Hawthorn oil transportation

Application to the North Dakota Public Service Commission for a Waiver of Procedures and Timelines and Consolidated Certificate of Corridor Compatibility and Route Permit

September 2009

HDR

Hawthorn Pipeline

Hawthorn Oil Transportation (North Dakota), Inc.

Application to the North Dakota Public Service Commission for a Waiver of Procedures and Timelines, and Consolidated Certificate of Corridor Compatibility and Route Permit

CASE #PU-09-153

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Prepared for:

The North Dakota Public Service Commission

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1.0 INTRODUCTION

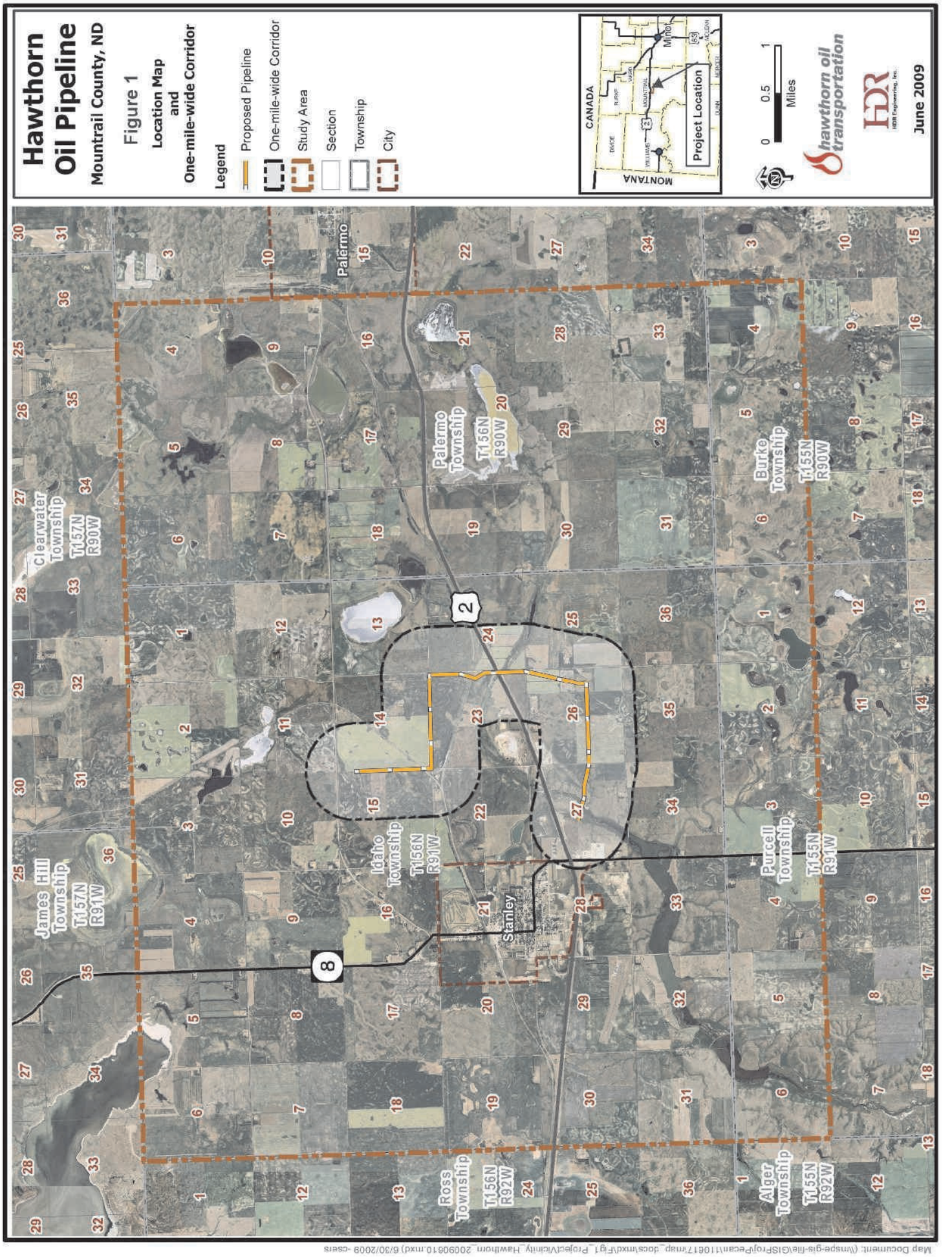
Hawthorn Oil Transportation (North Dakota), Inc. (Hawthorn) submits this application (Application) for a Waiver of Procedures and Time Schedules, a Consolidated Certificate of Corridor Compatibility (Corridor Certificate), and Route Permit, to construct the Hawthorn Oil Pipeline Project (Project). The Project is located in Mountrail County, North Dakota (Figure 1). The Project consists of approximately six miles of eight-inch-diameter steel pipeline that will transport up to 40,000 barrels per day of crude oil from an oil storage facility in Section 27-T156N-R91W Mountrail County, North Dakota, to an oil storage facility in Section 14-T156N-R91W, Mountrail County, North Dakota.

Hawthorn, a subsidiary of EOG Resources, Inc., is a Delaware corporation, headquartered in Houston, Texas and is authorized to do business in North Dakota. Hawthorn is committed to safeguarding North Dakota's communities and environment, and these goals are critical to Hawthorn's success.

The North Dakota Energy Conversion and Transmission Facility Siting Act, N.D. Cent. Code ch. 49-22 (Siting Act) governs applications for a Corridor Certificate and a Route Permit. Hawthorn has presented information herein required by the Siting Act. Hawthorn considered exclusion areas, avoidance areas, selection criteria, and policy criteria in the selection and design of the proposed Route (Figure 2). In addition, sufficient design and technical information have been provided for a thorough evaluation of the reasonableness of the Corridor and Route. The Corridor and Route have been sited primarily on existing right-of-way (ROW) which Hawthorn currently holds to minimize environmental and landowner impacts.

1.1 Waiver of Procedures and Time Schedules

Figure 1. Location Map



By this Application, Hawthorn requests that the NDPSC, pursuant to N.D. Cent. Code § 49-22-07.2, waive the following requirements:

1. That the NDPSC holds a separate hearing as may be required by N.D. Cent. Code §§ 49-22-08, 49-22-08.1, and 49-22-13, and N.D. Admin. Code § 69-06-01-02. Hawthorn requests that the NDPSC hold a single consolidated hearing on this Application. Hawthorn also requests that the NDPSC shorten the three-month period specified in N.D. Cent. Code § 49-22-08(5) and the six-month period specified in N.D. Cent. Code § 49-22-08.1(5).
2. That the NDPSC waive the requirements of N.D. Cent. Code §§ 49-22-08 and 49-22-08.1 insofar as these sections may require the separate filing of applications for a Corridor Certificate and a Route Permit, and insofar as they require separate publication of notices of filing applications.
3. That the NDPSC waive the requirement that a Ten-Year Plan is to be included in the Application.
4. That the NDPSC waive requirements for mylar maps and stereo-pair aerial photographs as set forth in the Commission's Application Guidelines for a Corridor Certificate and a Route Permit. Geographic Information System (GIS) maps that meet the intent of the NDPSC's requirements are provided in the Application.

The NDPSC's Application Guidelines for Waiver of Procedures and Time Schedules require a facility description, need for, cost of, and justification for the request for waiver, together with evidence that the Project will produce minimal adverse effects. As demonstrated in the Application, and as summarized below, Hawthorn's requests are justified, as the proposed facility is of such design, location, and purpose, that it will produce minimal adverse effects.

1.1.1 Description

Hawthorn seeks approval to construct, own, and operate an approximately 6-mile long, eight-inch-diameter steel crude oil pipeline to provide infrastructure needed to transport crude oil produced from the several oil fields in the area that predate from the Bakken families (Bakken Oil Fields). The pipeline begins at an oil storage facility in Section 27-T156N-R91W of Mountrail County and terminates at an oil storage facility in Section 14-T156N-R91W of Mountrail County (Figure 1).

A more detailed description of the facility is included in Section 4.2. Detailed maps showing the pipeline are contained in Figures 1 through 8.

1.1.2 Need

The need for the proposed facility and how it will further the public interest is described in greater detail in Section 2.0 of the Application.

1.1.3 Cost

The estimated total cost of construction is $2,500,000.

1.1.4 Justification for Waiver

Waivers of timelines and procedures are needed in order to prevent potentially significant delays in implementing additional means of transporting crude oil from the Bakken Oil Fields. Implementation of the Project will benefit landowners, municipalities and citizens of the State of North Dakota by significantly reducing traffic congestion and impacts on road infrastructure caused by truck transportation. It will also benefit oil producers and mineral owners by decreasing dependence upon existing pipeline capacity, which is currently constrained and provide new markets for crude oil product from the Bakken Oil Fields.

Section 49-22-07.2 of the Siting Act provides the NDPSC may waive procedures and time schedules upon a finding that "the proposed facility is of such length, design, location, or purpose that it will produce minimal adverse effects[.]" Based upon the thorough investigation and analysis set forth in the Application, waivers are appropriate because the proposed facility will produce minimal adverse effects.

In determining whether the proposed facility will result in adverse impacts on the environment, Hawthorn evaluated the Project using the criteria set forth in the Siting Act, N.D. Admin. Code art. 69-06 (the Rules), and the NDPSC's Guidelines for Energy Conversion and Transmission Facility Siting (Guidelines). Hawthorn evaluated the impacts of the Project considering the siting criteria laid out in N.D. Admin. Code ch. 69-06-08 (Section 3.0 of the Application) and the factors to be considered in N.D. Cent. Code § 49-22-09 (Section 8.0 of the Application). Impacts associated with the Project are summarized in Section 5.16 of the Application. Based upon this evaluation and the factors set forth in the Siting Act and Guidelines, the proposed facility will have minimal adverse effects.

The agencies and officers listed in N.D. Admin. Code § 69-06-01-05 were notified about the Corridor and Route in May of 2009. The U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture, U.S. Natural Resources Conservation Service (USNRCS), and other stakeholders not listed in N.D. Admin. Code § 69-06-01-05 were also notified during this time. These agencies, officers, and stakeholders concluded that, in general, the potential impacts of the Corridor and Route would produce minimal adverse effects. Hawthorn will take these inputs into consideration as it seeks to further minimize and mitigate potential adverse effects.

The conclusions of the agencies and officers are further addressed in Section 8.11 and Appendix C. Hawthorn submits and believes the evidence demonstrates it has taken feasible and prudent actions to minimize and mitigate to the greatest extent possible adverse impacts that are both known and predictable. As a result, the proposed Project will produce minimal adverse effects. Accordingly, Hawthorn respectfully requests that the NDPSC grant the requested waivers and render an expeditious decision.

1.2 Certificate of Corridor Compatibility

The following sections of the document contain the information required by the Guidelines for a Corridor Certificate.

1.3 Route Permit Application

The following Sections contain the information required by Guidelines, dated November 1979, for a Route Permit.

1.4 Project Summary

Hawthorn proposes to construct, own, and operate an eight-inch diameter steel crude oil pipeline operating at 475 Psig and 60 degrees Fahrenheit within the Corridor identified in Section 1.4.1. The pipeline will be approximately 6 miles in length and will connect a storage facility located in Section 27-T156N-R91W, Mountrail County with a storage facility in Section 14-T156N-R91W, Mountrail County. A more detailed description of the proposed facility is provided in Section 4.2 of this application. A Corridor and Route were selected after addressing the factors identified in N.D. Cent. Code § 49-22-09 and evaluating the criteria in N.D. Admin. Code § 69-06-08-02. Below is a description of the Study Area, the Corridor, and the Route.

1.4.1 Study Area and Proposed Corridor

The general Study Area is depicted in Figure 1. The Study Area primarily consists of the Idaho Township. A six mile long by one mile wide Corridor was selected within this Study Area to provide the opportunity to route a crude oil pipeline from oil storage facilities in Section 27-T156N-R91W to a storage facility located in Section 14-T156N-R91W This Corridor is shown in Figure 1.

The one mile width of this Corridor complies with N.D. Admin. Code § 69-06-04-02 which states "The width of a corridor must be at least ten percent of its length, but not less than one mile (1.61 kilometers) or greater than six miles (9.66 kilometers) unless approved by the [NDPSC]." Exclusion and avoidance criteria outlined in N.D. Admin. Code § 69-06-08-02 were considered as part of the selection of this the Corridor. Figure 2 presents exclusion and avoidance areas in the Study Area that were analyzed as part of the Corridor selection process.

Areas within the Corridor that fall under the avoidance and exclusion criteria of N.D. Admin. Code § 69-06-08-02 include residential and recreational areas. U.S. Fish and Wildlife Service (USFWS) and wetland easements are also located within the Corridor. Further discussion of these criteria, and other criteria considered, are included in Sections 3.0 and 5.0. Section 3.0 and Figure 2 address in greater detail, the criteria that were used in the Corridor selection process. Section 5.0 provides an environmental analysis of the Corridor, in compliance with N.D. Admin. Code § 69-06-08-02.

The factors addressed in N.D. Cent. Code § 49-22-09 were also considered in evaluating the Corridor for a pipeline and are discussed in Sections 3.0, 5.0, and 8.0.

The Corridor legal location descriptions (townships, ranges, and sections) are provided in Table 1-1.

Table 1-1. Corridor Legal Descriptions

County	Township Name	Township	Range	Sections
Mountrail	Idaho	156N	91W	10-11; 13-15; 22-28; 34-36

1.4.2 Proposed Route

Similar to the Corridor described in Section 1.4.1, the Route has a southern terminus at the oil storage facilities located in Section 27-T156N-91W southeast of Stanley in Mountrail County, and a northern terminus at a storage facility in Section 14-T156N-R91W, Mountrail County. The Route generally follows the center of the Corridor and follows a mostly "greenfield" alignment.

The proposed Route within the Corridor also considers the criteria outlined in N.D. Admin. Code § 69-06-08-02. Sections 3.0 and 5.0 discuss these criteria in greater detail. Figure 2 identifies the proposed Route relative to the Corridor and exclusion and avoidance criteria.

Legal descriptions of the Route location are provided in Table 1-2.

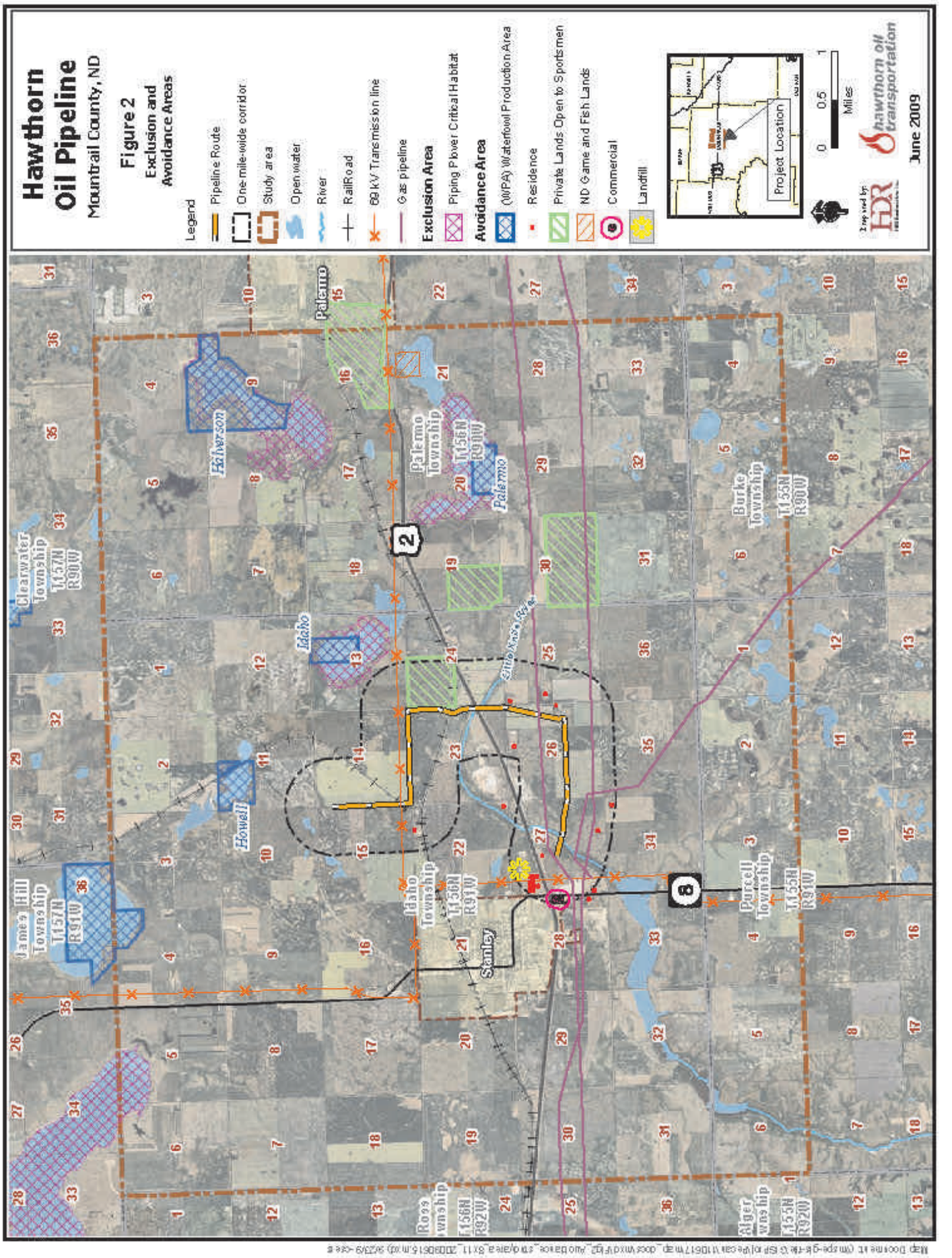
Table 1-2. Route Location Legal Descriptions

County	Township Name	Township	Range	Sections
Mountrail	Idaho	156N	91W	14,23,26,27

1.4.3 Product

The proposed Project will provide critical pipeline infrastructure connecting oil storage facilities and will create an additional means of transporting crude oil to refineries. The estimated in-service date for the Project is December, 2009.

Figure 2. Exclusion and Avoidance Areas



1.5 Project Schedule

Hawthorn's construction schedule will be set by reaching a number of milestone agreements and approvals. The in-service date is dependent upon permitting and development activities. Hawthorn anticipates receiving necessary pre-construction permits and approvals so construction can begin in November of 2009.

1. **Certificate of Corridor Compatibility Completion:** The Certificate of Corridor Compatibility application is included herein.
2. **Route Application:** The Route Permit Application is included herein.
3. **ROW Acquisition:** Hawthorn has obtained the necessary easements from landowners and crossing permits from the North Dakota Department of Transportation (NDDOT), Burlington Northern Santa Fe Railway (BNSF), Mountrail County, and Idaho Township.
4. **Equipment Procurement, Manufacture, and Delivery:** Hawthorn will order the transmission components as soon as practicable. Once the components have been ordered, delivery is anticipated to occur to allow construction to begin in November of 2009.
5. **Construction:** If the Project proceeds in 2009, construction is expected to begin in November of 2009, subject to road restrictions and weather. The construction will take approximately three weeks.
6. **Test and Operations:** Hawthorn expects system testing will occur in December of 2009.
7. **In-Service Date:** The expected in-service date will be December of 2009.

2.0 NEED FOR FACILITY

2.1 Needs Analysis

Existing pipelines for transmitting crude oil are near capacity. The pipeline will provide a more environmentally sensitive method of transporting crude oil than trucking to a new facility which will open new markets, and benefit the producers in the Bakken Oil Fields, landowners, citizens of the State of North Dakota, local municipalities, and mineral interest owners.

2.2 Alternatives

Other alternatives for transporting crude oil already exist. Transportation via current pipeline capacity is constrained, and transportation by truck is extensively utilized. The Route proposed for this pipeline is mostly existing ROW previously acquired. Other potential routes would involve traversing gravel pits or the City of Stanley, and they would require the purchase of additional rights of way. The Route selected has minimal effects on resources and residents.

3.0 PIPELINE FACILITY CORRIDOR AND ROUTE CRITERIA

Hawthorn evaluated the Study Area to determine the optimal location for the Corridor and Route. Within this Study Area, a one-mile wide Corridor was selected that complies with N.D. Admin. Code § 69-06-04-02. Within this Corridor, an approximately six-mile long Route was selected to connect an oil storage facility located in Section 27-T156N-R91W and a storage facility in Section 14-T156N-R91W.

The Corridor and Route were selected according to an inventory and suitability analysis based on the criteria listed in N.D. Admin. Code § 69-06-08-02. This includes an assessment of exclusion and avoidance area criteria; selection criteria that relate to minimizing potential land use and environmental impacts; policy criteria that relate to maximizing public benefits; and design and construction limitations. Hawthorn also included economic considerations as part of the Corridor and Route selection process.

The proposed Corridor meets the criteria set forth in N.D. Admin. Code § 69-06-08-02 which states: "Exclusion and avoidance areas may be located within a corridor, but at no given point shall such an area or areas encompass more than fifty percent of the Corridor width unless there is no reasonable alternative." Within the Corridor, the Route also avoids these exclusion and avoidance areas whenever feasible. Exclusion and avoidance areas within the Corridor are shown in Figure 2.

Hawthorn's consideration of the specific criteria is outlined in the following subsections.

3.1 Exclusion Areas

N.D. Admin. Code § 69-06-08-02-1 provides: "The following geographical areas [Table 3-1] shall be excluded in the consideration of a route for a transmission facility. A buffer zone of a reasonable width to protect the integrity of the area shall be included. Natural screening may be considered in determining the width of the buffer zone."

Exclusion areas are mapped for the Corridor and Route on Figure 2.

Table 3-1. Exclusion Areas

Geographic Area	Present within Corridor?	Greater than 50 percent of Corridor Width?	Route Buffer
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; monuments; and wilderness areas	No	No	No
Designated or registered state: parks; historic sites; monuments; historical markers; archaeological sites; and nature preserves	No	No	No
County parks and recreational areas; municipal parks; and parks owned or administered by other governmental subdivisions	No	No	No

Geographic Area	Present within Corridor?	Greater than 50 percent of Corridor Width?	Route Buffer
Areas critical to the life stages of threatened or endangered species	No	No	No
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged	No	No	No

3.2 Avoidance Areas

N.D. Admin. Code § 69-06-08-02(2) provides: "The following geographical areas [Table 3-2] shall not be considered in the routing of a transmission facility unless the applicant shows that under the circumstances there is no reasonable alternative. In determining whether an avoidance area should be designated for a facility, the commission may consider, among other things, the proposed management of adverse impacts; the orderly siting of facilities; system reliability and integrity; the efficient use of resources; and alternative routes. Economic considerations alone shall not justify approval of these areas. A buffer zone of a reasonable width to protect the integrity of the area shall be included unless a distance is specified in the criteria. Natural screening may be considered in determining the width of the buffer zone." Avoidance areas are mapped for the Corridor and Route on Figure 2.

Table 3-2. Avoidance Areas

Avoidance Areas	Present within Corridor?	Greater than 50-percent of Corridor Width?	Route Buffer
Designated or registered national: historic districts; wildlife areas; wild, scenic or recreational rivers; wildlife refuges; and grasslands	No	No	No
Designated or registered state: wild, scenic, or recreational rivers; game refuges; game management areas; management areas; forests, forest management lands; and grasslands	No	No	No
Historical resources which are not specifically designated as exclusion or avoidance areas	No	No	No
Areas that are geologically unstable	No	No	No
Within 500 feet of a residence, school, or place of business	No	No	No

Avoidance Areas	Present within Corridor?	Greater than 50-percent of Corridor Width?	Route Buffer
Reservoirs and municipal water supplies	No	No	No
Water sources for organized rural water districts	No	No	No
Irrigated land. This criterion shall not apply to an underground transmission facility.	N/A	N/A	N/A
Areas of recreational significance which are not designated as exclusion areas	The Corridor crosses one PLOTS parcel located in the NW ¼ of Section 24, T156N, R91W	No	No

3.3 Selection Criteria

According to N.D. Admin. Code § 69-06-08-02(3): "A corridor or route shall be designated only when it is demonstrated to the [NDPSC] by the applicant that any significant adverse effects resulting from the location, construction and maintenance of the facility, as they relate to the following, will be at an acceptable minimum or that those effects will be managed and maintained at an acceptable minimum [Table 3-3][.]" Table 3-3 identifies the selection criteria for the Project as well as other related resources.

Table 3-3. Selection Criteria

Selection Criteria	Potential Adverse Effects	
	Corridor	Route
Agricultural production	No permanent impacts are anticipated.	No permanent impacts are anticipated.
Family farms and ranches	No permanent impacts are anticipated. No family farms will be displaced due to construction of the Route.	No permanent impacts are anticipated. No family farms will be displaced due to construction of the Route.
Land which the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation	No permanent impacts are anticipated.	No permanent impacts are anticipated.
Surface drainage patterns and groundwater flow patterns	No impacts to surface drainage patterns or groundwater flow patterns are anticipated.	No impacts to surface drainage patterns or groundwater flow patterns are anticipated.
Noise-sensitive land uses	The noise-sensitive land uses within the Corridor are the	Noise impacts are nominal. The nearest sensitive receptor to the proposed route is approximately

Selection Criteria	Potential Adverse Effects	
	Corridor	Route
	residences near the pipeline.	500 feet. No impacts to noise-sensitive land uses are anticipated.
The visual effect on the adjacent area	Pipeline construction will be visible to landowners and residents who live near the pipeline during the estimated two week construction period. Visual impacts will be temporary, as the pipeline will be placed underground.	Visual impacts will be temporary, as the pipeline will be placed underground.
Extractive and storage resources	No permanent impacts are anticipated.	No permanent impacts are anticipated.
Radio and television reception and other communication or electronic control facilities	No impact to radio and television reception or other communication or electronic control facilities is anticipated.	No impact to radio and television reception or other communication or electronic control facilities is anticipated, due to construction of the line in the proposed location.
Human health and safety	Mitigation measures will be implemented as discussed in Section 5.4.3, and if maintenance schedules are met, no impacts to human health and safety are anticipated.	Mitigation measures will be implemented as discussed in Section 5.4.3, and if maintenance schedules are met, no impacts to human health and safety are anticipated.
Plant life	The land is primarily agricultural. Only the areas where the pipelines will be placed along a 150-ft wide ROW will temporarily impact plant life. Other areas where temporary impacts may occur will be restored.	The land is primarily agricultural in nature. Temporary impacts to may occur to native vegetation.
Wetlands, woodlands, and wooded areas	Wetland resources will be avoided, to the extent practicable. Woodlands, primarily associated with homes in the form of windbreaks and along fence rows, are sparse within the Corridor and are nearly absent within the proposed pipeline route. Impacts to wetlands and wooded areas will be avoided to the extent practicable, options to minimize impacts will be considered, and mitigation will be proposed consistent with	An initial review of proposed route relative to National Wetland Inventory data, recent aerial photography, and delineation data are included as Appendix B. The Route was designed to avoid impacts to woodlands, wetlands and windbreaks.

Selection Criteria	Potential Adverse Effects	
	Corridor	Route
	regulatory requirements.	
Animal health and safety	No impacts to livestock are anticipated from the operation of the pipeline. Avian species are not expected to be impacted by the pipeline.	No impacts to livestock are anticipated from the operation of the pipeline. Avian species are not expected to be impacted by the pipeline. Mitigation measures, as outlined in Section 5.14.3, will minimize these impacts.

3.4 Policy Criteria

According to N.D. Admin. Code § 69-06-08-02(4): "The commission may give preference to an applicant that will maximize benefits that result from the adoption of the following policies and practices, and in a proper case may require the adoption of such policies and practices [Table 3-4]."

Table 3-4. Policy Criteria

Policy Criteria	Suitable Policy or Practice of Applicant
Location and design	Hawthorn's policy is to locate and design the proposed pipeline and associated facilities to minimize environmental and landowner impacts.
Training and utilization of available labor in this state for the general and specialized skills required	Hawthorn will use local labor to the extent practicable.
Economies of construction and operation	Hawthorn will utilize local contractors to the extent practicable.
Use of citizen coordinating committees	Hawthorn has worked with landowners in siting the pipeline.
A commitment of a portion of the transmitted product for use in this state	The only refinery in the state, the Tessco Mandan Refinery, is currently running at capacity and has no need for additional crude oil.
Labor relations	No labor relations will be affected.
The coordination of facilities	Hawthorn has coordinated with landowners and utilities to determine the location of the facilities and to maximize benefits and minimize duplication of efforts.
Monitoring of impacts	Hawthorn will ensure that Best Management Practices (BMPs) are utilized during construction to minimize environmental impacts and will monitor construction compliance with the commitments made in this application and applicable permit conditions, including the NDPSC order.
Utilization of existing and proposed rights-of-way and corridors	There are a limited number of existing transmission, pipeline, and railroad ROWs within the Corridor. Selecting a route that follows existing transmission, pipeline, and railroad facilities would have made the Route much longer and would have potentially impacted additional avoidance and exclusion areas.

Policy Criteria	Suitable Policy or Practice of Applicant
Other existing or proposed transmission facilities	None

Safety and environmental performance is critical to the success of Hawthorn's crude oil pipeline. The objective is to provide an economical route that reduces impacts to the environment and landowners to the maximum extent practicable.

Design and Construction Limitations: Design and construction limitations associated with the Project are primarily associated with the location of the pipeline. The Project end points largely dictate the location of the pipeline. The Route minimizes adverse impacts on the criteria identified in N.D. Admin. Code § 69-06-08-02.

The USFWS administers wetland easements on private property as part of their National Wildlife Refuge System (NWRS). There are limitations to construction on these lands. Adverse impacts to wetlands within USFWS easements would result in the need for a compatibility assessment by local USFWS staff. For this particular Project, Hawthorn has routed its pipeline to avoid wetlands or to directionally drill under wetlands. Figure 8 identifies the USFWS wetland easements within the Corridor. Hawthorn will continue to coordinate with the USFWS regarding wetland easements.

3.5 Economic Considerations

There are several economic considerations in deciding where the pipeline should be routed. Overall, minimizing the routing distance between the endpoints decreases the cost to construct the pipeline, as less material and ROW will be needed.

Another consideration in decreasing costs is minimizing the number of inflection points required for the pipeline. Inflection points increase the cost of projects since additional engineering is typically required. Hawthorn attempted to minimize these economic factors while considering exclusion areas, avoidance areas, selection criteria, policy criteria, and other factors.

4.0 ENGINEERING AND OPERATIONAL DESIGN

4.1 Proposed Route Description

4.2 Description of Proposed Facility

The proposed facility will consist of an approximately 6.0 mile long, 8-inch diameter, steel pipeline that will be used to transport crude oil between an oil storage facility in Section 27-T156N-R91W, Mountrail County and a storage facility in Section 14-T156N-R91W, Mountrail County. The crude oil to be transported will be extracted from the Williston Basin and will ultimately be transported to the Stroud, Oklahoma area.

4.2.1 Transmission Structures and ROW Design

4.2.1.1 Transmission Structures

Hawthorn is proposing to construct an 8-inch diameter steel crude oil pipeline. The pipeline will typically operate at 60 degrees Fahrenheit and 475 Psig. The maximum ratings for the line are 120 degrees Fahrenheit and 1440 Psig. The pipeline will typically carry a flow rate of 1166 gallons per minute and is anticipated to transmit up to 14,600,000 barrels per year.

4.2.1.2 ROW Design

The approximately 6.0 mile-long pipeline route will follow an existing easement alignment. The permanent ROW is 150 feet wide for three miles of the Route and 70 feet wide for three miles of the Route. The location of the pipeline within the permanent ROW may vary, however, depending on terrain, the presence of other existing facilities, rights-of-way, and landowner concerns. Hawthorn has acquired all easements and crossing permits.

4.2.2 ROW Preparation, Construction, Restoration, and Maintenance

4.2.2.1 ROW Preparation

The proposed Route primarily crosses agricultural land. There are a few areas where trees and shrubs may need to be cleared within the ROW. Where safety requirements permit, trees and low growing shrubs will remain (generally less than 15 feet). Significant amounts of grading are not anticipated for preparation of the pipeline ROW.

4.2.2.2 Transmission Construction Procedures

Hawthorn's facilities will be designed, constructed, tested, operated, and maintained in accordance with applicable requirements of the U.S. Department of Transportation (USDOT), regulations in 49 C.F.R. § 195, U.S. Department of Labor regulations, Occupational Safety and Health Administration requirements, and other applicable federal and state regulations. These regulations are intended to ensure adequate protection for the public and to prevent crude oil pipeline accidents and failures. Among other design standards, 49 C.F.R. § 195 specifies pipeline material selection; minimum design requirements; protection from internal, external, and atmospheric corrosion; and qualification procedures for welding and operations personnel.

To minimize construction impacts, Hawthorn will implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the North Dakota Department of Health (NDDH). Hawthorn will also

implement other project-specific plans to avoid or minimize environmental impacts during construction, including:

- Spill Prevention and Response (SPAR) Plan
- Horizontal Directional Drilling Contingency Plan
- Unanticipated Discoveries Plan

4.2.2.3 General Pipeline Construction Procedures

Standard pipeline construction proceeds in the manner of an outdoor assembly line composed of specific activities that make up the linear construction sequence. These operations collectively include: survey and staking of the ROW, clearing and grading, trenching, pipe stringing, bending, welding, lowering the pipeline into the trench, backfilling the trench, hydrostatic testing, and ROW cleanup and restoration. These steps are discussed in the following subsections. In addition, Section 4.2.2.4 includes information regarding special construction techniques Hawthorn will use when crossing agricultural areas, roadways, waterbodies, and wetlands.

In the typical pipeline construction scenario, construction will proceed along the pipeline ROW in one continuous operation. As the spread moves along, construction at any single point along the pipeline, from initial surveying and clearing, to backfilling and finish grading, is anticipated to last about six to ten weeks. The entire process will be coordinated in such a manner as to minimize the total time an individual tract of land is disturbed, exposed to erosion, or temporarily precluded from its normal use.

Survey and Staking

The first step of construction will involve marking the limits of the approved work area (i.e., the construction ROW boundaries and temporary workspaces) as well as the pipeline centerline, access roads, existing utility lines, and special areas. Sensitive areas such as wetland boundaries and cultural resource sites to be avoided will be marked with appropriate flagging based on environmental and archeological surveys. Hawthorn will notify landowners in advance of construction activities that could affect their property, business, or operations.

Clearing and Grading

The construction work area will be cleared and graded (where necessary) to provide a relatively level surface for trench excavating equipment, a sufficiently wide work space for the passage of heavy construction equipment, and safety for the pipeline workers. In grassland areas where grading is not required, vegetation will be mowed to avoid damage to root systems and will be cleared to the edge of the work area. Temporary erosion controls will be installed after initial disturbance of the soils, where necessary, to minimize erosion and will be maintained throughout construction. Temporary erosion and sediment controls will be installed in accordance with Hawthorn's SWPPP.

Trenching

Hawthorn will excavate trenches to a depth sufficient to provide the minimum cover required by USDOT specifications, which is typically three feet. For 12-inch-diameter pipe, the trench is normally about five feet deep (to allow for about four feet of cover); about two feet wide in stable soils; and up to six feet wide at the top in saturated or otherwise unstable soils. Additional trench width may be required to maintain stability of trench walls for the safety of pipeline workers and equipment. In agricultural areas, Hawthorn may increase

the depth of cover so as not to interfere with land use activities. Spoil will typically be stored next to the trench on the opposite side of the working area and over existing easements where possible. Based on past experiences in the Study Area, Hawthorn does not anticipate that blasting will be required during construction of the Project.

Pipe Stringing, Bending, and Welding

Hawthorn will clear and grade the pipeline ROW, then will string the pipe along the ROW. Hawthorn will bend individual sections of pipe in the field where necessary to fit the contours of the trench. Then, Hawthorn will align and weld the sections together in long strings and place them on temporary supports along the edge of the trench. Pipe will be bent at the mill when necessary for sharp bends. The pipe will be pre-coated at the mill with a fusion-bonded epoxy external coating (or other coating technique) to provide corrosion protection. Welds will be x-rayed to ensure structural integrity and compliance with the applicable USDOT regulations. Those welds not meeting established specifications will be repaired or removed. Once the welds are approved, the welded joints will be externally coated and the entire pipeline will be visually and electronically inspected for any faults, scratches, or other damage, and inspected for coating defects. Hawthorn will repair any damage before lowering into the trench.

Lowering-in, Padding, and Backfilling

Immediately prior to lowering-in (except where the push method will be used), Hawthorn will dewater the trench as necessary in accordance with applicable permits. Prior to discharge, dewatering effluent will pass through sediment filters (hay bale structures and/or filter bags), if necessary, to ensure compliance with applicable water quality requirements. The pipeline will then be lowered into the trench, and trench breakers will be installed before backfilling at specified intervals to prevent water movement along the pipeline. The trench will then be backfilled using the excavated sub-soil. If the excavated material can damage the pipe and/or coating, the pipeline will be protected with a rock shield and/or covered with select fill, obtained from commercial borrow areas (or by separating suitable material from nearby trench spoil). Hawthorn will not use topsoil for pipeline padding.

Hydrostatic Testing

Hawthorn will hydrostatically test the pipeline prior to placing it in-service to ensure structural integrity of the pipe. Testing will be conducted according to USDOT specifications and will use water from approved sources near the pipeline. Use from a municipal water source is anticipated.

Upon completion of each test, the water will be discharged in accordance with applicable permits. It is anticipated that hydrostatic test water will be discharged overland within or along the edges of the construction rights-of-way using energy dissipation devices to minimize erosion and sedimentation. Test water will contact only new pipe, and Hawthorn does not anticipate the addition of chemicals to the test water. Once a segment of pipe has been successfully tested and dried, the pipe will be connected to the remainder of the pipeline.

Cleanup

Hawthorn will final grade and restore work areas to pre-construction contours within 20 days of backfilling the trench. Restoration will begin upon completion of final grading. To minimize future settling, the trench will be compacted with tracked construction equipment. Surplus construction material and debris will be removed and disposed of at appropriate disposal sites. Permanent erosion controls will be installed within

the ROW during the restoration phase. After completion of construction and hydrostatic testing, the new pipeline will be cleaned and dried using pipeline pigs that are propelled through the pipeline with compressed air. Once cleaned and purged of air, the pipeline will be capped and made ready to receive oil. Hawthorn will install pipeline markers and/or warning signs along the pipeline centerline at specified intervals to identify the location of the pipe.

Hawthorn will restore access roads to pre-construction conditions, unless otherwise specified by the property owner and approved by applicable regulatory agencies. Private and public property, such as fences, gates, driveways, and roads that were disturbed by construction will be restored to their original or better conditions, consistent with individual landowner agreements.

4.2.2.4 Special Construction Techniques

Residential Areas

Hawthorn will generally avoid construction near residential areas to ensure that its activities minimize any adverse impacts on residences and that cleanup is quick and thorough. However, where applicable, the following measures will be implemented to minimize Project impacts on residences:

- In the vicinity of streets and homes, temporary safety fences may be erected to limit access to the construction area. This fence would extend at least 100 feet on either side of the home along the ROW;
- Homeowners will be notified in advance of any scheduled disruption of household utilities and the duration of the interruption will be kept as brief as possible;
- Representatives of the local utility companies will be invited to be on-site during construction when necessary. Hawthorn will strive to accommodate any special concerns regarding private landscaping and other potential conflicts with the construction and operation of the pipeline;
- Hawthorn's contractor will minimize the time the trench is left open;
- Hawthorn's contractor will control dust during construction by applying water to the ROWs as necessary; and
- After backfilling, residential areas will be cleaned up, areas will be restored to "as before or better" condition, and construction debris will be removed from the area.

Agricultural Areas

The following general construction methods will be followed for construction through agricultural areas.

Prior to construction, Hawthorn will contact landowners to locate existing drainage structures and irrigation facilities. Information regarding future locations of drainage tiles and irrigation systems will be requested from the landowner. Water flow in crop irrigation systems will be maintained, unless shutoff is coordinated with the affected parties. Specific measures will be applied during different phases of construction in agricultural areas, including:

- Grading
  - Topsoil will be stripped as appropriate (ditch-plus-spoil side) and then segregated from subsequent subsoil piles;
  - Natural flow patterns of fields will be maintained by providing breaks in topsoil and

subsoil stockpiles; and

- In actively cultivated agricultural lands (including permanent or rotated cropland, hayfields, or improved pastures) topsoil stripping over the ditch area will be used. Subsoil may be stored in either subsoil storage areas or the ground surface if a definable, biodegradable vegetative layer exists.

- Drain Tiles
  - Flow will be maintained in drainage systems during construction to prevent ponding in adjacent non-disturbed areas;
  - All drainage systems will be probed to determine if damage has occurred beyond that in the ditch line. Tiles damaged during construction would be noted in a field notebook by station number and orientation for future reference. Colored flags will be placed and maintained during construction at damaged tile locations;
  - All tiles damaged during construction will be repaired to their original condition or better; and
  - Records of drainage system repairs will be maintained by Hawthorn and will be available for affected landowners' future reference.
- Restoration and Revegetation
  - Any rutting or compaction will be repaired prior to revegetation of disturbed areas; and
  - All stones larger and/or with higher densities than those in adjacent undisturbed areas will be collected and properly disposed of during restoration.

Hawthorn will compensate landowners for loss of production. However, in general, the ROW through agricultural lands will revert to its previous use during operation of the pipeline.

Road, Highway, and Railroad Crossings

The crossing of unpaved and paved highways, roads, and railroads will be performed in conformance with applicable crossing approvals and permits. Hawthorn will cross most major roads and railroads using the conventional bore method, which requires excavation of deep pits on each side of the railroad/road. When using the bore method, deep pits are excavated on each side of the railroad/road and temporary workspace is used to store the spoil from the pits. Sufficient pit depth and space to allow boring equipment to bore a hole under the feature at the minimum depth as prescribed by the permitting agency must be achieved, which is typically a minimum depth of five feet below the surface to allow the pipeline to withstand expected external loadings. Longer crossings may require welding of multiple pipe sections, as the pipe is pushed into the borehole. Depending on permit conditions, the pipe may or may not be cased at road crossings. When using the bore method, little or no disruption to traffic is expected.

Unpaved and smaller roads will be open cut where private landowners and governing authorities permit. Open cutting a road may require temporarily closing of the road. Detours may not be necessary if one lane of traffic can be kept open, except for the brief period when the trench must be cut and the pipeline installed, which can typically be done in one day. Safety and minimal traffic disruptions are important in open cut project implementation.

In some locations, Hawthorn will cross roadways using Horizontal Directional Drilling (HDD), which is similar to the conventional bore in that there would be little or no disruption to traffic. HDD is a specialized method that will be used to minimize impacts when the conventional bore method is not feasible, due to an extended crossing length, or when other site limitations such as sensitive waterbodies, wetlands, or congested conditions exist. HDD is described in detail, later in this section.

Wetland and Waterbody Crossings

Waterbody crossings will be constructed by Hawthorn in accordance with applicable permits and its SWPPP. Hawthorn's SWPPP will specify measures it will take from pre-construction planning through construction, restoration, monitoring, and maintenance, based on best management practices (BMPs) in the pipeline industry (NDDH, 1999). This includes BMPs relating to temporary bridge crossings, setbacks for temporary workspaces and equipment refueling, timing, construction methods, and restoration. Waterbody crossing methods will typically require temporary workspaces on both sides of the crossing to stage construction, fabricate the pipeline, and store materials. Temporary workspaces would be located in upland areas a minimum of 50 feet from the waterbody edge.

Depending on the size and sensitivity of a waterbody, Hawthorn will complete waterbody crossings using one of the following typical installation techniques: open cut or HDD. Wetlands will be crossed using HDD or similar to typical conventional upland cross-country construction procedures, with several modifications and limitations to reduce the potential for pipeline construction to affect wetland hydrology and soil structure. A brief description of open cut and HDD are provided below, as well as the specific techniques that would be used at wetland crossings. The methods that would be used at specific waterbodies are tabulated and discussed below.

Open Cut

The open cut crossing technique will be a "wet" crossing method that will be completed while the waterbody continues to flow across the work area. The open cut crossing method involves excavating a pipeline trench across the waterbody, installing a section of pipe, and then backfilling the trench with material excavated from the streambed. Excavation and backfilling of the trench will be accomplished using backhoes or other excavation equipment operating from one or both banks of the waterbody. Trench spoil will be stored at least ten feet from the stream banks (topographic conditions permitting). Sediment barriers, such as silt fence and staked straw bales, will be installed to prevent spoil and sediment-laden water from entering the stream.

For most non-sensitive streams and ditches, Hawthorn proposes to use the open cut crossing method.

Horizontal Directional Drill (HDD)

HDD is a dry crossing method that will be used by Hawthorn when a conventional boring method is not feasible for major roadway crossing, and when a wetland's or waterbody's size or environmental sensitivity make the use of other methods undesirable or impractical. HDD would require specialized equipment and personnel. HDD has three general steps: 1) drilling a pilot hole on an arc-shaped path that typically extends between 30 and 50 feet beneath the road or waterbody; 2) enlarging the pilot hole with a series of reamers to accommodate the pipeline; and 3) pulling a prefabricated section of pipe through the hole.

Drilling the pilot hole establishes the ultimate position of the installed pipeline. The head of the pilot drill string contains a pivoting head that can be controlled by an operator at the surface as the drill progresses. Typically, the pilot hole is directed downward at an angle until the proper depth is achieved, then turned and

directed horizontally for the required distance, and finally angled upward back to the surface. Throughout the process of drilling and enlarging the hole, a mud slurry consisting of bentonite and water will be pressurized and pumped through the drill stem to lubricate the drill bit, maintain the hole, and remove drill cuttings. Bentonite is the commercial name for a mixture of non-toxic clays and rock particles consisting of about 85 percent montmorillonite clay, 10 percent quartz and feldspars, and 5 percent accessory materials, such as calcite and gypsum. This slurry, referred to as drilling mud or drilling fluid, has the potential of being inadvertently released to the surface if fractures or fissures are encountered in the substrate during drilling.

The potential for an inadvertent release of drilling mud (also referred to as a frac-out) is generally greatest during drilling of the pilot hole when the pressurized drilling mud is seeking the path of least resistance. The path of least resistance is typically back along the path of the drilled pilot hole. However, if the drill path becomes temporarily blocked or encounters other areas such as large fractures or fissures that lead to the ground, a wetland, or a waterbody, then an inadvertent release could occur. Hawthorn will monitor the Route and the circulation of drilling mud throughout drilling for indications of an inadvertent release, and it will immediately implement corrective actions if a release is observed or suspected. The corrective actions Hawthorn will implement are outlined in its HDD Contingency Plan.

Once the pilot hole exits in an acceptable location, the reaming operation is initiated. During the reaming phase, a reaming head will be attached to the drill pipe and pulled back through the pilot hole to enlarge it. Several reaming passes will be made with incrementally larger reaming heads to enlarge the hole to about 1.5 times the diameter of the pipeline. As the drill path becomes larger, the potential for an inadvertent release generally decreases as the path of least resistance becomes increasingly well-established along the drill hole. Pressurized drilling fluid will continue to be jetted through the reaming head to float out drill cuttings and debris, to cool the drilling head, and to provide a cake wall to stabilize the hole. Once the drill hole is enlarged to the proper diameter, the pipe will be pulled back through the reamed hole.

Each HDD crossing will require temporary workspaces for drilling equipment, pipe assembly, supplies and materials, temporary mud pits and tanks, support vehicles, and access to the drilling sites and areas to turn equipment around. Access to a nearby water source, such as a well or municipal water supply, may also be necessary to withdraw water as needed for mixing the drilling mud or hydrostatic pressure testing of the pipe section. Erosion control measures will be installed in accordance with the Hawthorn SWPPP to prevent sediment-laden water from leaving the temporary work areas. After HDD is completed, drilling mud will be disposed of at an approved facility.

HDD may be impractical in locations with certain geotechnical conditions, that may affect drilling mud circulation or drill hole or pipeline integrity when the pipe is pulled back into the hole. Some examples of difficult geotechnical conditions include areas with fractured bedrock, subsurface boulders, or unconsolidated materials such as loose sand and gravel. Hawthorn has conducted a feasibility assessment for its proposed HDD crossing locations. Based on the feasibility assessment, HDD construction plans have been developed by Hawthorn, where the HDD crossing method is considered feasible.

Wetland Crossings

Hawthorn will generally avoid most wetland crossings by its routing or use of HDD. Where wetlands cannot be avoided, standard wetland construction mitigation measures will require that equipment working in wetlands be limited to that essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where there is no reasonable access to the

ROW, except through wetlands, non-essential equipment will be allowed to travel through wetlands, only if the ground is firm enough or has been stabilized to avoid rutting. Otherwise, non-essential equipment will be allowed to travel through wetlands only once. If the wetland can not support equipment without rutting, equipment operating in the wetland will need to be stabilized with prefabricated equipment mats or terra mats.

Clearing of vegetation in wetlands will be limited to trees and shrubs, which will be cut flush with the surface and removed from the wetland. To avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland soils, stump removal, grading, topsoil segregation, and excavation will be limited to the area immediately over the trench line. A limited amount of stump removal and grading may be conducted in other areas, if dictated by safety-related concerns. Topsoil segregation over the trench line will occur if the wetland soils were not saturated at the time of construction.

During clearing, sediment barriers, such as silt fence and staked straw bales, will be installed and maintained adjacent to wetlands and within temporary extra workspaces as necessary to minimize the potential for sediment runoff. Sediment barriers will be installed across the full width of the construction ROW at the base of slopes adjacent to wetland boundaries. Silt fence or straw bales installed across the working side of the ROW will be removed during the day when vehicle traffic is present and would be replaced each night. Alternatively, drivable berms may be installed and maintained across the ROW, in lieu of silt fence or straw bales. Sediment barriers will also be installed within wetlands along the edge of the ROW, where necessary, to minimize the potential for sediment to run off the construction ROW and into wetland areas outside of the work area. If trench dewatering is necessary in wetlands, silt-laden trench water will be discharged in accordance with Hawthorn's SWPPP, in a manner that does not cause erosion and does not result in heavily silt-laden water flowing into any waterbody. The water will typically be discharged into an energy dissipation/sediment filtration device, such as a geotextile filter bag or straw bale structure, to minimize the potential for erosion and sedimentation. The dewatering structures will be sized to handle the volume of water in the trench.

The method of pipeline construction used in wetlands will depend largely on the stability of the soils at the time of construction. Where wetland soils are saturated and/or inundated, a "push-pull" technique may be used for trenching and installation. The push-pull technique will involve stringing and welding the pipeline outside of the wetland and excavating the trench through the wetland using a backhoe supported by equipment mats. The water that seeps into the trench would be used to float the pipeline into place using attached floatation devices and by pushing or pulling the pipe with equipment and winches. After the pipeline floats into place, the floats will be removed and the pipeline will sink into place. Most pipes installed in saturated wetlands will be coated with concrete or equipped with set-on weights to provide negative buoyancy. After the pipeline sinks into place, backhoes working on equipment mats will backfill the trench and complete cleanup.

Because little or no grading will occur in wetlands, restoration of contours will be accomplished during backfilling. Prior to backfilling, trench breakers (polyurethane foam or bags of sand) will be installed where necessary to prevent the subsurface drainage of water from wetlands. Where topsoil has been segregated from subsoil, the subsoil will be backfilled first, followed by the topsoil. Topsoil will be replaced to the original ground level, leaving no crown over the trench line. In some areas where wetlands overlie rocky soils, the pipe will be padded with rock-free soil or sand before backfilling with native bedrock and soil.

Equipment mats and/or terra mats will be removed from wetlands following backfilling. After backfilling and major grading work are complete, any drivable berms will be removed and the ground surface will be returned to original contours. If a sediment control device is still needed at a location where a drivable berm was removed, a temporary sediment control device, such as silt fencing, will be installed.

If wetlands are located at the base of slopes, permanent slope breakers will be constructed across the ROW in upland areas adjacent to the wetland boundary. Temporary sediment barriers will be installed where necessary, until revegetation of adjacent upland areas is successful. Once revegetation is successful, sediment barriers will be removed from the ROW and disposed of properly.

Temporary workspace may be required on both sides of wetlands to stage construction, fabricate the pipeline, and store materials. Temporary workspace for wetland crossings will be located in upland areas at least 50 feet from the wetland edge.

4.2.2.5 Restoration Procedures

During construction, crews will attempt to limit ground disturbance wherever possible and will employ appropriate erosion control measures. Disturbed areas will be restored to their original condition to the maximum extent practicable, as negotiated with the landowner, and as required by regulatory agencies. Post-construction reclamation activities include removing and disposing of debris, dismantling temporary facilities (including staging and lay down areas), leveling or filling tire ruts, and reseeding non-cultivated areas disturbed by construction activities with vegetation similar to that which was removed.

Erosion control measures will be implemented as necessary to minimize runoff during construction. Specific measures will be determined once final design of the Route is complete, and a field review is made to determine any areas of concern. Erosion control measures such as silt fencing, straw bale fencing, mulching, seeding, or mesh fabric overlay will be installed as deemed appropriate. Access routes to structure locations will be reviewed prior to the mobilization of equipment so erosion concerns can be avoided or minimized. Construction crews will implement the mitigation and restoration measures mentioned in the Sections above when wetlands, streams, or waterbodies may be affected by construction.

4.2.2.6 Maintenance Procedures

Hawthorn will periodically use the ROW to perform inspections, to maintain equipment, and to make repairs during the life of the pipeline. Hawthorn will also conduct routine maintenance to remove undesired vegetation that may interfere with the safe and reliable operation of the proposed pipeline.

4.2.3 Easement/ROW Acquisition

Hawthorn completed the process of securing easements. Hawthorn contacted landowners to discuss the Project and secured approval to conduct necessary engineering surveys and soil investigations. During the construction phase, individual landowners will be advised of construction schedules, necessary site access, and any vegetation clearing required for the Project. The ROW will be cleared of the amount of vegetation necessary to construct, operate, and maintain the proposed pipeline. Landowners will be compensated for damages.

Where possible, staging and lay down areas will be located within the ROW and will be limited to previously disturbed or developed areas. If additional property is temporarily required for construction, temporary easements may be obtained from landowners for the duration of construction. These temporary easements

will be limited to special construction access needs, additional staging, or lay down areas required outside of the proposed ROW.

4.2.4 Associated Facilities

Meters and pig launching and receiving facilities will be installed at the beginning and end points of the pipeline.

5.0 ENVIRONMENTAL ANALYSIS

This Section describes the affected environment as it currently exists within the Project. Conservative impact estimates associated with the proposed pipeline Route assume the line will be approximately six miles long. Existing land uses along the pipeline ROW consist primarily of agricultural land and open space. Hawthorn proposes to use a permanent ROW that varies from 70 to 150 feet along the entire pipeline Route. Permanent land impacts are not anticipated. Possible temporary impacts include up to 74 acres located along the construction ROW and additional temporary work spaces needed for construction activities. However, it is anticipated that the total area of temporary impact along the construction ROW will be reduced as a result of boring performed under roads, railroads, and wetlands along the Route.

General information on land use and vegetation within the Corridor was estimated using the 2001 Land Cover Digital Dataset from the USFWS. Quantification of land uses within the Corridor was estimated using the Corridor limits and the Route limits. Corridor limits include an area one-half mile to either side of the proposed pipeline, resulting in a total Corridor width of one mile. The permanent ROW varies from 70 to 150 feet wide.

Topography is an important consideration for routing a pipeline because of its impacts on engineering design, constructability, and cost. Extreme topographic variation within the Project should be avoided, because it can make construction difficult, if not impractical, and as a consequence, prohibitively expensive. Even hilly or steep terrain that otherwise allows construction may require additional pipe and/or expensive methods for installing the pipeline.

5.1 Demographics

5.1.1 Description of Resources

The Study Area is located in Mountrail County, North Dakota. As of the year 2000, Mountrail County had a median household income (MHI) of about $27,100, which is approximately 22 percent less than the North Dakota MHI of roughly $34,600. Mountrail County displays a poverty level about seven percentage points higher than North Dakota. Population estimates indicate both Mountrail County and North Dakota have experienced a slight decline in population since the year 2000 (USCB, 2000 and USCB, 2008).

Table 5-1 summarizes the population and economic characteristics found within Mountrail County and North Dakota.

Table 5-1. Population and Economic Characteristics for North Dakota and Mountrail County

Location	Population 2000	Population (2008 estimate)	Median Household Income -2000 Census	Percentage of Population Below Poverty Level - 2000 Census
North Dakota	642,200	641,481	$34,604	11.9
Mountrail County	6,631	6,511	$27,098	19.3

U.S. year 2000 Census Block data records indicate approximately 1,500 people within the Study Area; 99 percent of these people are considered "white." The majority of residents within the Study Area live in Stanley, which had a population of 1,279 in the year 2000. U.S. year 2000 Census Block data records 80 people live within the Census Blocks that intersect the Corridor. Due to the coarseness of the Census Block

data—many of the Census Blocks studied extend outside of the Corridor by as much as one mile—the population residing within the Corridor is likely far less than 80 people (USCB, 2000). Nearly all of the people residing within the Corridor are considered "white."

Table 5-2 summarizes the population and economic characteristics found within the Study Area and Corridor.

Table 5-2. U.S. Census Racial Characteristics

Race	Mountrail County		Study Area[a]		Corridor[a,b]	
	Number	Percent	Number	Percent	Number	Percent
Total Population	6,631	100.0	1,523	100.0	80	100.0
White	4,376	66.0	1,508	99.0	79	98.8
Black or African American	6	<0.1	0	--	0	--
American Indian or Alaska Native	1,988	30.0	8	0.5	1	1.2
Asian	14	0.2	4	0.3	0	--
Native Hawaiian or Other Pacific Islander	3	<0.1	1	<0.1	0	--
Other	17	0.3	1	<0.1	0	--
Two or more races	227	3.4	1	<0.1	0	--

[a] 2000 U.S. Census Block Data includes areas beyond the boundaries of the site being studied

[b] Blocks 5004-5006 were excluded since 2006 FSA aerial photography indicate that no residences are present where these blocks intersect the Corridor

During a July 21, 2009 site visit, several homes were being constructed in a development north of U.S. Highway 2, near Stanley. There are no other known plans for residential developments or other construction within the Corridor or Route; however, it is not unreasonable to expect that some new developments may occur.

According to the 2000 U.S. Census, the educational, health and social services industry is the largest employer within Mountrail County (USCB, 2000). Other prominent industries include agriculture, forestry, fishing and hunting, mining, and retail trade. March 2009 unemployment rates in Mountrail County (not seasonally adjusted) were 5.7 percent, which is slightly higher than the 5.1 percent state unemployment rate for that same period (JSND, 2009).

5.1.2 Impacts

5.1.2.1 Corridor

There is no indication that any minority or low-income population is concentrated in any one area of the Corridor, or that the pipeline ROW will be placed in an area occupied primarily by any minority group. The limited permanent agricultural land conversion associated with the pipeline structure placement will constitute a small socioeconomic impact to those landowners along the Route.

The creation of construction jobs within the Project area and use of current businesses such as restaurants and hotels could temporarily benefit local communities. If local contractors are used, construction of the pipeline system will provide a temporary increase in the total personal income of the area. However, the

number of permanent jobs created is anticipated to be low, which means the economic expansion experienced during pipeline construction may be short-term. Personal income will also be generated by the circulation and recirculation of dollars paid out by the applicants, as business expenditures and state and local taxes. Labor relations within the Study Area will not be affected.

By virtue of the local ownership structure of Hawthorn, it is anticipated that the development of this Project will contribute to economic growth near the Project area and vicinity. The resulting pipeline network will provide a means for transportation of oil resources to markets being actively developed in North Dakota.

5.1.2.2 Proposed Route

Based on a review of structure types and locations relative to existing land use, approximately 57 acres of agricultural land may be temporarily removed from production during pipeline construction, not including potential impacts as a result of other additional temporary work spaces needed for construction activities. Permanent agricultural impacts are not expected from the construction of the Project. Landowner compensation for any crop damages has been negotiated as part of the easement agreements. There is no indication that any minority or low-income population is concentrated in any one area of the Route, or that the pipeline will be placed in an area occupied primarily by any minority group.

5.1.3 Mitigation

5.1.3.1 Corridor

Socioeconomic impacts associated with the Project will be primarily positive, due to an influx of wages and expenditures made at local businesses during the Project construction and an increase in the county's tax base from operation of the transmission line. Hawthorn will use local labor and contractors when practicable. Impacts to landowners will be minimized when practicable by negotiating easements that are at or above market rates, and by maintaining landowner communications throughout the Project.

5.1.3.2 Proposed Route

See Section 5.1.3.1 above for mitigation associated with the proposed Route.

5.2 Land Use

5.2.1 Description of Resources

The Study Area is located in north-central North Dakota within Mountrail County. A portion of the City of Stanley lies within the one-mile-wide Corridor.

Land use data for the Study Area is based on a review of USFWS 2001 Land Cover database information. The majority of the land within the Corridor and Route is agricultural land used for crops and grazing (Figure 5). Smaller portions of the land area are Alfalfa Hayland, wetlands, and undisturbed grassland. Table 5-3 identifies current land use in the Corridor and Route based on land classification data from USFWS.

Table 5-3. Current Land Uses

Habitat	Pipeline Corridor (1 mile)		Pipeline Route (70'-150')	
	Acreage	Percent of Corridor	Acreage	Percent of Route
Alfalfa Hayland	118.1	3.4	1.7	2.3
Cropland	1853.0	52.7	55.7	75.9
Lake	0.2	<0.1	0.0	--
Native grassland	1084.8	30.8	10.9	14.8
Riparian	5.5	0.2	0.0	--
Seasonal wetland	82.5	2.3	1.1	1.4
Semi-permanent wetland	48.0	1.4	0.6	0.8
Temporary wetland	13.5	0.4	0.0	--
Undisturbed grassland	309.5	8.8	3.5	4.8
Urban	4.2	<0.1	0.0	--
	3519.3	**100.0**	**73.5**	**100.0**

Along the Route, agricultural land use comprises approximately 97.8 percent of the land use, including approximately 75.9 percent cropland, 14.8 percent native grassland, 4.8 percent undisturbed grasslands, and 2.3 percent hayland. The remainder of the Route is composed of seasonal wetland and semi -permanent wetland areas.

Land within the Corridor is primarily used for agricultural purposes. Agricultural land use in the Corridor includes approximately 52.7 percent cropland, 30.8 percent native grassland, 8.8 percent undisturbed grassland, and 3.4 percent hayland. Native grasslands, primarily used for grazing livestock, include remnants of native prairie of various qualities, which are dependent on several factors, including grazing pressure and herbicide applications, to control weed species. Undisturbed grassland is defined as previously disturbed or previously cropped upland that has been seeded back into some type of grass mixture, but is currently intact. This undisturbed status is often temporary in nature and includes the possibility that the land may become cropland again. Just over four percent of the Corridor area contains wetlands, or open water. Wooded or forest areas within the Corridor are uncommon and primarily associated with streams and wind breaks, which are generally found near current or former homesteads. A small portion of the Corridor is described as urban, which is associated with the nearby town of Stanley.

Unique land uses consist of areas such as municipal airport, golf course, and cemeteries. The Study Area contains several unique land uses. The Stanley Municipal Airport is located in Mountrail County, just south of Stanley along 82nd Avenue NW. The Stanley Golf Club is located just north of Stanley along State Route 8. The Fairview Cemeteries are located along 4th St SW between 6th and 8th Ave SW in Stanley. There are seven churches in Stanley. Two missile silos are located along the north side and south side of the Study Area. All these unique land uses are located outside the Corridor and Route.

Current zoning ordinances of Mountrail County generally support agricultural lands and residences associated with them within the Corridor.

The Study Area contains USFWS Conservation Easements, Waterfowl Protection Areas, NDGFD Lands, private lands open to sportsmen, and Piping Plover critical habitat. There are eight sections of land within the Corridor that have wetlands under easement and two within the Route. In addition, there are no grassland easements within either the Route or the Corridor.

5.2.2 Impacts

5.2.2.1 Corridor

Land use in the Corridor is not expected to change as a result of construction of the proposed pipeline. The majority of the area within the pipeline ROW will still be available for agricultural practices. Careful planning of the pipeline route will avoid farm facilities and residences. Impacts on existing churches or cemeteries are not anticipated from this Project. The development of the proposed pipeline will not displace any existing or planned industrial facilities. The Project will not result in the displacement of any residences or farmsteads.

5.2.2.2 Proposed Route

The majority of the land impacted by the construction of the pipeline route is used for agriculture. During construction of the Route, additional areas may be temporarily disturbed within the pipeline route for use as staging areas. Possible land use impacts resulting from pipeline construction include temporary interruption of agricultural use within the construction ROW; disturbance to landscape features such as watercourses; aesthetic value to residents; physical landscape changes due to spoil heaps; and other signs of on-going construction. The majority of the area surrounding the construction ROW will remain in agricultural use and can still be used by the landowner during pipeline construction. There are no public or private airstrips within the Route that will be impacted by the pipeline. Consequently, no notification to the Federal Aviation Administration (FAA) will be required for this Project.

5.2.3 Mitigation

5.2.3.1 Corridor

In order to minimize land use disruptions as much as possible, Hawthorn will work closely with the landowners regarding the pipeline alignment within the ROW and the location of any temporary access areas required for periodic inspections or maintenance. Any disturbed areas will be returned as near as possible to original contours. Non-agricultural areas will be reseeded with area appropriate native vegetation.

5.2.3.2 Proposed Route

See Section 5.2.3.1 above.

5.3 Public Services

5.3.1 Description of Resources

5.3.1.1 Local Services

The Study Area is located in rural north central North Dakota. Within this area there are established transportation and utility networks that provide access and necessary services to light industry, cities, and homesteads and farms existing in and near the Corridor. Stanley is the only incorporated community located partly within the one-mile-wide Project Corridor. Stanley is located approximately 0.5 miles west of the

Route. Stanley's population was 1,279 in the 2000 census. Minot is the largest city located near the Study Area. Minot is approximately53 miles east of the Project Corridor. Stanley has emergency services, including fire departments, ambulance service, hospitals, and police. Stanley also has local retail service facilities.

5.3.1.2 Electrical Service

Although a high voltage transmission line (69 kV) was identified within the Corridor, impact to this line is not anticipated from the Project. Small distribution lines provide electricity to residents found within the Corridor.

5.3.1.3 Roads

U.S. and state highways and county roads characterize the existing roadway infrastructure within the Study Area. The Corridor is crossed by U.S. Highway 2 in a west to east direction and State Highway 8 in a north to south direction. Old Highway 2 runs through the northern boundary of the Corridor in an east to west direction. The Route crosses U.S. Highway 2 in Section 23-T156N -R91W. Primary local surface transportation within the Corridor is usually by U.S. and state highways and numerous interconnecting named gravel or unimproved roads.

5.3.1.4 Traffic

The average daily traffic (ADT) volumes near the Study Area along U. S. and state highways are documented in Table 5-4. ADT along 79th Ave NW, Stanley between U.S. Highway 2 and 63rd St NW, Stanley within the Corridor included 20 vehicles in 2008 (NDDOT, 2008). Traffic volume along U.S. Highway 2 between 80th Ave NW, Stanley and State Route 8 averaged 3,435 vehicles per day in 2008. State Route 8 between U.S. Highway 2 and 62nd St NW, Stanley averaged 2,360 vehicles per day in 2008.

Because determining the specific capacity of any highway is a complex process, estimates are generally used for most planning purposes. For purposes of comparison, the functional capacity of a two-lane paved rural highway has an ADT of approximately 5,000. Most of the rural highways found near the Corridor and Route carry lower ADT than those anticipated for rural North Dakota. Current traffic levels represent only a fraction of the total capacity of the roadways.

Table 5-4. Existing Daily Traffic Levels

Roadway Segment	Average Daily Traffic (year)	Average Daily Truck Volumes (year)
U.S. Hwy 2 between 80th Ave NW & State Route 8	3435 (2008)	725 (2008)
79th Ave NW between U.S. Hwy 2 & 63rd St NW	20 (2008)	No Data
80th Ave NW between 62nd St NW & 63rd St NW	5 (2008)	No Data
81st Ave NW between 62nd St NW & 63rd St NW	180 (1992)	No Data
State Route 8 between U.S. Hwy 2 & 62nd St NW	2360 (2008)	500 (2008)
State Route 8 between 62nd St NW & 63rd St NW	2005 (2008)	90 (2008)
Old Hwy 2 between State Route 8 & 81st Ave NW	310 (2005)	No Data

A majority of the rural county roads in North Dakota traverse east to west and north to south. The Route and Corridor boundary lines for this Project are entirely within Mountrail County. The Route originates near the northern boundaries of Sections 14 and 15 (T156N R91W) and terminates in the middle of Section 27 (T156N R91W). The Route crosses one major highway, U.S. Highway 2 in Section 23 (T156N R91W). Major roads will be bored and non-paved roads will be open cut, subject to approval under local road authorities. Where roads are open cut, traffic will be temporarily directed around the site. Most road crossings will typically be completed within one day, which will limit any disturbance to the traffic flow. The pipeline construction is expected to have limited impact on normal traffic operations.

5.3.1.5 Railroads

BNSF operates two lines within the Corridor. Both lines merge within the Corridor. The Route crosses two railroad locations, one between Sections 14 and 15 (T156N R91W), and one near the eastern boundary of Section 23 (T156N R91W). Because railroad crossings will be bored in order to place the pipeline, there are no anticipated impacts to these facilities. Crossing permits have been obtained.

5.3.1.6 Water Supply

The townships have limited public infrastructure services, which is typical of most townships. Homes within the Corridor typically utilize septic systems and water wells for their household needs.

5.3.1.7 Telephone, Fiber Optic, Microwave, Television and Radio Communications

There are no communication facilities located within the Corridor or within the Route ROWs. The Project will not cause any impacts to radio and television reception, or other communication or electronic control facilities.

5.3.2 Impacts

5.3.2.1 Corridor

Local Services

Negative impacts to local services are not anticipated.

Electrical Service

Although the pipeline ROW will pass beneath transmission line systems, impacts to these systems are not anticipated from the Project.

Roads

Pipeline construction will require temporary access points along the Route. Public and private roads will be used for Project access to the fullest extent possible, and no permanent roads will be constructed. Temporary access roads may be used to access pipeline construction ROW where necessary. Where temporary access roads are required, access will be approved by each landowner in advance and routed through uplands to avoid passing through sensitive features, such as wetlands.

Traffic

The maximum construction workforce is expected to generate an average of approximately 50 additional vehicle trips per day on local roadways. By using a combination of state and county highways and other township roads throughout the Project site, these traffic impacts will be negligible. Some of the area roadways

currently have minimal traffic. Therefore, the 50 additional vehicle trips may represent a substantial percentage increase, and consequently, may be perceptible. However, the total traffic load on these roadways would still be less than those which occur during seasonal variations, such as autumn harvest.

Railroads

Railroad crossings will be bored in order to place the pipeline. Impact to these facilities is not anticipated.

Water Supply

Construction and operation of the pipeline is not expected to significantly impact rural water supplies. The installation or abandonment of any wells is not anticipated. Surface water or groundwater appropriation is not anticipated.

Telephone, Fiber Optic, Microwave, Television and Radio Communications

Impacts to these communication resources are not anticipated, because there are not any located within the ROW Route.

5.3.2.2 Proposed Route

See above, Section 5.3.2.1.

5.3.3 Mitigation

5.3.3.1 Corridor

Construction and operation of the Project will comply with federal and state permits and laws, as well as industry construction and operation standards. Due to the minor impacts expected on the existing infrastructure during Project construction and operation, extensive mitigation measures are not anticipated.

Local Services

Impact on local services is not anticipated, and mitigation is not required.

Electrical Service

Construction of the Project will not negatively impact transmission system service, and mitigation is not necessary.

Roads

The use of public and private roads for delivery of equipment and materials, and by construction personnel, is not expected to significantly affect the current road conditions. Construction equipment and material weights will generally be no greater than that of existing large farm equipment, which is commonly used in the Study Area. Use of temporary access roads across agricultural lands may result in compaction of agricultural soils and loss of crops. Where necessary, compacted soils will be disked following construction, and landowners will be compensated for any crop losses.

Traffic

Permanent impacts are not anticipated, and mitigation is not necessary.

Water Supply

In the event water wells are abandoned, they will be sealed as required by North Dakota law. If temporary dewatering of groundwater is required during construction activities, dewatering water will be discharged under the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and SWPPP.

Telephone, Fiber Optic, Microwave, Television and Radio Communications

The Utilities Underground Location Center will be contacted prior to construction to locate and avoid underground facilities. To the extent that the proposed facilities cross or otherwise may affect existing telephone or fiber optic lines or equipment, Hawthorn will negotiate agreements with service providers to avoid interference with their facilities. Because impacts to any microwave or land-based telecom systems are not anticipated, mitigation is not proposed.

5.3.3.2 Proposed Route

See above, Section 5.3.3.1. Mitigative actions will extend to associated future construction, maintenance, and repairs by Hawthorn.

5.4 Human Health and Safety

5.4.1 Description of Resources

5.4.1.1 Human Health

Most pipelines are underground systems used for transporting liquid and gas products. The United States is crisscrossed with thousands of miles of underground pipelines delivering products such as oil, gasoline, home heating oil, natural gas, and industrial gases. The transportation of crude oil by pipeline involves some risk to the public in the event of an accident and the subsequent release of product into the environment. The greatest hazard is a fire or explosion following a major pipeline rupture.

The USDOT pipeline standards are published in 49 C.F.R. §§ 190-199. For example, 49 C.F.R. § 195 specifically addresses the transport of hazardous liquids by pipeline. By the definitions outlined in 49 C.F.R. § 195.2, hazardous liquids include petroleum, petroleum products, and anhydrous ammonia. Section 195 details the design requirements, construction, pressure testing, operation and maintenance, and qualification of pipeline personnel pertaining to pipelines transporting hazardous liquids.

An operator must 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.

Facilities associated with the Project will be designed, constructed, operated, and maintained in accordance with USDOT standards, including the provisions for written emergency plans and emergency shutdowns. Hawthorn will provide training to local emergency service personnel before the facilities are placed in service, as deemed appropriate.

All necessary measures will be taken to minimize fugitive dust emissions created during construction activities. Additional precautions will be taken during construction activities near any body of water to minimize adverse effects. These actions will include minimal disturbance of stream beds and banks to prevent excess siltation and the replacement of revegetation of any disturbed area as soon as reasonably

possible after construction work has been completed. Caution will be taken to prevent spills of oil and grease that may reach the receiving water from equipment maintenance, and/or the handling of fuels on the site.

5.4.1.2 Human Safety

Proper safeguards will be implemented during construction and operation of the pipeline and aboveground facilities. The Project will be designed to meet local, state, National Electrical Safety Code (NESC), Hawthorn, and Rural Utilities Service (RUS) safety standards. Construction crews will comply with these same standards when installing the pipeline and associated facilities.

5.4.2 Impacts

5.4.2.1 Corridor

Human Health

Leaks along the pipeline could potentially occur, causing crude oil to be released into the environment. Surficial waterbodies, soil, and groundwater may be impacted within the Corridor if the leak is not properly contained and remediated. If impacted waterbodies and groundwater are used for drinking water or recreation, human health could be negatively impacted. Impacts to soil would have similar negative impacts.

Natural gas associated with crude oil could potentially ignite if a leak occurred. This could cause a large fire fueled by the contents of the pipeline, if not immediately contained. Smoke from a fire may impact human health within the Corridor and beyond.

Additional possible health issues associated with dust emissions and impacts by construction on water sources will be limited as a result of actions taken during construction.

5.4.2.2 Proposed Route

Human Health

Should a leak occur along the Route, immediate health concerns in the vicinity of the pipeline would be the possibility of fire. Natural gas associated with crude oil would be limited in quantity to what is present in the headspace of the pipeline. The hazard would be to individuals present at a leak site at the time of a leak. Since natural gas is an extremely flammable gas, a fire may start if the gas is ignited soon after a pipeline rupture. Fires involving crude oil in pipelines have the potential to be fairly large if the source fueling the fire is not removed quickly. A large fire would also have the possibility of spreading into nearby areas. All of the pipeline Route is positioned a minimum of 500 feet from residences to minimize any possible hazards to human health.

Additional actions will be taken during construction to minimize any impacts to human health as a result of dust emissions.

5.4.2.3 Human Safety

The main focus during the pipeline construction will be the inclusion of appropriate medical and security services, temporary accommodations, and transportation which would minimize any impact on citizenry, local services, and infrastructures. These measures will ensure the local road network is not overloaded or damaged and that citizens are constrained from pipeline construction areas and their possible hazards. Adverse impacts to human safety are not anticipated with the Project.

5.4.3 Mitigation

5.4.3.1 Corridor

Human Health

The Route was selected to limit human exposure to crude oil to the extent practicable. Once the pipeline construction is complete, local municipalities and townships may choose to obtain additional special emergency response equipment utilized for responses to fires. Additional mitigation is not anticipated with the Project.

Human Safety

Assuming the proper safeguards and protective measures are implemented as described above, additional mitigation is not proposed.

5.4.3.2 Proposed Route

Since pipelines are buried underground, line markers will be used to indicate their approximate location along the Route. Markers will be placed in areas where a pipeline intersects a street, highway, or railroad, and at other appropriate locations along the Route. These markers will display the material transported in the pipeline, the name of the pipeline operator, and a telephone number indicating where the operator can be reached in the event of an emergency. Appropriate markers and security fencing will also be placed as deemed appropriate.

5.5 Noise

5.5.1 Description of Resources

Noise is comprised of a variety of sounds with different intensities spanning the entire frequency spectrum. A human perceives sound when sound pressure waves encounter auditory components in the ear. These components convert pressure waves into perceivable sound. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3-dBA is imperceptible to human hearing. A 5-dBA change in noise level, however, is clearly noticeable. A 10-dBA change in noise levels is perceived as a doubling of loudness, while a 20-dBA change is considered a dramatic change in loudness. Table 5-5 shows noise levels associated with common everyday sources and places.

Generally, background noise levels in rural areas vary between 40 and 50 dBA, while in suburban areas these levels increase to 50 to 60 dBA. In urban areas, noise levels vary between 60 and 70 dBA (FRA 2005). Most of the Corridor has background levels consistent with rural areas. The windy conditions in this region tend to increase ambient noise levels, as compared to other rural areas. Additionally, higher levels exist near roads and other areas of human activity. Portions of the proposed Route located along major highways and close to cities will have higher noise levels. Railroads can also be a significant source of noise near portions of the Route. Rail cars traveling at 50 mph 100 feet away, have noise levels of approximately 75 dBA. Train horns sounded at crossing vary between 95 and 115 dBA (FRA 2005).

Table 5-5. Common Noise Sources and Levels

Sound Pressure Level (dB)	Typical Sources
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational Speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Environmental Impact Analysis Handbook, ed. by Rau and Wooten, 1980

5.5.2 Impacts

5.5.2.1 Corridor

Because the pipeline crosses through primarily rural and agricultural areas, there will usually be only a few people near the pipeline Corridor. Those individuals located within the Corridor may experience a small amount of noise near the pipeline ROW during certain times. Noise will be generated during construction of the pipeline. The noise levels will be greater for those closer to the Route as described in section 5.5.2.2. Typically, the attenuation rate for linear noise sources is approximately -4 dB per distance doubled. In other words, the farther from the generation point a person is, the less noise they will hear.

5.5.2.2 Proposed Route

The ambient sound level of a region is defined by the total noise generated within the specific environment, and it is usually comprised of sounds emanating from natural and artificial sources. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day and throughout the week. This variation is caused in part by changing weather conditions and the effect of seasonal vegetative cover.

Pipeline construction is similar to an assembly line, with crews conducting separate but sequential activities, each generally proceeding at rates ranging from several hundred feet to one mile per day. Construction of the pipeline will include the following noise-generated activities: ROW preparation, soil stripping, trenching, pipe stringing, welding, laying pipe, and backfilling. There does not appear to be potential for rock outcroppings near the surface, so blasting is not likely to be required. Construction activities may occur on an intermittent basis. Construction equipment would be operated on an as-needed basis during the construction period and is not expected to be a significant noise factor.

The Route was sited to be at least 500 feet from any occupied houses or structures. This siting will minimize the noise that individuals will hear along the Route. At 500 feet and farther from the pipeline Route, any pipeline construction noise will be below the background noise levels and is not expected to be perceptible.

5.5.3 Mitigation

5.5.3.1 Corridor

Occupied houses and structures will be at least 500 feet from the proposed pipeline. At this distance, noise created by pipeline construction activity is predicted to be at or below background levels, especially in areas near roadways and railroads.

During construction, noise levels will be minimized by ensuring that construction equipment is equipped with mufflers in good working order. Construction activities will generally be limited to the hours of 7 a.m. to 7 p.m. and are not likely to occur during earlier morning or later evening hours. Additional mitigation measures are not necessary, due to the nominal noise impact anticipated from the Project.

5.5.3.2 Proposed Route

While individuals in the immediate vicinity of the construction activities may experience an increase in noise, this effect will be temporary and local. Nighttime noise is not expected to increase during construction, because most construction activities will be limited to daytime hours (see above, Section 5.5.3.1.). The buried pipeline located along the Route will not contribute significantly to aboveground noise levels after completion of the construction phase of the Project, making any mitigation measures unnecessary.

5.6 Visual Impacts

5.6.1 Description of Resources

The degree of visual impact resulting from a proposed Project is typically determined by considering the general character of the existing landscape and the visual features of the proposed facilities. Visual resources within the Study Area are a function of geology, climate, and historical processes, and they include topographic relief, vegetation, water, wildlife, land use, and human uses and development. The topography within the Study Area is characterized by nearly level to gently rolling hills and small shallow lakes and wetlands. Vegetation in the Study Area consists primarily of grassland and cropland. The Knife River, U.S. Highway 2, and Stanley are prominent features within the Study Area. An aerial map of the Study Area is shown in Figure 3, and a topographical map of the Study Area is shown in Figure 4.

The Corridor and Route cross U.S. Highway 2, a BNSF railway, and a transmission line. The Knife River is also crossed at two locations. Highway, railroad, utility, and river crossings will be bored in order to place the pipeline, which should not visually impact any of these features.

Within the Corridor and Route, the dominant land use is row crop agriculture with some rangeland.

Small pockets of woodland, primarily associated with wind breaks, are found near residences in the Corridor. Generally, these wooded areas are isolated groves or windrows established by the landowner/farmers to prevent wind erosion and shelter dwellings. The Route was designed to avoid impacts to woodlands and windbreaks where possible.

The southwest Corridor end point intersects the eastern Stanley municipal boundary. The southwest Route endpoint is within 0.5 miles of the eastern Stanley municipal boundary. Construction activities will likely be visible from Stanley in these areas.

5.6.2 Impacts

5.6.2.1 Corridor

Construction and operation of the proposed pipeline may affect visual resources by altering the terrain and vegetation patterns during construction or maintenance. These visual impacts are expected to be temporary. During construction, the cleared and graded ROW and temporary extra workspaces, as well as the construction equipment, may be visible to surrounding community residences and local roads within the Corridor. Additional visual impacts could include the removal of existing vegetation, the exposure of bare soils, and earthwork and grading scars associated with heavy equipment tracks, trenching, rock removal, machinery, and tool storage. Because of the topology of the Project area, dust generated from these activities, as well as the presence of equipment and construction vehicles, may be observed from some distance in the surrounding areas. Other visual effects could result from the removal or alteration of vegetation, or from landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Figure 3. Aerial Photo of Project Location

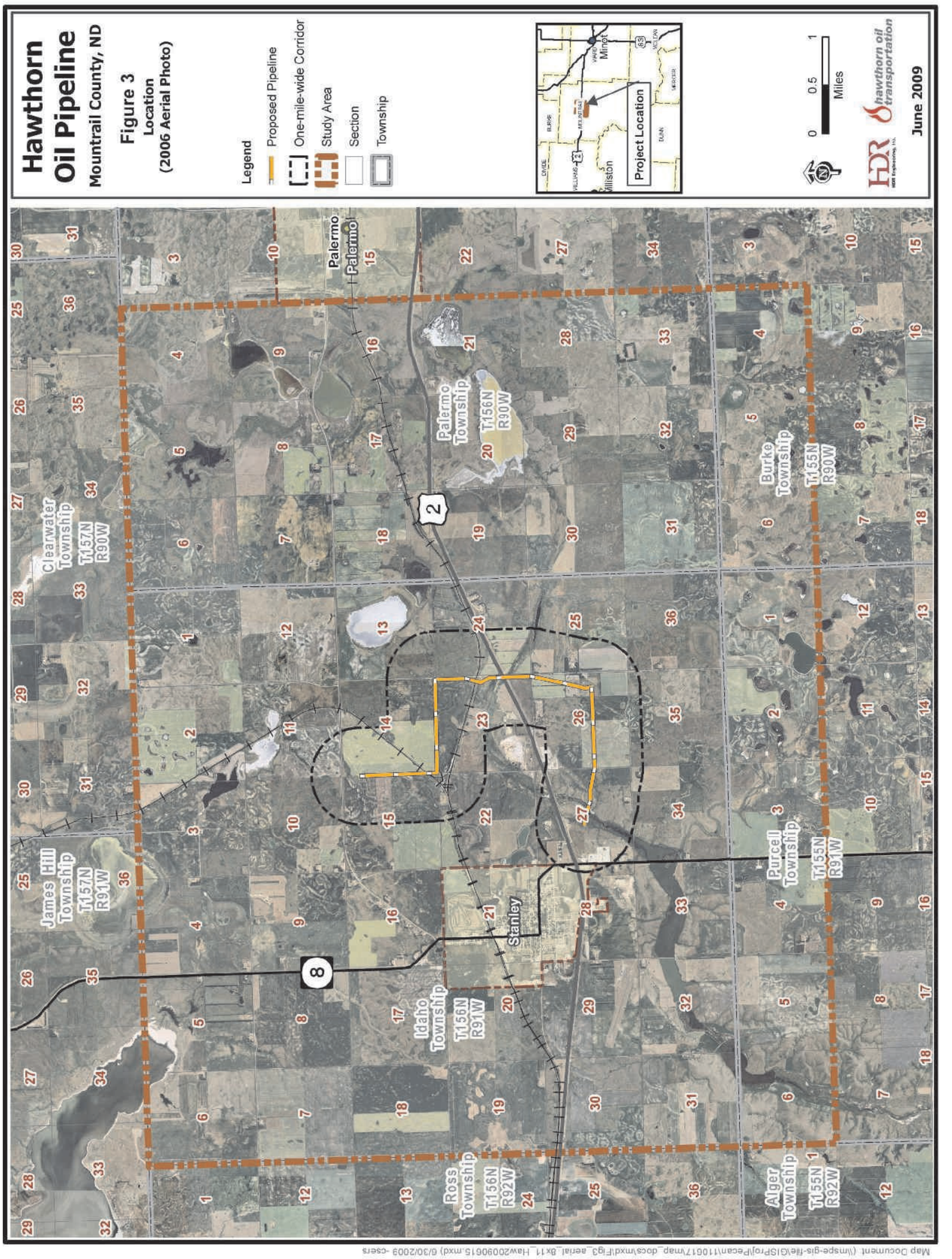
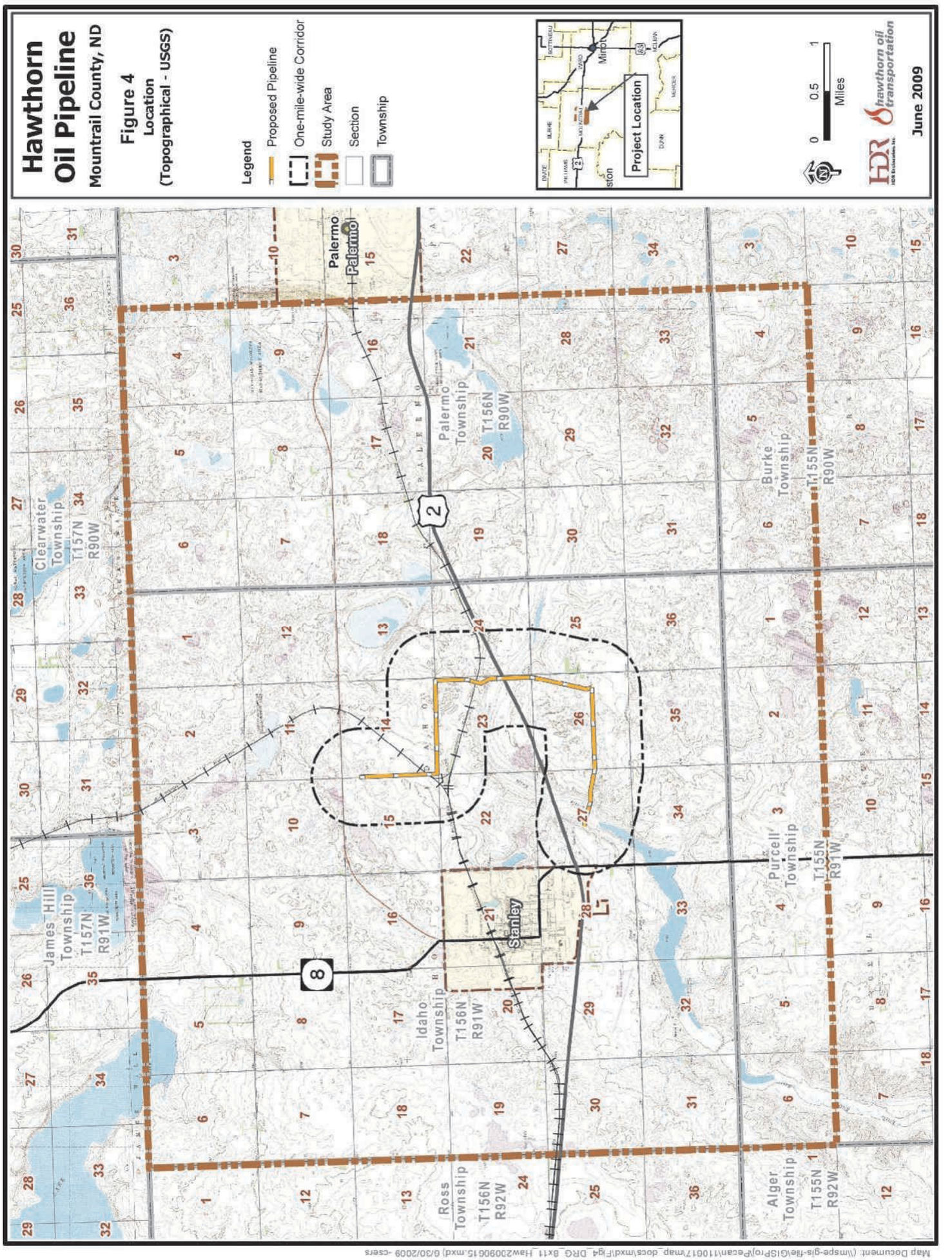


Figure 4. Topographical Map of Project Location



5.6.2.2 Proposed Route

Although routing of the proposed pipeline will be located outside of Stanley, it may be visible to some residents traveling near the area. Visual impacts will be most evident to passing motorists and recreationists where the Route parallels or crosses roads, especially while traveling along U.S. Highway 2. The Route will only specifically impact landowners and residents that live in close proximity to the Route. These impacts are expected to be temporary.

Impacts to aesthetics will be minimized by positioning the Route through rural areas. The duration of visual impacts will depend on the type of vegetation or land formation that is cleared or altered. Since the majority of the Route will cross agricultural land, the impact of vegetation clearing should be limited in duration. Reestablishment of vegetation following construction within agricultural areas is generally less than three years. Long-term visual changes will be minor and limited to permanent pipeline markers that may be visible at the crossing locations and will parallel roadways.

5.6.3 Mitigation

5.6.3.1 Corridor

The Corridor will contain segments of one highway, one railroad, one transmission line, and one river. Roadways, railroad, utility ROWs, and rivers will be crossed using trenchless technology (i.e., pipe boring; slick-bore process). The remaining area within the Corridor is agricultural. Permanent impacts to the Corridor are not anticipated and mitigation is not warranted.

5.6.3.2 Proposed Route

The pipeline ROW will temporarily contrast with most of the surrounding land uses, excluding those areas which have already been visually impacted by major highways, railroads, transmission lines, and existing oil and gas pipelines. Roadways, railroads, utility rights-of-way, and rivers will be crossed using trenchless technology (i.e., pipe boring; slick-bore process). Care will be taken to avoid pipeline placement, as much as possible, in biologically sensitive areas such as wetlands and high quality native prairies. The visibility of construction alterations within the ROW Corridor will diminish over time, as the affected areas age and begin to blend with the surrounding landscape. The Route will not impact any existing residences. Significant long-term visual impacts are not anticipated. Mitigative actions will extend to future construction, maintenance, and repairs.

5.7 Cultural Resources

5.7.1 Description of Resources

In May of 2009, Hawthorn contacted the North Dakota State Historic Preservation Office (SHPO) to request a review of potential project-related impacts on known or suspected cultural resources along the Route (Appendix A). The SHPO responded via letter (SHPO: NDSHPO REF: 09-0923 PSC/Hawthorn Oil Transportation Pipeline Project) (Appendix C) in May of 2009. The SHPO recommended Hawthorn sponsor an archival records search generally not more then one-mile-wide centered on the Route (half mile on each side of the centerline) to determine the nature of previous cultural resource investigations and the location of known cultural resources in the Study Area. The SHPO also stated unrecorded cultural properties may exist in the Study Area. Therefore, the SHPO suggested that a field survey take place in the Study Area.

During conversations between HDR Engineering, Inc. (HDR), on behalf of Hawthorn, and SHPO on May 12, 2009 and June 1, 2009, SHPO confirmed that tribal consultations would not be needed since the Project lacks the federal component requiring compliance with Section 106 of the National Historic Preservation Act of 1966, and its implementing regulations. However, SHPO recommends that Hawthorn submit a notification in good faith to the Indian Affairs Commission in Bismarck, North Dakota, as part of other federal, state, and local project notifications. It is anticipated the Project may be subject to regulations associated with the N.D. Cent. Code ch. 49-22. This notice is provided to the parties required by N.D. Admin. Code § 69-06-01-05 and other parties that have been identified by the NDPSC.

Hawthorn reviewed cultural resources information on file at the SHPO for the Study Area and prepared an archival records search report which is provided in Appendix A. Table 5-6 lists the 7 previous Class I cultural resource inventories on file at the SHPO for the Study Area. None of the sites identified during previous projects have had National Register of Historic Places (NRHP) eligibility determinations.

Table 5-6. Previously Identified Investigations in the Project Area

Manuscript Number	Manuscript Title	Author(s)/Associations	Report Date
10774	*A Cultural Resource Inventory of the Proposed EOG Multiple Use Rail Yard Facility in Mountrail County, North Dakota*	SWCA Environmental Consultants	December 2008
10324	*Stanley, North Dakota: A Historic District Evaluation of Buildings Along Portions of Main Street and 6th Avenue*	Blain Fandrick/Ethnoscience, Inc.	January 2008
10359	*Class III Cultural Resources Inventory of the Stanley Pipeline and Gas Plant Mountrail County, North Dakota*	Joel J. Tyberg/TEC Inc.	December 2007
10647	*Enbridge Stanley Station: A Class III Cultural Resource Inventory in Mountrail County, North Dakota*	Ed Stine/Metcalf Archaeological Consultants, Inc.	September 2008
7525	*Skarsgaard Gravel Pit: A Class III Cultural Resource Inventory, Mountrail County, North Dakota*	Robert M. Ross, Jr./Metcalf Archaeological Consultants, Inc.	December 1999
5986	*Environmental Assessment Stanley Water Supply System Cooperative Agreement No. 6-FC-60-00210 Garrison Diversion Unit MR&I Program*	Kadrmas Lee & Jackson PC Consulting Engineers and Surveyors	N/A
6486	*Fisher's Stanley Gravel Pit: A Class III Cultural Resource Inventory in Mountrail County, North Dakota*	Ed Stine/Metcalf Archaeological Consultants, Inc.	May 1995

Hawthorn will continue to coordinate with SHPO in anticipation of conducting archaeological field investigations along the entire Route that has not previously been surveyed. These investigations will be conducted by a professional archaeologist permitted by the State of North Dakota per N.D. Cent. Code § 55-03-01. Following its investigations, Hawthorn will provide the SHPO with a report for review and will discuss report recommendations with SHPO staff.

5.7.3.2 Route

Hawthorn does not anticipate impacts to identified NRHP-eligible sites or any other cultural resources within the Project area, because construction will be modified to avoid impacts to those resources. If potential NRHP-eligible sites identified during field investigations will be impacted, a professional archaeologist, in coordination with the SHPO, will establish appropriate buffers around the potentially eligible resources, or will develop other necessary treatment to protect site integrity.

Hawthorn will consider impacts to identified potential NRHP-eligible cultural resources to the extent practical. Constructing the line to avoid cultural resource areas should negate any adverse impacts. In the event that an adverse impact occurs, Hawthorn will determine the nature of the impact and consult with SHPO on whether or not the resource was eligible for listing on the NRHP. If the resource is determined eligible, mitigation could include an effort to minimize project impacts on the resource, and/or collection of additional documentation.

Hawthorn will develop a discovery plan if unknown cultural resources or human remains are inadvertently encountered during the Project. The discovery plan would outline the framework for handling such discoveries in an efficient and legally compliant manner. If human remains were identified, procedures would be followed to ensure appropriate authorities would be involved. Local and state guidelines, such as N.D. Cent. Code § 23-06-27, would be followed.

5.8 Recreational Resources

5.8.1 Description of Resources

Recreational opportunities in the Study Area include camping, hiking, biking, swimming, golfing, hunting, fishing, and nature observation. Within Stanley, some of the recreational opportunities include: the Prairie Rose Golf Course, an RV park, the Ina Mae Rude Aquatic Center, the Rae Rue Outdoor Swimming Pool, Flickertail Village and Museum, the Sibyl Community Center, athletic fields, and various parks.

The Study Area does not include any national or state designated Wild and Scenic Rivers, state forest land, national, state or county parks, or Native American reservations. No state game refuges or nature preserves are present within the Study Area. There are five USFWS Waterfowl Production Areas (WPA), one North Dakota Game and Fish Wildlife Management Area (WMA), and four parcels of Private Lands Open to Sportsmen (PLOTS) within the Study Area.

Of these lands, the Corridor crosses one PLOTS parcel located in the NW/4 of Section 24-T156N-R91W. The Route does not cross the PLOTS parcel.

5.8.2 Impacts

5.8.2.1 Corridor

In general, recreational impacts will be visual and limited to individuals using public or private property in the Corridor for hiking, hunting, fishing, or nature observation. One PLOTS area is located within the Corridor, but it will not be crossed by the Route. See Section 5.6 for a detailed discussion of anticipated visual impacts and proposed mitigation measures**.** Other significant impacts to recreational resources are not anticipated.

5.8.2.2 Proposed Route

Recreational impacts will be primarily visual and limited to individuals using public or private property for hiking, hunting, or nature observation. Significant impacts to recreational activities are not anticipated within the Route.

5.8.3 Mitigation

5.8.3.1 Corridor

Since it is anticipated that recreational resources will not be removed from service by implementation of the Project, adjacent land will not be converted or dedicated to recreational use or wildlife management. Mitigation is not anticipated to be necessary within the Corridor.

5.8.3.2 Proposed Route

The Route has been planned so it avoids impacts to recreational areas. Mitigation is not anticipated to be necessary within the Route.

5.9 Effects on Land Based Economies

5.9.1 Description of Resources

Agriculture/Farming

The majority of the Corridor is cultivated farmland and grasslands as summarized in Table 1 and shown on Figure 5. Approximately 1971.2 acres of the Corridor and 57.4 acres of the Route are composed of cultivated land. Native grassland makes up approximately 1,084.8 acres of the Corridor and 10.9 acres of the Route.

According to the North Dakota Annual Statistics Bulletin (USDA, 2002), Mountrail County is ranked 30th among North Dakota counties in agricultural products sold. Wheat is the most widely grown crop. Canola, barley, dry edible peas, and sunflowers are also produced.

Mountrail County recorded 682 farms in the 2002 Census. Principle primary commodities for Mountrail County included wheat, dry edible peas, canola, and barley. Prime farmland is an important factor of crop production for Mountrail County. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The National Resource Conservation Service (NRCS) includes two classifications for prime farmland. The first classification includes all areas of the soil series, and the second includes only the drained areas of the soil series. The NRCS also identifies farmland of statewide and local importance, which is defined as land that is important for the production of food, feed, fiber, forage, and oilseed crops. Farmlands of statewide or local importance also includes those lands that are considered nearly prime soils and produce high yields of crops in an economic manner when treated and managed according to acceptable farming methods. Some of these soils may produce as high a yield as prime farmland soils, if conditions are favorable. Figure 6 shows the prime farmland soil distribution in the Corridor and along the Route.

Table 5-8 summarizes the amounts of prime farmland and soils of statewide/local significance located within the Corridor and along the Route. The Corridor includes approximately 0.7 acres or 0.02 percent prime farmland soils. The pipeline Route ROW does not contain any prime farmland soils.

Figure 5. Land Cover

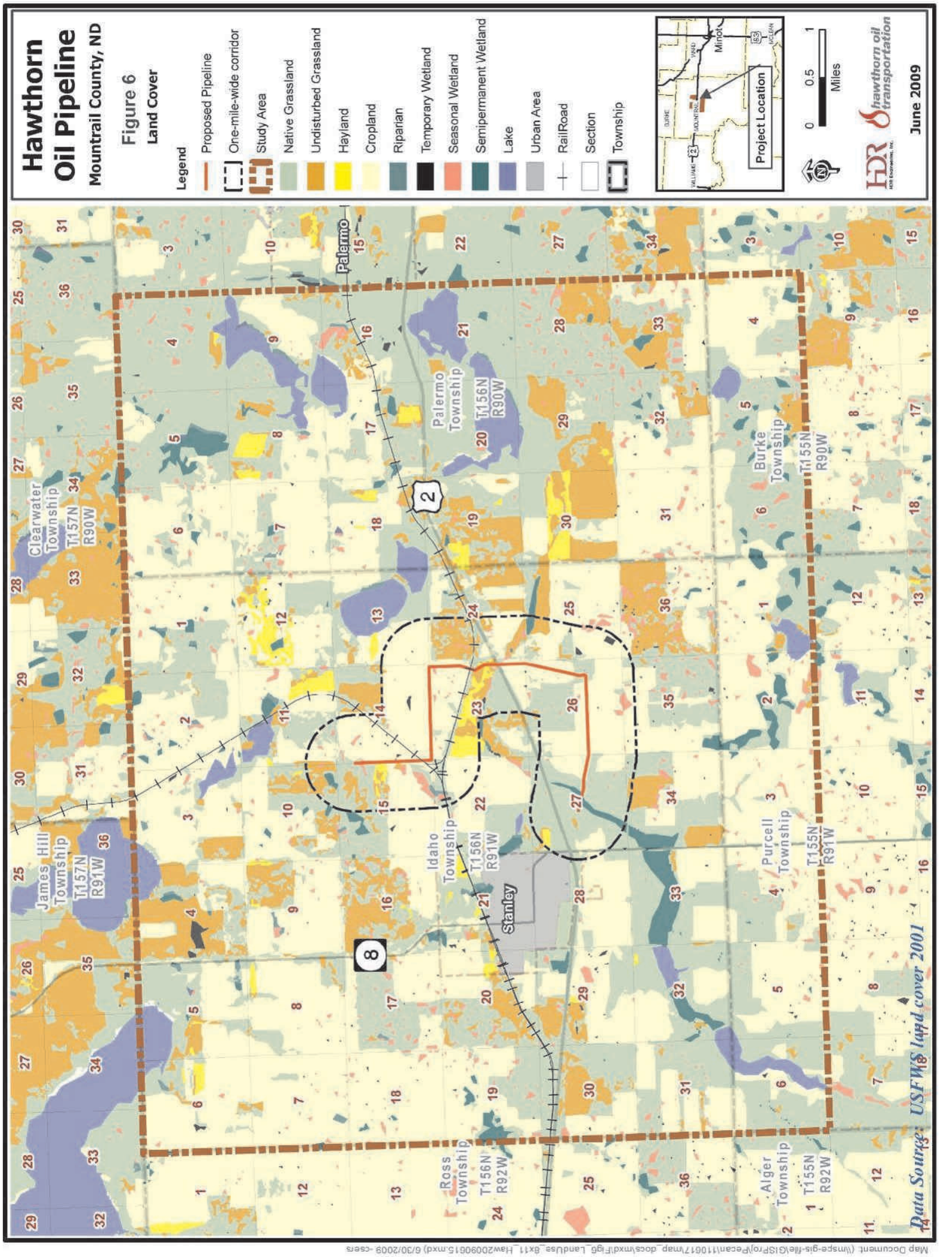


Figure 6. Prime Farmland and Soil Distribution Map

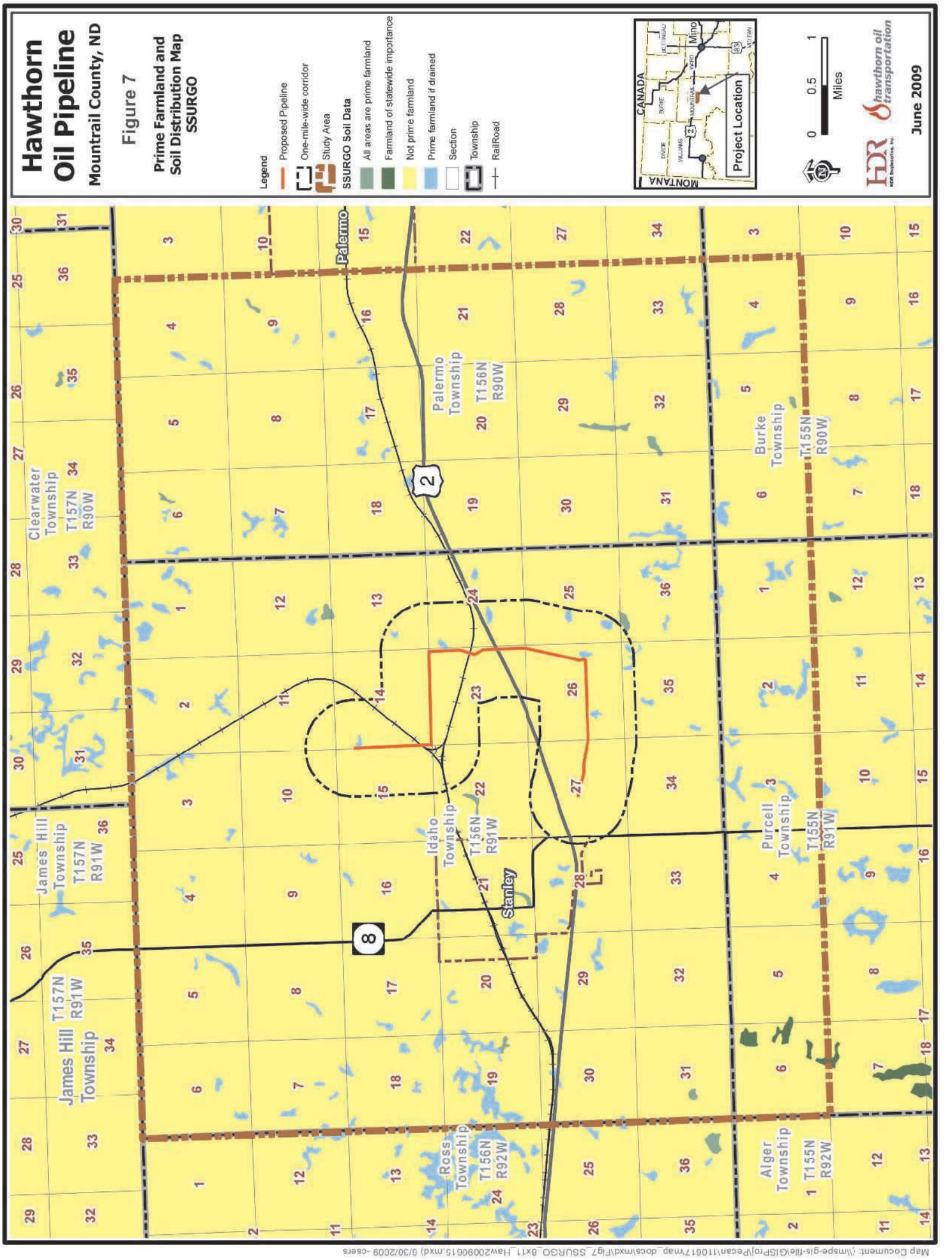


Table 5-8. Acres of Prime Farmland, Soils of Statewide/Local Importance, and Prime Farmland when Drained in the Corridor and along the Route

All Areas Are Prime Farmland (acres)	Soil of Statewide/ Local Importance (acres)	Prime Farmland Only When Drained (acres)	Not Prime Farmland (acres)	Percent Prime Farmland
Study Area Corridor				
0.7	0	44.1	3474.5	0.02
Proposed Route				
0	0	0.4	73.1	0

Table 5-9 lists the soil units found in the Corridor and Route defined as prime farmland, soils of statewide or local importance, and prime farmland only when drained.

Table 5-9. Farmland Soil Characteristics within the Corridor and Route

Corridor Soil Units	All Areas Are Prime Farmland	Soil of Statewide & Local Importance	Prime Farmland Only When Drained	Soil Unit in Route
Harnerly-Tonka Complex, 0 to 3 percent slopes			X	X
Makoti Silty Clay Loam, 0 to 3 percent slope	X			
Tonka Silt Loam			X	X

According to the North Dakota State Water Commission, only one irrigation permit is sited within the Study Area. This permit is associated with the Stanley Golf Club, which is located outside the Corridor along the north side of Stanley. N.D. Admin. Code § 69-06-08-2(2)(h) exempts underground transmission facilities, such as buried pipelines, from analysis for impacts to irrigated land. However, Hawthorn will coordinate with landowners during construction to minimize irrigation and drainage systems disruption. Hawthorn will compensate for damages and any resulting lost production. Hawthorn will repair, replace, or compensate landowners where irrigation or drainage systems are damaged by construction. Adverse impacts to irrigation permit areas within the Corridor are not anticipated.

There are 19 occupied residences within the Corridor, which are identified on Figure 2. The Route centerline was sited to be at least 500 feet from occupied houses and structures. Occupied houses and structures will be at least 500 feet from the pipeline ROW.

Woodlands

Economically important forestry resources are not in the Corridor. However, there are windbreaks and small groves of trees associated with farmsteads in the Corridor. These areas are too small to be identified in USFWS land cover data. The Route was designed to avoid impacts to woodlands and windbreaks where possible.

5.9.2 Impacts

5.9.2.1 Corridor

Agriculture/Farming

Permanent above -ground impacts are not anticipated. All areas within the Route will be available for usual farming activities after construction is completed. Short-term impacts on agricultural areas could include soil disturbance, possible compaction of farm soils, the loss of standing crops within the construction work area, and disruption of farming operations in the vicinity of construction for the growing season, during the year of construction. In view of the amount of agricultural land available within the Corridor, potential impacts will be negligible.

Woodlands

Impacts to woodland areas will be limited to those wooded areas associated with streams, rivers, and windbreaks near homesteads within the Corridor. The Route was designed to avoid adverse impacts to woodlands and windbreaks; therefore, limited adverse impacts to woodland areas are anticipated.

5.9.2.2 Proposed Route

Agriculture/Farming

Adverse impacts to animal health and safety from the construction or operation of the pipeline are not anticipated. Construction of the Project could affect grazing lands by: removing vegetation, reducing the carrying capacity of the leased area, damaging or removing fences or other natural barriers used for livestock control, or cutting water lines used to supply watering sources.

No agricultural land will be permanently removed from production due to the Project. Although there are approximately 57 acres of agricultural land located within the construction ROW which could be temporarily removed from production during construction, impacts will be lessened by boring, in some locations. In addition, there may be potential impacts due to temporary access and construction requirements. Landowner compensation for crop damage will be paid when determinable. All other agricultural areas within the ROW will be available for agricultural activities, upon completion of the Project.

The use of heavy equipment on agricultural soils may cause soil compaction. This is a concern where construction equipment use is intense, even during a relatively short duration, such as the construction period needed for pipeline installation. Where necessary, compacted soils will be disked following construction, and landowners will be compensated for crop losses. The pipeline construction is anticipated to have limited impact on the yearly production of crops in Mountrail County. Family farms will be temporarily impacted due to loss of use of agricultural lands during construction of the pipeline. Permanent impacts are anticipated to be minor, as noted above.

Woodlands

Limited woodland areas are present along the Route, with the only trees being a windrow in the east side of Section 26 of Idaho Township. Woodland habitats are usually associated with stream crossings, homesteads, and windbreaks. The Route was designed to avoid impacts to woodlands and windbreaks where possible.

5.9.3 Mitigation

5.9.3.1 Corridor

Agriculture/Farming

Hawthorn will work with landowners to minimize impacts to their land. The Route will be located to minimize impacts to farming operations and prime farmland, as much as possible. Land used for pipe burial will be available for future crop production. Construction staging areas and temporary access roads will be disked as necessary to relieve any excessive soil compaction caused by construction. Landowners will be compensated for any damage that occurs to crops as a result of pipeline construction.

Woodlands

Limited woodland areas exist within the Corridor. The Route was designed to avoid impacts to woodlands and windbreaks where possible. Any permanent impact to wooded areas will be minimal, because trees and shrubs will be replaced at a ratio of 2:1, as necessary, and will be monitored for survival for five years.

5.9.3.2 Proposed Route

Agriculture/Farming

No agricultural land will be permanently removed from production because of the construction of the pipeline. Construction staging areas and temporary transmission line access roads will be disked as necessary to relieve excessive compaction caused by construction. Landowners will be compensated for any damage that occurs to crops due to pipeline construction.

Woodlands

The Route was designed to avoid impacts to woodlands and windbreaks where possible. Description of Resources

Soils

Information from three U.S. Department of Agriculture (USDA, 2007), NRCS sources was used to identify the general soil map units occurring in the Corridor and Route. These resources include the Soil Survey for Mountrail County, the State Soil Geographic Database (ND-STATSCO), and the Soil Survey Geographic Database (SSURGO). The general soil map units, their characteristics, and their acreage in the Corridor are listed in Table 5-10 and shown on Figure 8. Soils in the Corridor are predominantly mollisols, which are typical of grassland ecosystems. Mollisols are characterized by a thick, dark surface horizon. They are rich in organic materials and are very productive agriculturally.

Table 5-10. Soil Types and Characteristics Found Within the Corridor

Soil Type and Description	Acreage in Corridor	Acreage in Route
Rhoades-Parshall-Harriet	106.2	0.0
Wabek-Manning - Deep, nearly level, gently sloping to steep, excessively drained and somewhat excessively drained loams and sandy loams on flats, knolls and ridges of outwash plains and terraces.	793.2	16.4
Williams-Bowbells - Deep, nearly level to gently sloping, undulating, gently rolling to hilly, well drained and moderately well drained loams and clay loams found on flats, swales, side slopes and summits of till plains and moraines.	1834.8	42.7
Zahl-Williams-Vida-Bowbells - Deep, nearly level to hilly, well drained and moderately well drained loams and clay loams found on swales, side slopes, knolls, ridges and summits of till plains and moraines.	785.1	14.4

5.9.4 Impacts

5.9.4.1 Corridor

Soils

Temporary impact to soils in the Study Area will be limited to the ROW. Additional temporary work spaces may be needed for construction activities in order to minimize overall impacts to cultivated lands. Temporary impacts to soils such as grading and equipment traffic are anticipated during construction in the areas immediately surrounding the Route. Soils crossed by the Route would be susceptible to contamination from spills or leaks of fuels, lubricants, and coolants from construction equipment.

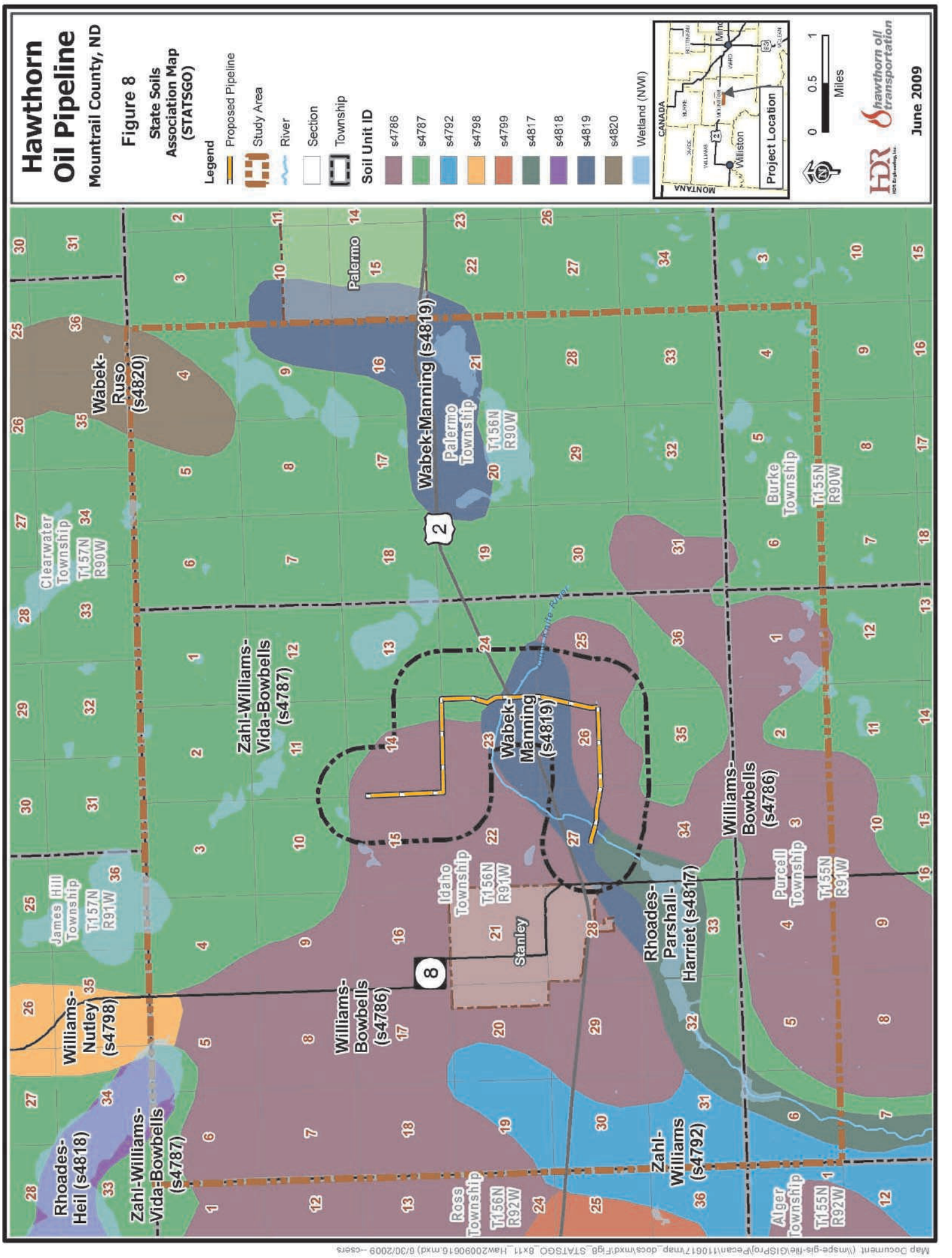
5.9.4.2 Proposed Route

Soils

Permanent impact to soils in the Study Area from pipeline construction and operation is not anticipated. Potential impacts from pipeline construction include interference with and/or damage to agricultural drainage or irrigation systems, the mixing of topsoil and subsoil, the potential loss of topsoil, and compaction/rutting. These impacts would primarily result from trench excavation and backfilling, and equipment and vehicle traffic along the ROW. During pipeline construction, up to 73 acres may be temporarily impacted within the construction ROW, by access roads and staging areas. The actual temporary impact to some areas will be reduced by boring rather than trenching the pipeline. In isolated cases, grading may be required during access roadway construction. Generally, soil removed in these cases will be on steep slopes which is not agriculturally productive. A discussion of impacts to prime farmland soils is provided with this section.

Potential for wind and water erosion exists in the soil types within the Corridor. Careful construction practices will minimize soil erosion during and after construction. Although contamination from spills or leaks of fuels, lubricants, and coolants from construction equipment could impact soils within the Route. Significant adverse impacts are not anticipated.

Figure 7. State Soils Association Map



5.9.5 Mitigation

5.9.5.1 Corridor

Soils

Wind and water erosion are potential hazards for soils found within the Corridor. To minimize erosion during and after construction, BMPs for erosion and sediment control will be utilized within the Study Area. Only non-structural practices, including: temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization, are expected to be required. Topsoil will be segregated if cuts are made during construction. It will be reapplied after final contours have been graded.

5.9.5.2 Proposed Route

Soils

See above, Section 5.9.5.1. Hawthorn will apply practices that mitigate erosion during construction, maintenance and repair activities but not sure that this is how the statement currently reads.

5.10 Geologic and Groundwater Resources

5.10.1 Description of Resources

Geology

The surficial geology of North Dakota is largely a result of glacial activity. Although surface material is influenced by modern rivers and lakes, great ice sheets scraped and ground deep furrows into the landscape during the Pleistocene Era. As the glaciers advanced, materials extracted from the underlying bedrock were transported and eventually deposited. As temperatures increased, the ice melted. The melting ice sheets left mixed sediments of all sizes and produced a relatively flat topography with small transient depressions, called potholes. Glacial tills, consisting of unconsolidated sand, gravel, silt, and clay, are remnants of the Pleistocene Era.

The Study Area lies in the Great Plains Physiographic Province in North Dakota. It is located in the northern and eastern portions of North Dakota and contains both glaciated and non-glaciated landforms.

The Great Plains Physiographic Province can be further divided into four regions that display similar landform characteristics. They are: the Missouri Coteau, the Coteau Slope, the Missouri Plateau (also known as the Missouri Slope Upland), and the Little Missouri Badlands. The Missouri Coteau and the Coteau Slope separate the Lowlands of North Dakota on the east, from the Great Plains on the west.

The Study Area is in the glaciated section of the Missouri Plateau. It is covered extensively with glacial materials that were deposited during late Wisconsin time. The glacial deposits consist largely of end moraine, but they also include lake-basin deposits of considerable area and small areas of ground moraine. Glacial outwash deposits of sand and gravel occurred in the valley of the Little Knife River, which the Corridor crosses in two areas. Thin deposits of alluvium and slope wash of recent age overlie the outwash deposits, and they are also present in the larger tributaries to the Little Knife River.

The following are descriptions of the geology in the Study Area and its occurrence from youngest to oldest (top to bottom):

- **Alluvium and Slope Wash (where present)**
  Deposits consist mostly of dark gray humic clay, silt, and very fine sand. They range in thickness from a few inches to several feet, and they grade downward and laterally into adjacent deposits.

- **Glacial Drift**
  Glacial drift is present throughout the entire Study Area. On a regional basis, the average thickness is approximately 100 feet, but can be less than ten feet in the valley of the Little Knife River. The deposits are described as gray, unoxidized till. Older drift is found beneath this layer and is characterized by yellowish-gray oxidized zones.

- **End Moraine**
  End moraine is considered the most extensive surficial deposit in the area. It is composed predominately of till which was deposited directly from glacial ice along its margins with little sorting by melt water. The till is a heterogeneous mixture of clay, silt, sand, gravel, and boulders. Clay and silt constitute more than 75 percent of the till; it is very compact and relatively impermeable. In certain places, the deposits include lenses of sorted sand and gravel.

- **Ground Moraine**
  Ground moraine is distinguished from the end moraine based on how it was deposited and the relatively flat topography associated with it. The deposition of ground moraine was directly from the glacial ice without any significant melt water action. In other respects, ground moraine is similar in character to the end moraine deposits.

- **Lake-Basin**
  Three basinal areas of varying size and shapes are in the Study Area. These are the sites of extinct glacial lakes, which existed for relatively short periods during the latter stages of the late Wisconsin Glaciations. Stratified deposits of clay, silt, and sand rest on till. Beach deposits are also present and consist of well -stratified and relatively well -sorted sand and gravel.

- **Outwash deposits**
  Glacial outwash deposits consisting of sand and gravel occur in the Little Knife River Valley, along the inside of the meandering loops. The deposits consist mostly of very coarse sand and gravel, but in the southern part of the area surrounding Stanley, they are overlain by and probably grade laterally into lake clays. The maximum thickness of these deposits is approximately 22 feet, located just south of Stanley.

- **Fort Union Formation**
  This Paleocene Age bedrock underlies the glacial drift over the entire Study Area. No exposures of the Fort Union are found in the Study Area, but in some places, especially in the Little Knife River Valley, the formation lies close to the surface. The formation consists of mostly light gray clay, sandy clay, and very fine sand. Lignite beds are rather common, with typical thicknesses of two feet. Thickness of the Fort Union in the Study Area is estimated to be 600 feet.

Groundwater

Groundwater is a valuable natural resource in North Dakota. It provides the primary source of domestic water for 60 percent of the state's population (NDDH, 1999a). Groundwater found beneath the surface of

North Dakota is obtainable from two major sources or rock: unconsolidated deposits and bedrock. Unconsolidated deposits are characterized by loose beds of gravel, sand, silt, and clay of glacial origin. Bedrock, consisting primarily of sandstone and shale, underlies the unconsolidated deposits throughout most of North Dakota. Subsurface voids that contain water are called aquifers. These areas are saturated geologic formations that yield a usable quantity of water to a well or spring. Aquifers created by unconsolidated glacial outwash deposits are referred to as glacial drift aquifers. They are often more productive than the underlying bedrock aquifers in North Dakota. The principal method of aquifer recharge is a combination of precipitation or melting snow and seepage from area stream and lake water into the subsurface.

Surficial aquifers can be found in unconsolidated deposits within the Study Area. Aquifers in the ground moraine and lake-basin areas are typically of small area extent and thickness. Yields from these aquifers are usually low, are of poor quality, are very hard, and contain objectionable amounts of iron. The aquifer in the outwash sand and gravel of the Little Knife River Valley is considerably important in the vicinity of Stanley. Groundwater generally occurs at water table conditions in this aquifer, but along the southern portion of the Stanley, deposits of clay and silt overlie the water-bearing sand and gravel. Here, it is likely that artesian conditions exist. The aquifer is estimated to be 16 million square feet with an average thickness of seven feet.

Municipal water for Stanley and several farm wells in the area is obtained from the Fort Union Formation. Wells drilled deep into this formation is not typical in the Study Area because of the high clay content found within the unit in this area.

5.10.2 Impacts

5.10.2.1Corridor

Geology

Known mineral resources within the Corridor are limited to gravel pits and oil and gas wells. Six inactive gravel pits were identified within the Corridor, but not within 500 feet of the Project centerline. One active gravel pit is located just outside the Corridor in Section 23. Hawthorn is not aware of any plans for future expansion of any active gravel pit. Impacts resulting from operation of the pipeline facilities are not anticipated. Four oil and gas wells are located within the Corridor. Two wells are listed as active and the other two are listed as dry.

Several economic coal deposits are located in Mountrail County. Economic coal deposits are defined as those that meet the minimum criteria established by coal companies operating surface mines in North Dakota. These economic criteria include defined minimum cumulative coal thickness and maximum coal depths. According to the Lignite Reserves Map from the North Dakota Geological Survey (NDGS), Stanley 100K sheet, no economic coal reserves are in the Study Area. The Route is not expected to cross any derelict mine locations or pass through any potential coalfields considered for future mining.

Temporary extra work spaces will be located in suitable areas near large drainages, above and below slopes where construction is expected to be difficult, at pipe laydown areas, and at sites that will be used for equipment parking and storage. Construction and operation of the pipeline will not materially alter the geologic conditions of the Study Area. Effects from construction could include disturbances to the natural topography along the ROW, due to trenching and grading activities. Over most of the Study Area, alteration of topographic contours would consist of minimal grading of the construction ROW to provide a safe level work surface. If steeply sloping ground conditions are found along the Route, additional grading to achieve a

safe work surface may be required. Following construction, Hawthorn will restore areas to their preconstruction contours, as close as possible.

Groundwater

The construction, operation, and maintenance of the proposed pipeline is not expected to adversely affect groundwater resources in the Study Area or in its vicinity. No measurable alteration of aquifer recharge capacity should occur, and the likelihood of groundwater contamination is insignificant.

Construction of the pipeline could affect groundwater in several ways. Clearing, grading, trenching, and soil stockpiling activities could temporarily alter overland flow and groundwater recharge. Near-surface soil compaction caused by the operation of heavy construction equipment could reduce the soil's ability to absorb water, which could increase surface runoff and the potential for ponding. These impacts would be localized and temporary.

Blasting is not anticipated by Hawthorn. No public or private water supply wells are located within 0.5 miles of the proposed pipeline ROW, and no known source water protection areas would by crossed by the Project.

Some dewatering may occur in areas during construction; however, relatively small volumes would be expected and effects on the overall groundwater system would be small and temporary. If shallow groundwater is encountered during excavations, it may be necessary to dewater those areas during construction. Trench dewatering operations would be brief and would typically last several days, or less. Potential impacts on the groundwater would include minor fluctuations in groundwater levels and/or increased turbidity within the aquifer adjacent to the activity. Because of the relatively small amount of water removed, the short duration of the activity, and the local discharge of the water, groundwater levels would quickly recover after pumping stops. Hawthorn would follow a Construction Plan that provides guidance on the location of dewatering structures, resulting in no deposition of sediments into wetlands and waterbodies, and no impacts on cultural resources or habitat for sensitive species. Hawthorn believes any effects from dewatering on groundwater and other environmental resources would be localized, temporary, and insignificant.

5.10.2.2 Proposed Route

Geology

As noted in Section 5.10.2.1, known mineral resources within the Corridor are limited to gravel pits and oil and gas wells. Therefore, construction and operation of the Project will not affect existing and future production of surficial mineral resources. Operation of the pipeline will not have any anticipated effects on future mineral production, including loss of revenue and diminished mineral land values. No geological hazards are expected to be created, provided the contractor uses prudent engineering design and construction practices.

Groundwater

Potential impacts on groundwater resources that could arise as a result of pipeline construction include increased runoff and reduced infiltration. This could affect localized groundwater recharge, localized draw down of groundwater, and the possibility of contamination from site drainage or accidental spillage of fuel, lubricants, and chemicals.

In locations where groundwater is close to the surface, trench excavation could possibly intersect the water table, requiring trench dewatering. Localized and minor changes to the water table could occur as a result of these activities. Because pipeline construction at a given location will be completed in a short period of time, any potential impacts from dewatering activities would be temporary.

5.10.3 Mitigation

5.10.3.1Corridor

Geology and Groundwater

Hawthorn will develop a SPAR Plan to address preventive and mitigative measures that will be used to avoid or minimize the potential impact of hazardous material spills during construction Efforts will be made during construction to ensure proper control and handling of petroleum or other chemical products.

5.10.3.2 Proposed Route

Geology and Groundwater

The greatest potential for impacts on groundwater would be an accidental release of a hazardous substance, such as fuels, lubricants, and coolants, during construction or operation. Dewatering of the pipeline trench may be carried out in areas where there is a high water table. The discharge of this water will be in accordance with relevant state guidelines.

Upon completion of construction, Hawthorn will restore the ground surface as much as possible to original contours and will revegetate the ROW to ensure restoration of preconstruction overland flow and recharge patterns. Preventative measures such as regular inspection of storage areas for leaks, replacement of deteriorating containers, and construction of containment systems around hazardous liquids storage facilities would follow the SPAR Plan discussed in Section 5.10.3.1.

5.11 Surface Water and Floodplain Resources

5.11.1 Description of Resources

Surface water and floodplain resources for the Corridor and Route were identified by reviewing U.S. Geological Survey (USGS) topographic maps, Flood Insurance Rate Maps (FIRM) produced by the Federal Emergency Management Agency (FEMA), U.S. Department of Agriculture 2006 Farm Service Agency (FSA) aerial photography, and USFWS National Wetland Inventory (NWI) data.

5.11.1.1 Surface Waters

The Study Area is located within the Lake Sakakawea Sub-basin (HUC 10110101). Surface water in the Study Area drains into Lake Sakakawea, which is a reservoir on the Missouri River located about 20 miles south of the Study Area. The Missouri River drains into the Mississippi River and ultimately into the Gulf of Mexico.

The topography of Study Area is rolling and contains numerous perennial lakes, seasonal lakes, and wetlands. Within the Study Area waterbodies are generally less than five acres in size. However, there are several lakes in the north and east parts of the Study Area that are greater than 100 acres in size. Excluding the riparian area along the Knife River, within the Corridor, NWI data indicates the largest waterbodies are generally less than ten acres in size, with the typical wetland being less than one acre in size.

Most of the stream flow in the Study Area comes as a result of patterns in precipitation, evapotranspiration, soils, and topography. Although these flows can vary, the highest stream flows generally occur in spring and early summer as a result of snowmelt, rain falling on melting snow, or heavy rain falling on saturated soils. Three different intermittent watercourses are crossed by the Corridor: the Knife River (crossed in two locations), a tributary to the Knife River, and a tributary to a lake in Section 13 of Idaho Township. Of these watercourses, the Route crosses the Knife River at two locations (Sections 23 and 27 of Idaho Township). NWI data records freshwater emergent riparian areas along both of the Knife River crossings. The Knife River riparian areas are about 200 feet wide at the Section 23 crossing and about 600 feet wide at the Section 27 crossing.

The NDDH, along with other state and federal agencies, has programs that monitor ambient water quality at fixed sites on major bodies of water. Water quality is evaluated on a periodic basis under Sections 305(b) and 303(d) of the Clean Water Act, 33 U.S.C. §§ 1251-1376 (CWA). The 305(b) report provides an inventory of surface water quality throughout the state to determine if established water quality standards are being met. Every two years, the NDDH develops and the U.S. Environmental Protection Agency reviews a list of North Dakota waterbodies that do not meet water quality standards for designated uses. Waterbodies in noncompliance are placed on the 303(d) List and are referred to as "impaired." Once placed on this list, "impaired" waters plans are developed to conduct a Total Maximum Daily Load (TMDL) study to set goals needed to improve water quality. Within the Study Area, the Knife River from the Stanley Reservoir downstream to Lake Sakakawea is consider an impaired water due to fecal coliform. There are no impaired waters within the Corridor or Route (EPA, 2008).

5.11.1.2 Floodplains

Floodplains are low-lying areas subject to periodic inundation, due to heavy rains or snow melt. These areas are generally adjacent to lakes, rivers, and streams. In their natural state, floodplains provide necessary temporary water storage during flooding events. The periodic flooding and drying in floodplain areas creates a unique habitat that supports a wide variety of plant and animal species. FEMA conducts engineering studies to delineate the extent of flood zone areas and boundaries in flood prone communities. A review of FIRM maps for Mountrail County reveals that detailed FEMA 100-year floodplain maps are not available within the Study Area. However, it is likely that a 100 year-floodplain associated with the Knife River exists, but has not been mapped by FEMA.

5.11.2 Impacts

5.11.2.1 Corridor

A Route sited within the Corridor would require the crossing of the Knife River and associated riparian areas at two locations. This Route would also cross the 100-year floodplain of the Knife River. This floodplain has not been mapped by FEMA. The other two intermittent streams within the Corridor, a tributary to the Knife River, and a tributary to a lake in Section 13 of Idaho Township, could be avoided by the Route.

Adverse impact to surface waters or floodplain resources within the Corridor is not anticipated. When crossing waterways, floodplains, or in environmentally sensitive areas such as wetlands, trenchless or "no-dig" technology will be used. This will minimize the disruptive effects that are generally associated with open trench pipeline construction, which will be used in the overland portions of the Route. Hawthorn will

employ HDD at stream crossings. In addition, each watercourse crossing will be designed to assist in the stability and long-term performance of stream banks.

The high-pressure pipe network buried underground will not be prone to flood damages or contribute to flooding within the Corridor and ROW.

5.11.3 Proposed Route

The Project construction will involve boring beneath the Knife River at two locations. In order to comply with Executive Order (EO) 11988 Floodplain Management, and local floodplain management ordinances, the Project will be designed to avoid impacts within the 100-year floodplain, or encroach on the floodway. This will result in long term beneficial affects to floodplain values.

5.11.4 Mitigation

5.11.4.1 Corridor

Impacts within the Corridor which would require mitigation are not anticipated. The Corridor will avoid impacts to waters of the United States by using HDD crossing methods. Construction activities will occur over a limited period of time with the minimum equipment required for safe and efficient operations. Direct access of vehicles and heavy machinery to watercourses will be minimized. If it is necessary for mechanical equipment to access the watercourse, it will be inspected in advance. If required, remedial action will be taken to prevent contamination from oil or fuel leakages. Hazardous chemicals, fuels, or lubricating oils will not be stored, and refueling will not be carried out within 100 feet of the watercourse.

Construction of access roads, if adjacent to perennial and intermittent streams and drainage ways, can be designed in a manner to facilitate unrestricted runoff from the upper portion of the watershed to the lower portion of the watershed, and to control runoff from disturbed areas to drainage ways. A National Pollutant Discharge Elimination System (NPDES) permit application and SPAR Plan will be prepared by Hawthorn, and submitted to the NDDH, as required, prior to the initiation of construction.

5.11.4.2 Proposed Route

Placement of the pipe will be designed and constructed so it will not impede the flow of any waterway or create any hazard during flooding. The pipeline will be installed below the watercourse bed at a level so the gradients on the channel beds are not impaired, and so future re-grading does not become more difficult. Additional temporary work areas may be required in areas of rough or steep terrain, wash crossings, and any areas identified as containing sensitive environmental resources. The location and extent of the bored sections will be determined by the physical and environmental constraints that would otherwise preclude the open-cut trenching methods. Environmentally sensitive areas such as wetlands and streams can be bypassed underground with trenchless methods. Selection of an appropriate method depends on site conditions and project priorities. Feasible construction methods for the proposed bored segments will be evaluated during preliminary design. Recommended construction methods will be provided during the final design to confirm the alignments, pipeline length, and anticipated geotechnical conditions.

Boring of the pipeline with below-ground tunneling methods will be utilized in the construction and installation of new fluid carrying 8-inch diameter piping. A small diameter tunnel will be drilled under each waterbody, and will then be enlarged. The pre-assembled pipeline will then be pulled through the tunnel.

Trenching and water diversion are not required with this method. It is anticipated that HDD will provide the necessary minimization measures for the avoidance of adverse short term impacts to the floodplain.

Pipeline crossings can only be constructed when the ground is firm and stable enough to permit the use of heavy equipment. In northern climates, this may require construction during winter when the ground is frozen solid. Generally, midwinter and late-summer are good times to pursue pipeline crossing projects, because the climate is either cold enough to freeze wetlands or warm and dry enough to avoid problems associated with heavy rain.

Pipeline crossings should be scheduled at times when there is as little heavy rainfall as possible. This will minimize the risks of debris, stockpiled soil, and other sources of sediment being washed into the streams. Disturbance of stream bottom sediment can result in changes in the community composition and location of invertebrate species downstream. Additionally, increased sediment loading can further reduce downstream dissolved oxygen concentrations by increasing biological oxygen demand. Therefore, minimizing sediment discharges should be an optimal goal of protecting stream ecology and diversity. If HDD is employed, inadvertent releases of drilling fluids and lubricants through seepage may occur, which sometimes can reach surface waters.

If ambient downstream flow rates are encountered, they will be maintained to protect aquatic life. Measures will be taken to minimize sediment loadings in the stream. Temporary erosion and sediment control measures will be installed across the entire width of the construction ROW after clearing and before ground disturbance. No silt/turbid discharge water from the trench dewatering operations will be allowed to enter any drain, waterbody, or wetland. Discharge of water from dewatering and hydrotesting operations will comply with relevant state discharge guidelines.

Where flooding has the potential of causing erosion of stream banks to the extent that pipelines are exposed, the pipeline crossing will be designed to accommodate usual flood or scour conditions at water crossings. Typically, bored crossings below streams are installed deeper than required by USDOT regulations at 49 CFR § 195.248. Site-specific geotechnical conditions will determine the actual depth of individual bored crossings.

5.12 Wetlands

5.12.1 Description of Resources

Wetlands within the Corridor and Route were identified using four primary sources of information: USFWS NWI data; a USACE approved delineation prepared for Section 14, T156N, R91W; a USFWS delineation conducted on USFWS wetland easements crossed by the proposed Route; and an informal on-site delineation of NWI wetland boundaries. See Figure 8 and Appendix B.

5.12.1.1 USFWS NWI Wetlands

Wetlands within the Study Area, Corridor, and Route have been identified by reviewing USFWS NWI data and recent aerial photography. NWI data provides guidance in determining areas to be evaluated for wetland characteristics, but it should not be used as the sole basis for wetland determinations.

Within the Study Area, NWI wetlands generally consist of scattered prairie pothole type wetlands that have a seasonal to semi-permanent water regime and open water wetlands with a permanent water regime. Riparian wetland is also present along the Knife River. The largest NWI wetland within the Study Area is about 100 acres and the typical NWI wetland is less than five acres. In the Study Area, the Knife River riparian area

maintains a width of over 1,000 feet where it flows south of US Highway 2. This riparian width is less than 200 feet north of US Highway 2.

NWI records approximately 200 acres of wetlands within the Corridor. Except for the relatively contiguous riparian Corridor along the Knife River, wetlands in the Corridor are representative of prairie pothole wetlands. Pothole wetlands within the Corridor range in size from 100 square feet to about 15 acres, with the typical NWI wetland being less than one-acre. NWI wetlands are scattered relatively evenly throughout the Corridor. Along the Knife River, NWI data indicates the riparian wetlands are generally 200 to 400 feet wide on the south side of US Highway 2, and 100 to 200 feet wide on the north side of US Highway 2. Table 5-11 summarizes counts and acreages of NWI wetlands within the Corridor. These wetlands are also shown on Figure 8.

Table 5-11. NWI Wetland Types and Acreages Found in the Corridor

Wetland Acreages (by type)		
Cowardin Classification	**Count**	**Acres[1]**
Palustrine, Aquatic Bed, Semipermanently Flooded (PABF)	2	21.28
Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated (PABFx)	1	0.46
Palustrine, Aquatic Bed, Intermittently Exposed, Excavated (PABGx)	1	0.46
Palustrine, Emergent, Aquatic Bed, Semipermanently Flooded (PEM/ABF)	1	23.88
Palustrine, Emergent, Aquatic Bed, Semipermanently Flooded, Diked/Impounded (PEM/ABFh)	1	33.01
Palustrine, Emergent, Temporarily Flooded (PEMA)	49	16.36
Palustrine, Emergent, Temporarily Flooded, Partially Drained/Ditched (PEMAd)	1	3.23
Palustrine, Emergent, Seasonally Flooded (PEMC)	107	102.48
Palustrine, Emergent, Seasonally Flooded, Partially Drained/Ditched (PEMCd)	1	0.77
Palustrine, Scrub-Shrub, Temporarily Flooded (PSSA)	1	1.17
Palustrine Unconsolidated Shore, Seasonally Flooded, Diked/Impounded (PUSCh)	1	0.17
Total		**203.27**

[1] Wetland acreage calculated by overlaying the proposed corridor onto USFWS NWI data.

The NWI wetlands located along the Route include primarily palustrine emergent wetlands, as summarized in Table 5-12.

Table 5-12. NWI Wetland Types and Acreages along the Route

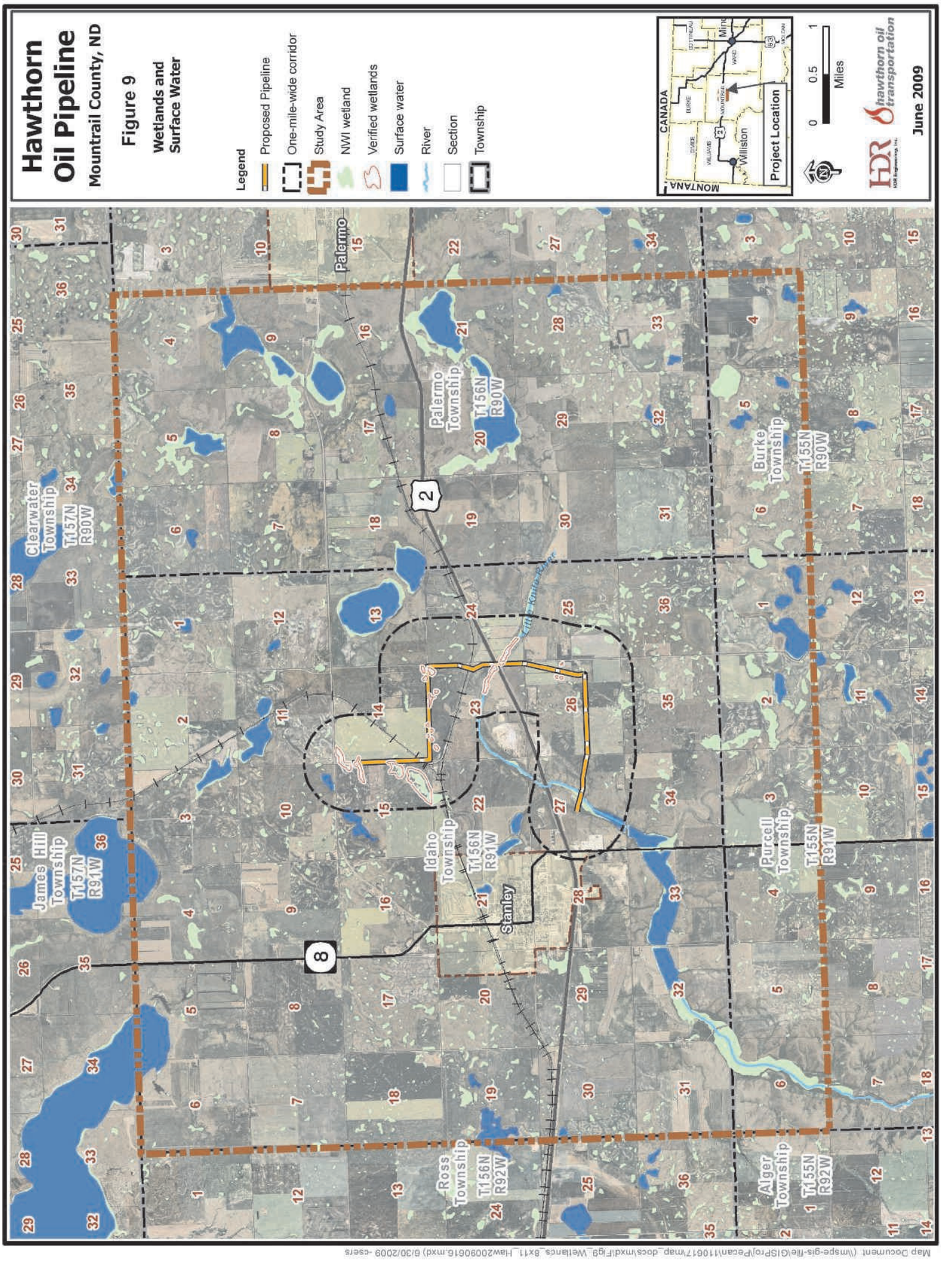
Wetland Acreages (by type)		
Cowardin Classification	**Count**	**Acres[1]**
Palustrine, Emergent, Aquatic Bed, Semipermanently Flooded, Diked/Impounded (PEM/ABFh)	1	0.55
Palustrine, Emergent, Temporarily Flooded (PEMA)	4	0.20
Palustrine, Emergent, Seasonally Flooded (PEMC)	6	1.48
Total		**2.23**

[1] Wetland acreage calculated by overlaying the proposed corridor onto USFWS NWI data.

5.12.1.2 USACE Approved Delineation in Section 14, T156N, R91W

On November 11-12, 2008, a wetland delineation was conducted in Section 14, T156N, R91W (Section 14) on behalf of EOG Resources, Inc. conducted according to the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (USACE, 2008). The USACE enforces Section 404 of the CWA, which regulates the discharge of dredged or fill material into waters of the United States, including wetlands. A wetland delineation report for Section 14 was submitted to the USACE in December, 2008. On January 29, 2009 the USACE confirmed that the delineated wetlands in Section 14 are isolated from waters of the United States and do not fall under the jurisdiction of the USACE (USACE Reference Project #NWO-2008-03114-BIS).

Figure 8. Wetlands and Surface Water



5.12.1.3 USFWS Wetland Easements

Wetland easements are legal agreements signed with the United States of America, through the USFWS, that pays landowners to permanently protect wetlands. Wetlands covered by an easement cannot be drained, filled, leveled, or burned. When these wetlands dry up naturally, they can be farmed, grazed, or hayed. When wetland easements are mapped as a larger parcel of land, as is the case for most of the Study Area, the easement only applies to the wetlands located on that parcel; uplands are not protected as part of a wetland easement.

On May 13, 2009, HDR conducted an on-site visit of the Route with Greg Harper a USFWS Wetland Manager in the Lostwood Management District. During this visit, the USFWS delineated and approved wetland boundaries located on USFWS wetland easements that the Route crosses in Sections 23 and 26, T156N, R91W. The Route avoids all wetlands located on USFWS easements.

5.12.1.4 Wetland Delineation

During the May 13, 2009 and July 21, 2009 site visits, HDR did a delineation of wetlands that are crossed by the Route. This wetland delineation was conducted in accordance with the *Interim Regional supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region*. This delineation identified the wetland boundaries of the Knife River crossings, verified the absence of wetlands in three small mapped NWI areas in Section 26, and confirmed the presence of wetlands within Section 14. (See Appendix B for a full summary of and exhibits associate with this wetland delineation).

Hawthorn will generally avoid most wetland crossings within the Route by its routing or use of HDD. Where wetlands cannot be avoided, standard wetland construction mitigation measures will require that equipment working in wetlands be limited to those essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where access to the ROW is only available through the wetland area, non-essential equipment will be allowed to travel through wetlands only if the ground is firm enough or has been stabilized, to avoid rutting. If rutting is anticipated, non-essential equipment will be allowed to travel through wetlands only once, and essential equipment will need to be stabilized with prefabricated equipment mats or terra mats.

Clearing of vegetation in wetlands will be limited to trees and shrubs, and disruption of the area will be restricted to the area immediately over the trench line. During clearing activities, sediment barriers will be installed and maintained adjacent to wetlands and within temporary extra workspaces, as necessary to minimize the potential for sediment runoff.

5.12.2 Impacts

5.12.2.1 Corridor

Adverse impacts to wetlands located on USFWS easements are not anticipated. However, if necessary, wetland areas within USFWS wetland easement areas will be directionally drilled by boring without disturbance. Outside of USFWS easements, a review of the data sources mentioned above, indicates there are numerous areas with positive wetland indicators present within the Corridor (See Figure 8). The Route will avoid wetlands within the Corridor whenever feasible.

Construction activities will be conducted in a manner that will avoid/ minimize impacts to existing wetland habitat in the Study Area. However, sediment may reach surface waters as the ground is disturbed by

excavation, grading, and construction traffic. Reasonable efforts will be employed to limit any sediment movement within the Study Area. Following completion of pipeline installation, it is anticipated that there will be no additional impacts on surface wetlands or water quality.

5.12.2.2 Proposed Route

The Route is not anticipated to cause impacts to wetlands located on USFWS easements. However, if necessary, wetland areas within USFWS wetland easement areas will be directionally drilled by boring without disturbance. On non-USFWS easement lands, several wetlands were identified along the pipeline Route which cannot feasibly be avoided; these wetlands may be temporarily impacted during construction.

Construction activities will be conducted in a manner that will avoid/minimize impacts to existing wetland habitat in the Study Area. Reasonable efforts will be employed to limit any sediment movement within the Study Area. Following completion of pipeline installation it is anticipated that there will be no additional impacts on surface wetlands or water quality.

5.12.3 Mitigation

5.12.3.1 Corridor

Adverse impacts to wetland areas found within USFWS wetland easements within the Corridor are not anticipated. Other wetland areas will be avoided when possible. Hawthorn will use BMPs during construction, operation, and maintenance of the pipeline to protect topsoil and minimize soil erosion into adjacent wetland resources. Practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with native species.

5.12.3.2 Proposed Route

Temporary impacts are anticipated to wetlands within the Route that are not under the jurisdiction of the USFWS or USACE. Hawthorn will use BMPs during construction and operation of the pipeline to protect topsoil and minimize soil erosion into adjacent wetland resources. Precautionary practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and revegetating disturbed areas with native species. If pipe boring is being performed, an excavated work area will be required on each side of the crossing for placement of boring equipment. Safety precautions such as bank shoring/sloping of the trench, road crossings and detour signs, barricades, night flashers or other devices will be used when necessary.

5.13 Vegetation

5.13.1 Description of Resources

The Study Area is located within the Missouri Coteau Slope Level IV ecoregion. Land use and landcover within this ecoregion is mainly tilled agriculture of spring wheat, barley, alfalfa, and silage corn. In this region some grazing takes place on steep, saline, or wet areas. Native vegetation within this ecoregion includes western wheatgrass, needle and thread, prairie junegrass, and green needlegrass. This ecoregion is located within the larger Northwestern Glaciated Plains Level III ecoregion, which has a western boundary that is formed by the Missouri River. The Northwestern Glaciated Plains marks the westernmost extent of continental glaciations (USGS, 2006).

Specific land cover types found within the pipeline Corridor and Routes were determined using the North Dakota Gap Analysis (GAP) Land Cover mapping (USGS, 2004). The Corridor crosses 19 GAP vegetative land cover types, along with small amounts of barren land and water. The Route crosses 12 vegetative land cover types, plus barren land and water. Table 5-13 lists GAP land cover types found within the Corridor and Route, their general descriptions, typical vegetative species, and total acreage within the Corridor and the Route.

The two primary land cover types crossed by the Corridor are cropland and planted herbaceous perennials. These areas comprise about 55 and 18 percent, respectively, of the land cover crossed by the Corridor. The two primary land cover types crossed by the Route are also cropland and planted herbaceous perennials. These areas comprise about 78 and 10 percent, respectively, of the land cover crossed by the Route.

Table 5-13. Land Cover Types

GAP Vegetation Type	Corridor (Acres)	Percent of Corridor	Route (Acres)	Percent of Route
Cropland. Lands tilled and planted to annual herbaceous small grain and row crops. Common small grain crops include wheat, barley, and oats. Examples of row crops include corn, sunflowers, soybeans, and dry edible beans. The land cover category includes both non-irrigated and irrigated crops. These lands have a bare soil phase during the growing season that generally occurs in early spring when most crops are planted.	1,935	55.0	57	77.9
Planted herbaceous perennials. Lands planted to perennial herbaceous grasses, forbs, or grass-legume mixtures. Often the species planted are introduced species such as smooth brome, crested wheatgrass, alfalfa, and sweet clover, although some plantings are native grass species. Most lands are used to produce forage crops for harvest or for grazing by domestic livestock. This class includes lands enrolled in retired cropland conservation programs that are planted to grass and legume species. In addition to planted fields, smooth brome has invaded and established stands in many native grasslands, and some of these are likely mapped as planted grasslands. Leafy spurge invasions in native grassland may also be mapped as this class.	638	18.1	8	10.4
Mesic tall and mixed grasses. The species composition is heavily influenced by grazing history and moisture availability. On the most mesic sites with light grazing, big bluestem and other tall grasses can be abundant. As water availability decreases or herbivore increases, mid grasses such as western wheatgrass, green needlegrass, and smooth brome increase in importance. Under heavy continuous grazing Kentucky bluegrass and blue grama can dominate the sites. Landscape positions include swales, depressions, and footslopes with increased water availability from runoff from adjacent lands.	6	0.2	--	--
Bluestem - Needlegrass-Wheatgrass transition prairie. A transition prairie between tall grass prairie to the east and mixed grass prairie to the west generally occurring on soils derived from glacial materials. Common species are little bluestem, porcupinegrass, green needle grass, big bluestem, switchgrass, western wheatgrass, slender wheatgrass, needle and thread grass, blue grama, Kentucky bluegrass, and smooth brome. Dominance by a single species typically occurs only over small areas with most stands less than 0.1 ha in size. The	225	6.4	2	3.2

GAP Vegetation Type	Corridor (Acres)	Percent of Corridor	Route (Acres)	Percent of Route
complex distribution of species over short distances is believed to be largely determined by variability in plant available moisture and nutrients. An outstanding feature of glacial till parent materials is their variability due to the diverse ways by which the debris was laid down, of differences in the chemical composition of the original materials and of fluctuation in the grinding action of the ice. Soils heterogeneity occurs over short distances with textures varying from sands, silts, sand, and clays.				
Wheatgrass prairie. This vegetation occurs on nearly level to rolling landscapes with deep, well drained, medium to fine textured soils. Dominant graminoid species include western wheatgrass, green needlegrass, needle and thread grass, and blue grama. Saltgrass and brittle prickly pear are often common and diagnostic species of sites with saline-alkali soils. Wyoming big sagebrush and silver sagebrush can occur as scattered shrubs contributing little cover in some stands in the Missouri plateau physiographic region.	124	3.5	1	1.6
Needlegrass prairie. Dominant grasses are needle and thread grass, blue grama, and upland western wheatgrass and prairie sandreed are abundant locally. This vegetation occurs on nearly level to rolling landscapes with shallow to deep, moderately coarse textured soils, with moderate permeability and low to moderate available water capacity.	154	4.4	<1	0.3
Little bluestem prairie. This vegetation type represents a heterogeneous plant community where little bluestem is a common and conspicuous species. Other common graminoid species include threadleaf sedge, needle and thread grass, and prairie sandreed. In western ND some stands, particularly on north facing slopes, may have small thickets and scattered individuals of creeping juniper, skunk bush, silver buffaloberry, silver sagebrush, Saskatoon serviceberry, soapweed yucca, and occasionally individuals of Rocky Mountain juniper or green ash. The community occurs primarily on steep to moderately steep slopes on the sides and crests of hills. Soils are shallow, of coarse to moderately fine texture, overlaying sandstone, shale or siltstone parent materials that restrict rooting depth.	35	1.0	<1	<0.1
Sand prairie. Diagnostic grasses include prairie sandreed, sand bluestem, needle and thread grass, and blue grama. Stands of this map unit occur on poorly to moderately well-developed, well or excessively drained coarse textured sand, loamy sand, or sandy loam soils. Topography ranges from nearly level to hilly and choppy wind-worked sand dunes. There is little runoff or evaporation because of the high permeability of the soil. Soil near the surface is consequently dry throughout much of the year, but moisture is present further down, favoring deep-rooting species.	50	1.4	<1	1.0
Saline prairie. Characteristic grasses include saltgrass, foxtail barley, Nuttall's alkali grass, and alkali cordgrass. This vegetation type occurs in shallow basins and lake plains, low terraces and bottomlands along streams that receive additional water from seepage and/or runoff with deep, poorly drained, medium, and fine textured saline and alkaline soils.	10	0.3	--	--

GAP Vegetation Type	Corridor (Acres)	Percent of Corridor	Route (Acres)	Percent of Route
Upland deciduous shrubland. Upland areas dominated by shrubs typically occur on sites where available soil moisture is greater than sites with prairie land cover types and less than sites with woodland land cover types. Sites include well-drained depressions and riparian areas, north and east facing slopes, and woodland edges. Stands are typically small and vary greatly in shrub density and species composition. The following species are dominants in different stands: western snowberry occupies upland depressions, mesic swales, and flood plains; silver buffaloberry, chokecherry, Juneberry, fireberry hawthorn, silverberry, and American plum often occur as small, dense thickets in mesic swales and aspects, and the outer edges of floodplains and woodlands; smooth sumac occurs on the edges of Bur Oak woodlands in eastern North Dakota; skunkbush sumac occupies ridges, hills, and slopes associated with scoria outcrops in south western North Dakota; Eastern poison ivy often obtains greatest abundance on sandy soils.	55	1.6	<1	0.9
Lowland deciduous shrubland. Depression and riparian areas dominated by shrubs with a high water table and high water availability. This map unit includes lands mapped by the Palustrine scrub-shrub. Sandbar willow and peachleaf willow are common shrub species in this map unit. Beaked hazelnut, a common understory species of Aspen and Bur Oak woodlands, occurs as dense riparian shrublands in Pembina Hills.	1	<0.1	--	--
Deciduous woodland. Woodlands dominated by mixtures of deciduous species including the native tree species green ash, bur oak, aspen, American elm, and eastern cottonwood and a wide variety of introduced deciduous and conifer tree species planted in shelterbelts, windbreaks and tree rows.	10	0.3	--	--
Lacustrine wetland. Wetlands and deepwater habitats with the following characteristics: (1) situated in a topographic depression or a dammed river channel, (2) lacking trees, shrubs, persistent emergents, emergent mosses, or lichens with greater than 30% area coverage.	1	<0.1	--	--
Palustrine temporary wetland. Wetlands dominated by persistent emergents or aquatic beds where surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface. Plants that grow in both uplands and wetlands may be characteristic of this water regime.	17	0.5	<1	0.3
Palustrine seasonal wetland. Wetlands dominated by persistent emergents or aquatic beds where surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.	107	3.1	2	3.2
Palustrine semipermanent wetland. Wetlands dominated by persistent emergents or aquatic beds where surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land's surface.	50	1.4	<1	0.7

GAP Vegetation Type	Corridor (Acres)	Percent of Corridor	Route (Acres)	Percent of Route
Water. Surface water identified from analysis of Landsat Thematic Mapper imagery that was not identified as wetlands in the U.S. Fish and Wildlife Service National Wetland Inventory Data.	7	0.2	<1	0.2
Barren land. Lands characterized by rock, gravel, sand, or soil and the absence or low abundance of vegetation. Examples include mines, roads, oil pads and other anthropogenic or natural disturbances that result in the loss of vegetation.	55	1.6	<1	0.1
Developed-high intensity residential. Highly developed areas where people reside in high numbers.	4	0.1	--	--
Developed-low intensity residential. Lands consisting of a mixture of constructed materials and vegetation.	3	0.1	--	--
Developed - commercial/industrial/transportation. Infrastructure such as roads, railroads, airports and other highly developed areas not classified as high intensity residential.	3	0.9	<1	0.2

Noxious weeds are defined as plant species that are difficult to control, spread easily, and are injurious to public health, crops livestock, land, or other property. Twelve species in North Dakota are listed as noxious weeds. Table 5-14 lists these 12 species and their recorded presence in Mountrail County. In addition, Mountrail County has added three species to their noxious weed list, common tansy (*Tanacetum vulgare*), yellow toadflax (*Linaria vulgaris*), and houndstongue (*Cynoglossum officinale*).

Table 5-14. North Dakota Noxious Weeds

Common	Scientific	Acres Reported in Mountrail County as part of 2007 NDDA Noxious Weed Survey
Absinth wormwood	*Artemisia absinthium*	1,200
Canada thistle	*Cirsium arvense*	20,100
Dalmation toadflax	*Linaria genistifolia*	--
Diffuse knapweed	*Centaurea diffusa*	--
Field bindweed	*Convolvulus arvensis*	900
Leafy spurge	*Euphorbia esula*	12,300
Musk thistle	*Carduus nutans*	2
Purple loosestrife	*Lythrum salicaria*	--
Russian knapweed	*Centaurea repens*	--
Saltcedar	*Tamarix ramosissima*	1,100
Spotted knapweed	*Centaurea maculosa*	300
Yellow starthistle	*Centaurea solstitialis*	--

The Corridor and Route do not contain state or federal grassland or USFWS grassland easements.

5.13.2 Impacts

5.13.2.1Corridor

Permanent adverse impacts to vegetation are not expected to occur within the Corridor. Temporary impacts may occur within the Route and where access is needed for pipeline construction activities. Wooded or forest areas within the Corridor are uncommon and are primarily associated with streams and wind breaks which are generally found near current or former homesteads.

5.13.2.2 Proposed Route

Existing agricultural and grazing practices in the Route have substantially altered the original vegetative landscape. Minimal impacts are expected to occur to native plant communities. Permanent vegetative impacts from pipeline construction are not anticipated.

Temporarily disturbed areas that are normally cultivated will be available after pipeline construction is complete. Areas not currently in agricultural use will be reseeded per USFWS and NRCS recommendations to blend in with existing vegetation and discourage establishment of invasive plant species.

5.13.3 Mitigation

5.13.3.1 Corridor

Hawthorn will work closely with landowners to minimize adverse impacts to vegetation associated with construction of the pipeline. The Corridor and Route were designed to avoid impacts to woodlands and windbreaks where possible. Impacts to wooded areas are anticipated to be minimal. Hawthorn has conducted a pre-construction survey for wetlands (See Section 5.12.1) and native prairie to minimize any impacts to those areas. Hawthorn will use trenchless technology (i.e., HDD) to avoid impacts to wetlands that have been identified within the Route. Hawthorn will use BMPs during construction and operation of the pipeline to protect topsoil and minimize soil erosion to wetland resources. Practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with native species.

5.13.3.2 Proposed Route

See above, Section 5.13.3.1.

5.14 Wildlife

5.14.1 Description of Resources

The North Dakota Game and Fish Department (NDGFD) estimates approximately 81 species of mammals, 223 species of breeding birds, 15 species of reptiles, 11 species of amphibians, and 95 species of fish are in North Dakota. The responsibilities of NDGFD relate primarily to its role as the natural resource agency with primary responsibility over conservation of natural resources and the protection of the environment, under the NDGFD Plan.

Wildlife habitat types in the Corridor generally coincide with the major vegetation types described in this section. Wildlife in the Study Area consists of birds, mammals, fish, reptiles, amphibians and insects, both resident and migratory, which utilize habitat in the Study Area for forage, migratory stopover, breeding,

and/or shelter. Species present in the Study Area are associated with agricultural fields, pasture grasslands, and wetland areas. Common wildlife species may include ruffed, sharp-tailed, and sage grouse, Hungarian Partridge, mourning dove, ducks, geese, sand hill crane, snipe, woodcock, ring-necked pheasant, various raptors, rabbit, and squirrel. Larger mammals that are found within the area include red fox, coyote, white tail deer, mule deer, and pronghorn antelope.

5.14.2 Impacts

5.14.2.1Corridor

Construction activities will include the use of up to a 150 foot wide ROW for clearing, leveling, trenching, stock-piling backfill, pipe assembly, and equipment movement. Impacts to wildlife resulting from clearing and construction will involve habitat removal and modification. This will result in the temporary removal of existing vegetation from the proposed ROW and a direct/indirect effect on the wildlife that reside in or wander into the construction area.

5.14.2.2 Proposed Route

The majority of the Route is cross tilled agricultural land with lesser areas of pasture/prairie land. These habitats have generally been altered from their original vegetation community structure and diversity as a result of crop production and livestock grazing. ROW clearing and grading and other pipeline construction activities associated with the pipeline construction and operation will result in the removal of vegetation, alteration of wildlife habitat, and displacement of wildlife. In general, impact on terrestrial wildlife would be short -term and minimal, because sensitive habitats would not be affected. Additionally, much of the area affected by construction would be reverted to the pre-construction habitat type following construction.

5.14.3 Mitigation

5.14.3.1Corridor

Vegetative clearing along the construction ROW for the pipeline could potentially impact nesting migratory birds protected under the Migratory Bird Treaty Act of 1918, 16 U.S.C. §§ 703-712 (MBTA). The MBTA protects most bird species, including, but not limited to, cranes, ducks, geese, shorebirds, hawks, and songbirds. Migratory bird pathways, stopover habitats, wintering areas, and breeding areas may occur within the Corridor, and may be associated with wetlands, ponds, shorelines, riparian corridors, fallow fields and grasslands, and woodland and forested areas. To protect nesting migratory birds, it is recommended that all active migratory bird nests are avoided during construction and operation of the pipeline.

5.14.3.2 Proposed Route

Prior to construction activities, a presence/absence survey will be conducted for active nest building or nest repair. In the event that migratory birds are encountered on-site during project construction, every effort will be made to avoid the taking of protected birds, active nests, eggs, and/or young. Hawthorn will continue to consult with the USFWS, as needed, regarding nesting avian species within the Route.

During operation of the pipeline, little if any vegetation maintenance will be required. Where vegetation maintenance will be required, adverse impact on wildlife and bird species using the ROW is not anticipated.

5.15 Rare and Unique Natural Resources

5.15.1 Description of Resources

Five USFWS WPAs (Halverson, Howell, Idaho, Palermo, and State of ND #2) are located wholly or partially within the Study Area. The focus of these areas is to preserve wetlands and grasslands critical to waterfowl and wildlife. There is also a NDGF WMA within the Study Area, the Palermo WMA. All of these public lands are located in the north and east sides of the Study Area. None of these areas are crossed by the Corridor or the Route.

There are also four wetlands within the Study Area that have been designated as Critical Habitat Areas for the federally threatened Piping Plover. These critical habitat areas generally correspond to the wetlands that are partially including in the Halverson, Idaho, Palermo, and State of ND #2 WPAs. None of these Critical Habitat Areas are crossed by the Corridor or the Route.

The USFWS, NDGF, and North Dakota Parks and Recreation Department (NDPR) were asked to review the Study Area, Corridor, and Route for threatened and endangered species and unique habitats.

The Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1544 (ESA), ensures that any actions authorized, funded, or carried out by federal agencies do not jeopardize the existence of any listed endangered, threatened, or candidate species. The USFWS stratifies potential candidates based upon the species' biological vulnerability. Species listed as endangered or threatened are provided full protection, which includes prohibition of destruction of critical habitat. Candidate species are those under consideration for inclusion onto the threatened or endangered species list. While they are sensitive species they are not afforded formal protection under the ESA.

In response to a request for a project review, the USFWS stated that Piping Plover (*Charadrius melodus*), a threatened species, and Dakota Skipper (*Hesperia dacotae*), a candidate species, may be found within the Study Area. Additionally, Interior Least Tern (*Sterna antillarum*), Whooping Crane (*Grus americana*), Pallid Sturgeon (*Scaphirhynchus albus*), and Gray Wolf (*Canis lupus*) have been found in Mountrail County, North Dakota.

5.15.1.1 Piping Plover

There are four designated Piping Plover Critical Habitat Areas within the Study Area. Designated Critical Habitat Areas for this species do not exist within the Corridor or the Route. The nearest designated area is located approximately 0.1 miles from the Corridor and about 0.6 miles from the Route.

Piping Plovers are protected on private land and lands in the federal ownership. Within the Corridor and the Route, the Knife River is the only body of water that may offer potential nesting habitat for Piping Plovers. Compaction of soil in dry or frozen conditions has the potential to impact Piping Plovers for many years after the Project is completed.

The following recommendations were made by the USFWS concerning working in potential or known Piping Plover habitat: total avoidance of documented or potential nesting wetlands from April 1 to September 1; a one-half mile no -entry buffer on shorelines of wetlands with potential or documented plover nesting throughout the year; and, any wetland shoreline in the Study Area should be avoided by vehicles.

5.15.1.2Dakota Skipper

The Dakota Skipper, a small to medium-sized hesperiine butterfly is associated with high quality native prairie ranging from wet-mesic tallgrass prairie to dry-mesic mixed grass prairie. This insect has been documented within Mountrail County. Although no requirement exists to protect candidate species, they are considered to be significantly valuable and worth protecting. Any impacts to this species are restricted by the limited existence of their preferred habitat within the Corridor and Route.

The NDGFD indicated they reviewed the Project for wildlife concerns and recommended the Knife River be crossed by directional boring, if possible. The Project will bore under stream crossings and will implement reasonable controls necessary to minimize erosion and sedimentation within those areas. It was also noted that wetlands found within the Study Area should be avoided if possible, and protected if avoidance is not possible. Above-ground appurtenances should not be placed in wetland areas, alterations should not be made to existing drainage patterns, and every effort should be made to prevent the destruction of woody vegetation.

The NDPR provided a response and information from the North Dakota Natural Heritage Inventory Database (NHID) which the NDPR maintains as the most complete source of data on North Dakota's rare, endangered, or otherwise significant plant and animal species, plant communities and other natural features. NDPR provided written comment on May 26, 2009, and noted several occurrences within an approximate one-mile radius of the Study Area. None of the documented occurrences were located within the Corridor or the Route, according to a response on June 8, 2009.

5.15.2 Impacts

5.15.2.1Corridor

Adverse impacts to rare and unique natural resources are not anticipated, as both open water and other sensitive habitats are expected to be avoided by routing and underground boring by HDD.

5.15.2.2 Route

Impacts to rare and unique natural resources are not anticipated. Open water will be avoided, and disturbance to other sensitive habitats, including wetlands, is expected to be minimal. The presence of the wetland community along the Route has been investigated as a part of a preliminary pre-construction wetland delineation survey conducted in 2009.

5.15.3 Mitigation

5.15.3.1Corridor

Site specific mitigation measures will not be necessary because adverse impacts to rare and unique natural resources are not anticipated.

5.15.3.2 Route

A pre-construction inventory of existing wetlands including other vegetation cover types has been conducted along the Route. Hawthorn will avoid the resources identified to the extent practicable and will implement the mitigation measures outlined in Section 5.14.3.1. Additional mitigation measures are not proposed.

5.16 Summary of Route Impacts

Table 5-15. Summary of Route Impacts and Mitigation

Resource	Impact	Mitigation
Demographics	Socioeconomic impacts are primarily positive due to increased expenditures during construction and the long term benefits of an increased tax base of the county due to property taxes. Approximately two acres of agricultural land will be permanently removed from production, due to construction of the Project.	Impacts are primarily positive, so mitigation is not proposed for socioeconomic impacts. Impacts to landowners will be minimized to the extent practicable.
Land Use	Approximately two acres of land will be permanently impacted due to the construction of the pipeline route. The existing land use is primarily agricultural and will remain in agricultural use.	Hawthorn will work with landowners and regulatory agencies to minimize impacts of the Project.
Public Services	Significant impacts are not anticipated.	The Route will be constructed according to the configuration identified by the Utilities to mitigate potential impacts. Impacts to existing public services will be avoided, to the extent practicable.
Human Health and Safety	Adverse impacts are not anticipated.	Hawthorn will follow "prudent avoidance" methods to minimize any potential impacts to human health. If proper safeguards are implemented, no additional mitigation is required.
Noise	The closest occupied structure to the generation outlet is approximately 550 feet. Impacts to noise sensitive land uses are not anticipated.	Mitigation measures are not proposed.
Visual	The pipeline ROW will be evident to individuals traveling on adjacent as well as residences and landowners that live in close proximity to the Route.	The Route minimizes the number of residences impacted by the line.
Cultural and Archaeological	Adverse impacts to previously identified cultural resources are not anticipated.	Hawthorn has completed a Class III Cultural Resources Inventory for the Corridor and the Route with report recommendations provided to the SHPO for concurrence prior to construction.
Recreational Resources	Adverse impacts to recreational resources are primarily visual, and will be limited to individuals using the resources.	The Route will cross agricultural areas for almost the entire length. Visual impacts will be minimal.
Land Based Economies	Approximately two acres of land will be permanently impacted by construction of the pipeline ROW.	Hawthorn will work with landowners to minimize impacts to their land.
Soils	Approximately two acres of land will be permanently impacted by the generation outlet.	BMPs for erosion and sediment control will be utilized to minimize wind and water erosion along the Route. Temporarily disturbed areas that are not cultivated will be revegetated.

Resource	Impact	Mitigation
Geologic and Groundwater Resources	Adverse impacts to geologic and groundwater resources are not anticipated. Hawthorn will consult with appropriate agencies to determine the extent of abandoned underground coal mines in the vicinity of the pipeline.	Mitigation measures are not necessary.
Surface Water and Floodplain Resources	Adverse impacts are not anticipated to intermittent streams, drainage ways, or floodplain resources.	Structures will not be placed within a regulatory floodway.
Wetlands	Wetland areas will be avoided as practicable; wetlands found within USFWS wetland easements will be bored.	A wetland delineation survey was conducted in 2008. Wetland impacts will be avoided to the extent practicable.
Vegetation	Approximately two acres of land will be permanently impacted by the pipeline ROW.	Hawthorn will work with land owners to minimize impacts. Hawthorn will use BMPs during construction and operation to minimize impacts. Temporarily disturbed areas will be reseeded per USFWS and NRCS recommendations.
Wildlife	Impacts to wildlife populations are expected to be minimal.	A variety of mitigation measures will be implemented, as discussed in Section 5.14.3.
Rare and Unique Natural Resources	Impacts to rare and unique natural resources are not anticipated.	Hawthorn will coordinate with the USFWS about any endangered or threatened species observed along the Route.

6.0 PUBLIC COORDINATION

A key component to the Project's success is informing the public of the Project's status. Landowners along the Route were contacted by phone and mail asking for permission to survey their land. ROW and crossing permits have been obtained. Hawthorn will be available to answer landowner questions and provide additional information in person or by phone.

On May 8, 2009, Hawthorn provided a written notice about the Project to county chairmen and auditors; township and city officers; and representatives and senators of districts within the proposed corridor (see Appendix C). Hawthorn, has also notified the key state agencies identified in N.D. Admin. Code § 69-06-01-05 about the Project Corridor and Route, and notified key federal agencies including the USACE, USFWS, and the NRCS. Issues raised by state and federal agencies are described in Section 8.11 of the Application and copies of correspondence are provided in Appendix C.

Hawthorn is committed to keeping key stakeholders engaged in the Project as it moves forward. Hawthorn may host a landowner meeting before the NDPSC if this is deemed appropriate, but this is not currently anticipated to be necessary.

7.0 IDENTIFICATION OF REQUIRED PERMITS/APPROVALS

Table 7-1. Possible Permits and Approvals

Agency	Type of Approval	Status*	Need
Federal Approvals			
USACE	Section 404 Permit	NA	Permit required for fill in jurisdictional waters of the US. If needed, authorization under Nationwide Permit 12 is anticipated.
BNSF	Crossing Permit	Obtained	Required for a project that crosses or is within the railroad ROW.
State of North Dakota			
NDPSC	Waiver of Procedures and Time Schedules	1	Included herein.
	Certificate of Corridor Compatibility	1	Included herein.
	Route Permit	1	Included herein.
NDDH	National Pollutant Discharge Elimination System (NPDES) Permit: General Construction Storm Water	2	Required for disturbance of over 1 acre of land. Must prepare a SWPPP.
SHPO	Permit to Investigate Effects on Cultural Resources	1	Compliance with N.D. Cent. Code ch. 55-03 to assess the potential project effects to cultural resources.
NDDOT	Road Approach/Access Permit	NA	Permit required for construction of access roads from state highways.
	Utility Permit/Risk Management Documents	Obtained	Permit required for utility crossings on state highway ROW.
Local Permits			
Mountrail County Townships	Utility Permit	Obtained	Permit required for utility crossings on county road ROW and in places where the pipeline may parallel within 100-feet of the centerline of any state highway ROW or within 75-feet of the centerline of any county highway ROW.

** Status Explanation:*

1 Applied – decision pending

2 Will apply once Certificate and Route permit is received

3 Final layout will determine whether permit/approval is needed

8.0 FACTORS CONSIDERED

The Siting Act lists 11 factors to guide the NDPSC in evaluating the Corridor and the Route.

8.1 Public Health and Welfare, Natural Resources, and the Environment

The preceding Sections discuss the research and investigations relating the effects of the proposed facility on public health and welfare, natural resources, and the environment. The effects and mitigation in relation to the Corridor and the Route are discussed in the impact and mitigation of Section 5.0. Impacts evaluated in the Corridor and the Route are minor.

8.2 Technologies to Minimize Adverse Environmental Effects

Hawthorn will utilize recent technologies to minimize impacts to the environment. The Corridor study and consequently the Route structures proposed for the Project are the most appropriate technologies to minimize adverse environmental effects. This is evident in the minimal environmental effects identified in this Application.

8.3 Potential for Beneficial Uses of Waste Energy

This factor is not applicable to the Project.

8.4 Unavoidable Adverse Environmental Effects of the Route

Unavoidable adverse environmental effects include the temporary physical impacts to the land, primarily agricultural land, associated with the Project. Hawthorn will implement measures as described in the environmental analysis herein and as identified by regulatory agencies to minimize these unavoidable adverse environmental effects.

8.5 Alternatives to the Proposed Corridor or Route

Corridor and Route alternatives are identified to determine if adverse impacts could be avoided or reduced on environmentally sensitive resources, such as large population centers, scenic areas, wildlife and natural habitat management areas, and wetlands.

A more direct alignment for the Corridor was considered as part of the Corridor development process. However, constraints such as gravel pits, water features, existing structures, occupied residences, and a wastewater treatment plant create less feasible routing opportunities. An alternate Corridor with a more direct north-south alignment would also severely limit the potential to develop a Route the follows existing pipeline rights-of-way.

Alternative Routing was evaluated within the Corridor in an attempt utilize existing ROWs while avoiding impacts to exclusion and avoidance areas, USFWS wetland easements, potential cultural resource areas, and other selection and policy criteria. The alignment of the Route reflects the adjustments that were made following the ROW while avoiding or minimizing impacts to these areas.

8.6 Irreversible and Irretrievable Commitment of Natural Resources for the Corridor or the Route

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

Construction of the Project would help provide an economical and reliable means of transporting oil resources to the market. In order to construct the Project, resources such as steel, aggregate material, and hydrocarbon fuels will be used during construction.

8.7 Direct and Indirect Economic Impacts of the Proposed Facility

Direct economic impacts include impacts associated with agricultural land being temporarily removed from production during pipeline construction. Landowners were compensated for the easements that are required for the pipeline, and once construction is complete, agricultural land within the ROW will still be available for farming.

The remaining direct and indirect economic impacts are primarily positive. To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers will contribute to the total personal income of the region. Additional personal income will be generated for residents in the county and the state by circulation and recirculation of dollars paid out by Hawthorn, as business expenditures and state and local taxes. Expenditures made for equipment, energy, fuel, operating supplies, and other products and services will benefit businesses in the county and the state.

Long-term beneficial impacts to the county's tax base as a result of the construction and operation of the pipeline will improve the local economy. The development of petroleum energy in this region will be important in diversifying and strengthening the economic base of central North Dakota. Additional revenues are expected from property and income taxes.

8.8 Existing Development Plans of the State, Local Government and Private Entities at or in the Vicinity of the Corridor and Route

Conflicts are not anticipated with existing state and local government and private entities' development plans.

8.9 Effect of Route on Cultural Resources

Hawthorn reviewed cultural resources information on file at the SHPO for the Corridor and the Route and prepared a Class I Cultural Resources Inventory and a Class III Cultural Resources Inventory (See Appendix A). A review of the 31 documented properties at the SHPO identified one previously recorded archaeological resource site potentially within the Corridor (Table 5-7).

Hawthorn is committed to minimizing adverse impacts to cultural resources and will avoid these properties and additional properties identified throughout the Project. Cultural resources in the area may be avoided due to the nature of pipeline construction. The pipeline can be constructed to avoid sensitive areas by identifying cultural resource properties early and adjusting the pipeline route accordingly. In the event that an impact

cannot be avoided, Hawthorn will determine the nature of the impact on the cultural resource and consult with the SHPO on whether the cultural resource would be considered eligible for listing in the NRHP. Mitigation for project-related impacts on NRHP-eligible cultural resources may include an effort to minimize adverse impacts on the property and/or additional documentation through data recovery.

Before construction of the pipeline, Hawthorn will develop a discovery plan to be in place should previously unknown cultural resources or human remains inadvertently be encountered. The discovery plan will outline the framework for handling such discoveries in an efficient and legally compliant manner. The discovery plan may include the following topics: construction contractor training, identification of resources in the field, contact information for Hawthorn's designated professionals to address a discovery, procedures for avoidance, and associated tasks in the event of work stoppage in a construction area. With regard to a discovery of previously unknown cultural resources or of human remains, procedures would be followed to ensure the appropriate authorities would become involved quickly and in accordance with local and state guidelines.

Adverse impacts to paleontological resources are not anticipated, because the site is covered with numerous feet of glacial sediments.

8.10 Effect of the Route on Biological Resources

Hawthorn has consulted with the appropriate state and federal agencies and has implemented measures to avoid and minimize effects to biological resources in the vicinity of the Project. The impact of the Project on wildlife is expected to be minimal.

8.11 Issues Raised by Agencies

Agencies were contacted to comment on the Corridor and the Route in letters sent on May 8, 2009, except as noted below. A copy of the letter sent to each agency is provided in Appendix C, along with the mailing list that was utilized. A summary of comments received are provided below. Where applicable, letters and other correspondence received from agencies are provided in Appendix C.

8.11.1 North Dakota Game and Fish Department (NDGFD)

On May 27, 2009 the NDGFD indicated their primary concern pertained to the possible disturbance of native prairie. NDGFD asked that work within native prairie areas be avoided to the extent possible, and disturbed areas be reclaimed to pre-project conditions.

The NDGFD said steps should be taken to protect wetlands that cannot be avoided, and that above-ground appurtenances not be placed in wetland areas. In addition, the NDGFD stated no alterations should be made to existing drainage patterns.

8.11.2 U.S. Fish and Wildlife Service (USFWS)

The USFWS commented on the Project in a June 1, 2009 letter. USFWS focused on high value habitat avoidance, threatened and endangered species, grassland restoration, and wetlands. A summary of these themes is provided

8.11.2.1 High Value Habitat Avoidance

Birds

The USFWS has authority over bird species in accordance with the MBTA, the Bald and Golden Eagle Protection Act of 1940 (BGEPA), and the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) (ESA).

The USFWS recommended construction within existing habitats be scheduled during the late summer or fall/early winter so it will not disrupt waterfowl or other wildlife during breeding season, February 1 to July 15. If construction is to take place during breeding season, the USFWS recommended a qualified biologist conduct field surveys to determine the presence of nesting migratory birds. If nesting migratory birds are found, measures will be taken to protect the birds until fledged.

Streams and Wetlands

The proposed pipeline crosses one Class I Stream, the Little Knife River. The USFWS recommends precautions be taken during construction to avoid impacts to the creek channel and adjacent riparian habitat by maintaining the existing channel alignment and bank contours, and by eliminating the placement of fill material in the creek channel. If impacts to aquatic and woodland resources cannot be avoided, it is recommended that a mitigation plan be developed to offset habitat losses.

The USFWS noted the Corridor intersects several wetlands that have been identified by the NWI. The USFWS suggests Hawthorn include a detailed plan to avoid or at least minimize impacts to wetlands, if possible.

USFWS Lands

The USFWS recommends all property interests within the National Wildlife Refuge (NWR) System be avoided during project construction, when possible. The USFWS also provided a map of refuges and WPAs, as well as wetland and grassland easements. This map is in Appendix B.

The proposed Corridor and Route do not cross any USFWS NWR or WPA lands. The Corridor and Route do cross USFWS wetland easement lands. On May 13, 2009, the USFWS did a site visit with a Hawthorn representative to confirm wetland boundaries and USFWS easements that are crossed by the Route. This site visit confirmed USFWS easement wetlands are not expected to be crossed by the proposed pipeline.

If impacts to USFWS wetland easements become necessary, Hawthorn will request a compatibility assessment from local USFWS. The process will consider the magnitude of the impact, the type or quality of the habitat which is impacted, and the feasibility of avoiding the impact. If compatibility is found, a ROW permit will be issued for the impact.

8.11.2.2 Threatened and Endangered Species

The USFWS provided recommendations regarding Piping Plovers (*Charadrius melodus*) and Dakota skippers (*Hesperia dacotae*) that may be within the Study Area. The USFWS also included a list of federal threatened, endangered, and candidate species and designated critical habitat that are found in Mountrail County.

Piping Plover (Threatened)

Piping Plovers are designated as critical habitat just east of the Corridor, in Section 13 of Idaho Township. Within the Study Area, there are two additional Critical Habitat Areas about 1.5 to 2 miles to the east of the

Corridor and one Critical Habitat Area about three miles northwest of the Corridor. Neither the Corridor nor the Route cross Critical Habitat Areas.

The USFWS recommended the following in order to avoid disturbing Piping Plover and their habitat: avoidance of documented and potential nesting wetlands from April 1 to September 1; a 400 foot no -entry buffer on shorelines for wetlands with potential or documented Piping Plover nesting; and vehicles should be avoided on any wetland shoreline in the Study Area. In the event Hawthorn cannot identify Piping Plover nesting areas, the USFWS recommended either retaining a qualified biologist to survey the Study Area, or maintain a one-half mile no-entry buffer on all nesting wetlands.

Dakota Skipper (Candidate Species)

The USFWS stated that legal protection for the Dakota Skipper does not exist, but this species is considered to have significant value and is worth protecting. According to the USFWS, Dakota Skippers, in eastern North Dakota prairies, favor habitats dominated by warm season or bluestem grasses that typically contain wood lilies, harebells, coneflowers, and other asters, and in some areas, smooth camas. The USFWS recommended that the Project avoid impacts to potential Dakota Skipper habitat. If Dakota Skippers may be present near the Project, the USFWS asked to be notified.

8.11.2.3Grassland Restoration

The USFWS recommends that immediately after construction, native species be reseeded in disturbed areas to reduce erosion. If trenching is preformed in grassland habitat, USFWS recommends post-construction reseeding of native prairie grasses, forbs, and legumes.

8.11.3 U.S. Army Corps of Engineers (USACE)

The USACE responded on May 15, 2009. It indicated permits should be requested if work will be done in navigable waters (under Section 10 of the Rivers and Harbors Act) or Waters of the United States (under Section 404 of the CWA). The USACE also enclosed a fact sheet for nationwide permit 12.

It is not anticipated that the Route will require a permit from the USACE.

8.11.4 State Historical Society of North Dakota (SHPO)

The SHPO and Hawthorn have engaged in consultation to identify previous cultural resources located in the area and to discuss stratagems on how to best identify previously unrecorded cultural resources in the Study Area. In response to the SHPO, Hawthorn has completed a Class I and a Class III cultural resources inventory. Seven cultural resources reports were identified within the Study Area. A review of the cultural resource survey reports and additional records at the SHPO identified 31 previously recorded cultural resources site within the Corridor. A review of the cultural resource reports and SHPO records identified one previously recorded cultural resource sites near the Route (Appendix A).

Hawthorn is committed to minimizing impacts to these resources and will make reasonable efforts to avoid these resources and additional resources identified throughout the Project. Cultural resources in the area may be avoided due to the nature of pipeline construction; the pipeline can be constructed to avoid sensitive areas by identifying cultural resource properties early and adjusting the pipeline route accordingly. In the event an impact cannot be avoided, Hawthorn will determine the nature of the impact and consult with the SHPO on whether or not the cultural resource was eligible for listing in the NRHP. Treatment for Project-related

impacts on NRHP-eligible cultural resources may include an effort to minimize project impacts on the resource and/or additional documentation through data recovery.

With regard to a discovery of human remains, procedures will be followed to ensure the appropriate authorities would become involved quickly and in accordance with local and state guidelines.

8.11.5 North Dakota Geological Survey (NDGS)

The NDGS did not respond.

8.11.6 North Dakota Parks and Recreation Department (NDPR)

On May 26, 2009, NDPR indicated there are five LWCF sites near the Study Area. According to the NDPR, LWCF projects associated with Stanley include: the Stanley Park (Project # 38-0222), the Stanley Community Recreation Park (Project # 38-0588), Stanley Recreation Developments (Project #s 38-0482 and 38-1146), the Stanley swimming pool (Project #s 38-0592 and 38-1202), and the Stanley golf course (Project # 38-0672). HDR followed up with NDPR via voicemail and email regarding these locations. On June 9, 2009, Jessica Riepl, Grant Coordinator for NDPR, responded: "It does not appear that the oil pipeline corridor and proposed pipeline route cross any of the land and water conservation sites."

The NDPR conducted a search for rare plants and ecological communities in the North Dakota Natural Heritage Conservation database. Two records of Piping Plover (*Charadrius melodus*) were identified within about 0.5 miles of the edge of the Corridor. These records are associated with relatively large wetlands located in Sections 11 and 13 of T156N, R91W. The last recorded observation at these locations was in 1996.

NDPR has deferred further comments regarding animal species to the NDGFD and the USFWS.

A review of landcover data and FSA 2006 aerial photography indicates that both the Corridor and the Route avoid wetlands and riparian habitat directly associated with these Piping Plover records.

8.11.7 North Dakota Office of Attorney General

On May 11, 2009, the North Dakota Office of Attorney General responded that the Attorney General and his staff are prohibited by law from providing legal advice or legal assistance to members of the public or private businesses. Therefore, the Attorney General indicated he will not take any action in response to the notification letter.

8.11.8 North Dakota Department of Commerce

The North Dakota Department of Commerce did not respond.

8.11.9 North Dakota Department of Health (NDDH)

On May 15, 2009, the NDDH responded that environmental impacts from the proposed construction will be minor and can be controlled by proper construction methods. A summary of NDDH's comments on construction include: 1) minimize fugitive dust; 2) care should be taken to avoid adverse affects to waterbodies; 3) disturbance of one or more acres requires a permit to discharge stormwater runoff until the site is stabilized. The permit may be obtained from the NDDH's website or by calling the Division of Water Quality; and, 4) noise levels should be minimized, especially near residences and during the early morning or late evening hours.

8.11.10 North Dakota Department of Transportation (NDDOT)

The NDDOT did not respond.

8.11.11 North Dakota State Water Commission

The North Dakota State Water Commission did not respond.

8.11.12 Natural Resources Conservation Service (NRCS)

On May 19, 2009, the NRCS commented that the Farmland Protection Policy Act, 7 U.S.C. §§ 4201-4209 (FPPA) gave NRCS the responsibility of documenting the conversion of farmland (i.e., prime, statewide, and local importance) to non-agricultural use for projects that receive federal funding. For federally funded projects, form AD-1006 must be completed. NRCS also commented that the Wetland Conservation Provisions of the 1985 Food Security Act, as amended, provide that if a U.S. Department of Agriculture (USDA) participant converts a wetland for the purpose of, or to have the effect of, making agricultural production possible, loss of USDA benefit could occur. NRCS recommends that impacts to wetlands be avoided.

At this time, federal funding is not being used for the Project, thus the completion of USDA form AD-1006 is not required. Permanent wetland impacts are not anticipated as part of the Project.

8.11.13 North Dakota State Land Department

On May 20, 2009, the North Dakota State Land Department commented via e-mail that there are not North Dakota School Trust Lands within the Study Area.

8.11.14 North Dakota Aeronautics Commission

The North Dakota Aeronautics Commission did not respond.

8.11.15 North Dakota Department of Agriculture

The North Dakota Department of Agriculture did not respond.

8.11.16 North Dakota Department of Human Services

The North Dakota Department of Human Services did not respond.

8.11.17 North Dakota Department of Labor

The North Dakota Department of Labor did not respond.

8.11.18 Job Service North Dakota

On May 11, 2009, Job Service North Dakota responded that they have no comments regarding the Project and applicable permits are not required.

8.11.19 North Dakota Department of Career and Technical Education

The North Dakota Department of Career and Technical Education did not respond.

8.11.20 North Dakota Governor

The North Dakota Governor did not respond.

8.11.21 North Dakota Indian Affairs Council

The North Dakota Indian Affairs Council did not respond.

8.11.22 North Dakota Office of Management and Budget

The North Dakota Office of Management and Budget did not respond.

8.11.23 North Dakota Soil Conservation Committee

The North Dakota Soil Conservation Committee did not respond.

8.11.24 North Dakota Farm Service Agency

The North Dakota Farm Service Agency did not respond.

9.0 QUALIFICATIONS OF CONTRIBUTORS TO SITING STUDY

Name Project Role	Education And Professional Experience
Mark Wollschlager Project Manager	Mr. Wollschlager has over 29 years of experience in dealing with environmental issues for a wide array of projects. BS Biology, University of Minnesota, 1975 Juris Doctor, William Mitchell College of Law, 1979
Aaron Diehl Assistant Project Manager	Mr. Diehl is an environmental scientist for HDR. He has five years of experience in the environmental field and two years of experience working on permits and applications for the energy industry. Mr. Diehl has worked on applications and permits for transmission lines, wind energy, and transportation projects, which includes NEPA documents, Certificate of Need applications, and Route Permit applications. He also has experience in wetland delineations, threatened and endangered species surveys, avian surveys, and ArcView GIS (geographic information system). Master of Landscape Architecture, University of Minnesota, Coursework, 2005-2006 Master of Environmental Science, Taylor University, 2005 Bachelor of Science, environmental biology, Taylor University, 2004, Magna Cum Laude
Carol Sersland, AICP, GISP GIS Manager	Ms. Sersland is an environmental planner and GIS analyst for HDR. She has more than 15 years of experience in GIS applications such as spatial analysis and mapping. For more than 20 years, Ms. Sersland has written and coordinated environmental assessments and permit applications, including federal NEPA documents and Minnesota environmental documents. She has provided analysis for transit projects, highway projects, subdivision approvals, and corridor facilities (transmission lines, pipelines, and rail). She has designed and generated planning analyses for city and county comprehensive plans, park and trail plans, and transportation plans. Master of Science coursework, Spatial Analysis, University of Minnesota, 1992-1994 Bachelor of Science, Recreation Resource Management, University of Minnesota, 1981
Tim Ahrens	Mr. Ahrens is a document production specialist for HDR. He has five years of experience in editing and document design, including two years at HDR. He has edited and produced Certificate of Need applications, Route Permit applications, environmental impact statements, and environmental assessments. Bachelor of Arts, Communication and Journalism, University of Wisconsin-Eau Claire, 2004

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Appendix A

Class I Literature Search
Class III Cultural Resources Inventory Data

The Class I Literature Search report was completed in the beginning of June 2009. The literature search was structured to 1) summarize the previously identified archaeological resources within the project area, 2) describe the previously completed surveys within the project area, 3) document the regulatory environment at the time of the reports completion, and 4) provide recommendations for future archaeological survey in the area. The results of the Class I Literature Search led to the decision to prepare a Class III Intensive Cultural Resource Inventory for the project area.

The results of the Class I Literature Search were used to develop the Cass III Intensive Cultural Resource Inventory report for the project area. The fieldwork for the Class III intensive survey was completed in the beginning of August 2009. A report summarizing the results of the Class III intensive survey was prepared to 1) document the regulatory environment at the time of its completion, 2) document the methodology followed (which was based on the results of the Class I literature search), 3) convey the results of the survey fieldwork, and 4) document the conclusions that can be made on archaeological resources in the project area based on the results of the Class III intensive survey.

HDR | ONE COMPANY *Many Solutions*™ Memo

To:	Greg Jacobsen		
From:	Stephen Sabatke	Project:	Pecan Pipeline Hawthorn Oil Pipeline
cc:			
Date:	June 08 09		

Re: Hawthorn Oil Pipeline Class I Cultural Resource Literature Review

This memorandum documents the cultural resources data collection (Class I Literature Search) for the proposed Hawthorn Oil Pipeline Project in Mountrail County, North Dakota. In May of 2009 HDR began assisting Hawthorn Oil Transportation (North Dakota), Inc.. (Hawthorn) in preparing the application for a Consolidated Certificate of Corridor and Route Permit, planning and creating maps for the proposed project boundary. It is anticipated this Project is subject to regulations associated with the North Dakota Century Code 49-22. This notice is provided to the parties identified by North Dakota Administrative Code 69-06-01-05 and other parties that have been identified by the PSC staff. Additionally, HDR reviewed information on file at the State Historic Preservation Office (SHPO) located in Bismarck, North Dakota, to identify previously recorded cultural properties in the study area and to consider those properties during project planning. Cultural resource data, housed at the SHPO, consisted of cultural resource site files, cultural resource site leads, and previous professional cultural resource surveys and reports. HDR also reviewed 19th Century Public Land Survey (PLS) maps to identify potential historic-period cultural features in the project area, which is a part of the Southern Missouri River drainage basin.

SHPO Correspondence

In May 2009 Hawthorn contacted the North Dakota SHPO (ND SHPO) to request a review of potential project-related impacts on known or suspected cultural resources within the proposed wind farm project area. The ND SHPO responded with a letter (SHPO: NDSHPO REF.: 09-0923 PSC/HDR) in May 2009 recommending that Hawthorn sponsor an archival records search consisting of the project boundary plus a half mile buffer area around the project boundary to determine the nature of previous cultural resource investigations and the location of known cultural resources in the proposed project vicinity. The ND SHPO also stated that there is a potential for unrecorded cultural properties to exist in the project area. Therefore, the ND SHPO suggested that a field survey, primarily pedestrian, take place in the proposed project area.

Tribal Correspondence

During conversations between HDR, on behalf of Hawthorn, and SHPO on May 12th and June 1st, SHPO confirmed that tribal consultations would not be needed since the project lacks the federal component that would require compliance with Section 106 of the National Historic Preservation Act and its implementing regulations. However, SHPO recommends that Hawthorn submit a notification in good faith to the Indian Affairs Commission in Bismarck, North Dakota, as part of other federal, state, and local project notifications.

Cultural Resource Reports and Sites

HDR reviewed existing cultural resources documentation for specific sections in the following township for the study area (Table 1).

HDR Engineering, Inc. | 701 Xenia Avenue South, Suite 600 Minneapolis, MN 55416 | Phone (763) 591-5400 Fax (763) 591-5413 www.hdrinc.com

Table 1. Study Area

County	Township	Range	Sections
Mountrail	156N	91W	10, 11, 13-15, 21-28, 34-36

The archival report inventory documented 7 previous cultural resource investigations within half a mile of the project boundary. These reports illustrate a wide variety of investigations in the study area, including those conducted in support road reconstruction and rail yard areas.

Table 2. Previous Cultural Resource Investigations in the Study Area

Manuscript Number	Manuscript Title	Author(s)/Associations	Report Date
10774	*A Cultural Resource Inventory of the Proposed EOG Multiple Use Rail Yard Facility in Mountrail County, North Dakota*	SWCA Environmental Consultants	December 2008
10324	*Stanley, North Dakota: A Historic District Evaluation of Buildings Along Portions of Main Street and 6th Avenue*	Blain Faindrick/Ethnoscience, Inc.	January 2008
10359	*Class III Cultural Resources Inventory of the Stanley Pipeline and Gas Plant Mountrail County, North Dakota*	Joel J. Tyberg/TEC Inc.	December 2007
10647	*Enbridge Stanley Station: A Class III Cultural Resource Inventory in Mountrail County, North Dakota*	Ed Stine/Metcalf Archaeological Consultants, Inc.	September 2008
7525	*Skarsgaard Gravel Pit: A Class III Cultural Resource Inventory, Mountrail County, North Dakota*	Robert M. Ross, Jr./Metcalf Archaeological Consultants, Inc.	December 1999
5986	*Environmental Assessment Stanley Water Supply System Cooperative Agreement No. 6-FC-60-00210 Garrison Diversion Unit MR&I Program*	Kadrmas Lee & Jackson PC Consulting Engineers and Surveyors	N/A
6486	*Fisher's Stanley Gravel Pit: A Class III Cultural Resource Inventory in Mountrail County, North Dakota*	Ed Stine/Metcalf Archaeological Consultants, Inc.	May 1995

Investigations in the study area documented 31 cultural resources. 24 cultural resources sites and 7 cultural resource site leads have been identified within the project corridor (Table 3). Of the 24 cultural resource sites, all are not evaluated. The cultural resource sites consist of structures, rock cairns, stone circles, and cultural material scatter. Of the 7 cultural resource site leads, all are unevaluated and consist of cultural material scatters.

Table 3. Previously Identified Cultural Resources located in the Study Area

Site Number	Site Type	Comments	Location			Eligibility to NRHP
			Township	Range	Section	
32MN755	Jay T and Myrtle Smith Property	None	156	91	28	Not Evaluated
32MN752	Aleda Rice House	None	156	91	28	Not Evaluated
32MN751	Malene Sondersen Duplex	None	156	91	28	Not Evaluated
32MN750	Fred Alger House	None	156	91	28	Not Evaluated
32MN702	Nelson Farmstead	None	156	91	28	Not Evaluated
32MN633	Flickertail Village	None	156	91	28	Not Evaluated
32MN768	Stone Circle	None	156	91	27	Not Evaluated
32MN769	Rock Cairns	None	156	91	27	Not Evaluated
32MN770	Stone Circle	None	156	91	27	Not Evaluated
32MN771	Rock Cairn	None	156	91	27	Not Evaluated
32MN772	Stone Circles	None	156	91	27	Not Evaluated
32MN460	Stone Circles	None	156	91	27	Not Evaluated
32MN461	Stone Circles/Pit	None	156	91	27	Not Evaluated
32MN574	N/A	None	156	91	23	Not Evaluated
32MN573	N/A	None	156	91	23	Not Evaluated
32MN766	N/A	None	156	91	27	Not Evaluated
32MN632	Stanley Grandstand	None	156	91	28	Not Evaluated
32MN686	St. Margarets Catholic	None	156	91	28	Not Evaluated
32MN685	Our Saviors Free Lutheran	None	156	91	28	Not Evaluated
32MN684	Maranatha Assembly of God	None	156	91	28	Not Evaluated
32MN765	Stone Circle	None	156	91	27	Not Evaluated
32MN767	Stone Circle	None	156	91	27	Not Evaluated
32MN774	Cultural Material Scatter	None	156	91	27	Not Evaluated
32MN773	Rock Cairn	None	156	91	27	Not Evaluated
32MNX0321	Cultural Material	Site Lead	156	91	14	Not Evaluated

Site Number	Site Type	Comments	Location			Eligibility to NRHP
			Township	Range	Section	
	Scatter					
32MNX0324	Cultural Material Scatter	Site Lead	156	91	34	Not Evaluated
32MNX0317	Cultural Material Scatter	Site Lead	156	91	10	Not Evaluated
32MNX0318	Cultural Material Scatter	Site Lead	156	91	11	Not Evaluated
32MNX823	N/A	Site Lead	156	91	28	Not Evaluated
32MNX818	Lyle Aho	Site Lead	156	91	28	Not Evaluated
32MNX839	Isolated Find	Site Lead	156	91	26	Not Evaluated

The following paragraphs, organized by report number, describe the nature of these investigations and identified cultural resources. All sites with an alpha-numeric site number (00ABX0000) are considered unevaluated by the SHPO and usually recommended for no further work. Alpha-numeric sites are identified by two characteristics. One states that a property solely reported by a landowner or other non-professional as containing cultural resources is not sufficient for a positive identification of cultural resource. The second defining characteristic is a location where four or fewer artifacts are identified. In addition, those alpha-numeric sites with little possibility for further buried artifacts in the immediate vicinity, are referred to as "Isolated Finds". However, alpha-numeric sites can also be those sites identified as having four or fewer artifacts and thought to have potential for buried artifacts in the immediate vicinity, warranting additional investigation.

#10774 A Cultural Resource Inventory of the Proposed EOG Multiple Use Rail Yard Facility in Mountrail County, North Dakota.

Ferris (2008) conducted a Class III cultural resource inventory for the construction of a multiple use rail yard facility in Mountrail County. Seven previously recorded sites and one previously recorded isolated find were located in the area surrounding the project location.

#10324 Stanley, North Dakota: A Historic District Evaluation of Buildings Along Portions of Main Street and 6th Avenue.

Fandrick (2008) conducted a Class III cultural resource inventory for the North Dakota Department of Transportation to conduct a historic district analysis or portions of Stanley.

#10359 Class III Cultural Resources Inventory of the Stanley Pipeline and Gas Plant Mountrail County, North Dakota.

Tyberg (2007) conducted a Class III cultural resource inventory for a proposed pipeline and gas plant in Mountrail County. Six historic period sites, five prehistoric sites, one multi-component site, and one prehistoric isolated find were recorded, none of which had been previously recorded or reported. All sites are recommended as not eligible for listing on the NRHP.

#10647 Enbridge Stanley Station: A Class III Cultural Resource Inventory in Mountrail County, North Dakota.

Stine (2008) conducted a Class III cultural resource inventory for the expansion of the Stanley Station as part of an oil pipeline upgrade. Two previously recorded archaeological sites were noted.

#7525 Slarsgaard Gravel Pit: A Class III Cultural Resource Inventory, Mountrail County, North Dakota.

Ross (1999) conducted a Class III cultural resource inventory of a gravel pit in Mountrail County. No cultural resources were recorded.

#5986 Environmental Assessment Stanley Water Supply System Cooperative Agreement No. 6-FC-60-00210 Garrison Diversion Unit MR&I Program.

Kadrmas Lee & Jackson PC Consulting Engineers and Surveyors evaluated three alternative solutions to providing the city of Stanley, North Dakota and surrounding rural area with an acceptable quantity and quality water supply.

#6486 Fisher's Stanley Gravel Pit: A Class III Cultural Resource Inventory in Mountrail County, North Dakota.

Stine (1995) conducted a Class III cultural resource inventory for a proposed gravel pit in Mountrail County. No cultural resources were observed.

#261 Projects No. F-7-002054 and F-4-002089 Ray to Berthold.

Franke (1976) conducted a survey for the right-of-way of the projects. The survey found no historic, archaeological, or architectural sites during the survey.

#8670 Cultural Resources Investigations Along U.S. Highway 2 in Ward, Mountrail, and Williams Counties, North Dakota Volume I of II.

Bradley (2001) conducted a Class III cultural resource survey for the 99.31 mile North Dakota Department of Transportation highway improvement project spanning from Minor and Williston. One hundred and twenty-three (123) archaeological sites were identified during the inventory, and 53 of the sites were newly identified.

Public Land Survey Map Review

HDR reviewed Public Land Survey (PLS) maps for the study area (Table 4). The maps illustrate environmental conditions, including elevation variation across the landscape and watercourses, during the 1870s. None of the maps show cultural features or locations of historic land use.

Table 4. Public Land Survey Data by Township and Range

Township	Range	Public Land Survey Publish Date	Cultural Feature/Locations
156N	91W	1893	*Great Northern Railway through sections 30, 20-24

*This railway is still in existence as a working railroad and pipeline construction is believed to be boring underneath it.

Implications for Archaeological Resources

After reviewing the information in the SHPO database of recorded cultural resources and previous survey reports, communication with SHPO, nineteenth-century Public Land Survey maps (PLS), and after visual inspection of the project area, HDR believes that the project area has potential to yield additional unrecorded cultural resources. Examination of the cultural resource information represented in a Geographical Information System (GIS) format has shown that a moderate to dense number of cultural properties exist near or within the project area. The previous intuitive model for this region developed by cultural resource professionals over the years suggests that cultural resource sites will be located near permanent water sources, on high or prominent landforms, and in areas with significant land use. However, in this area cultural resource locations are scattered and survey data is scarce, hence, patterning for cultural resource sites can not be predicted accurately.

Proposed Class III Survey

Cultural resource survey proposed by HDR will focus on construction locations that have not received previous survey. A previous survey report, "Kvamme Pipeline: A Class III Cultural Resource Inventory, Mountrail County, North Dakota" dated August 2008 prepared by Earthworks, Inc., establishes that a 100% pedestrian survey has already occurred with the 150 foot right-of-way in Sections 23, 24, 25, and 26 of Township 156 N and Range 91W. In addition, a previous survey report, "A Cultural Resource Inventory of the Proposed EOG Multiple Use Rail Yard Facility in Mountrail Co., ND" dated December 2008 prepared by SWCA Environmental Consultants, establishes that survey has occurred in Section 14 Township 156 N and Range 91W of the project area. HDR recommends no further survey in these locations. Once the construction footprint for the project is solidified the potential for the project to impact cultural resources can be examined and evaluated. Hawthorn in consultation with HDR will try to identify potential NRHP eligible cultural resources to the extent practical.

HDR proposes that locations identified as needing survey will be examined using the following techniques. The entire survey route will be examined for historic architecture properties. The properties will be identified using maps and via visual inspection. Archaeological survey will use primarily pedestrian survey to investigate identified areas when ground visibility is 25% or greater. Shovel testing will be used to investigate identified areas when ground visibility is 25% or less. Soils removed in this way will be screened through ¼-inch hardware mesh. A hand-held global positioning system (GPS) unit will be used to locate the project area. The GPS unit will also be used to mark locations of interest, cultural resource sites, shovel test areas, and pedestrian survey areas. A digital camera will be used to document areas along the survey route to show the projects existing environment. In addition, any location identified as having a cultural resource site will be photographed to show the existing environment. Notes will be taken to document the survey of the project area.

Conclusions

HDR recommends a Class III intensive cultural resource inventory be conducted in locations not previously surveyed for cultural resources and within the construction footprint of the project. In addition, HDR recommends that site (32MN771) be relocated because of its proximity to the proposed construction route. The site should be visibly identified with flagging for easy identification and avoidance by construction crews and be given a 20 meter or 50 foot buffer zone in order to minimize accidental construction impacts. These investigations must be conducted by a professional archaeologist permitted by the State of North Dakota per NDCC 55-03-01. In addition, the existing Great Northern Railway that runs through sections 30 and 20-24 of the project area is probably a significant historic property. HDR recommends that Hawthorn bore underneath the rail line to avoid any disturbance of this resource. The nature of the cultural resource inventory would depend on surface exposure and the characteristics of the landform for development. For the survey, HDR archaeologist in coordination with SHPO will discuss the proposed survey methodology documented above before implementation, document the areas proposed for ground disturbance, identify existing archaeological resources within those areas, and offer recommendations for archaeological avoidance and impact minimization.

References

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http://www.swc.state.nd.us/4dlink9/4dcgi/GetSubCategoryRecord/Map%20and%20Data%20Resources/Government%20Surveys

Ferris, Kade.
December 2008. A Cultural Resource Inventory of the Proposed EOG Multiple Use Rail Yard Facility in Mountrail County, North Dakota. SWCA Environmental Consultants.

Morrison, John.
August 2008. Kvamme Pipeline: A Class III Cultural Resource Inventory, Mountrail County, North Dakota. Eathworks, Inc.

The North Dakota Comprehensive Plan for Historic Preservation: Archeological Component. January 1990. Archeology and Historic Preservation Division, State Historical Society of North Dakota, North Dakota Heritage Center.

Hawthorn Oil Pipeline Project
Class III Archaeological and Historic Facilities Resource Inventory for a Proposed Pipeline in Mountrail County, North Dakota

Hawthorn Oil Transportation (North Dakota), Inc.

August 2009

By

Stephen Sabatke MA

Melissa Lundberg

Principal Investigator:

Stephen Sabatke MA

SHPO Ref #: 09-0923

Abstract

This report documents the Class III Archaeological and Historic Facility Resources Inventory for the proposed Hawthorn Oil Pipeline Project in Mountrail County, North Dakota. In the summer of 2009 Hawthorn Oil Transportation (North Dakota), Inc.(Hawthorn) contracted with HDR Engineering Inc.(HDR) to prepare a Public Service Commission (PSC) application for a Consolidated Certificate of Corridor and Route Permit for the proposed project area. In accordance with North Dakota Century Code 49-22 regulations and PSC application instructions, HDR completed a Class I Literature Search and a Class III Archaeological and Historic Facility Resource Inventory for the proposed project area. HDR did not find any additional archaeological or historic facility sites as a result of the Class III Archaeological and Historic Facility Resource Inventory for the portions of the project area surveyed by HDR. If the project is later determined to be a federal undertaking, HDR recommends that the project constitutes a determination of "***No Historic Properties Affected***" and "***No Significant Sites Affected.***" The project should proceed as planned and documented.

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Introduction

In July 2009, Hawthorn contracted HDR Engineering Inc. (HDR) to complete a Class III Archaeological and Historic Facility Resources Inventory for the Hawthorn Oil Pipeline Project in Mountrail County, North Dakota. The pipeline is approximately 6 miles long and in some locations runs parallel to existing pipelines. The map attached to this report documents the archaeological sites, historic facility sites, and survey locations in the project area.

Archaeological and historic facility investigations were in compliance with state and federal guidelines, such as the North Dakota Century Code 49-22 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. On July 21st HDR conducted field investigations in the project area. HDR Archaeologist Stephen Sabatke acted as Principal Investigator, and was assisted by environmental scientist Aaron Diehl. Figures 1 and 2 illustrate the environment in the project area.

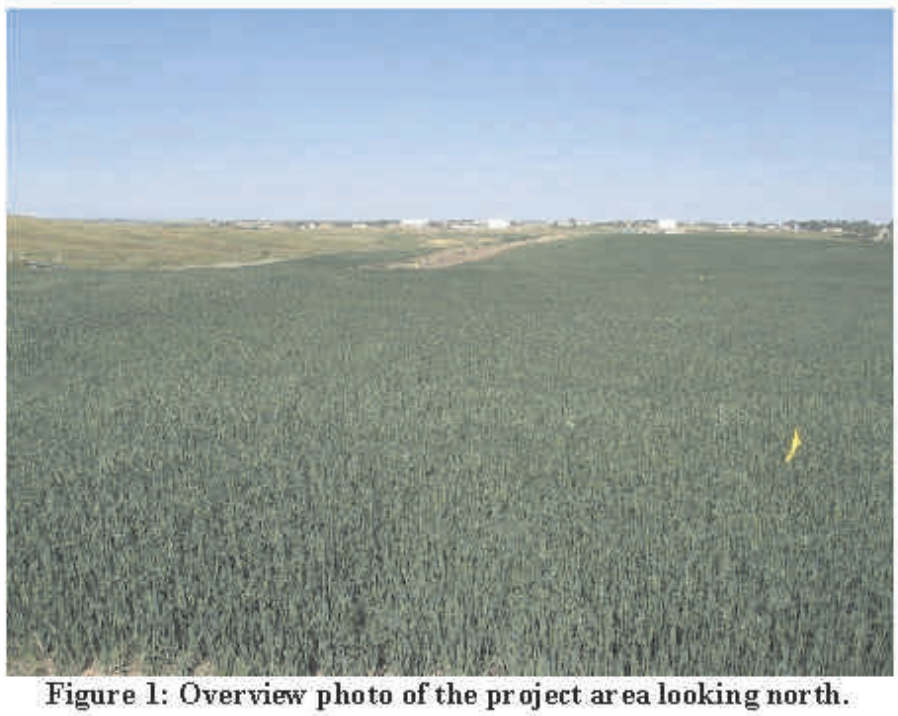

Figure 1: Overview photo of the project area looking north.

Figure 2: Overview photo of the project area looking west.

Literature Search

In March of 2009 Mr. Sabatke reviewed information on file at the SHPO located in Bismarck, North Dakota, to review cultural properties in the data gathering area. Cultural resource data, housed at the SHPO, consisted of cultural resource site files, cultural resource site leads, and previous professional cultural resource surveys and reports. In addition, HDR reviewed 19th Century Public Land Survey (PLS) maps to identify potential historic-period facilities in the project area.

HDR reviewed existing cultural resources documentation for specific sections in the following townships for the data gathering area (Table 1). All these sections are located in Mountrail County North Dakota.

Table 1. Data Gathering Area

County	Township	Range	Section
Mountrail	156N	91W	10,11,13-15, 21-28, 34-36

Recorded Archaeological Sites and Historic Properties

Review of the data gathering area documented 31 archaeological and or historic facility sites ands site leads. None of these archaeological and or historic facility sites and site leads are located within the project area. Table 2 documents the archaeological and historic facility sites and site leads are within the data gathering area. None of the 24 archaeological and or historic facility sites have been evaluated. The resource sites consist of historic facilities, rock cairns,

stone circles, and prehistoric or historic material scatters. None of the 7 archaeological and or historic facility site leads have been evaluated. The site leads consist of prehistoric or historic material scatters.

Table 2. Previously Identified Cultural Resources located in the Study Area

Site Number	Site Type	Comments	Location			Eligibility to NRHP
			Township	Range	Section	
32MN755	Jay T and Myrtle Smith Property	None	156	91	28	Not Evaluated
32MN752	Aleda Rice House	None	156	91	28	Not Evaluated
32MN751	Malene Sondersen Duplex	None	156	91	28	Not Evaluated
32MN750	Fred Alger House	None	156	91	28	Not Evaluated
32MN702	Nelson Farmstead	None	156	91	28	Not Evaluated
32MN633	Flickertail Village	None	156	91	28	Not Evaluated
32MN768	Stone Circle	None	156	91	27	Not Evaluated
32MN769	Rock Cairns	None	156	91	27	Not Evaluated
32MN770	Stone Circle	None	156	91	27	Not Evaluated
32MN771	Rock Cairn	None	156	91	27	Not Evaluated
32MN772	Stone Circles	None	156	91	27	Not Evaluated
32MN460	Stone Circles	None	156	91	27	Not Evaluated
32MN461	Stone Circles/Pit	None	156	91	27	Not Evaluated
32MN574	N/A	None	156	91	23	Not Evaluated
32MN573	N/A	None	156	91	23	Not Evaluated
32MN766	N/A	None	156	91	27	Not Evaluated
32MN632	Stanley Grandstand	None	156	91	28	Not Evaluated
32MN686	St. Margarets Catholic	None	156	91	28	Not Evaluated
32MN685	Our Saviors Free Lutheran	None	156	91	28	Not Evaluated
32MN684	Maranatha Assembly of God	None	156	91	28	Not Evaluated
32MN765	Stone Circle	None	156	91	27	Not Evaluated
32MN767	Stone Circle	None	156	91	27	Not Evaluated
32MN774	Cultural Material Scatter	None	156	91	27	Not Evaluated
32MN773	Rock Cairn	None	156	91	27	Not Evaluated

Site Number	Site Type	Comments	Location			Eligibility to NRHP
			Township	Range	Section	
32MNX321	Cultural Material Scatter	Site Lead	156	91	14	Not Evaluated
32MNX324	Cultural Material Scatter	Site Lead	156	91	34	Not Evaluated
32MNX317	Cultural Material Scatter	Site Lead	156	91	10	Not Evaluated
32MNX318	Cultural Material Scatter	Site Lead	156	91	11	Not Evaluated
32MNX823	N/A	Site Lead	156	91	28	Not Evaluated
32MNX818	Lyle Aho	Site Lead	156	91	28	Not Evaluated
32MNX839	Isolated Find	Site Lead	156	91	26	Not Evaluated

Previous Cultural Resources Investigations

The archival report inventory documented 7 previous investigations within a halfmile of the project area. These reports illustrate a wide variety of investigations in the data gathering area, including those conducted in support of road reconstruction and rail yard areas.

Table 3. Previous Cultural Resource Investigations in the Study Area

Manuscript Number	Manuscript Title	Author(s)/Associations	Report Date
10774	A Cultural Resource Inventory of the Proposed EOG Multiple Use Rail Yard Facility in Mountrail County, North Dakota	SWCA Environmental Consultants	December 2008
10324	Stanley, North Dakota: A Historic District Evaluation of Buildings Along Portions of Main Street and 6th Avenue	Blain Fandrick/Ethnoscience, Inc.	January 2008
10359	Class III Cultural Resources Inventory of the Stanley Pipeline and Gas Plant Mountrail County, North Dakota	Joel J. Tyberg/TEC Inc.	December 2007
10647	Enbridge Stanley Station: A Class III Cultural Resource Inventory in Mountrail County, North Dakota	Ed Stine/Metcalf Archaeological Consultants, Inc.	September 2008
7525	Skarsgaard Gravel Pit: A Class III Cultural Resource Inventory, Mountrail County, North Dakota	Robert M. Ross, Jr./Metcalf Archaeological Consultants, Inc.	December 1999
5986	Environmental Assessment Stanley Water Supply System Cooperative Agreement No. 6-FC-60-00210 Garrison Diversion Unit MR&I Program	Kadrmas Lee & Jackson PC Consulting Engineers and Surveyors	N/A
6486	Fisher's Stanley Gravel Pit: A Class III Cultural Resource Inventory in Mountrail County, North Dakota	Ed Stine/Metcalf Archaeological Consultants, Inc.	May 1995

Public Land Survey Map Review

HDR reviewed Public Land Survey (PLS) maps for the project area (Table 4). The maps illustrate environmental conditions, including elevation variation across the landscape and watercourses, during the 1890s. One historic facility site was identified during the literature search near the survey area. This historic facility is represented by a rail line. The rail line was labeled on an 1893 PLS map as the "Great Northern Railway". The rail line is currently labeled the "Burlington Northern".

Table 4. Public Land Survey Data by Township and Range

Township	Range	Public Land Survey Publish Date	Cultural Feature/Locations
156N	91W	1893	*Great Northern Railway through sections 30, 20-24

**This railway is still in existence as a working railroad.*

Environment

The project area is located in Mountrail County east of the town of Stanley. This area of North Dakota is referred to as the Garrison Study Unit (GSU), which encompasses the northwestern part of North Dakota. The North Dakota Comprehensive Plan for Historic Preservation: Archeological Component (ND SHPO: 1990) states that the land in this area of North Dakota has gently rolling hills dissected by numerous river and creeks which drain to the Missouri River (now referred to as Garrison Reservoir or Lake Sakakawea). Knob-and-kettle glaciated terrain with potholes and other glacial features are also commonly found in this area. Immediately following the last glacial expansion a large lake formed at the edge of the retreating glacier. This lake, known as Glacial Lake Agassiz, was present on the landscape for thousands of years.

The Garrison Study Unit

The North Dakota Comprehensive Plan for Historic Preservation: Archeological Component (ND SHPO: 1990) currently divides the state into 13 Study Units, or drainage basins which helps to better identify and understand the flora and fauna in the area. The Garrison Study Unit (unit 6) is located within the glaciated Missouri Plateau Subsection of the Missouri Plateau Section of the Great Plains Physiographic Province. The majority of the study area is make up of Missouri Coteau and Coteau Slope terrain. This areas vegetation is dominated by missed grasses including blue grama grass, needle-and-thread grass, and western wheatgrass. Forests scattered along the Missouri River housed vegetation such as cottonwoods, box elder, elm, and willows. The wildlife included bison, white-tailed deer, bison, elk, pronghorns, grizzly bears, mountain lions, wolves, coyotes, foxes, otters, porcupines, prairie dogs, mink, cottontail rabbits, jackrabbits, golden and bald eagles, hawks, owls, grouse and a variety of waterfowl. Over half of the recorded sites in this area consist of stone circles and other rock features.

Cultural Context

The following section is not intended to be an exhaustive description of the project area's prehistoric environment. Rather it is intended to be a brief explanation of the project area that documents the significant themes of each time period. The general themes that will be touched on here are climate, fauna, flora, terrain, technology, and human occupation. No significant climate or terrain changes have occurred since the end of the Plains Woodland time period, so themes such as climate, fauna, flora, and terrain from that period to the present will not be discussed.

Paleo-Indian

Around 13,500 years ago, environmental shifts in climate had warmed enough to cause the Des Moines Sub-Lobe to begin to retreat. Environmental conditions around the project area at the time would have been tundra-like immediately adjacent to the glacier and gradually turning to forest farther away from the glacier. Eventually climate shifts would push the forest out and be replaced by prairie. Some of the floras identified from this period are poplar, willow, sage, grasses, chenopods, sedges, aspen, spruce, and pine (Kay: 1998). Some of the faunas identified from this period are American mastodon, Columbian mammoth, long-nosed peccary, Harlan's ground sloth, horse, camel, giant bison, dire wolves, saber-toothed tigers, along with a variety of other species (Kay: 1998).

The Paleo-Indian time period is between 11,500 years ago to 7,500 years ago. The tradition was characterized by hunting big game animals and gathering local resources. Diagnostic artifacts from this time period are: Clovis, Goshen, Folsom, Hell Gap-Agate Basin, Cody knives, Parallel Oblique Flaked, Pryor Stemmed, and Caribou Lake Paleo-Indian complexes. Lifeways from this time are not well known but site types include: camps, Knife River flint quarries, other lithic procurement areas, lithic workshops, and isolated artifact finds.

Archaic

Climatic shift during this time period trends to a warmer and dryer climate (Kay: 1998). At this time tall and short grass prairie environments expanded into states east of the Mississippi River and into the northern plains. This time period is often called the Hypsithermal, or the prairie period or prairie maximum. At this time modern flora and fauna took over as the dominant wildlife in the area. Sites identified from this time period indicate a heavy reliance on bison hunting (Dyck and Morlan: 2001). However, during this time period other fauna such as elk, white-tail deer, ground squirrel, wolf, coyote, fox, muskrat, pocket gopher, chipmunk, deer mouse, rabbit, fish when accessible, waterfowl, and a variety of other modern flora show up in the soil matrix.

This time period can be divided into three periods: Early (7,500 to 4,500 years ago), Middle (4,500 to 3,000 years ago), and Late (3,000 to 2,400 years ago) (ND SHPO: 2003). The tradition is characterized by development of the atlatl along with hunting and gathering of essentially modern flora and fauna. Diagnostic artifacts from this time period include: Oxbow, McKean Lanceolate, Duncan, Hanna, Pelican Lake, and Yonkee. Known site types include: animal kill sites, camps, Knife River flint quarries, lithic workshops, and burial sites.

Woodland, Plains, and Equestrian

The Woodland period introduced new traditions of the individuals settling in this area. The practice of mound burials, the production and use of ceramic vessels, and the intensified use of indigenous seedy plants and grasses for food all became more prominent during this time. This time period brought more permanent habitation due to the increase in harvesting. The term Middle Missouri is used to identify this area and is defined as a subarea within the Northern Plains that "includes the Missouri Valley from just below the mouth of the White River in South Dakota to just above the mouth of the Yellowstone River in North Dakota" (Kay:1998). The people populating these villages were not nomadic as many of the other tribes in the plains were. They were horticultural people living in substantial rectangular dwellings. This is because the soil in the Middle Missouri Valley is more fertile then the Red River Valley to the east. This allowed the surrounding tribes to settle and build permanent villages in which they could plant crops and sustain themselves along with bison being the main component of their diets (Kay: 1998). The domestic plants found in the Middle Missouri include: maize, cucurbits, common beans, sunflower, and marsh elder. Wild plums, grapes, rose hips, hackberries, chokecherries, and buffaloberries were also harvested. Cultural complexes from this time period include: Sonota/Besant, Laural, Avonlea, Blackduck, Mortlach, Old Women's, and Sandy Lake. Known site types include: burial mounds and or other burial sites, occupation camps, quarries and lithic procurement areas, and bison kill sites.

The North Dakota Comprehensive Plan for Historic Preservation: Archeological Component (ND SHPO:1990) defines people of the Plains Village tradition as those of a horticultural-hunt-gather. The introduction of Europeans brought diseases that caused the populations to decline, however communities were able to continue to thrive due to stored surplus of food, particularly corn. Known site types include: fortified and unfortified earthlodge villages, winter villages, camps, quarries, eagle trapping sites, conical timber lodges, burials, lithic workshops, bison kill sites, and rock are sites.

The Equestrian Nomadic Tradition refers to those dependent upon horses and traveled throughout the Northern Plains hunting. This allowed for a greater capacity to acquire food and transport it which began in the mid 1700's. Known site types include: camps, battle sites, and animal kill sites.

Fur Trade/Contact

The first fur trade contact in this area occurred in 1738 when a French explorer named La Verendrye reached the Missouri River (Remele:1998). Increasing numbers of explorers and fur tradesmen would reach the area in the years following first contact and increased demand for furs by European societies lead to the establishment of settlements or forts in strategic locations throughout the Northern Plains. This exchange linked the Northern Plains to a world-wide economic and political system. Known site types include: fur trading posts and forts, trails, loading and shipping facilities, trapping, trading and hunting grounds, camps and camp sites, steamboat docks, stores, dwellings, warehouses, and residences of prominent fur trade participants.

Military Confrontation

This time period, defined as between 1862 and 1870, is characterized by and increasing Federal presence in form of a chain of military outposts (Remele:1998). An unfulfilled treaty between the Federal government and the Dakota lead conflict in Minnesota in 1862. This in turn led to military expeditions by the United States government in 1863, 1864, and 1865 within the western territories. Battles at Whitestone Hill and Killdeer Mountain in 1863 and battles in the Badlands in 1864 diminished Dakota resistance. Known site types include: forts, posts, armories, battlefields, trails, roads, bridges, fords, mail stations, cemeteries, villages, camps, camp sites, dumps, defensive work corrals, barns, storage areas, and dwellings and residences.

American Settlement/Statehood

The American Settlement time period ran from 1861 through North Dakota's statehood on November 2, 1889 (Remele: 1998). The settlement of North Dakota has a direct tie to the creation of railroads and railroad lines across the state. Towns and settlements developed in order to serve the homesteaders, frontier citizens, and railroad crews working in the territory. Around 1879, a population boom occurred that had direct ties to the development of organized, highly mechanized, and large bonanza farms. These bonanza farms had a dramatic effect on the landscape. For the first time, large sections of the prairie were able to be cultivated and farmed. This led to a dramatic decrease in wild prairie land.

The Great Depression

During the Great Depression (1929-1940), a slowing national economy, heavy from debt, low prices for agricultural goods, crop failures, dust storms, and extreme weather resulted in series of farm foreclosures, bank failures, and residential dwellings and business abandonment. Known site types may include: abandoned farms, banks, businesses buildings, city parks, civic improvements, relief facilities, WPA projects, Civilian Conservation Corps camps and project sites (ND SHPO:1990).

Modern Industrial Development

Remele defines this time period as the 1940s. 50s, and 60s (Remele:1998). During this time period, a post-war economy was driving the development of large industrial facilities in order to change raw materials into products for local and national consumption. Large construction project, such as dam building and reservoirs, allowed farms, corporations, and citizens of the state to control their access to water resource throughout the year in a more predictable manner. Discovery of natural resources, such as oil and coal, allowed for the development of these industries in the state. Additionally, the beginnings of Cold War stress between the United States and foreign governments generated a perceived need for strategic placement of military bases. Known site types include: Air Force installations, armories, storage areas, dwellings and residences, brick plants, concrete plants, blotting plants, meat packing plants, food processing plants, assembly plants, factories, foundries, saw mills, gristmills, gravel potash and uranium mines, tipples, mines, mine entrances, loading and transportation facilities, storage yards,

railroad spurs, office buildings, camps, oil wells, gas wells, petroleum product refineries, tank batteries, pipelines, and pumping stations.

Research Objectives/Methodology

The archaeological and historic facility investigation review consisted of locations not receiving previous survey within the project area. HDR felt that any of the site types described within the cultural context or literature search portions of this document could be found within the project area.

Environmental landforms along the project area were examined in order to identify high, medium, and low potential areas for archaeological resources. High potential areas were defined as locations within 500 feet of existing or former extensive water sources, on a relatively level and minimally disturbed surface, and with enough elevation not to be easily inundated in times of heavy moisture. Areas of medium potential were defined as locations with a relatively level surface, sufficient elevation to not be inundated in times of heavy moisture, further than 500 feet from existing or former extensive water sources, and/or showing minimal amounts of ground disturbance. Low potential areas were defined as areas on slope, areas easily inundated by heavy moisture, areas with existing wetlands, areas inundated by water, and/or areas that showed excessive amounts of ground disturbance. HDR investigated land forms with high to medium potential.

Shovel testing and pedestrian survey techniques were used to survey the project area. Shovel testing was used when the project crossed heavily vegetated areas that did not lend themselves to pedestrian survey. Shovel testing was restricted to areas where soil exposure was 25 percent or less and areas that had good to moderate potential to produce archaeological remains. Soils removed in this way were screened through one-quarter-inch hardware mesh. Pedestrian survey was used to examine the project area when ground visibility was 25 percent or greater.

A Trimble ProXT GPS unit (ProXT) was used to locate and follow the project area. In order to survey the project area effectively, the ProXT zoom function was used to show an area of 100 m (or 300 ft). The ProXT unit was used to mark locations identified as areas of interest and/or areas were shovel testing occured. The ProXT has sub-meter accuracy and the ability to have comments written on specific locations.

An Olympus Stylus 300 Digital Camera was used to photograph the project area. Photos were taken using the camera's high quality function. Photos were taken to show the general landscape of the area surveyed. Photos were also used to document areas of interest identified during the survey.

Notes were taken to keep a record of events that occurred during the day. These notes were used to keep track of information pertinent to the project. Items recorded included; date, weather condition during the day, travel time, start time of survey, locations of survey, locations of interest, shovel tests, meals, brief conversations with informants during survey if applicable, soil information, e-mail time, and photographic log.

Statement of Impact/Work Summary

In general survey went from west to east. Access to the line was obtained via roads (80th Ave. NW and 62nd St. NW) on the section lines that crossed the project area. The Hawthorn Pipeline project area is sandwiched between the Embridge Pipeline (to the north) and a new unmarked pipeline (to the south). The Hawthorn pipeline project area seems to be adjacent to the Embridge Pipeline and unmarked pipeline to the south. A second unmarked pipeline was noted near the Embridge pipeline as the survey continued.

Survey was conducted in sections 26 and 27 where the pipeline runs from east to west. The majority of the pervious identified sites can be found in section 27. Hence it was felt that additional sites would be located in this area. The rest of the proposed pipeline was surveyed by SWCA Environmental Consultants in December of 2008 and by Earthworks in August 2008. SWCA surveyed Section 14 of Township 156 and Range 91 and Earthworks surveyed the line between Sections 23, 24 and 25, 26 Township 156 and Range 91. These surveys covered the 150 foot right-of-way project area in there respective locations. Since survey complete by SWCA and Earthworks was recent and followed the same general methodology for investigation, HDR did not revisit these locations for additional survey.

No shovel testing was required due to adequate visibility, and no artifacts were recovered via this method of survey. Areas with crops had adequate visibility for pedestrian survey because agricultural practices and immature plants covered the survey area. In addition, much of the project area was adjacent to recent pipeline construction that had survey investigation.

The right-of-way for the pipeline in section 27 is about 15 meters wide (or 50 feet) and the pipeline right-of-way in section 26 is about 21 meters wide (or 70 feet). Pedestrian survey in section 27 was accomplished by the crew walking 4 meters apart on the south side of the center line from east to west and then walking 4 meters apart on the north side of the center line in parallel transects from west to east. Pedestrian survey in section 26 was accomplished by the crew walking 10 meters apart (5 meters to each side of the center line) in a parallel transect from west to east. No artifacts were recovered via pedestrian survey.

The survey team was unable to reestablish the previously reported location of site 32MN771. Upon reaching the location of site 32MN771 as documented in the ND SHPO records two pipelines were observed. One was marked as an Embridge pipeline and one was unmarked. It appears, according to the existing data, that the site now lies within the right of way of the Embridge pipeline. The visibility was adequate in this area and no shovel testing was conducted. Figures 3 and 4 below illustrate the environment in this area. No additional archaeological or historic facility sites were identified in the part of the project area that was surveyed by HDR.

Figure 3: Looking to the northwest from the top of the east bank. The Embridge Pipeline is in white and the second unmarked pipeline is in brown.

Figure 4: Looking to the west. The white storage facility in the middle of the photo is where the Hawthorn Pipeline heads. The linear green swaths on the landscape represent other pipeline construction that had occurred in and near the project area.

The right of way on the west bank has more vegetation then the east, however it is located on a slope. The project area is disturbed by other pipeline construction and visibility was adequate. No shovel testing was conducted in this area. Photo 5 illustrates the environment in this area.

Figure 5: Looking east from the west bank. The large green swath represents previous pipeline construction.

Recommendations

No archaeological or historic facility sites were found during the Class III Archaeological and Historic Facility Resource Inventory for the portions of the project area that received survey by HDR. If the project is later determined to be a federal undertaking, HDR recommends that the project constitutes a determination of "***No Historic Properties Affected.***" and "***No Significant Sites Affected.***" The project should proceed as planned and documented.

If federal funds or permits are required, this study could likely be used as a basis to satisfy the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations in 36 CFR 800. If Section 106 requirements are identified, consultation with the SHPO, tribal communities, and other interested parties would be needed.

If construction plans change and additional survey is needed, then survey should continue to focus on areas of higher potential for cultural resources. HDR also recommends that, if previously unknown cultural resources are encountered in the immediate area during preconstruction and/or construction, ground disturbing activities at that location cease and a professional archaeologist be notified.

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Appendix B

Wetland Delineation

HDR | ONE COMPANY *Many Solutions*®

Memo

To:	Hawthorn Oil Transportation		
From:	Aaron Diehl and Michael DeRuyter (HDR)	Project:	Hawthorn Oil Transportation Wetland Delineations
Date:	July 27, 2009		

Re: Wetland Survey Results

OVERVIEW

On May 13, 2009 and July 21, 2009, the proposed Hawthorn Oil Transportation Project (Project) route was evaluated for the presence of wetlands. Prior to these visits, the U.S. Army Corps (USACE) had already completed a jurisdictional determination that the wetlands that were delineated for EOG Resources in Section 14 of the Project "are isolated and not waters of the United States" (USACE, 2009). The information gathered during these studies documents that the Project centerline:

- crosses three USACE non-jurisdictional (isolated) wetlands
- crosses two wetlands along the Knife River that are assumed to be USACE jurisdictional
- does not cross wetlands located on U.S. Fish and Wildlife Service (USFWS) wetland easements

The following summarizes the results of these studies and the recommendations regarding the identified wetlands.

RESULTS

January 20, 2009 USACE Section 14 Jurisdictional Determination (Section 14 JD)

In a letter from the USACE dated January 20, 2009, the USACE responded to SWCA Environmental Consultants that the wetlands identified during the November, 2008 delineation in Section 14 "are isolated and are not waters of the U.S." Locations of these wetlands are shown in Exhibit A-1 through A-3. The USACE also concluded that an intermittent drainage located in the eastern half of Section 14 was determined not to be a water of the U.S. (USACE, 2009). Since this non-jurisdictional drainage appears to be the only potential nexus to waters of the U.S. within Section 14, it is likely that all wetlands within Section 14 are isolated and are not waters of the U.S. However, authorized staff members of the U.S. Army Corps of Engineers should be contacted if an official jurisdictional determination for wetlands is to be made for the wetlands not identified during the November, 2008 delineation. A full copy of the determination is available at: https://www.nwo.usace.army.mil/html/od-rmd/jur/jur.htm, document NWO-2008-3114-BIS.

HDR Engineering, Inc. | 701 Xenia Avenue South, Suite 600 Minneapolis, MN 55416 | Phone (763) 591-5400 Fax (763) 591-5413 www.hdrinc.com

May 13, 2009 Site Visit

On May 13, 2009 (May Visit) HDR conducted a site visit of the route with Greg Harper, a USFWS Wetland Manager/Refuge Officer in the Lostwood Wetland Management District. During the May Visit the USFWS identified and approved delineated wetland boundaries located on USFWS wetland easement parcels crossed by the route in Sections 23 and 26, T156N, R91W.

During this visit the USFWS determined that the proposed route avoids all wetlands located on USFWS easements (Exhibits A-2 through A-5). Photos of USFWS Wetlands 1-6 are included as Exhibit B.

July 21, 2009 Site Visit

On July 21, 2009 (July Visit) HDR conducted a site visit to delineate wetlands within the route that had not already been identified as part of the Section 14 JD or on USFWS easements. Due to construction activities that have taken place since the Section 14 JD, several Section14 wetlands were also confirmed during this visit (i.e., Wetlands F and G). Table 1 lists the wetlands identified during this visit. Data sheets collected for these wetlands are included as Exhibit C. Photos of Wetland A-H are included as Exhibit B.

Table 1 Delineated Wetlands During July Visit

Wetland ID	Location*	Crossed by Route Centerline?	USACE Jurisdictional?	Comments
A	SE ¼, Sec 27	Yes	Likely	Knife River; wetland continues to the north and south of the delineation.
B	SE ¼ Sec 23	Yes	Likely	Knife River; culverts pass under 79th Ave to the east and US Hwy 2 to the north
C	SE ¼ Sec 23	No	Likely	Knife River; wetland continues to the northwest, culverts pass south under US Hwy 2.
D	SE ¼ Sec 14	No	Not likely	PEMC basin on north side of 63rd St. in Section 14. Not delineated as part of Section 14 JD; however, wetland is part of same complex that was determined to be isolated in the Section 14 JD. Datasheet not collected at this point, see datasheet F&G for comparable information.

Wetland ID	Location*	Crossed by Route Centerline?	USACE Jurisdictional?	Comments
E	SE ¼ Sec 14	No	Not likely	PEMC basin on north side of 63rd St. in Section 14. Not delineated as part of Section 14 JD, however, wetland is part of same complex that was determined to be isolated in the Section 14 JD. Datasheet not collected at this point, see datasheet F&G for comparable information.
F	SW ¼ Sec 14	Yes	No	PEMC basin on north side of 63rd St. in Section 14. Confirmed non-jurisdictional in Section 14 JD.
G	SW ¼ Sec 14	Yes	No	PEMC basin on north side of 63rd St. in Section 14. Confirmed non-jurisdictional in Section 14 JD.
H	NW ¼ Sec 14 and NE ¼ Sec 15	Yes	Not likely	PEMC basin. Not delineated as part of Section 14 JD, however, wetland is part of same complex that was determined to be isolated in the Section 14 JD. Wetland continues about 700 feet to the west of the delineated boundary.

**All site are located within T156N, R91W, of Idaho Township*

During the July Visit,three small mapped National Wetland Inventory (NWI) basins crossed by the route centerline in the east half of Section 26 were determined to be non-wetland areas (Exhibit A). These NWI areas were dominated by wheat, peas, and Canada thistle, respectively, and all had 10YR 3/2 loam soils. A representative data sheet of these non-wetlands can be found in Exhibit C. No wetland hydrology was observed within, or immediately adjacent to these NWI wetlands. Photos of these non-wetland NWIs are included in Exhibit B.

RECOMMENDATIONS

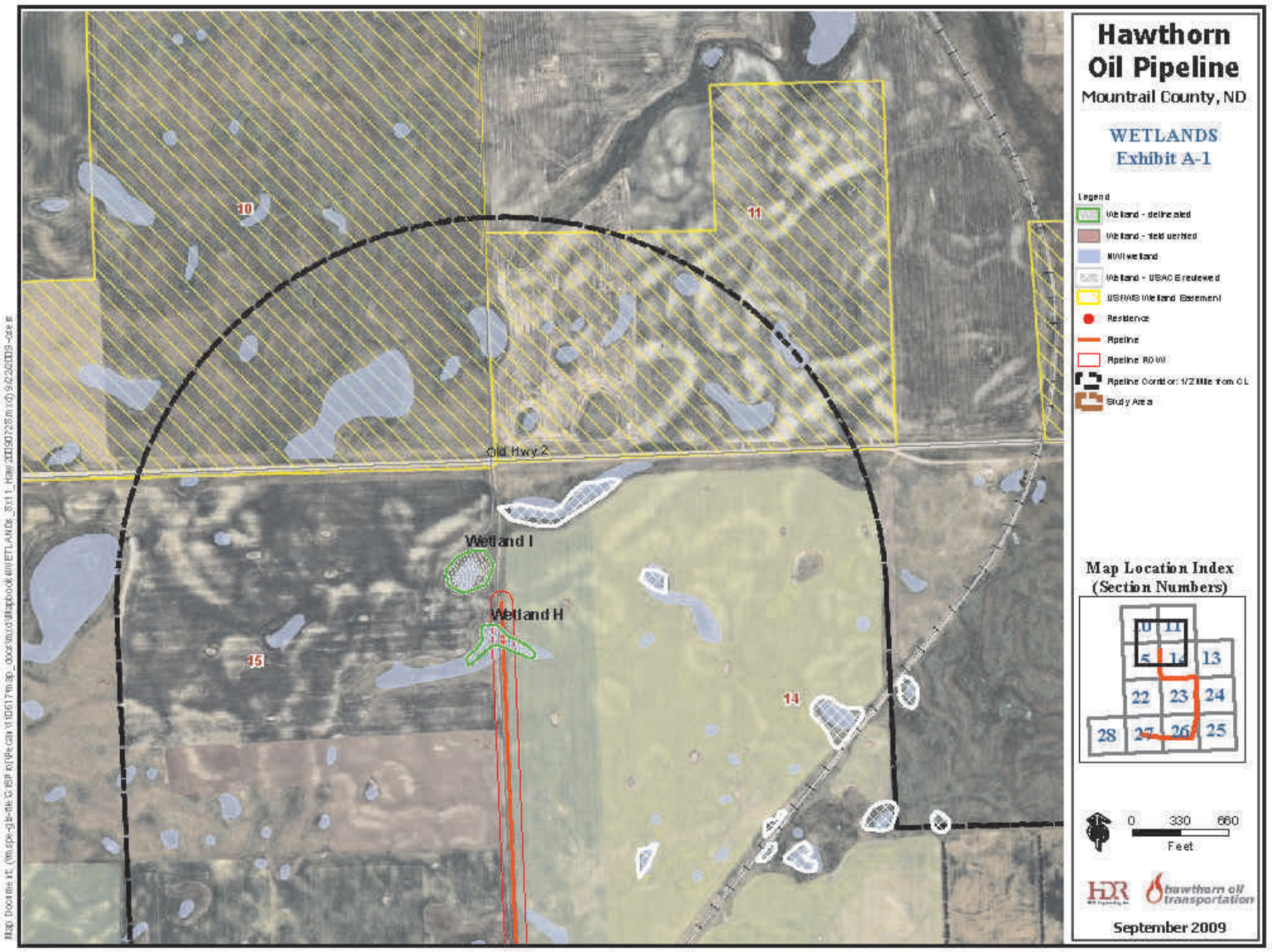
Except for the crossings of the Knife River, all wetlands crossed by the pipeline appear to be isolated from waters of the United States. It is recommended that the Project avoid impacts to the Knife River by boring under the river at a location that is upland of the wetland boundary. It is also advised that the Project follow the recommendations offered in the USFWS, North Dakota Game and Fish, and North Dakota Department of Health advisory letters that were received by the Project as part of the North Dakota Public Service Commission (PSC) route permit application process.

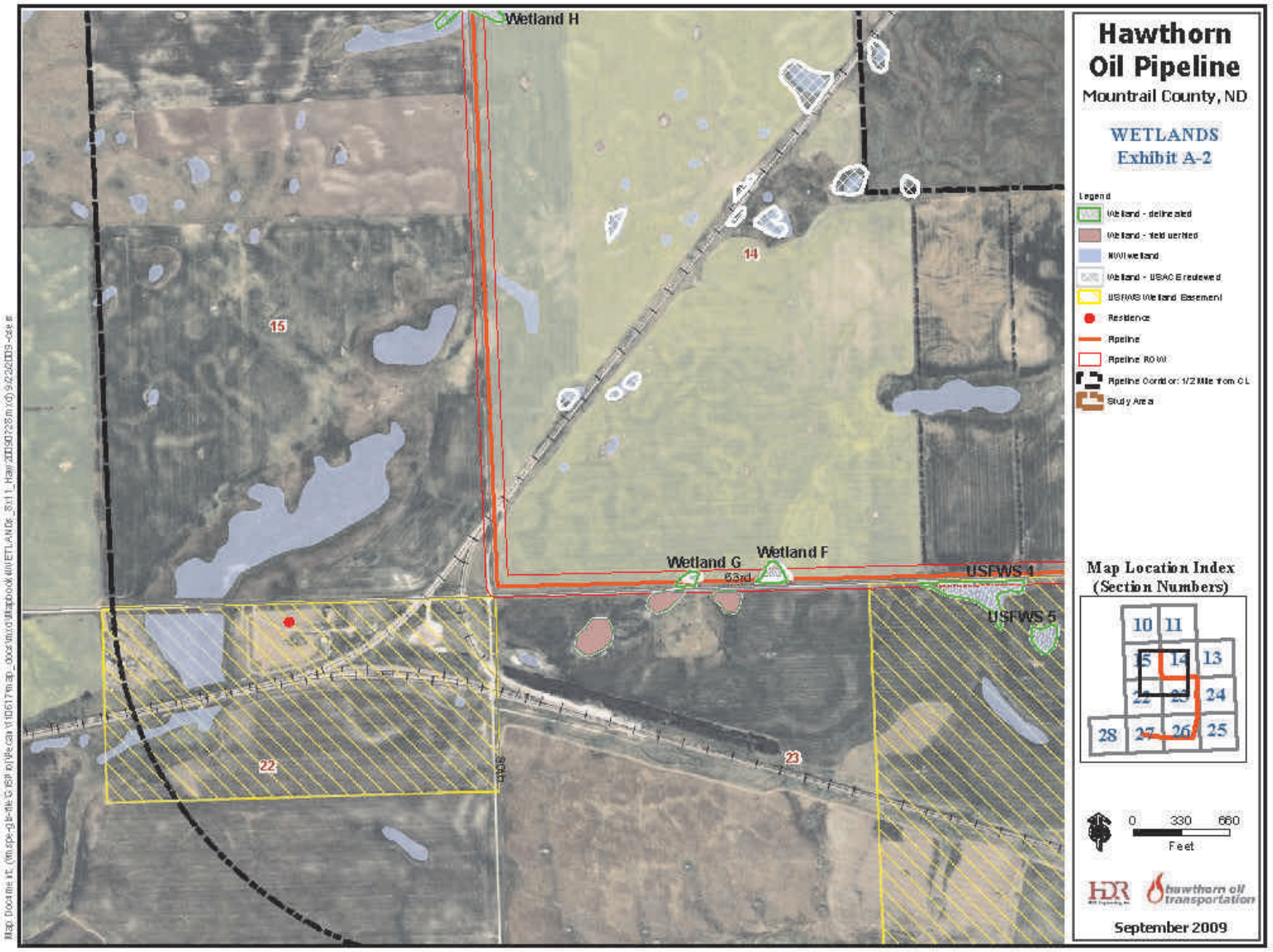
For isolated basins, it is recommended that the Project avoid permanent impacts whenever feasible. If isolated wetland basins are disturbed during construction, topography should be returned to original contours following construction, if feasible.

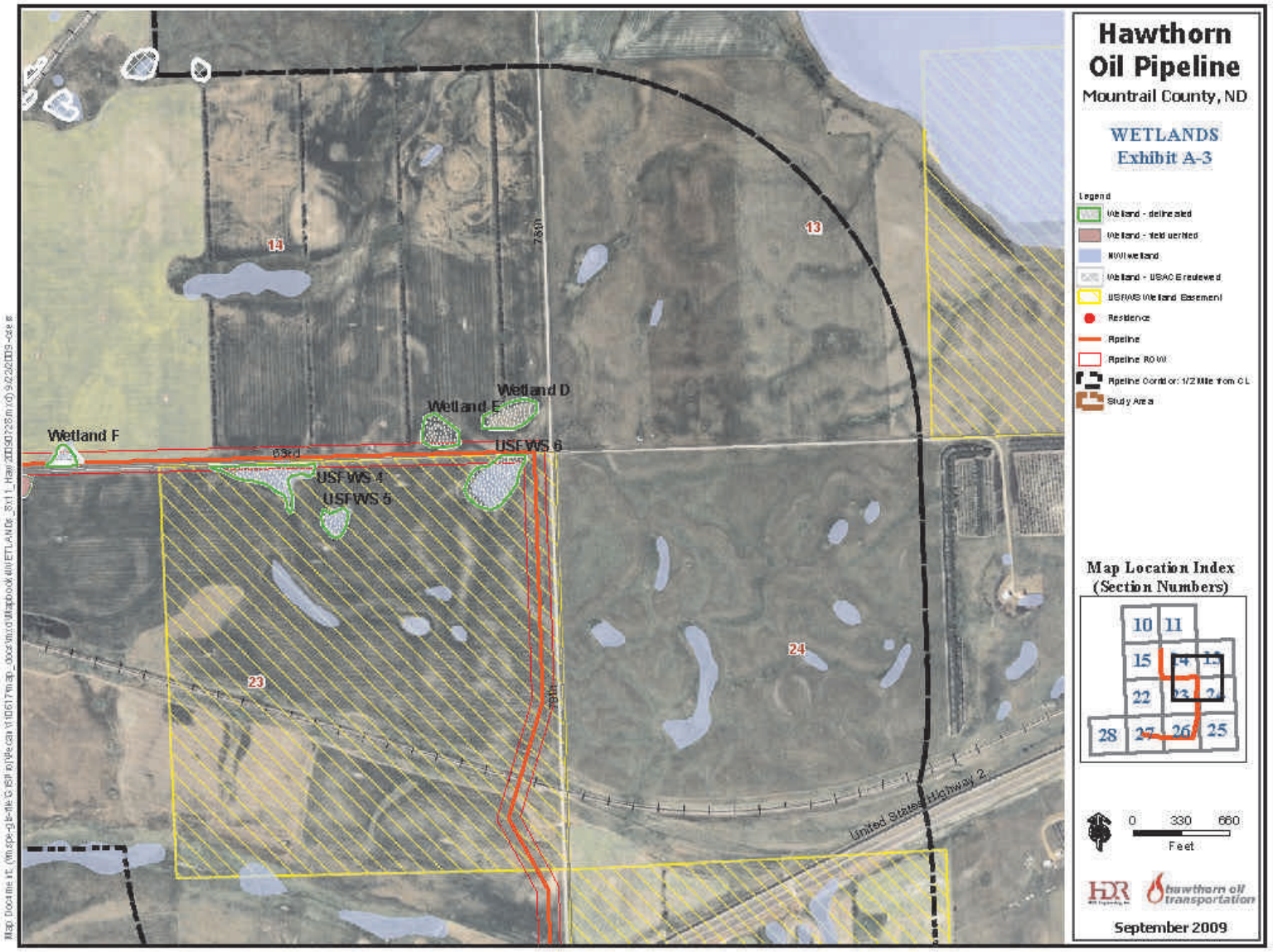
Sources

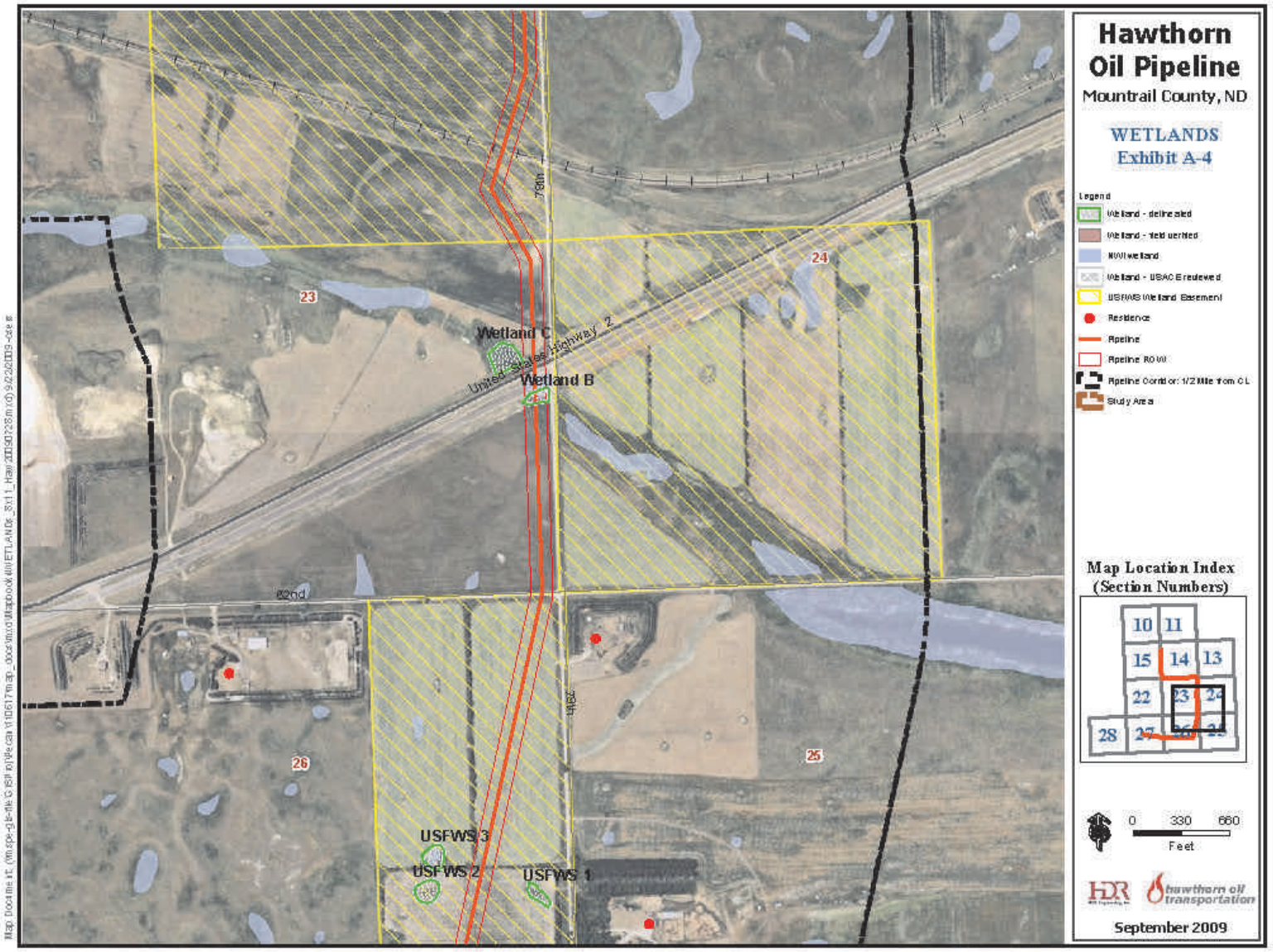
U.S. Army Corps of Engineers. January 29, 2009. *Jurisdictional Determination of Delineated Wetlands in Section 14, T156N, R91W, Mountrail County, ND: NWO-2008-03114-BIS.* Bismarck, ND. 12 pages. Available at: https://www.nwo.usace.army.mil/html/od-rnd/jur/jur.htm

Exhibit A
Wetland Delineation Maps


Hawthorn
Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-1
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Old Hwy 2
Wetland I
Wetland H
10
11
14
15
Map Location Index
(Section Numbers)
10
11
13
22
23
24
28
27
26
25
0
330
660
Feet
September 2009


Wetland H
14
15
22
23
Wetland G
Wetland F
USFWS 4
USFWS 5
63rd
Hawthorn Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-2
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Map Location Index
(Section Numbers)
10
11
15
14
13
22
23
24
28
27
26
25
0
330
660
Feet
HDR
hawthorn oil transportation
September 2009


Hawthorn Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-3
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Wetland D
Wetland E
Wetland F
USFWS 6
USFWS 4
USFWS 5
63rd
78th
United States Highway 2
13
14
23
24
Map Location Index
(Section Numbers)
10
11
15
22
28
27
26
25
0
330
660
Feet
September 2009


Hawthorn Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-4
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Map Location Index
(Section Numbers)
10
11
15
14
13
22
23
24
28
27
26
25
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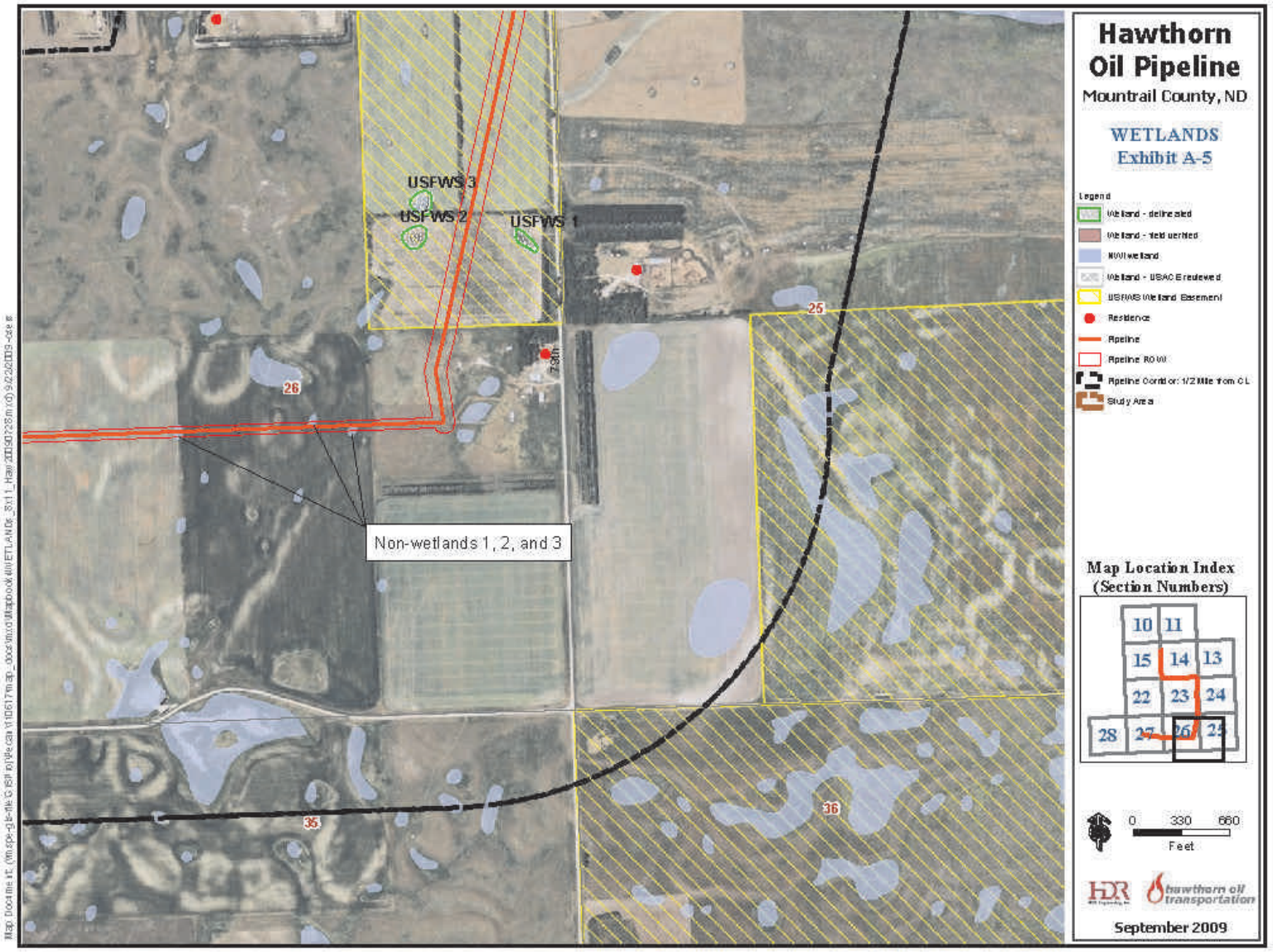
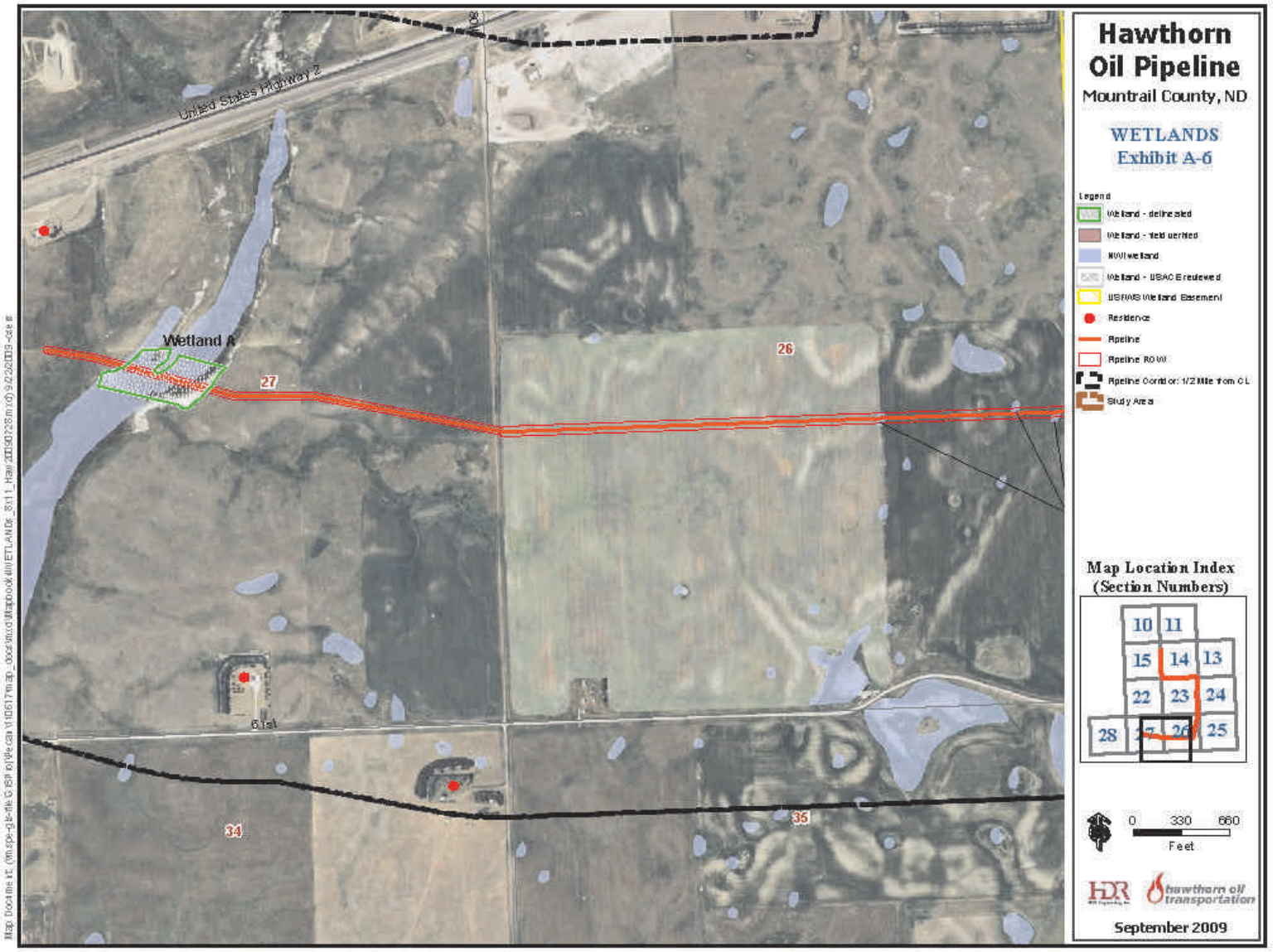
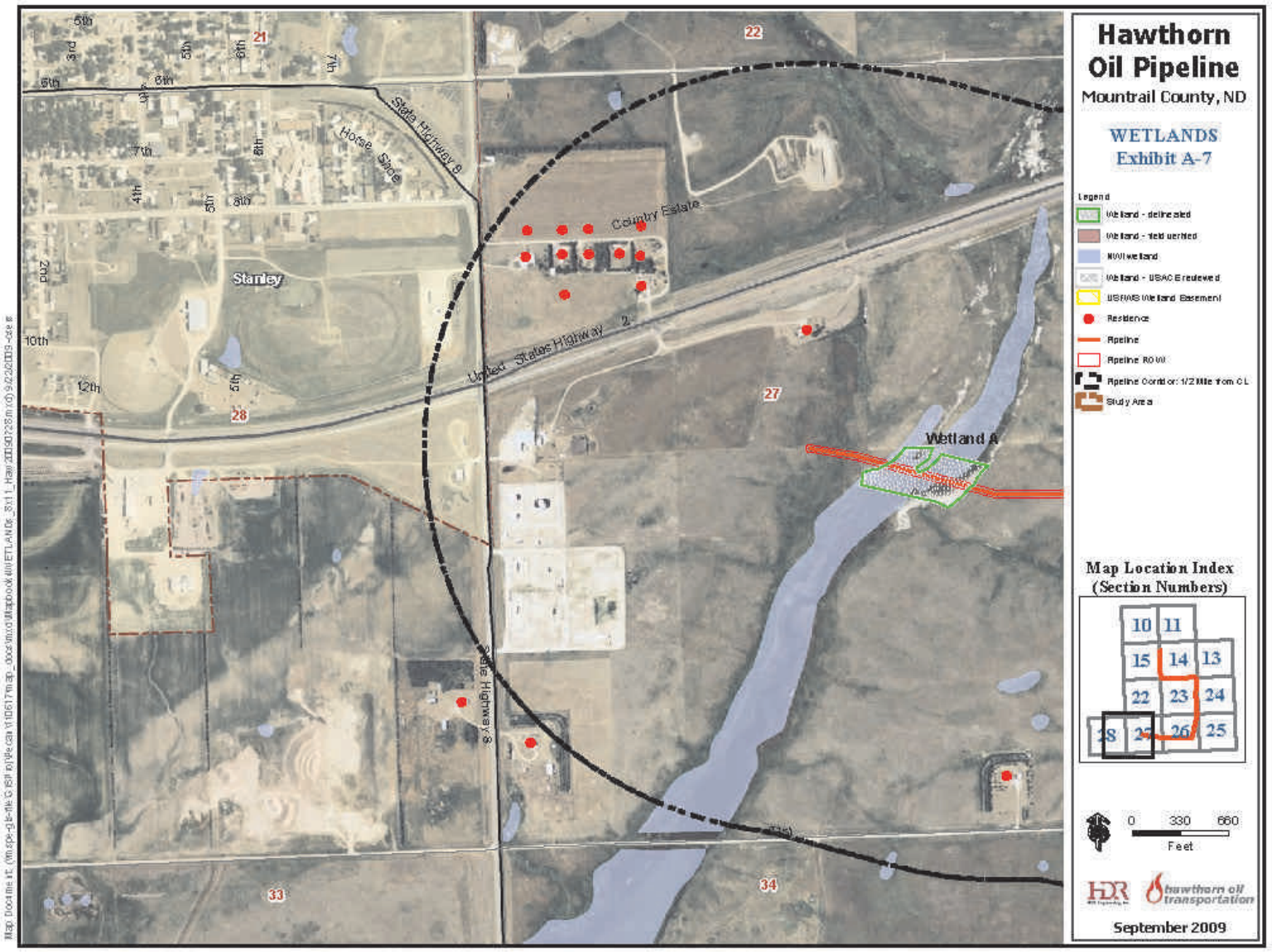
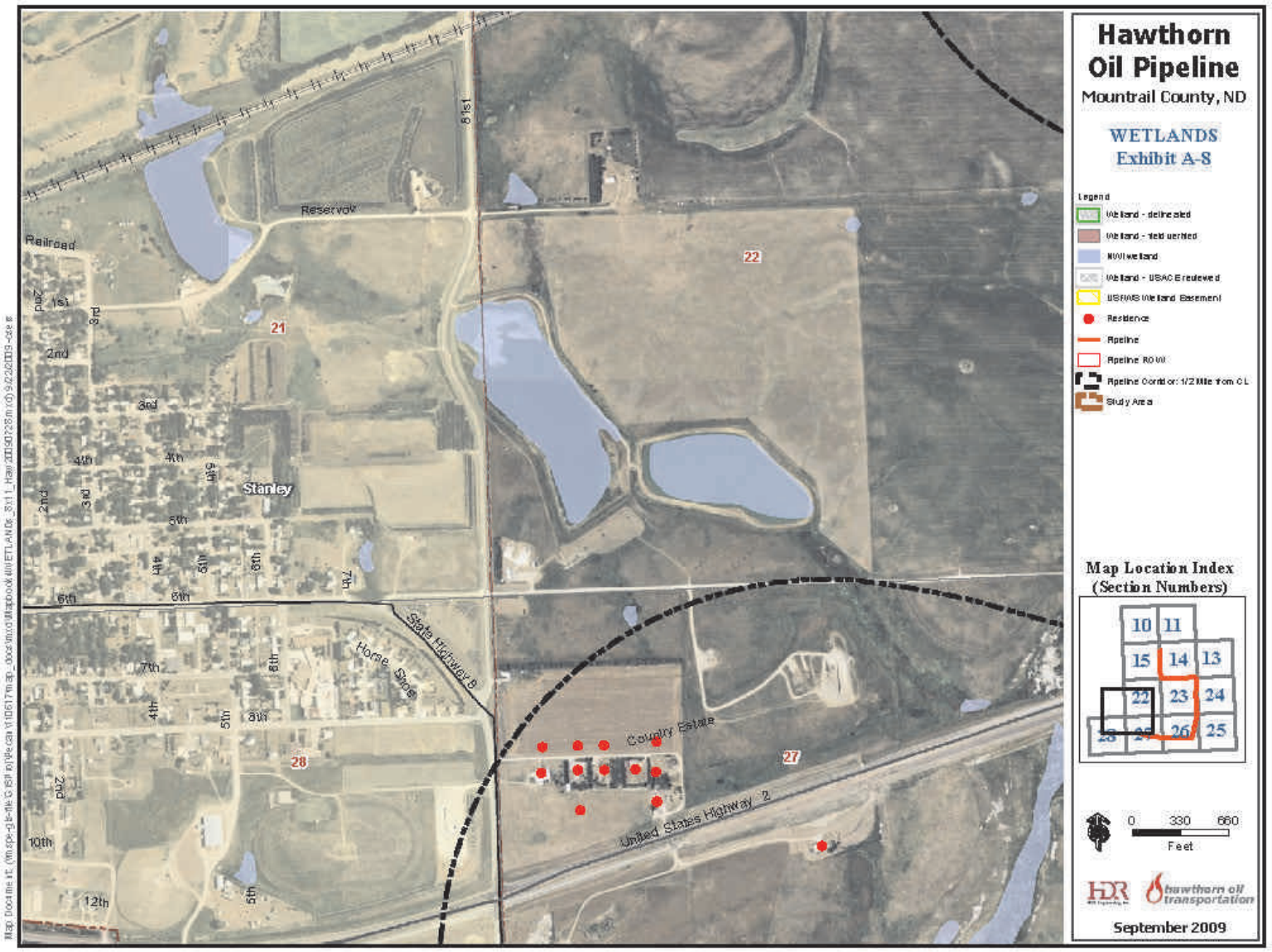
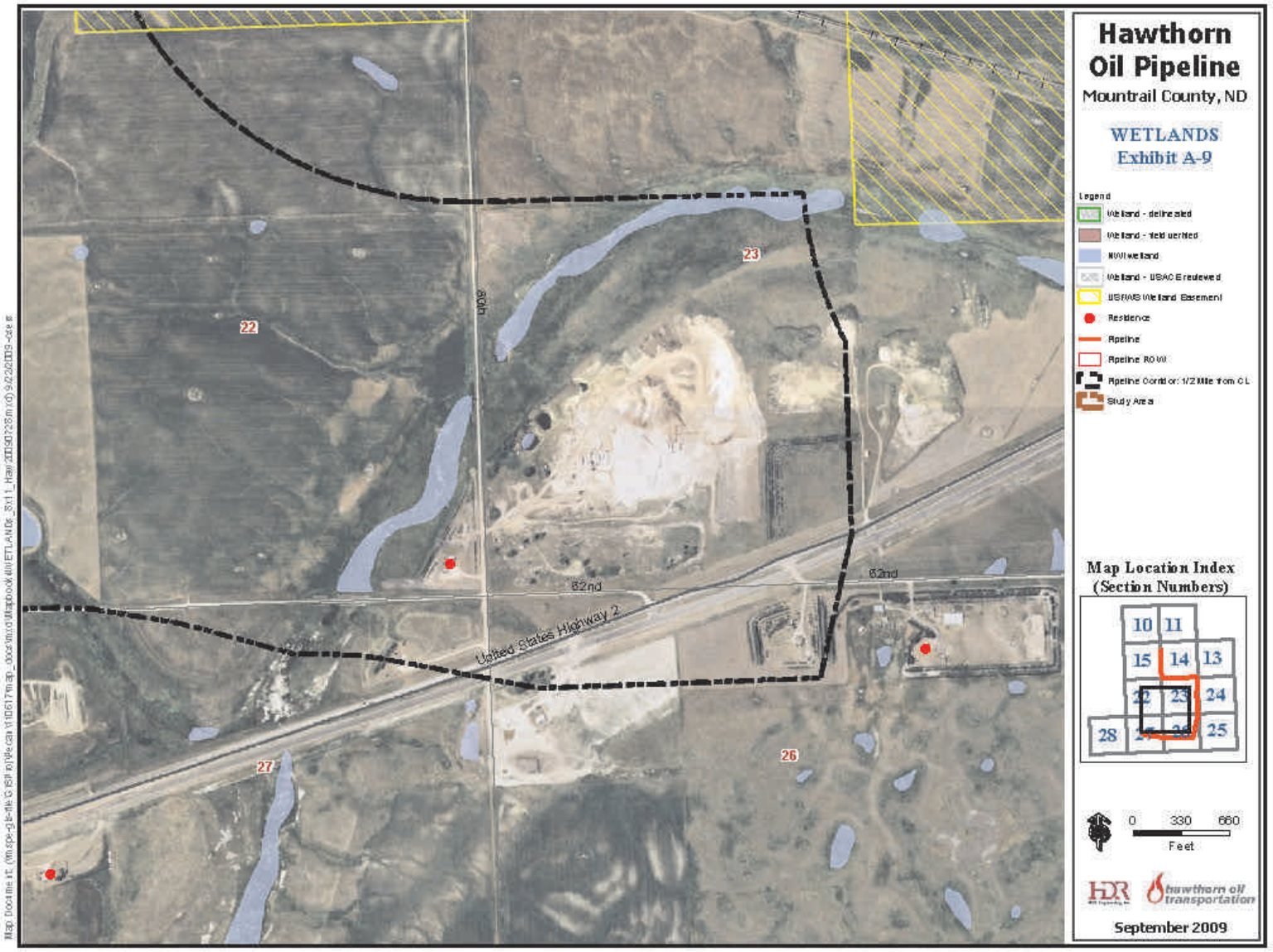
79th
82nd
USFWS 3
USFWS 2
USFWS 1


USFWS 3
USFWS 2
USFWS 1
Non-wetlands 1, 2, and 3
25
26
35
36
Hawthorn Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-5
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Map Location Index
(Section Numbers)
10
11
15
14
13
22
23
24
28
27
26
25
0
330
660
Feet
HDR
hawthorn oil transportation
September 2009


United States Highway 2
Wetland A
27
26
61st
34
35
Hawthorn Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-6
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Map Location Index
(Section Numbers)
10
11
15
14
13
22
23
24
28
27
26
25
0
330
660
Feet
HDR
hawthorn oil transportation
September 2009


Hawthorn Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-7
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Wetland A
Stanley
Horse Shoe
Country Estate
United States Highway 2
State Highway 8
Map Location Index
(Section Numbers)
10 11
15 14 13
22 23 24
28 27 26 25
0 330 660
Feet
HDR
hawthorn oil transportation
September 2009


Hawthorn
Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-8
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Map Location Index
(Section Numbers)
10
11
15
14
13
22
23
24
26
25
0
330
660
Feet
September 2009
Reservoir
Railroad
Stanley
State Highway 8
Horse Shoe
County Estate
United States Highway 2
21
22
27
28


Hawthorn
Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-9
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Map Location Index
(Section Numbers)
10
11
15
14
13
22
23
24
28
25
0
330
660
Feet
HDR
hawthorn oil transportation
September 2009
22
23
26
27
190th
62nd
62nd
United States Highway 2

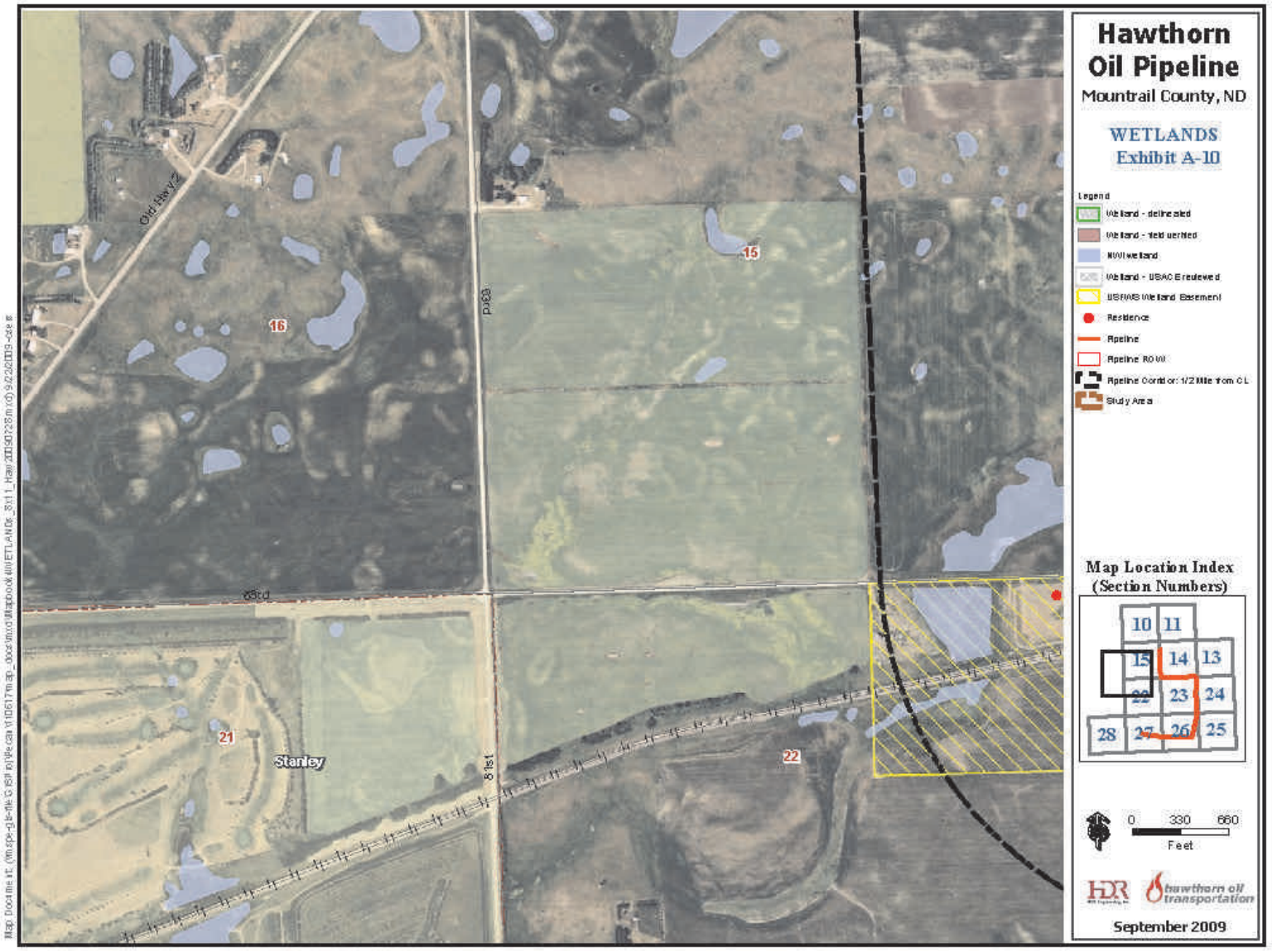

Hawthorn
Oil Pipeline
Mountrail County, ND
WETLANDS
Exhibit A-10
Legend
Wetland - delineated
Wetland - field verified
NWI wetland
Wetland - USACE reviewed
USFWS Wetland Easement
Residence
Pipeline
Pipeline ROW
Pipeline Corridor: 1/2 Mile from CL
Study Area
Map Location Index
(Section Numbers)
10
11
15
14
13
23
24
28
27
26
25
0
330
660
Feet
September 2009
Old Hwy 2
85rd
84th
81st
16
15
21
22
Stanley

Exhibit B
Wetland Delineation Photographs

Photo 1

Wetland A

SE ¼, Sec 27,
T156N, R91W, of
Idaho Township

Facing West
July, 2009

Photo 2

Wetland B

SE ¼ Sec 23,
T156N, R91W, of
Idaho Township

Facing East
July, 2009

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-1

Photo 3

Wetland C

SE ¼ Sec 23,
T156N, R91W, of
Idaho Township

Facing West
July, 2009

Photo 4

Wetland D

SE ¼ Sec 14,
T156N, R91W, of
Idaho Township

Facing North
May, 2009

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-2

Photo 5

Wetland E

T156N, R91W, of
Idaho Township

Facing North
July, 2009

Photo 6

Wetland F

SW ¼ Sec 14,
T156N, R91W, of
Idaho Township

Facing Northwest
May, 2009

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-3

Photo 7

Wetland G

SW ¼ Sec 14,
T156N, R91W, of
Idaho Township

Facing Northwest
May, 2009

Photo 8

Wetland H

NW ¼ Sec 14 and
NE ¼ Sec 15,
T156N, R91W, of
Idaho Township

Facing East
July, 2009

HDR	Site Photos Hawthorn Oil Transportation Project Mountrail County, North Dakota	**Exhibit B-4**

Photo 9

USFWS Wetland 1

NE ¼ Sec 26,
T156N, R91W, of
Idaho Township

Facing South
May, 2009

Photo 10

USFWS Wetland 2

NE ¼ Sec 26,
T156N, R91W, of
Idaho Township

Facing West
May, 2009

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-5

Photo 11

USFWS Wetland 3

NE ¼ Sec 26,
T156N, R91W, of
Idaho Township

Facing North
May, 2009

Photo 12

USFWS Wetland 4

NE ¼ Sec 23,
T156N, R91W, of
Idaho Township

Facing West
May, 2009

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-6

Photo 13

USFWS Wetland 5

NE ¼ Sec 23,
T156N, R91W, of
Idaho Township

Facing South
May, 2009

Photo 14

USFWS Wetland 6

NE ¼ Sec 23,
T156N, R91W, of
Idaho Township

Facing East
May, 20009

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-7

Photo 15

Non-Wetland NWI 1

SE ¼ Sec 26,
T156N, R91W, of
Idaho Township

Facing South
July, 2009

Photo 16

Non-Wetland NWI 2

SE ¼ Sec 26,
T156N, R91W, of
Idaho Township

Facing East
July, 2009

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-8

Photo 17

Non-Wetland NWI 3

SE ¼ Sec 26,
T156N, R91W, of
Idaho Township

Facing East
July, 2009

Photo 18

Typical Landscape
Crossed by Pipeline
Route

HDR

Site Photos
Hawthorn Oil Transportation Project
Mountrail County, North Dakota

Exhibit B-9

Exhibit C
Wetland Delineation Data Sheets

WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Toe of Slope	**Slope(%):**	<2%
City/County:	Mountrail	**Local Relief:**	Concave	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	27	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Wetland A	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	PEM/ABFh

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☑ **Hydrophytic Vegetation Present?**
- ☑ **Hydric Soil Present?**
- ☑ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☑ **Yes** ☐ **No**

Summary Remarks:

Data collected along the Knife River. Salt fringe along edge or river. Center was Eleocharis palustris, Glyceria sp, Scirpus acutus. Throughflow was minimal to absent during sampling.

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Scolochloa festucacea	50	Y	OBL
Salicornia rubra	15	N	OBL
Hordeum jubatum	10	N	FACW
Distichlis spicata	5	N	NI

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**1** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**100.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	65	x1	65
FACW:	10	x2	20
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	75		85

Prevalence Index = B/A **1.13**

Hydrophytic Vegetation Indicators:

- ☑ **Dominance Test > 50%**
- ☑ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

☑ **Hydrophytic Vegetation Present?**

% Bare Ground in Herb Stratum: 20

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	80

Vegetation Remarks:

S. festucacea formed wetland fringe followed by a mixed zone of H. jubatum, Salicornia rubra, Rumex crispus, Glyceria sp., Eleocharis palustris and Scirpus acutus. Sharp wetland transition to dry prairie.

US Army Corps of Engineers **Great Plains Iterim Version**

WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	16	10YR 4/ 2		10YR 5/6	5	RM	M	Clay	River alluvium

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☑ Hydric Soil Present?

Soil Remarks:

Alluvial soil.

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☑ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches):

☑ Wetland Hydrology Present?

Hydrology Remarks:

Broad salt crust present along fringe of wetland. Saturated conditions near center of wetland.

US Army Corps of Engineers — Great Plains Iterim Version

WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Hillslope	**Slope(%):**	2-5%
City/County:	Mourtrail	**Local Relief:**	Convex	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	27	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Upland A	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	none

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☐ **Hydrophytic Vegetation Present?**
- ☐ **Hydric Soil Present?**
- ☐ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☐ **Yes** ☑ **No**

Summary Remarks:
Dry prairie just upslope of Wetland A.

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Koeleria macrantha	40	Y	NI
Deschampsia cespitosa	30	Y	FACW
Melilotus officinalis	5	N	FACU-
Stipa comata	5	N	NI
Stipa spartea	5	N	NI

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across all Strata:	2	(B)
Percent of Dominant Species that are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	0	x1	0
FACW:	30	x2	60
FAC:	0	x3	0
FACU:	5	x4	20
UPL:	0	x5	0
	35		80

Prevalence Index = B/A 2.29

Hydrophytic Vegetation Indicators:

- ☐ **Dominance Test > 50%**
- ☑ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	85

☐ **Hydrophytic Vegetation Present?**

Vegetation Remarks:
Macrobiotic crust, Artemesia frigida, A. ludoviciana, Echinacea angustifolia, Gaillardia aristata, Pediomelum argophyllum, Polygala alba, Anemone patens, Liatris puncata, Ratibita columnifera, Solidago missouriensis, Rosa sp., Dalea purpurea, Snowberry

US Army Corps of Engineers **Great Plains Iterim Version**

WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	12	10YR 4/3						Silty Loamy Clay	Dry and crumbly

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☐ Hydric Soil Present?

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches):

☐ Wetland Hydrology Present?

Hydrology Remarks:

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Depression	**Slope(%):**	2-5%
City/County:	Mountrail	**Local Relief:**	Concave	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	23	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Wetland B	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☑ **Hydrophytic Vegetation Present?**
- ☑ **Hydric Soil Present?**
- ☑ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☑ **Yes** ☐ **No**

Summary Remarks:

Wetland is part of Knife River located between US 2 and 79th Ave. River flows under these roads through a series of concrete and corregated culverts.

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Phalaris arundinacea	90	Y	FACW+

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**1** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**100.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	0	x1	0
FACW:	90	x2	180
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	90		180

Prevalence Index = B/A **2.00**

Hydrophytic Vegetation Indicators:

- ☑ **Dominance Test > 50%**
- ☑ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	90

☑ **Hydrophytic Vegetation Present?**

Vegetation Remarks:

P. arundinacea was drowned out at base of depression

US Army Corps of Engineers **Great Plains Iterim Version**

WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	12	10YR 2/1						Clay loam	muck

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☑ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☑ **Hydric Soil Present?**

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches): 0

☑ **Wetland Hydrology Present?**

Hydrology Remarks:

Water appears to "bounce" in this reach of the river during rain events. Defined, steep, 4 foot deep edges to wetland.

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Hillslope	**Slope(%):**	2%
City/County:	Mountrail	**Local Relief:**	Convex	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	23	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Upland B	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	none

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☐ **Hydrophytic Vegetation Present?**
- ☐ **Hydric Soil Present?**
- ☐ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☐ **Yes** ☑ **No**

Summary Remarks:

Disturbed, smooth brome covered hillslope adjacted to Wetland B.

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Bromis inermis	100	Y	NI

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**0** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**0.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	0	x1	0
FACW:	0	x2	0
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	0		0
Prevalence Index = B/A			0.00

Hydrophytic Vegetation Indicators:

- ☐ **Dominance Test > 50%**
- ☐ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

☐ **Hydrophytic Vegetation Present?**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	100

Vegetation Remarks:

Smooth brome assumed to be an upland indicator

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	12	10YR 3/1						Loam	dry

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☐ Hydric Soil Present?

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches):

☐ Wetland Hydrology Present?

Hydrology Remarks:

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Depression	**Slope(%):**	2-5%
City/County:	Mountrail	**Local Relief:**	Concave	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	23	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Wetland C	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	none

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☑ **Hydrophytic Vegetation Present?**
- ☑ **Hydric Soil Present?**
- ☑ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☑ **Yes** ☐ **No**

Summary Remarks:
Reach of the Knife River

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Scirpus acutus	80	Y	OBL
Carex atherodes	20	N	OBL

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	1 (A)
Total Number of Dominant Species Across all Strata:	1 (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	100.0% (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	100	x1	100
FACW:	0	x2	0
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	100		100

Prevalence Index = B/A 1.00

Hydrophytic Vegetation Indicators:

- ☑ **Dominance Test > 50%**
- ☑ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	100

☑ **Hydrophytic Vegetation Present?**

Vegetation Remarks:
Basin within Knife River. Deeper areas S. acutus, shallower areas C atherodes

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	8	10YR 2/1						Clay loam	muck

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☑ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☑ **Hydric Soil Present?**

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☑ Saturation Present? Depth (inches): 0

☑ **Wetland Hydrology Present?**

Hydrology Remarks:

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Hillslope	**Slope(%):**	2%
City/County:	Mourtrail	**Local Relief:**	Concave	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	23	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Upland C	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	none

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☑ **Hydrophytic Vegetation Present?**
- ☐ **Hydric Soil Present?**
- ☐ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☐ **Yes** ☑ **No**

Summary Remarks:
Top of Stream Bank

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Agropyron caninum	80	Y	FAC
Bromis inermis	15	N	NI
Carex sp.	5	N	NI

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**1** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**100.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	0	x1	0
FACW:	0	x2	0
FAC:	80	x3	240
FACU:	0	x4	0
UPL:	0	x5	0
	80		240

Prevalence Index = B/A 3.00

Hydrophytic Vegetation Indicators:

- ☑ **Dominance Test > 50%**
- ☑ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

% Bare Ground in Herb Stratum:	**Tree Percentage:**	0
	Shrub Percentage:	0
	Herb Percentage:	100

☑ **Hydrophytic Vegetation Present?**

Vegetation Remarks:
Smooth brome assumed upland.

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	16	10YR 3/1		10YR 4/4	2	D	M	Loam	

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☐ Hydric Soil Present?

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches):

☐ Wetland Hydrology Present?

Hydrology Remarks:

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Depression	**Slope(%):**	2%
City/County:	Mourtrail	**Local Relief:**	Convex	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	14	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Wetland F & G	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☑ **Hydrophytic Vegetation Present?**
- ☑ **Hydric Soil Present?**
- ☑ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☑ **Yes** ☐ **No**

Summary Remarks:

Seasonal prairie pothole wetlands. Located adjacent to tilled farm fields.

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Polygonum amphibium	95	Y	OBL
Spartina pectinata	5	N	FACW

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**1** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**100.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	95	x1	95
FACW:	5	x2	10
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	100		105

Prevalence Index = B/A 1.05

Hydrophytic Vegetation Indicators:

- ☑ **Dominance Test > 50%**
- ☑ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

☑ **Hydrophytic Vegetation Present?**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	100

Vegetation Remarks:

Also Sparganium eurycarpum and Typha sp.

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	8	10YR 2/1						Loam	Muck

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☑ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☑ **Hydric Soil Present?**

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☑ Saturation Present? Depth (inches): 0

☑ **Wetland Hydrology Present?**

Hydrology Remarks:

Noted to contain water during earlier visit in May 2009.

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Hillslope	**Slope(%):**	2%
City/County:	Mountrail	**Local Relief:**	Concave	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	14	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Upland F & G	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	none

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☐ **Hydrophytic Vegetation Present?**
- ☐ **Hydric Soil Present?**
- ☐ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☐ **Yes** ☑ **No**

Summary Remarks:
Disturbed uplandland adjacent to tilled field.

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Bromis inermis	95	Y	NI
Solidago missouriensis	5	N	NI

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**0** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**0.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	0	x1	0
FACW:	0	x2	0
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	0		0

Prevalence Index = B/A **0.00**

Hydrophytic Vegetation Indicators:

- ☐ **Dominance Test > 50%**
- ☐ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

☐ **Hydrophytic Vegetation Present?**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	100

Vegetation Remarks:
Both species assumed to be upland

US Army Corps of Engineers **Great Plains Iterim Version**

WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

	Matrix		Redox Features					
Depth (in)	Color (moist)	%	Color (moist)	%	Type	Loc	Texture	Remarks

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☐ Hydric Soil Present?

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches):

☐ Wetland Hydrology Present?

Hydrology Remarks:

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Depression	**Slope(%):**	2%
City/County:	Mountrail	**Local Relief:**	Concave	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	14 & 15	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Wetland H	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☑ **Hydrophytic Vegetation Present?**
- ☑ **Hydric Soil Present?**
- ☑ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☑ **Yes** ☐ **No**

Summary Remarks:

Prairie pothole wetland. Hydrology wetter on west side of wetland. Full west side fo wetland not delineated

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Polygonum amphibium	90	Y	OBL
Beckmannia syzigachne	10	N	OBL

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**1** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**100.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	100	x1	100
FACW:	0	x2	0
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	100		100

Prevalence Index = B/A **1.00**

Hydrophytic Vegetation Indicators:

- ☑ **Dominance Test > 50%**
- ☑ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	100

☑ **Hydrophytic Vegetation Present?**

Vegetation Remarks:

East side of wetland slightly disturbed by construction activities. East side also contains traces of sunflower and lambsquarter.

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	12	10YR 3/1		10YR 4/56	10	RM	M	Loam	

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRRH outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☑ **Hydric Soil Present?**

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☑ Saturation Present? Depth (inches): 0

☑ **Wetland Hydrology Present?**

Hydrology Remarks:

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**	Hillslope	**Slope(%):**	2%
City/County:	Mountrail	**Local Relief:**	Concave	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	14 & 15	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Upland H	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	none

Are climatic / hydrologic conditions on the site typical for this time of year? ☑ **(If No Explain in Remarks)**

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☑

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

- ☐ **Hydrophytic Vegetation Present?**
- ☐ **Hydric Soil Present?**
- ☐ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☐ **Yes** ☑ **No**

Summary Remarks:

Edge of prairie pothole wetland

VEGETATION

(Use Scientific Names)

	% Cover	Dominant Species	Indicator Status
herb			
Bromis inermis	90	Y	NI

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	**0** (A)
Total Number of Dominant Species Across all Strata:	**1** (B)
Percent of Dominant Species that are OBL, FACW, or FAC:	**0.0%** (A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	0	x1	0
FACW:	0	x2	0
FAC:	0	x3	0
FACU:	0	x4	0
UPL:	0	x5	0
	0		0
Prevalence Index = B/A			**0.00**

Hydrophytic Vegetation Indicators:

- ☐ **Dominance Test > 50%**
- ☐ **Prevalence Index ≤ 3.0**
- ☐ **Morphological Adaptations**
- ☐ **Problematic Hydrophytic Vegetation**

☐ **Hydrophytic Vegetation Present?**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	90

Vegetation Remarks:

Smooth brome assumed to be upland.

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	%	Redox Features Color (moist)	%	Type	Loc	Texture	Remarks
0	14	10YR 3/1						Loam	dry
14	16	10YR 3/2						Clay loam	

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☐ Hydric Soil Present?

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches):

☐ Wetland Hydrology Present?

Hydrology Remarks:

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

Project Site:	Hawthorn Pipeline	**Landform:**		**Slope(%):**	1%
City/County:	Mountrail	**Local Relief:**	None	**Sub-Region (LRR):**	
Sampling Date:	7/21/2009 **State:** ND	**Section:**	26	**Lat/Northing:**	
Applicant/Owner:		**Township:**	156	**Long/Easting:**	
Sampling Point:	Non-Wetland 1	**Range:**	91	**Datum:**	
Investigator 1:	A. Diehl	**Soil Map Unit Name:**			
Investigator 2:				**NWI Classification:**	PEMA

Are climatic / hydrologic conditions on the site typical for this time of year? ☐ **(If No Explain in Remarks)**

Are Vegetation ☑ **Soil** ☑ **Hydrology** ☐ **Significantly Disturbed?** **Are Normal Conditions present?** ☐

Are Vegetation ☐ **Soil** ☐ **Hydrology** ☐ **Naturally Problematic?**

SUMMARY OF FINDINGS - Attach a site map showing sampling point locations, transects, important features, etc.

☐ **Hydrophytic Vegetation Present?**
☐ **Hydric Soil Present?**
☐ **Wetland Hydrology Present?**

Is the Sampled Area within a Wetland? ☐ **Yes** ☑ **No**

Summary Remarks:

Non-wetland area that was mapped as a PEMA by the NWI. Cropland on both sides with a fenceline dominated by Canada thistle. Crops showing no hydrologic stress. No depression in landform.

VEGETATION

(Use Scientific Names)

herb	% Cover	Dominant Species	Indicator Status
Cirsium arvense	80	Y	FACU

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across all Strata:	1	(B)
Percent of Dominant Species that are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index Worksheet

	(A)		(B)
OBL:	0	x1	0
FACW:	0	x2	0
FAC:	0	x3	0
FACU:	80	x4	320
UPL:	0	x5	0
	80		320

Prevalence Index = B/A 4.00

Hydrophytic Vegetation Indicators:

☐ **Dominance Test > 50%**
☐ **Prevalence Index ≤ 3.0**
☐ **Morphological Adaptations**
☐ **Problematic Hydrophytic Vegetation**

☐ **Hydrophytic Vegetation Present?**

% Bare Ground in Herb Stratum:

Tree Percentage:	0
Shrub Percentage:	0
Herb Percentage:	80

Vegetation Remarks:

Adjacent farm fields have been planted to wheat and to peas.

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WETLAND DETERMINATION DATA FORM - GREAT PLAINS REGION

SOIL- Profile Description: (Describe to the Depth needed to Document the Indicator or Confirm the Absence of Indicators.)

Depth (in)		Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type	Redox Features Loc	Texture	Remarks
0	16	10YR 3/ 2						Loam	Tilled A horizon

SOIL-Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16)

Indicators for Problematic Hydric Soils:

- ☐ 1 cm Muck (A9) (LRR I and J)
- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ High Plains Depressions (F16) *(LRR H outside of MLRA 72/73)*
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

☐ Restrictive Layer Present?

Type:

Depth (inches):

☐ Hydric Soil Present?

Soil Remarks:

HYDROLOGY-Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surf. (B8)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres along Living Roots (C3) *(where not tilled)*
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imag.(C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost Heave Hummocks (D7) (LRR F)

Field Observations:

- ☐ Surface Water Present? Depth (inches):
- ☐ Water Table Present? Depth (inches):
- ☐ Saturation Present? Depth (inches): >16

☐ Wetland Hydrology Present?

Hydrology Remarks:

US Army Corps of Engineers — Great Plains Iterim Version

Appendix C

Agency Correspondence

From: Heiser, Gerald R.
To: Diehl, Aaron;
Subject: Re: Hawthorn Pipeline near Stanley, ND
Date: Thursday, September 17, 2009 11:56:26 AM

Mr. Diehl:

The Little Knife River in Mountrail County, North Dakota is not claimed as sovereign by the State of North Dakota. Therefore, a sovereign lands permit is not required for this project. Thank you for your inquiry.

Gerald R. Heiser
Sovereign Lands Manager
Office of the State Engineer
Bismarck, North Dakota
Phone: (701) 328-4935
Email: gheiser@nd.gov

On 9/17/09 11:48 AM, "Diehl, Aaron" <Aaron.Diehl@hdrinc.com> wrote:

Per our conversation this morning, attached is a copy of the notification letter that was sent out for the proposed Hawthorn Oil Pipeline Project in Mountrail County, North Dakota.

Please review the figure at the end of the document and determine whether the proposed pipeline alignment crosses any North Dakota Sovereign Lands. If you have time to look at this figure by end of business tomorrow, that would be most helpful.

Thanks!
Aaron Diehl
Environmental Scientist
HDR ONE COMPANY | ***Many Solutions***
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