United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Great Plains Regional Office
115 Fourth Avenue S.E., Suite 400
Aberdeen, South Dakota 57401

TAKE PRIDE IN AMERICA

JUN 03 2011

IN REPLY REFER TO:
DESCRM
MC-208

MEMORANDUM

TO: Superintendent, Fort Berthold Agency

FROM: Regional Director, Great Plains Region

SUBJECT: Environmental Assessment and Finding of No Significant Impact

In compliance with the regulations of the National Environmental Policy Act (NEPA) of 1969, as amended, for six proposed oil and gas drilling wells by Enerplus on the Fort Berthold Reservation, an Environmental Assessment (EA) has been completed and a Finding of No Significant Impact (FONSI) has been issued.

All the necessary requirements of the National Environmental Policy Act have been completed. Attached for your files are copies of the EA, FONSI and Notice of Availability. The Council on Environmental Quality (CEQ) regulations require that there be a public notice of availability of the FONSI (40 C.F.R. Part 1506.6(b)). Please post the attached notice of availability at the Agency and Tribal buildings for 30 days.

If you have any questions, please call Marilyn Bercier, Regional Environmental Scientist, Division of Environment, Safety and Cultural Resources Management, at (605) 226-7656.

Attachment

cc: Tex Hall, Chairman, Three Affiliated Tribes (with attachment)
Elgin Crows Breast, THPO (with attachment)
Derek Enderud, BLM, Dickenson, ND (with attachment)
John Shelman, US Army Corps of Engineers
Jeffrey Hunt, Virtual One Stop Shop

Finding of No Significant Impact

Enerplus Resources (USA) Corporation

Environmental Assessment for
Six Bakken and Three Forks Oil Wells:

Beluga 148-93-06A-05-3H
Duet 148-93-185C-07-1H
Chord 148-93-18D-07-3H
Humpback 148-93-06A-05-4H TF
Harmony 148-93-18C-0-2H TF
Music 148-93-18D-07-4H TF

Fort Berthold Indian Reservation
Dunn County, North Dakota

The U.S. Bureau of Indian Affairs (BIA) has received a proposal to drill up to six oil/gas wells, access roads and related infrastructure on the Fort Berthold Indian Reservation in Dunn County, North Dakota. Associated federal actions by BIA include determinations of effect regarding cultural resources, approvals of leases, rights-of-way and easements, and a positive recommendation to the Bureau of Land Management regarding the Applications for Permit to Drill.

Potential of the proposed actions to impact the human environment is analyzed in the attached addendum to an existing Environmental Assessment (EA), as required by the National Environmental Policy Act. Based on the recently completed addendum to the EA, I have determined that the proposed project will not significantly affect the quality of the human environment. No Environmental Impact Statement is required for any portion of the proposed activities.

This determination is based on the following factors:

1. Agency and public involvement was solicited and environmental issues related to the proposal were identified.
2. Protective and prudent measures were designed to minimize impacts to air, water, soil, vegetation, wetlands, wildlife, public safety, water resources, and cultural resources. The remaining potential for impacts was disclosed for both the Proposed Action and the No Action Alternative.
3. Guidance from the U.S. Fish and Wildlife Service has been fully considered regarding wildlife impacts, particularly in regard to threatened or endangered species. This guidance includes the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) (MBTA), the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.) (NEPA), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250) (BGEPA), Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds", and the Endangered Species Act (16 U.S.C. 1531 et seq.) (ESA).
4. The proposed actions are designed to avoid adverse effects to historic, archeological, cultural and traditional properties, sites and practices. The Tribal Historic Preservation Officer has concurred with BIA's determination that no historic properties will be affected.
5. Environmental justice was fully considered.
6. Cumulative effects to the environment are either mitigated or minimal.
7. No regulatory requirements have been waived or require compensatory mitigation measures.
8. The proposed projects will improve the socio-economic condition of the affected Indian community.

Regional Director

6-2-11
Date

Notice of Availability and Appeal Rights

Enerplus: Beluga 148-93-06A-05-3H, Humpback 148-93-06A-05-4H TF
Duet 148-93-185C-07-1H, Harmony 148-93-18C-0-2H TF
Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF

The Bureau of Indian Affairs (BIA) is planning to issue administrative approvals related to installation of six oil and gas wells as shown on the attached map. Construction by Enerplus is expected to begin in 2011.

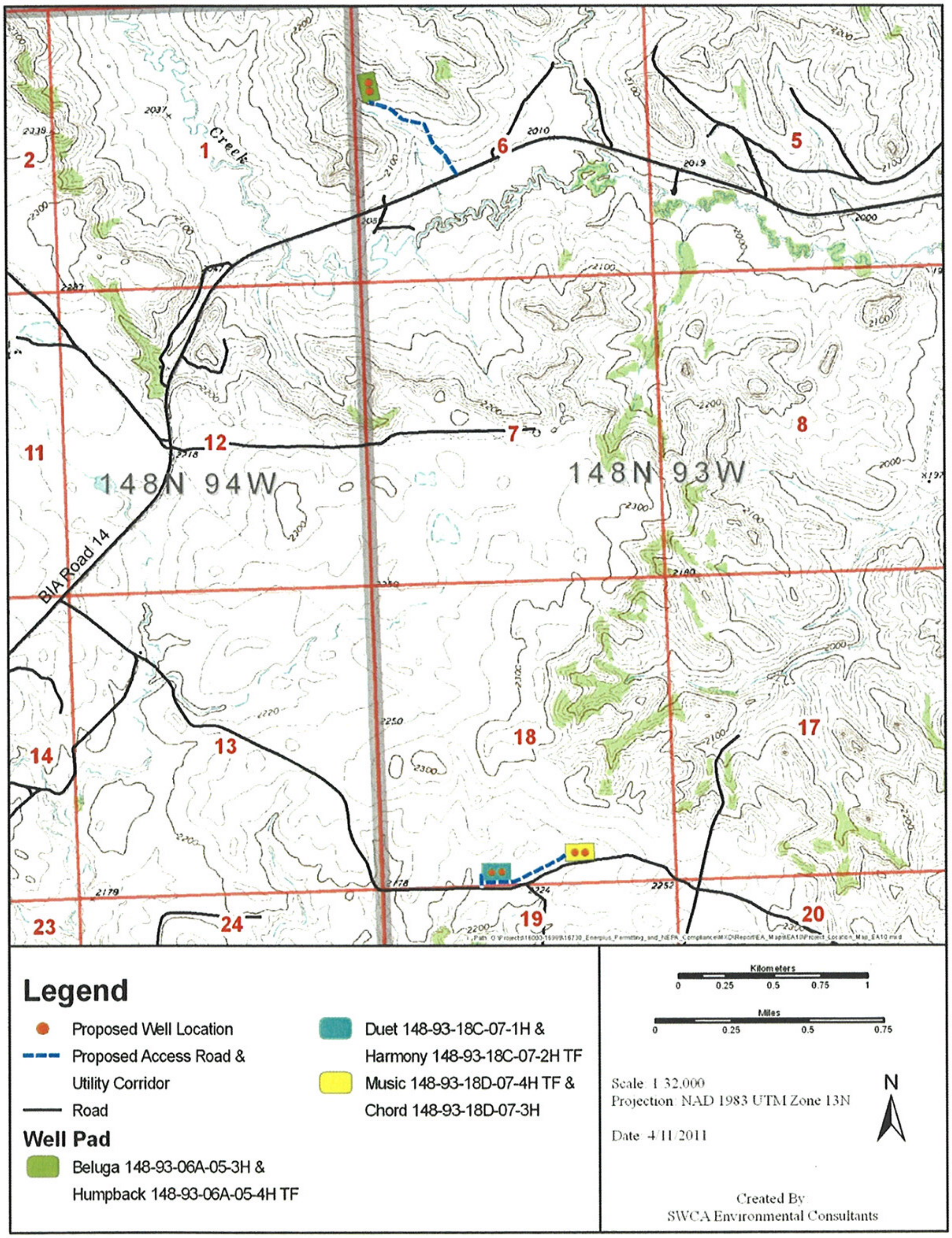
An environmental assessment (EA) determined that proposed activities will not cause significant impacts to the human environment. An environmental impact statement is not required. Contact Howard Bemer, Superintendent at 701-627-4707 for more information and/or copies of the EA and the Finding of No Significant Impact (FONSI).

The FONSI is only a finding on environmental impacts – it is not a decision to proceed with an action and *cannot* be appealed. BIA's decision to proceed with administrative actions *can* be appealed until July 2, 2011, by contacting:

> United States Department of the Interior
> Office of Hearings and Appeals
> Interior Board of Indian Appeals
> 801 N. Quincy Street, Suite 300, Arlington, Va 22203.

Procedural details are available from the BIA Fort Berthold Agency at 701-627-4707.

Project locations.



ENVIRONMENTAL ASSESSMENT

United States Department of the Interior
Bureau of Indian Affairs

Great Plains Regional Office
Aberdeen, South Dakota

Cooperating Agency:

Bureau of Land Management

North Dakota Field Office
Dickinson, North Dakota

Enerplus Resources (USA) Corporation

6 Exploratory Bakken and Three Forks Oil Wells:

SWNW Section 6, T148N, R93W
Beluga 148-93-06A-05-3H **Humpback 148-93-06A-05-4H TF**

SESW Section 18, T148N, R93W
Duet 148-93-185C-07-1H **Harmony 148-93-18C-0-2H TF**

SWSE Section 18, T148N, R93W
Chord 148-93-18D-07-3H **Music 148-93-18D-07-4H TF**

Fort Berthold Indian Reservation

June 2011

For information contact:
Bureau of Indian Affairs, Great Plains Regional Office
Division of Environment, Safety and Cultural Resources Management
115 4th Avenue SE, Aberdeen, South Dakota 57401 (605) 226-7656

Environmental Assessment: Enerplus Resources (USA) Corporation: Six Exploratory Bakken/Three Forks Oil Wells

Prepared for

United States Department of the Interior
Bureau of Indian Affairs

Prepared by

SWCA Environmental Consultants

April 2011

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Enerplus Resources (USA) Corporation (Enerplus) has acquired the leases and is proposing to drill six horizontal oil and gas wells on three pad locations on the Fort Berthold Indian Reservation (Reservation) to evaluate, and possibly develop, the commercial potential of natural resources. Developments have been proposed on lands held in trust by the United States in Dunn County, North Dakota. The Bureau of Indian Affairs (BIA) is the surface management agency for potentially affected tribal lands and individual allotments. The BIA manages lands held in title by the tribe and tribal members to subsurface mineral rights. Development has been proposed in locations that target specific areas in the Bakken and Three Forks formations, known oil reserves. The following three proposed dual-well pad sites, shown in Figure 1.1, would be located within the Reservation in which the majority of the external boundaries are located above the Bakken and Three Forks formations:

- A well pad site would be located in the SW¼ NW¼ of Section 6, Township (T) 148 North (N), Range (R) 93 West (W), Dunn County, North Dakota, within a 1,280-acre spacing unit (Figure 1.2). This site would contain the Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF wells.

- The Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF wells would be located on a well pad site in the SE¼ SW¼ of Section 18, T148N, R93W, Dunn County, North Dakota, within a 1,280-acre spacing unit (Figure 1.2).

- The Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF wells would be located on a well pad site in the SW¼ SE¼ of Section 18, T148N, R93W, Dunn County, North Dakota, within a 1,280-acre spacing unit (Figure 1.2).

New access roads with underground utility corridors would be constructed from the nearest BIA road to the well pads, as shown in Figure 1.1, to facilitate the construction and operation of each proposed well. Well pads would be constructed to accommodate drilling activities and well operations. Pits constructed for drilled cuttings would be used during drilling operations and reclaimed once operations have ceased. Proposed well sites would also include support facilities; buried gathering oil, gas, and water pipelines; and electrical utilities if the wells are completed for long-term commercial production. All components (i.e., roads, underground utility lines, well pads, supporting facilities) would be reclaimed upon final abandonment unless formally transferred, with federal approval, to either the BIA or the landowner. The proposed wells are exploratory; should they prove productive, further exploration of surrounding areas is possible.

This environmental assessment (EA) addresses the potential impacts associated with the construction, and possible long-term operation, of the above-listed wells and directly related infrastructure and facilities. Further oil and gas exploration and development would require additional National Environmental Policy Act of 1969 (NEPA) analysis and federal action.

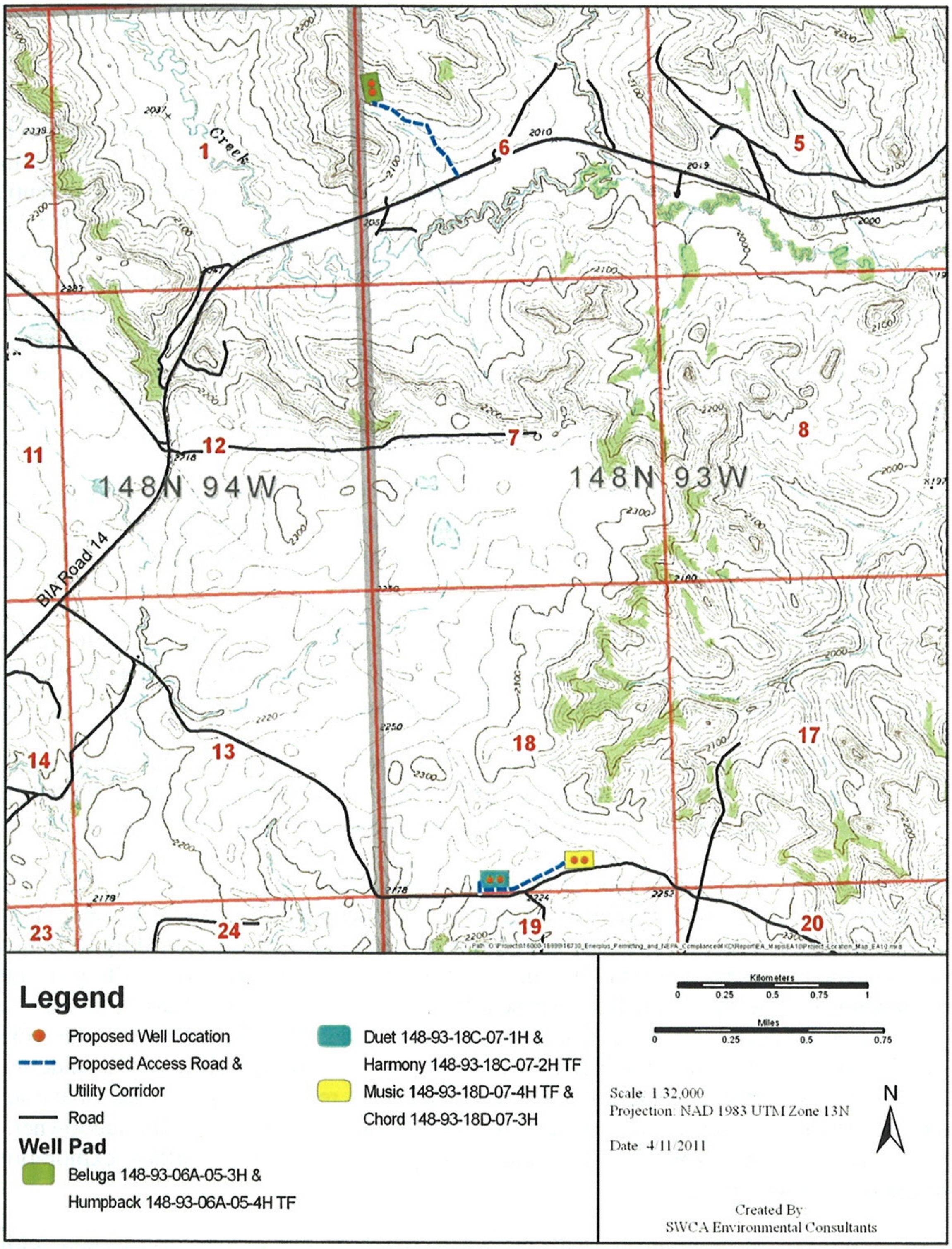

Figure 1.1. Project location and components for wells located in the NW¼ SW¼ of Section 6, and the SE¼ SW¼ and SW¼ SE¼ of Section 18, T148N, R94W.

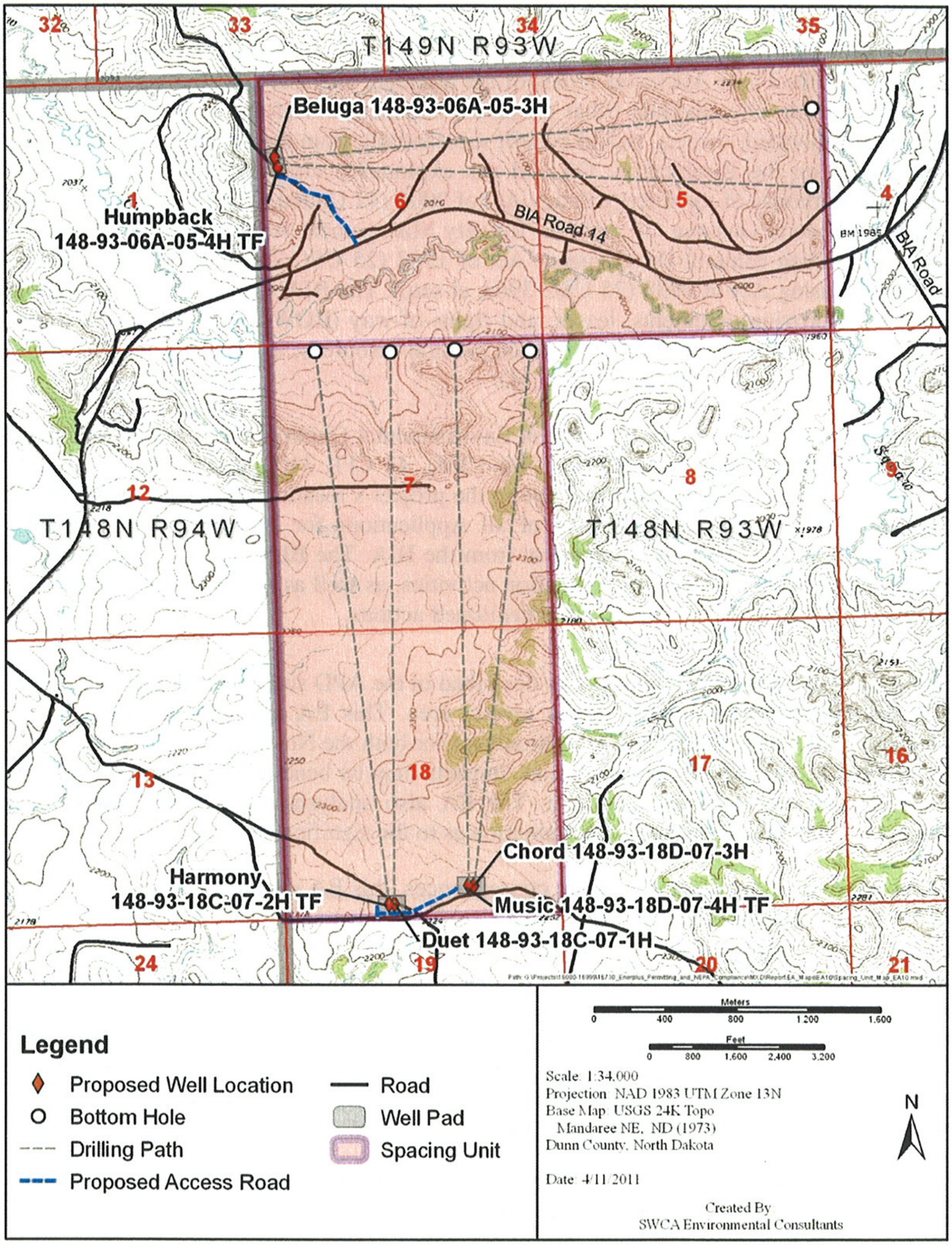

Figure 1.2. 1,280-acre spacing units in SW¼ NW¼ of Section 6 and SE¼ SW¼, SE¼ SE¼, and SW¼ SE¼ of Section 18, T148N, R94W and respective drilling targets of each well.

1.2 FEDERAL AND OTHER RELEVANT REGULATIONS AND AUTHORITIES

The BIA's general mission is to represent the interests, including the trust resources, of members of the Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara (MHA) Nation, as well as those of individual tribal members. All members of the MHA Nation, including individual allotment owners, would benefit substantially from the development of oil and gas exploration on the Reservation. Oil and gas exploration and subsequent development are under the authority of the Energy Policy Act of 2005 (42 United States Code [USC] 15801, et seq.), the Federal Onshore Oil and Gas Royalty Management Act of 1982 (30 USC 1701, et seq.), the Indian Mineral Development Act of 1982 (25 USC 2101, et seq.), and the Indian Mineral Leasing Act of 1938 (25 USC 396a, et seq.). The BIA's role in the proposed project includes approving easements, leases, and rights-of-way (ROWs) for both access roads and gathering pipelines; determining effects on cultural resources; and making recommendations to the Bureau of Land Management (BLM).

Compliance with NEPA, the Council on Environmental Quality (CEQ) regulations (Title 40 Code of Federal Regulations [CFR] 1500–1508), 43 CFR 3100, and Onshore Oil and Gas Order Nos. 1, 2, 6, and 7 is required due to the project's location on federal lands. The BLM is responsible for the final approval of all Applications for Permit to Drill (APDs) after receiving recommendations for approval from the BIA. The BLM is also tasked with on-site monitoring of construction and production activities, as well as resolution of any dispute that may arise as a result of any of the aforementioned actions.

The procedures and technical practices described in the APD supporting documents and in the EA describe potential impacts to the project area. This EA analyzes potential impacts to elements in the natural and human environment for both the No Action Alternative (described in Section 2.1) and the Proposed Action. Impacts may be beneficial or detrimental, direct or indirect, and short-term or long-term. The EA also analyzes the potential for cumulative impacts and ultimately makes a determination as to the significance of any impacts.

In the absence of significant negative consequences, this EA would result in either a Finding of No Significant Impact (FONSI). Should significant adverse impacts be identified as a result of the direct, indirect, or cumulative effects of the Proposed Action, then the NEPA requires the preparation of an environmental impact statement (EIS). It should be noted that a significant benefit from the project does not require preparation of an EIS. Commercial viability of the proposed wells could result in additional exploration in the area, and any future oil/gas exploration activities and associated federal actions that are proposed wholly or partly on trust land would require additional NEPA analysis and BIA consideration prior to implementation and/or production activities.

Following a Notice to Proceed with the proposed project, Enerplus would comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements. Enerplus also agrees to follow all best management practices (BMPs) and monitoring mitigations listed in this document. No disturbance of any kind can begin until all required clearances, consultations, determinations, easements, leases, permits, and surveys are in place.

2.0 PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

The BIA, as required by the NEPA, must "study, develop, and describe appropriate alternatives to the recommended course of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources" (NEPA Sec. 102[2][e]). Developing a range of alternatives allows for exploration of options designed to meet the purpose and need for the action. Along with the No Action Alternative, the BIA is considering the Proposed Action.

2.1 THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed project, including well pads, wells, and access roads and gathering lines, would not be constructed, drilled, installed, or operated. The BIA would not approve easements, leases, or ROWs for the proposed locations and the BLM would not approve the APD. No impacts would occur as a result of this alternative to the following critical elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice (EJ). There would be no project-related ground disturbance, use of hazardous materials, or trucking of product to collection areas. Surface disturbance, deposition of potentially harmful biological material, and traffic levels would not change from present levels. Under the No Action Alternative, the MHA Nation, tribal members, and allottees would not have the opportunity to realize potential financial gains resulting from the discovery of resources at these well locations.

2.2 THE PROPOSED ACTION

In addition to the No Action Alternative, this document analyzes the potential impacts of six exploratory oil and gas wells on three pad locations with varied surface and mineral estates located in the west-central portions of the Reservation in Dunn County. The proposed wells would test the commercial potential of the Bakken and Three Forks formations. Well bottom hole locations, shown in Figure 1.2 were chosen by Enerplus in consultation with tribal and BIA resource managers to provide information for future development.

2.2.1 Well Pad and Infrastructure Locations and Disturbance

Well pad and infrastructure locations, shown in Figure 1.2 and detailed in Table 2.1, were developed in consultation with tribal and BIA resource managers during a pre-clearance process that included surveys for cultural, archaeological, and natural (i.e., biological and physical) resources.

Table 2.1. Proposed Well Pad and Infrastructure Locations and Disturbance.

Well Pad Location	Well Name	Detailed Infrastructure Disturbance	Total Disturbance (Acres)
SW¼ NW¼ of Section 6, T148N, R93W, Dunn County, North Dakota	Beluga 148-93-06A-05-3H Humpback 148-93-06A-05-4H TF	5.61-acre well pad 2,055.62-foot and 5.90-acre access road and utility corridor	11.51
SE¼ SW¼ of Section 18, T148N, R93W, Dunn County, North Dakota	Duet 148-93-18C-07-1H Harmony 148-93-18C-07-2H TF	3.73-acre well pad 833.01-foot and 2.39-acre access road and utility corridor	6.12
SW¼ SE¼ of Section 18, T148N, R93W, Dunn County, North Dakota	Chord 148-93-18D-07-3H Music 148-93-18D-07-4H TF	3.82-acre well pad 1,598.60-foot and 4.59-acre access road and utility corridor	8.41
Total Proposed Disturbance		Well pads = 13.16 acres Access roads/utility corridor = 44,87.23 feet and 12.88 acres	26.04

Interdisciplinary on-site meetings were conducted between November 3 and November 4, 2010, to review well site locations and proposed access roads and underground utility corridors. The on-site meetings were attended by the surveyor, natural and cultural resource specialists, the Enerplus representative, the BIA representative, and the Tribal Historic Preservation Office (THPO) monitor. Surveys were conducted at that time to determine potential impacts to resources; topography, potential drainage issues, erosion control measures, and pad and related facility locations (access roads, gathering pipelines, topsoil/subsoil stockpiles, reserve pits, tanks, etc.) were also discussed at the on-site meeting in order to minimize effects to natural and cultural resources. The combined disturbance of the project is estimated to be approximately 26.04 acres, as shown in Table 2.1.

2.2.2 Well Pads

The proposed well sites would include a leveled area (pad) and a pit. The pad would be used for the drilling rig and equipment and the pit would be excavated, lined, and used for drilling cuttings. The pads would be stripped of topsoil and vegetation and then graded. The topsoil would be stockpiled and stabilized with a cover crop until it could be used to reclaim and revegetate the disturbed area. The subsoils would be used in the construction of the pad and the finished pads would be graded to ensure that water drains away from the pad. Erosion-control BMPs would be implemented and could include surface drainage controls, soil surface protection methodologies, and sediment capture features.

The two-well pads average approximately 300 by 500 feet in size. Cut-and-fill slopes, stockpiled topsoil, and cuttings pit backfill placed on the edge of the pads would result in additional surface disturbance per pad. Total long-term surface disturbance from well pads would total approximately 13.16 acres. All proposed pads would have a 2:1 slope on cut ends. Details of pad construction and reclamation can be found in the APD.

2.2.3 Access Roads and Utility Corridors

Proposed access roads would be constructed to connect the well pads and minimize disturbance as much as possible (Figure 1.1). Up to 4,487.23 feet (0.89 mile) of new access roads would be constructed. A maximum disturbed ROW width of 125 feet would be used for access roads and utility line corridors. All utilities would be buried underground within each corridor. Approximately 12.88 total acres of new surface disturbance would result from the proposed roads and utility corridors. All proposed access roads would have cattle guards installed at the entrance to access spurs and pads. Signed agreements would be in place allowing road construction across affected private and allotted land surfaces, and any applicable approach permits and/or easements would be obtained prior to any construction activity.

Construction would follow road design standards outlined in the BLM Gold Book (BLM and U.S. Forest Service [USFS] 2007). At a minimum, 6 inches of topsoil would be removed from the access road corridors. This stockpiled topsoil would then be placed on the outside slopes of the ditches following road construction. The ditches would be reseeded as quickly as possible using a seed mixture determined by the BIA. Care would be taken during road construction to avoid disturbing or disrupting any buried utilities that may exist along BIA Road 14 or in the vicinity of new road construction. The access roads would be surfaced with a minimum of 4 inches of aggregate prior to commencement of drilling operations and would remain in use for the life of the wells. Details of road construction are addressed in the APD. A diagram of typical road cross sections is provided as Figure 2.1.

Enerplus also proposes to construct and install buried oil, gas, and water gathering pipelines within the utility corridor along the proposed access roads from the well pads to the existing improved roads that provide access, including BIA Road 14, or directly to trunk lines in the area. A buried electric line and fiber optic line would also be installed. The utility corridor would be part of the proposed ROW and no additional disturbance is anticipated.

2.2.4 Drilling

After securing mineral leases, Enerplus submitted the Notices of Staking to the BLM from February 10 to 15, 2011, and the ROW on-site meeting was conducted on November 3 and 4, 2010. Copies of APDs submitted to the BLM North Dakota Field Office are sent to the BIA's office in New Town, North Dakota. Construction would begin only when the BIA completes the NEPA process and the APDs are subsequently approved by the BLM.

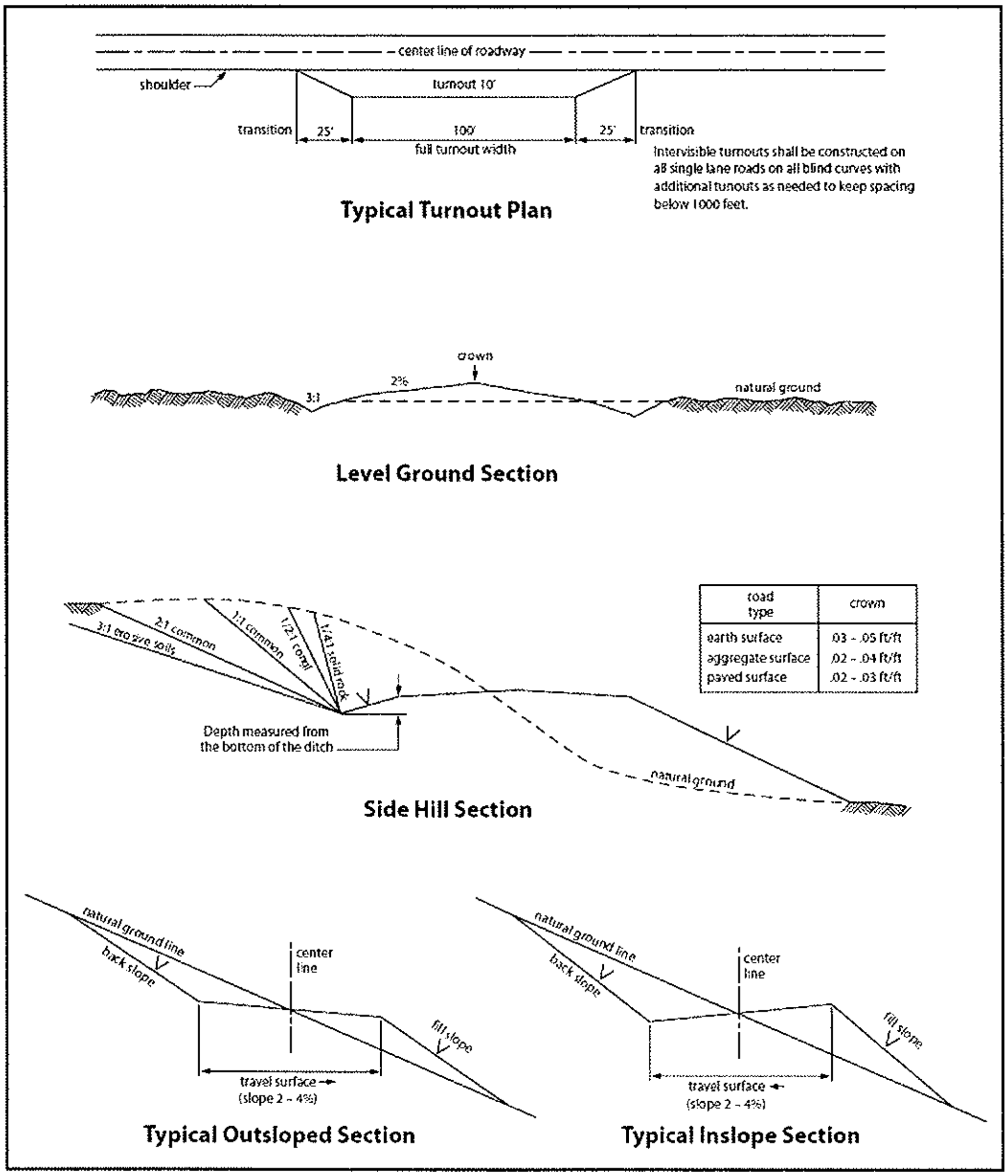

Figure 2.1. Typical road cross sections (BLM and U.S. Forest Service 2007).

Enerplus uses a semi-closed loop drilling system. Rig transport and on-site assembly would take roughly seven days for each well; a typical drill rig is shown in Figure 2.2. Drilling would require approximately 30 days to reach target depth, using a rotary drilling rig rated for drilling to approximately 20,000 feet. For the first 2,000 feet drilled, a freshwater-based mud system (1.26 gallons per foot of hole drilled) with non-hazardous additives would be used to minimize contaminant concerns. Water would be obtained from a commercial source for this drilling stage.

After setting and cementing the near-surface casing, an oil-based mud system (80% to 85% diesel fuel and 15% to 20% water) would be used to drill to a 7-inch casing point at approximately 11,100 feet, depending on the formation targeted. Oil-based drilling fluids reduce the potential for hole sloughing while drilling through water-sensitive formations (shales/salts). Approximately 3,400 gallons of salt water and 13,400 gallons of diesel fuel per well would be used to complete vertical drilling. The lateral reach of the borehole would be drilled using approximately 63,000 gallons of salt water as mud and adding polymer sweeps as necessary to clean the hole.

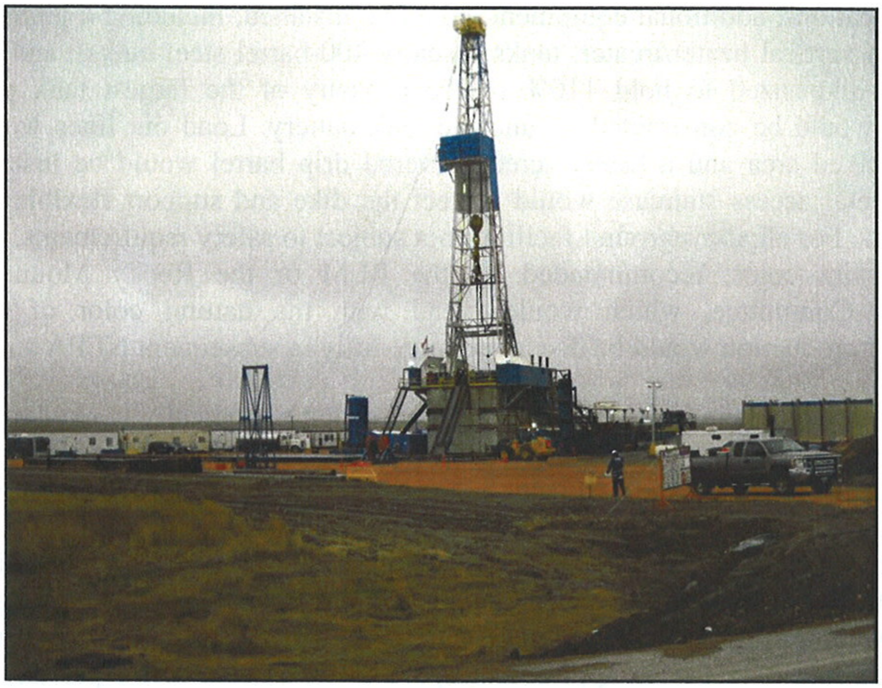

Figure 2.2. Typical drilling rig.

2.2.5 Casing and Cementing

Surface casing would be set at an approximate depth of 2,200 to 2, 400 feet, depending on the targeted formation, and cemented back to the surface during drilling, isolating all near-surface freshwater aquifers in the project area. The Fox Hills Formation and Pierre Formation would be encountered at depths of approximately 1,600 to 2,200 feet. Intermediate casing would be cemented from approximately 11,100 feet (total measured depth [TMD]) deep to a depth of about 4,700 to 4,800 feet in order to isolate the hydrocarbon zone present in the Dakota Formation below at an average depth of 5,300 feet. Casing and cementing operations would be conducted in full compliance with Onshore Oil and Gas Order No. 2 (43 CFR 3160).

2.2.6 Completion and Evaluation

A completion rig unit would be moved on site following the conclusion of drilling and casing activities. Approximately 30 days are usually required, at the proposed well depths, to clean out the well bore, pressure test the casing, perforate and fracture the horizontal portion of the hole, and run production tubing for commercial production. The typical procedure for fracturing a target formation to increase production includes pumping a mixture of sand and a carrier (e.g., water and/or nitrogen) downhole under extreme pressure. The resulting fractures are propped open by the sand, increasing the capture zone of the well and subsequently maximizing the efficient drainage of the field. After fracturing, the well is "flowed back" to the surface where fracture fluids are recovered and disposed of in accordance with North Dakota Industrial Commission (NDIC) rules and regulations.

2.2.7 Commercial Production and Gathering Lines

If drilling, testing, and completion support commercial production from any of the six proposed locations, additional equipment would be installed, including a pumping unit at the well head, a vertical heater/treater, tanks (usually 400-barrel steel tanks), and a flare pit. An impervious dike sized to hold 110% of the capacity of the largest tank plus one day's production would be constructed around the tank battery. Load out lines would be located inside the diked area and a heavy screen-covered drip barrel would be installed under the outlet. A metal access staircase would protect the dike and support flexible hoses used by tanker trucks. For all aboveground facilities not subject to safety requirements, the BIA would choose a paint color, recommended by the BLM or the Rocky Mountain Five-State Interagency Committee, which would blend with the natural color of the landscape. Commercial production would be discussed more fully in subsequent NEPA analyses.

Oil would be collected in tanks installed on location and periodically trucked to an existing oil terminal for sales. Any produced water would be captured in tanks and periodically trucked to an approved disposal site. The frequency of trucking activities for both oil and produced water would depend upon volumes and rates of production. The duration of production operations cannot be reliably predicted, but some oil wells have pumped for more than 100 years. The operator estimates that each well would yield approximately 180 barrels of oil per day and 40 barrels of water during the first year of production. After the first year, the operator estimates production would decrease to approximately 40 to 60 barrels of oil per day and 10 to 15 barrels of water. Produced water is mostly recovered frac fluids and is expected to become minimal after two years.

In the future, the operator may install a full utility corridor within the access road ROWs. The utility corridor is sized to accommodate the installation of buried oil, gas, and water gathering pipelines and buried electric and fiber optic lines.

Large volumes of gas are not expected from these locations. Small volumes would be flared in accordance with Notice to Lessees (NTL) 4A and adopted NDIC regulations, which prohibit unrestricted flaring for more than the initial year of operation (North Dakota Century Code [NDCC] 38-08-06.4).

2.2.8 Construction Details at Individual Sites

2.2.8.1 <u>SW¼ NW¼ of Section 6, T148N, R93W: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF</u>

This proposed two-well site, seen in Figure 1.2, is located approximately 5.9 miles southeast of Mandaree in the SW¼ NW¼ of Section 6, T148N, R93W in Dunn County. A new access road/utility corridor, approximately 2,055.62 feet long, would be constructed to connect to BIA 14 to the southeast. The new road would have a ROW width of 125 feet, to accommodate the utility corridor, and would disturb approximately 5.90 acres; the proposed well pad would disturb approximately 5.61 acres (including backfill), bringing the total anticipated new disturbance to 11.51 acres. The BIA would require the following site-specific protection measures at the well site:

- A drainage ditch would be constructed on the northeast and southeast sides of the pad to divert runoff.
- Matting would be installed on the cut and fill sides of the pad.
- Eagle nesting surveys would be conducted in March at the well pad.
- Access would be allowed to the range unit north of well pad location

Please see Section 3.9, Mitigation and Monitoring, for more information regarding BMPs and other protection measures.

2.2.8.1.1 Beluga 148-93-06A-05-3H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NE¼ NE¼ of Section 5, T148N, R93W (Figure 1.2). Vertical drilling to the kickoff point would be completed at approximately 10,121 feet, at which point drilling would turn roughly horizontal to an approximate total vertical depth (TVD) of 10,599 feet. The drill string would total approximately 20,534 feet at the TMD, including approximately 9,662 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 550 feet from the north line and 200 feet from the east line, about 9,881 feet northeast of the surface hole location. A setback of at least 200 feet would be maintained.

2.2.8.1.2 Humpback 148-93-06A-05-4H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the SE¼ NE¼ of Section 5, T148N, R93W (Figure 1.2). Vertical drilling to the kickoff point would be completed at approximately 10,194 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,672 feet. The drill string would total approximately 20,343 feet at the TMD, including approximately 9,399 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 2,090 feet from the north line and 200 feet from the east line, about 9,863 feet northeast of the surface hole location. A setback of at least 200 feet would be maintained.

2.2.8.2 SE¼ SW¼ of Section 18, T148N, R93W: Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF

This proposed two-well site, seen in Figure 1.2, is located approximately 8.1 miles southeast of Mandaree in the SE¼ SW¼ of Section 18, T148N, R93W in Dunn County. A new access road/utility corridor, approximately 833.01 feet long, would be constructed to connect to the existing Enerplus pad to the southeast in Section 19 (Figure 1.2). The new road would have a ROW width of 125 feet, to accommodate the utility corridor, and would disturb approximately 2.39 acres; the proposed well pad would disturb approximately 3.73 acres (including backfill), bringing the total anticipated new disturbance to 6.12 acres. The BIA would require the following site-specific protection measures at the well site:

- The northwest corner of the pad would be rounded
- An 18-inch berm would be constructed around north and west sides of the pad.

Please see Section 3.9, Mitigation and Monitoring, for more information regarding BMPs and other protection measures.

2.2.8.3 Duet 148-93-18C-07-1H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NE¼ NE ¼ of Section 7, T148N, R93W (Figure 1.2). Vertical drilling to the kickoff point would be completed at approximately 10,194 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,672 feet. The drill string would total approximately 20,611 feet at the TMD, including approximately 9,667 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 200 feet from the north line and 1,940 feet from the west line, about 10,144 feet northwest of the surface hole location. A setback of at least 200 feet would be maintained.

2.2.8.4 Harmony 148-93-18C-07-2H TF

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NW¼ NW ¼ of Section 7, T148N, R93W (Figure 1.2). Vertical drilling to the kickoff point would be completed at approximately 10,284 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,762 feet. The drill string would total approximately 21,319 feet at the TMD, including approximately 10,285 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 200 feet from the north line and 550 feet from the west line, about 10,151 feet northwest of the surface hole location. A setback of at least 200 feet would be maintained.

2.2.8.5 SW¼ SE¼ of Section 18, T148N, R93W: Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF

This proposed dual-well site, seen in Figure 1.2, is located approximately 8.2 miles southeast of Mandaree in the SW¼ SE¼ of Section 18, T148N, R93W in Dunn County. A new access road/utility corridor, approximately 1,598.6 feet long, would be constructed to connect to the proposed well pad to the southwest (Figure 1.2). The new road would have a ROW width of 125 feet, to accommodate the utility corridor, and would disturb approximately 4.59 acres; the proposed well pad would disturb approximately 3.82 acres (including backfill), bringing the total anticipated new disturbance to 8.41 acres. During the EA on-site visit, the access road was rerouted to avoid a drainage located southwest of the proposed well pad. The BIA had no site-specific protection requirements at this site. Please see Section 3.9, Mitigation and Monitoring, for information regarding general BMPs and other protection measures.

2.2.8.5.1 Chord 148-93-18D-07-3H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NE¼ NE¼ of Section 7, T148N, R93W (Figure 1.2). Vertical drilling to the kickoff point would be completed at approximately 10,188 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,666 feet. The drill string would total approximately 20,704 feet at the TMD, including approximately 9,766 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 200 feet from the north line and 550 feet from the east line, about 9,844 feet northeast of the surface hole location. A setback of at least 200 feet would be maintained.

2.2.8.5.2 *Music 148-93-18D-07-4H TF*

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NW¼ NE¼ of Section 7, T148N, R93W (Figure 1.2). Vertical drilling to the kickoff point would be completed at approximately 10,268 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,746 feet. The drill string would total approximately 20,391 feet at the TMD, including approximately 9,373 feet of lateral reach into the Three Forks member. The drilling target is approximately 200 feet from the north line and 1,940 feet from the east line, about 9,847 feet northwest of the surface hole location. A setback of at least 200 feet would be maintained.

2.2.9 Reclamation

2.2.9.1 <u>Interim Reclamation</u>

Interim reclamation would consist of reclaiming all areas not needed for production operations for the life of a well. Immediately after well completion, all equipment and materials unnecessary for production operations would be removed from a location and surrounding area. The cuttings pit drill contents would be treated, solidified, backfilled, and buried as soon as possible after well completion. Cuttings would be mixed with a non-toxic reagent resulting in an irreversible reaction to produce an inert, solid material. Any oil residue would be dispersed and captured, preventing coalescence and release to the environment at significant rates. The alkaline nature of the stabilized material also chemically stabilizes various metals that may be present, primarily by converting them into less soluble compounds. The treated material would then be buried in the cuttings pit, and overlain by at least 4 feet of overburden as required by adopted NDIC regulations. The surface above the cuttings pit would be seeded to re-establish native/desired vegetation. Topsoil would be spread along the cut and fill slopes of a road.

If commercial production equipment is installed, the well pads would be reduced in size by approximately 35% of each two-well pad; the portion of the well pads not needed for production would be recontoured, covered with 6 inches of topsoil, and reseeded using methods and seed mixtures determined by the BIA.

The working area of each well pad and the running surface of access roads would be surfaced with scoria or crushed rock obtained from a previously approved location. The outslope portions of roads would be covered with stockpiled topsoil and reseeded with a seed mixture determined by the BIA, reducing the residual access-related disturbance to a width of approximately 28 feet. Enerplus would control noxious weeds within the ROW, well pads, or other applicable facilities by approved chemical or mechanical methods.

All topsoil material stockpiled after construction, and following interim reclamation, would be immediately placed in windrows no higher than 2 to 4 feet, seeded with a certified weed-free annual ryegrass (*Lolium multiflorum*) at a rate of 10 pounds per acre, and covered with fiber matting to prevent erosion and maintain soil fertility.

2.2.9.2 <u>Final Reclamation</u>

Final reclamation would occur either in the very short term if a proposed well is commercially unproductive, or later upon final abandonment of commercial operations. All disturbed areas would be reclaimed, reflecting the BIA view of oil and gas exploration and production as temporary intrusions on the landscape. All facilities would be removed, well bores would be plugged with cement, and dry hole markers would be set. Access roads and work areas would be leveled or backfilled as necessary, scarified, recontoured, and reseeded. Exceptions to these reclamation measures might occur if the BIA approves assignment of an access road either to the BIA roads inventory or to concurring surface allottees. Figure 2.3 shows an example of reclamation (BLM and USFS 2007).

2.3 BIA-PREFERRED ALTERNATIVE

The preferred alternative is to complete all administrative actions and approvals necessary to authorize or facilitate oil and gas developments at the four proposed well pad locations.

The well pad and access road are constructed to the minimum size necessary to safely conduct drilling and completion operations.

The well pad and access road have been recontoured back to the original contour, the topsoil respread, and the site revegetated.

Figure 2.3. Example of reclamation from the BLM Gold Book (BLM and USFS 2007).

3.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The broad definition of NEPA leads to the consideration of the following elements of the human and natural environment: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and EJ.

3.1 PHYSICAL AND GEOLOGICAL SETTING

The proposed well sites and spacing units are in a rural area located on the Reservation in west-central North Dakota. The Reservation is the home of the MHA Nation and encompasses more than one million acres, of which almost half, including the project area, are held in trust by the United States for either the MHA Nation or individual allottees.

The proposed wells and access roads are situated geologically within the Williston Basin, where the shallow structure consists of sandstones, silts, and shales dating to the Tertiary period (65 to 2 million years ago), including the Sentinel Butte and Golden Valley formations. The underlying Bakken Formation is a well-known source of hydrocarbons; its middle member is targeted by the proposed project. Although earlier oil/gas exploration activity within the Reservation was limited and commercially unproductive, recent economic changes and technological advances now make accessing oil in the Bakken Formation feasible.

The Reservation is within the northern Great Plains ecoregion, which consists of four physiographic units: 1) the Missouri Coteau Slope north of Lake Sakakawea, 2) the Missouri River trench (not flooded), 3) the Little Missouri River badlands, and 4) the Missouri Plateau south and west of Lake Sakakawea (Williams and Bluemle 1978). Much of the Reservation is on the Missouri Coteau Slope. Elevations of the glaciated, gently rolling landscape range from a normal pool elevation of 1,838 feet at Lake Sakakawea to over 2,600 feet on Phaelan's Butte near Mandaree. Annual precipitation on the plateau averages between 15 and 17 inches. Mean temperatures fluctuate between -3 and 21 degrees Fahrenheit (°F) in January and between 55°F and 83°F in July, with 95 to 130 frost-free days each year (Bryce et al. 1998; High Plains Regional Climate Center 2008).

The project area lies within the Williston Basin, a large geological structural depression located in North Dakota and Montana in the United States, and Saskatchewan, Canada. The basin consists of deep layers of sedimentary rock deposited over time above a Precambrian geologic basement (Figure 3.1). Thick accumulations of limestone and dolomite were deposited during the Cambrian, Ordovician, Silurian, and Devonian Periods, interspersed with thinner deposits of sandstone, siltstone, shales, and salts (Peterson 1995). Deposition has continued in the basin through the current geological epoch, with the maximum depth of sedimentary deposits of approximately 16,000 feet in the area of Willison, North Dakota (Peterson 1995).

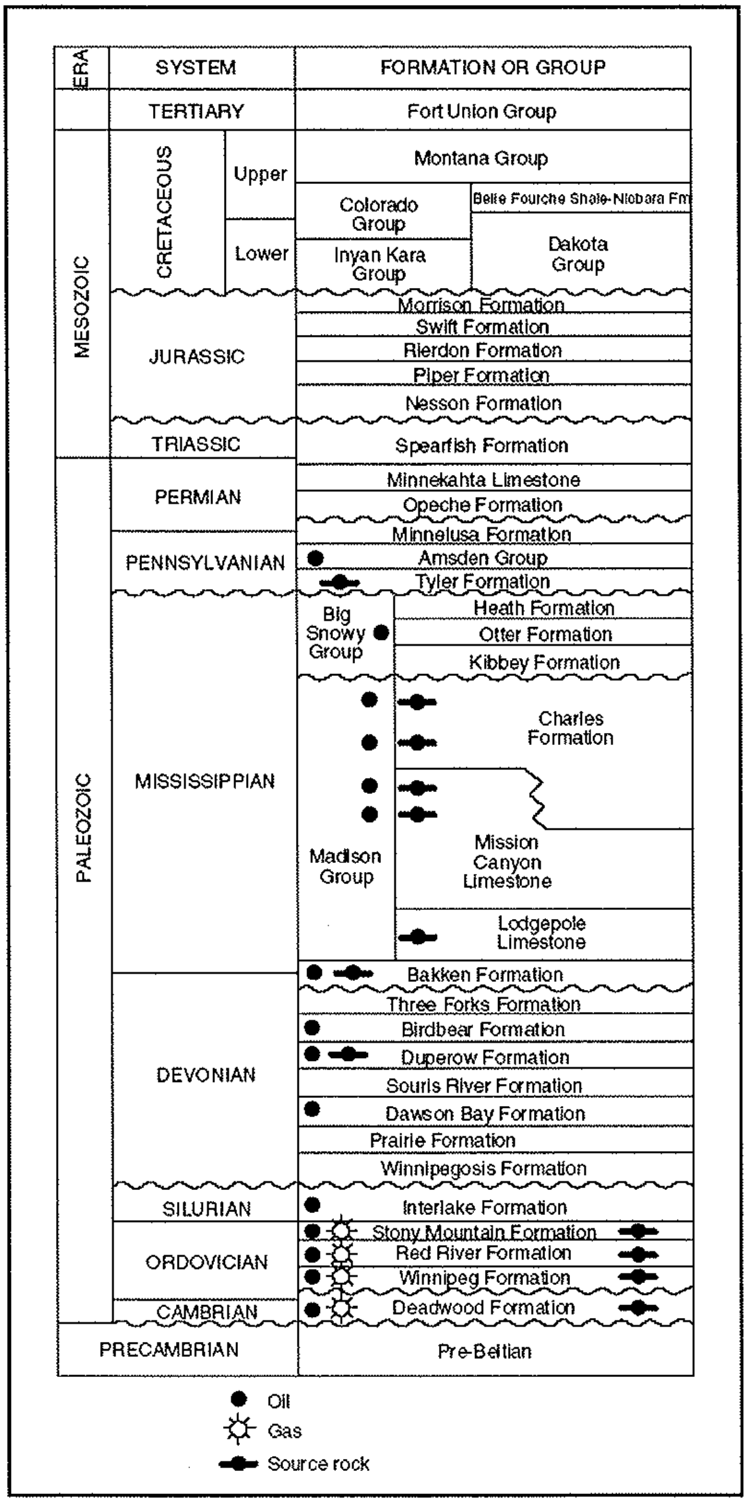

Figure 3.1. Typical stratigraphic column of the Williston Basin, with oil and gas bearing formations (Source: Peterson 1995).

The proposed new exploratory wells would target the Bakken and Three Forks formations. The Bakken Formation was deposited during the Upper Devonian and Lower Mississippian perios, ranging from 417 to 350 million years ago. It lies approximately 11,000 feet below the surface at its deepest location, and approximately 8,500 feet beneath the Reservation where the new wells are proposed. The formation is typically 158 feet thick, made up of an upper and lower member composed marine shales, with a middle member composed of thick interbedded layers of limestone, siltstone, dolomite, and sandstone. The Bakken Formation is located between thick and exceptionally tight formations of low-permeability carbonates: the Three Forks Limestone Formation lies below the Bakken Formation and is approximately 250 feet thick, while the Lodgepole Limestone lies above the Bakken Formation and is approximately 900 feet thick. These massive limestone formations have acted as seals to the Bakken Formation hydrocarbons and contributed to the trapping and development of mature crude oil deposits (Energy Information Administration 2006).

Regional subsidence of the Williston Basin during the Cretaceous Period and tectonic activity during the Laramide Orogeny produced geological anticlines that serve as traps for petroleum resources (Peterson 1995). Oil was first discovered in the Williston Basin at Cedar Creek Anticline in the 1920s, and subsequent discoveries in North Dakota of the extensive Bakken Formation and other oil and gas producing formations resulted in the development of major oil fields since the 1950s. However, efficient oil recovery continued to be limited by technical hurdles until 2004 (Energy Information Administration 2006).

The hydrocarbon resources of the Bakken Formation are considered to be "continuous" across the entire formation, with the Middle Member of the Bakken Formation having the greatest porosity and permeability. The limestone sealing formations of the Madison Group above the Bakken serves to maintain internal pressure and thermal conditions, while preventing the petroleum from escaping (Energy Information Administration 2006). Improved horizontal well stimulation methods using advanced hydraulic fracturing (HF) technology have greatly improved petroleum production rates and economic output of the formation's substantial oil reserves since 2004 (Energy Information Administration 2006). Current drilling and HF technology used to release oil from the Bakken Formation includes deep vertical drilling to extend the well shaft to the target formation, followed by horizontal drilling of a lateral well shaft (parallel to the surface) within the target formation. A non-perforated well shaft is installed in the vertical section, while a perforated well shaft, ranging in length from 9,000 to nearly 11,000 feet long, is installed in lateral sections of the well. If adequate hydrocarbon-bearing deposits are identified, the perforated lateral well shaft is used to deliver HF fluids and small compression-resistant particles called proppants, into the target formation at high pressure, and to collect oil and other fluids from the well. Further discussion of HF technology and its potential effects on groundwater is included in Section 3.3.2.1.

3.2 AIR QUALITY

3.2.1 Air Quality Standards and Criteria Pollutants

The federal Clean Air Act (CAA) (USC 7401–7671, as amended in 1990) established National Ambient Air Quality Standards (NAAQS) for criteria pollutants to protect public health and welfare. It also set standards for other compounds that can cause cancer, regulated emissions that cause acid rain, and required federal permits for large sources. NAAQS have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead (U.S. Environmental Protection Agency [EPA] 2010a). The primary NAAQS are set for pervasive compounds that are generally emitted by industry or motor vehicles. Standards for each pollutant meet specific public health and welfare criteria; thus, they are called the "criteria pollutants."

The CAA mandates prevention of significant air quality deterioration in certain designated attainment areas and has designated more stringent air quality standards, known as Secondary Standards, for these areas. Class I attainment areas have national significance and include national parks greater than 6,000 acres, national monuments, national seashores, and federal wilderness areas larger than 5,000 acres that were designated prior to 1977 (Ross 1990). The Class I regulations (40 CFR 51.307) attempt to protect visibility through a review of major new and modified sources of pollutants, and requiring strict air quality emission standards if they would have an adverse impact on visibility within the Class I area (National Park Service 2010).

The nearest designated attainment area to the project area is the Theodore Roosevelt National Park (TRNP), a Class I area that covers about 110 square miles in three units within the Little Missouri National Grassland. The TRNP is located approximately 16 miles south of Watford City, North Dakota, and approximately 40 miles west of the proposed well sites. Two air quality monitoring stations are located within the TRNP, with the North Unit monitoring most criteria pollutants (National Park Service 2010; North Dakota Department of Health [NDDH] 2010). All other parts of the state, including the Reservation, are classified as Class II attainment areas, affording them protections through the Primary NAAQS (NDDH 2010).

Some states have adopted more stringent standards for criteria pollutants, or have chosen to adopt new standards for other pollutants. For instance, the NDDH has established a standard for hydrogen sulfide (H_2S), which can be found in Table 3.1 (NDDH 2010).

Criteria pollutants and their health effects include the following.

- Sulfur dioxide (SO_2) is a colorless gas with a strong, suffocating odor. SO_2 is produced by burning coal, fuel oil, and diesel fuel, and can trigger constriction of the airways, causing particular difficulties for asthmatics. Long-term exposure is associated with increased risk of mortality from respiratory or cardiovascular disease. SO_2 emissions are also a primary cause of acid rain and plant damage (EPA 2010a).

- Inhalable Particulate Matter (PM_{10} and $PM_{2.5}$) is a class of compounds that can lodge deep in the lungs, causing adverse health problems, depending on their size, concentration, and content. Based on extensive health studies, particulate matter is regulated under two classes. PM_{10} is the fraction of total particulate matter 10 microns or smaller, and $PM_{2.5}$ is two and a half microns or smaller. Inhalable particulate matter can range from inorganic wind-blown soil to organic and toxic compounds found in diesel exhaust. Toxic compounds such as benzene often find a route into the body via inhalation of fine particulate matter (EPA 2010a).

- Nitrogen dioxide (NO_2) is a reddish-brown gas with an irritating odor. Primary sources include motor vehicles, industrial facilities, and power plants. In the summer months,

NO_2 is a major component of photochemical smog. NO_2 is an irritating gas that may constrict airways, especially of asthmatics, and increase the susceptibility to infection in the general population. NO_2 is also involved in ozone smog production (EPA 2010a).

- Ozone (O_3) is a colorless gas with a pungent, irritating odor and creates a widespread air quality problem in most of the world's industrialized areas. Ozone smog is not emitted directly into the atmosphere but is primarily formed through the reaction of hydrocarbons and nitrogen oxides (NO_x) in the presence of sunlight. Ozone's health effects can include reduced lung function, aggravated respiratory illness, and irritated eyes, nose, and throat. Chronic exposure can cause permanent damage to the alveoli of the lungs. Ozone can persist for many days after formation and travel several hundred miles (EPA 2010a).

- Carbon monoxide (CO) is a colorless, odorless gas that is a byproduct of incomplete combustion. CO concentrations typically peak nearest a source, such as roadways or areas with high fireplace use, and decrease rapidly as distance from the source increases. Ambient levels are typically found during periods of stagnant weather, such as on still winter evenings with a strong temperature inversion. CO is readily absorbed into the body from the air. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure are headaches, fatigue, slow reflexes, and dizziness (EPA 2010a).

The Primary and Secondary NAAQS for criteria pollutants are shown in Table 3.1. NEPA assessments require analysis of both near-field and far-field as part of the cumulative effects of proposals on air quality. Therefore, the North Dakota Ambient Air Quality Standards (AAQS) are shown as well federal standards.

Table 3.1. NAAQS and Other Air Quality Standards.

Pollutant	Averaging Period	Primary Standard (NAAQS)	Secondary Standard (National Parks)	North Dakota AAQS
SO_2 in parts per million of air (ppm)	3-hour	-	0.5	0.273 (1-hour)
	24-hour	0.14	-	0.099
	Annual mean	0.03	-	0.023
PM_{10} in micrograms per cubic meter of air ($\mu g/m^3$)	24-hour	150	-	150
	Expected annual mean	50	-	50
$PM_{2.5}$ ($\mu g/m^3$)	24-hour	35	35	35
	Weighted annual mean	15	15	15
NO_2 (ppm)	Annual mean	0.053	0.053	0.053
CO (ppm)	8-hour	9	-	9
	1-hour	35	-	35
O_3 (ppm)	8-hour	0.075	0.075	-
	1-hour	-	-	0.12
Lead ($\mu g/m^3$)	3-month arithmetic mean within a 3-year period	0.15	0.15	1.5 (quarterly mean)
H_2S (ppm)	Instantaneous	-	-	10
	1-hour	-	-	0.20
	24-hour	-	-	0.10
	3-month	-	-	0.02

Sources: EPA 2010a; NDDH 2010.

North Dakota has separate state standards for SO_2 and H_2S that are different from the federal criteria standards. All other state criteria pollutant standards are the same as federal. North Dakota was one of 13 states that met standards for all federal criteria pollutants in 2008.

In addition, the EPA averages data from monitoring stations within each county to determine the Air Quality Index (AQI), a general measure of air quality for residents of the county. An AQI greater than 100 is indicative of unhealthy air quality conditions for the county residents, although residents may experience greater or lesser risks depending on their proximity to the sources of pollutants (EPA 2010b).

3.2.2 Greenhouse Gas Emissions and Climate Change

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Some GHGs such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The EPA (2010c) identifies the principal GHGs that enter the atmosphere because of human activities as the following:

- **Carbon Dioxide (CO_2)**: CO_2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH_4)**: CH_4 is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- **Nitrous Oxide (N_2O)**: N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- **Fluorinated Gases**: Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are typically emitted in small quantities, but are potent GHGs thought to contribute significantly to global warming processes (EPA 2010c).

CO_2 is the primary GHG, responsible for approximately 90% of radiative forcing (the rate of energy change as measured at the top of the atmosphere; can be positive [warmer] or negative [cooler]) (EPA 2010c). To simplify discussion of the various GHGs, the term "Equivalent CO_2 or CO_2e" has been developed. CO_2e is the amount of CO_2 that would cause the same level of radiative forcing as a unit of one of the other GHGs. For example, one ton of CH_4 has a CO_2e of 22 tons; therefore, 22 tons of CO_2 would cause the same level of radiative forcing as one ton of CH_4. N_2O has a CO_2e value of 310. Thus, control strategies often focus on the gases with the highest CO_2e value.

According to the Pew Center, "Over the past 50 years, the (worldwide) data on extreme temperatures have shown similar trends of rising temperatures: cold days, cold nights, and frosts occurred less frequently over time, while hot days, hot nights, and heat waves occurred more frequently" (Pew Center 2009). Generally, the earth's temperature has increased about one degree Celsius since 1850 but some areas have seen an increase of four degrees. Sea levels are also rising, mountain glaciers are disappearing, and ocean currents, such as the Gulf Stream, are slowing (Intergovernmental Panel on Climate Change [IPCC] 2007).

Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases. The IPCC Working Group I Fourth Assessment compiles and analyzes global data on climate change, and reports that warming of the climate system is evident from global observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level (IPCC 2007). Globally, 11 out of the 12 years between 1995 and 2007 ranked among the warmest years in the instrumental record of global surface temperature since 1850 (IPCC 2007). The National Oceanic and Atmospheric Agency (NOAA) monitored data indicates that 21 of the previous 30 years (1979–2009) have had above average temperatures in the contiguous United States, with departures from average temperatures occurring with increasing frequency, as shown in Figure 3.2 (NOAA 2010).

Many physical and biological effects have been observed to correlate with trends in global warming. Sea levels are rising worldwide and along much of the United States coast (EPA

2010c). Tide gauge measurements and satellite altimetry suggest that sea level has risen worldwide approximately 4.8 to 8.8 inches during the last century (IPCC 2007). A significant amount of sea level rise has likely resulted from the observed warming of the atmosphere and the oceans. Hydrological systems, ice pack, and permafrost are also affected by higher oceanic and atmospheric temperatures, affecting biological systems and agriculture (IPCC 2007).

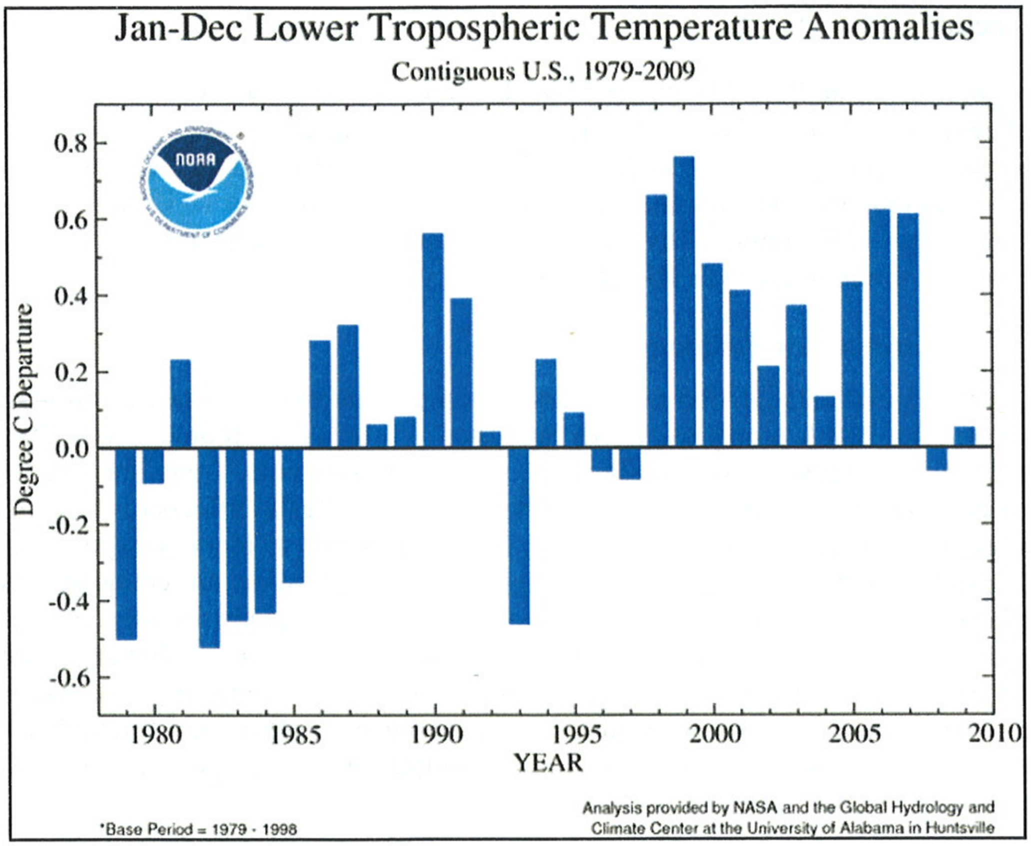

Figure 3.2. Temperature anomalies in the contiguous United States, 1979–2009.

IPCC experts concluded that most of the observed increase in globally averaged temperature since the mid-twentieth century is very likely due to the observed increase in anthropogenic GHG concentrations (IPCC 2007).

Therefore, the EPA collects data on and encourages limiting or reducing emissions of anthropogenic sources of GHGs to the earth's atmosphere (EPA 2010d). Many U.S. states have adopted goals and actions to reduce GHGs. The EPA and the National Highway Traffic Safety Administration have increased corporate fuel economy standards to promote national energy security and reduce GHGs. Standards would equal 35 miles per gallon by 2020, with an estimated savings to drivers of $100 billion annually (EPA 2010d).

On May 13, 2010, the EPA issued a final rule that establishes thresholds for GHG emissions that define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and title V Operating Permit programs are required for new and existing industrial facilities (EPA 2010d). This final rule "tailors" the requirements of these CAA permitting programs to limit which facilities would be required to obtain PSD and title V permits. Facilities responsible for nearly 70% of the national GHG emissions from stationary sources would be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities. Emissions from small farms, restaurants, and all but the very largest commercial facilities are not covered by these programs at this time; however, the EPA recently initiated additional hearings to help determine the types of industries to be held to new standards under these federal permits (EPA 2010d).

Energy production and supply was estimated to emit up to 25.9% of GHGs world-wide in 2004 (Pew Center 2009). CH_4, with a high radiative forcing CO_2e ratio, is a common fugitive gas emission in oil and gas fields (EPA 2010c). Oil and gas production, however, is highly variable in potential GHG emissions. Oil and gas producers in the United States are not considered large GHG emitters by the EPA, and are not the subject of any current federal proposals that would regulate GHG emissions.

3.2.3 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are a class of compounds known to cause cancer, mutation, or other serious health problems. HAPs are usually a localized problem near the emission source. HAPs are regulated separately from criteria air pollutants. There are several hundred HAPs recognized by the EPA and State of North Dakota. Health effects of HAPs may occur at exceptionally low levels; for many HAPs, it is not possible to identify exposure levels that do *not* produce adverse health effects. Major sources of toxic air contaminants include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), wood smoke, and motor vehicle exhaust. Unlike regulations for criteria pollutants, there are no ambient air quality standards for HAPs. Examples of HAPs found in gases released by oil field development and operation include benzene, toluene, xylene, and formaldehyde (BLM 2009). HAP emissions receive evaluation based on the degree of exposure that can cause risk of premature mortality, usually from cancer.

Risk assessments express premature mortality in terms of the number of deaths expected per one million persons. The NDDH typically reviews projects and either requires an applicant to prepare a risk assessment or assign the state engineers to do the work. For new sources emitting HAPs with known negative health effects, an applicant must demonstrate that the combined impact of new HAP emission does not result in a maximum individual cancer risk greater than one in one hundred thousand.

3.2.4 Existing Air Quality in the Project Area

Federal air quality standards apply in the project area, which is designated as a Class II attainment area. Although the State of North Dakota does not have jurisdiction over air quality matters on the Reservation and no air quality monitoring stations occur within the boundaries of the Reservation, monitoring efforts are being made by the state and industry in the area. The NDDH operates a network of monitoring stations around the state that continuously measure pollution levels. Industry also operates monitoring stations as required by the state. The data from all these stations are subject to quality assurance, and when approved, it is published on the Internet and available from EPA and NDDH (NDDH 2010).

Monitoring stations providing complete data near the project site include Theodore Roosevelt National Park North Unit (TRNP-NU) (Air Quality Station # 380530002) in McKenzie County, and Dunn Center (Air Quality Station # 38025003) in Dunn County. These stations are located west and southeast of the proposed well sites, respectively. Bear Paw Energy and Amerada Hess operate site-specific monitoring stations in the region. However, these stations do not provide complete data that would be applicable to this analysis (NDDH 2010).

Criteria pollutants measured at the two monitoring stations include SO_2, PM_{10}, NO_2, and O_3. Lead and CO are not monitored by the two stations. Table 3.2 summarizes the NAAQS and the maximum levels of criteria pollutants. The highest value at either of the two monitoring locations is shown for each year from 2007 through 2009.

Table 3.2. Maximum Levels of Monitored Pollutants, 2007–2009, as Measured at Dunn Center and Theodore Roosevelt National Park North Unit Monitoring Stations.

Criteria Pollutant	Averaging Period	Primary Standard (NAAQS)	Maximum Reported Level from Dunn Center and TRNP-NU Monitoring Stations		
			2009	2008	2007
SO_2 in parts per million (ppm)	24-hour	0.14	0.006	0.004	0.004
	Annual mean	0.03	0.0005	0.0004	0.0011
PM_{10} in micrograms per cubic meter or air ($\mu g/m^3$)	24-hour	150	54	108	57.4
	Expected annual mean	50	11.3	14.2	13.2
$PM_{2.5}$ ($\mu g/m^3$)	24-hour	35	15	35.7	22.2
	Weighted annual mean	15	3.4	3.7	3.6
NO_2 (ppm)	Annual mean	0.053	0.0015	0.0018	0.0015
O_3 (ppm)	8-hour	0.08	0.057	0.0063	0.0071

Source: NDDH 2010.

All monitored criteria pollutants are well below federal and state standards measured at the monitoring stations for all years in the study period from 2007 through 2009. In addition to the low levels of monitored criteria pollutants, the EPA reports that Dunn County and McKenzie County had zero days in which the AQI exceeded 100 in 2007 and 2008, indicating that general air quality does not pose an unhealthy condition for residents of these counties (EPA 2010b). The AQI was not available for 2009, but is also likely to be zero for these counties.

3.2.5 Typical Project Emissions from Oilfield Development

According to EPA Emission Inventory Improvement documents (EPA 1999), oil field emissions encompass three primary areas: combustion, fugitive, and vented. Typical processes that occur during exploration and production include the following.

- Combustion emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), GHGs, and HAPs. Sources include engine exhaust, dehydrators, and flaring (EPA 1999).
- Fugitive emissions include criteria pollutants, H_2S, VOCs, HAPs, and GHGs. Sources of fugitive emissions include mechanical leaks from well field equipment such as valves, flanges, and connectors that may occur in heater/treaters, separators, pipelines, wellheads, and pump stations. Pneumatic devices such as gas actuated pumps and pressure/level controllers also result in fugitive emissions. Other sources of fugitive emissions include evaporation ponds and pits, condensate tanks, storage tanks, and wind-blown dust (from truck and construction activity) (EPA 1999).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents (EPA 1999).

Pad and road construction, drilling activities, and tanker traffic would generate emissions of criteria pollutants and HAPs. Primary emissions sources during drilling are diesel exhaust, wind-blown dust from disturbed areas and travel on dirt roads, evaporation from pits and sumps, and gas venting. Diesel emissions are being progressively controlled by the EPA in a nationwide program (EPA 2010d). This program takes a two-pronged approach. First, fuels are improving to the ultra-low sulfur standard, and secondly manufacturers must produce progressively lower engine emissions.

3.2.6 Air Quality Best Management Practices

Under the CAA, federal land management agencies have an affirmative responsibility to protect air quality. Tribes, federal land managers, and private entities can make emission controls part of a lease agreement. BMPs can be adopted for various portions of an oil/gas well's lifecycle. BMPs fall into the following six general categories:

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions
  - Use directional drilling to drill multiple wells from a single well pad.
  - Use centralized water storage and delivery, well fracturing, gathering systems.
  - Use telemetry to remotely monitor and control production.
  - Use water or dust suppressants to control fugitive dust on roads.
  - Control road speeds.
  - Use van or carpooling.
- Drilling BMPs to reduce rig emissions
  - Use cleaner diesel (Tier 2, 3, and 4) engines.
  - Use natural gas-powered engines.
  - Use "green" completions to recapture product that otherwise would have been vented or flared.
- Unplanned or emergency releases
  - Use high-temperature flaring if gas is not recoverable.

- Vapor recovery
  - Use enclosed tanks instead of open pits to reduce fugitive VOC emissions.
  - Use vapor recovery units on storage tanks.
- Inspection and maintenance
  - Use and maintain proper hatches, seals, and valves.
  - Optimize glycol circulation and install a flash tank separator.
  - Use selective catalytic reduction.
  - Replace high-bleed with low-bleed devices on pneumatic pumps.
- Monitoring and repair
  - Use directed inspection and maintenance methods to identify and cost-effectively fix fugitive gas leaks.
  - Install an air quality monitoring station.

3.2.7 Potential Air Quality Impacts

Based on the existing air quality of the region and the typical air emissions of similar oilfield projects, and implementation of BMPs identified in Section 3.2.6, the Proposed Action would not produce significant increases in criteria pollutants, GHGs, or HAPs.

3.3 WATER RESOURCES

This section identifies the existing water resources within the project area and potential effects of the project. Specific subjects discussed in this section include surface water and surface water quality, groundwater resources, hydraulic fracturing, and the potential short-term and long-term impacts of the proposed project on these water resources.

3.3.1 Surface Water

The surface water resources in the project area would be managed and protected according to existing federal law and policies regarding the use, storage, and disposal of the resource during the construction and operation of the project. Surface water resource use and protection is administered under the following federal laws:

- Clean Water Act of 1972 (CWA), as amended (33 USC 1251 et seq.)
- Federal Land Policy and Management Act of 1976 (43 USC 1711–1712)
- NEPA of 1972 (42 USC 4321)
- Safe Drinking Water Act of 1974, as amended (42 USC 300 et seq.)

Water quality is protected under the Federal Water Pollution Control Act (as amended), otherwise known as the CWA. The CWA has developed rules for regulating discharges of pollutants into waters of the U.S. and also regulates water quality standards for surface waters. The CWA has also made it unlawful to discharge any pollutant from a point source into any navigable waters of the U.S., unless a permit has been obtained from the National Pollution Discharge Elimination System (NPDES) program.

The Environmental Division of the MHA Nation has had an application pending with the EPA since 1996 for delegation of authority to set federally approved water quality standards on the Reservation. In the absence of tribal surface water quality authorities, enforcement of federal environmental laws regarding surface water on the Reservation is accomplished through permitting, inspection, and monitoring activities of the NPDES, as administered by the EPA.

The project area is located within the Lake Sakakawea basin (hydrologic unit code [HUC] 10110101), and the Waterchief Bay watershed. Surface water is abundant in the project area, as shown in Figure 3.3 (North Dakota Department of Health, Division of Water Quality 2010). The proposed Enerplus wells and associated roads in the NW¼ SW¼ of Section 6 would occur within the Upper Squaw Creek subwatershed, which is part of the Lake Sakakawea basin, the Little Missouri River subregion, and the Missouri region. Water from the site would flow into Upper Squaw Creek, then travel to the southeast for approximately 20 miles until reaching perennial waters in Lake Sakakawea, as shown in Figure 3.4.

The proposed well sites at SE¼ SW¼ and SW¼ SE¼ of Section 18 fall within the Lower Moccasin Creek sub-watershed of the Moccasin Creek Bay Watershed, also part of the Lake Sakakawea basin, as shown in Figure 3.3 and Figure 3.4 (North Dakota Department of Health, Division of Water Quality 2010).

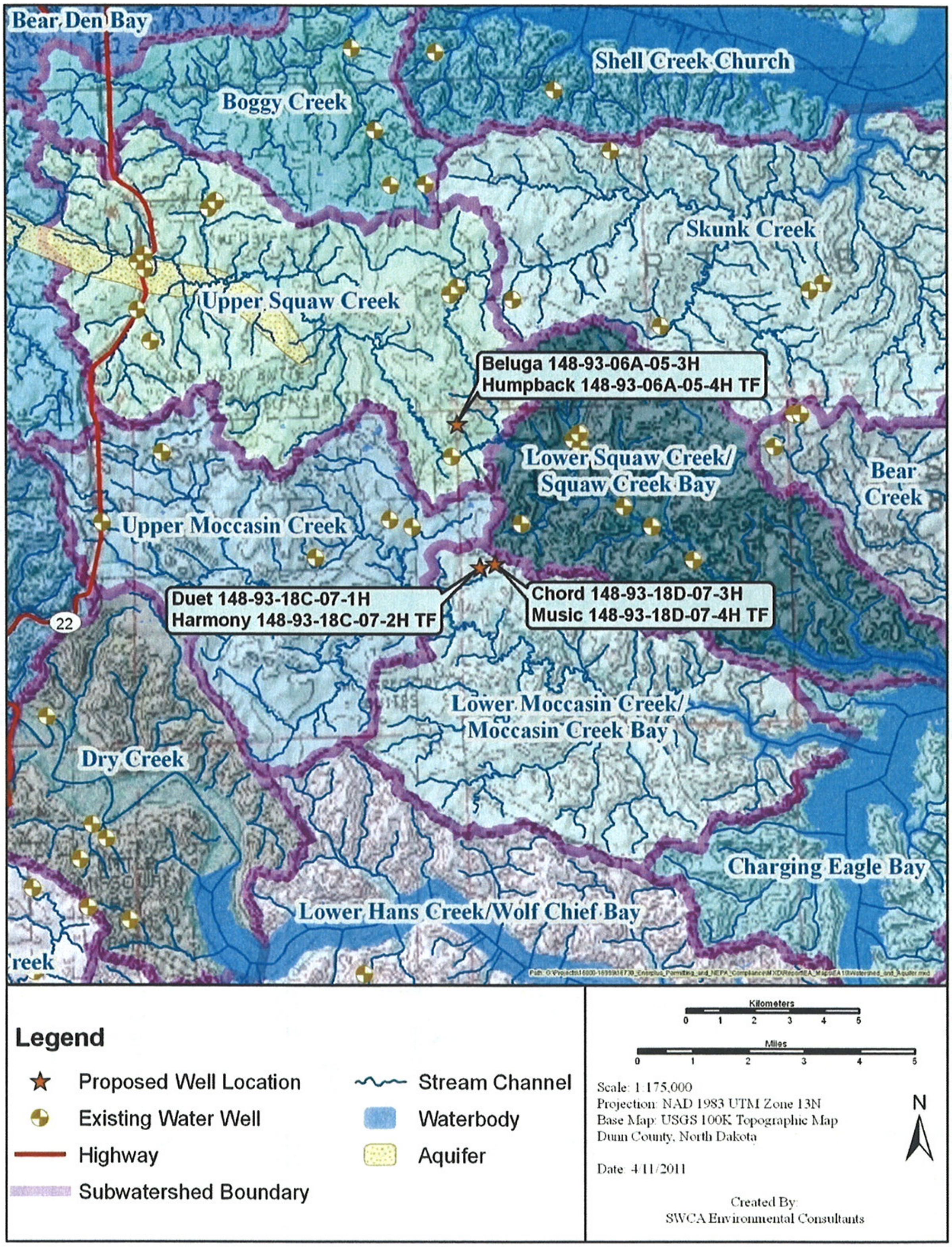

Figure 3.3. Watersheds and aquifers near the project area (North Dakota Department of Health, Division of Water Quality 2010).

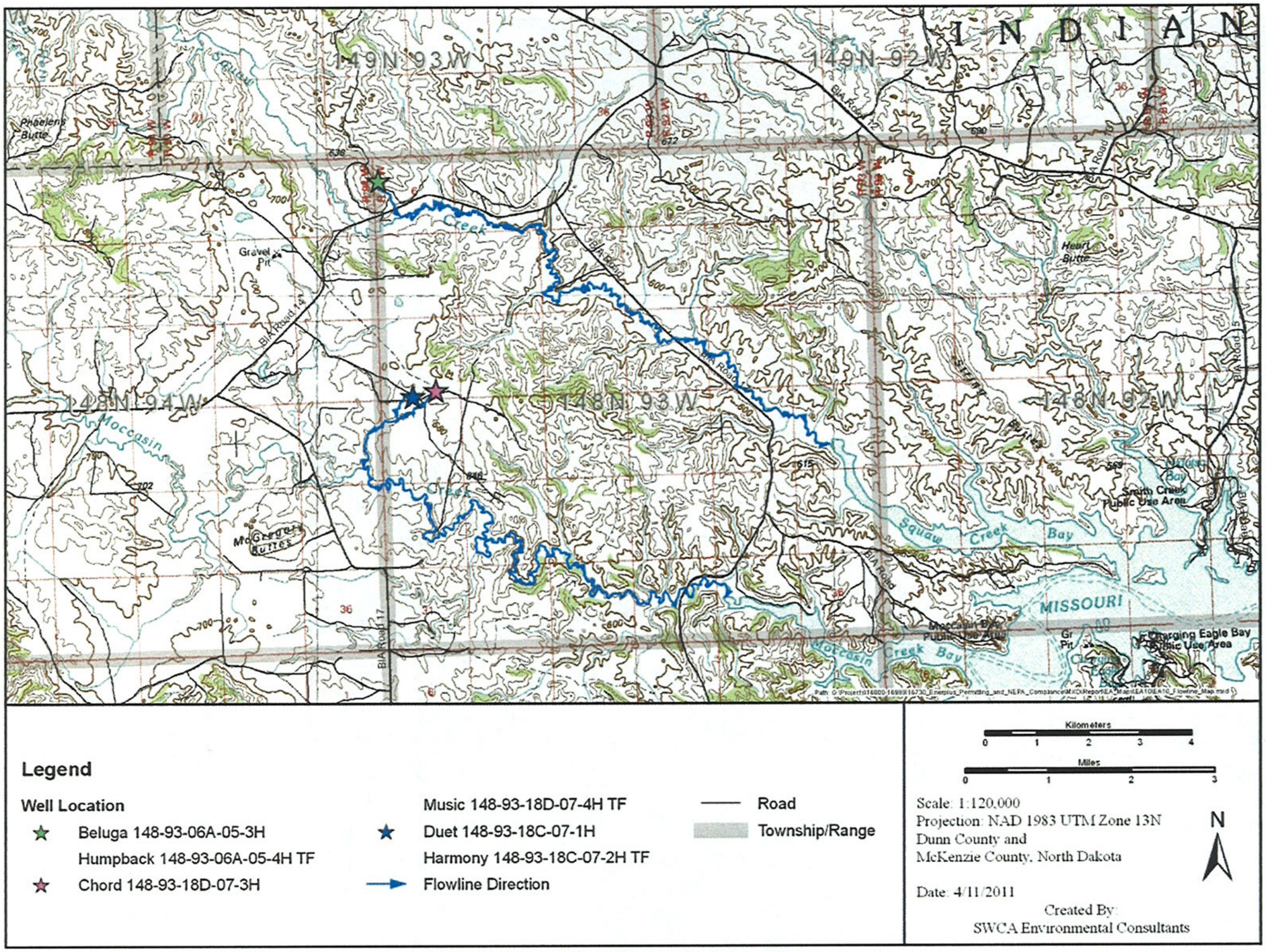

Figure 3.4. Surface runoff and drainage direction from each of the proposed well pads (North Dakota Department of Health, Division of Water Quality 2010).

During the November 2010 site visits, the BIA made site-specific recommendations for design measures that would reduce or minimize surface runoff and potential surface water degradation from the construction of the new wells, access roads, and buried utilities. Enerplus has adopted the site-specific measures shown in Table 3.3. These measures would reduce long-term erosion and runoff from the sites.

A query of the EPA Storage and Retrieval Water Quality Database for the Lake Sakakawea Drainage/Basin HUC showed that water quality data were not available from within the project area (EPA 2010e). Furthermore, standards for specific priority pollutants have not been developed for the project area or the Reservation. No ongoing discharge of water to surface waters of the U.S. would be required for this project. This project would comply with all the specific terms and conditions of the NPDES Construction Permit, in accordance with Section 402 of the CWA (EPA 2010e).

As part of the NPDES Construction Permit, the proposed project would be engineered and constructed to minimize the suspended sediment (i.e., turbidity) concentration of surface runoff, avoid disruption of drainages, and avoid direct impacts to surface water. No surface water would be used for well drilling operations. Any chemicals or potentially hazardous materials would be handled in accordance with the operator's spill prevention, control, and countermeasure plan. Provisions established under this plan would minimize potential impacts to any surface waters associated with an accidental spill.

Table 3.3. Well Pad Distances to Wetlands and Other Surface Water Bodies, and Site-specific Owner-committed Measures.

Well Pad Location	Nearest Wetland (NWI) (miles)	Nearest Perennial Stream (miles)	Distance to Lake Sakakawea (river miles)	Site-specific Owner-committed Measures to Reduce Erosion and Runoff
SW¼ NW¼ of Section 6, T148N, R93W	0.44	0.79	12.6	Use semi-closed loop system during drilling. Install a diversion ditch on the northeast and southeast sides of the well pad. Use matting on the northeast and southeast exposed slopes of the well pad. Grind woody vegetation into topsoil and use for reclamation.
SE¼ SW¼ of Section 18, T148N, R93W	0.03	1.07	14.1	Use semi-closed loop system during drilling. Round the northwest corner of well pad. Construct n 18-inch berm on the north and west side of the well pad.
SW¼ SE¼ of Section 18, T148N, R93W	0.10	1.30	14.4	Use semi-closed loop system during drilling.

NWI = National Wetlands Inventory.

3.3.2 Groundwater

3.3.2.1 Groundwater Aquifers and Typical Groundwater Quality

Aquifers in the project area and surrounding region include, from deepest to shallowest, the Cretaceous Fox Hills and Hell Creek formations and the Tertiary Ludlow, Tongue River, and Sentinel Butte formations (Table 3.4). The aquifers in question lie at depths from 670 to 1,900 feet below the surface. Shallow post-glacial outwash aquifers are located elsewhere in the Williston Basin, but do not occur within the proposed project areas . Shallow wells drilled to the upper member of the Fort Union and the Tongue River formations at depths ranging from 100 to 750 feet below the surface are often used for cattle watering. These wells typically contain total dissolved solid levels less than 3,000 parts per million (ppm). The shallow Sentinel Butte Formation is commonly used as a domestic water source in Dunn County and meets standards of the NDDH (Croft 1985). There are many wells drilled for domestic purposes throughout the Williston Basin in the basal Fox Hills Sand at depths ranging from 1,300 to 1,800 feet deep. The total dissolved solids level of the Fox Hills aquifer is normally 2,500 to 3,000 ppm, producing good drinking water. Detailed analyses are available from the North Dakota Geological Survey, Bulletin 68, Part III, 1976.

Table 3.4. Common Aquifers in the Proposed Project Area and Surrounding Region.

Period	Formation		Depth Range (feet)	Thickness (feet)	Lithology	Water-Yielding Characteristics
Quaternary	Alluvium		0–40	40	Silt, sand, and gravel	50 gal/min from sand and gravel deposits
Tertiary	Fort Union Group	Sentinel Butte	0–670	0–670	Silty, clay, sand and lignite	5 to 100 gal/min in sandstone. 1 to 200 gal/min in lignite
		Tongue River	140–750	350–490	Silty, clay, sand and lignite	Generally less than 100 gal/min in sandstone
		Cannonball/ Ludlow	500–1,150	550–660	Fine- to medium-grained sandstone, siltstone, and lignite	Generally less than 50 gal/min in sandstone
Cretaceous	Hell Creek		1,000–1,750	200–300	Claystone, sandstone, and mudstone	5 to 100 gal/min in sandstone
	Fox Hills		1,100–2,000	200–300	Fine- to medium-grained sandstone and some shale	Generally less than 200 gal/min in sandstone; some up to 400 gal/min

Sources: Croft 1985; Klausing 1979.
gal/min = gallons per minute

3.3.2.2 Existing Groundwater Wells

One existing groundwater well has been identified within 1 mile and three existing groundwater wells are located within 5 miles of the proposed Enerplus oil wells, based on data from the North Dakota State Water Commission (2011). The details of these groundwater wells are presented in Table 3.5.

Two of these wells have unknown uses, and three of the wells are currently used for groundwater monitoring or observation. None of the wells are identified for domestic or municipal water use. The wells are all relatively shallow and the water sources include the Sentinel Butte-Tongue River and the Tongue River aquifers.

Table 3.5. Existing Groundwater Wells within 5 Miles of the Proposed Wells.

Water Well #	Location	Type	Depth (feet)	Aquifer	Nearest Proposed Well Pad	Distance (miles)
5245	T148N R93W; Section 17	Unkn.	Unkn.	Sentinel Butte-Tongue River	Music/ Chord	0.82
5247	T148N R94W; Section 13	Unkn.	Unkn.	Sentinel Butte-Tongue River	Duet/ Harmony	1.35
21389	T148N R93W; Section 4	Observation	340	Tongue River	Beluga/ Humpback	2.17
5241	T148N R93W; Section 4	Observation	Unkn.	Sentinel Butte-Tongue River	Beluga/ Humpback	2.19

Source: North Dakota State Water Commission (2011)

3.3.2.3 Hydraulic Fracturing Process

HF is a well stimulation process used in North Dakota's Bakken and Three Forks formations to maximize the extraction of oil and gas. The process enhances subsurface fracture systems, allowing oil to move more freely through porous rock to production wells that bring the oil or gas to the surface (EPA 2010f). During fracturing, fluids, commonly made up of water and chemical additives, are pumped down the well bore into these target formations at high pressure. The HF process uses large volumes of water under high pressure to fracture rock within the target formation to increase formation porosity and allow the flow of petroleum from the rock. Depending upon the characteristics of the well and the rock being fractured, a few million gallons of water can be required to complete a job (Arthur et al. 2008).

Only specific sections of the well within the target formation receive the full force of pumping. As pressure builds up in this portion of the well, water opens fractures, and the driving pressure extends the fractures deep into the rock unit. When pumping stops, these fractures quickly snap closed and the water used to open them is pushed back into the borehole, back up the well and is collected at the surface. The water returned to the surface is a mixture of the water injected and pore water that has been trapped in the rock unit for millions of years. The pore water is usually a brine with significant amounts of dissolved solids (Arthur et al. 2008).

When the pressure exceeds the rock strength, the fluids open or enlarge fractures that can extend several hundred feet from the well shaft, which is oriented laterally within the target formation. After the fractures are created, a propping agent is pumped into the fractures to keep them from closing when the pumping pressure is released. After fracturing is completed, the internal pressure of the geologic formation causes the injected fracturing fluids to rise to the surface where they are stored in disposal tanks (EPA 2010f).

Proppants are small compression-resistant particles added to the HF fluids to assist in holding the fractures open and creating pore space through which petroleum can flow. Sand was the original proppant but now aluminum beads, ceramic beads, sintered bauxite, and other materials are being used in the wells. Over one million pounds of proppants can be used while fracturing a single well (Arthur et al. 2008).

In addition to proppants, a variety of chemical additives are included with the water used in HF. Some chemicals are used to thicken the water into a gel that is more effective at opening fractures and carrying proppants deep into the rock unit. Other chemicals are added to reduce friction, keep rock debris suspended in the liquid, prevent corrosion of equipment, kill bacteria, control pH, and other functions (Arthur et al. 2008). Typical chemical additives used in the HF fluids are shown in Table 3.6.

Table 3.6. Common Additives of Hydraulic Fracturing Fluid.

Additive Type	Main Compound	Common Use of Main Compound
Acid	Hydrochloric acid or muriatic acid	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Cold sterilant in health care industry
Breaker	Sodium chloride	Food preservative
Corrosion inhibitor	N,n-dimethyl formamide	Used as a crystallization medium in Pharmaceutical Industry
Friction reducer	Petroleum distillate	Cosmetics including hair, make-up, nail and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickener used in cosmetics, sauces, and salad dressings
Iron control	2-hydroxy-1,2,3-propanetricaboxylic acid	Citric acid is used to remove lime deposits; lemon juice ~7% citric acid
Oxygen scavenger	Ammonium bisulfite	Used in cosmetics
Proppant	Silica, quartz sand	Play sand
Scale inhibitor	Ethylene glycol	Automotive antifreeze and de-icing agent

Source: Arthur et al. 2008.

3.3.2.4 Potential Impacts to Surface Water and Groundwater Resources

The majority of the identified groundwater wells may have minimal hydrologic connections due to their respective distances greater than 1 mile from the nearest project well and shallow depths. However, the well within 1 mile of a proposed well pad could be affected by any cross contamination of aquifers during drilling. Water quality would be protected by drilling with freshwater to a point below the base of the Fox Hills Formation, implementing proper hazardous materials management, and using appropriate casing and cementing to permanently seal the well shaft from any surrounding aquifers. Surface casing would be employed to a depth of 2,500 feet below ground surface to isolate and protect all near surface aquifers from contamination during drilling, as described in Section 2.2.5 of this document, to protect the potable water aquifers from any potential contamination during the drilling and operations phases.

Since the introduction of technological advances in HF, some environmental concerns have been published related to the use of chemical additives and their potential effect on groundwater resources. These concerns, reviewed in Arthur et al. (2008), include:

1. Fractures produced in the well might extend directly into shallow rock units that are used for drinking water supplies, or fractures produced in the well might communicate with natural fractures that extend into shallow rock units that are used for drinking water supplies.
2. The casing of a well might fail and allow fluids to escape into shallow rock units used for drinking water supplies.
3. Accidental spills of hydraulic fracturing fluids or fluids expelled during a fracturing job might seep into the ground or contaminate surface water.

The EPA recently studied the effects of coalbed methane well fracking, publishing the results in a report entitled *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (EPA 816-R-04-003) in 2004 (EPA 2010g). The report has received both internal and external peer review, and public comment on its research design and incident information. Based on its research, the EPA concluded that there was negligible risk of fracturing fluid contaminating underground sources of drinking water during hydraulic fracturing of coalbed methane production wells, which are significantly more shallow than the Bakken and Three Forks formations. However, the EPA continues to monitor the effects of fracking in coalbed methane well completion (EPA 2010g). The EPA is currently undertaking a study to evaluate of the effect of oilfield HF technology, processes, and fluids on potable water aquifers. The EPA study is not expected to be completed until 2012 (EPA 2010f).

Oil-bearing formations typically occur much deeper than potable water aquifers; approximately 8,700 feet of intervening rock formations occur between the Bakken Formation and the deepest groundwater wells within 1 mile of the proposed wells. In addition, the unique geological position of the Bakken Formation places it immediately beneath the Madison Group, as shown in Figure 3.1. The Madison group of Mississippian age includes three geological formations that have properties that greatly limit the possibility of HF fractures extending vertically into shallower geological formations containing potable water. The following characteristics of the three members of the Madison Group show extremely high resistance to fracturing or vertical transmission of fluids.

3.3.2.4.1 Lodgepole Limestone Sequence

This is a sequence of primarily Mississippian limestones, with scattered interbedded shales approximately 900 feet thick. It lies immediately above the Bakken Formation. This sequence of rocks is characterized as hard and very dense, requiring significant pressure to initiate fractures (Energy Information Administration 2006).

3.3.2.4.2 Mission Canyon Limestone

Like the Lodgepole Limestone, the Mission Canyon is a dense limestone formation with very low porosity that ranges from 500 to 800 feet thick (Figure 3.1). Any HF pressures within the Bakken Formation that might be sufficient to initiate fracturing of the Lodgepole Limestone are assumed to be greatly reduced before reaching the Mission Canyon Limestone Formation, and very unlikely to cause any fracturing or transmission of fluids.

3.3.2.4.3 Charles Salt

The Charles Salt is ubiquitous through a great portion of the Williston Basin in both Montana and North Dakota and lies immediately above the limestones described above. This salt formation is approximately 600 feet thick. At the depth below the surface and the associated pressures, this salt is ductile, and would flow slowly to fill any void created by drilling or other pressure. This "flow characteristic," although very challenging to well drilling, would serve to seal any potential fracture that might be propagated artificially through HF. The salt would flow completely around the HF fluids or proppant, thereby eliminating any opportunity for the artificially induced fracture to stay open. Further, the water from the Bakken is almost fully salt-saturated; even with water flow from the Bakken to the Charles Salt formation, there could be almost no dissolution to enhance any fracture, and the formation would form a barrier, or cap, for any potential HR fracture.

Above the Charles Salt lie greater than 6,000 feet of limestones, siltstones, interbedded salts, sandstones, and shales, many of which tend to be soft and incompetent, providing a serious impediment to any fracture height growth and redirecting and attenuating any fracture that is started. The multiple layers encountered would also serve to dissipate any energy from a fracture stimulation resulting in very limited fracture competency.

Potable water aquifers lie approximately 4,000 feet above the Bakken Formation. In general, almost any of the intervening rock packages appear to be able to independently act as an effective impediment to fracture growth in a vertical direction. Although large volumes of sand (proppant) are used in the modern, multi-stage fracture stimulations, relatively small amounts of proppant are used per stage and are specifically designed to limit fracture growth. This technology is highly unlikely to result in fractures that could expand through the Madison Group limestones or reach the Charles Salt Formation.

No direct or indirect impacts to surface water or groundwater resources would be anticipated from drilling of the proposed wells, HF completions, or operation of the proposed wells due to the following:

- The geological setting of the Bakken and Three Forks formations with extremely tight capping formations of the Madison Unit forming an impermeable barrier to upward fracturing or fluid movement.
- The use of semi-closed loop drilling, construction BMPs, and spill prevention planning during the construction phase of the project.
- Implementation of site-specific measures (Table 3.3) to reduce long-term erosion and runoff into nearby streams and Lake Sakakawea.
- The use of protective casings on the well shafts to protect shallow water-bearing rock formations during drilling and operation of the oil wells.

3.4 SOILS

3.4.1 Natural Resources Conservation Service Soil Data

The project area is located toward the center of the Williston Basin. The Greenhorn Formation, which consists of thin limestone and dark gray to black organic-rich shale, is found from the surface to a depth of approximately 4,000 feet. The Greenhorn is subdivided into lower and upper intervals of limestone and calcareous shale with a middle interval of shale. Near-surface sediment is of Recent, Pleistocene, or Tertiary age, and includes Sauk, Tippecanoe, Kaskaskia, Absaroka, Zuni, and Tejas Sequences. The Natural Resources Conservation Service (NRCS) soil data for soil series found in the project area are shown in Figure 3.5 and Figure 3.6 (NRCS 2010).

The overall percentage of project disturbance by soil series is summarized in Table 3.7 and is based on the spatial extent of soil series combinations derived from NRCS data; therefore, the acreage is the acreage is approximate and used as a best estimate of soil series distribution at each of the proposed project areas. The K-factor of each of the soil series is also included. K-factor indicates the vulnerability of material less than 2 millimeters in size to sheet and rill erosion by water. Values can range from 0.02 (i.e., lowest erosion potential) to 0.69 (i.e., greatest erosion potential) (NRCS 2010).

Table 3.7. Percentage of the Overall Project Disturbance Comprised of Specific Soil Types.

Feature	Soil Series	K-factor	Acres	% of Overall Project Disturbance
SW¼ NW¼ of Section 6: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF				
Well pad	Cabba loam, 15 to 45 percent slopes	0.02	0.113	0.434
	Cherry-Vanda complex, 2 to 9 percent slopes, gullied	0.43	1.514	5.814
	Cabba-Badland complex, 15 to 70 percent slopes	0.02	1.803	6.924
Access road	Cabba loam, 15 to 45 percent slopes	0.02	0.020	0.078
	Cherry-Vanda complex, 2 to 9 percent slopes, gullied	0.43	4.331	16.633
	Vanda silty clay, 0 to 2 percent slopes	0.37	0.305	1.172
	Savage-Rhoades silty clay loams, 0 to 6 percent slopes	0.37	0.214	0.822
SE ¼SW¼ of Section 18: Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF				
Well pad	Rhoades silt loam, 0 to 6 percent slopes	0.37	0.128	0.490
	Dogtooth-Cabba complex, 9 to 15 percent slopes	0.24	0.001	0.003
	Farland silt loam, 2 to 6 percent slopes	0.32	3.318	12.743
Access road	Farland silt loam, 2 to 6 percent slopes	0.32	0.592	2.275
SW¼ SE¼ of Section 18: Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF				
Well pad	Regent-Dogtooth silty clay loams, 0 to 6 percent slopes	0.37	3.419	13.129
Access road	Regent-Dogtooth silty clay loams, 0 to 6 percent slopes	0.37	0.324	1.243
	Farland silt loam, 2 to 6 percent slopes	0.32	2.965	11.386

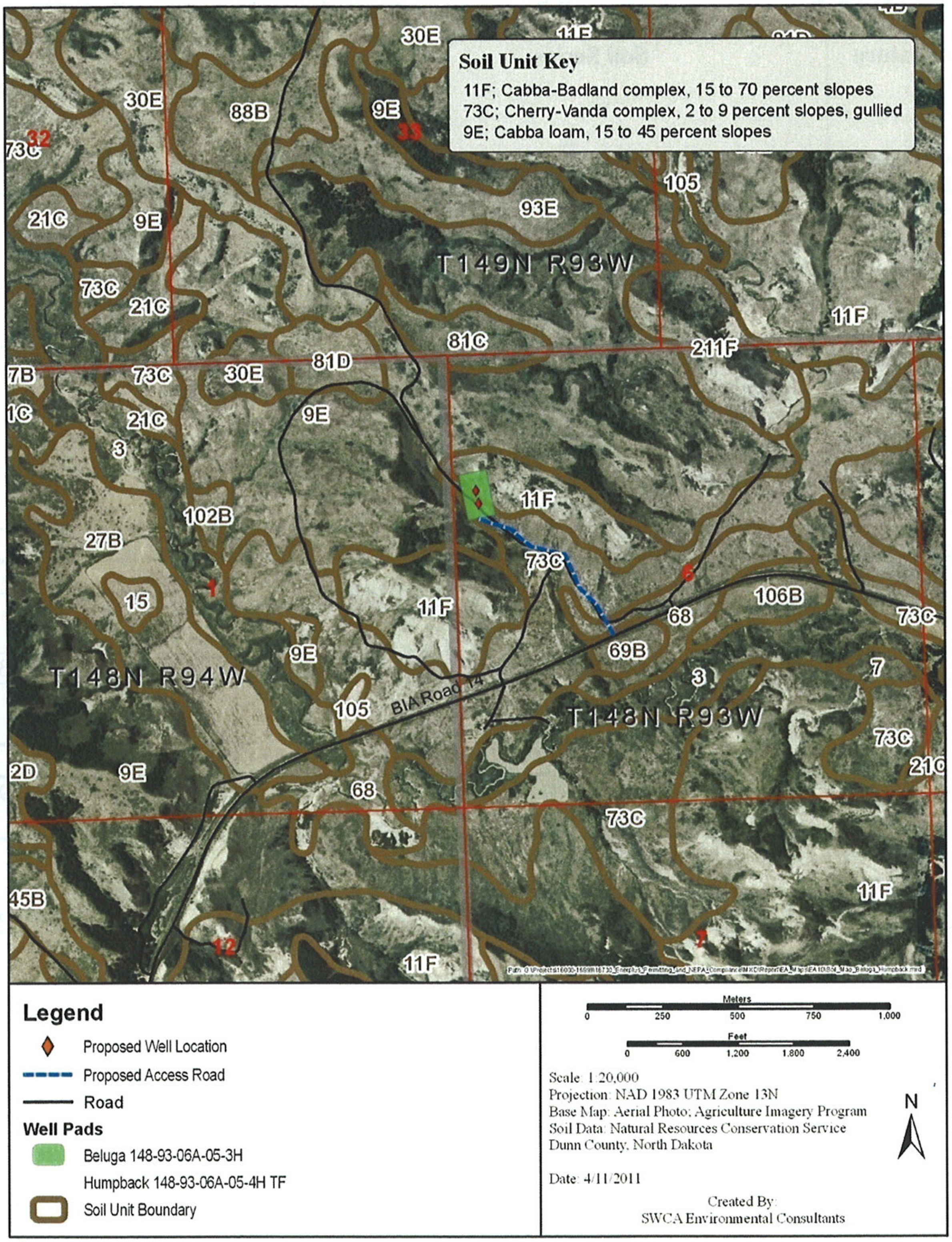

Figure 3.5. Approximate spatial extent of soil types within and around the well pads in Section 6, T148N, R93W.

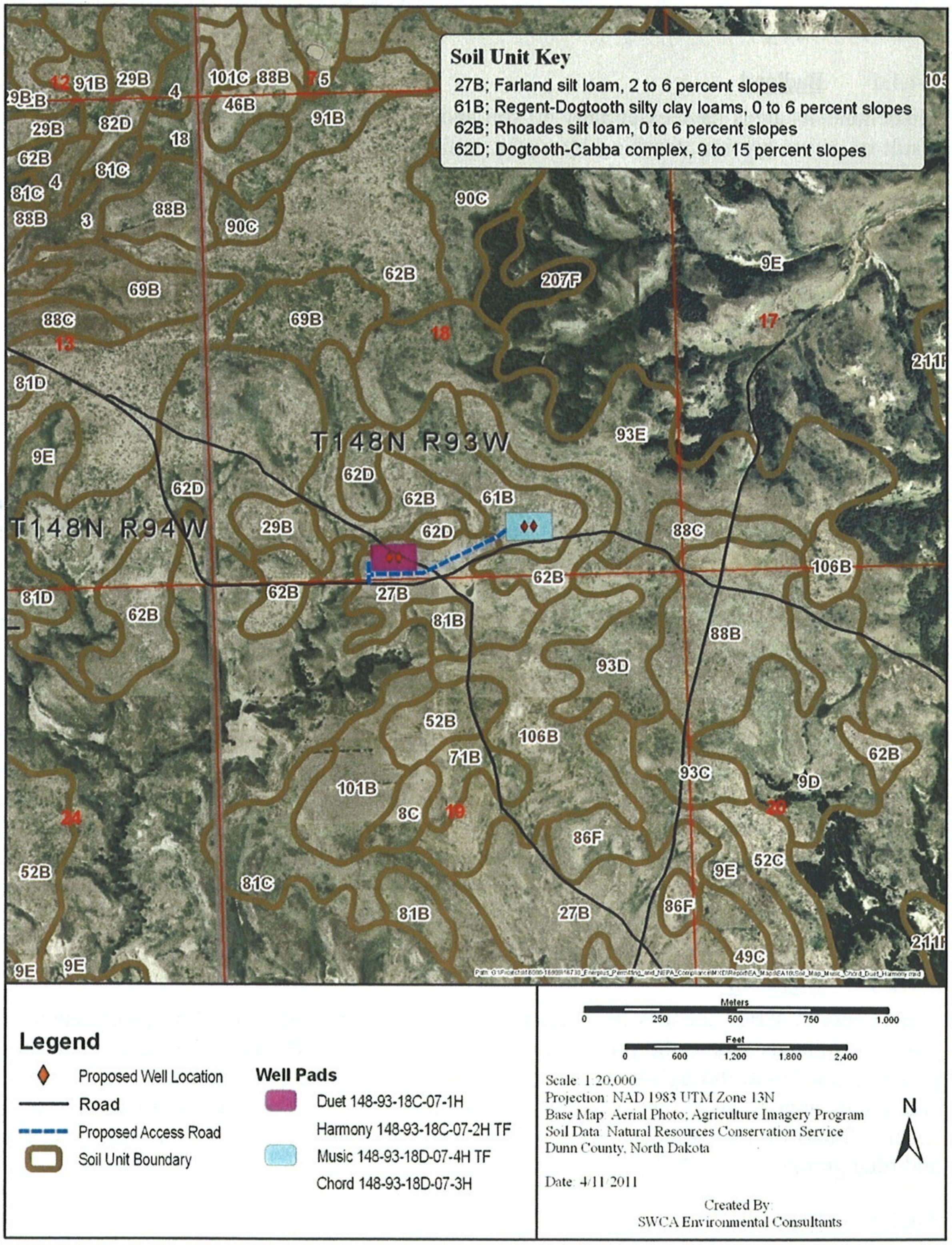

Figure 3.6. Approximate spatial extent of soil types within and around the well pads in Section 18, T148N, R93W.

The following soil series descriptions represent individual soil series reported to exist within the proposed project area (NRCS 2010).

3.4.1.1 Badland

Miscellaneous areas have essentially no soil and support little or no vegetation. This can be a result of active erosion, washing by water, unfavorable soil conditions, or human activities. Some miscellaneous areas can be made productive but only after major reclamation efforts. Badland is moderately steep to very steep barren land dissected by many intermittent drainage channels. Ordinarily, the areas are not stony. Badland is most common in semiarid and arid regions where streams cut into soft geologic material. Local relief generally ranges between 33 and 656 feet. Potential runoff is very high, and erosion is active. Badland, outcrop-Patent complex, 6% to 25% slopes. Badland occurs on the barren shoulders and backslopes of ridges. Patent soils occur on alluvial fans. This map unit occurs in badlands (NRCS McKenzie County, North Dakota, 2003).

3.4.1.2 Cabba

The Cabba series consists of shallow, well-drained, moderately permeable soils found on hills, escarpments, and sedimentary plains. The soil slopes broadly range between 2% and 70%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 43°F. The most common vegetation species found on this soil type are little bluestem (*Schizachyrium scoparium*), green needlegrass (*Nassella viridula*), and other various herbs, forbs, and shrub species (NRCS 2010).

3.4.1.3 Cherry

The Cherry series consists of very deep, well-drained, moderately slowly or slowly permeable soils that formed in alluvium on fans, foot slopes, dissected uplands and terraces. Slopes range from 0% to 25%. Mean annual air temperature is 42°F, and mean annual precipitation is 14 inches. Soils are cropped to small grains, hay, and pasture and are used for grazing. Native vegetation is western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), green needlegrass, needle and thread (*Hesperostipa comata*), and a variety of forbs and shrubs (NRCS 2010).

3.4.1.4 Dogtooth

The Dogtooth series consists of moderately deep, well-drained, very slowly permeable soils found in uplands where the predominant slope is between 0% and 25%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 42°F. The most common vegetation species found on this soil type are range and pasture grasses, including western wheatgrass and blue grama (NRCS 2010).

3.4.1.5 Farland

The Farland series consists of very deep, well-drained soils that formed in stratified alluvium on terraces, valley foot slopes, and fans on uplands. Permeability is moderate or moderately slow. Slope ranges from 0% to 20%. Mean annual precipitation is about 14 inches, and mean annual temperature is about 42°F. Potential native vegetation species found on this soil type include needle and thread, green needlegrass, western wheatgrass, and blue grama (NRCS 2010).

3.4.1.6 Regent

The Regent series consists of moderately deep, well-drained soils found on uplands. Permeability is slow with slopes ranging from approximately 0% to 45%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is used most often for cultivation of small grains, hay, and pasture. Native vegetation species common to this soil type include blue grama, green needlegrass, and western wheatgrass (NRCS 2010).

3.4.1.7 Rhoades

The Rhoades series consists of deep and very deep, well to moderately well-drained, very slowly permeable soils found on swales and uplands with slopes ranging from approximately 0% to 25%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass and blue grama (NRCS 2010).

3.4.1.8 Savage

The Savage series consists of very deep, well-drained soils that formed in silty alluvium, loess, or in glaciofluvial or glaciolacustrine material. These soils are on alluvial fans, stream terraces, drainageways, sedimentary plains, and till plains. Slopes are 0% to 25%. Mean annual precipitation is about 16 inches, and the mean annual air temperature is about 42°F. Savage soils are used mainly for dryland crops. Some areas are used for irrigated crops and as rangeland. Potential native vegetation is mainly bluebunch wheatgrass (*Pseudoroegneria spicata*), western wheatgrass, green needlegrass, and perennial forbs (NRCS 2010).

3.4.1.9 Vanda

The Vanda series consists of very deep, well-drained soils that formed in alluvium derived mainly from semi-consolidated sedimentary bedrock or from glaciolacustrine or glaciofluvial deposits. These soils are on alluvial fans, lake plains, sedimentary plains, drainageways, and stream terraces. Slopes are 0% to 15%. Mean annual precipitation is about 12 inches. Mean annual air temperature is about 43°F. Vanda soils are used mainly for range. The potential native vegetation is mainly western wheatgrass, Nuttall alkaligrass (*Puccinellia nuttalliana*), big sagebrush (*Artemisia tridentata*), blue grama, alkali sacaton (*Sporobolus airoides*), forbs, and shrubs (NRCS 2010).

3.4.2 Field-derived Soil Data

Soil data derived from on-site excavated soil pits, including the matrix value, hue, chroma, and color name, are summarized in Table 3.8. Additionally, redoximorphic features (i.e., reduced/oxidized iron or manganese deposits), and soil texture were noted at each soil pit. A Munsell Soil Color Chart was used to determine the color of moist soil samples.

Table 3.8. Soil Data Obtained through the Excavation of Soil Pits within the Proposed Project Area.

Well Pad Location/ Well Name and Component	Depth (inches)	% of Sample	Soil Matrix Color (color name)	Redoximorphic Feature Color	Texture	Topography Slope (°)
NW¼ SW¼ of Section 6: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF						
Well pad	0–16	100	10YR 5/4	N/A	Silty clay loam	3–5
SE¼ SW¼ of Section 18: Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF						
Well pad	0–8	100	10YR 4/2	N/A	Silty clay loam	1–3
	8-16	100	10YR 4/3	N/A	Silty clay loam	
SW¼ SE¼ of Section 18: Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF						
Well pad	0–10	100	10YR 4/2	N/A	Silty clay loam	1–3
	10-16	100	10YR 4/3	N/A	Silty clay loam	

Enerplus has committed to the following specific protective measures that would prevent or reduce erosion potential at each site.

- All construction would include implementation of BMPs to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization. Sites would be inspected during construction in accordance with NPDES requirements, and monitored after construction to ensure that erosion does not occur.
- Well pads are designed to be level with reclamation being completed on exposed cut and fill slopes shortly following construction.
- Roads would be constructed with crown and ditch to direct runoff away from gravel surfaces. Roads are designed with appropriately sized culverts at any intermittent stream crossings, in accordance with BLM Gold Book Standards. All disturbed areas except the road surface would be reseeded and stabilized as soon as practical following construction.
- Erosion and sedimentation control measures would be implemented in all project areas, such as installing culverts with energy dissipating devices at culvert outlets to avoid sedimentation in ditches, constructing water bars alongside slopes, and planting cover crops to stabilize soil following construction and before permanent seeding takes place.
- Any disturbance from operational maintenance actions along gathering pipelines would be followed by reclamation.

- Other site-specific erosion control measures have been required by the BIA, and agreed to by Enerplus, as shown in Table 3.3.

3.4.3 Potential Impacts from Soil Erosion

Some potential for erosion to occur may exist at sites, depending on surface disturbance, site-specific slope, soil type, K-factor, and construction technique and/or long-term maintenance.

Keeping in mind the general and site-specific measures identified previously, the potential impacts from erosion are discussed in detail for each site.

3.4.3.1 SW¼ NW¼ of Section 6: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF

- The proposed well pad, new access road, and buried utility lines would occur in areas that are dominated by Cabba, Vanda, Cherry soil types, which are silty clay-loam soils that are moderate to moderately deep, well-drained, and moderately permeable (Figure 3.5, Table 3.7 and Table 3.8). Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to these soil types (NRCS 2010).
- 11.51 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 5% (Table 3.8), so the potential for runoff in an event is low. Potential erosion from around the well pad and the access road could also occur over the life of the project.
- The K-factor of these soils ranges from 0.02 (very low erosion potential) to 0.43 (moderate erosion potential).
- Site-specific measures identified in Table 3.3 would serve to reduce erosion from exposed soil surfaces, and the construction and reclamation measures indicated for the components at the site would be sufficient to reduce erosion to insignificant levels.

3.4.3.2 SE¼ SW¼ of Section 18: Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF

- The Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF well pad, proposed new access road, and buried utility lines would occur in areas that are dominated by Rhoades, Cabba, Dogtooth, and Farland soil types (Figure 3.6, Table 3.7 and Table 3.8). As described previously, these soil types are silty clay-loams that are moderate to very deep, well-drained, with low to moderate permeability. Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2010).
- 6.12 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 3% (Table 3.8), so the potential for runoff and erosion in an event is low.
- The well pad location, access road, and gathering pipeline ROW have a K-factor ranging from 0.24 to 0.37 (Table 3.7), indicating moderate erosion potential.

- Site-specific measures identified in Table 3.3 would serve to reduce erosion from exposed soil surfaces, and the construction and reclamation measures indicated for the components at the site would be sufficient to reduce erosion to insignificant levels.

3.4.3.3 SW¼ SE¼ of Section 18: Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF

- The Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF well pad, proposed new access road, and gathering pipeline would occur in areas that are dominated by Reagent, Dogtooth, and Farland soil types (Figure 3.6, Table 3.7 and Table 3.8). As described previously, these soil types are silty clay-loams that are moderate to very deep, well-drained, with low to moderate permeability. Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2010).
- 8.41 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 3% (Table 3.8), so the potential for runoff and erosion in an event is low.
- The well pad location, access road, and gathering pipeline ROW have a K-factor ranging from 0.24 to 0.37 (Table 3.7), indicating moderate erosion potential.
- Site-specific measures identified in Table 3.3 would serve to reduce erosion from exposed soil surfaces, and the construction and reclamation measures indicated for the components at the site would be sufficient to reduce erosion to insignificant levels.

Most of the soils in the project area are known to support native grassland vegetation, which may substantially increase the probability for successful and permanent reclamation, provided care is taken in areas where the soils are less than ideal for vegetative growth (NRCS 2010). Proven construction BMPs are known to significantly reduce erosion of various types of soil, including those in the project area (BLM Instruction Memorandum 2004-124, www.blm.gov/bmp; BLM and USFS 2007; Grah 1997).

The project is not expected to create unmanageable erosion issues or interfere with reclamation of the area. Topsoil stripped from areas of new construction would be retained for use during reclamation. Any areas stripped of vegetation during construction would be reseeded once construction activities have ceased. All construction sites would be monitored during and after construction, and BMPs would be used to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization. The implementation of BMPs by the operator would reduce project effects and maintain negligible levels of erosion; therefore, no significant adverse impacts to soil resources are anticipated.

3.5 WETLANDS, HABITAT, AND WILDLIFE

3.5.1 Wetlands

National Wetlands Inventory (NWI) maps maintained by the U.S. Fish and Wildlife Service (USFWS) do not identify any jurisdictional wetlands within the proposed well pads or access roads (USFWS 2010a). No wetlands were observed along the proposed access roads or well pads during surveys conducted in November 2010. According to the USFWS NWI database, three freshwater emergent wetlands (PEMs) and two fresh water ponds are located within 0.5 mile of the proposed project areas, as shown in Table 3.3 and Figure 3.7. None of the proposed new access roads or well pads would intersect any of the identified wetlands.

The proposed well site located in NW¼ SW¼ of Section 6 lies 0.44 mile from the nearest wetland or pond. This proposed well site is also located 0.79 mile from the nearest perennial stream. In order to prevent impacts as a result of construction, drilling, or production activities, Enerplus would employ standard and enhanced erosion control measures, as shown in Table 3.3. Site-specific erosion control measures required at this site include using semi-closed loop system and other BMPs during drilling, installing a diversion ditch on the northeast and southeast sides of the well pad, using matting on the northeast and southeast exposed slopes of the well pad, and grinding woody vegetation into topsoil and using it during reclamation.

The proposed well pad in SE¼ SW¼ of Section 18 is located within 0.5 mile of three wetlands, including one PEM approximately 0.12 acres in size, and two freshwater ponds. The nearest wetland occurs 0.03 mile from the proposed well pad, which is the nearest identified wetland for the proposed project. The nearest perennial stream is 1.07 miles from this site. In order to prevent impacts to these PEM wetlands and streams as a result of construction, drilling, or production activities, Enerplus would employ standard and enhanced erosion control measures, as shown in Table 3.3. Site-specific erosion control measures required at this site include using semi-closed loop system and other BMPs during drilling, rounding the northwest corner of well pad, and constructing an 18-inch berm on the north and west sides of the well pad.

The proposed well pad located in SW¼ SE¼ of Section 18 is located within 0.5 mile of two PEMs. The nearest wetland identified by the NWI lies 0.10 mile from the well location, and is approximately 0.12 acres in size. The second PEM wetland is approximately 0.58 acres. The nearest perennial stream lies 1.3 miles away from the site. In order to prevent impacts to these PEM wetlands as a result of construction, drilling, or production activities, Enerplus would employ standard and enhanced erosion control measures, as shown in Table 3.3. Site-specific erosion control measures required at this site include using semi-closed loop system and other BMPs during drilling.

Lake Sakakawea is located at a distance of 12.6 to 14.4 river miles away from the proposed well pads. In order to prevent any downstream impact to Lake Sakakawea, Enerplus would employ standard BMPs to reduce the potential for adverse impact.

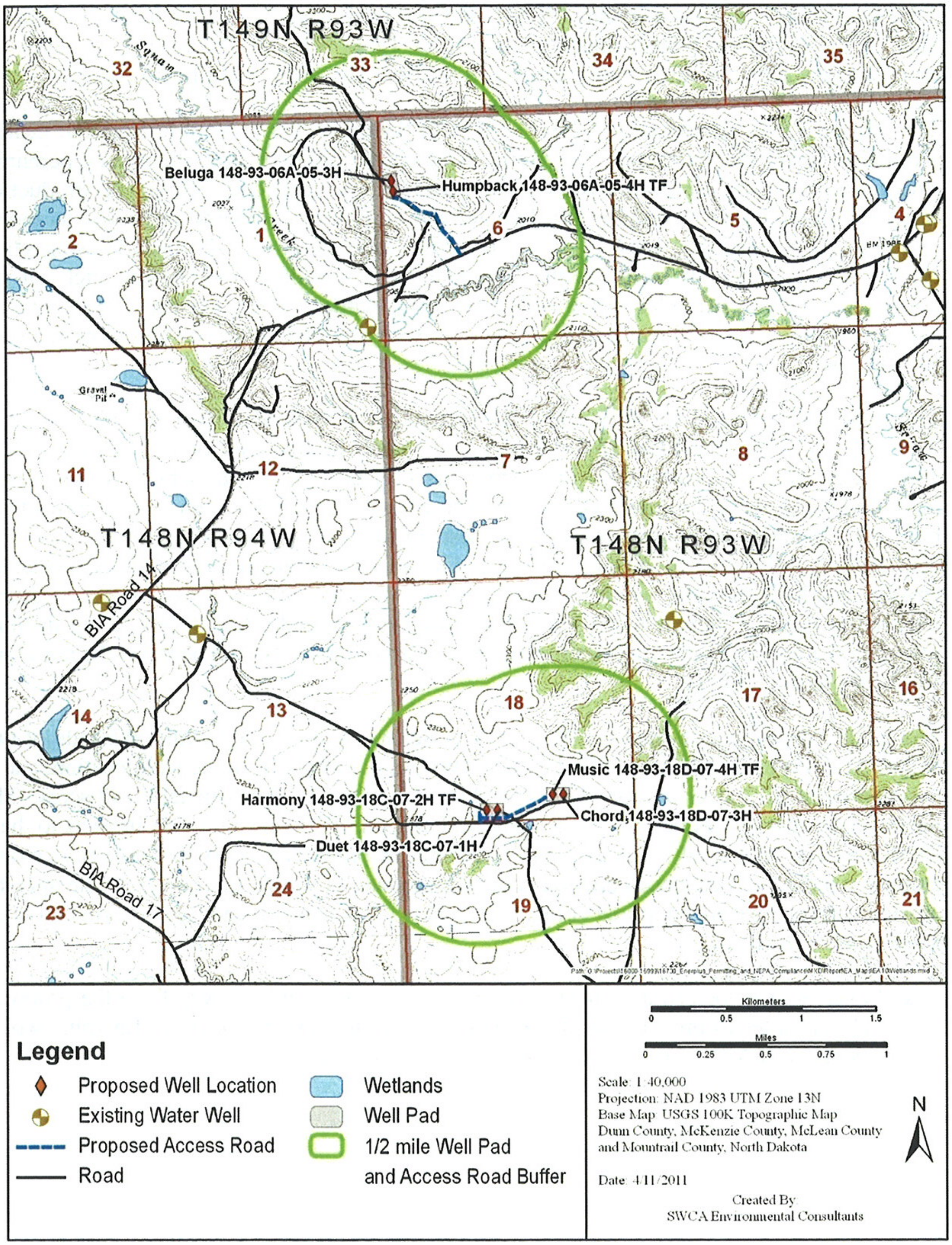

Figure 3.7. NWI-identified wetlands within 0.5 mile of proposed project areas.

3.6 VEGETATION AND INVASIVE SPECIES

3.6.1 Vegetation Data

The proposed project areas occur in the Missouri Plateau ecoregion (Missouri Slope), which is a western mixed-grass and short-grass prairie ecosystem (Bryce et al. 1998). Native grasses include big bluestem (*Andropogon gerardii*), little bluestem, blue grama, side-oats grama (*Bouteloua curtipendula*), green needlegrass, and western wheatgrass. Common wetland vegetation includes various sedge species (*Carex* spp.), bulrush (*Scirpus* spp.), and cattails (*Typha* spp.). Common plant species found in woody draws, coulees, and drainages include chokecherry (*Prunus virginiana*), silver buffaloberry (*Shepherdia argentea*), and western snowberry (*Symphoricarpos occidentalis*).

3.6.1.1 SW¼ NW¼ of Section 6: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF

Vegetation noted at the NW¼ SW¼ of Section 6 well pad project area includes little bluestem, green needlegrass, narrow-leaved purple coneflower (*Echinacea pallida* var. *angustifolia*), and silver buffaloberry (Figure 3.8 and Figure 3.9).

Figure 3.8. Vegetation at the SW¼ NW¼ of Section 6: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF well pad area, facing north. Photo taken November 3, 2010.

Figure 3.9. Vegetation at the NW¼ SW¼ of Section 6: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4H TF well site access road, facing south. Photo taken November 3, 2010.

3.6.1.2 <u>SE¼ SW¼ of Section 18: Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF</u>

Vegetation noted at the SE¼ SW¼ of Section 18 well pad project area includes western snowberry, green needlegrass, fringed sage (*Artemisia frigida*), and needle and thread (Figure 3.10 and Figure 3.11).

Figure 3.10. Vegetation at the SE¼ SW¼ of Section 18: Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF well pad area, facing north. Photo taken November 3, 2010.

Figure 3.11. Vegetation at the SE¼ SW¼ of Section 18: Duet 148-93-18C-07-1H and Harmony 148-93-18C-07-2H TF well site access road, facing north. Photo taken November 3, 2010.

3.6.1.3 SW¼ SE¼ of Section 18: Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF

Vegetation noted at the SW¼ SE¼ of Section 18 well pad project area includes western snowberry, green needlegrass, narrow-leaved purple coneflower, silver sage (*Salvia argentea*), and needle and thread (Figure 3.12 and Figure 3.13).

Figure 3.12. Vegetation at the SW¼ SE¼ of Section 18: Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF well pad area, facing north. Photo taken November 3, 2010.

Figure 3.13. Vegetation at the SWSE Section 18: Chord 148-93-18D-07-3H and Music 148-93-18D-07-4H TF well pad area, facing west. Photo taken November 3, 2010.

3.6.2 Noxious Weeds

"Noxious weeds" is a general term used to describe plant species that are not native to a given area, spread rapidly, and have adverse ecological and economic impacts. These species may have high reproduction rates and are usually adapted to occupy a diverse range of habitats otherwise occupied by native species. These species may subsequently out-compete native plant species for resources, causing a reduction in native plant populations.

Noxious weeds have the potential to detrimentally affect public health, ecological stability, and agricultural practices. NDCC (Chapter 63-01.1) and the North Dakota Department of Agriculture (NDDA) recognize 11 species as noxious, as shown in Table 3.9 (NDDA 2009). Each county has the authority to add additional species to their list of noxious weeds. In 2009, three state noxious weed species were found on 86,100 acres in Dunn County. Dunn County does not maintain a list of other noxious species. However, 3,000 acres of black henbane (*Hyoscyamus niger*) were shown to occur in Dunn County in 2009 (NDDA 2009; 2010).

Table 3.9. Recognized Noxious Weed Occupied Area in Dunn County, North Dakota.

Common Name	Scientific Name	Dunn County (acres)
State Noxious Weeds		
Absinth wormwood	*Artemisia absinthium*	39,300
Canada thistle	*Cirsium arvense*	28,500
Diffuse knapweed	*Centaurea diffusa*	0
Leafy spurge	*Euphorbia esula*	18,300
Musk thistle	*Carduus nutans*	0
Purple loosestrife	*Lythrum salicaria*	0
Russian knapweed	*Acroptilon repens*	0
Spotted knapweed	*Centaurea stoebe*	0
Yellow toadflax	*Linaria vulgaris*	0
Dalmatian toadflax	*Linaria dalmatica*	0
Saltcedar	*Tamarix ramosissima*	0
Other Noxious Weeds		
Black henbane	*Hyoscyamus niger*	3,000
Common burdock	*Arctium minus*	0
Houndstongue	*Cynoglossum officinale*	0
Halogeton	*Halogeton glomeratus*	0
Baby's breath	*Gypsophila muralis*	0

Efforts to reduce the spread of noxious weeds would be made during the project construction and maintenance processes. The following guidelines would be followed during construction, reclamation, and maintenance stages of the project to control the spread of noxious weeds.

- Construction equipment, materials, and vehicles would be stored at construction sites or at specified construction yards.
- All personal vehicles, sanitary facilities, and staging areas would be confined to a limited number of specified locations to decrease chances of incidental disturbance and spread of weeds.
- In areas with existing noxious weed infestations, vegetation, soils, and trench spoil material would be stockpiled adjacent to the removal point and, following construction, would be returned to its original locations to prevent spreading.
- Prompt re-establishment of the desired vegetation in disturbed areas is required. Seeding would occur during the frost-free periods after construction. Certified "noxious weed-free" seed would be used on all areas to be seeded.

3.6.3 Potential Impacts on Vegetation and Noxious Weeds

The Proposed Action would result in minor loss of native grassland vegetation. The potential disturbance for each project component at each well pad is displayed in Table 2.1, and would total 26.04 acres overall.

In addition to the removal of typical native grasslands, removal of existing vegetation may facilitate the spread of invasive species. The APD and this EA require the operator to control noxious weeds throughout project areas. If a noxious weed community is found, it would be eradicated unless the community is too large, in which case it would be controlled or contained to prevent further growth. The services of a qualified weed control contractor would be used.

Surface disturbance and vehicular traffic would not take place outside approved ROWs for the well pads. Areas that are stripped of topsoil must be reseeded and reclaimed at the earliest opportunity. Additionally, certified weed-free straw and seed must be used for all construction, seeding, and reclamation efforts. Prompt and appropriate construction, operation, and reclamation are expected to maintain minimal levels of adverse impacts to vegetation and would reduce the potential establishment of invasive vegetation species.

Rapid reclamation and the implementation of BMPs would minimize any long-term loss of soil and degradation of vegetation resources in the pipeline ROW. Construction of the three proposed well pads and their access roads and buried utility line corridors would result in long-term disturbance of approximately 26.04 acres of vegetation, since these facilities would only be partially reclaimed, and would be in continuous use for the life of the project. The loss of 26.04 acres would be widely dispersed and, with implementation of BMPs and noxious weed management guidelines, would result in negligible levels of vegetation disturbance and would not result in significant adverse impacts to vegetation resources.

3.6.4 Wildlife

3.6.5 Threatened and Endangered Species Occurrence and Habitat

Several wildlife species that may exist in Dunn County (USFWS 2010a) are listed as threatened or endangered under the Endangered Species Act (ESA) (16 USC 1531 et seq.). According to the USFWS, listed species in Dunn County include the gray wolf (*Canis lupus*), black-footed ferret (*Mustela nigripes*), whooping crane (*Grus americana*), piping plover (*Charadrius melodus*) and its Designated Critical Habitat, interior least tern (*Sterna antillarum*), and pallid sturgeon (*Scaphirhynchus albus*), as well as two federal candidate species, the Dakota skipper (*Hesperia dacotae*) and the Sprague's pipit (*Anthus spragueii*). In addition to the ESA, the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668–668d, 54 Sta. 250) and the Migratory Bird Treaty Act of 1918 (MBTA) (916 USC 703–711) protect nesting migratory bird species. The listed species and their federal status are provided in Table 3.10. SWCA did not observe any of these species or their habitats within the project area during surveys.

An SWCA biologist conducted general wildlife surveys during site visits in November 2010. No wildlife was observed, and no threatened or endangered species or their habitats were observed within the project area. However, eagle nesting habitat was observed within 0.5 mile of the well pad site in SW¼ NW¼ of Section 6. An aerial eagle nest survey was flown by the SWCA biologist on Friday March 25, 2011, for Enerplus to identify any eagle nests within 0.5 mile of the SW¼ NW¼ of Section 6: Beluga 148-93-06A-05-3H and Humpback 148-93-06A-05-4HTF well pad and access road area, per recommendations of the BIA. No nests or eagles were observed during the survey.

Table 3.10. Summary of Potential Effects to Threatened and Endangered Species.

Species	ESA Status	Habitat Suitability or Known Occurrence	Operator-committed Measures	Effects Determination
Black-footed ferret (*Mustela nigripes*)	Endangered	Species is presumed extirpated from North Dakota.	None	No effect
Gray wolf (*Canis lupus*)	Endangered	Nearest known gray wolf populations exist in Minnesota, Canada, Montana, and Wyoming.	None	No effect

Species	ESA Status	Habitat Suitability or Known Occurrence	Operator-committed Measures	Effects Determination
Whooping crane (*Grus americana*)	Endangered	Birds may occasionally stopover during migration due to the presence of suitable foraging habitat near the project areas.	Drilling or construction activity would cease and the BIA and USFWS would be notified if whooping cranes are sighted. In addition, migratory bird protective measures would be implemented, as follows: • Construction would be conducted outside the migratory bird breeding season (February 1–July 15). • If construction is to occur during bird breeding season, vegetation within the construction ROW would be mowed/cleared and maintained prior to February 1 and until ground disturbing activities occur, weather conditions (i.e., snow cover) permitting, or surveys would be conducted for nesting migratory birds within 5 days of construction and construction delayed until Notice to Proceed obtained from the BIA and USFWS. • Reserve pits would include avian-safe coverings and be reclaimed immediately after wells are completed.	May affect, is not likely to adversely affect
Piping plover (*Charadrius melodus*)	Threatened	Birds are unlikely to be present due to lack of suitable foraging or nesting habitat.	See migratory bird protective measures for whooping crane.	May affect, is not likely to adversely affect

Species	ESA Status	Habitat Suitability or Known Occurrence	Operator-committed Measures	Effects Determination
Designated Critical Habitat for piping plover	Designated Critical Habitat	Critical Habitat occurs within the watershed of the project area, on the shoreline and islands of Lake Sakakawea, approximately 12.6 to 14.1 miles from proposed well pads and access roads.	Enerplus would implement all BMPs, erosion control measures, and spill prevention practices required by the CWA. Enerplus would use a semi-closed-loop drilling system and an impervious dike sized to hold 110% of the capacity of the largest tank plus one day's production would be constructed around the tank battery to prevent hazardous runoff or spills. Use of site-specific erosion and runoff reduction measures identified in Table 3.3.	May affect, is not likely to adversely affect
Interior least tern (*Sterna antillarum*)	Endangered	The nearest suitable nesting and foraging habitat occurs on the shoreline and islands of Lake Sakakawea, approximately 12.6 to 14.1 miles from proposed well pads and access roads. Migrating or foraging interior least terns may transition through the project area.	See migratory bird protective measures for whooping crane. See Designated Critical Habitat protective measures for piping plover.	May affect, is not likely to adversely affect

Species	ESA Status	Habitat Suitability or Known Occurrence	Operator-committed Measures	Effects Determination
Sprague's pipit (*Anthus spragueii*)	Candidate	Habitat requirements include unfragmented native grasslands of intermediate height (4–12 inches) with a minimum patch size of 358 acres.	See migratory bird protective measures for whooping crane.	May affect, is not likely to adversely affect
Pallid sturgeon (*Scaphirhynchus albus*)	Threatened	Lake Sakakawea is approximately 12.6 to 14.1 miles from proposed well pads and access roads.	See Designated Critical Habitat protective measures for piping plover.	May affect, is not likely to adversely affect
Dakota skipper (*Hesperia dacotae*)	Candidate	Suitable habitat was noted within the project area. However, no adverse impact is anticipated as a result of construction activities.	None.	May affect, is not likely to adversely affect
Other Federally Protected Species				
Bald eagle (*Haliaeetus leucocephalus*)	BGEPA	No known nests occur within 0.5 mile of the project area. Raptor habitat and aerial nest survey was conducted. No raptor nests were observed within the project area. Eagle nesting habitats does occur within in the project area.	See migratory bird protective measures for whooping crane. Eagle nesting surveys conducted in March 2011 at the well pads in the SW¼ NW¼ of Section 6, T148N, R93W. No nests were observed within 0.5 mile (see Appendix A).	No adverse effects anticipated

Species	ESA Status	Habitat Suitability or Known Occurrence	Operator-committed Measures	Effects Determination
Golden eagle (*Aquila chrysaetos*)	BGEPA	Based on eagle habitat survey conducted in November 2010 and eagle nest survey conducted in March 2011, no known nests occur within 0.5 mile of the project area. Golden eagles may occasionally visit the project area.	See bald eagle protective measures.	No adverse effects anticipated
Migratory birds	MBTA	Migratory birds are likely to occur in all project areas.	See migratory bird protective measures for whooping crane.	No adverse effects anticipated

3.6.6 General Wildlife Species Occurrence and Habitat

No wildlife species were observed during field visits to the proposed project areas on November 3, 2010. Several species common to the northern Great Plains are likely to be present in the project area including, but not limited to, mule deer (*Odocoileus hemionus*), American badger (*Taxidea taxus*), eastern spotted skunk (*Spilogale putoris*), and grassland songbirds such as western meadowlark (*Sturnella neglecta*) and loggerhead shrike (*Lanius ludovicianus*).

3.6.7 Potential Impacts to Wetlands, Habitat, and Wildlife

With the implementation of standard BMPs, no riparian or wetland habitats are anticipated to be directly or indirectly impacted by the proposed access roads or wells.

Indirect effects of the project on listed species could result from human disturbance and increases in vehicular traffic during drilling and commercial production, as well as indirectly from habitat degradation, sedimentation, or accidental release of drilling fluids or hazardous materials from the drilling, construction, or operation of the wells. Enerplus has committed to the following specific measures to protect migratory:

- Construction would be conducted outside the migratory bird breeding season (February 1–July 15).
- If construction is to occur during bird breeding season, vegetation within the construction ROW would be mowed/cleared and maintained prior to February 1 and until ground disturbing activities occur, weather conditions (i.e., snow cover) permitting, or surveys would be conducted for nesting migratory birds within five days

of construction and construction delayed until Notice to Proceed obtained from the BIA and USFWS.

- Cuttings pits would include avian-safe coverings and be reclaimed immediately after wells are completed.

Additionally, Enerplus has committed to using a semi-closed loop drilling system, ensuring that the cuttings pit would 1) be smaller than a typical pit and 2) contain only dry cuttings, which would be solidified with Class C fly ash and buried in place following completion of drilling operations. For additional information on general BMPs and other operator-committed measures, please see Sections 2.2.8, Construction Details at Individual Sites, and Section 3.11, Mitigation and Monitoring.

Minor impacts to unlisted wildlife species and their habitats could result from the construction of three well pads and new access roads, increased vehicular traffic density, drilling activities, and long-term disturbances during commercial production. Ground clearing may impact habitat for small birds, small mammals, and other wildlife species. The proposed project may affect raptor and migratory bird species through direct mortality, habitat degradation, and/or displacement of individual birds. These impacts are regulated in part through the MBTA. Fragmentation of native prairie habitat can detrimentally affect grouse species; however, due to the ratio of each project area to the total landscape area, the overall disturbance would be negligible.

Several precautions that may limit or reduce the possible impact to all wildlife species include:

- locating well pads over areas with existing disturbances;
- netting the cuttings pit between drilling and reclamation;
- removing any oil found in pits and ponds;
- installing covers under drip buckets and spigots; and
- conducting interim reclamation of at least half the disturbed area.

Reclamation would begin without delay if a well is determined to be unproductive, or upon completion of commercial production. Any wildlife species inhabiting the project area are likely to adapt to changing conditions and continue to persist without adverse impacts.

3.7 CULTURAL RESOURCES

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations, and agreements. Section 106 of the National Historic Preservation Act of 1966 (16 USC 470 et seq.) requires, for any federal, federally assisted, or federally licensed undertaking, that the federal agency take into account the effect of that undertaking on any district, site, building, structure, or object that is included in the National Register of Historic Places (National Register) before the expenditure of any federal funds or the issuance of any federal license. Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural, and religious significance. Eligibility criteria (36 CFR

60.6) include association with important events or people in our history, distinctive construction or artistic characteristics, and either a record of yielding or a potential to yield information important in prehistory or history. In practice, properties are generally not eligible for listing on the National Register if they lack diagnostic artifacts, subsurface remains, or structural features, but those considered eligible are treated as though they were listed on the National Register, even when no formal nomination has been filed. This process of taking into account an undertaking's effect on historic properties is known as "Section 106 review," or more commonly as a cultural resource inventory.

The area of potential effect (APE) of any federal undertaking must also be evaluated for significance to Native Americans from a cultural and religious standpoint. Sites and practices may be eligible for protection under the American Indian Religious Freedom Act of 1978 (42 USC 1996). Sacred sites may be identified by a tribe or an authoritative individual (Executive Order 13007). Special protections are afforded to human remains, funerary objects, and objects of cultural patrimony under the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.).

Whatever the nature of the cultural resource addressed by a particular statute or tradition, implementing procedures invariably include consultation requirements at various stages of a federal undertaking. The MHA Nation has designated a Tribal Historic Preservation Officer (THPO) by Tribal Council resolution, whose office and functions are certified by the National Park Service. The THPO operates with the same authority exercised in most of the rest of North Dakota by the State Historic Preservation Officer (SHPO). Thus, BIA consults and corresponds with the THPO regarding cultural resources on all projects proposed within the exterior boundaries of the Fort Berthold Indian Reservation.

3.7.1 Cultural Resource Inventories

Cultural resource inventories of these well pads and access roads were conducted by personnel of SWCA Environmental Consultants, using an intensive pedestrian methodology. For the Beluga 148-93-06A-05-3H & Humpback 148-93-06A-05-4H TF project approximately 22 acres were inventoried (Kohler 2011a); for the Duet 148-93-18C-07-1H & Harmony 148-93-18C-07-2H TF project approximately 10.08 acres were inventoried (Kohler 2011b); and for the Chord 148-93-18D-07-3H & Music 148-93-18D-07-4H TF approximately 14.1 acres were inventoried (Fewings 2011). These inventories were conducted on November 3, 2010. No historic properties were located that appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.6) for inclusion on the National Register. As the lead federal agency, and as provided for in 36 CFR 800.5, on the basis of the information provided, BIA reached a determination of **no historic properties affected** for these undertakings. This determination was communicated to the THPO on March 10, 2011; however, the THPO did not respond within the allotted 30 day comment period.

3.7.2 Potential Impacts to Cultural Resources

No historic properties were located that appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.6) for inclusion on the National Register. As the lead federal agency, and as provided for in 36 CFR 800.5, on the basis of the information provided, BIA reached a determination of no historic properties affected for these undertakings. This determination was communicated to the THPO on March 10, 2011; however, the THPO did not respond within the allotted 30-day comment period. For the Harmony 148-93-18C-07-2H TF and Duet 148-93-18C-07-1H project approximately 10.1 acres were inventoried on November 3, 2010 (Kohler 2011c). No historic properties were located that appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.6) for inclusion on the National Register. As the lead federal agency, and as provided for in 36 CFR 800.5, on the basis of the information provided, the BIA reached a determination of no historic properties affected for this undertaking. This determination was communicated to the THPO on March 10, 2011; however, the THPO did not respond within the allotted 30-day comment period.

If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and the THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties. Following any such discovery, operations would not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. The presence of qualified cultural resource monitors during construction activities is encouraged.

3.8 PUBLIC HEALTH AND SAFETY

The Proposed Action would occur in a rural area with a total of three residences located within 1 mile of the three proposed well pads (Table 3.11). The nearest home would be 0.15 mile from any proposed well.

Table 3.11. Distance and Direction from Proposed Multi-well Pads to Nearest Home.

Proposed Multi-well Pads	Distance to Nearest Home (miles)	Direction to Nearest Home
SW¼ NW¼ of Section 6	0.15	South
SE¼ SW¼ of Section 18	2.1	North
SW¼ SE¼ of Section 18	2.1	North

Health and safety concerns include sour gas that could be released as a result of drilling activities, hazards introduced by heavy truck traffic, and hazardous materials used or generated during construction, drilling, and/or production activities.

H_2S is extremely toxic in concentrations above 500 ppm, but it has not been found in measurable quantities in the Bakken Formation. Before reaching the Bakken, however, drilling would penetrate the Mission Canyon Formation, which is known to contain varying concentrations of H_2S. Contingency plans submitted to the BLM comply fully with relevant portions of Onshore Oil and Gas Order No. 6 to minimize potential for gas leaks during drilling. Emergency response plans protect both the drilling crew and the general public within 1 mile of a well; precautions include automated sampling and monitoring by drilling personnel stationed at each well site.

Standard mitigation measures would be applied, and because release of H_2S at dangerous concentration levels is very unlikely, no direct impacts from H_2S are anticipated with implementation of the project.

Tanker trips would depend on production, but Enerplus estimates approximately two trucks per day during the initial production period. Trucks for normal production operations would use the existing and proposed access roads. Produced water would be transported to an approved disposal site. All traffic would be confined to approved routes and conform to established load restrictions and speed limits for state and BIA roadways and haul permits would be acquired as appropriate.

The EPA specifies chemical reporting requirements under Title III of the Superfund Amendments and Reauthorization Act (SARA), as amended. No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with the Proposed Action. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities would be used, produced, stored, transported, or disposed of in association with the Proposed Action. All operations, including flaring, would conform to instructions from BIA fire management staff.

A temporary, lined cuttings pit would be constructed within the disturbed area of each well pad and constructed so as not to leak, break, or allow discharge and in a way that minimizes the accumulation of precipitation runoff into the pit.

Spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations. Sewage would be contained in a portable chemical toilet during drilling. All trash would be stored in a trash cage and hauled to an appropriate landfill during and after drilling and completion operations.

3.8.1 Potential Impacts to Public Health and Safety

With the implementation of the described reporting and management of hazardous materials, no adverse impacts to public health and safety are anticipated as a result of the proposed new wells. Other potential adverse impacts to any nearby residents from construction would be largely temporary. Noise, fugitive dust, and traffic hazards would be present for about 90 to 150 days (depending on the number of wells per pad) during construction, drilling, and well completion as equipment and vehicles move on and off the site, and then diminish sharply during production operations. If a well proved productive, one small pumper truck would visit the well once a day to check the pump. Bakken wells typically produce both oil and water at a high rate initially. Gas would be flared initially and intermittently, while oil and produced water would be stored on the well pad in tanks and then hauled out by tankers until the well could be connected to gathering pipelines. Up to four 400-barrel oil tanks and one 400-barrel water tank would be located on the pad inside a berm of impervious compacted subsoil. The berm would be designed to hold 110% of the capacity of the largest tank plus one day's production.

3.9 SOCIOECONOMICS

The scope of analysis for social and economic resources includes a discussion of current social and economic data relevant to the project area and surrounding communities of the Reservation and McKenzie, Dunn, McLean, and Mountrail counties, North Dakota. These counties were chosen for analysis because their proximity to the proposed well locations and overlap with the Reservation could result in socioeconomic impacts. These communities are collectively referred to as the Analysis Area.

3.9.1 Socioeconomic Analysis Area

This section discusses community characteristics such as population, housing, demographics, employment, and economic trends within the Analysis Area. Also included are data relating to the State of North Dakota and the United States, which provide a comparative discussion when compared to the Analysis Area. Information in this section was obtained from various sources including, but not limited to, the U.S. Census Bureau, the U.S. Bureau of Economics, and the North Dakota State Government.

3.9.2 Population and Demographic Trends

Historic and current population counts for the Analysis Area, compared to the state, are provided below in Table 3.12. The state population showed little change between the previous two census counts (1990–2000), however in 2010 the state population increased by 4.7% to 672,594 (U.S. Census Bureau 2011a). Populations in McKenzie and Mountrail counties have increased slightly from 2000 to 2009 while McLean and Dunn counties had a rate of decline of -10.8% and -6.5%, respectively (U.S. Census Bureau 2011b). These declines can be attributed to more people moving to metropolitan areas, which are perceived as offering more opportunities for growth. However, population on or near the Reservation has increased approximately 13.3% from 2000 to 2005 (BIA 2005). While Native Americans are the predominant group on the Reservation, they are considered the minority in all other areas of North Dakota.

As presented in Table 3.12, population growth on the Reservation (13.3%) exceeds the overall growth in the state of North Dakota (0.7%) and four counties in the Analysis Area. This trend in population growth for the Reservation is expected to continue in the next few years (Fort Berthold Housing Authority 2008).

Table 3.12. Population and Demographics.

County or Reservation	Population in 2009	% of State Population	% Change Between 1990–2000	% Change Between 2000–2009	Predominant Group in 2009 (%)	Predominant Minority in 2009 (Percent of Total Minority Population)
Dunn	3,365	0.5	-10.1	-6.5	Caucasian (85.3%)	American Indian (13.6%)
McKenzie	5,799	0.9	-10.1	1.1	Caucasian (76.7%)	American Indian (21.5%)
McLean	8,310	1.3	-11.0	-10.8	Caucasian (91.2%)	American Indian (7.1%)
Mountrail	6,791	1.0	-5.6	2.4	Caucasian (62.7%)	American Indian (35.1%)
On or near Fort Berthold Indian Reservation[1]	11,897	1.8	178.0[2]	+13.3[3]	American Indian	Caucasian (~27%)
Statewide	672,594[4]	100	0.5	4.7[4]	Caucasian (91.1)	American Indian (5.6%)

Source: U.S. Census Bureau 2011b.

[1] Population shown reflects the total enrollment in the tribe in 2005. 2008 data unavailable. All information related to the Reservation reflects 2005 data, including state population. 11,897 reflects tribal enrollment on or near the Reservation. According to the BIA, near the Reservation includes those areas or communities adjacent or contiguous to the Reservation (BIA 2005).

[2] Reflects percent change between 1991 and 2001 (BIA 2001).

[3] Reflects percent change between 2001 and 2005.

[4] Refelects population levels in 2010 (U.S. Census Bureau 2011a).

3.9.3 Employment

The economy in the state of North Dakota, including the Reservation and four counties in the Analysis Area, has historically depended on agriculture, including grazing and farming. However, 2010 economic data indicate that the major employers in North Dakota include government and government enterprises, which employed 16.6%; health care and social assistance, which employed 11.9%; and retail trade, which employed at 10.8% of the state's labor force (U.S. Bureau of Economic Analysis 2011a). Energy development and extraction, power generation, and services related to these activities have become increasingly important over the last several years and many service sector jobs are directly and indirectly associated with oil and gas development.

In 2010, total employment in the state of North Dakota was approximately 355,000 (Table 3.13). The average weekly wage for all employees on private nonfarm payrolls was $697 in North Dakota. All counties in the Analysis Area, and the entire state of North Dakota showed average weekly wages that were higher than the state and national average in 2010 (Table 3.13).

In 2010, the statewide unemployment rate was 3.8% of the workforce (Table 3.13). This is the lowest unemployment rate in the nation (Bureau of Labor Statistics 2011a). While some counties in the Analysis Area experienced a slight increase in unemployment, others were unchanged or experienced a decreased unemployment since 2005 (Table 3.13).

Table 3.13. 2010 Total Employment, Average Weekly Wages, and Unemployment Rates.

Location	Total Employment	Average Weekly Wage	Unemployment Rate	Change in Unemployment Rate (2005–2010)
United States	139,909,000	$781	9.4%	**+4.3%**
North Dakota	355,000	$697	3.8%	**+0.4%**
Dunn County	1,684	$829	3.3%	**-0.1%**
McKenzie County	2,625	$1,006	2.6%	**-1.1%**
McLean County	2,674	$820	3.8%	**-1.2%**
Mountrail County	4,713	$947	2.4%	**-3.6%**
On or near Fort Berthold Indian Reservation*	1,287	N/A	71%	**N/A**

Sources: Bureau of Labor Statistics 2011a, 2011b; U.S. Department of Agriculture 2011; BIA 2005.
* Represents 2005 data only.

According to the 2005 American Indian Population and Labor Force Report, of the 8,773 tribal members that were eligible for BIA-funded services, 4,381 constituted the total available workforce. Approximately 29%, or 1,287 members, were employed in 2005, indicating a 71% unemployment rate (as a percent of the labor force) for members living on or near the Reservation; 55% of the employed members were living below poverty guidelines. Compared to the 2001 report, 2005 statistics reflect a 6.2% increase in the number of tribal members employed living on or near the Reservation, but unemployment (as a percent of the labor force) has stayed steady at 71% and the percentage of employed people living below the poverty guidelines has increased to 55% (BIA 2005).

Although detailed employment information for the Reservation is not provided by the U.S. Bureau of Economics or the State of North Dakota, residents of the Reservation are employed in similar ventures as those outside the Reservation. Typical employment includes ranching, farming, tribal government, tribal enterprises, schools, federal agencies, and recently, employment related to conventional energy development. The MHA Nation's Four Bears Casino and Lodge, located 4 miles west of New Town, employs approximately 320 people, of which 90% are tribal members (Fort Berthold Housing Authority 2008).

The Fort Berthold Community College, which is tribally chartered to meet the higher education needs of the people of the MHA Nation, had 11 full-time members and 25 adjunct members in academic year 2006–2007. Approximately 73% of the full-time faculty members are of American Indian/Alaska Native descent, approximately 88% of which are enrolled members of the MHA Nation. Additionally, 65% of the part-time faculty members are of American Indian/Alaska Native descent and all (100%) are tribal members.

3.9.4 Income

Per capita income is often used as a measure of economic performance, but it should be used with changes in earnings for a realistic picture of economic health. Since total personal income includes income from 401(k) plans and other non-labor income sources like transfer payments, dividends, and rent, it is possible for per capita income to rise even if the average wage per job declines over time. The North American Industry Classification System is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. Per capita income, median household income and poverty rates for the Analysis Area and North Dakota are presented in Table 3.14.

Table 3.14. Income and Poverty in Analysis Area, 2008.

Unit of Analysis	Per Capita Income (2000)	Per Capita Income[1] (2008)	Median Household Income[3] (2009)	Percent of all People in Poverty[3] (2009)
Dunn County	$21,031	$29,558	$44,681	11.2%
McKenzie County	$22,269	$36,862	$49,465	12.8%
McLean County	$23,125	$42,466	$49,212	10.3%
Mountrail County	$23,045	$34,590	$49,884	12.4%
Fort Berthold Indian Reservation[4]	$8,855	$10,291[4]	$26,977[4]	N/A
North Dakota	$25,624	$39,874	$47,898	11.7%

[1] U.S. Bureau of Economic Analysis 2011a, 2011b.
[2] U.S. Department of Agriculture 2010.
[3] U.S. Census Bureau 2009a.
[4] Population shown reflects the total enrollment in the tribe in 2005. 2008 data unavailable. All information related to the Reservation reflects 2005 data, including state population (BIA 2005).

From 2000 to 2008, per capita include increased by 28.8% for Dunn County, 39.6% for McKenzie County, 45.5% for McLean County, and 33.4% for Mountrail County. These figures compare to a 35.7% increase for the State of North Dakota per capital personal income (U.S. Bureau of Economic Analysis 2009).

According to a 2008 report published by the Fort Berthold Housing Authority, the average per capita income for the Reservation was $8,855 in 1999, compared to $17,769 for the state and the U.S. average of $21,587 at that time (Fort Berthold Housing Authority 2008). The median household income on the Reservation was $26, 977, compared to $41,994 in the U.S.

With the exception of McLean County, counties that overlap the Reservation tend to have per capita incomes and median household incomes below North Dakota statewide averages. As presented in Table 3.13, unemployment rates in all counties, including the Reservation, were equal to or above the state average of 3.8%. Subsequently, Reservation residents and MHA

Nation members tend to have per capita incomes and median household incomes below the averages of the encompassing counties, as well as statewide and higher unemployment.

3.9.5 Housing

Workforce-related housing can be a key issue associated with development. Historical information on housing in the four counties in the Analysis Area was obtained from the U.S. Census Bureau, 2000 Census, with 2009 updates (U.S. Census Bureau 2011c). Because the status of the housing market and housing availability changes often, current housing situations can be difficult to characterize quantitatively. Therefore, this section discusses the historical housing market. Table 3.15 provides housing unit supply estimates in the Analysis Area, including the Reservation and four overlapping counties.

The Fort Berthold Housing Authority manages a majority of the housing units within the Reservation. Housing typically consists of mutual-help homes built through various government programs, low-rent housing units, and scattered-site homes. Housing for government employees is limited, with a few quarters in Mandaree and White Shield available to Indian Health Service employees in the Four Bears Community and to BIA employees. Private purchase and rental housing are available in New Town. New housing construction has recently increased within much of the Analysis Area, but availability remains low.

Table 3.15. Housing Development Data for the Reservation and Encompassing Counties.

Region	Total Housing Units						% Change 2000–2009
	Occupied	Owner Occupied	Renter Occupied	Vacant	Total	Total	
	2000	2000	2000	2000	2000	2009	
Dunn	1,378	1,102	276	587	1,965	1,985	+1.0
McKenzie	2,151	1,589	562	568	2,719	2,801	+2.9
McLean	3,815	3,135	680	1,449	5,264	5,461	+3.6
Mountrail	2,560	1,859	701	878	3,438	3,607	+4.7
Reservation	1,908	1,122	786	973	2,881	N/A	N/A
North Dakota	257,152	171,299	85,853	32,525	289,677	316,435	+8.5

Source: U.S. Census Bureau 2011c.

Availability and affordability of housing could impact oil and gas development and operations. The number of owner-occupied housing units (1,122) within the Reservation is approximately 58% lower than the average number of owner-occupied housing units found in the four overlapping counties (1,921).

In addition to the relatively low percent change of the total housing units compared to the state average, these four counties are ranked extremely low for both the state and national housing starts and have minimal new housing building permits, as presented in Table 3.16.

Table 3.16. Housing Development Data for the Encompassing Counties 2000–2008.

Housing Development	North Dakota County			
	Dunn	McKenzie	McLean	Mountrail
New private housing building permits 2003–2008	14	14	182	110
Housing starts / state rank	51 / 53	15 / 53	21 / 53	17 / 53
Housing starts / national rank	3,112 / 3,141	2,498 / 3,141	2,691 / 3,141	2,559 / 3,141

Source: U.S. Census Bureau 2009b, 2009c.

3.9.6 Potential Impacts to Area Socioeconomics

Impacts to socioeconomic resources of the Analysis Area would be minimal and therefore would not adversely impact the local area. Short-term impacts to socioeconomic resources would generally occur during the construction/drilling and completion phase of the proposed wells. Long-term effects would occur during the production phase, should the wells prove successful. Impacts would be significant if the affected communities and local government experienced an inability to cope with changes including substantial housing shortages, fiscal problems, or breakdown in social structures and quality of life.

As presented in Table 3.17, implementation of the proposed wells is anticipated to require between 14 and 28 workers per well in the short term. If the wells prove successful, Enerplus would install production facilities and begin long-term production. To ensure successful operations, production activities require between one and four full-time employees to staff operations. It is anticipated that a mixture of local and Enerplus employees would work in the project area. Therefore, any increase in workers would constitute a minor increase in population in the project area required for short-term operations and would not create a noticeable increase in demand for services or infrastructure on the Reservation or the communities near the project area.

Table 3.17. Duration of Employment during Proposed Project Implementation.

Activity	Duration of Activity (average days per well)	Daily Personnel (average number per well)
Construction (access road and well pad)	5–8 days	3–5
Drilling	30–35 days	8–15
Completion/Installation of facilities	Approx. 10 days	3–8
Production	Ongoing – life of well	1–4

Although some counties within the Analysis Area has experienced a recent decline in population between 2000 and 2009 (as shown in Table 3.12), the population on the Reservation itself has increased. This has not led to significant housing shortages. The historic housing vacancy rate (Table 3.15) indicates that housing has remained available despite the growth of the population on the Reservation. The levels of available housing are therefore anticipated to be able to absorb the projected slight increase in population related to this proposed project. As such, the proposed project would not have measurable impacts on housing availability or community infrastructure in the area. The proposed project also would not result in any identifiable impacts to social conditions and structures within the communities in the project area.

Implementation of the proposed project would likely result in direct and indirect economic benefits associated with industrial and commercial activities in the area, including the Reservation, State of North Dakota, and potentially local communities near the Reservation. Direct impacts would include increased spending by contractors and workers for materials, supplies, food, and lodging in Dunn County and the surrounding areas, which would be subject to sales and lodging taxes. Other state, local, and Reservation tax payments and fees would be incurred as a result of the implementation of the proposed project, with a small percentage of these revenues distributed back to the local economies. Wages due to employment would also impact per capita income for those that were previously unemployed or underemployed. Indirect benefits would include increased spending from increased oil and gas production, as well as a slight increase in generated taxes from the short-term operations. Mineral severance and royalty taxes, as well as other relevant county and Reservation taxes on production would also grow directly and indirectly as a result of increased industrial activity in the oil and gas industry.

3.10 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, signed in 1994 by President Clinton, requires agencies advance EJ by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from federal programs, policies, decisions, or operations. Meaningful involvement means federal officials actively promote opportunities for public participation and federal decisions can be materially affected by participating groups and individuals.

The EPA headed the interagency workgroup established by the 1994 Executive Order and is responsible for related legal action. Working criteria for designation of targeted populations are provided in *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (EPA 1998). This guidance uses a statistical approach to consider various geographic areas and scales of analysis to define a particular population's status under the Executive Order.

EJ is an evolving concept with potential for disagreement over the scope of analysis and the implications for federal responsiveness. Nevertheless, due to the population numbers, tribal members on the Great Plains qualify for EJ consideration as both a minority and low-income population. Table 3.18 summarizes relevant data regarding minority populations for the Analysis Area.

Table 3.18. Minority Population Breakdown by North Dakota County and Race, 2000–2009.

Race	Dunn		McKenzie		McLean		Mountrail		North Dakota	
	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009
Total Population	3,600	3,365	5,737	5,799	9,311	8,310	6,629	6,791	642,204	646,844
Non-Hispanic	3,573	3,330	5,679	5,696	9,230	8,199	6,542	6,589	634,418	632,126
Hispanic or Latino[1]	27	35	58	103	81	111	87	202	7,786	14,718
Races										
Caucasian	3,123	2,827	4,457	4,450	8,632	7,577	4,546	4,259	596,722	589,112
African American	1	4	4	12	2	15	7	31	4,157	7,813
American Indians and Alaska Natives	448	459	1,216	1,249	568	587	1,988	2,385	31,440	36,258
Asian / Pacific Islanders	8	3	4	8	12	19	17	17	3,912	5,646
Two or more races	25	30	39	80	97	112	71	99	5,973	8,015
All minorities	477	538	1,280	1,349	679	733	2,083	2,532	45,482	57,732
% minority population	13.2	15.9	22.3	23.2	7.3	8.8	31.4	37.2	7.1	8.9
Change in minority population (2000–2009)	+12.8%		+5.3%		+7.9%		+21.5%		+26.9%	

[1] Hispanic or Latino may be of any race.

Sources: U.S. Census Bureau 2011d.

In July 2009, the U.S. Census Bureau estimated that North Dakota's total minority population comprised approximately 57,732 persons, or 8.9% of the state's total population (i.e., 646,844 residents). This represents an increase of 26.9% over the 2000 minority population of the state. Within the Analysis Area, the number of Caucasian residents decreased, while minorities in nearly all categories increased, producing a strong increase in the percentage of minority population in each of the counties in the Analysis Area during the period from 2000 until 2009 (Table 3.18) (U.S. Census Bureau 2010). The four counties of the Analysis Area showed an increase of 5.3% to 21.5% in minority population, compared with the statewide increase of 26.9%.

In 2009, the counties in the Analysis Area had a higher percentage of American Indian and Alaska Natives, ranging from 7.1% in McLean County to nearly 35.1% in Mountrail County, compared with the state as a whole which had approximately 5.6% in this category (U.S. Census Bureau 2011d). The North Dakota Indian Affairs Commission (NDIAC) reports that American Indian population (race alone or in combination) in North Dakota has increased 12% from 35,228 in 2000 to 35,666 in 2008 (NDIAC 2011), with estimates for the future American Indian population (one race only) would be 47,000 in 2015 and 59,000 in 2025 in North Dakota (NDIAC 2011). The Reservation has a total population of 5,915 in the 2000 census, with 67.4 % American Indian, mostly with tribal affiliations with MHA Nation (NDIAC 2011).

Poverty rate data for the counties in the Analysis Area are summarized in Table 3.19. The data show that poverty rates have decreased in the Analysis Area during the period from 2000 to 2009 (U.S. Department of Agriculture 2009). McKenzie and Mountrail counties continue to have poverty rates that exceed the statewide poverty rate of 11.7%. All counties within the Analysis Area have lower median household incomes that the statewide household income of $47,898.

Table 3.19. Poverty Rates and Median Household Income for the Analysis Area.

Location	2000	2009	2009 Median Household Income
Dunn County	13.3%	11.2%	$44,681
McKenzie County	15.7%	12.8%	$49,465
McLean County	12.3%	10.3%	$49,212
Mountrail County	15.7%	12.4%	$49,884
North Dakota	10.4%	11.7%	$47,898

Source: U.S. Department of Agriculture 2009.

3.10.1 Potential Impacts to Environmental Justice

The Analysis Area, having larger and increasing minority populations, compared with statewide numbers, could result in disproportionately beneficial impacts from the proposed oilfield development. These would derive from direct and indirect economic opportunities for tribal members. Generally, existing oil and gas leasing has already benefited the MHA Nation government and infrastructure from tribal leasing, fees, and taxes. Current oil and gas leasing on the Reservation has also already generated revenue to MHA Nation members who hold surface and/or mineral interests. However, owners of allotted surface within the Analysis Area may not necessarily hold mineral rights. In such cases, surface owners do not receive oil and gas lease or royalty income, and their only related income would be compensation for productive acreage lost to road and well pad construction. Those with mineral interests also may benefit from royalties on commercial production if the wells prove successful. Profitable production rates at proposed locations might lead to exploration and development of additional tracts owned by currently non-benefitting allottees. In addition to increased revenue for land and mineral holders, exploration and development would increase employment on the Reservation with oversight from the Tribal Employment Rights Office, which would help alleviate some of the poverty prevalent on or near the Reservation. Tribal members without either surface or mineral rights would not receive any direct benefits, except through potential employment, should they be hired. Indirect benefits of employment and general tribal gains would be the only potential offsets to negative impacts. Poverty rates in the Analysis Area have already begun to decrease since oil and gas development began after 2000, as shown in Table 3.19. There is potential for adverse economic impacts to tribal members who do not reside within the Reservation and therefore do not share in direct or indirect benefits.

Potential adverse impacts could occur to tribes and tribal members, as well, such as the potential disturbance of any traditional cultural properties and cultural resources. These potential impacts are reduced through surveys of proposed well locations and access road routes, mitigation measures required by the BIA, and thorough reviews and determinations by the BIA that there would be no effect to historic properties. The possibility of disproportionate impacts to tribes or tribal members is further reduced by the requirement for immediate work stoppage following an unexpected discovery of cultural resources of any type. Mandatory consultation would take place during any such work stoppage, affording an opportunity for all affected parties to assert their interests and contribute to an appropriate resolution, regardless of their home location or tribal affiliation.

The proposed project has not been found to pose a threat for significant impact to any other critical element, including air quality, public health and safety, water quality, wetlands, wildlife, soils, or vegetation within the human environment. Through the avoidance of such impacts, no disproportionate impact is expected to low-income or minority populations. The Proposed Action offers many positive consequences for tribal members, while recognizing EJ concerns. Procedures summarized in this document and in the APD are binding and sufficient. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required.

3.11 MITIGATION AND MONITORING

Many protective measures and procedures are described in this document and in the APD. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. Monitoring of cultural resource impacts by qualified personnel is recommended during all ground-disturbing activities. Each phase of construction and development through production would be monitored by the BLM, the BIA, and representatives of the MHA Nation to ensure the protection of cultural, archaeological, and natural resources. In conjunction with 43 CFR 46.30, 46.145, 46.310, and 46.415, a report would be developed by the BLM and the BIA that documents the results of monitoring in order to adapt the projects to eliminate any adverse impact on the environment.

Mitigation opportunities can be found in general and operator-committed BMPs and mitigation measures. BMPs are loosely defined as techniques used to lessen the visual and physical impacts of development. The BLM has created a catalog of BMPs that, when properly implemented, can assist industry in a project's design, scheduling, and construction techniques. Enerplus would implement, to the extent possible, the use of BMPs in an effort to mitigate environmental concerns in the planning phase allowing for smoother analysis, and possibly faster project approval. Many of these are required by the BLM when drilling federal or tribal leaseholds and can be found in the surface use plan in the APD.

3.11.1 General BMPs

Although largely project-specific, there are a number of BMPs that can, and should, be considered on development projects in general. The following are examples of general BMPs:

- Planning roads and facility sites to minimize visual impacts.
- Using existing roads to the extent possible, upgrading as needed.
- Reducing the size of facility sites and types of roads to minimize surface disturbance.
- Minimizing topsoil removal.
- Stockpiling stripped topsoil and protecting it from erosion until reclamation activities commence. At that time, the soil would be redistributed and reseeded on the disturbed areas. The reclaimed areas would be protected and maintained until the sites are fully stabilized.
- Avoiding removal of, and damage to, trees, shrubs, and groundcover where possible. Trees near construction areas would be marked clearly to ensure that they are not removed.
- Mowing, instead of clearing, a facility or well site to accommodate vehicles or equipment.
- Maintaining buffer strips or using other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Planning for erosion control.
- Storing chemicals in a proper manner (including secondary containment).
- Keeping sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a state-approved sanitary landfill.
- Conducting snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.
- Avoiding or minimizing topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Maintaining buffers around work areas where there is a risk of fire as a result of construction activities.
- Keeping fire extinguishers in all vehicles.
- Planning transportation to reduce vehicle density.
- Posting speed limits on roads.
- Avoiding traveling during wet conditions that could result in excessive rutting.
- Painting facilities a color (Shale) that would blend with the environment.
- Practicing dust abatement on roads.
- Recontouring disturbed areas to approximate the original contours of the landscape.

- Developing a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.

Enerplus recognizes that there are several BMPs that can be used to mitigate environmental concerns specific to projects associated with below-ground linear alignments, such as those included in the proposed utility corridor. These include:

- Following the contour (form and line) of the landscape.
- Avoiding locating ROWs on steep slopes.
- Sharing common ROWs.
- Co-locating multiple lines in the same trench.
- Using natural (topography, vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations.

Enerplus would implement these and/or other BMPs to the extent that they are technically feasible and would add strategic and measurable protection to the project area.

3.11.2 Mitigation and Safety Measures Committed to by Enerplus

3.11.2.1 Dust Control

During construction, a watering truck may be kept on site and the access roads would be watered as necessary, especially during periods of high winds and/or low precipitation.

3.11.2.2 Wildlife

As mentioned in Section 3.4.3, Potential Impacts to Wetlands, Habitat, and Wildlife, Enerplus has committed to using a semi-closed-loop drilling system, ensuring that the cuttings pit would 1) be smaller than a typical pit and 2) contain only dry cuttings, which would be solidified with fly ash and buried in place following completion of drilling operations. Additional protections committed to by Enerplus include the following.

- Consolidating well locations by designing multi-well pads to minimize disturbance and habitat fragmentation.
- Stopping work and notifying the USFWS and the BIA if a whooping crane is sighted within 1 mile of the proposed project area. In coordination with the USFWS and the BIA, work may resume after the bird(s) leaves the area.
- Lining all pits with a liner with a minimum thickness of 12 millimeters.
- Fencing all pits.
- Installing all gathering pipelines and utility lines underground from the well pads to the points of connection and tie-in to established trunklines and utilities.

3.11.2.3 Erosion Controls and Spill Prevention

- As described in Section 2.2.7, Commercial Production, an impervious dike sized to hold 110% of the capacity of the largest tank plus one day's production would be constructed around the tank battery. Load out lines would be located inside the diked area and a heavy screen-covered drip barrel would be installed under the outlet. A metal access staircase would protect the dike and support flexible hoses used by tanker trucks.

- Topsoil would be placed to divert flow away from well pad locations to limit the possibility of surface contamination.
- For the SW¼ NW¼ of Section 6, the following site-specific measures would be adhered to:
  - Use semi-closed loop system during drilling.
  - Install a diversion ditch on the northeast and southeast sides of the well pad.
  - Use matting on the northeast and southeast exposed slopes of the well pad.
  - Grind woody vegetation into topsoil and use for reclamation.
- For the SE¼ SW¼ of Section 18, the following site-specific measures would be adhered to:
  - Use semi-closed loop system during drilling.
  - Round the northwest corner of well pad.
  - Construct n 18-inch berm on the north and west side of the well pad.
- For the SW¼ SE¼ of Section 18, the following site-specific measures would be adhered to:
  - Use semi-closed loop system during drilling.
- As described in Section 2.2.9.1, Interim Reclamation, all disturbed areas that are not needed for operations after construction and drilling are complete would be revegetated.

3.11.2.4 Fire Control

Enerplus would implement fire prevention and control measures including, but not limited to:

- Requiring construction crews to carry fire extinguishers in their vehicles and/or equipment.
- Training construction crews in the proper use of fire extinguishers.
- Contracting with the local fire district to provide fire protection.

3.11.2.5 Traffic

Construction personnel would stay within the ROW or would follow designated access roads.

3.11.2.6 Cultural Resources

The following protocol would be adhered to by all construction personnel during construction and maintenance of the well pad or access road.

- All project workers are prohibited from collecting artifacts or disturbing cultural resources in any area under any circumstances.

If cultural resources are discovered during construction or operation, work shall immediately be stopped, the affected site be secured, and the BIA and the THPO notified. In the event of a discovery, work shall not resume until written authorization to proceed has been received from the BIA.

3.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Removal and consumption of oil and/or gas from the Bakken Formation would be an irreversible and irretrievable commitment of resources. Other potential resource commitments include land area devoted to the disposal of cutting, soil lost to erosion (i.e., wind and water), unintentionally destroyed or damaged cultural resources, wildlife killed as a result of collision with vehicles (i.e., construction machinery and work trucks), and energy expended during construction and operation.

3.13 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Short-term development activities would not detract significantly from long-term productivity, and use, of the project areas. The construction of access roads and well pad areas would eliminate any forage or habitat use by wildlife and/or livestock. Any allottees to which compensation for land disturbance is owed would be properly compensated for the loss of land use. The initial disturbance area would decrease considerably once the wells are drilled and non-necessary areas have been reclaimed. Rapid reclamation of the project area would facilitate revived wildlife and livestock usage, stabilize the soil, and reduce the potential for erosion and sedimentation.

3.14 CUMULATIVE IMPACTS

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. Past and current disturbances in the vicinity of the project area include farming, grazing, roads, and other oil and gas wells. Over the past several years, exploration has accelerated over the Bakken Formation. Most of this exploration has taken place outside the Reservation boundary on fee land, but for purposes of cumulative impact analyses, land ownership and the Reservation boundary are immaterial. The cumulative impact area (CIA) may vary depending on the particular resource under consideration, but effects may be felt as far as 20 miles from the proposed project.

Within the Reservation and near the proposed project areas, development projects remain few and widely dispersed, but off-reservation well density is much higher, as shown in Table 3.20 and Figure 3.14. Five active wells occur within 1 mile of the project area, as shown in Table 3.20, with four being confidential. A cumulative total of 59 active and confidential wells occurs within a 5-mile CIA, a cumulative total of 160 active and confidential wells occurs within a 10-mile CIA, and a cumulative total of 712 active and confidential wells occurs within a 20-mile CIA, with the majority of wells in the 20-mile CIA being off the Reservation.

Reasonably foreseeable future cumulative impacts must also be considered. Should development of the proposed new wells prove productive, it is likely that Enerplus or other operators would pursue additional development in the area. None of the project areas proposed in this EA would share access roads with any other proposed wells, but this may change in the future. If successful commercial production is achieved, new exploratory wells may be proposed, though such developments are merely speculation until APDs are submitted to the BLM and BIA for approval. Enerplus has suggested, but not yet formally proposed, that potentially 74 more wells may eventually be drilled in the same general area as the proposed project, using many of the same main access roads and minimizing the disturbance as much as possible.

Table 3.20. Active, Confidential, Active, and Permitted Wells within the Cumulative Impact Area.

Well Type	SW¼ NW¼ of Section 6		SE¼ SW¼ of Section 18		SW¼ SE¼ of Section 18	
1-mile CIA						
Reservation (on/off)	On	Off	On	Off	On	Off
Active wells	0	0	1	0	1	0
Confidential wells	2	0	1	0	1	0
Permitted wells	0	0	0	0	0	0
Cumulative total active and confidential wells within 1-mile CIA	5					
5-mile CIA						
Reservation (on/off)	On	Off	On	Off	On	Off
Active wells	16	0	21	0	21	0
Confidential wells	24	0	12	0	12	0
Permitted wells	0	0	0	0	0	0
Cumulative total active and confidential wells within 5-mile CIA	59					
10-mile CIA						
Reservation (on/off)	On	Off	On	Off	On	Off
Active wells	36	0	28	6	28	6
Confidential wells	51	0	42	6	53	6
Permitted wells	0	0	0	0	0	0
Cumulative total active and confidential wells within 10-mile CIA	160					
20-mile CIA						
Reservation (on/off)	On	Off	On	Off	On	Off
Active wells	80	270	59	269	59	269
Confidential wells	80	76	64	80	65	79

Permitted wells	14	2	9	3	9	3
Cumulative total active and confidential wells within 20-mile CIA	712					

Figure 3.14. Active, confidential, and permitted wells within a 1-, 5-, 10-, and 20-mile radius of the proposed project locations.

Cumulative Effects on Land Use

Although it is the dominant activity currently taking place in the area, oil and gas development is not expected to have more than a minor cumulative effect on land use patterns. Current farming and ranching activities are expected to continue with little change because virtually all available acreage is already organized into range units to use surface resources for economic benefit. Undivided interests in the land surface, range permits, and agricultural leases are often held by different tribal members than those holding mineral rights.

Cumulative Effects on Human Health and Safety

The main effect of the proposed wells and other foreseeable future well-field development on human health and safety is related to the possibility of accidental release of petroleum, drilling or fracking fluids, or H_2S into the environment. A cumulative total of five active and confidential oil and gas wells currently occurs within 1 mile of the proposed multi-well pads, and the nearest home is within 0.23 mile of the nearest well. In addition, the proposed wells would add to the cumulative total of 712 existing wells located within 20 miles of the proposed well pads. Maintaining adequate setbacks from residences, along with adequate spill prevention measures and other emergency plans, would generally prevent hazardous materials from coming into direct contact with drinking water, surface water, and groundwater, or residential populations. However, the risk of accidental release of toxic or hazardous substances is never completely eliminated. Therefore, the proposed project would incrementally contribute to a low level of cumulative impact on human health and safety in the CIA.

Cumulative Effects on Air Quality

It is anticipated that the pace and level of oil and gas development within this region of the state would continue at the current rate over the next few years and contribute to cumulative air quality impacts. The Proposed Action would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions associated with the Proposed Action would occur predominantly during construction and drilling operations and would therefore be localized, largely temporary, and limited in comparison with regional emissions.

Cumulative Effects on Vegetation and Wildlife

Vegetation resources across the project area could be affected by various activities, including additional energy development and surface disturbance of quality native prairie areas that have been largely undisturbed by development activities, grazing, and agriculture. Indirect impacts to native vegetation may be possible due to soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Continued oil and gas development within the Reservation could result in the loss, and further fragmentation, of native mixed-grass prairie habitat.

Past, present, and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for listed species as well as unique wildlife, such as migratory grassland birds. Potential cumulative impacts of the proposal plus other foreseeable future oil and gas development on the Reservation could include habitat fragmentation from construction of other well pads and roads, with potential effects on migratory grassland birds. The project would generate new long-term disturbance of approximately 26.04 acres of grassland habitat during the construction of roads and well pads, out of a total 804,244 acres within a 20-mile radius of the project. Similar levels of disturbance have occurred at 712 active wells within the 20-mile radius, as indicated above. Existing oil and gas development is estimated to have disturbed approximately 7,120 acres (10 acres per well), or approximately 0.89% of the available surface area within the 20-mile radius. The project would result in an estimated relative incremental increase of 0.007% long-term disturbance when added to the existing surface disturbance.

Cumulative Effects on Surface Water and Groundwater Resources

No surface discharge of water would occur under the Proposed Action, nor would any surface water or groundwater be used during project development. The Proposed Action, when combined with other actions (cattle grazing, other oil and gas development, and agriculture) that are likely to occur in and near the project area in the future, would increase sedimentation and runoff rates. Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in the Upper Moccasin Creek sub-watershed, but increases in degradation would be reduced by Enerplus's commitment to minimizing disturbance, using erosion control measures as necessary, and implementing BMPs designed to reduce impacts.

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The Proposed Action would create additional lengths of unpaved roadway in the project area. Thus, the Proposed Action would incrementally add to existing and future impacts to soil resources in the general area. However, Enerplus is committed to using BMPs to mitigate these effects. BMPs would include implementing erosion and sedimentation control measures, such as installing culverts with energy dissipating devices at culvert outlets to avoid sedimentation in ditches, constructing water bars alongside slopes, planting cover crops to stabilize soil following construction and before permanent seeding takes place. Additional information regarding BMPs can be found in Section 3.11, Mitigation and Monitoring.

No adverse impacts potable water aquifers and associated groundwater wells are anticipated from the development of the proposed new wells, based on current data and research on the geological effects of HF methods and processes. As a result, it can be reasonably assumed that there would be no cumulative impacts as a result of current and future oil and gas development on the Reservation which target deep geological formations such as the Bakken and Three Forks.

Cumulative Effects on Cultural Resources

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided, negating the cumulative impacts to the archaeological record.

Cumulative Effects on Socioeconomics

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area. The Proposed Action includes 12 wells, which would be an additional source of revenue for some residents of the Reservation. Increases in employment would be temporary during the construction, drilling, and completion phases of the proposed project. Therefore, little change in employment would be expected over the long term.

Current impacts from oil and gas-related activities are still fairly dispersed, and the required BMPs would limit potential impacts. No significant negative impacts are expected to affect any critical element of the human environment; impacts would generally be low and mostly temporary. Enerplus has committed to implementing interim reclamation of the roads and well pads immediately following construction and completion. Implementation of both interim and permanent reclamation measures would decrease the magnitude of cumulative impacts.

4.0 CONSULTATION AND COORDINATION

The BIA must continue to make efforts to solicit the opinions and concerns of all stakeholders (Table 4.1). For the purpose of this EA, a stakeholder is considered any agency, municipality, or individual person to which the proposed action may affect either directly or indirectly in the form of public health, environmental, or socioeconomic issues. A scoping letter declaring the location of the proposed project areas and explaining the actions proposed at each site was sent in advance of this EA to allow stakeholders ample time to submit comments or requests for additional information. Additionally, a copy of this EA would be submitted to all cooperating federal agencies and also to those agencies with interests in or near the proposed actions that could be affected by those actions.

Table 4.1. Scoping Comments.

Name	Organization	Comment	Response to Comment
Bagley, Lonny	Bureau of Land Management	No Comment	
Benson, Barry	Three Affiliated Tribes	No Comment	
Bercier, Marilyn	Bureau of Indian Affairs	No Comment	
Berg, George	NoDak Electric Cooperative, Inc.	No Comment	
Black, Mike	Bureau of Indian Affairs	No Comment	
Boyd, Bill	Midcontinent Cable Company	No Comment	
Brady, Perry	THPO, Three Affiliated Tribes	No Comment	
Brien, David	Chairman, Turtle Mountain Band of Chippewa	No Comment	
Brugh, V. Judy	Three Affiliated Tribes	No Comment	
Cayko, Richard	McKenzie County	No Comment	
Christenson, Ray	Southwest Water Authority	No Comment	
Cimarosti, Dan	U.S. Army Corps of Engineers	Submit a Section 10 permit application if needed.	Section 10 permit not needed.
U.S. Army Corps of Engineers, Omaha District	Garrison Project Office	No Comment	
Danks, Marvin	Fort Berthold Rural Water Director	No Comment	
Dhieux, Joyce	U.S. Environmental Protection Agency	No Comment	
Director, Insurance & Hazard	Federal Emergency Management Agency	David Kyner: Major concern is whether or not project is located within a mapped Special Flood Hazard Area.	Project area is not in a flood hazard area. Please see Section 3.3, Water Resources.
Dixon, Doug	Montana Dakota Utilities	No Comment	
Erickson, Carroll	Ward County Board of Commissioners	No Comment	
Flores, J.R.	U.S. Department of Agriculture	No Comment	
Fox, Fred	Three Affiliated Tribes	No Comment	
Glatt, David	North Dakota Department of Health	Impacts minor and can be controlled by using proper construction methods.	See Sections 2.2.8, Construction Details at Individual Sites, and 3.11, Mitigation and Monitoring, for site-specific details and BMPs.
Gorton, Candace	U.S. Army Corps of Engineers	No Comment	
Guzman, Frank	U.S. Forest Service	No Comment	

Name	Organization	Comment	Response to Comment
Hall, Todd	Three Affiliated Tribes	No Comment	
Hanson, Jesse	North Dakota Parks and Recreation	No historic plant or animal species are known to occur within one mile. During reclamation, we recommend that the area be revegetated with native species.	See Sections 2.2.9, Reclamation, 3.4, Wetlands, Habitat, and Wildlife, 3.6, Vegetation and Invasive Species, and 3.11, Mitigation and Monitoring for more information.
Hauck, Reinhard	Dunn County	No Comment	
His Horse Is Thunder, Ron	Chairman, Standing Rock Sioux Tribe	No Comment	
Hoffman, Warren	Killdeer, Weydahl Field	No Comment	
Hovda, Roger	Reservation Telephone Cooperative	No Comment	
Hudson-Schenfisch, Julie	McLean County Board of Commissioners	No Comment	
Hynek, David	Chair, Mountrail Board of County Commissioners	No Comment	
Jarski, Tim	Reservation Telephone Cooperative	No Comment	
Johnson, Harley	New Town Municipal Airport	No Comment	
Kadrmas, Ray	Dunn County	No Comment	
Kuehn, John	Parshall-Hankins Field Airport	No Comment	
Kulas, Cheryl	Indian Affairs Commission	No Comment	
Land Department	Northern Border Pipeline Company	No Comment	
Laux, Eric	U.S. Army Corps of Engineers	Brad Thompson: Coordinate with the EPA, USFWS, North Dakota Game and Fish Department, SHPO. Consult the floodplain management office.	Necessary consultations have, or will be, made.
Lindemann, Larry	Airport Manager, Barnes County Municipal Airport	No Comment	
Manager	Xcel Energy	No Comment	

Name	Organization	Comment	Response to Comment
McKenna, Mike	North Dakota Game and Fish Department	Avoid construction to the extent possible within native prairie, wooded draws, riparian corridors, and wetland areas. Conduct botanical surveys and aerial surveys for raptor nests before construction	See Affected Environment, Section 3.4, Wetlands, Habitat, and Wildlife. Also see Section 3.11, Mitigation and Monitoring, for additional site-specific monitoring.
Mercer County	Mercer County Board of Commissioners	No Comment	
Missile Engineer, Chief	Minot Air Force Base	No Comment	
NAGPRA Office	Three Affiliated Tribes	No Comment	
Nash, Mike	Bureau of Land Management	No Comment	
Natural Resources Department	Three Affiliated Tribes	No Comment	
Nelson, Richard	U.S. Bureau of Reclamation	Kelly McPhillips: Project components would affect Bureau of Reclamation facilities (rural water pipelines). Please review enclosed map for potential adverse effects and proper pipeline crossing, should that be necessary. Coordinate with the Reclamation Rural Water Director.	See Section 2.2.2, Access Roads and Utility Corridors. Enerplus would consult with the Rural Water Director if the project components should come into contact with any Bureau of Reclamation rural water lines.
Dressler, Patricia	Federal Aviation Administration	No Comment	
Olson, Frances	McKenzie County	No Comment	
Paaverud, Merl	State Historical Society	Send copy of reports and forms to keep archives current. Consider putting traditional cultural property-related info in separate reports not sent to SHPO.	Reports will be sent to the required agencies. See Section 3.7, Cultural Resources.
Packineau, Mervin	Three Affiliated Tribes	No Comment	
Paulson, Gerald	Western Area Power Administration	No Comment	
Pearson, Myra	Spirit Lake Sioux Tribe	No Comment	
Peterson, Walter	North Dakota Department of Transportation	No Comment	
Poitra, Fred	Three Affiliated Tribes	No Comment	

Name	Organization	Comment	Response to Comment
Prchal, Doug	North Dakota Parks and Recreation Department	No Comment	
Representative, Mandaree Segment	Three Affiliated Tribes	No Comment	
Rudolph, Reginald	McLean Electric Cooperative, Inc.	No Comment	
Schelkoph, David	West Plains Electric Cooperative, Inc.	No Comment	
Selvage, Michael	Chairman, Sisseton-Wahpeton Sioux Tribe	No Comment	
Sorenson, Charles	U.S. Army Corps of Engineers	Due to the close proximity to the Missouri River/Lake Sakakawea, please consider constructing a catch trench on the down-sloping side of the pad to contain hazardous wastes. Please consider a closed-loop drilling system. Additional weed-free fill material should be obtained from a supplier. Equipment should be cleaned to prevent transportation of weeds onto tribal or U.S. Army Corps of Engineers lands. Do not allow surface occupancy within ½ mile of any known threatened and endangered species habitat. Construction time frame recommendations made. Cumulative impacts should be adequately addressed.	See Section 2.2.8, Construction Details, for information regarding berms. Enerplus uses the semi-closed loop system with a pit for cuttings only as a matter of practice. No additional fill material is required. Enerplus will treat any noxious weeds within the project area. No surface occupancy would be allowed within 0.5 mile of any known threatened and endangered habitat. See Section 3.14, Cumulative Impacts, for cumulative impacts analysis.
Svoboda, Larry	U.S. Environmental Protection Agency	No Comment	
Sweeney, Paul	Natural Resources Conservation Service	Jerome Schaar: The Farmland Protection Policy Act does not apply, no further action is needed. Avoid impacts to wetlands.	Thank you for your comment. See Section 3.4, Wetlands, Habitat, and Wildlife.
Thorson, Gary	McKenzie Electric Cooperative	No Comment	
Towner, Jeffrey	U.S. Fish and Wildlife Service	Comments given during USFWS scoping	Please see Sections 3.4.2, 3.11.2.2, and 3.14.
Chevance, Nick	National Park Service, Midwest Region	No Comment	

Name	Organization	Comment	Response to Comment
Vodehnal, Dale	U.S. Environmental Protection Agency	No Comment	
Wells, Marcus	Chairman, Three Affiliated Tribes	No Comment	
Whitcalf, Frank	Three Affiliated Tribes	No Comment	
Williams, Damon	Three Affiliated Tribes	No Comment	
Wolf, Malcolm	Three Affiliated Tribes	No Comment	

5.0 LIST OF PREPARERS

An interdisciplinary team contributed to this document according to guidance provided in Part 1502.6 of CEQ regulations. This document was drafted by SWCA Environmental Consultants under the direction of the BIA. Information was compiled from various sources within SWCA Environmental Consultants.

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- Nelson Klitzka and Nicholas Smith, Archaeologist
  Conducted cultural resource surveys.
- Todd Kohler, Archaeologist
  Conducted cultural resource surveys and prepared cultural resource reports for well pads and access roads.
- Wade Epperson, GIS Specialist
  Created maps and spatially derived data.

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7.0 ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AAQS	ambient air quality standards
APD	Application for Permit to Drill
APE	area of potential effect
AQI	air quality index
BGEPA	Bald and Golden Eagle Protection Act
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CIA	cumulative impact area
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
EA	environmental assessment
EIS	environmental impact statement
EJ	Environmental Justice
Enerplus	Enerplus Resources (USA) Corporation
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HF	hydraulic fracturing
HUC	hydrologic unit code
IPCC	Intergovernmental Panel on Climate Change
MBTA	Migratory Bird Treaty Act
MHA Nation	Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara Nation
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NDCC	North Dakota Century Code
NDDA	North Dakota Department of Agriculture
NDDH	North Dakota Department of Health
NDIAC	North Dakota Indian Affairs Commission
NDIC	North Dakota Industrial Commission
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NO_x	nitrogen oxide

NOAA	National Oceanic and Atmospheric Agency
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTL	Notice to Lessees
NWI	National Wetlands Inventory
PEM	palustrine emergent
PM	particulate matter
ppm	parts per million
PSD	Prevention of Significant Deterioration
Reservation	Fort Berthold Indian Reservation
ROW	right-of-way
SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
THPO	Tribal Historic Preservation Officer
TMD	total measured depth
TRNP	Theodore Roosevelt National Park
TRNP-NU	Theodore Roosevelt National Park North Unit
TVD	total vertical depth
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

APPENDIX A

Threatened and Endangered Species in Dunn County

SPECIES ACCOUNTS AND EFFECTS DETERMINATIONS

ENDANGERED SPECIES ACT

Black-footed Ferret (*Mustela nigripes*)
Affects Determination: No Effect

Black-footed ferrets are nocturnal, solitary carnivores of the weasel family that have been largely extirpated from the wild primarily due to range-wide decimation of the prairie dog (*Cynomys* sp.) ecosystem (Kotliar et al. 1999). They have been listed by the U.S. Fish and Wildlife Service (USFWS) as endangered since 1967, and have been the object of extensive re-introduction programs (USFWS 2010a). Ferrets inhabit extensive prairie dog complexes of the Great Plains, typically composed of several smaller colonies in proximity to one another that provide a sustainable prey base. The *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (USFWS 1989) states that ferrets require black-tailed prairie dog (*Cynomys ludovicianus*) towns or complexes greater than 80 acres in size, and towns of this dimension may be important for ferret recovery efforts (USFWS 1988a). Prairie dog towns of this size are not found in the project area. In addition, this species has not been observed in the wild for more than 20 years. The proposed project would have **no effect** on this species.

Gray Wolf (*Canis lupus*)
Affects Determination: No Effect

The gray wolf, listed as endangered in the United States in 1978, was believed extirpated from North Dakota in the 1920s and 1930s with only sporadic reports from the 1930s to present (Licht and Huffman 1996). The presence of wolves in most of North Dakota consists of occasional dispersing animals from Minnesota and Manitoba (Licht and Fritts 1994; Licht and Huffman 1996). Most documented gray wolf sightings that have occurred within North Dakota are believed to be young males seeking to establish territory (Hagen et al. 2005). The Turtle Mountains region in north-central North Dakota provides marginal habitat that may be able to support a very small population of wolves. The closest known pack of wolves is the Minnesota population located approximately 28 kilometers (km) from the northeast corner of North Dakota.

The gray wolf uses a variety of habitats that support a large prey base, including montane and low-elevation forests, grasslands, and desert scrub (USFWS 2010b). Due to a lack of forested habitat and distance from Minnesota and Manitoba populations, as well as the troubled relationship between humans and wolves and their vulnerability to being shot in open habitats (Licht and Huffman 1996), the re-establishment of gray wolf populations in North Dakota is unlikely. Additionally, habitat fragmentation, in particular road construction as a result of oil and gas development, may further act as a barrier against wolf recolonization in western North Dakota. Therefore, the proposed project would have **no effect** on the gray wolf.

Whooping Crane (*Grus americana*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The whooping crane was listed as endangered in 1970 in the United States by the USFWS, and in 1978 in Canada. Historically, population declines were caused by shooting and destruction of nesting habitat in the prairies from agricultural development. Current threats to the species includes habitat destruction, especially suitable wetland habitats that support breeding and nesting, as well as feeding and roosting during their fall and spring migration (Canadian Wildlife Service and USFWS 2007).

The July 2010 total wild population was estimated at 383 (USFWS 2010c). There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, where approximately 83% of the wild nesting sites occur (Canadian Wildlife Service and USFWS 2007; USFWS 2010c). Dunn County, including the project area, is within the primary migratory flyway of whooping cranes.

Whooping cranes probe the soil subsurface with their bills for foods on the soil or vegetation substrate (Canadian Wildlife Service and USFWS 2007). Whooping cranes are omnivores and foods typically include agricultural grains, as well as insects, frogs, rodents, small birds, minnows, berries, and plant tubers. The largest amount of time during migration is spent feeding in harvested grain fields (Canadian Wildlife Service and USFWS 2007). Studies indicate that whooping cranes use a variety of habitats during migration, in addition to cultivated croplands, and generally roost in small palustrine (marshy) wetlands within 1 km of suitable feeding areas (Howe 1987, 1989). Whooping cranes have been recorded in riverine habitats during their migration, with eight sightings along the Missouri River in North Dakota (Canadian Wildlife Service and USFWS 2007:18). In these cases, they roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

Suitable whooping crane foraging habitat (i.e., cultivated cropland) was observed near the project area. However, project precautionary measures would be implemented if a whooping crane is sighted in or near the project area. Enerplus would cease all drilling and construction activities and notify the USFWS and Bureau of Indian Affairs (BIA) of the sighting, should a crane be spotted within 1 mile of the project area. As a result, the proposed project **may affect, but is not likely to adversely affect** the endangered whooping crane.

Piping Plover (*Charadrius melodus*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The piping plover is a small shorebird which breeds only in three geographic regions of North America: the Atlantic Coast, the Northern Great Plains, and the Great Lakes. Piping plover populations were federally listed as threatened and endangered in 1985, with the Northern Great Plains and Atlantic Coast populations listed as threatened, and the Great Lakes population listed as endangered (USFWS 1985a).

Plovers in the Great Plains make their nests on open, sparsely vegetated sand or gravel beaches adjacent to alkali wetlands, and on beaches, sand bars, and dredged material islands of major river systems (USFWS 2002, 2010d). The shorelines of lakes of the Missouri River constitute significant nesting areas for the bird. Piping plovers nest on the ground, making shallow scrapes in the sand, which they line with small pebbles or rocks (USFWS 1988b). Anthropogenic alterations of the landscape along rivers and lakes where piping plover nest have increased the number and type of predators, subsequently decreasing nest success and chick survival (USFWS 2002, 2010d). The birds fly south by mid to late August to areas along the Texas coast and Mexico (USFWS 2002). The Northern Great Plains population has continued to decline despite federal listing, with population estimates of 1,500 breeding pairs in 1985 reduced to fewer than 1,100 in 1990. Low survival of adult birds has been identified as a factor (Root et al. 1992). Current conservation strategies include identification and preservation of known nesting sites, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 1988b, 2010d).

Suitable shoreline habitat for breeding and nesting plovers does not occur in the project area, and Lake Sakakawea is a minimum of 16.6 river miles from the proposed well pads and access roads. It is unlikely that migrating plovers would visit the project during their migration. Therefore, the proposed project **may affect, but is not likely to adversely affect** piping plovers.

Designated Critical Habitat of Piping Plover
Affect Determination: No Effect

The USFWS has Designated Critical Habitat for the Great Lakes and Northern Great Plains populations of piping plover (USFWS 2002). Designated Critical Habitat for the piping plover includes 183,422 acres and 1,207.5 river miles of habitat, including areas near the proposed project, along the shoreline of Lake Sakakawea in McKenzie County, North Dakota (UFWS 2002).

Since the project would not modify, alter, disturb, or affect the shoreline of Lake Sakakawea or any of its tributary streams in any way, **no effect** to Designated Critical Habitat of the piping plover would occur.

Interior Least Tern (*Sterna antillarum*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The interior population of the least tern is listed as endangered by the USFWS (1985b). This bird is the smallest member of the gull and tern family, measuring approximately 9 inches in length. Terns remain near flowing water, where they feed by hovering over and diving into standing or flowing water to catch small fish (USFWS 2010e).

The interior population of least terns breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems, where they nest in small colonies. From late April to August, terns nest in a shallow hole scraped in an open sandy area, gravel patch, or exposed flat and bare sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines. The adults continue to care for chicks after they hatch. Least terns in North Dakota are often found sharing sandbars with the piping plover, a threatened species (USFWS 2010e).

Census data indicate over 8,000 least terns in the interior population. In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe, and on the Missouri and Yellowstone rivers upstream of Lake Sakakawea (USFWS 1990a, 2010e). Approximately 100 pairs breed in North Dakota (USFWS 2010e). Details of their migration are not known, but their winter range is reported to include the Gulf of Mexico and Caribbean Islands (USFWS 1990a, 2010e).

Loss of suitable breeding and nesting habitat for terns has resulted from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. River and reservoir changes have led to reduced sandbar formation and other shoreline habitats for breeding, resulting in population declines. In addition, other human shoreline disturbances affect the species (USFWS 1990a). Critical Habitat has not been designated for the species (USFWS 2010e).

Current conservation strategies include identification and avoidance of known nesting areas, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 2010e).

Suitable shoreline habitat for breeding and nesting plovers does not occur in the project area, and Lake Sakakawea is a minimum of 16.6 river miles from the proposed well pads and access roads. It is unlikely that terns would visit the upland habitats present in the project area. Therefore, the proposed project **may affect, but is not likely to adversely affect** endangered least terns.

Sprague's Pipit (*Anthus spragueii*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Sprague's pipit is a small passerine, 10 to 15 centimeters in length, endemic to the Northern Great Plains (USFWS 2010f). The Sprague's pipit requires large treks of native prairie habitats, unplowed, throughout their life cycle. Because native grasslands are disturbance dependent, Sprague's pipit prefers grassland habitat that are regularly disturbed. The frequency of disturbance required for habitat maintenance depends on how quickly grasses grow to an intermediate height (4 to 12 inches) following a disturbance event.

In North Dakota, Sprague's pipit has been found in areas of moderate grazing. Sprague's pipits are sensitive to patch size and avoid edges between grasslands and other habitat features (USFWS 2010f). They may avoid non-grassland features including roads, trails, oil wells, croplands, woody vegetation, and wetlands. The Sprague's pipit is reported to stay up to 350 meters (m) away from anthropogenic features such as roads, oil wells, and wind turbines (USFWS 2010f). The USFWS has estimated that each new oil well and associated road in North Dakota results in potential impacts approximately 51 acres (21 ha) of pipit habitat due to avoidance and habitat fragmentation (USFWS 2010f). Due to increasing habitat fragmentation, especially by energy development, throughout the Sprague's pipit range and the loss of native prairie habitat, the Sprague's pipit was listed as a Candidate Species under the ESA in 2010 (USFWS 2010f).

In North Dakota, Sprague's pipit breeds throughout the state except for the easternmost counties. During the breeding season they prefer large patches of well drained, open native grassland with a minimum size of 358.3 acres (range = 170 to 776 acres). They have not been observed in areas smaller than 71.6 acres on their breeding grounds (USFWS 2010f).

Sprague's pipits were not observed within the project area during surveys in November 2010. Native prairie habitat with grasses of intermediate height does occur within the project area. However, the habitat within and surrounding the project area has been previously disturbed by agriculture, roads, and oil and gas development. The proposed project is unlikely to directly affect habitat due to lack of adequate patch sizes required by the Sprague's pipit for breeding grounds in the immediate project area, but may indirectly contribute to reduced use of any nearby suitable grassland habitat patches within 350 m of the proposed new facilities. Therefore, the proposed project **may affect, but is not likely to adversely affect** Sprague's pipit.

Pallid Sturgeon (*Scaphirhynchus albus*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The pallid sturgeon was listed as Endangered in 1990 in the United States by the USFWS (1990b). The primary factor leading to the decline of this species is the alteration of habitat through river channelization, creation of impoundments, and alteration of flow regimes (USFWS 1990b). These alterations within the Missouri River have blocked movements to spawning, feeding, and rearing areas, destroyed spawning habitat, altered flow conditions which can delay spawning cues, and reduced food sources by lowering productivity (USFWS 2007a). The fundamental elements of pallid sturgeon habitat are defined as the bottom of swift waters of large, turbid, free-flowing rivers with braided channels, dynamic flow patterns, flooding of terrestrial habitats, and extensive microhabitat diversity (USFWS 1990b).

The pallid sturgeon population which is found near the project area occurs from the Missouri River below Fort Peck Dam to the headwaters of Lake Sakakawea and the lower Yellowstone River up the confluence of the Tongue River, Montana (USFWS 2007a). This population consists of approximately 136 wild adult pallid sturgeon (USFWS 2007a). Hatchery reared sturgeon have also been stocked since 1998. The pallid sturgeon has been found to utilize the 25 km of riverine habitat that would be inundated by Lake Sakakawea at full pool (Bramblett 1996 per USFWS 2007a). Larval pallid sturgeons have also been found to drift into Lake Sakakawea. While the majority of pallid sturgeons are found in the headwaters of Lake Sakakawea, North Dakota Game and Fish have caught and released pallid sturgeon in nets set in 80 to 90 feet of water between the New Town and Van Hook area. Based on this information, pallid sturgeon could be found throughout Lake Sakakawea (personal communication, email from Steve Krentz, Pallid Sturgeon Project Lead, U.S. Fish and Wildlife Service, to Mike Cook, Aquatic Ecologist, SWCA Environmental Consultants, September 3, 2010).

Suitable habitat for pallid sturgeon does not occur in the project area, and Lake Sakakawea is a minimum of 16.6 river miles from the proposed well pads and access roads. However, Squaw Creek and Moccasin Creek, which drain the project area, are perennial tributaries to the Missouri River in Lake Sakakawea. Potential pollution and sedimentation occurring within the project area are concerns for downstream populations of endangered pallid sturgeon. Activities associated with the construction, production, or reclamation of the proposed project area are not anticipated to adversely affect water quality and subsequently the pallid sturgeon. Therefore, the proposed project **may affect, but is not likely to adversely affect** pallid sturgeon.

Dakota Skipper (*Hesperia dacotae*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Dakota skipper is a small butterfly with a 1-inch wingspan and is found primarily in undisturbed native tall grass and upland dry mixed grass prairie areas with a high diversity of wildflowers and grasses (Committee on the Status of Endangered Wildlife in Canada 2003). The Dakota skipper appears to require a range of precipitation-evaporation ratios between 60 and 105 and a soil pH between 7.2 and 7.9 (McCabe 1981). Larvae feed on grasses, favoring little bluestem. Adults commonly feed on nectar of flowering native forbs such as harebell (*Campanula rotundifolia*), wood lily (*Lilium philadelphicum*), and purple coneflower (*Echinacea purpurea*). The species is threatened by conversion of native prairie to cultivated agriculture or shrublands, over-grazing, invasive species, gravel mining, and inbreeding (USFWS 2005). Dakota skippers are not known to occur within the project area; however, suitable habitat does occur. The proposed project **may affect, but is not likely to adversely affect** this species. The use of best management practices and conservation guidelines (USFWS 2007b) during construction and operation and immediate reclamation of short-term disturbance should decrease direct, indirect, and cumulative impacts to this species.

MIGRATORY BIRD TREATY ACT / THE BALD AND GOLDEN EAGLE PROTECTION ACT

Bald Eagle (*Haliaeetus leucocephalus*)
Status: Delisted in 2007; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Effects of Project: No adverse effects anticipated

Suitable nesting or foraging habitat for bald eagles includes old growth trees relatively close (usually less than 1.24 miles [Hagen et al. 2005]) to perennial waterbodies. The project area does not contain old growth trees and the closest well pad is 4.7 miles from Lake Sakakawea and 6.9 miles from the Little Missouri River. A bald eagle was observed in flight at the well pad located in the NE¼ of Section 3, T148N, R94W. Nesting habitat was observed and eagle nesting surveys would be conducted in February/March at the well pads located in NW¼ NE¼ of Section 23, T149N, R94W; NE¼, NW¼ of Section 3, T148N, R94W; and NE¼, Section 3 of T148N, R94W. If nests are discovered, the BIA and USFWS would be notified. Therefore, no adverse effects are anticipated.

Golden Eagle (*Aquila chrysaetos*)
Status: Not Listed; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Effects of Project: No adverse effects anticipated

No golden eagles or nests were observed during the field surveys, however, golden eagles may occur within or near the project area. The golden eagle prefers habitat characterized by open prairie, plains, and forested areas. Usually, golden eagles can be found in proximity to badland cliffs which provide suitable nesting habitat. The closest known golden eagle nest (Nest ID GE269) is located a minimum of 2.1 miles from the proposed wells pads. However, no primary or secondary indication of golden eagle presence, including nests, was observed within or near the project area during the field survey. Nesting habitat was observed and eagle nesting surveys would be conducted in February/March at the well pads located in NW¼

NE¼ of Section 23, T149N, R94W; NE¼, NW¼ of Section 3, T148N, R94W; and NE¼ of Section 3, T148N, R94W. If nests are discovered, the BIA and USFWS would be notified. Therefore, the project is unlikely to cause any adverse effects to golden eagles.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3425 Miriam Avenue
Bismarck, North Dakota 58501

APR 11 2011

Mr. Joey Sheeley, Project Manager
SWCA Environmental Consultants
1892 South Sheridan Avenue
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Re: Enerplus 18 Exploratory Oil and Gas Wells, Fort Berthold Reservation, McKenzie and Dunn Counties, North Dakota

Dear Ms. Sheeley:

This is in response to your February 11, 2011, scoping letter on the proposed construction of eighteen exploratory oil and gas wells on eight well pads, to be completed by Enerplus Resources (USA) Corporation (Enerplus) on the Fort Berthold Reservation, Dunn and McKenzie Counties, North Dakota.

Specific locations for the proposed wells are:

Pointer and Terrier: T. 149 N., R. 94, Section 23, McKenzie County
Impala and Giraffe: T. 149 N., R. 94 W., Section 23, Dunn County
Jackal, Lion, Rhino and Hippo: T. 148 N., R. 94 W., Section 3, Dunn County
Trumpet and Bugle: T. 148 N., R. 94 W., Section 13, Dunn County
Blue and Bowhead: T. 148 N., R. 93 W., Section 6, Dunn County
Beluga and Humpback: T. 148 N., R. 93 W., Section 6, Dunn County
Duet and Harmony: T. 148, R. 93 W., Section 18, Dunn County
Chord and Music: T. 148 N, R. 93 W., Section 18, Dunn County

We offer the following comments under the authority of and in accordance with the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) (MBTA), the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.) (NEPA), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250) (BGEPA), Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds", and the Endangered Species Act (16 U.S.C. 1531 et seq.) (ESA).

Threatened and Endangered Species

In an e-mail dated October 13, 2009, the Bureau of Indian Affairs (BIA) designated SWCA Environmental Consultants (SWCA) to represent the BIA for informal Section 7 consultation under the ESA. Therefore, the U.S. Fish and Wildlife Service (Service) is responding to you as the designated non-Federal representative for the purposes of ESA, and under our other authorities as the entity preparing the NEPA document for adoption by the BIA.

The Service concurs with your "may affect, is not likely to adversely affect" determination for piping plover, interior least tern and pallid sturgeon, and designated critical habitat for piping plover. The proposed location for these eight well pads is approximately 23.2, 20.9, 20.5, 16.6, 12.8, 12.6, 14.1 and 14.4 stream miles, respectively, from nesting and foraging locations and habitat on Lake Sakakawea for these species and designated critical habitat for the piping plover.

The Service concurs with your "may affect, is not likely to adversely affect" determination for whooping cranes. This concurrence is predicated on Enerplus' commitment to stop work on the proposed site if a whooping crane is sighted within 1 mile of the proposed project area and immediately contacting the Service. Work may resume in coordination with the Service once the bird(s) has(ve) left the area.

The Service acknowledges your "no effect" determination for gray wolf and black-footed ferret.

The Dakota skipper and Sprague's pipit are candidate species for listing under the ESA; therefore, an effects determination is not necessary for these species. No legal requirement exists to protect candidate species; however, it is within the spirit of the ESA to consider these species as having significant value and worth protecting. Although not required, Federal action agencies such as the BIA have the option of requesting a conference on any proposed action that may affect candidate species such as the Dakota skipper and Sprague's pipit.

Migratory Birds

Enerplus has committed to implementing the following measures:

- Construction will be done outside of the migratory bird nesting season (Feb. 1-July 15);
- Or, mow and maintain vegetation within the projection construction area (access roads and well pads) prior to and during the breeding season to deter migratory birds from nesting in the project area until construction is underway;
- Or, conduct an ornithological survey within 5 days before construction begins at the well pads. If nests are discovered, BIA and the Service will be notified.

Bald and Golden Eagles

According to the eagle nest database maintained by the North Dakota Game and Fish Department, there are no known eagle nests within 0.5 mile of the wells. Your letter states that no eagle nests were observed within 0.5 mile of the project area during line-of-sight surveys conducted on November 3 and 4, 2010. Your April 1, 2011, email to Heidi Riddle of my staff states that no nests or eagles were detected during nest surveys conducted on March 25, 2011.

The Service believes that Enerplus' commitment to implement the aforementioned measures demonstrates that measures have been taken to protect migratory birds and bald and golden eagles to the extent practicable, pursuant to the MBTA and the BGEPA.

Thank you for the opportunity to comment on this project proposal. If you require further information or the project plans change, please contact me or Heidi Riddle of my staff at (701) 250-4481 or at the letterhead address.

Sincerely,

Jeffrey K. Towner

Jeffrey K. Towner
Field Supervisor
North Dakota Field Office

cc: Bureau of Indian Affairs, Aberdeen
(Attn: Marilyn Bercier)
Bureau of Land Management, Dickinson
ND Game & Fish Department, Bismarck