# United States Department of the Interior

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

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IN REPLY REFER TO:
DESCRM
MC-208

JAN 07 2011

**MEMORANDUM**

TO: Superintendent, Fort Berthold Agency

FROM: Acting 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 five proposed exploratory drilling wells by Zenergy 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 is a copy 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 (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

## Zenergy Operating Company, LLC

## Environmental Assessment for Five Bakken Exploratory Oil Wells:

## Dakota-3 Joseph Eagle #2-19H
## Dakota-3 Sarah Smith #22-23H
## Dakota-3 Fox #14-8H
## Dakota-3 Gerald Hale #33-28H
## Dakota-3 Mandaree Warrior #14-11H

## Fort Berthold Indian Reservation
## Dunn and McKenzie Counties, North Dakota

The U.S. Bureau of Indian Affairs (BIA) has received a proposal to drill up to five exploratory oil/gas wells, access roads and related infrastructure on the Fort Berthold Indian Reservation to be located in Section 19, Township (T) 149 North (N), Range (R) 93 West (W), Dunn County; Section 22, T149N, R93W, Dunn County; Section 08, T149N, R93W, Dunn County; Section 33, T150N, R94W, McKenzie County and Section 14, T149N, R94W, McKenzie County. 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

1/7/11
Date

# 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 State Office**
**Dickinson, North Dakota**

**Zenergy Operating Company, LLC**

**Five Bakken Exploratory Oil Wells:**

**Dakota-3 Joseph Eagle #2-19H**
**Dakota-3 Sarah Smith #22-23H**
**Dakota-3 Fox #14-8H**
**Dakota-3 Gerald Hale #33-28H**
**Dakota-3 Mandaree Warrior #14-11H**

**Fort Berthold Indian Reservation**

**January 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: Five Bakken Exploratory Oil Wells; Zenergy Operating Company, LLC

## Dakota-3 Joseph Eagle #2-19H, Dakota-3 Fox #14-8H, Dakota-3 Mandaree Warrior #14-11H, Dakota-3 Sarah Smith #22-23H, and Dakota-3 Gerald Hale #33-28H

Prepared for

United States Department of the Interior
Bureau of Indian Affairs

Prepared by

SWCA Environmental Consultants

December 6 2010

## TABLE OF CONTENTS

## LIST OF FIGURES

## LIST OF TABLES

## LIST OF APPENDICES

**Appendix**

# 1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

## 1.1 INTRODUCTION

Zenergy Operating Company, LLC (Zenergy) has acquired the leases and is proposing to drill five oil wells on five 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 Middle Bakken member of the Bakken Formation, a known oil reserve. The following proposed well sites, shown in Figure 1-1, will be located within the Reservation:

- Dakota-3 Joseph Eagle #2-19H: NW¼ NE¼ of Section 19, Township (T) 149 North (N), Range (R) 93 West (W), Dunn County
- Dakota-3 Sarah Smith #22-23H: NW¼ NW¼ of Section 22, T149N, R93W, Dunn County
- Dakota-3 Fox #14-8H: SE¼ SW¼ of Section 08, T149N, R93W, Dunn County
- Dakota-3 Gerald Hale #33-28H: SW¼ SE¼ of Section 33, T150N, R94W, McKenzie County
- Dakota-3 Mandaree Warrior #14-11H: SE¼ SW¼ of Section 14, T149N, R94W, McKenzie County

New access roads would be constructed from the nearest BIA road to the well pads, as shown in Figures 1-2 through 1-6, 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 and gathering pipelines, as shown in Figures 1-2 through 1-6, if the wells are completed for long-term commercial production. Oil, gas, and water pipelines will be constructed on tribal land to join existing pipelines, as follows:

- The Dakota-3 Sarah Smith #22-23H gathering pipeline will tie into the existing Arrow Phase 1B-South Pipeline.
- The gathering line from the Dakota-3 Fox #14-8H will join the existing Arrow Midstream Holdings Oil and Gas Pipeline System
- The gathering line from the Gerald Hale #33-28H will join the existing Arrow Phase 1A Pipeline.
- The gathering line from the Dakota-3 Joseph Eagle #2-19H will join the existing Dakota-3 Clara #14-17H gathering pipeline.

- The gathering line from the Dakota-3 Mandaree Warrior #14-11H will join the existing Arrow Phase 1B Highway 22 Pipeline.

All components (i.e., roads, well pads, gathering lines, 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 actions.

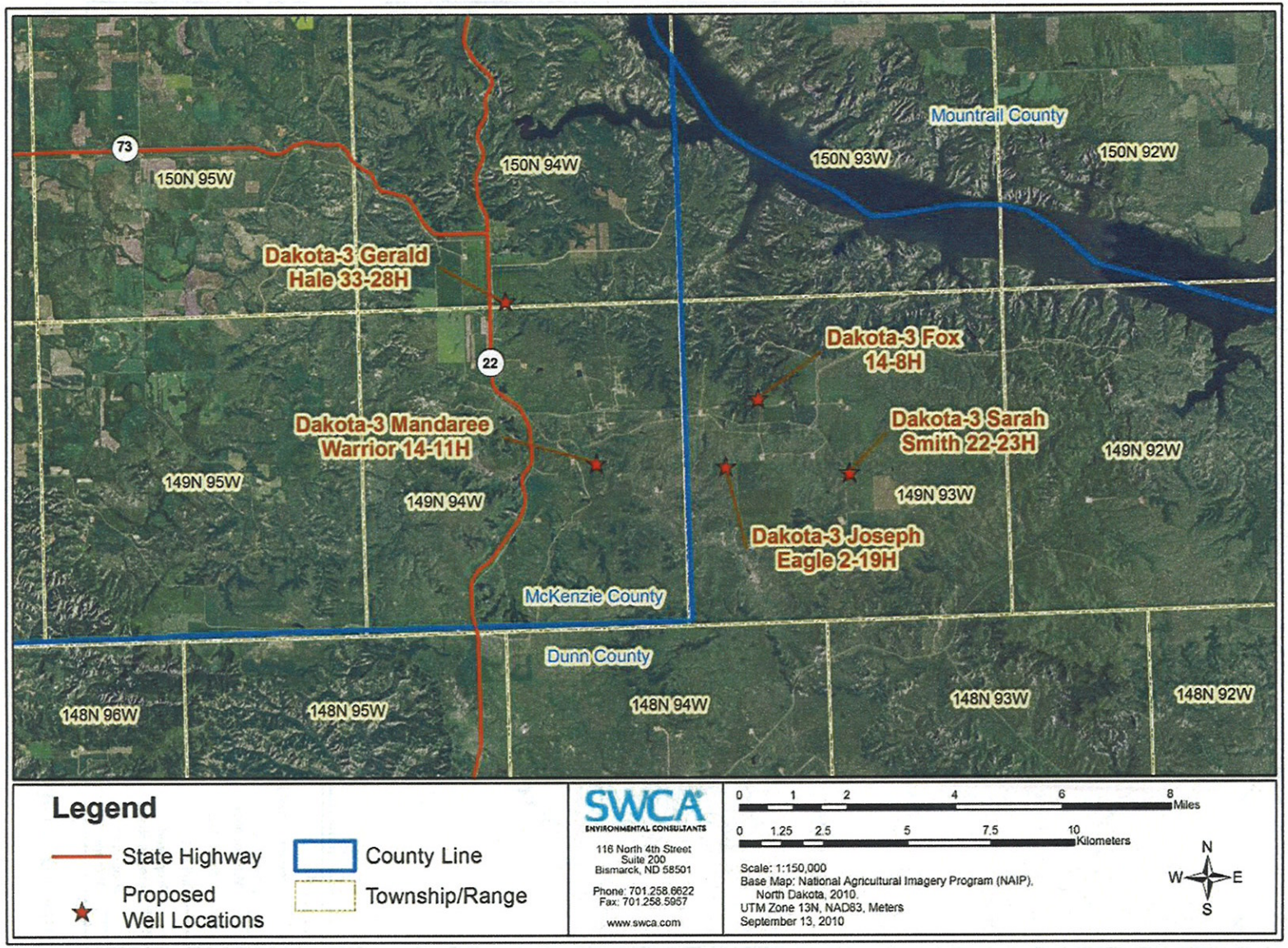



**Figure 1-1. Project overview map.**

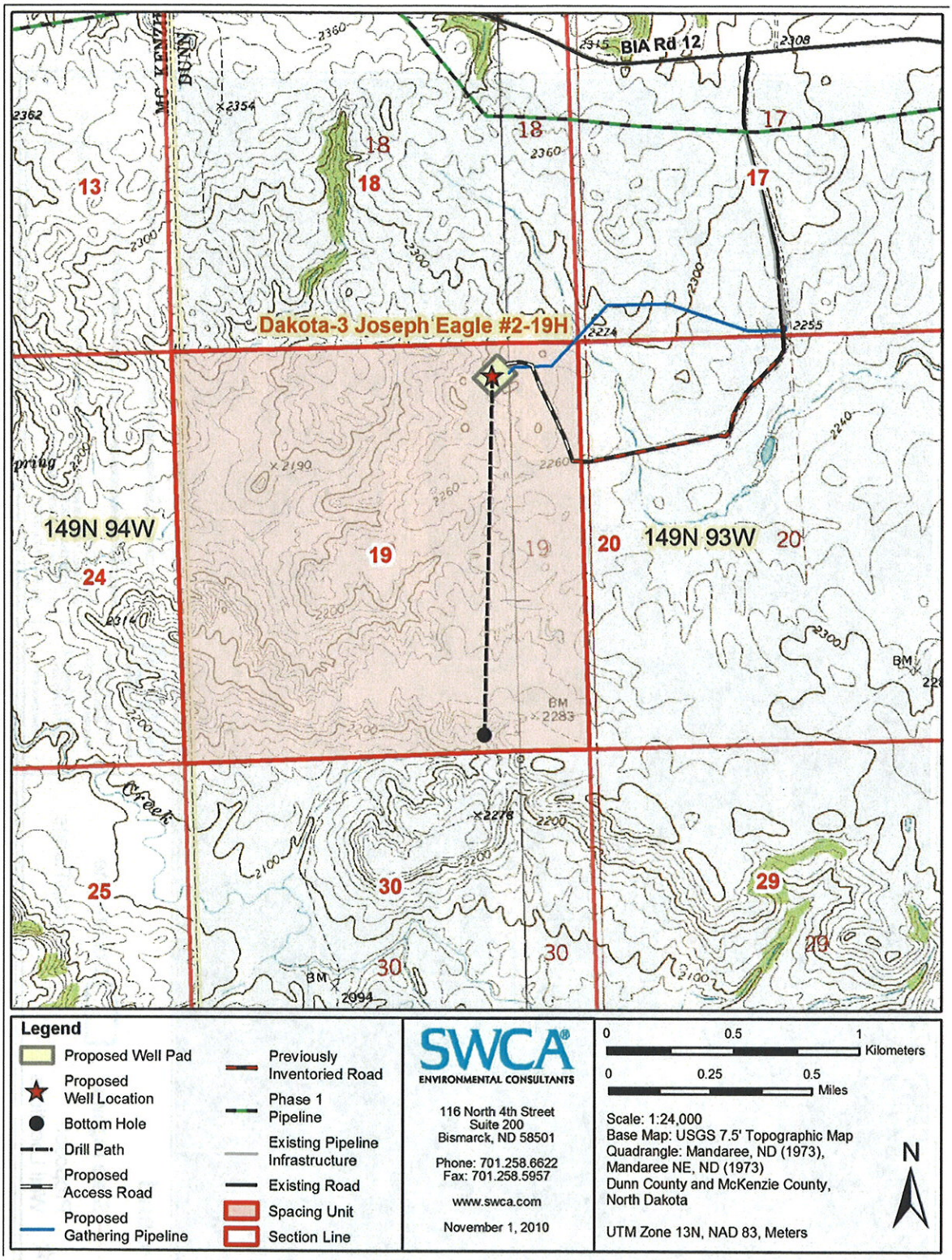



**Figure 1-2. Proposed Dakota-3 Joseph Eagle #2-19H infrastructure location and spacing unit boundary.**

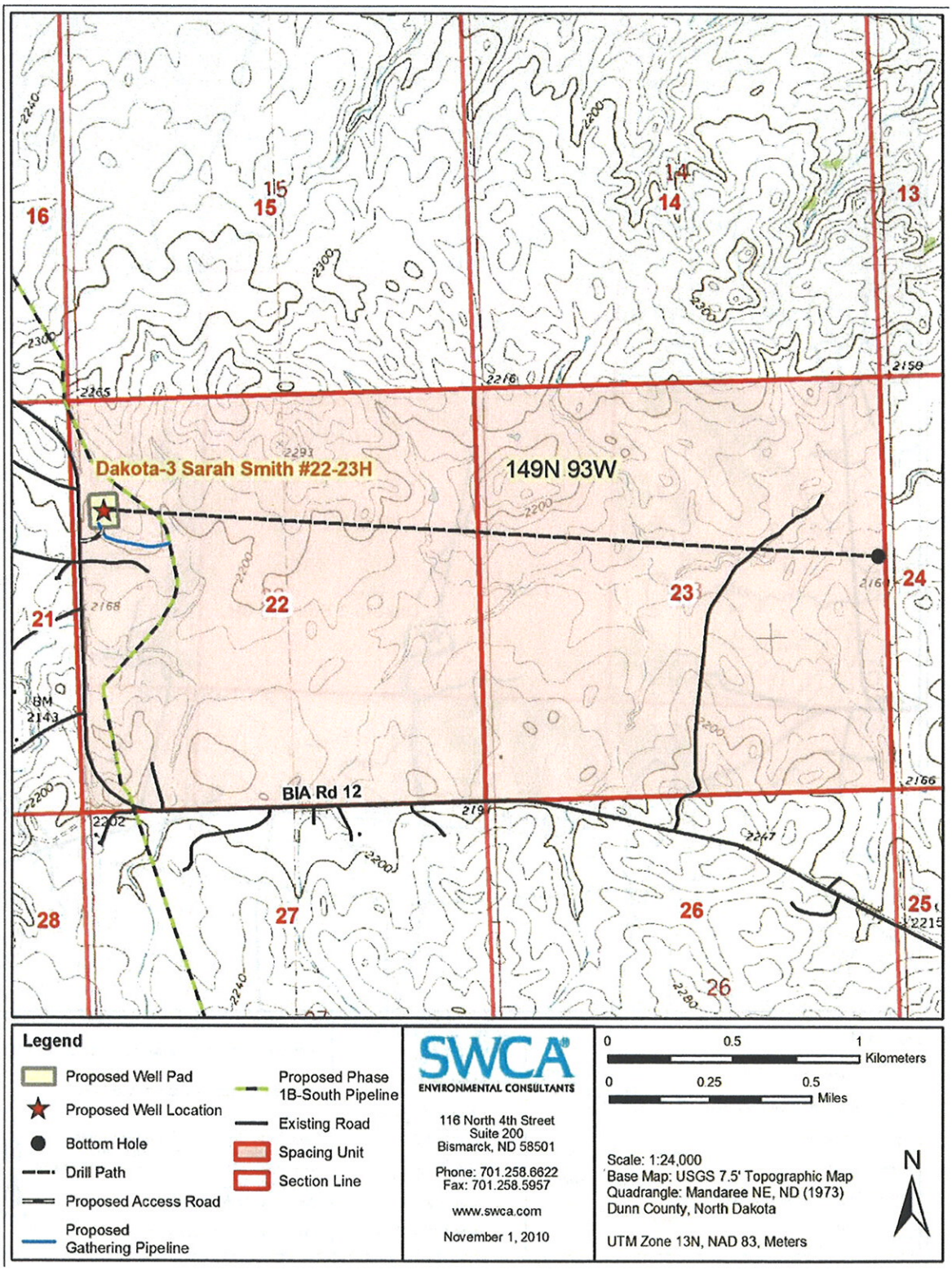



**Figure 1-3. Proposed Dakota-3 Sarah Smith #22-23H infrastructure location and spacing unit boundary.**

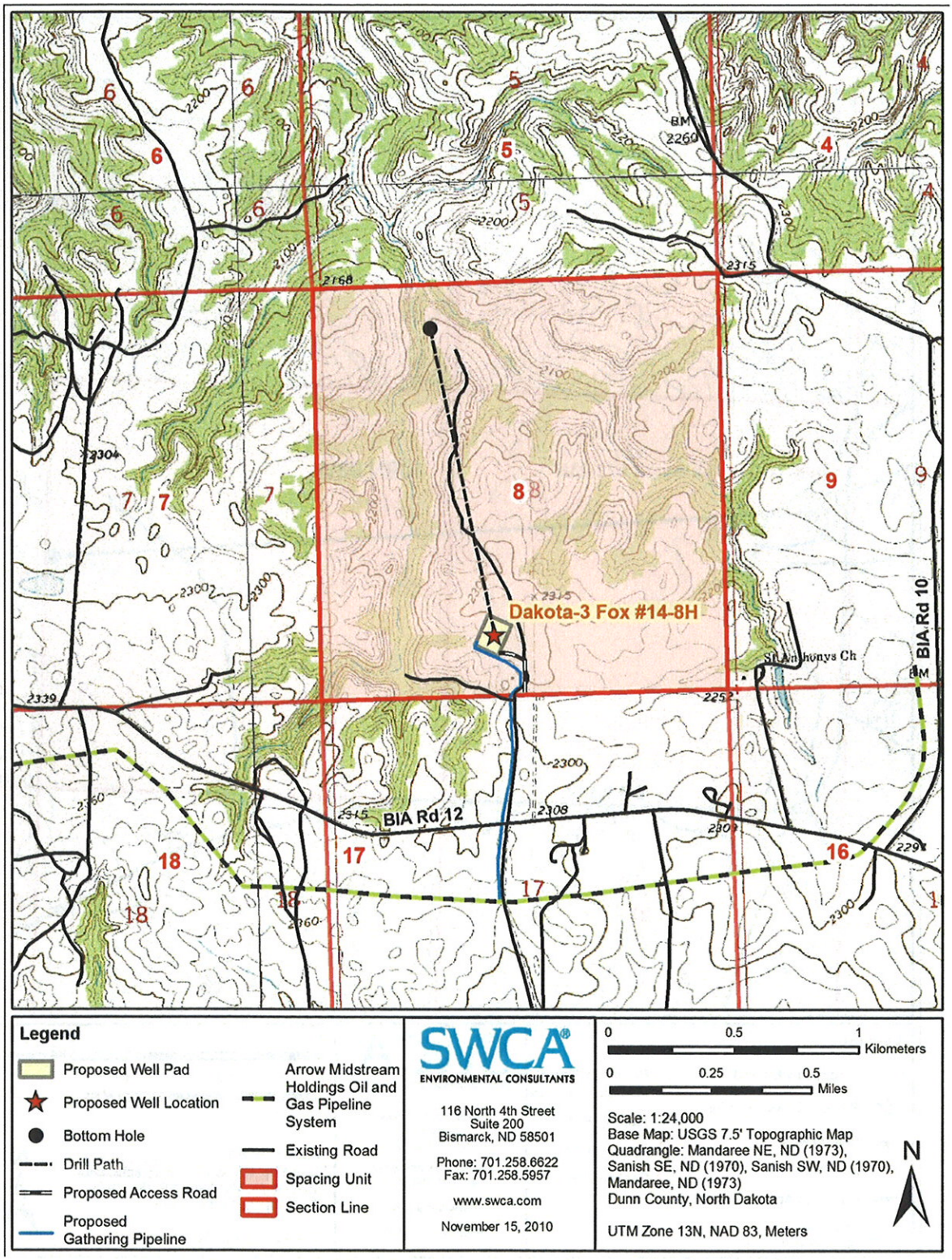



**Figure 1-4. Proposed Dakota-3 Fox #14-8H infrastructure location and spacing unit boundary.**

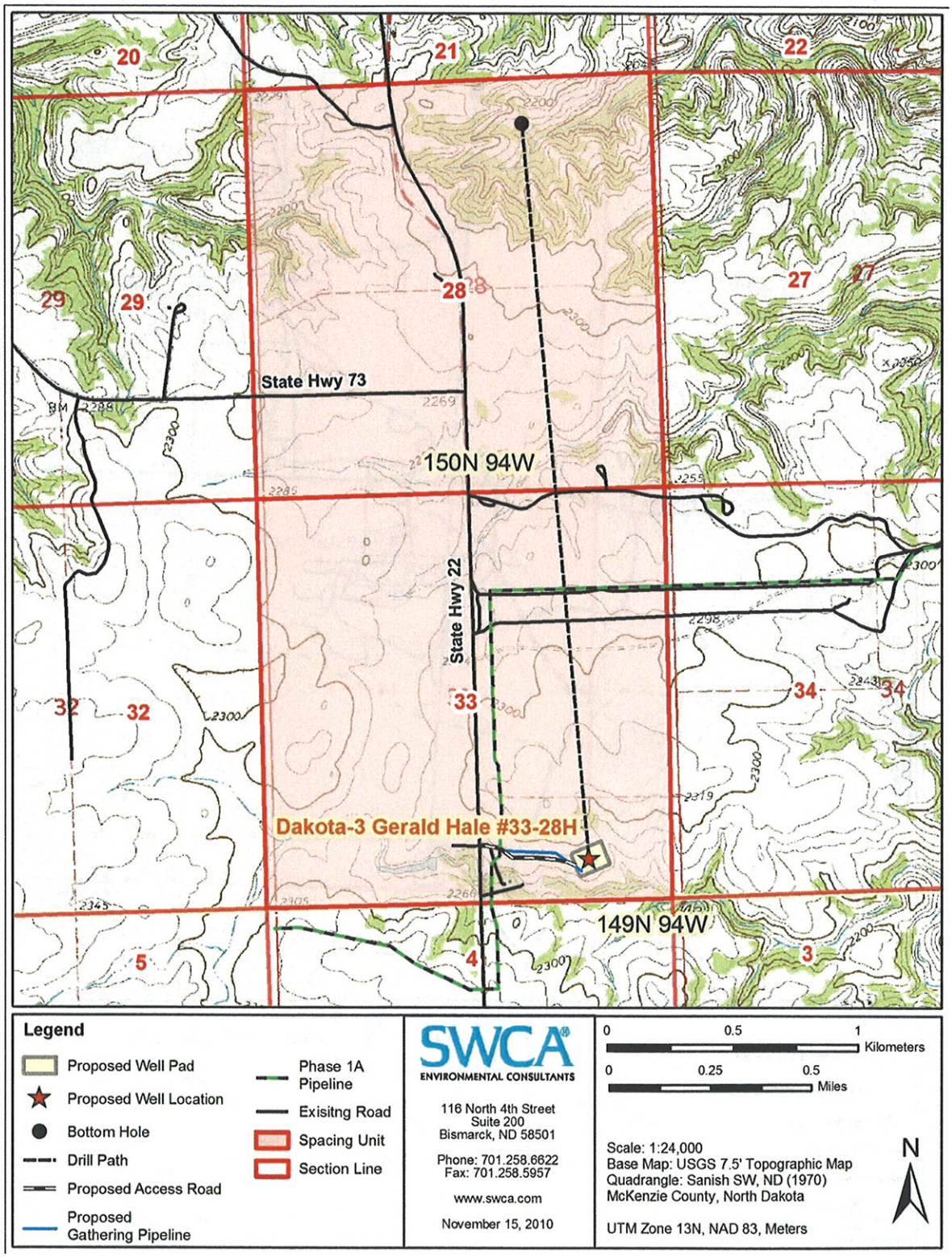



**Figure 1-5. Proposed Dakota-3 Gerald Hale #33-28H infrastructure location and spacing unit boundary.**

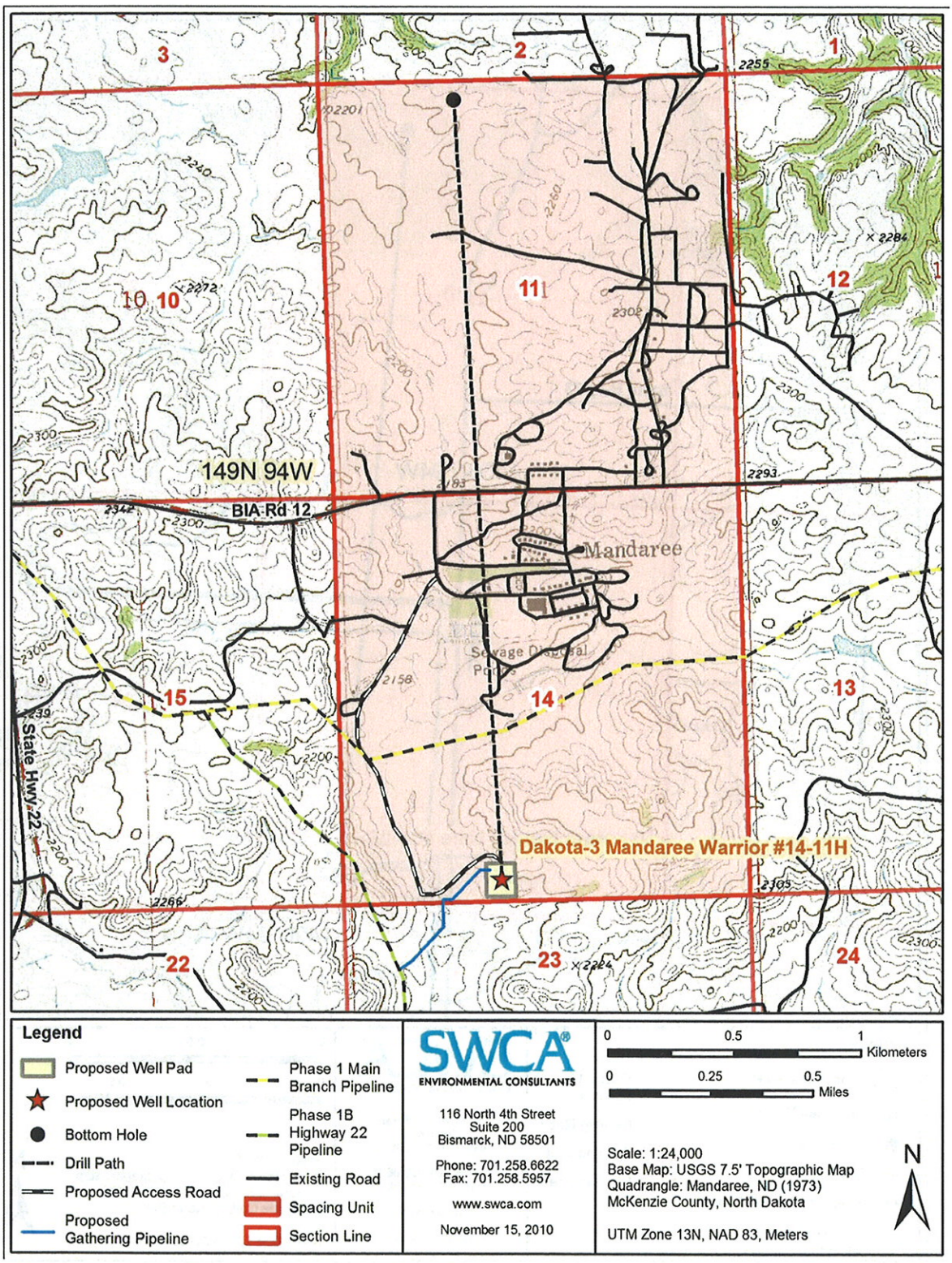



**Figure 1-6. Proposed Dakota-3 Mandaree Warrior #14-11H infrastructure location and spacing unit boundary.**

## 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 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.

Zenergy will comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements. Zenergy also agrees to follow all best management practices 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, access roads, and gathering pipelines, 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. 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 five new exploratory oil and gas wells and their infrastructure located in the west-central portions of the Reservation in McKenzie County and Dunn County, North Dakota. The proposed wells would test the commercial potential of the Middle Bakken Dolomite member of the Bakken Formation. Well bottom hole locations, shown in Figures 1-2 through 1-6, were chosen by Zenergy 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 Figures 1-1 through 1-6 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 Dakota-3 Well Pad and Infrastructure Locations and Disturbance.**

| Dakota-3 Well Pad Name | Well Pad Location | Detailed Infrastructure Disturbance | Total Disturbance (Acres) |
|---|---|---|---|
| Joseph Eagle #2-19H | NW¼ NE¼ Section 19, T149N, R93W, Dunn County, North Dakota | 3.42-acre well pad<br>1.08-mile and 8.67-acre access road<br>0.77-mile and 4.71-acre gathering pipeline | 16.80 |
| Sarah Smith #22-23H | NW¼ NW¼ Section 22, T149N, R93W, Dunn County, North Dakota | 3.67-acre well pad<br>0.07-mile and 0.56-acre access road<br>0.199-mile and 1.205-acre gathering pipeline | 5.43 |
| Fox #14-8H | SE¼, SW¼ Section 08, T149N, R93W, Dunn County, North Dakota | 3.27-acre well pad<br>0.15-mile and 1.17-acre access road<br>0.716-mile and 4.337-acre gathering pipeline | 8.78 |
| Gerald Hale #33-28H | SW¼ SE¼ Section 33, T150N, R94W, McKenzie County, North Dakota | 3.21-acre well pad<br>0.25-mile and 1.98-acre access road<br>0.207-mile and 2.511-acre gathering pipeline | 7.70 |
| Mandaree Warrior #14-11H | SE¼ SW¼, Section 14, T149N, R94W, McKenzie County, North Dakota | 3.67-acre well pad<br>1.10-mile and 8.78-acre access road<br>0.217-mile and 1.320-acre gathering pipeline | 13.77 |
| **Total Proposed Disturbance** | | Well Pads = 17.24 acres<br>Access Roads = 21.16 acres<br>Pipelines = 14.083 acres | 52.48 |

Interdisciplinary on-site meetings were conducted between March 30 and July 8, 2010, to review well site locations and proposed access roads and gathering pipelines. The on-site meetings were attended by the surveyor, natural and cultural resource specialists, the Zenergy 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 52.48 acres, as shown in Table 2-1.

### 2.2.2 Well Pads

The proposed well pads would include a leveled area (pad) and a pit. Details of well pad construction are addressed in the APD and available upon request from the BIA. The pad would be used for the drilling rig and equipment and the pit would be excavated, lined, and used for drill cuttings. Each well would be drilled using a semi-closed loop drilling system. Semi-closed loop systems collect semi-dry cuttings in the reserve pit with all drilling fluids removed by centrifugal processes and reused in the drilling operations. Any free fluid located in the reserve pit will be removed as soon as possible. The pads would be stripped of topsoil and vegetation, 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 Best Management Practices (BMPs) would be implemented and could include surface drainage controls, soil surface protection methodologies, and sediment capture features.

The well pads average approximately 3.45 acres per well pad, but dimensions vary depending on the site characteristics, cut-and-fill slopes, stockpiled topsoil, and reserve pit backfill placed on the edge of the pads. Total surface disturbance from the well pads would be 17.24 acres, as itemized in Table 2-1. Details of pad construction and reclamation can be found in the APDs.

### 2.2.3 Access Roads and Utility Corridor

New roads are proposed to allow for access for well construction and production activities. Details of road construction are addressed in the APD and available upon request from the BIA. Table 2-1 indicates that the proposed new wells would require a total 2.65 miles of new roadways, and 21.16 acres of long-term disturbance from new access roads.

Zenergy also proposes to construct and install oil, gas, and water gathering pipelines along the proposed access roads from the well pads to the existing improved roads that provide access, including BIA 12. A buried electric line would be installed in the future, if production is warranted. The utility corridor would be part of the proposed ROW and no additional disturbance is anticipated.

A diagram of typical road cross sections is shown in Figure 2-1.**Error! Reference source not found.** 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 re-seeded 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, either along BIA Road 12 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.

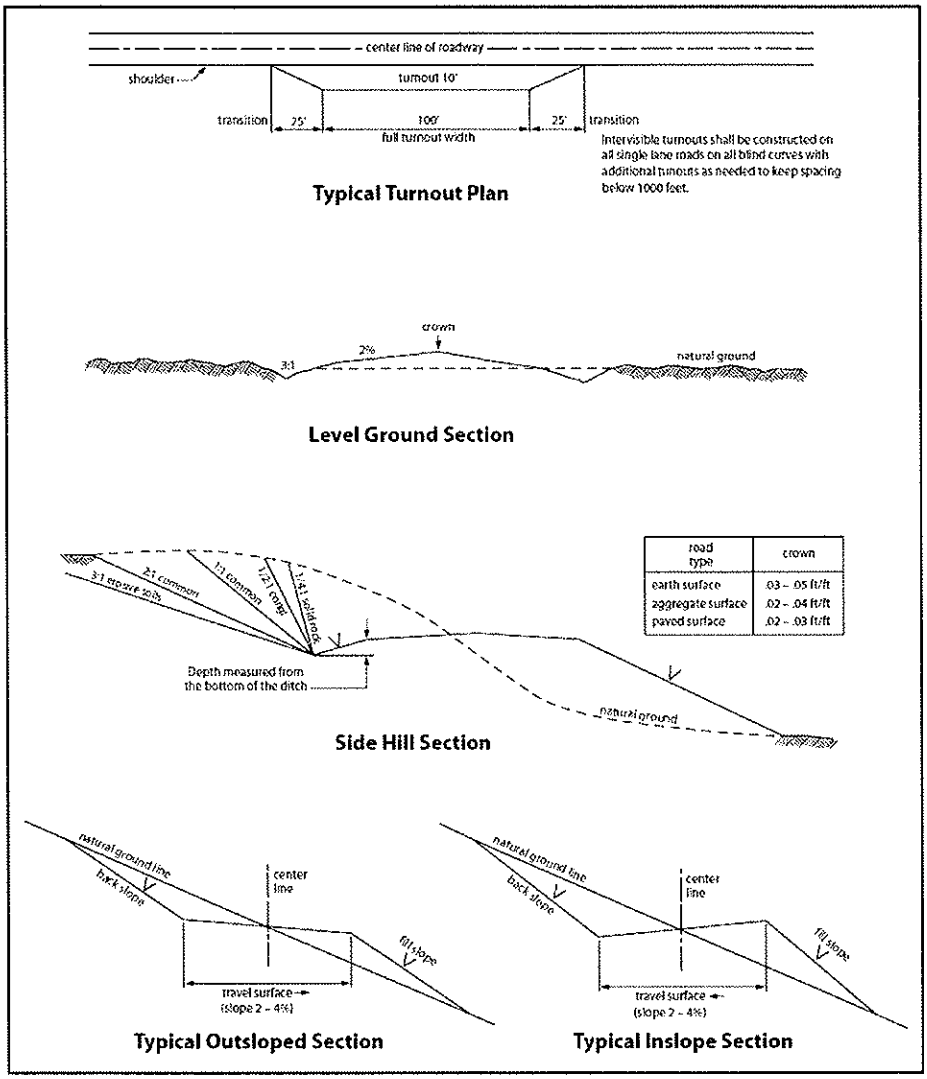



**Figure 2-1. Typical road cross sections (BLM and USFS 2007).**

### 2.2.4 Drilling

After securing mineral leases, Zenergy submitted the Notices of Staking to the BLM on June 25, 2010. The BIA's office in New Town, North Dakota, receives copies of the APD from the BLM North Dakota Field Office. Construction would begin only when the BIA completes the NEPA process and the APDs are subsequently approved by the BLM.

Vertical drilling would be completed at approximately 10,350 feet, at which point drilling would turn roughly horizontal to the surface until reaching the specified bottom hole locations in the Middle Bakken member. A setback of at least 500 feet from the bottom hole to the unit boundary would be maintained.

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 35 days to reach target depth, using a rotary drilling rig rated for drilling to approximately 15,000 feet. For the first

2,500 feet drilled, a freshwater-based mud system with non-hazardous additives would be used to minimize contaminant concerns. Approximately 4,720 gallons of water per well would be obtained from a commercial source and recycled in the semi-closed loop system 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, adding mud and polymer sweeps as necessary to clean the hole. Oil-based drilling fluids reduce the potential for hole sloughing while drilling through water-sensitive formations (shales). Approximately 4,720 gallons of water and 18,900 gallons of diesel fuel per well would be used to complete vertical drilling. The lateral reach of the borehole would be drilled using 33,600 gallons of fresh water as mud and adding polymer sweeps as necessary to clean the hole. Drilling fluids would be recirculated in the semi-closed loop system, with only the cutting being collected in the pit.

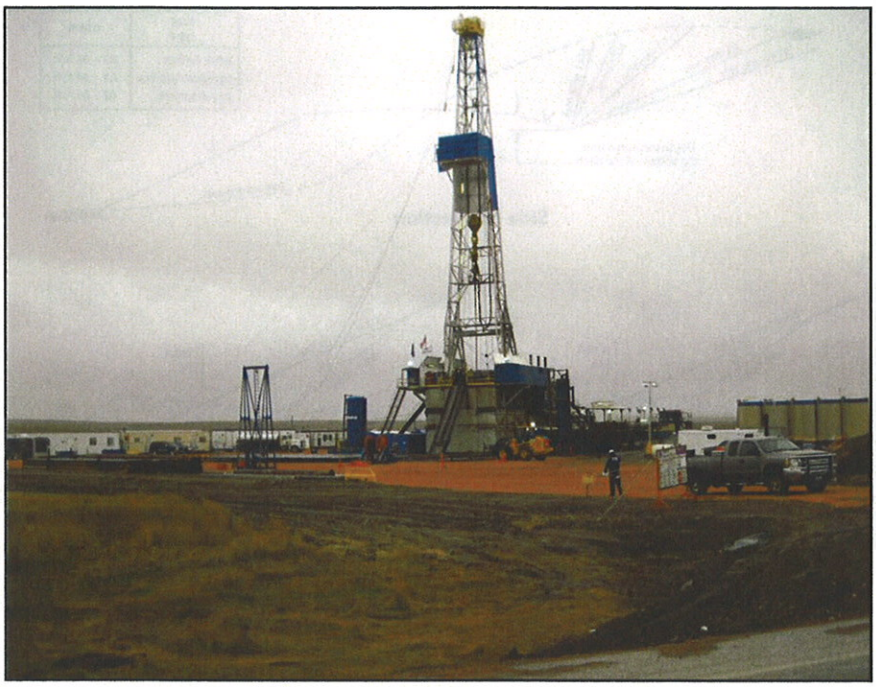


**Figure 2-2. Typical drilling rig. (Ruffo 2009)**

### 2.2.5 Casing and Cementing

Surface casing would be set at an approximate depth of 2,500 feet 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 1,700 and 1,800 feet, respectively. Production casing would be cemented from approximately 11,256 feet deep to a depth of about 4,000 feet in order to isolate the hydrocarbon zone present in the Dakota Formation below a depth of 4,500 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 Pipelines

If drilling, testing, and production support commercial production from any of the five 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 (Figure 2-3). An impervious dike sized to hold 110% of the capacity of the largest tank plus one full day's production would surround the tanks and the heater/treater. 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 above-ground 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.

Zenergy proposes to construct and install oil, gas, and water gathering pipelines on tribal land originating from each of the five wells and joining existing pipelines, as follows:

- The Dakota-3 Sarah Smith #22-23H gathering pipeline will tie into the existing Arrow Phase 1B-South Pipeline.
- The gathering line from the Dakota-3 Fox #14-8H will join the existing Arrow Midstream Holdings Oil and Gas Pipeline System
- The gathering line from the Gerald Hale #33-28H will join the existing Arrow Phase 1A Pipeline.
- The gathering line from the Dakota-3 Joseph Eagle #2-19H will join the existing Dakota-3 Clara #14-17H gathering pipeline.
- The gathering line from the Dakota-3 Mandaree Warrior #14-11H will join the existing Arrow Phase 1B Highway 22 Pipeline.

**Figure 2-3. Typical producing oil well pad (Sobotka 2008).**

Details of gathering line construction are addressed in the APD and available upon request from the BIA.

The locations of gathering pipelines are shown in Figures 1-2 through 1-6 and disturbance areas are summarized in Table 2-1. Oil, gas, and water pipelines would be buried in either two 2.5-foot-wide trenches, spaced 5.0 feet apart, or one 5.0-foot-wide trench. The total length of shared ROW for the proposed gathering pipelines is a total of 2.109 miles. Oil and gas pipelines would be no more than 8 inches in diameter and constructed of steel. The water pipeline would be 4 inches in diameter and constructed of Fiberspar® or similar material. All construction disturbance would occur within a 100-foot temporary ROW and permanent surface disturbance would occur within a 50-foot ROW corridor. In total, approximately 14.083 acres would be disturbed as a result of activities associated with the construction of the proposed gathering pipelines. Pipeline disturbance would be reclaimed as soon as practical following construction, resulting in no long-term disturbance. 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 the wells would yield approximately 500 barrels of oil per day and 50 barrels of water during the first year of production. After the first year, the operator estimates production would decrease to approximately 250 barrels of oil per day and 25 barrels of water. Produced water is mostly recovered frac fluids and is expected to become minimal after two years.

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 Field Camp

A few personnel would be housed in self-contained trailers for a very short period of time; long-term housing is not proposed. Most personnel, both construction and drilling, would commute to the site. Human waste would be collected on site in portable toilets and trailers and it would be transported off site to a state-approved wastewater treatment facility. All other solid waste would be contained in enclosed containers and transported to, and disposed of at, state-approved facilities.

### 2.2.9 Construction Details at Individual Sites

The construction of each individual well pad, access road, and gathering pipeline will vary in the amount of surface disturbance due to limiting factors such as topographic position and distance from each proposed well pad to trunk pipelines and existing road infrastructure. The amount of acreage disturbed as a result of the proposed undertaking is summarized in table 2.1.

**Dakota-3 Joseph Eagle #2-19H**
Vertical drilling would be completed at approximately 9,600 feet, at which point drilling would turn roughly horizontal to an approximate total vertical depth (TVD) of 10,000 feet and total measured depth (TMD) of 10,350 feet. The complete drilling string would measure approximately 14,850 feet, including approximately 4,500 feet of lateral reach into the Middle Bakken Formation.

**Dakota-3 Sarah Smith #22-23H**
Vertical drilling would be completed at approximately 9,600 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,000 feet and TMD of 10,350 feet. The complete drilling string would measure approximately 14,850 feet, including approximately 4,500 feet of lateral reach into the Middle Bakken Formation.

**Dakota-3 Fox #14-8H**
Vertical drilling would be completed at approximately 9,600 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,000 feet and TMD of 10,350 feet. The complete drilling string would measure approximately 14,850 feet, including approximately 4,500 feet of lateral reach into the Middle Bakken Formation.

**Dakota-3 Gerald Hale #33-28H**
Vertical drilling would be completed at approximately 10,000 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,400 feet and TMD of 10,850 feet. The complete drilling string would measure approximately 21,550 feet, including approximately 9,000 feet of lateral reach into the Middle Bakken Formation.

**Dakota-3 Mandaree Warrior #14-11H**
Vertical drilling would be completed at approximately 9,800 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,200 feet and TMD of 10,550

feet. The complete drilling string would measure approximately 19,550 feet, including approximately 9,000 feet of lateral reach into the Middle Bakken Formation.

### 2.2.10 Reclamation

#### 2.2.10.1 Interim Reclamation

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 reserve pit drill cuttings 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 reserve pit, and overlain by at least 4 feet of overburden as required by adopted NDIC regulations. The surface above the reserve 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 pad would be reduced in size to approximately 300 by 200 feet; the portion of the well pad not needed for production would be recontoured, covered with 6 inches of topsoil, and reseeded using methods and seed mixtures determined by the BIA.

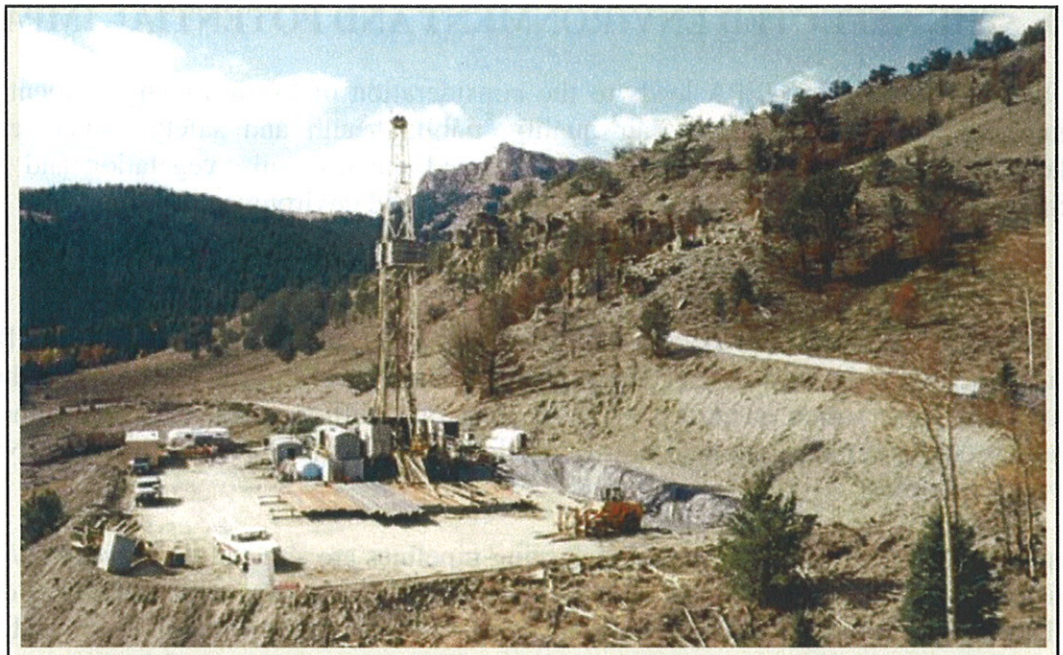
The working area of each well pad and the running surface of access roads would be surfaced with scoria or crushed rock obtained from a previously approved location. The outslope portions of roads would be covered with stockpiled topsoil and reseeded with a seed mixture determined by the BIA, reducing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

#### 2.2.10.2 Final Reclamation

Final reclamation would occur either in the very short term if the 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 2-4 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 five proposed well 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 2-4. 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 environmental justice.

## 3.1 PHYSICAL SETTING

The proposed well sites and spacing units are in a rural area located on the Fort Berthold Indian Reservation in west-central North Dakota. The Reservation is the home of the MHA Nation. The Reservation 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, access roads, and gathering pipelines 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).

## 3.2 AIR QUALITY

### 3.2.1 Air Quality Standards for Criteria Pollutants

The federal Clean Air Act (CAA) (USC § 7401–7671, as amended in 1990) established national ambient air quality standards 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. National ambient air quality standards (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 have been 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 will have an adverse impact on visibility within the Class I area (National Park Service [NPS] 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 50 miles west of the proposed well sites. Two air quality monitoring stations are located there, with the North Unit monitoring most criteria pollutants (NPS 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 (NDDH 2010).

Criteria pollutants and their health effects include the following.

- **Sulfur dioxide ($SO_2$):** $SO_2$ 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 (PM10 and PM2.5):** PM10 and PM2.5 are classes 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: PM10 is the fraction of total particulate matter 10 microns or smaller, and PM2.5 is two and one-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 ($NO_2$):** $NO_2$ 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 ($O_3$):** $O_3$ 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 (NOx) in the presence of sunlight. Health effects associated with $O_3$ 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. $O_3$ can persist for many days after formation and travel several hundred miles (EPA 2010a).
- **Carbon monoxide (CO):** 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 standards for criteria pollutants are summarized 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 as 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 |
| PM10 in micrograms per cubic meter of air ($\mu g/m^3$) | 24-hour | 150 | - | 150 |
| | Expected Annual Mean | 50 | | 50 |
| PM2.5 ($\mu g/m^3$) | 24-hour | 35 | 35 | - |
| | Weighted Annual Mean | 15 | 15 | - |
| $NO_2$ (ppm) | Annual Mean | 0.053 | 0.053 | 0.053 |
| CO (ppm) | 8-hour | 9 | - | 9 |
| | 1-hour | 35 | - | 35 |

| Pollutant | Averaging Period | Primary Standard (NAAQS) | Secondary Standard (National Parks) | North Dakota AAQS |
|---|---|---|---|---|
| $O_3$ (ppm) | 8-hour | 0.075 | 0.075 | - |
| | 1-hour | - | - | 0.12 |
| Lead ($\mu g/m^3$) | Quarterly Mean | 1.5 | 1.5 | 1.5 |
| Hydrogen Sulfide ($H_2S$) (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 several pollutants that are different from the federal criteria standards. These are the standards for $SO_2$ and $H_2S$. 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 Responses to the Threat of 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 percent of radiative forcing, which is the rate of energy change as measured at the top of the atmosphere. Radiative forcing 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 methane ($CH_4$) 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 (EPA 2010c). These GHGs are all positive radiative forcing GHGs Thus, control strategies often focus on the gases with the highest positive $CO_2e$ values (EPA 2010c).

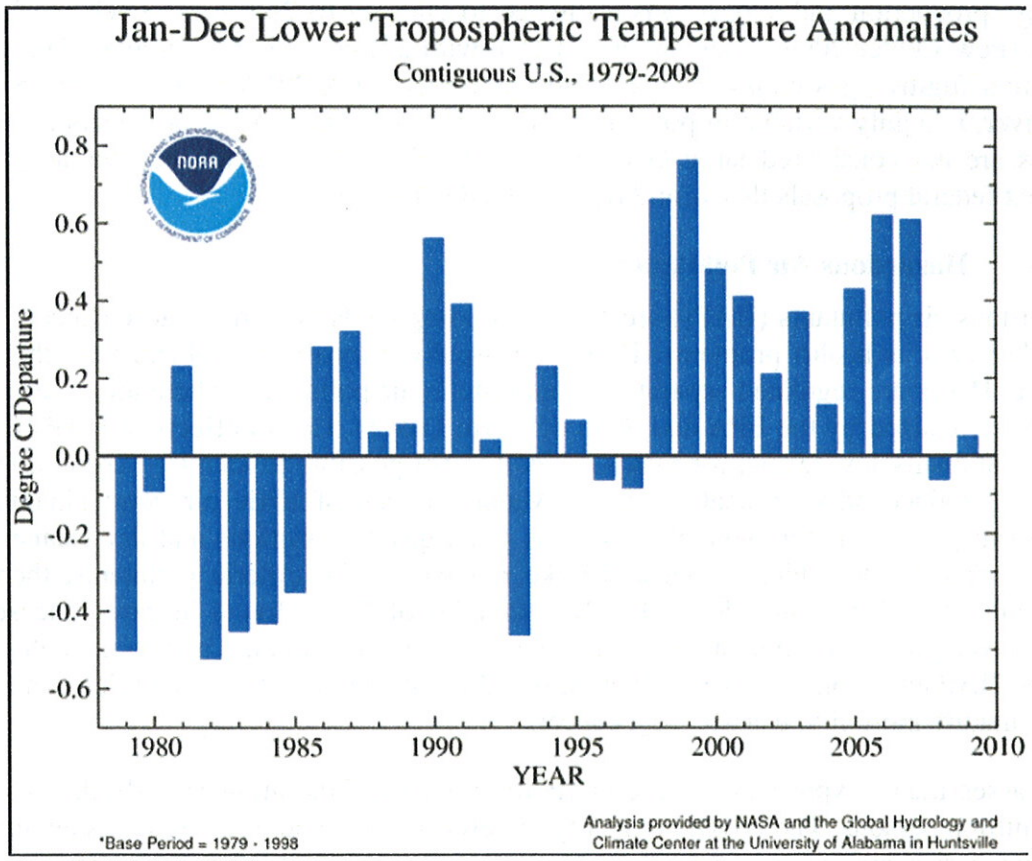
According to the Pew Center, "Over the past 50 years, the (worldwide) data on extreme temperatures have shown similar trends of rising temperatures: cold days, cold nights, and frosts occurred less frequently over time, while hot days, hot nights, and heat waves occurred more frequently" (Pew Center 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 (IPCC) 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 12 years between 1995 and 2007 ranked among the 12 warmest years in the instrumental record of global surface temperature since 1850 (IPCC 2007). The National Oceanic and Atmospheric Agency (NOAA) monitored data indicate 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 regularity, as shown in Figure 3-1 (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 U.S. coast (EPA 2010c). Tide gauge measurements and satellite altimetry suggest that sea level has risen worldwide approximately 4.8 to 8.8 inches (12–22 centimeters) 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).

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 earth's atmosphere (EPA 2010d). Many U.S. states have adopted goals and actions to reduce GHGs.




Source: NOAA 2010

**Figure 3-1. Temperature Anomalies in the Contiguous U.S., 1979–2009.**

The EPA and the National Highway Traffic Safety Administration have increased corporate fuel economy standards to promote national energy security and reduce GHGs. Standards will equal 35 miles per gallon by 2020, with an estimated savings to drivers of $100 billion annually (EPA 2010d).

On May 13, 2010, 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 will be required to obtain PSD and title V permits. Facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will 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 will not be 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). Methane gas ($CH_4$), with a high radiative forcing $CO_2e$ ratio, is a common fugitive gas emission in oil and gas fields (EPA 2010d). 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 affects. 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 World Wide Web and available from EPA and NDDH (NDDH 2010).

Monitoring stations providing complete data near the project area 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 (NDDH 2010). 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 coverage that is applicable to this analysis (NDDH 2010).

Criteria pollutants measured at the two monitoring stations include $SO_2$, PM10, $NO_2$, and $O_3$. Lead and CO are not monitored by any of the three 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 |
| $SO_2$ (parts per million [ppm]) | 24-hour | 0.14 | 0.006 | 0.004 | 0.004 |
| | Annual Mean | 0.03 | 0.0005 | 0.0004 | 0.0011 |
| PM10 (micrograms per cubic meter [$\mu g/m^3$]) | 24-hour | 150 | 54 | 108 | 57.4 |
| | Expected Annual Mean | 50 | 11.3 | 14.2 | 13.2 |
| PM2.5 ($\mu g/m^3$) | 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 in the project area 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 air quality index 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 Air Emissions from Oil Field 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; and
  - use van or carpooling.
- Drilling BMPs to reduce rig emissions
  - Use cleaner diesel (Tier 2, 3, and 4) engines;
  - use natural gas-powered engines; and
  - 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; and
  - 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; and
  - 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; and
  - install an air quality monitoring station.

### 3.2.7 Potential Air Quality Impacts

Based on the existing air quality of the region, typical air levels and types of emissions from similar oil field projects, and Zenergy's commitment to 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, 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, as amended (33 USC 1251 et seq.)
- Federal Land Policy and Management Act of 1976 (43 USC 1711–1712)
- National Environmental Policy Act 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 Clean Water Act (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 for delegation of authority to set federally approved water quality standards on the Reservation pending with the EPA since 1996. 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.

Surface water is abundant in the project area, as shown in Figure 3-2. The proposed Zenergy wells and associated roads and gathering pipelines would occur within two subwatersheds, Boggy Creek (hydrologic unit code [HUC] 1011010121) and Upper Squaw Creek (HUC 1011020506), of the Lake Sakakawea Watershed (HUC 10110101) which is part of the Lake Sakakawea basin, the Little Missouri River subregion and Missouri region.

Dakota-3 Joseph Eagle #2-19H falls within the Upper Squaw Creek subwatershed. Runoff from the well pad would flow south and southwest in a minor branch for approximately 2 miles, until joining Upper Squaw Creek, then traveling to the southeast for approximately 20 miles until reaching perennial waters in Lake Sakakawea, as shown in Figure 3-2 and Figure 3-3.

Dakota-3 Sarah Smith #22-23H falls within the Upper Squaw Creek subwatershed. Runoff from the well pad would flow south into Upper Squaw Creek and travel approximately 12 miles, until reaching perennial waters in Lake Sakakawea, as shown in Figure 3-2 and Figure 3-4.

Dakota-3 Fox #14-8H falls within the Boggy Creek subwatershed. Runoff from the well pad would flow north into Boggy Creek and travel approximately 3 miles until reaching perennial waters in Lake Sakakawea, as shown in Figure 3-2 and Figure 3-5.

Dakota-3 Gerald Hale #33-28H falls within the Boggy Creek subwatershed. The Boggy Creek subwatershed runoff from the well pad would flow east into Boggy Creek and travel approximately 6 miles until reaching perennial waters in Lake Sakakawea, as shown in Figure 3-2 and Figure 3-6.

Dakota-3 Mandaree Warrior #14-11H falls within the Upper Squaw Creek subwatershed. Runoff from the well pad would flow southeast into Upper Squaw Creek and travel approximately 15 miles until reaching perennial waters in Lake Sakakawea, as shown in Figure 3-2 and Figure 3-7.

A query of the EPA Storage and Retrieval (STORET) 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 will

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.

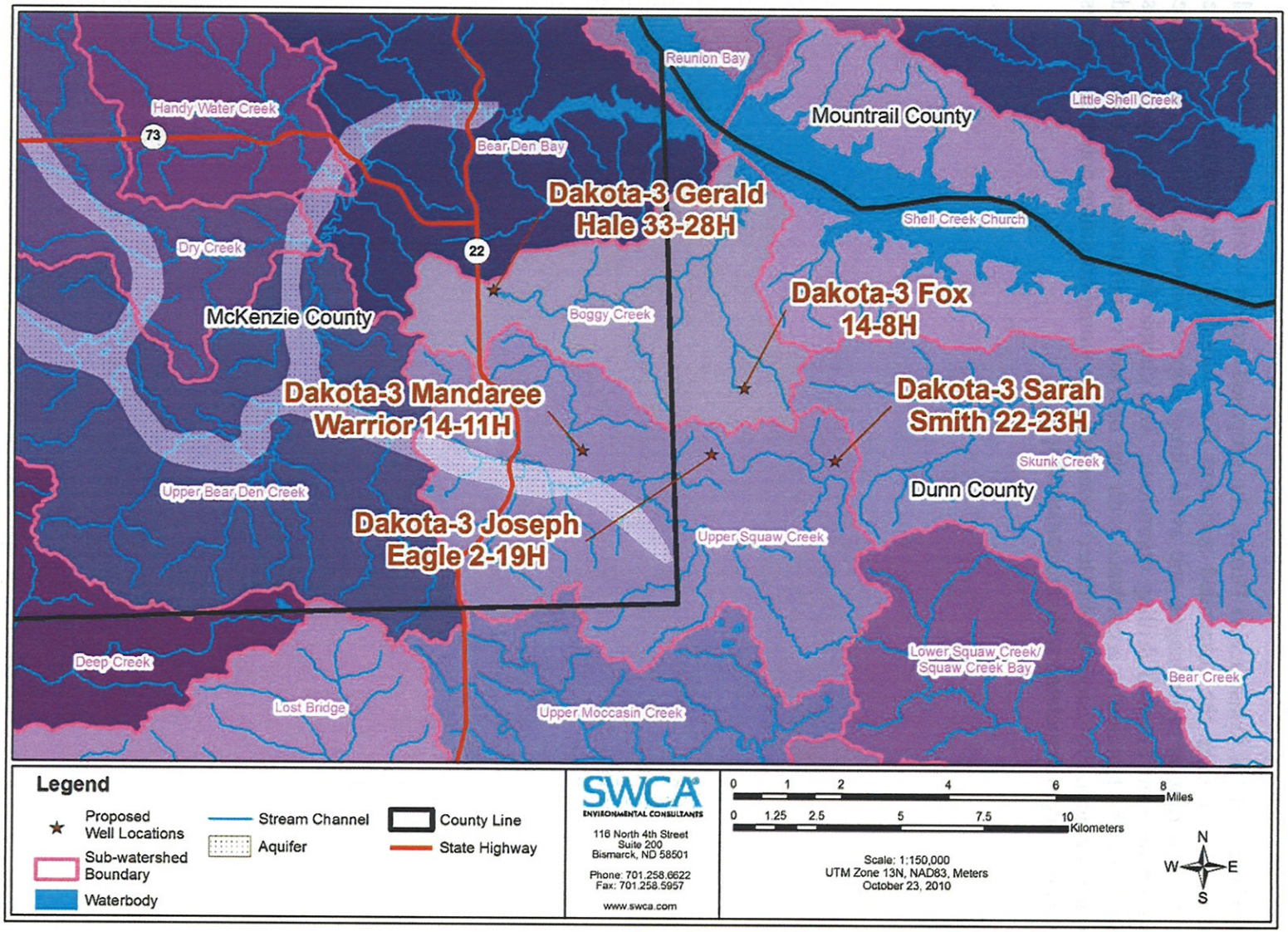



**Figure 3-2. Watersheds, surface runoff direction, and aquifers near the project area.**

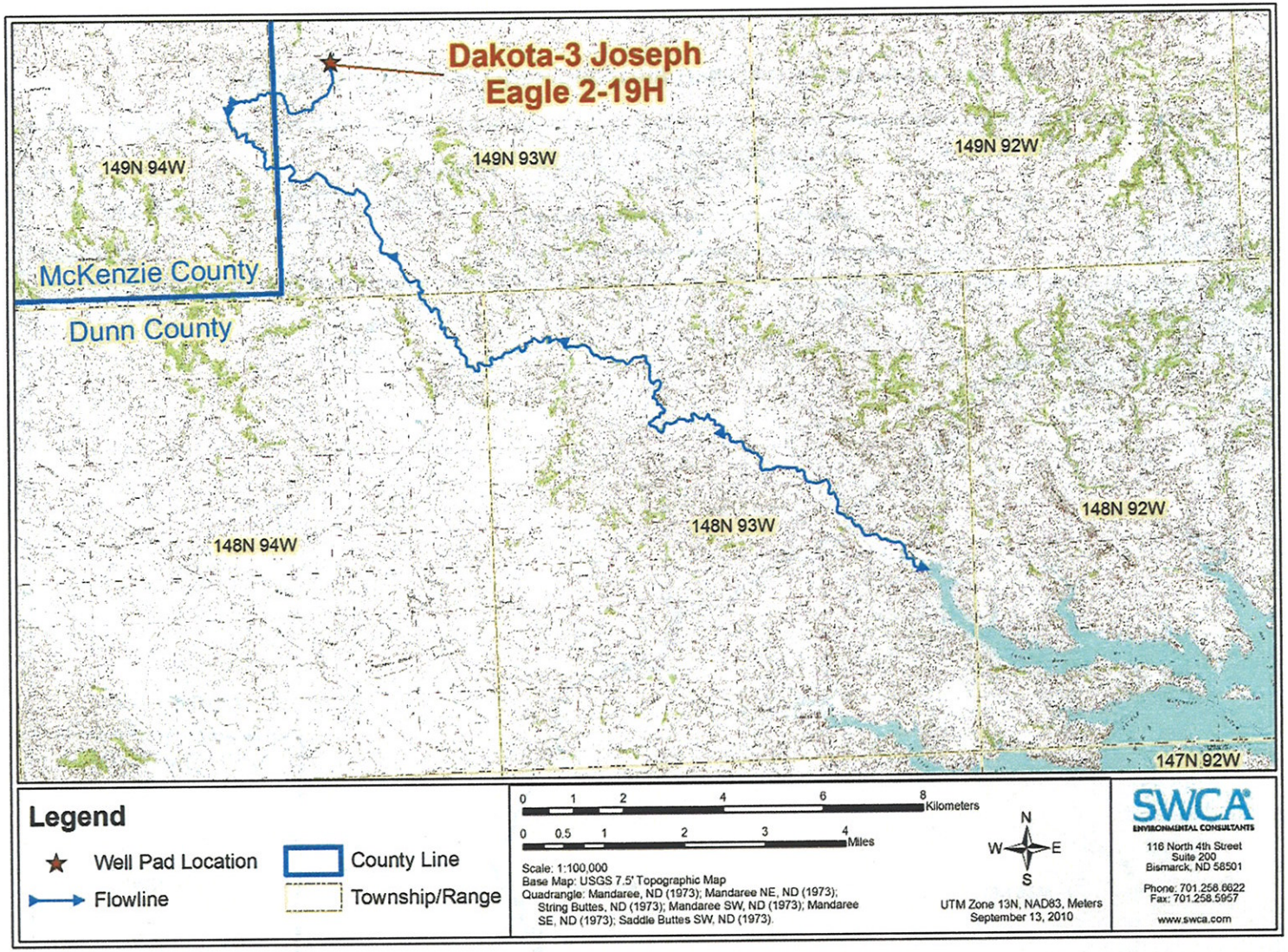



**Figure 3-3. Drainage direction from Dakota-3 Joseph Eagle #2-19H.**

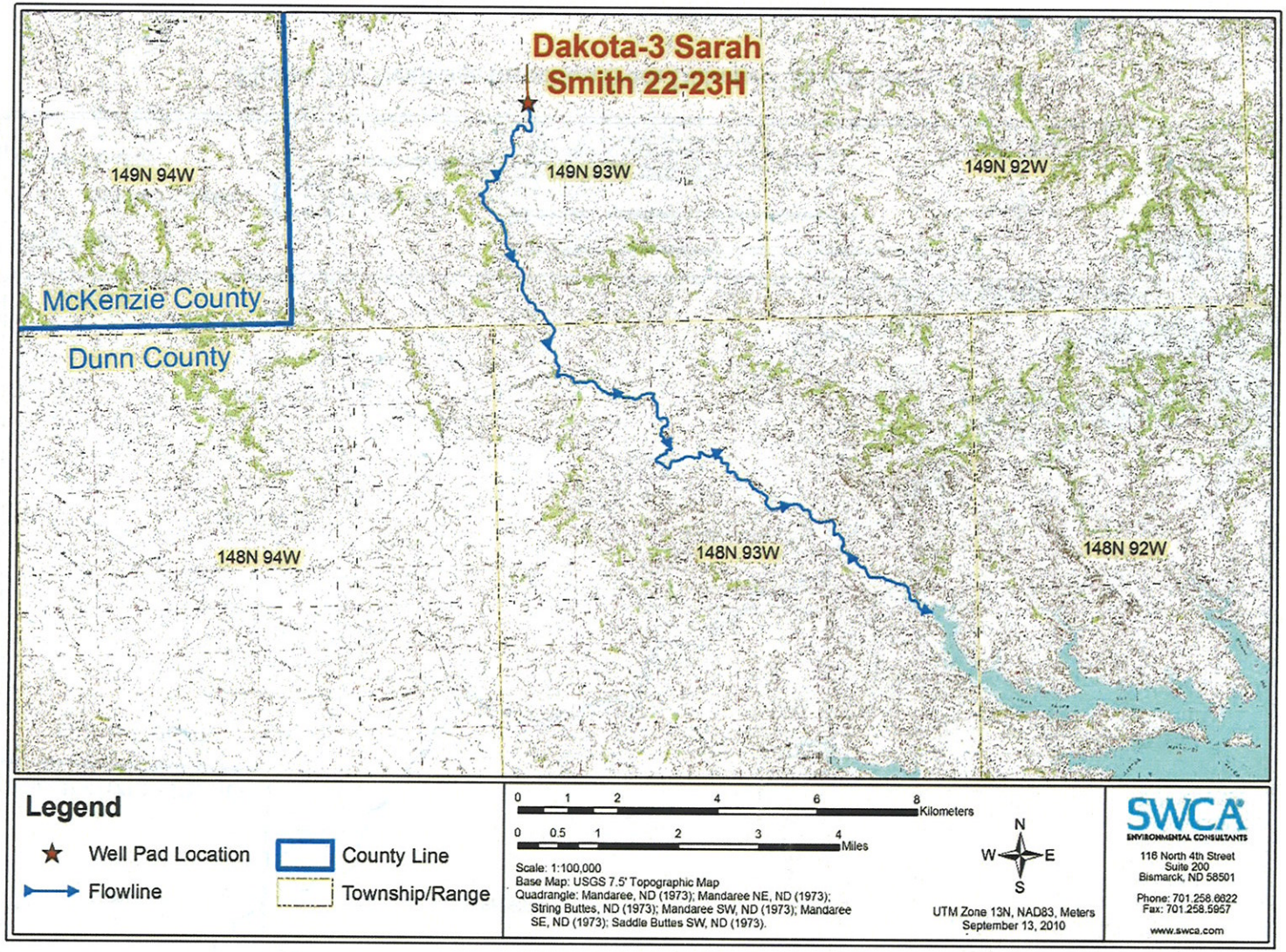



**Figure 3-4. Drainage direction from Dakota-3 Sarah Smith #22-23H.**

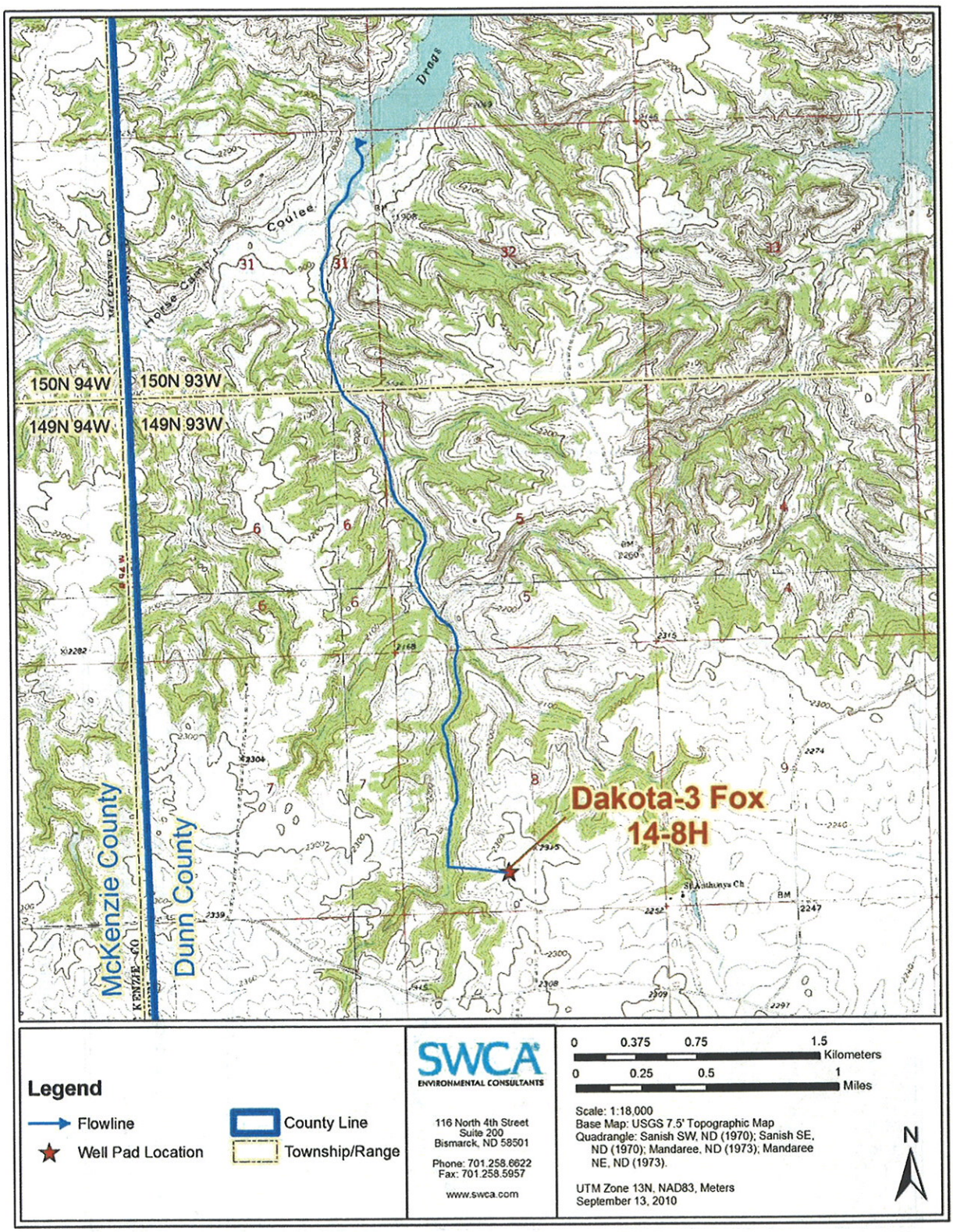



**Figure 3-5. Drainage direction from Dakota-3 Fox #14-8H.**

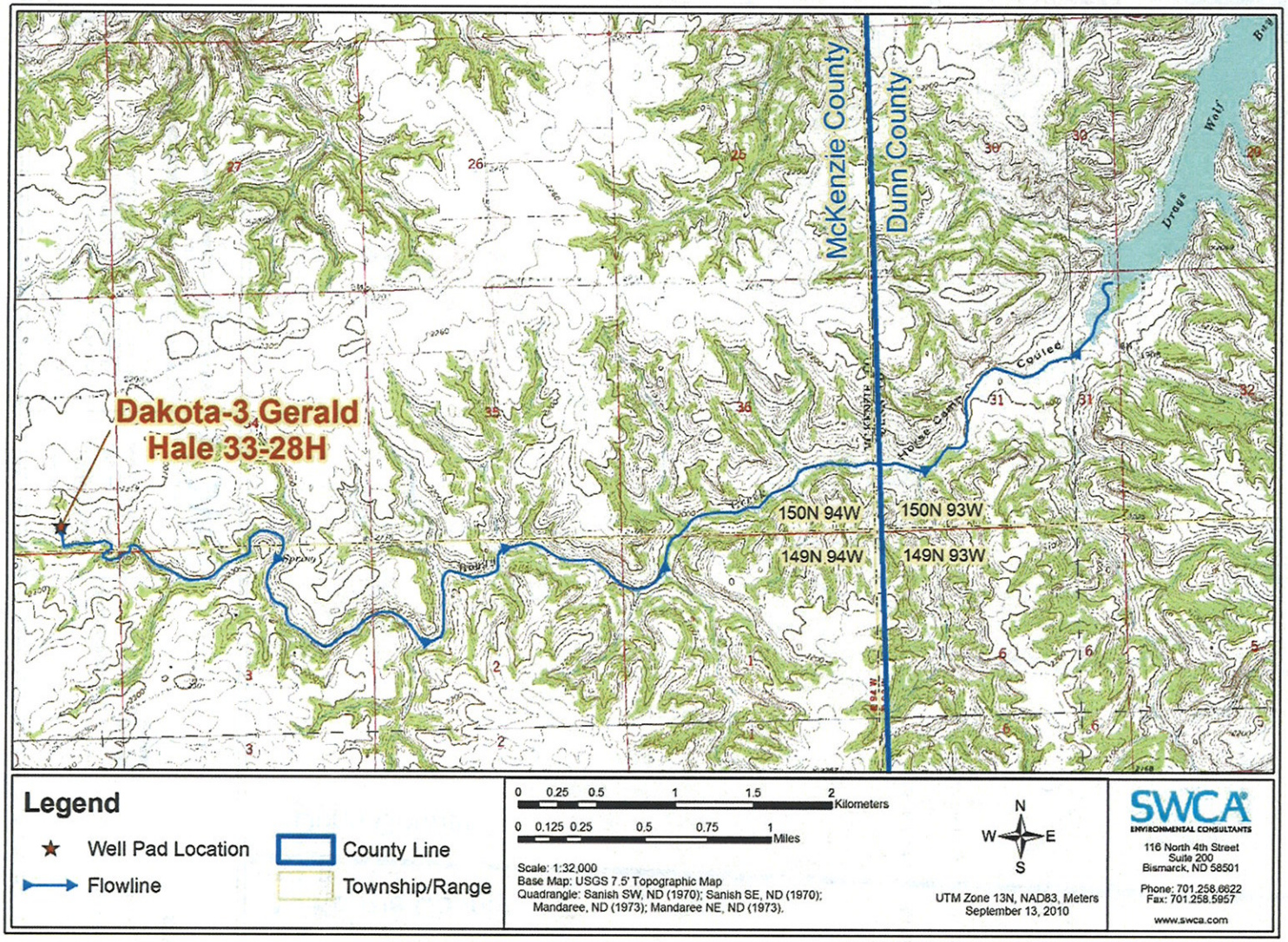



**Figure 3-6. Drainage direction from Dakota-3 Gerald Hale #33-28H.**

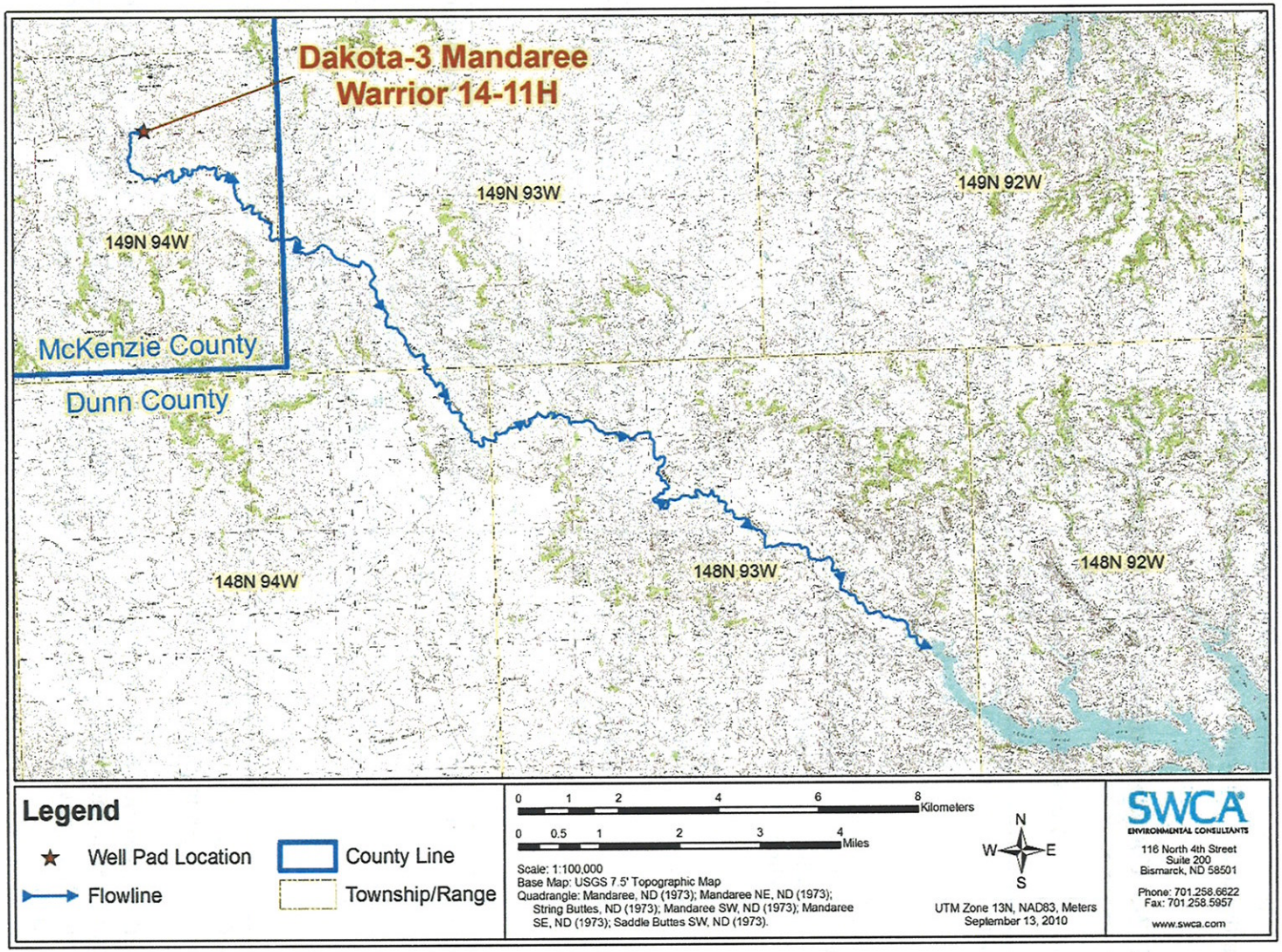



**Figure 3-7. Drainage direction from Dakota-3 Mandaree Warrior #14-11H.**

### 3.3.2 Groundwater

Aquifers in the project area include, from deepest to shallowest, the Cretaceous Fox Hills and Hell Creek formations and the Tertiary Ludlow, Tongue River, and Sentinel Butte formations (Table 3-3). Several shallow aquifers related to post-glacial outwash composed of till, silt, sand, and gravel are located in Dunn County. However, none are within the proposed project areas.

**Table 3-3. 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 | Maximum yield of 50 gal/min to individual wells 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

The shallow Sentinel Butte Formation, commonly used for domestic supply in the area, outcrops in Dunn and McKenzie counties. This aquifer meets standards of the NDDH (Croft 1985). Detailed analyses are available from the North Dakota Geological Survey, Bulletin 68, Part III, 1976.

Review of electronic records of the North Dakota State Water Commission revealed 100 existing water wells within 5 miles of any proposed oil wells. Of these, five water wells are near the proposed Joseph Eagle #2-19H well pad, seven are near the Fox #14-8H well pad, 39

are near the Sarah Smith #22-23H well pad, 19 are near the Gerald Hale #33-28H well pad, and 30 are near the Mardaree Warrior #14-11H well pad. Of the existing water wells within 5 miles of the proposed wells, four are for municipal or public water supply, 26 are for domestic or domestic and stock use, 13 are for stock use only, 27 are monitoring wells, 1 is for industrial use, and the remainder are either unknown or unused.

Twenty-two existing water wells are within 1 mile of the proposed Zenergy oils wells. The details of these wells are presented in Table 3-4. Of those wells within 1 mile of the nearest proposed well, one is used for public water supply, eight are domestic wells, one is used for stock alone, one is industrial, seven are monitoring wells, and four are either unknown or unused. The existing water wells are located as follows:

- One water well is located near the Joseph Eagle #2-19H well pad, at a distance of 0.27 mile.
- Six water wells are near the Sarah Smith #22-23H well pad, with the nearest at a distance of 0.15 mile.
- Four water wells are near the Fox #14-8H well pad, with the nearest at a distance of 0.17 mile.
- One water well is near the Gerald Hale #33-28H well pad, at a distance of 0.71 mile.
- Ten water wells are near the Mandaree Warrior #14-11H well pad, with the nearest at a distance of 0.19 mile.

In addition, one public supply water well (#149-094-14BA) is located 0.84 mile from the proposed Mandaree Warrior #14-11H well pad.

**Table 3-4. Existing Water Wells within 1 Mile of Proposed Wells.**

| Water Well # | Section | Township / Range | Type | Depth (feet) | Aquifer | Nearest Proposed Well Pad | Miles to Proposed Well Pad |
|---|---|---|---|---|---|---|---|
| 149-093-21AAD | 21 | 149N/093W | Domestic | 100 | Unknown | Sarah Smith #22-23H | 0.15 |
| 149-093-08DCC | 8 | 149N/093W | Domestic | 500 | Sentinel Butte | Fox #14-8H | 0.17 |
| 149-094-23BBA | 23 | 149N/094W | Monitoring | 69 | Unknown | Mandaree Warrior #14-11H | 0.19 |
| 149-093-18DDB | 18 | 149N/093W | Unused | 465 | Sentinel Butte | Joseph Eagle #2-19H | 0.27 |
| 149-094-14-1 | 14 | 149N/094W | Monitoring | 16 | Unknown | Mandaree Warrior #14-11H | 0.49 |

| Water Well # | Section | Township / Range | Type | Depth (feet) | Aquifer | Nearest Proposed Well Pad | Miles to Proposed Well Pad |
|---|---|---|---|---|---|---|---|
| 149-094-14-2 | 14 | 149N/094W | Monitoring | 29 | Unknown | Mandaree Warrior #14-11H | 0.49 |
| 149-094-14-3 | 14 | 149N/094W | Monitoring | 28 | Unknown | Mandaree Warrior #14-11H | 0.49 |
| 149-094-14-4 | 14 | 149N/094W | Monitoring | 25 | Unknown | Mandaree Warrior #14-11H | 0.49 |
| 149-094-23ACD | 23 | 149N/094W | Monitoring | 120 | Unknown | Mandaree Warrior #14-11H | 0.58 |
| 149-093-21DCA | 21 | 149N/093W | Unused | 35 | Unknown | Sarah Smith #22-23H | 0.62 |
| 149-094-14ACD | 14 | 149N/094W | Domestic | 66 | Unknown | Mandaree Warrior #14-11H | 0.65 |
| 149-093-22CCD | 22 | 149N/093W | Domestic | 100 | Unknown | Sarah Smith #22-23H | 0.67 |
| 149-093-09CCC | 9 | 149N/093W | Domestic | 453 | Unknown | Fox #14-8H | 0.68 |
| 150-094-33CB | 33 | 150N/094W | Unknown | 11,630 | Unknown | Gerald Hale #33-28H | 0.71 |
| 149-094-14B | 14 | 149N/094W | Unknown | 227 | Sentinel Butte & Tongue River | Mandaree Warrior #14-11H | 0.74 |
| 149-093-09CCD | 9 | 149N/093W | Domestic | 65 | Sentinel Butte | Fox #14-8H | 0.78 |
| 149-094-14BA | 14 | 149N/094W | Public Supply | 1,746 | Fox Hills | Mandaree Warrior #14-11H | 0.84 |
| 149-093-28 AA | 28 | 149N/093W | Industrial | 1,680 | Unknown | Sarah Smith #22-23H | 0.84 |
| 149-093-27BAA | 27 | 149N/093W | Monitoring | 62 | Unknown | Sarah Smith #22-23H | 0.86 |
| 149-093-05CDC | 5 | 149N/093W | Stock | 84 | Sentinel Butte | Fox #14-8H | 0.93 |
| 149-093-27ABA2 | 27 | 149N/093W | Domestic | 130 | Unknown | Sarah Smith #22-23H | 0.98 |

| Water Well # | Section | Township / Range | Type | Depth (feet) | Aquifer | Nearest Proposed Well Pad | Miles to Proposed Well Pad |
|---|---|---|---|---|---|---|---|
| 149-094-15AAA | 15 | 149N/094W | Domestic | 285 | Unknown | Mandaree Warrior #14-11H | 0.99 |

Source: North Dakota State Water Commission (2010).

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. However, the 22 wells 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. Drilling would proceed in compliance with Onshore Oil and Gas Order No. 2, Drilling Operations (43 CFR 3160).

Since none of the proposed project area lies within the boundaries of the post-glacial outwash aquifers, low porosity bedrock near the project wells would act as confining layers to prevent impacts to groundwater resources. Additionally, well completion methods would prevent cross contamination between aquifers or the introduction of hazardous materials into aquifers.

#### 3.3.2.1 Potential Impacts to Surface Water and Groundwater Resources

The proposed wells would be located between 0.15 and 0.71 mile from the nearest water well, and several groundwater protective measures have been included in the drilling and production, such as 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. Based on the location, design, and drilling methods, no significant adverse impacts to surface water or groundwater resources are anticipated from the Proposed Action.

## 3.4 SOILS

### 3.4.1 Natural Resources Conservation Service Soil Data

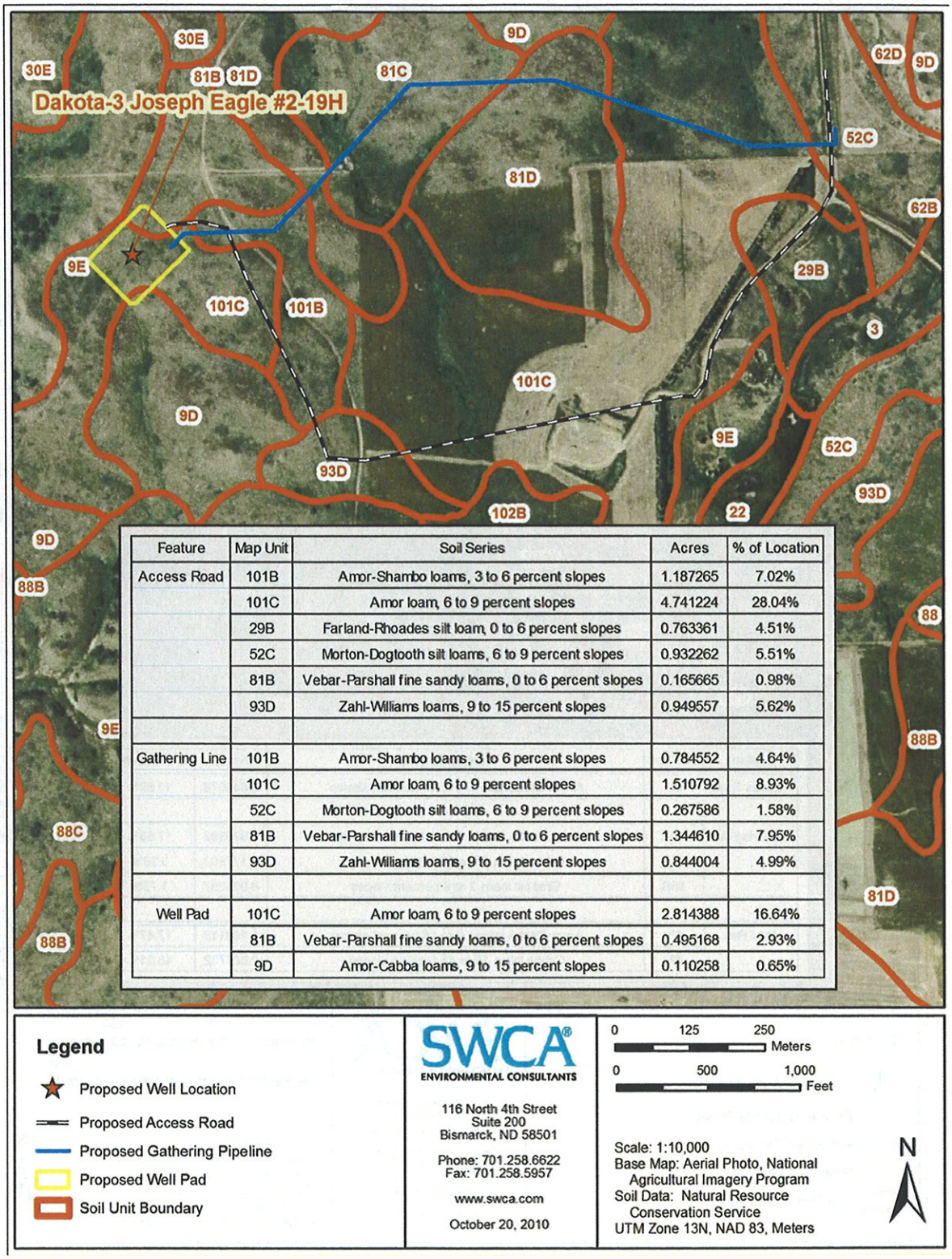
The project area is located toward the center of the Williston Basin. The Greenhorn Formation, which consists of thin limestone and dark gray to black organic-rich shale, is found from the surface to a depth of approximately 4,000 feet. The Greenhorn is subdivided into lower and upper intervals of limestone 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 described in this section.

The overall percentage of project disturbance by soil series is summarized in Table 3-5 and is based on the spatial extent of soil series combinations derived from NRCS data (Figures 3-8 through 3-12); therefore, 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).

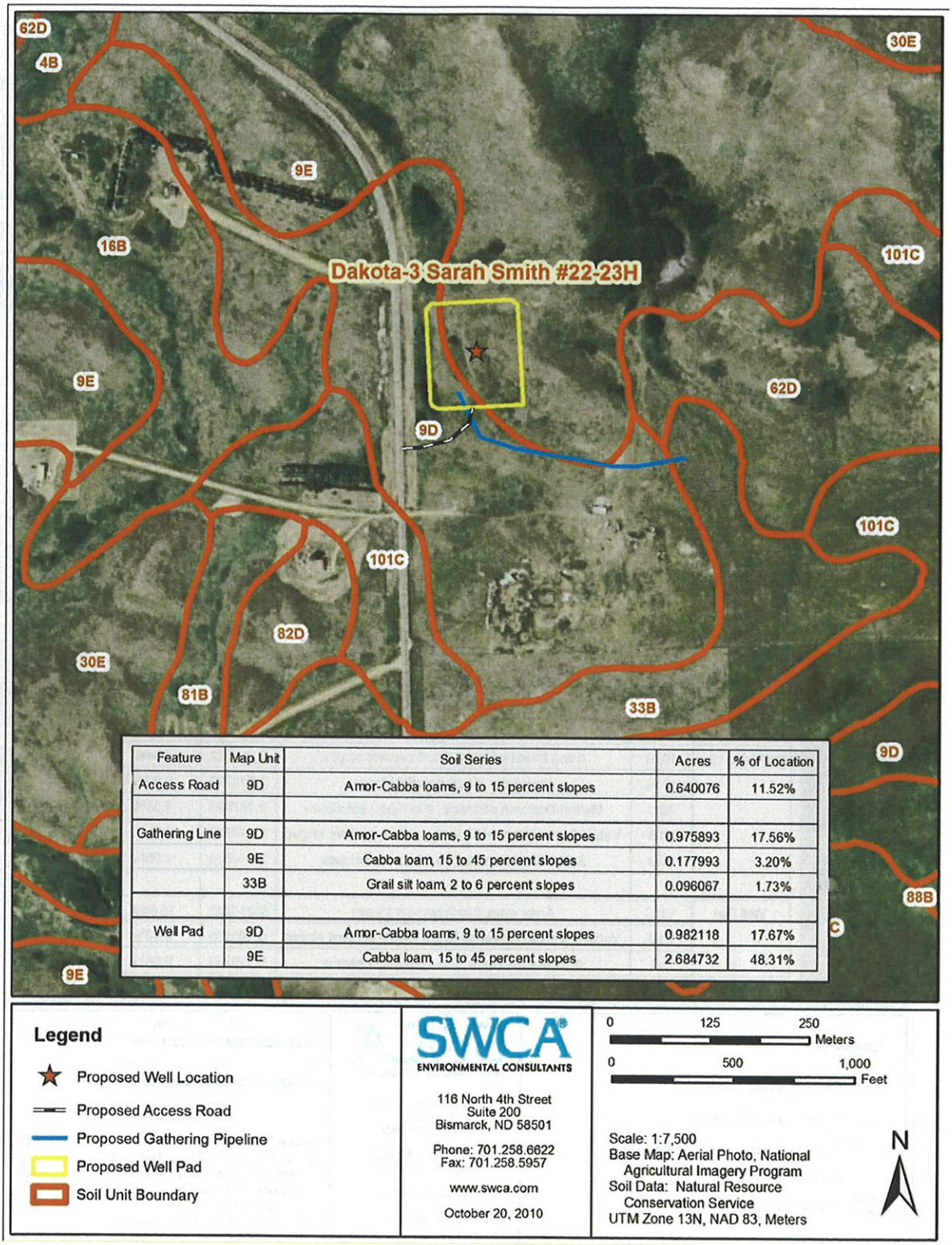
**Table 3-5. Percentage of the Overall Project Disturbance Comprised of Specific Soil Types.**

| Map Unit | Soil Series | K-factor | Acres | % of Project Disturbance |
|---|---|---|---|---|
| 101C | Amor loam, 6 to 9 percent slopes | 0.24 | 9.07 | 17.19% |
| 9D | Amor-Cabba loams, 9 to 15 percent slopes | 0.32 | 9.27 | 17.57% |
| 101B | Amor-Shambo loams, 3 to 6 percent slopes | 0.28 | 1.97 | 3.74% |
| 33 | Belfield-Grail silty clay loams, 0 to 2 percent slopes | 0.25 | 4.93 | 9.35% |
| 9E | Cabba loam, 15 to 45 percent slopes | 0.32 | 3.99 | 7.56% |
| 34B | Daglum-Belfield complex, 0 to 6 percent slopes | 0.32 | 1.54 | 2.92% |
| 29B | Farland-Rhoades silt loam, 0 to 6 percent slopes | 0.32 | 0.76 | 1.45% |
| 33B | Grail silt loam, 2 to 6 percent slopes | 0.37 | 0.10 | 0.18% |
| 14 | Korchea loam, channeled, 0 to 2 percent slopes | 0.28 | 0.55 | 1.04% |
| 232C | Lambert-Slickspots-Rhoades complex, 0 to 9 percent slopes | 0.37 | 2.26 | 4.29% |
| 52C | Morton-Dogtooth silt loams, 6 to 9 percent slopes | 0.28 | 1.20 | 2.27% |
| 71C | Regent-Janesburg complex, 6 to 9 percent slopes | 0.32 | 4.53 | 8.59% |
| 36B | Rhoades-Daglum complex, 0 to 6 percent slopes | 0.32 | 2.47 | 4.69% |
| 81B | Vebar-Parshall fine sandy loams, 0 to 6 percent slopes | 0.2 | 2.01 | 3.80% |
| 88C | Williams loam, 6 to 9 percent slopes | 0.28 | 1.20 | 2.27% |
| 43C | Williams-Zahl loams, 6 to 9 percent slopes | 0.28 | 0.71 | 1.34% |
| 145F | Zahl-Cabba-Arikara complex, 9 to 70 percent slopes | 0.37 | 2.10 | 3.98% |
| 45F | Zahl-Cabba-Maschetah complex, 3 to 70 percent slopes | 0.37 | 2.30 | 4.36% |
| 93D | Zahl-Williams loams, 9 to 15 percent slopes | 0.28 | 1.79 | 3.40% |
| | **Total Project Soil Disturbance** | | **52.75** | **100.00%** |



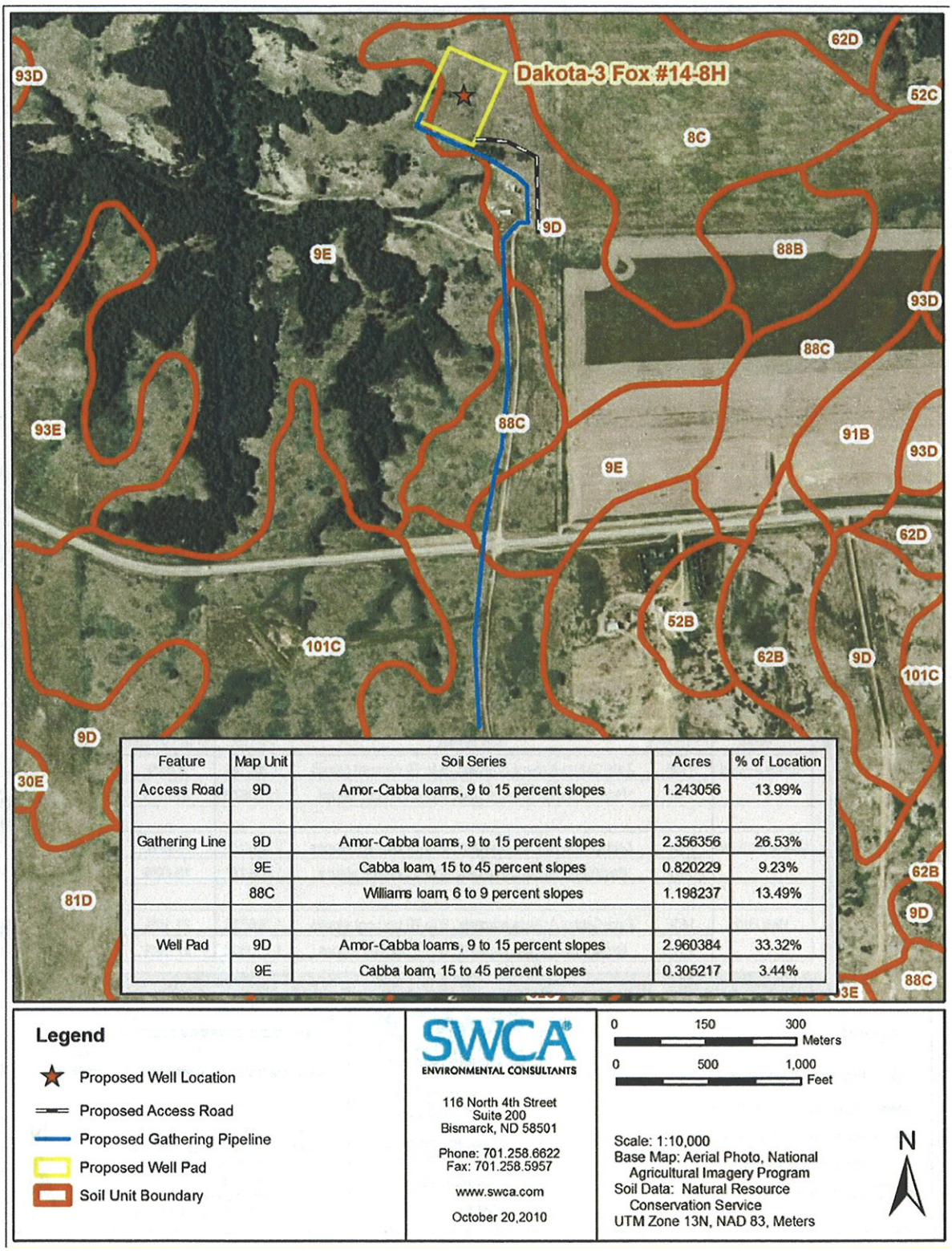

| Feature | Map Unit | Soil Series | Acres | % of Location |
|---|---|---|---|---|
| Access Road | 101B | Amor-Shambo loams, 3 to 6 percent slopes | 1.187265 | 7.02% |
| | 101C | Amor loam, 6 to 9 percent slopes | 4.741224 | 28.04% |
| | 29B | Farland-Rhoades silt loam, 0 to 6 percent slopes | 0.763361 | 4.51% |
| | 52C | Morton-Dogtooth silt loams, 6 to 9 percent slopes | 0.932262 | 5.51% |
| | 81B | Vebar-Parshall fine sandy loams, 0 to 6 percent slopes | 0.165665 | 0.98% |
| | 93D | Zahl-Williams loams, 9 to 15 percent slopes | 0.949557 | 5.62% |
| | | | | |
| Gathering Line | 101B | Amor-Shambo loams, 3 to 6 percent slopes | 0.784552 | 4.64% |
| | 101C | Amor loam, 6 to 9 percent slopes | 1.510792 | 8.93% |
| | 52C | Morton-Dogtooth silt loams, 6 to 9 percent slopes | 0.267586 | 1.58% |
| | 81B | Vebar-Parshall fine sandy loams, 0 to 6 percent slopes | 1.344610 | 7.95% |
| | 93D | Zahl-Williams loams, 9 to 15 percent slopes | 0.844004 | 4.99% |
| | | | | |
| Well Pad | 101C | Amor loam, 6 to 9 percent slopes | 2.814388 | 16.64% |
| | 81B | Vebar-Parshall fine sandy loams, 0 to 6 percent slopes | 0.495168 | 2.93% |
| | 9D | Amor-Cabba loams, 9 to 15 percent slopes | 0.110258 | 0.65% |

**Figure 3-8. Approximate spatial extent of soil types within and around Joseph Eagle #2-19H.**



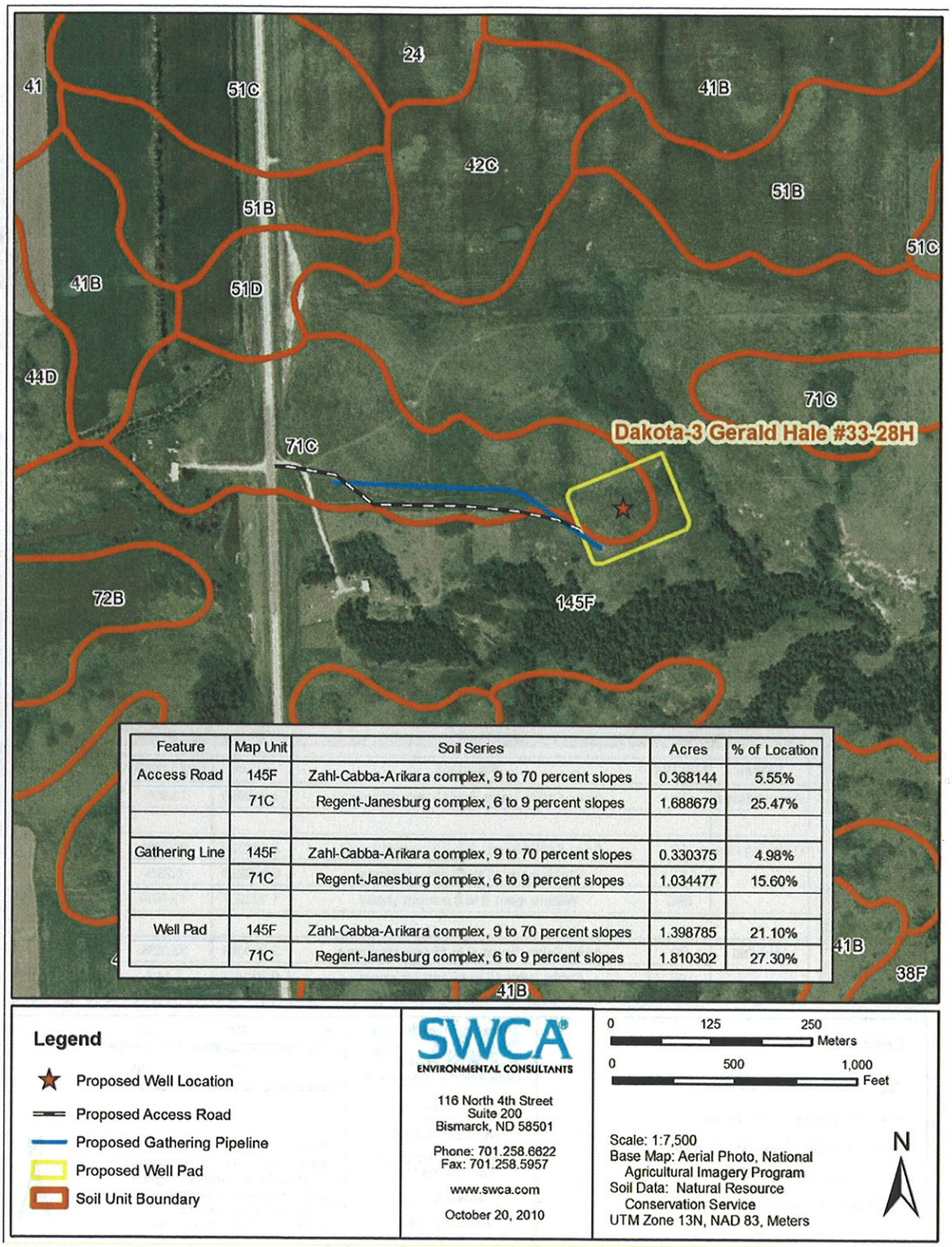

| Feature | Map Unit | Soil Series | Acres | % of Location |
|---|---|---|---|---|
| Access Road | 9D | Amor-Cabba loams, 9 to 15 percent slopes | 0.640076 | 11.52% |
| | | | | |
| Gathering Line | 9D | Amor-Cabba loams, 9 to 15 percent slopes | 0.975893 | 17.56% |
| | 9E | Cabba loam, 15 to 45 percent slopes | 0.177993 | 3.20% |
| | 33B | Grail silt loam, 2 to 6 percent slopes | 0.096067 | 1.73% |
| | | | | |
| Well Pad | 9D | Amor-Cabba loams, 9 to 15 percent slopes | 0.982118 | 17.67% |
| | 9E | Cabba loam, 15 to 45 percent slopes | 2.684732 | 48.31% |

**Figure 3-9. Approximate spatial extent of soil types within and around Sarah Smith #22-23H.**




| Feature | Map Unit | Soil Series | Acres | % of Location |
|---|---|---|---|---|
| Access Road | 9D | Amor-Cabba loams, 9 to 15 percent slopes | 1.243056 | 13.99% |
| | | | | |
| Gathering Line | 9D | Amor-Cabba loams, 9 to 15 percent slopes | 2.356356 | 26.53% |
| | 9E | Cabba loam, 15 to 45 percent slopes | 0.820229 | 9.23% |
| | 88C | Williams loam, 6 to 9 percent slopes | 1.198237 | 13.49% |
| | | | | |
| Well Pad | 9D | Amor-Cabba loams, 9 to 15 percent slopes | 2.960384 | 33.32% |
| | 9E | Cabba loam, 15 to 45 percent slopes | 0.305217 | 3.44% |

**Figure 3-10. Approximate spatial extent of soil types within and around Fox #14-8H.**




| Feature | Map Unit | Soil Series | Acres | % of Location |
|---|---|---|---|---|
| Access Road | 145F | Zahl-Cabba-Arikara complex, 9 to 70 percent slopes | 0.368144 | 5.55% |
| | 71C | Regent-Janesburg complex, 6 to 9 percent slopes | 1.688679 | 25.47% |
| | | | | |
| Gathering Line | 145F | Zahl-Cabba-Arikara complex, 9 to 70 percent slopes | 0.330375 | 4.98% |
| | 71C | Regent-Janesburg complex, 6 to 9 percent slopes | 1.034477 | 15.60% |
| | | | | |
| Well Pad | 145F | Zahl-Cabba-Arikara complex, 9 to 70 percent slopes | 1.398785 | 21.10% |
| | 71C | Regent-Janesburg complex, 6 to 9 percent slopes | 1.810302 | 27.30% |

**Legend**

- Proposed Well Location
- Proposed Access Road
- Proposed Gathering Pipeline
- Proposed Well Pad
- Soil Unit Boundary

SWCA ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

October 20, 2010

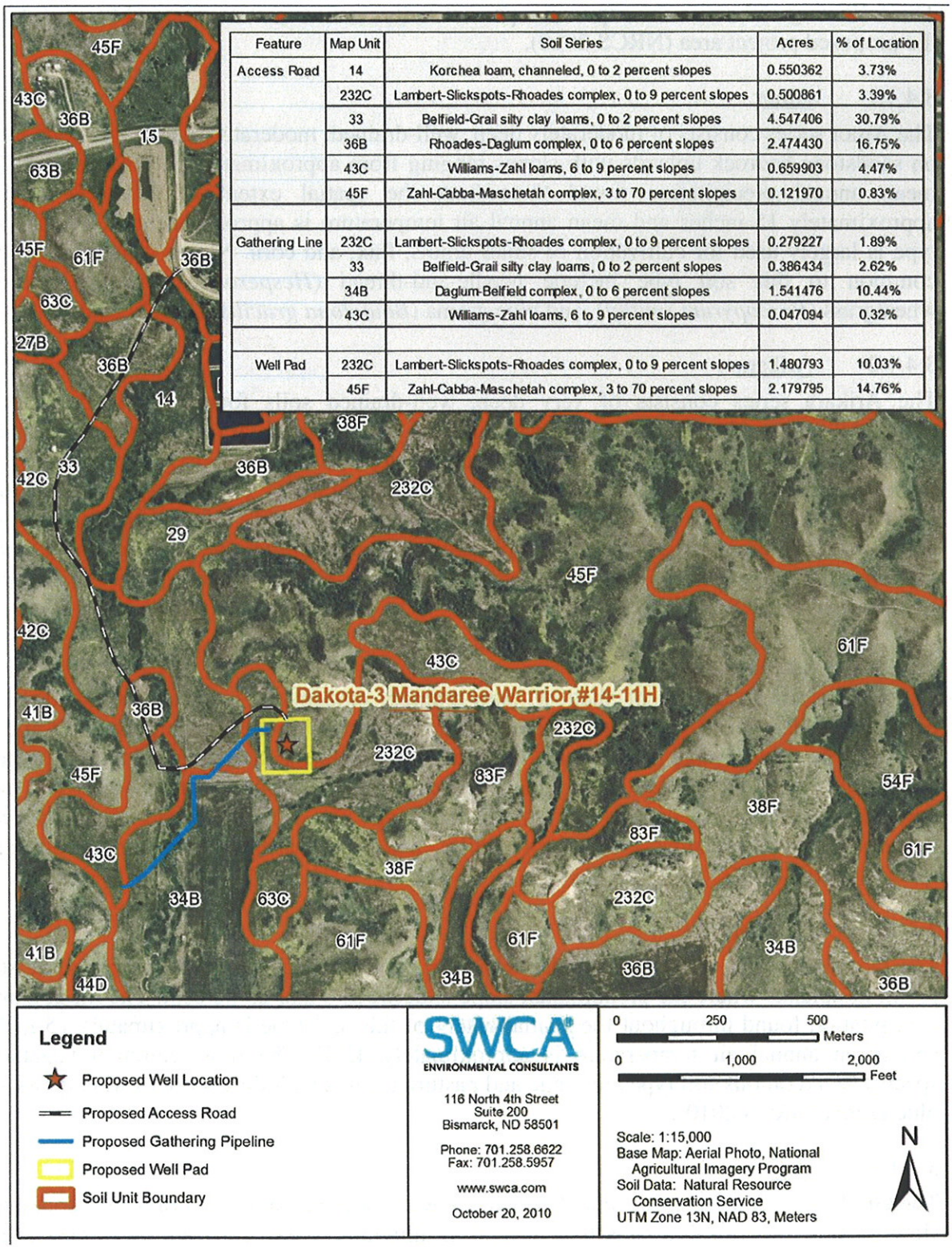
0 125 250 Meters

0 500 1,000 Feet

Scale: 1:7,500
Base Map: Aerial Photo, National Agricultural Imagery Program
Soil Data: Natural Resource Conservation Service
UTM Zone 13N, NAD 83, Meters

N

**Figure 3-11. Approximate spatial extent of soil types within and around Gerald Hale #33-28H.**




| Feature | Map Unit | Soil Series | Acres | % of Location |
|---|---|---|---|---|
| Access Road | 14 | Korchea loam, channeled, 0 to 2 percent slopes | 0.550362 | 3.73% |
| | 232C | Lambert-Slickspots-Rhoades complex, 0 to 9 percent slopes | 0.500861 | 3.39% |
| | 33 | Belfield-Grail silty clay loams, 0 to 2 percent slopes | 4.547406 | 30.79% |
| | 36B | Rhoades-Daglum complex, 0 to 6 percent slopes | 2.474430 | 16.75% |
| | 43C | Williams-Zahl loams, 6 to 9 percent slopes | 0.659903 | 4.47% |
| | 45F | Zahl-Cabba-Maschetah complex, 3 to 70 percent slopes | 0.121970 | 0.83% |
| | | | | |
| Gathering Line | 232C | Lambert-Slickspots-Rhoades complex, 0 to 9 percent slopes | 0.279227 | 1.89% |
| | 33 | Belfield-Grail silty clay loams, 0 to 2 percent slopes | 0.386434 | 2.62% |
| | 34B | Daglum-Belfield complex, 0 to 6 percent slopes | 1.541476 | 10.44% |
| | 43C | Williams-Zahl loams, 6 to 9 percent slopes | 0.047094 | 0.32% |
| | | | | |
| Well Pad | 232C | Lambert-Slickspots-Rhoades complex, 0 to 9 percent slopes | 1.480793 | 10.03% |
| | 45F | Zahl-Cabba-Maschetah complex, 3 to 70 percent slopes | 2.179795 | 14.76% |

**Figure 3-12. Approximate spatial extent of soil types within and around Mandaree Warrior #14-11H.**

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

#### 3.4.1.1 Amor

The Amor series consists of moderately deep, well-drained, moderately permeable soils found on sandstone bedrock uplands with slopes ranging from approximately 0 to 25 percent. 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. This soil type is largely used for cultivation of small grains, flax, and corn. Native vegetation species common to this soil type include needle-and-thread (*Hesperostipa comata*), western wheatgrass (*Pascopyrum smithii*), and blue grama (*Bouteloua gracilis*) (NRCS 2010).

#### 3.4.1.2 Arikara

The Arikara series consists of very deep, well-drained soils found on wooded slopes. Permeability is moderate with slopes ranging from approximately 9 to 70 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 40°F. This soil type is used most often for woodland grazing. Native vegetation species common to this soil type include bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*), quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and Rocky Mountain juniper (*Juniperus scopulorum*) (NRCS 2010).

#### 3.4.1.3 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 percent. 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 (*Stipa viridula*), and other various herbs, forbs, and shrub species (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 percent. 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 Grail

The Grail series consists of deep and very deep, well- or moderately well-drained, moderately slow or slowly permeable soils that formed in alluvium. These soils are on terraces, fans, swales, and foot slopes on uplands and have slopes ranging from 0 to 15 percent. Mean annual air temperature is 42°F, and mean annual precipitation is 15 inches. Most areas are used for cultivated crops such as wheat, oats, and barley. Native vegetation includes mixed

grasses such as western wheatgrass, big bluestem (*Andropogon gerardii*), green needlegrass, and needle-and-thread (NRCS 2010).

#### 3.4.1.6 Janesburg

The Janesburg series consists of moderately deep, well-drained soils formed in residuum weathered from alkaline, soft shale, siltstone, and mudstone. These soils have slow or very slow permeability. They are on upland plains and have slopes of 0 to 25 percent. Mean annual air temperature is about 42°F, and mean annual precipitation is about 15 inches. This soil type is used for range, pasture, and small grains. Native vegetation is western wheatgrass, blue grama, green needlegrass, sedges, and forbs (NRCS 2010).

#### 3.4.1.7 Lambert

The Lambert soils consist of very deep, well-drained soils formed in recent alluvium on uplands, fans, and terraces. These soils are moderately to slowly permeable and have slopes of 0 to 65 percent. Mean annual precipitation is about 14 inches and mean annual air temperature is about 42°F. Lambert soils in moderately sloping areas are about equally divided between cropland and native pasture. Lambert soils in steep areas are all range. Uncultivated areas are chiefly in western wheatgrass, blue grama, threadleaf sedge (*Carex filfolia*), and needle-and-thread grass (NRCS 2010).

#### 3.4.1.8 Maschetah

The Maschetah series consists of very deep, well-drained soils that formed in calcareous silty eolian or alluvial deposits. These soils are on sedimentary plains and hills with slopes of 0 to 45 percent. Mean annual precipitation is about 17 inches, and mean annual temperature is about 43°F. Maschetah soils are used mainly for range and some are used for growing small grains. Potential native vegetation is mainly western wheatgrass, blue grama, bluegrass (*Poa* spp.), needle-and-thread, and fringed sagewort (*Artemisia frigida*) (NRCS 2010).

#### 3.4.1.9 Morton

The Morton series consists of moderately deep, well-drained, moderately permeable soils that formed in material weathered from soft calcareous silty shales, siltstones, and fine-grained sandstones. These soils are on uplands and have slopes of 0 to 15 percent. Mean annual air temperature is 42°F, and mean annual precipitation is 15 inches. Cultivated areas are used for growing small grains, flax, corn, hay, and pasture. Native vegetation is medium and short prairie grasses such as western wheatgrass, green needlegrass, and blue grama (NRCS 2010).

#### 3.4.1.10 Parshall

The Parshall series consists of very deep, well- or moderately well-drained, moderately rapidly permeable soils formed in alluvium. These soils are on terraces, outwash plains, and upland swales and have slopes of 0 to 25 percent. Mean annual air temperature is 42°F, and mean annual precipitation is 16 inches. Most areas are cropped to small grains, flax, tame grass, and alfalfa. Native vegetation is medium and short prairie grasses such as needle-and-thread and some legumes (NRCS 2010).

#### 3.4.1.11 Regent

The Regent series consists of moderately deep, well-drained, slowly permeable soils formed in residuum weathered from alkaline soft shale, siltstone, or mudstone. These soils are on uplands and have slopes of 0 to 45 percent. Mean annual air temperature is 42°F, and mean annual precipitation is 16 inches. This soil type is largely used for cultivation and pasture. Native vegetation is medium and short grasses such as western wheatgrass, green needlegrass, blue grama, and some forbs and upland sedges (NRCS 2010).

#### 3.4.1.12 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 percent. 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 includes western wheatgrass and blue grama (NRCS 2010).

#### 3.4.1.13 Shambo

The Shambo series consists of deep and very deep, well-drained, moderately permeable soils that formed in calcareous alluvium mainly from soft sandstone, mudstone, and shale. These soils are on terraces and fans along stream valleys and are on fans on uplands. Slope ranges from 0 to 35 percent. Mean annual air temperature is 42°F, and mean annual precipitation is 15 inches. This soil type is largely used for cultivation. Native vegetation includes green needlegrass, needle-and-thread, western wheatgrass, prairie junegrass (*Koeleria macrantha*), blue grama, and a variety of forbs.

#### 3.4.1.14 Vebar

The Vebar series consists of well-drained, moderately deep, moderately rapidly permeable soils that formed in residuum weathered from soft calcareous sandstone. These soils are on uplands and have slopes ranging from 0 to 65 percent. Mean annual air temperature is 42°F, and mean annual precipitation is 16 inches. This soil type is largely used for cultivation and pasture. Native grasses are needle-and-thread, and prairie sandreed (*Calamovilfa longifolia*) (NRCS 2010).

#### 3.4.1.15 Williams

The Williams series consists of very deep, slowly permeable, well-drained soils found on glacial till plains and moraines with slopes at approximately 0 to 35 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 14 inches and mean annual air temperature is approximately 40°F. This soil type is largely used for cultivation. Native vegetation species common to this soil type include western wheatgrass, needle-and-thread, blue grama, and green needlegrass (NRCS 2010).

#### 3.4.1.16 Zahl

The Zahl series consists of very deep, slowly permeable, well-drained soils found on glacial till plains, moraines, and valley side slopes at approximately 1 to 60 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 14 inches

and mean annual air temperature is approximately 40°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass, little bluestem, and needle-and-thread (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 3-6. 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 3-6. Soil Data Obtained through the Excavation of Soil Pits within the Proposed Project Area.**

| Well Name and Component | Depth (inches) | % of Sample | Soil Matrix Color (color name) | Redoximorphic Feature Color | Texture | Topography Slope (°) |
|---|---|---|---|---|---|---|
| Dakota-3 Joseph Eagle #2-19H | | | | | | |
| Well Pad | 0–18 | 100 | 10YR 4/6 | N/A | Silty Clay Loam | 3–5 |
| | 18–20 | 100 | 10YR 4/5 | N/A | Silty Clay Loam | |
| Dakota-3 Sarah Smith #22-23H | | | | | | |
| Well Pad | 0–12 | 100 | 10YR 3/2 | N/A | Silty Clay | 3–5 |
| | 12–20 | 100 | 10YR 4/2 | N/A | Silty Clay | |
| Dakota-3 Fox #14-8H | | | | | | |
| Access Road | 0–16 | 100 | 10YR 3/2 | N/A | Clay | 1–3 |
| | 16–19 | 100 | 10YR 3/2 | 2.5Y 7/8 | Clay | |
| | 19–20 | 100 | 2.5YR 4/2 | N/A | Silty Clay | |
| Well Pad | 0–16 | 100 | 10YR 2/1 | N/A | Sandy Clay | 3–5 |
| | 16–20 | 95 | 10YR 2/1 | N/A | Clay Loam | |
| | | 5 | 10YR 3/2 | N/A | Clay Loam | |
| Gathering Line | 0–9 | 100 | 10YR 3/1 | N/A | Loam | 1–3 |
| | 9–18 | 98 | 2.5YR 4/2 | N/A | Loam | |
| | | 2 | 10YR 5/6 | N/A | Loam | |
| Dakota-3 Gerald Hale #33-28H | | | | | | |
| Well Pad | 0–20 | 100 | 2.5YR 4/1 | N/A | Clay Loam | 3–5 |
| Access Road/ Gathering Line | 0–18 | 100 | 10YR 3/1 | N/A | Loam | 1–3 |

| Well Name and Component | Depth (inches) | % of Sample | Soil Matrix Color (color name) | Redoximorphic Feature Color | Texture | Topography Slope (°) |
|---|---|---|---|---|---|---|
| Dakota-3 Mandaree Warrior #14-11H | | | | | | |
| Well Pad | 0–6 | 100 | 10YR 3/2 | N/A | Sandy Clay | 3–5 |
| | 6–16 | 100 | 10YR 4/3 | N/A | Sandy Clay | |

### 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. All gathering pipelines would be recontoured to the original topography and revegetated immediately following construction, resulting in no potential soil loss.

Table 3-7 provides analysis of the calculated potential for soil loss for each proposed well pad and access road using the standard Universal Soil Loss Equation which is based on physical characteristics of the sites and soils (NRCS 2010).

**Table 3-7. Calculated Rate of Potential Soil Loss by Project Component.**

| Well Pad Name and Component | Surface Disturbance (acres) | Potential Soil Loss (tons/acre/year) |
|---|---|---|
| **Dakota-3 Joseph Eagle #2-19H** | | |
| Well Pad | 3.42 | 77.96 |
| Access Road | 8.67 | 5.99 |
| **Dakota-3 Sarah Smith #22-23H** | | |
| Well Pad | 3.67 | 56.44 |
| Access Road | 0.56 | 5.99 |
| **Dakota-3 Fox #14-8H** | | |
| Well Pad | 3.27 | 24.76 |
| Access Road | 1.17 | 5.99 |
| **Dakota-3 Gerald Hale #33-28H** | | |
| Well Pad | 3.21 | 65.26 |
| Access Road | 1.98 | 6.92 |
| **Dakota-3 Mandaree Warrior #14-11H** | | |
| Well Pad | 3.67 | 77.96 |
| Access Road | 8.78 | 6.92 |

Zenergy 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 along side 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.

Site-specific analysis of potential impacts from erosion is discussed below.

3.4.3.1 Dakota-3 Joseph Eagle #2-19H

- The Dakota-3 Joseph Eagle #2-19H well pad, proposed new access road, and gathering pipeline will occur in areas that are dominated by silty clay-loam soils that are moderate to moderately deep, well-drained, and moderately permeable (Figure 3-8, Table 3-5). Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2010).
- 16.9 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 5%, and the site is well-vegetated, so the potential for runoff in an event is low. The well pad location, access road, and gathering pipeline ROW have a K-Factor of 0.28 to 0.37. Based on calculations of the Universal Soil Loss Equation, potential soil loss of 77.96 tons per acre per year could occur from erosion around the well pad, primarily on the fill side, as shown in Table 3-6, if it is not properly managed to prevent such loss. Potential erosion from the access road of 5.99 tons per acre per year could also occur over the life of the project. 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 Dakota-3 Sarah Smith #22-23H

- The Dakota-3 Sarah Smith #22-23H well pad, proposed new access road, and gathering pipeline will occur in areas that are dominated by silty clay-loam soils that are moderate to moderately deep, well-drained, and moderately permeable (Figure 3-9, Table 3-5). Reclamation of vegetative communities should be easily

obtainable due to the affinity of native grassland species to this soil type (NRCS 2010).

- 5.5 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 5%, so the potential for runoff in an event is low. The well pad location, access road, and gathering pipeline ROW have a K-Factor of 0.32 to 0.37. Based on calculations of the Universal Soil Loss Equation, potential soil loss of 56.44 tons per acre per year could occur from erosion around the well pad, primarily on the fill side, as shown in Table 3-6, if it is not properly managed to prevent such loss. Potential erosion from the access road of 5.99 tons per acre per year could also occur over the life of the project. 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 Dakota-3 Fox #14-8H

- The Dakota-3 Fox #14-8H well pad, proposed new access road, and gathering pipeline will occur in areas that are dominated by silty clay-loam soils that are moderate to moderately deep, well-drained, and moderately permeable (Figure 3-10, Table 3-5). Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2010).

- 8.8 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 5%, so the potential for runoff in an event is low. The well pad location, access road, and gathering pipeline ROW have a K-Factor of 0.32. Based on calculations of the Universal Soil Loss Equation, potential soil loss of 24.76 tons per acre per year could occur from erosion around the well pad, primarily on the fill side, as shown in Table 3-6, if it is not properly managed to prevent such loss. Potential erosion from the access road of 5.99 tons per acre per year could also occur over the life of the project. The construction and reclamation measures indicated for the components at the site would be sufficient to reduce erosion to insignificant levels.

3.4.3.4 Dakota-3 Gerald Hale #33-28H

- The Dakota-3 Gerald Hale #33-28H well pad, proposed new access road, and gathering pipeline will occur in areas that are dominated by silty clay-loam soils that are moderate to moderately deep, well-drained, and moderately permeable (Figure 3-11, Table 3-5). Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2010).

- 6.6 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 5%, so the potential for runoff in an event is low. The well pad location, access road, and gathering pipeline ROW have a K-Factor of 0.37. Based on calculations of the Universal Soil Loss Equation, potential soil loss of 65.26 tons per acre per year could occur from erosion around the well pad, primarily on the fill side, as shown in Table 3-6, if it is not properly managed to prevent such loss. Potential erosion from the access road of

6.92 tons per acre per year could also occur over the life of the project. The construction and reclamation measures indicated for the components at the site would be sufficient to reduce erosion to insignificant levels.

3.4.3.5 Dakota-3 Mandaree Warrior #14-11H

- The Dakota-3 Mandaree Warrior #14-11H well pad, proposed new access road, and gathering pipeline will occur in areas that are dominated by silty clay-loam soils that are moderate to moderately deep, well-drained, and moderately permeable (Figure 3-12, Table 3-5). Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2010).
- 14.8 acres of surface disturbance would occur. The topography in the project area does not exceed approximately 5%, so the potential for runoff in an event is low. The well pad location, access road, and gathering pipeline ROW have a K-Factor of 0.37. Based on calculations of the Universal Soil Loss Equation, potential soil loss of 77.96 tons per acre per year could occur from erosion around the well pad, primarily on the fill side, as shown in Table 3-6, if it is not properly managed to prevent such loss. Potential erosion from the access road of 6.92 tons per acre per year could also occur over the life of the project. 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

### 3.5.1 Wetlands

National Wetland Inventory 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 2009). No wetlands were observed along any access road ROWs or at any of the well sites during surveys conducted in June 2010.

According to the USFWS National Wetland Inventory database, one palustrine emergent (PEM) wetland is located within 0.5 mile from the proposed project areas (Table 3-8). This PEM wetland is located between 0.14 and 0.48 mile from the proposed well pads. Lake Sakakawea is the closest wetland located at a distance of 6.19 to 18.45 river miles away from the proposed well pads. Due to the location of these PEM wetlands, no impacts are expected as a result of construction, drilling, or production activities associated with the proposed well pad areas and associated access roads. In order to prevent any downstream impact to Lake Sakakawea, Zenergy would employ standard BMPs to reduce the potential for adverse impact.

**Table 3-8. Distance from Well Pad Location to Palustrine Emergent Wetland (PEM) Wetland and to Lake Sakakawea.**

| Well Pad Name | Distance to PEM Wetland (miles) | River Miles to Lake Sakakawea |
|---|---|---|
| Dakota-3 Joseph Eagle #2-19H | 0.24 | 17.68 |
| Dakota-3 Sarah Smith #22-23H | 0.22 | 12.11 |
| Dakota-3 Fox #14-8H | 0.48 | 3.31 |
| Dakota-3 Gerald Hale #33-28H | 0.14 | 6.19 |
| Mandaree Warrior #14-11H | 0.46 | 18.45 |

## 3.6 VEGETATION AND NOXIOUS WEEDS

### 3.6.1 Vegetation Data

The proposed project area occurs in the Northwestern Great Plains ecoregion (River Breaks) (U.S. Geological Survey 2010), which is a western mixed-grass and short-grass prairie ecosystem (Bryce et al. 1998). Native grasses include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), blue grama (*Bouteloua gracilis*), and western wheatgrass (*Pascopyrum smithii*). 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 Juniper (*Juniperus* spp.), silver buffaloberry (*Shepherdia argentea*), and western snowberry (*Symphoricarpos occidentalis*).

#### 3.6.1.1 Dakota-3 Joseph Eagle #2-19H

Vegetation noted at the Dakota-3 Joseph Eagle #2-19H project area includes western snowberry, bluegrass (*Poa* spp.), green needlegrass (*Nasella viridula*), little bluestem grass, needle-and-thread (*Hesperostipa comata*), silver buffaloberry, silver sage (*Salvia argentia*), and salsify (*Trapogon* spp.) (Figures 3-13 and 3-14).

**Figure 3-13. Vegetation at center of Dakota-3 Joseph Eagle #2-19H well pad, facing north. Photo taken July 8, 2010.**

**Figure 3-14. Vegetation at the Dakota-3 Joseph Eagle #2-19H project area, facing west. Photo taken July 8, 2010.**

3.6.1.2 Dakota-3 Sarah Smith #22-23H

Vegetation noted at the Dakota-3 Sarah Smith #22-23H project area includes bluegrass, western snowberry, smooth brome (*Bromus inermis*), prairie sagewort (*Artemisia frigida*), narrow-leaved purple coneflower (*Echinacea angustifolia*), western wheatgrass, tall wormwood (*Artemisia campestris*), and black-eyed susan (*Rudbeccia hirta*) (Figures 3-15 and 3-16).

**Figure 3-15. Vegetation at the Dakota-3 Sarah Smith #22-23H project area, facing north. Photo taken July 7, 2010.**

**Figure 3-16. Vegetation at the Dakota-3 Sarah Smith #22-23H project area, facing west-northwest. Photo taken July, 16, 2010.**

3.6.1.3 Dakota-3 Fox #14-8H

Vegetation noted at the Dakota-3 Fox #14-8H project area includes smooth brome, tall wormwood, prairie sagewort, narrow-leaved purple coneflower, cheatgrass (*B. tectorum*), hoary sagebrush (*A. cana*), western wheatgrass, chokecherry (*Prunus virginiana*), creeping juniper (*Juniperus horizontalis*), golden currant (*Ribes aureum*), and wild rose (*Rosa* sp) (Figures 3-17 and 3-18).

**Figure 3-17. Vegetation at the Dakota-3 Fox #14-8H project area, facing north. Photo taken March 30, 2010.**

**Figure 3-18. Vegetation at the Dakota-3 Fox #14-8H project area, facing southwest. Photo taken March 30, 2010.**

3.6.1.4 Dakota-3 Gerald Hale #33-28H

Vegetation noted at the Dakota-3 Gerald Hale #33-28H project area includes smooth brome, chokecherry, narrow-leaved purple coneflower, western wheatgrass, alfalfa (*Medicago* spp.), prairie sagewort, and Downy hawthorn (*Crataegus mollis*) (Figures 3-19 and 3-20).

**Figure 3-19. Vegetation at the Gerald Hale #33-28H project area, facing north. Photo taken May 13, 2010.**

**Figure 3-20. Vegetation at the Gerald Hale #33-28H project area, facing south. Photo taken May 13, 2010.**

3.6.1.5 Dakota-3 Mandaree Warrior #14-11H

Vegetation noted at the Dakota-3 Mandaree Warrior #14-11H project area includes little bluestem, junegrass (*Koeleria cristata*), western snowberry, green needlegrass, buffaloberry, prairie turnip (*Pediomelum esculenta*), and Canada thistle (*Circium arvense*) (Figures 3-21 and 3-22).

**Figure 3-21. Vegetation at the Mandaree Warrior #14-11 project area, facing north. Photo taken May 13, 2010.**

**Figure 3-22. Vegetation at the Mandaree Warrior #14-11 project area, facing south. Photo taken May 13, 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. McKenzie County has five additional species listed as county noxious weeds. In 2009, three state noxious weed species were found on 86,100 acres in Dunn County. In 2009, seven state noxious weed species were found on 62,222 acres in McKenzie County. In 2009, no county listed species were found in McKenzie County. Dunn County does not maintain a list of other noxious species. However, 3,000 acres of black henbane were shown to occur in Dunn County in 2009 (NDDA 2009).

**Table 3-9. Recognized Noxious Weed Occupied Area in Dunn and McKenzie Counties, North Dakota.**

| Common Name | Scientific Name | Dunn County (acres) | McKenzie County (acres) |
|---|---|---|---|
| **State Noxious Weeds** | | | |
| absinth wormwood | *Artemisia absinthium* | 39,300 | 15 |
| Canada thistle | *Cirsium arvense* | 28,500 | 33,600 |
| diffuse knapweed | *Centaurea diffusa* | 0 | 1 |
| leafy spurge | *Euphorbia esula* | 18,300 | 26,200 |
| musk thistle | *Carduus nutans* | 0 | 0 |
| purple loosestrife | *Lythrum salicaria* | 0 | 0 |
| Russian knapweed | *Acroptilon repens* | 0 | 0 |
| spotted knapweed | *Centaurea stoebe* | 0 | 5 |
| yellow toadflax | *Linaria vulgaris* | 0 | 0 |
| dalmatian toadflax | *Linaria dalmatica* | 0 | 1 |
| salt cedar | *Tamarix ramosissima* | 0 | 2,400 |
| **Other Noxious Weeds** | | | |
| black henbane | *Hyoscyamus niger* | 3,000 | 0 |
| common burdock | *Arctium minus* | 0 | 0 |
| houndstongue | *Cynoglossum officinale* | 0 | 0 |
| halogeton | *Halogeton glomeratus* | 0 | 0 |
| baby's breath | *Gypsophila muralis* | 0 | 0 |

Source: NDDA 2009

Evaluation of the existing vegetation during on-site assessments conducted in June 2010 indicated that Canada thistle, a state-listed noxious weed, is present at the proposed Mandaree Warrior #14-11H site. 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 and some improved livestock pasture vegetation. The potential disturbance associated with each project component at each well pad is displayed in Table 2-1, and would total 52.48 acres overall.

In addition to the removal of typical native grasslands, removal of existing vegetation may facilitate the spread of noxious weeds. 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 utilized.

Surface disturbance and vehicular traffic must not take place outside approved ROWs for the well pads, access roads, and gathering pipelines. 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.

Construction of 2.992 acres of pipeline would result in temporary disturbance of 14.083 acres of grassland habitat. 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 five proposed well pads and their access roads would result in long-term disturbance of approximately 38 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 38 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.

## 3.7 WILDLIFE

### 3.7.1 Threatened and Endangered Species Occurrence and Habitat

Several wildlife species that may exist in Dunn and McKenzie counties (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 and McKenzie counties, North Dakota, include the gray wolf, black-footed ferret, whooping crane, piping plover and its Designated Critical Habitat, interior least tern, and pallid sturgeon, as well as two federal candidate species, the Dakota skipper and the Sprague's pipit. In addition to the ESA, the Bald and Golden Eagle Protection Act (BGEA) (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.

**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 will cease and the BIA and USFWS will be notified if whooping cranes are sighted.<br><br>In addition, migratory bird protective measures will be implemented, as follows:<br>Construction will be conducted outside of the migratory bird breeding season (February 1–July 15).<br><br>If construction is to occur during bird breeding season, vegetation within the construction right-of-way (ROW) will be regularly mowed; or surveys will be conducted for nesting migratory birds within 5 days of construction and construction delayed until Notice to Proceed obtained from BIA.<br>Reserve pits will 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 2.46 to 18.45 miles from proposed well pads and access roads. | Zenergy will implement all best management practices (BMPs), erosion control measures, and spill prevention practices required by the Clean Water Act. Zenergy will use a semi-closed loop drilling system and surround each well pad with a berm to prevent hazardous runoff or spills. | 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 2.46 to 18.45 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.<br><br>See Designated Critical Habitat protective measures for piping plover. | May Affect, Is Not Likely to Adversely Affect |
| Pallid Sturgeon (*Scaphirhynchus albus*) | Threatened | Lake Sakakawea is approximately 2.46 to 18.45 miles from proposed well pads and access roads. | Zenergy will implement all BMPs, erosion control measures, and spill prevention practices required by the Clean Water Act. Zenergy will use a semi-closed loop drilling system and surround each well pad with a berm to prevent hazardous runoff or spills. | May Affect, Is Not Likely to Adversely Affect |

| Species | ESA Status | Habitat Suitability or Known Occurrence | Operator-Committed Measures | Effects Determination |
|---|---|---|---|---|
| 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*) | Bald and Golden Eagle Protection Act (BGEPA). | Raptor habitat survey was conducted. No evidence of eagle habitat or nesting occurs in the project area. | Pre-construction survey for nests or suitable nesting/foraging habitats.<br><br>See migratory bird protective measures for whooping crane. | No Adverse Effects Anticipated |
| Golden Eagle (*Aquila chrysaetos*) | BGEPA | Raptor habitat survey was conducted. No evidence of eagle nesting habitats in the project area. Golden eagles may occasionally visit the project area. | Pre-construction survey for nests or suitable nesting/foraging habitats.<br><br>See migratory bird protective measures for whooping crane. | No Adverse Effects Anticipated |
| Migratory Birds | Migratory Bird Treaty Act | Suitable habitat for nesting migratory grassland birds occurs in the project area. | See migratory bird protective measures for whooping crane. | No Adverse Effects Anticipated |

## 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 USFWS as endangered since 1967, and have been the object of extensive re-introduction programs (USFWS 2010b). 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 will 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 2010c). 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 U.S. Fish and Wildlife Service 2007).

The July 2010 total wild population was estimated at 383 (USFWS 2010d). 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 U.S. Fish and Wildlife Service 2007; USFWS 2010d). Dunn and McKenzie counties, including the project area, are 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 U.S. Fish and Wildlife Service 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 U.S. Fish and Wildlife Service 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 U.S. Fish and Wildlife Service 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. Zenergy would cease all drilling and construction activities and notify the USFWS 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, 2010e). 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, 2010e). 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, 2010e).

Suitable shoreline habitats for breeding and nesting plovers does not occur in the project area, and Lake Sakakawea lies a minimum of 3.31 river miles away 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: May Affect, Is Not Likely to Adversely Affect

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 (USFWS 2002).

**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 2010f).

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 will often be found sharing sandbars with the piping plover, a threatened species (USFWS 2010f).

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 2010f). Details of their migration are not known, but their winter range is reported to include the Gulf of Mexico and Caribbean Islands (USFWS 1990a, 2010f).

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 2010f).

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 2010f).

Suitable shoreline habitats for breeding and nesting terns does not occur in the project area, and Lake Sakakawea lies a minimum of 3.31 river miles away 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.

**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 habitats for pallid sturgeon does not occur in the project area, and Lake Sakakawea lies a minimum of 3.31 river miles away from the proposed well pads and access roads. However, Squaw Creek and Boggy 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. 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 BMPs 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 (Dakota-3 Fox #14-8H) is 2.64 miles from Lake Sakakawea and 9.39 miles from the Little Missouri River. No eagles or nests were observed during the field surveys. Therefore, no adverse effects are anticipated. However, the possibility of transient, flying bald eagle individuals traversing the project area does exist.

**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 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. However, no primary or secondary indication of golden eagle presence, including nests, was observed within or near the project area during the field survey. Therefore, the project is unlikely to cause any adverse effects to golden eagles.

### 3.7.2 General Wildlife Species Occurrence and Habitat

The wildlife species listed in Table 3-11 were observed during field visits to the proposed project areas. All species listed were visually observed by a biologist during the field survey (i.e., primary observation). Various secondary indicators, including scat, tracks, and animal carcasses, were also observed within the proposed project areas as indicated in the table.

**Table 3-11. Wildlife Observed during Field Surveys at the Proposed Project Areas.**

| Well Pad Area | Common Name | Scientific Name | Observation Type | Habitat |
|---|---|---|---|---|
| Dakota-3 Joseph Eagle #2-19H | NA | NA | NA | NA |
| Dakota-3 Sarah Smith #22-23H | Field mouse | *Mus musculus* | Primary | Forest, Prairie, Desert |
| Dakota-3 Fox #14-8H | White-tailed deer | *Odocoileus virginianus* | Primary | Wooded draws and open meadows |
| | Eastern cottontail | *Sylvilagus floridanus* | Primary | Brushy area, fields, woodlands, swamps, and thickets |
| | Badger (burrows) | *Taxidea taxus* | Secondary | Open prairie |
| | Coyote (scat) | *Canis latrans* | Secondary | Forest, Prairie, Desert |
| Dakota-3 Gerald Hale #33-28H | NA | NA | NA | NA |
| Dakota-3 Mandaree Warrior #14-11H | NA | NA | NA | NA |

### 3.7.3 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.

No impacts to listed species are anticipated because of the low likelihood of their occurrence within the proposed project areas, confirmed by on-site assessments conducted by SWCA Environmental Consultants biologists. If construction is planned during the critical season, a migratory bird survey would be conducted prior to commencement of construction. Additionally, Zenergy has committed to using a semi-closed loop drilling system, ensuring that the reserve pit would 1) be smaller than a typical pit, and 2) would contain only dry cuttings, which would be solidified with 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 2.2.9, Construction Details at Individual Sites, and 3.12, Mitigation and Monitoring.

Minor impacts to unlisted wildlife species and their habitats could result from the construction of two 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 (916 USC 703–711). 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 reserve 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 impact.

## 3.8 CULTURAL RESOURCES

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations and agreements. The *National Historic Preservation Act of 1966* (16 USC 470 *et seq.*) at Section 106 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* (NAGPRA, 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 Reservation.

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 Dakota-3 Sarah Smith #22-23H project approximately 15.1 acres were inventoried between July 7 and 16, 2010 (Schleicher 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 this undertaking. This determination was communicated to the THPO on November 3, 2010. For the Dakota-3 Joseph Eagle #2-19H project approximately 38.01 acres were inventoried between July 8 and August 17, 2010 (Smith and Lechert 2010). Two archaeological sites were located that may possess the quality of integrity and meet at least one of the criteria (36 CFR 60.6) for inclusion on the National Register. However, BIA reached a determination of **no historic properties affected** for this undertaking as the archaeological sites will be avoided. This determination was communicated to the THPO on November 16, 2010. For the Dakota-3 Gerald Hale #33-28H project approximately 15.8 acres were inventoried between May 13 and July 16, 2010 (Schleicher *et al.* 2010). One archaeological site was located that may possess the quality of integrity and meet at least one of the criteria (36 CFR 60.6) for inclusion on the National Register. However, BIA reached a determination of **no historic properties affected** for this undertaking as the archaeological site will be avoided. This determination was communicated to the THPO on November 16, 2010. For the Dakota-3 Mandaree Warrior #14-11H project approximately 40.36 acres were inventoried between June 16 and October 27, 2010 (Eisenhauer and Lechert 2010). One archaeological site was located, but which does not 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. Thus BIA reached a determination of **no historic properties affected** for this undertaking. This determination

was communicated to the THPO on November 18, 2010. For the Dakota-3 Fox #14-8H project approximately 26.57 acres were inventoried between March 30 and October 10, 2010 (Lechert 2010). One archaeological site was located, but which does not 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. Thus BIA reached a determination of **no historic properties affected** for this undertaking. This determination was communicated to the THPO on November 29, 2010. However, the THPO did not respond within the allotted 30 day comment period to the determination for any of these five projects.
No cultural resources that are potentially eligible for listing on the National Register are known to be present in the APE; therefore, there would be no adverse impacts to cultural resources as a result of the Proposed Action.

If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and 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

## 3.9 PUBLIC HEALTH AND SAFETY

The Proposed Action would occur in a rural area with at least one home located within 1 mile of each of the proposed well sites, as shown in Table 3-12.

**Table 3-12. Distance and Direction from Proposed Wells to Nearest Home.**

| Proposed Well | Distance to Nearest Home | Direction to Nearest Home |
|---|---|---|
| Dakota-3 Joseph Eagle #2-19H | 0.77 mile | Northwest |
| Dakota-3 Sarah Smith #22-23H | 0.15 mile | South |
| Dakota-3 Fox #14-8H | 0.50 mile | Southwest |
| Dakota-3 Gerald Hale #33-28H | 0.10 mile | Southwest |
| Dakota-3 Mandaree Warrior #14-11H | 0.65 mile | 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.

Hydrogen sulfide ($H_2S$) is extremely toxic in concentrations above 500 parts per million (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 Zenergy 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 reserve 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.

### 3.9.1 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 60 days 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.

## 3.10 SOCIOECONOMICS

### 3.10.1 Socioeconomic Analysis Area

The scope of analysis for social and economic resources includes a discussion of current social and economic data relevant to the Analysis 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.

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.

### 3.10.2 Population and Demographic Trends

Historic and current population counts for the Analysis Area, compared to the state, are provided below in Table 3-13. The state population showed little change between the last two census counts (1990–2000), but there were notable changes at the local level. Populations in all four counties have steadily declined in the past. McLean and Dunn counties had a higher rate of population decline among the four counties at -10.5% and -7.8%, respectively. 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% since 2000. 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 3-13, population growth on the Reservation (13.3%) exceeds the overall growth in the state of North Dakota (-0.1%) 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 3-13. Population and Demographics.**

| County or Reservation | Population in 2008 | % of State Population | % Change Between 1990–2000 | % Change Between 2000–2008 | Predominant Group in 2008 (%) | Predominant Minority in 2008 (Percent of Total Minority Population) |
|---|---|---|---|---|---|---|

| County or Reservation | Population in 2008 | % of State Population | % Change Between 1990–2000 | % Change Between 2000–2008 | Predominant Group in 2008 (%) | Predominant Minority in 2008 (Percent of Total Minority Population) |
|---|---|---|---|---|---|---|
| Dunn | 3,318 | 0.5 | -10.1 | -7.8 | Caucasian (84.9%) | American Indian (15.1%) |
| McKenzie | 5,674 | 0.8 | -10.1 | -1.1 | Caucasian (76.3%) | American Indian (23.7%) |
| McLean | 8,337 | 1.3 | -11.0 | -10.5 | Caucasian (91.3%) | American Indian (8.7%) |
| Mountrail | 6,511 | 1.0 | -5.6 | -1.8 | Caucasian (62.8%) | American Indian (37.2%) |
| On or Near Fort Berthold Indian Reservation[1] | 11,897 | 1.8 | 178.02 | +13.33 | American Indian | Caucasian (~27%) |
| Statewide | 641,481 | 100 | 0.005 | -0.1 | Caucasian | American Indian (8.6%) |

Source: U.S. Census Bureau 2010a.

[1] Bureau of Indian Affairs 2005. Population shown reflects the Total enrollment in the Tribe in 2005. 2008 data unavailable. All information related to the Fort Berthold Indian 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.

### 3.10.3 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, 2007 economic data indicates that the major employers in North Dakota include government and government enterprises, which employed 16.6%; health care and social assistance, which employed 11.7%; and retail trade, which employed at 11.3% of the state's labor force (U.S. Bureau of Economic Analysis 2009a). 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.

Table 3-14 provides data on 2009 employment opportunities for the Analysis Area, and changes in unemployment for the period between 2005 and 2009. All counties in the Analysis Area, and the entire state of North Dakota showed average weekly wages that were lower than the national average in 2009. In 2009, total employment in the state of North Dakota was approximately 354,916, with a statewide unemployment rate of 4.3% of the workforce, one of the lowest in the nation (Bureau of Labor Statistics 2009). While some counties in the Analysis Area experienced a slight increase in unemployment, others were unchanged or experienced a decreased unemployment.

**Table 3-14. 2009 Total Employment, Average Weekly Wages, and Unemployment Rates.**

| Location | Total Employment (September 2009) | Average Weekly Wage (September 2009) | Unemployment Rate (2009) | Change in Unemployment Rate (2005–2009) |
|---|---|---|---|---|
| United States | 128,088,742 | $840 | 9.8% | |
| North Dakota | 354,916 | $680 | 4.3% | +0.9% |
| Dunn County | 929 | 647 | 4.5% | +1.1% |
| McKenzie County | 2,899 | 839 | 3.5% | -0.2% |
| McLean County | 3,594 | 755 | 5.0% | No change |
| Mountrail County | 3,126 | 681 | 4.2% | -1.8% |
| On or Near Fort Berthold Indian Reservation* | 1,287 | N/A | 71% | N/A |

Sources: Bureau of Labor Statistics 2009; U.S. Department of Agriculture 2010; Bureau of Indian Affairs 2005.
* Represents 2005 data only.

The BIA publishes biannual reports documenting the Indian service and labor market for the nation. 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.

### 3.10.4 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 as well as 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 (NAICS) 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. According to NAICS standards, per capita personal income for Dunn County was $20,634 in 2000 and $26,440 in 2007, an increase of approximately 28.1%; per capita personal income for McKenzie County was $21,637 in 2000 and $32,927 in 2007, an increase of approximately 52.1%; per capita personal income for McLean County was $23,001 in 2000 and $38,108 in 2007, an increase of approximately 65.6%; per capita personal income for Mountrail County was $23,363 in 2000 and $32,324 in 2007, an increase of approximately 38.3%. These figures compare with a State of North Dakota per capital personal income of $25,105 in 2000 and $36,082 in 2007, an increase of approximately 43.7% from 2000 (U.S. Bureau of Economic Analysis 2009b).

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).

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 3-15, unemployment rates in all counties, including the Reservation, were equal to or above the state average of 3.1%. 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. Per capita income for residents on or near the Reservation is approximately 28% lower than the statewide average. The median household income reported for the Reservation (i.e., $26,274) is approximately 40% lower than the state median of $43,936. According to the BIA, approximately 55% of tribal members living on or near the Reservation were employed, but living below federal poverty levels (BIA 2005).

**Table 3-15. Income and Poverty in Analysis Area, 2007.**

| Unit of Analysis | Per Capita Income[1] | Median Household Income | Percent of all People in Poverty[2] |
|---|---|---|---|
| Dunn County | 26,440 | $37,632 | 13.5% |
| McKenzie County | 32,927 | $41,333 | 13.8% |
| McLean County | 38,108 | $44,421 | 10.4% |
| Mountrail County | 32,324 | $35,981 | 15.9% |

| Unit of Analysis | Per Capita Income[1] | Median Household Income | Percent of all People in Poverty[2] |
|---|---|---|---|
| Fort Berthold Indian Reservation[3] | 10,291 | $26,274 | N/A |
| North Dakota | 36,082 | $43,936 | 11.8% |

[1] U.S. Bureau of Economic Analysis 2009b
[2] United Stated Department of Agriculture (USDA) 2009
[3] North Dakota State Data Center 2009

### 3.10.5 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 2008 updates (U.S. Census Bureau 2010a). 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 3-16 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 3-16. Housing Development Data for the Reservation and Encompassing Counties.**

| Region | Total Housing Units | | | | | | % Change 2000–2008 |
|---|---|---|---|---|---|---|---|
| | Occupied | Owner Occupied | Renter Occupied | Vacant | Total | Total | |
| | 2000 | 2000 | 2000 | 2000 | 2000 | 2008 | |
| Dunn | 1,378 | 1,102 | 276 | 587 | 1,965 | 1,968 | +0.1 |
| McKenzie | 2,151 | 1,589 | 562 | 568 | 2,719 | 2,781 | +2.2 |
| McLean | 3,815 | 3,135 | 680 | 1,449 | 5,264 | 5,420 | +2.9 |
| Mountrail | 2,560 | 1,859 | 701 | 878 | 3,438 | 3,528 | +2.6 |
| 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 | 313,332 | +8.2 |

Source: U.S. Census Bureau 2010a.

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 3-17.

**Table 3-17. 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 2009a, 2009b.

### 3.10.6 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 3-18, 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, Zenergy 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 Zenergy 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.

Although the Analysis Area has experienced a recent decline in population between 2000 and 2008 (as shown in Table 3-13), the population on the Reservation itself has increased. This has not led to significant housing shortages. The historic housing vacancy rate (Table 3-16) 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.

**Table 3-18. 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 |

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.

## 3.11 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 environmental justice (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 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 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 3-19 summarizes relevant data regarding minority populations for the Analysis Area.

**Table 3-19. Minority Population Breakdown by North Dakota County and Race, 2000–2008[2].**

| Race | Dunn | | McKenzie | | McLean | | Mountrail | | North Dakota | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2008 | 2000 | 2008 | 2000 | 2008 | 2000 | 2008 | 2000 | 2008 |
| Total Population | 3,600 | 3,318 | 5,737 | 5,674 | 9,311 | 8,337 | 6,629 | 6,511 | 642,204 | 641,481 |
| Non-Hispanic | 3,573 | 3,275 | 5,679 | 5,581 | 9,230 | 8,191 | 6,542 | 6,327 | 634,418 | 628,254 |
| Hispanic or Latino[1] | 27 | 43 | 58 | 93 | 81 | 146 | 87 | 184 | 7,786 | 13,227 |
| **Races** | | | | | | | | | | |
| Caucasian | 3,123 | 2,818 | 4,457 | 4,329 | 8,632 | 7,610 | 4,546 | 4,086 | 596,722 | 586,272 |
| African American | 1 | 2 | 4 | 30 | 2 | 9 | 7 | 27 | 4,157 | 6,956 |
| American Indians and Alaska Natives | 448 | 467 | 1,216 | 1,230 | 568 | 587 | 1,988 | 2,277 | 31,440 | 35,666 |
| Asian / Pacific Islanders | 8 | 3 | 4 | 10 | 12 | 19 | 17 | 20 | 3,912 | 5,095 |
| Two or More Races | 25 | 28 | 39 | 75 | 97 | 112 | 71 | 101 | 5,973 | 7,492 |
| All Minorities | 509 | 543 | 1,321 | 1,438 | 760 | 808 | 2,170 | 2,609 | 53,268 | 55,209 |
| % Minority Population | 14.1 | 16.4 | 23.0 | 25.3 | 8.2 | 9.7 | 32.7 | 40.1 | 8.3 | 8.6 |
| Change in Minority Population (2000-2008) | +6.7% | | +8.9% | | +6.3% | | +20.2% | | +3.6% | |

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

[2] U.S. Census Bureau estimates of population demographics were made in July 2008.

Source: U.S. Census Bureau 2010a.

In July 2008, the U.S. Census estimated that North Dakota's total minority population comprised approximately 55,209 persons, or 8.6% of the state's total population (i.e., 641,481 residents). This represents an increase of 3.63% over the 2000 minority population of the state, even though the overall state's total population decreased during the same time. An even stronger trend of increased minority population, and decrease in overall population occurred in the Analysis Area during the same time period. As presented in Table 3-19, 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 2008 (U.S. Census Bureau 2010a). The four counties of the Analysis Area showed an increase of 6.3% to 20.2% in minority population, compared with the statewide increase of 3.6%.

The American Indian and Alaska Native population is the largest minority in each of the counties, as well as for the state as a whole (North Dakota Indian Affairs Commission [NDIAC] 2010). The 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 (U.S. Census Bureau 2010a), with estimates for the future American Indian population (one race only) at 47,000 in 2015 and 59,000 in 2025 in North Dakota (NDIAC 2010). 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 (NDAIC 2010).

Poverty rate data for the counties in the Analysis Area are summarized in Table 3-20. The data show that poverty rates have decreased in the Analysis Area during the period from 2000 to 2008 (U.S. Census Bureau 2010b). However, except for McLean County, the poverty rates are higher and the median household incomes are lower for area residents in 2008, compared with the statewide poverty rate of 11.5% and median household income of $45,995.

**Table 3-20. Poverty Rates and Median Household Income for the Analysis Area.**

| Location | 2000 | 2008 | 2008 Median Household Income |
|---|---|---|---|
| Dunn County | 13.3% | 12.2 | $40,801 |
| McKenzie County | 15.7% | 14.4 | $44,704 |
| McLean County | 12.3% | 11.1 | $46,131 |
| Mountrail County | 15.7% | 14.0 | $41,551 |
| North Dakota | 10.4% | 11.5% | $45,996 |

Source: U.S. Census Bureau 2010b.

### 3.11.1 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 oil field 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 3.17. 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 and thorough reviews and determinations by the BIA that there would be no effect to historic properties. Furthermore, nothing is known to be present that qualifies as a Traditional Cultural Property or for protection under the American Indian Religious Freedom Act. 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.

## 3.12 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 will be monitored by the BLM, 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 will be developed by the BLM and 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. Zenergy 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.

### 3.12.1 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 properly (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 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.

Zenergy 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; and
- using natural (topography, vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations.

Zenergy 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.

### 3.12.2 Mitigation and Safety Measures Committed to by Zenergy

#### 3.12.2.1 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.

#### 3.12.2.2 Utility Lines

All utility lines, including electric lines and other lines essential to oil well operations, will be installed underground.

#### 3.12.2.3 Fire Control

Zenergy 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; and
- contracting with the local fire district to provide fire protection.

3.12.2.4 Traffic

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

3.12.2.5 Semi-closed Loop System

Zenergy commits to using a semi-closed loop system for the well locations.

3.12.2.6 Wildlife

During an informal Section 7 consultation with the USFWS, the following mitigation measures were agreed upon to reduce the potential impact to protected species.

3.12.2.6.1 *Bald and Golden Eagle and Migratory Bird Protective Measures*

- Zenergy will have a biologist survey the project area for bald or golden eagle nests five days before construction begins. If nests are discovered, the BIA and USFWS will be notified. If eagle nests are present, a minimum 0.5-mile buffer will be maintained from any active eagle nest.
- Zenergy will conduct all construction outside of the migratory bird breeding season (between February 1 and July 15); or, if construction occurs during bird breeding season, Zenergy will either:
  - mow and maintain vegetation within the project construction area (access road and well pad) 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 of the project area five days before construction begins, and if nests are discovered, notify BIA and USFWS.

3.12.2.6.2 *ESA Protective Measures*

- Piping Plover and its Designated Critical Habitat, Interior Least Tern, and Pallid Sturgeon: A 4-foot berm will be placed around each location to prevent any accidental release of drilling fluids or hazardous materials into the watersheds of Lake Sakakawea. Migratory bird protective measures will be enforced.
- Whooping Crane: If a whooping crane is sighted within 1 mile of the proposed project area, work will be stopped and the BIA and USFWS will be notified. In coordination with the USFWS, work may resume after the bird(s) leaves the area.

It is the opinion of the USFWS that Zenergy's commitment to implement the avoidance measures described above demonstrates compliance with the ESA, MBTA, and BGEPA. Copies of the USFWS letters resulting from the Section 7 consultation are provided in Appendix A.

3.12.2.7 Cultural Resources

Zenergy recognizes the need to protect cultural resources on the project locations and has committed to the following.

- Avoiding, as recommended, all identified National Register eligible or unevaluated cultural resources. Buffers would be placed between eligible or unevaluated cultural resources and the proposed infrastructure (5-acre well pad or 66-foot-wide access road construction corridor). When avoidance buffers of 50 feet or greater cannot be achieved due to project design constraints, temporary fencing is recommended along the edge of the construction corridor and monitoring by a qualified archaeologist is recommended during all ground-disturbing activities to ensure that inadvertent impacts to cultural resources are avoided.
- Prohibiting all project workers from collecting artifacts or disturbing cultural resources in any area under any circumstances.
- Avoiding impacts to NRHP eligible or unevaluated cultural resources on well sites and access roads. If cultural resources are discovered during construction or operation, work shall immediately be stopped, the affected site be secured, and BIA and THPO notified. In the event of a discovery, work shall not resume until written authorization to proceed has been received from the BIA.

## 3.13 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.

## 3.14 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.

## 3.15 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. For purposes of this analysis, the cumulative impact analysis area (CIAA) is considered to be all lands within a 20-mile radius of the project area, as shown in Figure 3-23.

Past and current disturbances in the CIAA include farming, grazing, roads, and other oil and gas wells, both on the Reservation and off. Although the project area is surrounded on all sides by Reservation lands, land ownership is not relevant to the assessment of cumulative impacts except as it is predictive of future impacts. Farming and grazing activities occur on the Reservation regardless of the density of oil and gas development, since undivided interests in the land surface, range permits, and agricultural leases are often held by different tribal members than those holding mineral rights, such that economic benefits of both agricultural and oil and gas activities currently co-exist.

Over the past several years, exploration has accelerated over the Bakken Formation. Existing oil and gas wells within 1 mile, 5 miles, 10 miles, and 20 miles of the project area are shown in Table 3-21. Existing oil and gas development has been occurring for several years on private fee land surrounding the Reservation, such that many more wells currently exist off the Reservation, as shown in Table 3-21 and Figure 3-23.

**Table 3-21. Number of Confidential, Active, and Permitted Wells Surrounding the Project Area.**

| | 1-mile Radius | | 5-mile Radius | | 10-mile Radius | | 20-mile Radius | |
|---|---|---|---|---|---|---|---|---|
| Reservation (on/off) | on | off | on | off | on | off | on | off |
| Confidential Wells | 5 | 0 | 19 | 3 | 29 | 13 | 63 | 92 |
| Active Wells | 0 | 0 | 13 | 4 | 27 | 42 | 62 | 286 |
| Permitted Wells | 0 | 0 | 2 | 0 | 0 | 0 | 7 | 5 |

Reasonably foreseeable impacts of future developments in the CIAA must also be considered. Should development of the proposed five wells prove productive, it is likely that Zenergy and other operators would pursue additional development in the CIAA. For purposes of cumulative impact analyses, the density of active and permitted oil wells is expected to increase steadily within the CIAA over the next decade. Although it is the dominant activity currently taking place in the area, oil and gas development is expected to have a minor cumulative effect on land use patterns and the human and natural environment, due to the dispersed and passive nature of the development.

Within the Reservation and near the proposed project areas, development projects remain few and widely dispersed. Dispersed location of well pads is achieved through the use of federal planning units, called spacing units, designed to maintain productivity of future wells. Given the expected dispersal of future oil and gas well development, the current pattern of farming and ranching activities is expected to continue as the secondary economic activity in the CIAA with little change because virtually all available acreage is already organized into range units to use surface resources for economic benefit. The same economic incentives for co-existing agricultural land uses and oil and gas development may not occur off the Reservation, and agriculture and grazing may be reduced in the future as the economic benefits of oil production increases.

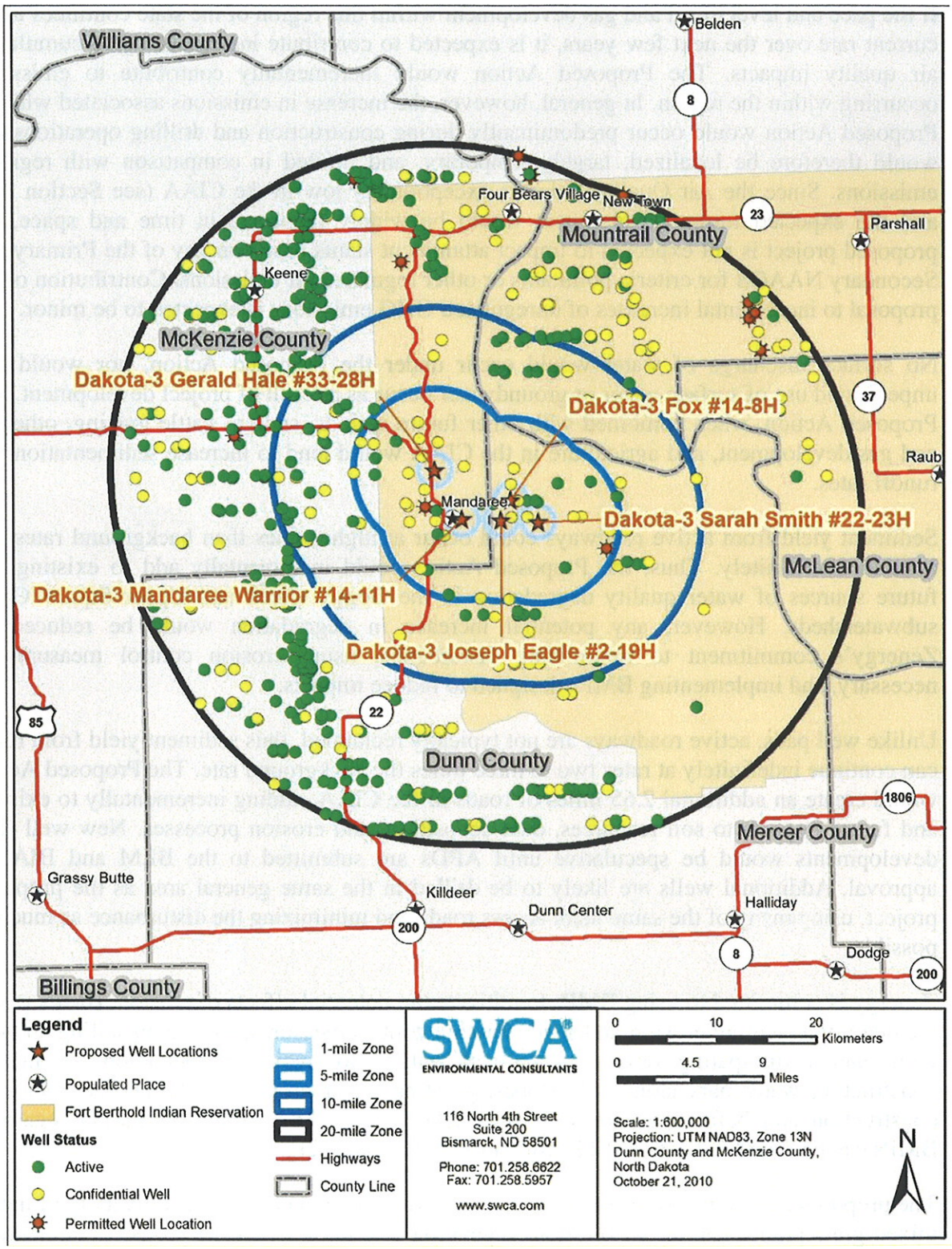



**Figure 3-23. Existing and Projected Future Oil and Gas Development within a 1-, 5-, 10-, and 20-mile radius of the proposed project locations.**

If the pace and level of oil and gas development within this region of the state continues at the current rate over the next few years, it is expected to contribute incrementally 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. Since the Air Quality Index is exceptionally low in the CIAA (see Section 3.2), and the expected future development would be widely dispersed in time and space, the proposed project is not expected to impact attainment status based on any of the Primary and Secondary NAAQS for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

No surface discharge of water would occur under the Proposed Action, nor would any unpermitted use of surface water or groundwater occur as a result of project development. The Proposed Action, when combined with other future actions, such as cattle grazing, other oil and gas development, and agriculture in the CIAA would tend to 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 Boggy Creek and Upper Squaw Creek subwatersheds. However, any potential increase in degradation would be reduced by Zenergy'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 an additional 2.65 miles of roads in the CIAA, adding incrementally to existing and future impacts to soil resources, dust deposition, and erosion processes. New well field developments would be speculative until APDs are submitted to the BLM and BIA for approval. Additional wells are likely to 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.

Zenergy is committed to using BMPs to mitigate the potential effects of erosion. 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 along side slopes, planting cover crops to stabilize soil following construction and before permanent seeding takes place. Additional information regarding BMPs can be found in Section 3.12, Mitigation and Monitoring.

The proposed action would result in some loss of vegetation and ecological diversity of native mixed-grass prairie habitat. In addition, vegetation resources across the project area could be affected by forseeable future energy development and surface disturbance in the CIAA. Continued oil and gas development within the CIAA could result in the loss, and further fragmentation, of native mixed-grass prairie habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss,

compaction, and increased encroachment of unmanaged invasive weed species. 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 certain listed species known to use native mixed-grass prairie habitats. Such impacts could be partially offset by avoidance of previously undisturbed prairie habitats, as well as implementation of soil and vegetation mitigation measures and BMPs. Cumulative impacts to vegetation and other biological resources are therefore expected to be minor.

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. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the proposal.

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area. The Proposed Action includes development of five new 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 and natural environment; impacts would generally be low and mostly temporary.

Concerns regarding the contamination of aquifers commonly used for drinking water by fracturing fluids described in section 2.2.6 of this document in natural gas formations outside of the Bakken Formation have recently been investigated the EPA (US EPA 2010f). Aquifers identified in table 3-3 of this document include the Sentinel Butte Formation which is used for drinking water, occurs at depths of 0-670 feet below ground surface, while the deepest aquifer identified in the project area, the Fox Hills Formation, occurs at depths of 1,100-2,000 feet below ground surface. The oil wells proposed in this undertaking by contrast will achieve depths no shallower than 9,600 feet below ground surface, well below any known aquifer in the project area. Additionally, as laid out in section 2.2.5 of this document surface casing will be employed to a depth of 2,500 feet below ground surface to isolate all near surface aquifers. Potentially as a result of the disparity in depths of the aquifers and oil wells, no direct or indirect impacts have yet been identified with fracturing in the Bakken Formation.

Zenergy 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 3-22). 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 3-22. Scoping Comments.**

| Name | Organization | Comment | Response to Comment |
|---|---|---|---|
| Bagley, Lonny | BLM | No Comment | |
| Benson, Barry | MHA Nation | No Comment | |
| Bercier, Marilyn | BIA | No Comment | |
| Berg, George | NoDak Electric Cooperative, Inc. | No Comment | |
| Black, Mike | BIA | No Comment | |
| Boyd, Bill | Midcontinent Cable Company | No Comment | |
| Brady, Perry | THPO, Three Affiliated Tribes | No Comment | |
| Brugh, V. Judy | MHA Nation | No Comment | |
| Cayko, Richard | McKenzie County | No Comment | |
| Chevance, Nick | National Parks Service | No Comment | |
| Christenson, Ray | Southwest Water Authority | No Comment | |
| Cimarosti, Dan | USACE | Enclosed Section 10 Application in case a permit is required. | Section 10 applications are not required since all drilling is proposed in non-jurisdictional upland areas. |
| Crooke, Patsy | USACE | No Comment | |
| Danks, Marvin | Fort Berthold Rural Water Director | No Comment | |
| Dhieux, Joyce | EPA | No Comment | |
| Dixon, Doug | Montana Dakota Utilities | No Comment | |
| Erickson, Carroll | Ward County Board of Commissioners | No Comment | |
| Ferris, Kade | Turtle Mountain Band of Chippewa | No Comment | |
| Fitzpatrick, Barbara | FEMA | 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. |
| Flores, J.R. | U.S. Department of Agriculture | No Comment | |
| Fox, Fred | MHA Nation | No Comment | |
| Glatt, David | North Dakota Department of Health | Impacts will be minor and can be controlled by proper construction methods. | See Sections 2.2.9 Construction Details at Individual Sites and 3.12 Mitigation and Monitoring for site-specific details and BMPs. |
| Guzman, Frank | USFS | No Comment | |

| Name | Organization | Comment | Response to Comment |
|---|---|---|---|
| Hanson, Jesse | North Dakota Parks and Recreation | 1) The project as defined does not affect state park lands or Land and Water Conservation Fund recreation projects. 2) The proposed project is in proximity to the Killdeer Mountain Four Bears Scenic Byway and we recommend development be completed with the least amount of or no visual impact. 3) No current or historic plant or animal species of concern or significant ecological communities are known to occur within one-mile radius of the project area. 4) Recommend that any impacted areas be revegetated with species native to the project area. | See Sections 2.2.10 Reclamation, 3.5 Wetlands, 3.6 Vegetation and noxious weeds, 3.7 Wildlife, and 3.12 Mitigation and Monitoring for more information. |
| Hauck, Reinhard | Dunn County | No Comment | |
| Hefferman, Dan | EPA | 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 | |
| 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 | |
| Kyner, Dave | FEMA | No Comment | |
| Latimer, Tom | Red Willow Great Plains, LLC | No Comment | |
| Laux, Eric | USACE | No Comment | |

| Name | Organization | Comment | Response to Comment |
|---|---|---|---|
| Lindemann, Larry | Airport Manager, Barnes County Municipal Airport | No Comment | |
| McKenna, Mike | North Dakota Game and Fish Department | Recommend construction be avoided were possible in native prairie, wooded draws, riparian areas, and wetlands. Botanical and raptor surveys suggested. | See Affected Environment Sections 3.5 Wetlands, 3.6 Vegetation and noxious weeds, and 3.7 Wildlife. BMPs discussed in APD and will be covered in Conditions of Approval. |
| McPhillips, Kelly | Bureau of Reclamation | Project components would affect BOR facilities (rural water pipelines). Please review enclosed map for potential adverse effects and proper pipeline crossing, should that be necessary. Coordinate with the FBIR Rural Water director. | See Section 2.2.3 Access Roads and Section 2.2.7 Gathering Pipelines. Zenergy would consult with the Rural Water Director if the project components should cross or otherwise affect any BOR rural water lines. |
| Melhouse, Ronald | Bureau of Reclamation | No Comment | |
| Nash, Mike | BLM | No Comment | |
| Nelson, Richard | U.S. Bureau of Reclamation | No Comment | |
| Nordquist, Don | Petro-Hunt, LLC | No Comment | |
| Obenauer, Steve | FAA | 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 TCP-related info in separate reports not sent to SHPO. | Reports will be sent to the required agencies. See 3.8 Cultural Resources. |
| Packineau, Mervin | MHA Nation | 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 | MHA Nation | No Comment | |
| Prchal, Doug | North Dakota Parks and Recreation Department | No Comment | |

| Name | Organization | Comment | Response to Comment |
|---|---|---|---|
| Renschler, Jason | USACE | 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 | |
| Shortbull, Marietta | Fort Berthold Agency | No Comment | |
| Smith, Heather | EOG Resources, Inc. | No Comment | |
| Sorensen, Charles | USACE | USACE recommends: Closed-loop system, a catch trench be established, sewage collection be a closed system, additional fill should be weed-free, drilling rig and associated equipment should be properly cleaned to prevent the spread of noxious weeds, n( surface occupancy allowed within 1/2 mile of known threatened or endangered species critical habitat. | See 2.2.9 Construction Details for information regarding berms. Zenergy uses the semi-closed loop system as a matter of practice, with a pit for cuttings only. No additional fill material is required. NSO would be allowed within ½ mile of any known T&E habitat. |
| Svoboda, Larry | EPA | No Comment | |
| Sweeney, Paul | Natural Resources Conservation Service | Confirms receipt of letter requesting a determination of the project affecting farmland according to FPPA [Farmland Protection Policy Act]. Recommends impacts to wetlands be avoided. | FPPA does not apply to the project. See Section 3.5 Wetlands. |
| Thompson, Brad | USACE | Acknowledges receipt of letter. Project is not within USACE owned or operated lands so no floodplain or flood risk information is provided. | Thank you for your comment |
| Thorson, Gary | McKenzie Electric Cooperative | No Comment | |
| Towner, Jeffrey | USFWS | No Comment | |
| Wells, Marcus | Chairman, MHA Nation | No Comment | |
| Whitcalf, Frank | MHA Nation | No Comment | |
| Williams, Damon | MHA Nation | No Comment | |

| Name | Organization | Comment | Response to Comment |
|---|---|---|---|
| Wolf, Malcolm | MHA Nation | No Comment | |
| Chief Missile Engineer | Minot Air Force Base | No Comment | |
| Garrison Project Office | USACE | No Comment | |
| Insurance & Hazard Director | FEMA | No Comment | |
| Land Department | Northern Border Pipeline Company | No Comment | |
| Manager | Xcel Energy | No Comment | |
| NAGRPA Office | Three Affiliated Tribes | No Comment | |
| Natural Resources Department | 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.

Zenergy Operating Company, LLC

- Kelley Bryan, Williston Basin Land Manager

SWCA Environmental Consultants

- Claudia Oakes, Senior Environmental Planner

*Prepared the EA.*

- Laura Leslie Burckhardt, Aquatic Ecologist

*Prepared the EA*

- Joshua Ruffo, Wildlife Biologist

*Conducted natural resource surveys for well pads and access roads.*

- Chris McLaughlin, Biologist

*Conducted natural resource surveys for well pads and access roads.*

- Mike Cook, Biologist

*Conducted natural resource surveys for well pads and access roads.*

- Alan Hutchinson, Archaeologist

*Conducted cultural resource surveys and prepared cultural resource reports for well pads and access roads.*

- Stephanie Lechert, Archaeologist

*Conducted cultural resource surveys and prepared cultural resource reports for well pads and access roads.*

- Nelson Klitzka, Archaeologist

*Conducted cultural resource surveys, assisted with cultural resources section, and prepared cultural resource reports for well pads and access roads.*

- Jon Markman, Archaeologist/Field Coordinator

*Conducted cultural resource surveys for well pads and access roads.*

- Branden Bornemann and Trent Reeder, GIS Specialists

*Created maps and spatially derived data.*

- Matt Spann, Environmental Specialist

*Assisted with water resources section.*

- Rick Wadleigh, NEPA Specialist

*Reviewed document for content and adequacy.*

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Eisenhauer, Nancy, and Stephanie Lechert
(2010) A Class I and Class III Cultural Resource Inventory of the Zenergy Dakota-3 Mandaree Warrior #14-11H Well Pad, Access Road and Gathering Pipeline, Fort Berthold Indian Reservation, McKenzie County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

Lechert, Stephanie
(2010) A Class I and Class III Cultural Resource Inventory of the Zenergy Dakota-3 Fox #14-8H Well Pad, Access Road and Gathering Line, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

Schleicher, Jolene
(2010) A Class I and Class III Cultural Resource Inventory of the Dakota-3 Sarah Smith #22-23H Well Pad, Access Road and Gathering Line on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

Schleicher, Jolene, Judith Cooper and Stephanie Lechert
(2010) A Class I and Class III Cultural Resource Inventory of the Dakota-3 Gerald Hale #33-28H Well Pad, Access Road and Gathering Line, Fort Berthold Indian Reservation, McKenzie County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

Smith, Nicholas, and Stephanie Lechert
(2010) A Class I and Class III Cultural Resource Inventory of the Zenergy Dakota-3 Joseph Eagle #2-19H Well Pad, Access Road and Gathering Pipeline, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

# 7.0 ACRONYMS

| | |
|---|---|
| °F | degrees Fahrenheit |
| APD | Application for Permit to Drill |
| APE | Area of Potential Effect |
| 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 |
| CIAA | cumulative impact analysis area |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| CWA | Clean Water Act |
| EA | environmental assessment |
| EIS | environmental impact statement |
| EJ | Environmental Justice |
| 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 |
| HUC | hydrologic unit code |
| MHA Nation | Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara Nation |
| NAAQS | National Ambient Air Quality Standards |
| $N_2O$ | nitrous oxide |
| NAGPRA | Native American Graves Protection and Repatriation Act |
| NDCC | North Dakota Century Code |
| NDDA | North Dakota Department of Agriculture |
| NDDH | North Dakota Department of Health |
| NDIC | North Dakota Industrial Commission |
| NEPA | National Environmental Policy Act |
| $NO_2$ | nitrogen dioxide |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| NTL | Notice to Lessees |
| $O_3$ | ozone |
| PEM | palustrine emergent |
| PM | particulate matter |
| ppm | parts per million |
| ROW | right-of-way |
| SHPO | State Historic Preservation Officer |
| $SO_2$ | sulfur dioxide |

| | |
|---|---|
| THPO | Tribal Historic Preservation Officer |
| TMD | total measured depth |
| TRNP | Theodore Roosevelt National Park |
| 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

## U.S. Fish and Wildlife Service Consultation Letters

# United States Department of the Interior

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

OCT 13 2010

Mr. Josh Ruffo
SWCA Environmental Consultants
116 N 4th Street, Suite 200
Bismarck, North Dakota 58501

Re: Zenergy Operating Company, Scoping for Five Proposed Wells on Fort Berthold Reservation

Dear Mr. Ruffo:

This is in response to your August 5, 2010, scoping document on five proposed exploratory oil and gas wells proposed to be drilled and completed by Zenergy Operating Company, LLC (Zenergy) on the Fort Berthold Reservation, Dunn and McKenzie Counties, North Dakota.

Specific locations for the proposed wells are:

Dakota-3 Joseph Eagle #2-19H: T. 149 N., R. 93 W., Section 19, Dunn County
Dakota-3 Mandaree Warrior #14-11H: T. 149 N., R. 94 W., Section 14, McKenzie County
Dakota-3 Sarah Smith #23-23H: T. 149 N., R. 93 W., Section 22, Dunn County
Dakota-3 Mandaree #30-31H: T. 150 N., R. 93 W., Section 30, Dunn County
Dakota-3 Buffalo #1-36H/Dakota-3 Corral #1-36H2: T. 149 N., R. 93 W., Section 1, 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 plovers, interior least terns, and pallid sturgeon. This concurrence is predicated on Zenergy's placement of the five wells approximately 3.25, 4.5, 3.5, 0.75, and 1 mile respectively from Lake Sakakawea. In addition, according to your October 5, 2010, email correspondence with Heidi Riddle of my staff, Zenergy has agreed to construct and maintain a four foot berm around the perimeter of all five well pads.

The Service concurs with your "may affect, is not likely to adversely affect" determination for whooping cranes. This concurrence is predicated on Zenergy's commitment to stop work on the proposed site if a whooping crane is sighted within one mile of the proposed project area and immediately contacting the Service.

The Service concurs with your "may affect, not likely to adversely affect" determination for gray wolf.

The Service acknowledges your no effect determination for black-footed ferret.

**Migratory Birds and Bald and Golden Eagle Protection Act**

In an email correspondence on September 5, 2010, to Heidi Riddle of my staff, you clarified that Zenergy will implement the following measures to avoid/minimize take of migratory birds:

- Construction will be done outside of the migratory bird nesting season (Feb. 15-July 15);
- Or, mow/grub the location and access road before the breeding season, if construction will occur in the spring;
- Or, conduct an avian survey five days prior to construction and report any findings to the Service.

You stated that "Although delisted in 2007, the bald eagle remains a species of special concern to the BIA and the Department of the Interior, and is effectively treated the same as a listed species." Bald and golden eagles are not treated the same as listed species, but receive protection under the BGEPA and MBTA. Absence of take, particularly for golden eagles, must be demonstrated.

Your September 5, 2010, email correspondence states that line of sight surveys for eagle nests were conducted within 0.5 mile of the project area and no eagle nests were found.

The Service believes that Zenergy's commitment to implement the aforementioned measures does demonstrate compliance with the MBTA and the BGEPA.

General Comments

There are a number of basic misstatements and lack of key information in your letter. One statement in the letter is: "Any wildlife species inhabiting the project area are likely to adapt to changing conditions, and continue to persist without adverse impact." No information is presented to support this statement and a basic knowledge of wildlife biology belies it. The Service indicated during the mock exercise sponsored by the BIA at Fort Berthold on June 23 of this year that broad, unsupported statements like this will not be accepted by the Service as credible statements of anticipated impacts to wildlife or lack thereof.

Your effects determinations for many species are "may affect, not likely to adversely affect", which implies that some level of impact may occur to a given species. However, your analysis of such impacts is either incomplete in many instances, or contains wording that is contradictory to such a determination. For example, Attachment 1, page 1, you have determined that the project is not likely to adversely affect piping plovers. In the paragraph describing impacts, you state that "no impacts are anticipated". If an impact could occur, the paragraph should discuss those impacts, and any measures that the company is committed to implementing to avoid or minimize such impacts.

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

United States Department of the Interior

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

OCT 15 2010

Mr. Michael Cook
SWCA Environmental Consultants
116 N 4th Street, Suite 200
Bismarck, North Dakota 58501

Re: Zenergy Operating Company Scoping for five new wells on Ft. Berthold Reservation

Dear Mr. Cook:

This is in response to your September 20, 2010, request for concurrence on five proposed exploratory oil and gas wells proposed to be drilled and completed by Zenergy Operating Company, LLC (Zenergy) on the Fort Berthold Reservation, Dunn and McKenzie Counties, North Dakota. In an October 5, 2010, email from Josh Ruffo to Heidi Riddle of my staff, Mr. Ruffo indicated that three of the five wells were being reviewed in a separate scoping, and that your request for concurrence would now only include two wells. Our comments on the other three wells were submitted to Mr. Ruffo on October 13, 2010.

Specific locations for the proposed wells are:

Dakota-3 Fox #14-8H: T. 149 N., R. 93 W., Section 8, Dunn County
Dakota-3 Gerald Hale #33-28H: T. 150 N., R. 94 W., Section 33, McKenzie 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 plovers, interior least terns, pallid sturgeon and designated piping plover critical habitat. This concurrence is predicated on Zenergy's placement of the two wells approximately 3.31 and 6.19 miles, respectively, from Lake Sakakawea. While not necessary for concurrence, Zenergy has also committed to construct a four foot berm around the perimeter of both pads.

The Service concurs with your "may affect, is not likely to adversely affect" determination for whooping cranes. This concurrence is predicated on Zenergy's commitment to stop work on the proposed site if a whooping crane is sighted within one mile of the proposed project area and immediately contacting the Service.

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

**Migratory Birds and Bald and Golden Eagle Protection Act**

The document states that Zenergy will implement the following measures to avoid/minimize take of migratory birds:

- Construction will be done outside of the migratory bird nesting season (Feb. 15-July 15);
- Or, mow/grub the location and access road before the breeding season, if construction will occur in the spring;
- Or, conduct an avian survey five days prior to construction and report any findings to the Service.

The document also states that line of sight surveys for eagle nests were conducted within 0.5 mile of the project area and no eagle nests were found.

The Service believes that Zenergy's commitment to implement the aforementioned measures does demonstrate compliance with 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

# United States Department of the Interior

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

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

NOV 16 2010

Perry 'No Tears' Brady, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Brady:

We have considered the potential effects on cultural resources of an oil well pad, access road and gathering line route in McKenzie County, North Dakota. Approximately 15.9 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. One archaeological site (32MZ2152) was located which may possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking, as the archaeological site will be avoided by shifting the well pad. Catalogued as **BIA Case Number AAO-1823/FB/10,** the proposed undertaking, location, and project dimensions are described in the following report:

Schleicher, Jolene, Judith Cooper and Stephanie Lechert
(2010) A Class I and Class III Cultural Resource Inventory of the Dakota-3 Gerald Hale #33-28H Well Pad, Access Road and Gathering Line, Fort Berthold Indian Reservation, McKenzie County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. The Standard Conditions of Compliance will be adhered to.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

Acting Regional Director

Enclosure

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

# United States Department of the Interior

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

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MG-208

NOV 16 2010

Perry 'No Tears' Brady, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Brady:

We have considered the potential effects on cultural resources of an oil well pad, access road and gathering line route in Dunn County, North Dakota. Approximately 38.01 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. Two archaeological sites (32DU1538, 32DU1539) were located which may possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking, as the archaeological sites will be avoided by rerouting the gathering line and fencing. Catalogued as **BIA Case Number AAO-1823/FB/10,** the proposed undertaking, location, and project dimensions are described in the following report:

Smith, Nicholas, and Stephanie Lechert
(2010) A Class I and Class III Cultural Resource Inventory of the Zenergy Dakota-3 Joseph Eagle #2-19H Well Pad, Access Road and Gathering Pipeline, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. The Standard Conditions of Compliance will be adhered to.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

ACTING Regional Director

Enclosure

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

United States Department of the Interior

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

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

NOV 0 3 2010

Perry 'No Tears' Brady, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Brady:

We have considered the potential effects on cultural resources of an oil well pad, access road and gathering line route in Dunn County, North Dakota. Approximately 15.1 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. No historic properties were located which appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking, as the archaeological site will be avoided by rerouting the access road and fencing. Catalogued as **BIA Case Number AAO-1823/FB/10,** the proposed undertaking, location, and project dimensions are described in the following report:

Schleicher, Jolene
(2010) A Class I and Class III Cultural Resource Inventory of the Dakota-3 Sarah Smith #22-23H Well Pad, Access Road and Gathering Line on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. The Standard Conditions of Compliance will be adhered to.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

Regional Director

Enclosure

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

# United States Department of the Interior

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

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

NOV 29 2010

Elgin Crows Breast, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Crows Breast:

We have considered the potential effects on cultural resources of an oil well pad, access road and gathering line in Dunn County, North Dakota. Approximately 26.57 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. Although one archaeological site (32DU1490) was recorded, it does not appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management Agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking. Catalogued as **BIA Case Number AAO-1887/FB/11**, the proposed undertaking, location, and project dimensions are described in the following report:

Lechert, Stephanie
(2010) A Class I and Class III Cultural Resource Inventory of the Zenergy Dakota-3 Fox #14-8H Well Pad, Access Road and Gathering Line, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK. Ms. on file (**AAO-1887/FB/11**)

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. The Standard Conditions of Compliance will be adhered to.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

Regional Director

Enclosures

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

# United States Department of the Interior

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

TAKE PRIDE IN AMERICA

NOV 18 2010

IN REPLY REFER TO:
DESCRM
MC-208

Perry 'No Tears' Brady, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Brady:

We have considered the potential effects on cultural resources of an oil well pad, access road and gathering line route in McKenzie County, North Dakota. Approximately 40.36 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. One archaeological site (32MZ2153) was located but which does not appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking. Catalogued as **BIA Case Number AAO-1823/FB/10,** the proposed undertaking, location, and project dimensions are described in the following report:

Eisenhauer, Nancy, and Stephanie Lechert
(2010) A Class I and Class III Cultural Resource Inventory of the Zenergy Dakota-3 Mandaree Warrior #14-11H well Pad, Access Road and Gathering Pipeline, Fort Berthold Indian Reservation, McKenzie County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. The Standard Conditions of Compliance will be adhered to.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

ACTING Regional Director

Enclosure

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

# Notice of Availability and Appeal Rights

**Zenergy: Dakota-3 Joseph Eagle #2-19H**
**Dakota-3 Sarah Smith #22-23H**
**Dakota-3 Fox #14-8H**
**Dakota-3 Gerald Hale #33-28H**
**Dakota-3 Mandaree Warrior #14-11H**

**The Bureau of Indian Affairs (BIA) is planning to issue administrative approvals related to installation of five oil and gas wells as shown on the attached map. Construction by Zenergy 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 February 7, 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.