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

FEB 2 4 2010

MEMORANDUM

TO: Superintendent, Fort Berthold Agency

FROM: Regional Director, Great Plains Region

SUBJECT: Environmental Assessment and Finding of No Significant Impact

In compliance with the regulations of the National Environmental Policy Act (NEPA) of 1969, as amended, for Six proposed exploratory drilling wells, access roads and related infrastructure by Zenergy on 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: Marcus Levings, Chairman, Three Affiliated Tribes (with attachment)
Perry "No Tears" Brady, THPO (with attachment)
Roy Swalling, BLM, Dickenson, ND (with attachment)
John Shelman, US Army Corps of Engineers

Finding of No Significant Impact
Zenergy Operating Company, LLC

Six Bakken Exploratory Oil Wells:
Dakota-3 Goodbird #36-25H
Dakota-3 Black Hawk #1-12H
Dakota-3 Packineau #4-32H
Dakota-3 Paul Peter Coffey #4-35H
Dakota-3 Mann #16-27H
Dakota-3 Wicker #34-27H

Fort Berthold Indian Reservation
Dunn County, North Dakota

The U.S. Bureau of Indian Affairs (BIA) has received a proposal for six oil/gas wells, access roads and related infrastructure on the Fort Berthold Indian Reservation to be located in Section 36, T148N,R93W, Section 36, T148N, R93W, Section 32, T149N, R92W, Section 27, T148N, R93W, Section 27, T148N, R93W, and Section 34, T149N, R93W, Dunn 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.

The potential of the proposed actions to impact the human environment is analyzed in the attached Environmental Assessment (EA), as required by the National Environmental Policy Act. Based on the recently completed EA, I have determined that the proposed projects 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.

4. The proposed actions are designed to avoid adverse effects to historic, archaeological, cultural and traditional properties, sites and practices. Compliance with the procedures of the National Historic Preservation Act is complete.

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

2/24/2010
Date

ENVIRONMENTAL ASSESSMENT

United States Department of 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

Six Bakken Exploratory Oil Wells:

Dakota-3 Goodbird #36-25H
Dakota-3 Black Hawk #1-12H
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Dakota-3 Paul Peter Coffey #4-35H
Dakota-3 Mann #16-27H
Dakota-3 Wicker #34-27H

Fort Berthold Indian Reservation

February 2010

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

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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 six horizontal oil and gas wells on four 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 and McKenzie counties, 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. Developments have been proposed in locations that target specific areas located in the Middle Bakken Dolomite member of the Bakken Formation, a known oil reserve. The following proposed well sites, shown in Figures 1 through 5, will be located within the Reservation in which the majority of the external boundaries are located above the Bakken Formation.

- **Dakota-3 Goodbird #36-25H**: SE¼ SE¼ of Section 36, Township (T) 148 North (N), Range (R) 93 West (W), Dunn County
- **Dakota-3 Black Hawk #1-12H**: SE¼ SE¼ of Section 36, T148N, R93W, Dunn County
- **Dakota-3 Packineau #4-32H**: C NW¼ of Section 32, T149N, R92W, Dunn County
- **Dakota-3 Paul Peter Coffey #4-35H**: SE¼ SE¼ of Section 27, T148N, R93W, Dunn County
- **Dakota-3 Mann #16-27H**: SE¼ SE¼ of Section 27, T148N, R93W, Dunn County
- **Dakota-3 Wicker #34-27H:** SE¼ SW¼ of Section 34, T149N, R93W, Dunn County

Existing access roads will be upgraded and will include a utility corridor; new access roads and utility corridor will be constructed in order to facilitate the construction and operation of each proposed well. Well pads will be constructed to accommodate drilling activities and well operations. Pits constructed for drilled cuttings will be used during drilling operations and reclaimed once operations have ceased. Should any of the proposed well sites result in long-term commercial production, supporting facilities may be constructed on site. All components (i.e., roads, well pads, supporting facilities) will 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 will require additional National Environmental Policy Act of 1969 (NEPA) analysis and federal actions.

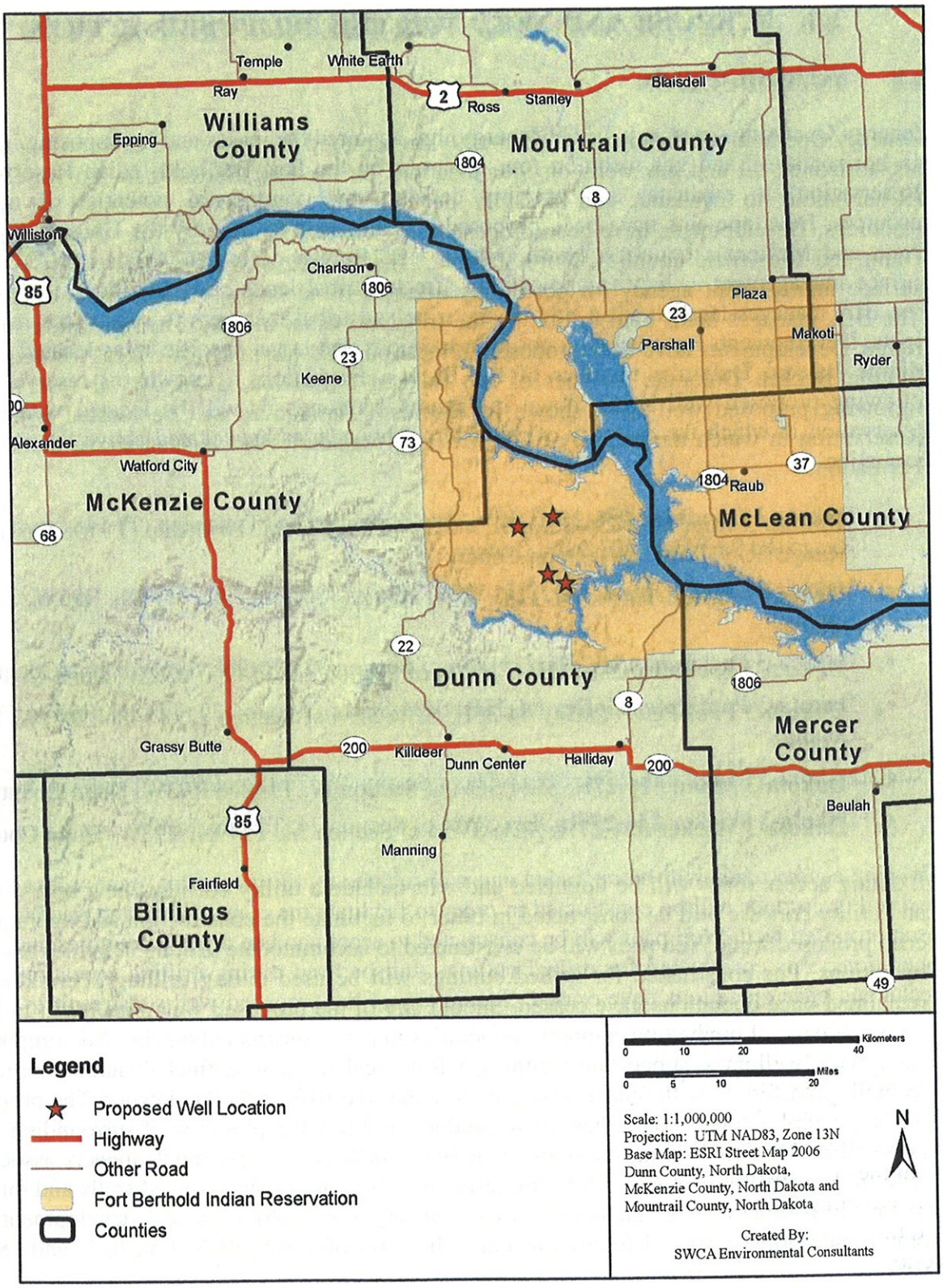


Figure 1. Project location.

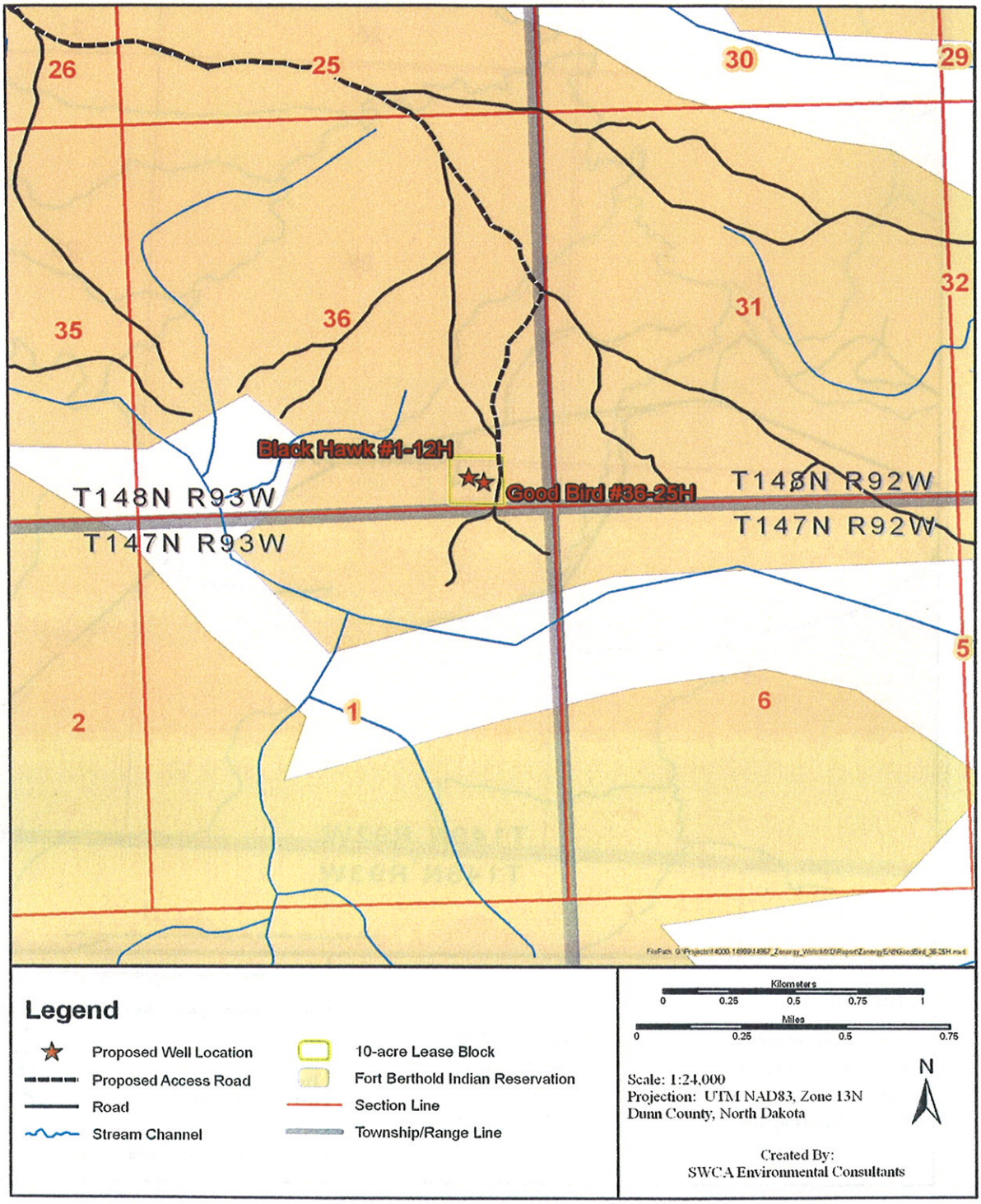


Figure 2. Goodbird #36-25H and Black Hawk #1-12H proposed locations.

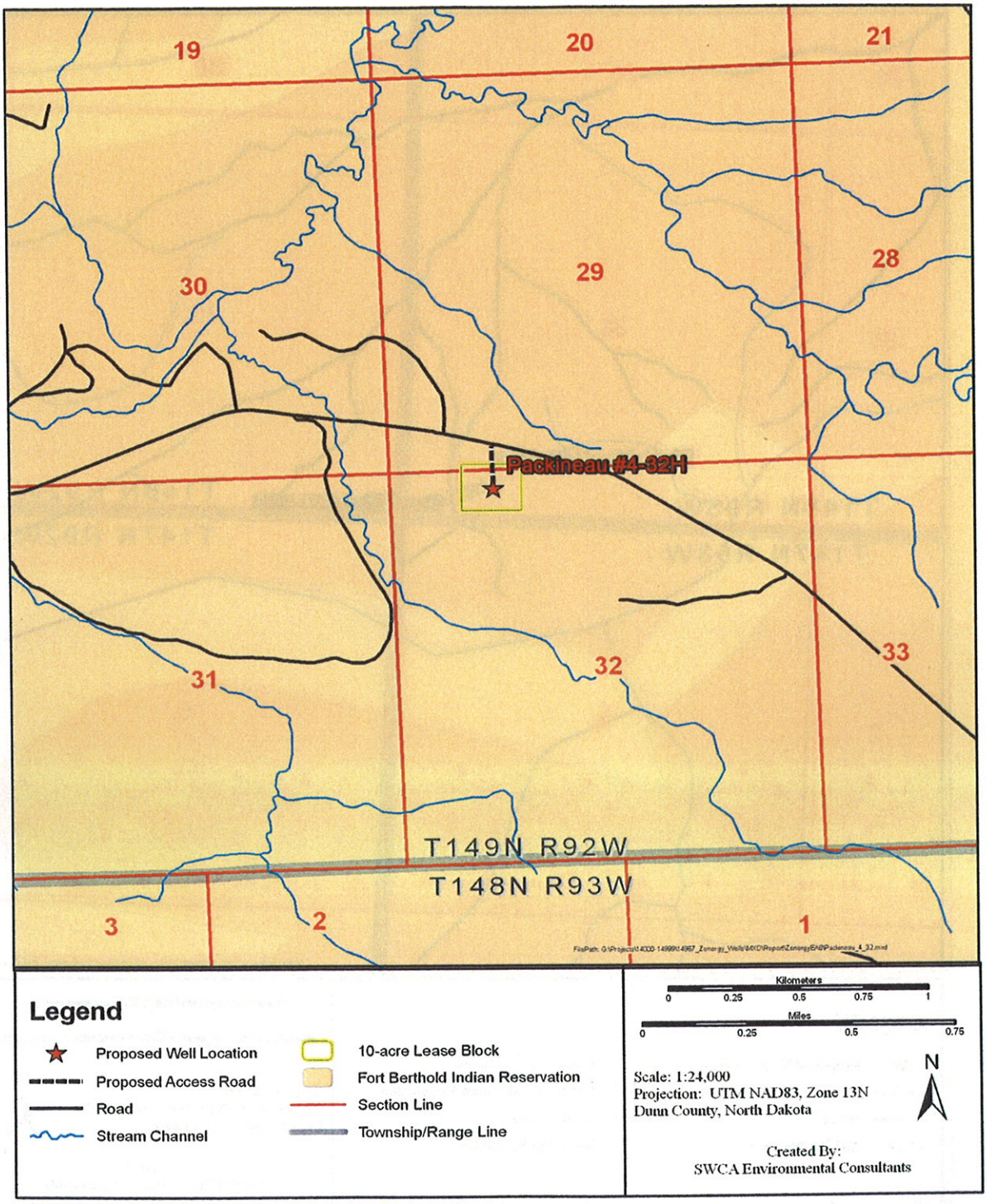


Figure 3. Packineau #4-32H proposed location.

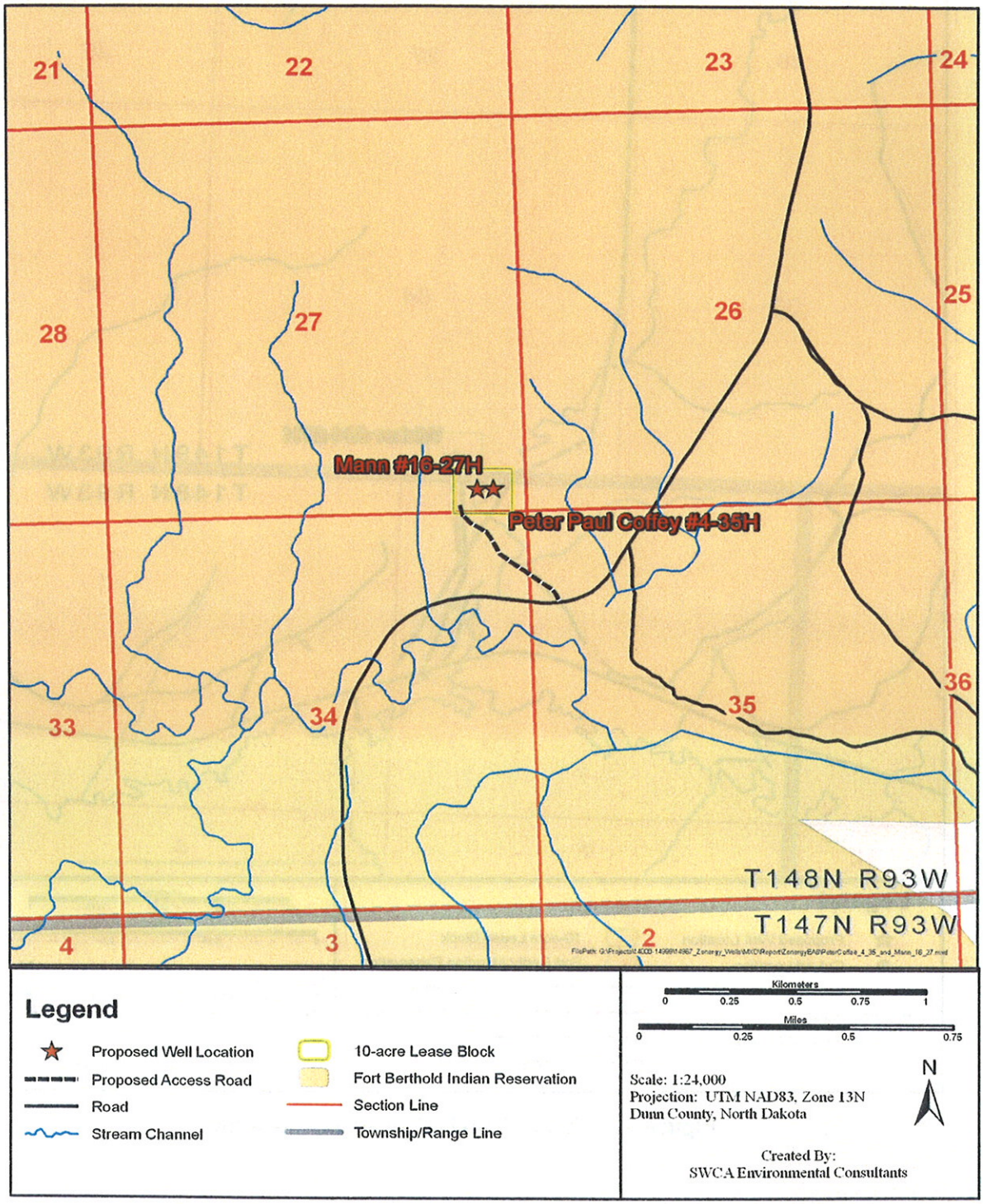


Figure 4. Paul Peter Coffey #4-35H and Mann #16-27H proposed locations.

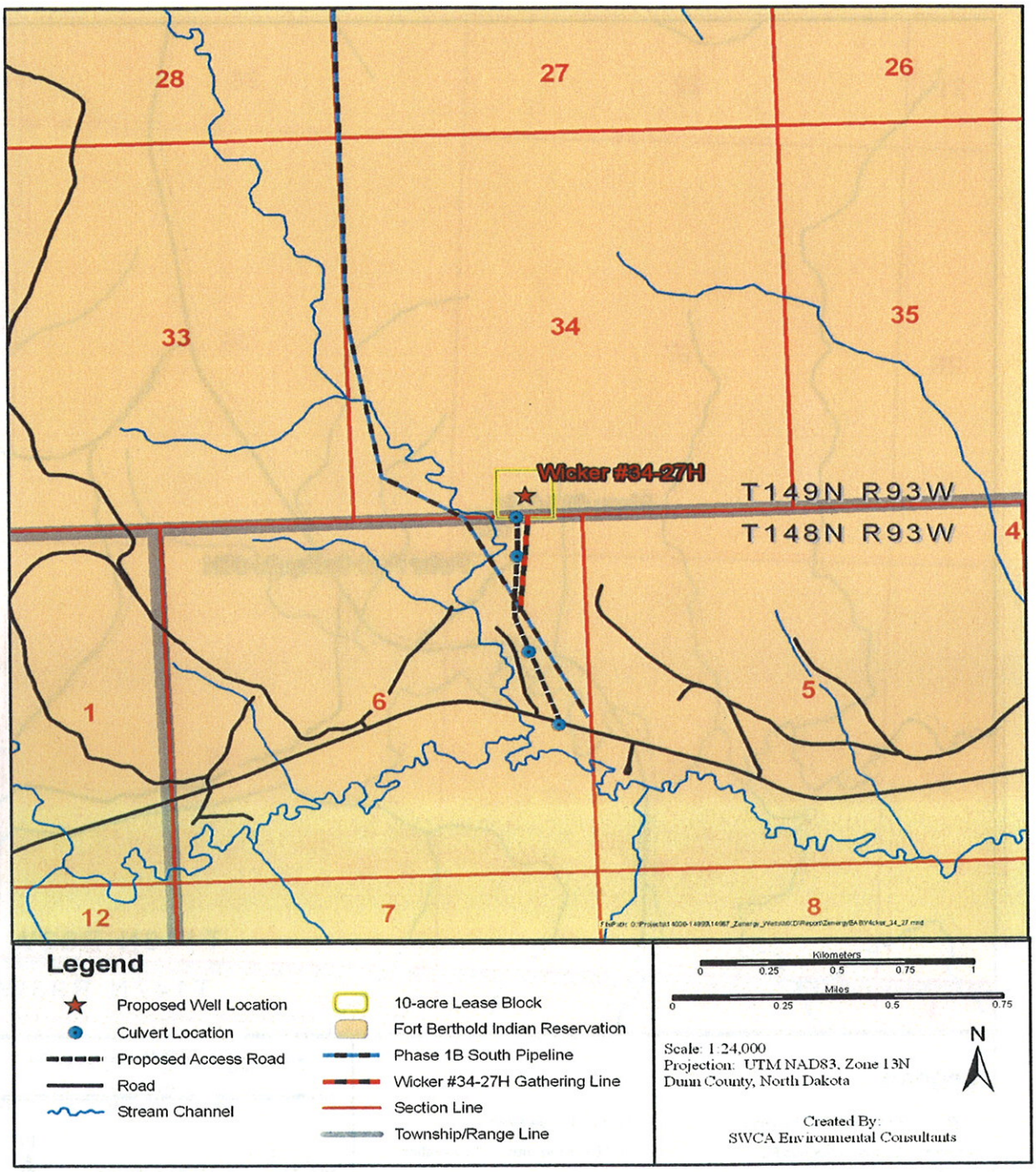


Figure 5. Wicker #34-27H proposed location.

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, will benefit economically 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); 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 are 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 will describe potential impacts to the project area. This EA will result in either a Finding of No Significant Impact or in the preparation of an Environmental Impact Statement (EIS). Commercial viability of the proposed wells could result in additional exploration in the area. Should future oil/gas exploration activities be proposed wholly or partly on trust land, those proposals and associated federal actions 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. 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 directed 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, BIA is considering the Proposed Action.

2.1 THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed project, including well pads, wells, and access roads, 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 project 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 recovery of resources at these well locations.

2.2 THE PROPOSED ACTION

This document analyzes the potential impacts of six exploratory oil and gas wells with varied surface and mineral estates located in the west-central portions of the Reservation in Dunn and McKenzie counties. Sites were chosen by Zenergy in consultation with tribal and BIA resource managers to provide information for future development. Well site locations underwent a pre-clearance process that included surveys for cultural, archaeological, and natural (i.e., biological and physical) resources. The proposed wells would test the commercial potential of the Middle Bakken Dolomite member of the Bakken Formation.

2.2.1 Field Camps

A few personnel would be housed in self-contained trailers for a very short period of time. Long-term housing is not being 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.

2.2.2 Access Roads and Utility Corridors

2.2.2.1 Access Roads

Up to 17,022 feet (i.e., 3.22 miles) of new access roads would be constructed. A maximum disturbed ROW width of 66 feet for each access road would result in up to 25.1 acres of new

surface disturbance. Signed agreements would be in place allowing road construction across affected private and allotted land surfaces, and any applicable approach permits and/or easements would be obtained prior to any construction activity.

Construction would follow road design standards outlined in the BLM Gold Book (BLM and U.S. Forest Service [USFS] 2007). At a minimum, 6 inches of topsoil would be removed from the access road corridors. This stockpiled topsoil would then be placed on the outside slopes of the ditches following road construction. The ditches would be reseeded as quickly as possible using a seed mixture determined by the BIA. Care would be taken during road construction to avoid disturbing or disrupting any buried utilities that may exist along BIA Roads 12, 14, and 17. If a site were to be established as a commercial production site, the access roads would be surfaced with a minimum of 4 inches of aggregate. Also, the roadway would remain in use for the life of the well(s). Details of road construction are addressed in the APDs. A diagram of typical road cross sections is shown in Figure 6.

2.2.2.2 Utility Corridors

Zenergy plans to construct oil, produced water, and gas gathering lines from the Wicker #34-27H well site to a tie-in point on the Arrow Midstream Holdings, LLC gathering system. In accordance with the BLM Gold Book and Best Management Practices (BMPs), Zenergy would co-locate the gathering lines along proposed and existing access roads, wherever possible, to reduce overall disturbance. In addition to the construction practices described in Section 2.2.2.1 *Access Roads*, Zenergy would also:

- avoid constructing gathering lines on steep hillsides or in water courses;
- avoid blocking or changing the natural course of any drainage;
- bury the gathering lines at least 4 feet below the bottom of any channel that is crossed;
- test the gathering lines prior to backfilling the trenches;
- compact the trenches during backfilling and then heaped to mitigate settling; and
- recontour any cut-and-fill slopes.

Please see Section 2.2.8 *Construction Details at Individual Sites* for more information on gathering line construction.

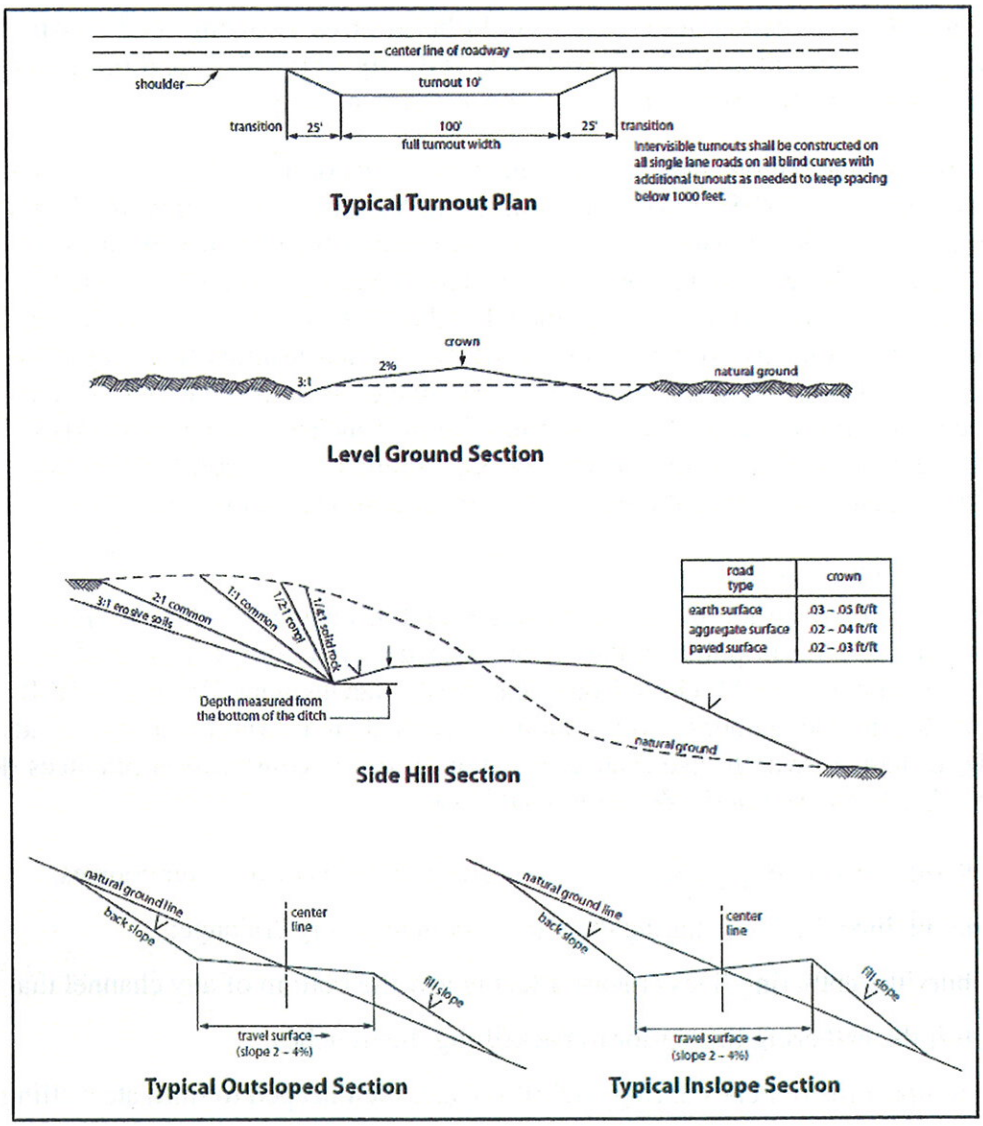


Figure 6. Typical road cross sections (BLM and USFS 2007).

2.2.3 Well Pads

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

The single-well pads average approximately 430 by 330 feet in size and the dual-well pads average 630 by 330 feet. Cut-and-fill slopes, stockpiled topsoil, and reserve pit backfill placed on the edge of the pads would result in approximately 0.4 acre of additional surface

disturbance per pad. Total surface disturbance would average approximately 5.1 acres per well pad and would total 20.6 acres. Details of pad construction and reclamation can be found in the APD.

2.2.4 Drilling

After securing mineral leases, Zenergy submitted the Notices of Staking to the BLM on the following dates.

- Dakota-3 Goodbird #36-25H: October 7, 2009
- Dakota-3 Black Hawk #1-12H: October 7, 2009
- Dakota-3 Packineau #4-32H: November 13, 2009
- Dakota-3 Paul Peter Coffey #4-35H: November 16, 2009
- Dakota-3 Mann #16-27H: November 16, 2009
- Dakota-3 Wicker #34-24H: August 25, 2009

The BIA's office in New Town, North Dakota, received copies of the APDs from the BLM North Dakota Field Office. Construction will begin when the BIA completes the NEPA process and the APDs are then approved by the BLM.

Rig transport and on-site assembly would take roughly seven days for each well; a typical drill rig is shown in Figure 7. 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. Water would be obtained from a commercial source for this drilling stage, using approximately 8.4 gallons of water per foot of hole drilled.

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 the 7-inch casing point. 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.

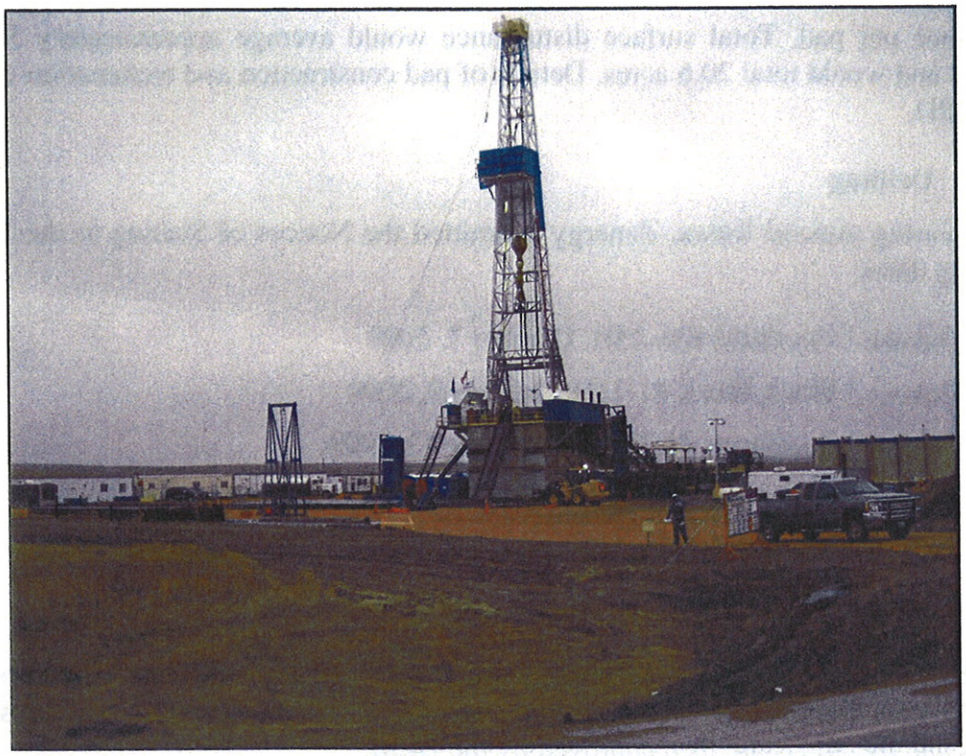


Figure 7. Typical drilling rig.

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 1,600 and 1,700 feet, respectively. Production casing would be cemented from approximately 10,400 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 Activities

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

2.2.7.1 Goodbird #36-25H, Black Hawk #1-12H, Packineau #4-32H, Paul Peter Coffey #4-35H, Mann #16-27H,Wicker #34-27H

If drilling, testing, and production support commercial production from any of the six proposed locations, additional equipment would be installed, including a pumping unit at the well head, a vertical heater/treater, and a flare pit (Figure 8). 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. If commercial production is shown to be feasible and further impacts are anticipated, subsequent NEPA analyses would be completed as indicated by overall commercial production processes.

Figure 8. Typical producing oil well pad (Sobotka 2008).

The duration of production operations cannot be reliably predicted, but some oil wells have pumped for more than 100 years. The operator estimates that each well would yield approximately 500 barrels of oil per day and 100 barrels of water during the first year of production. After the first year, the operator estimates production would decrease to approximately 300 barrels of oil per day and 45 barrels of water. Produced water is mostly recovered frac fluids and is expected to become minimal after two years.

2.2.7.2 Goodbird #36-25H, Black Hawk #1-12H, Packineau #4-32H, Paul Peter Coffey #4-35H, Mann #16-27H

Tanks (usually 400-barrel steel tanks) would be installed at these locations until gathering lines can be installed from the well head to an available gathering system. This document does not address the potential of gathering lines for these five wells; in the future, Zenergy may apply for ROWs for oil, gas, and water pipelines, which would likely be located within existing disturbance along access and arterial roads. This EA does not address the impacts of construction or operation of such ancillary developments for these two locations.

An impervious dike sized to hold 100% 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.

Oil would be collected in tanks installed on location and periodically trucked to an existing oil terminal for sales. Any produced water would be captured in tanks and periodically trucked to an approved disposal site. The frequency of trucking activities for both oil and produced water would depend upon volumes and rates of production.

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

2.2.7.3 Wicker #34-27H

For information on the product transportation system (gathering lines) for the Wicker #34-27H, please see Section 2.2.8 *Construction Details at Individual Sites* below.

2.2.8 Construction Details at Individual Sites

2.2.8.1 Goodbird #36-25H and Black Hawk #1-12H Dual-Well Pad

The proposed Goodbird #36-25H and Black Hawk #1-12H dual-well site, shown in Figure 9, is located approximately 13.8 miles southeast of Mandaree in the SE¼ SE¼ of Section 36, T148N, R93W, Dunn County, North Dakota. A new access road approximately 12,249 feet long would be constructed from the well site to BIA 17 (Figures 9 through 12); Zenergy is building this access, rather than upgrading the existing primitive road that runs south to the proposed well site, at the request of the BIA as it will be a shared road to another proposed well location. The new road would disturb approximately 18.6 acres and the proposed well pad would disturb approximately 5.7 acres; the total anticipated new disturbance would be 24.3 acres.

2.2.8.1.1 Goodbird #36-25H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NW¼ NW¼ of Section 25, T148N, R93W (Figure 11). Vertical drilling would be initially completed at approximately 9,951 feet, at which point drilling would turn roughly horizontal to an approximate total vertical depth (TVD) of 10,801 feet. The drill string would total approximately 20,301 feet at the total measured depth (TMD), including approximately 9,500 feet of lateral reach into the Middle Bakken Formation. The drilling target is located about 550 feet from the north line (FNL) and 1,220 feet from the west line (FWL), approximately 10,165 feet northwest of the surface hole location. A setback of at least 550 feet would be maintained.

Figure 9. Goodbird #36-25H/Black Hawk #1-12H well pad area, looking north.

Figure 10. Goodbird #36-25H/Black Hawk #1-12H access road, looking south-southwest.

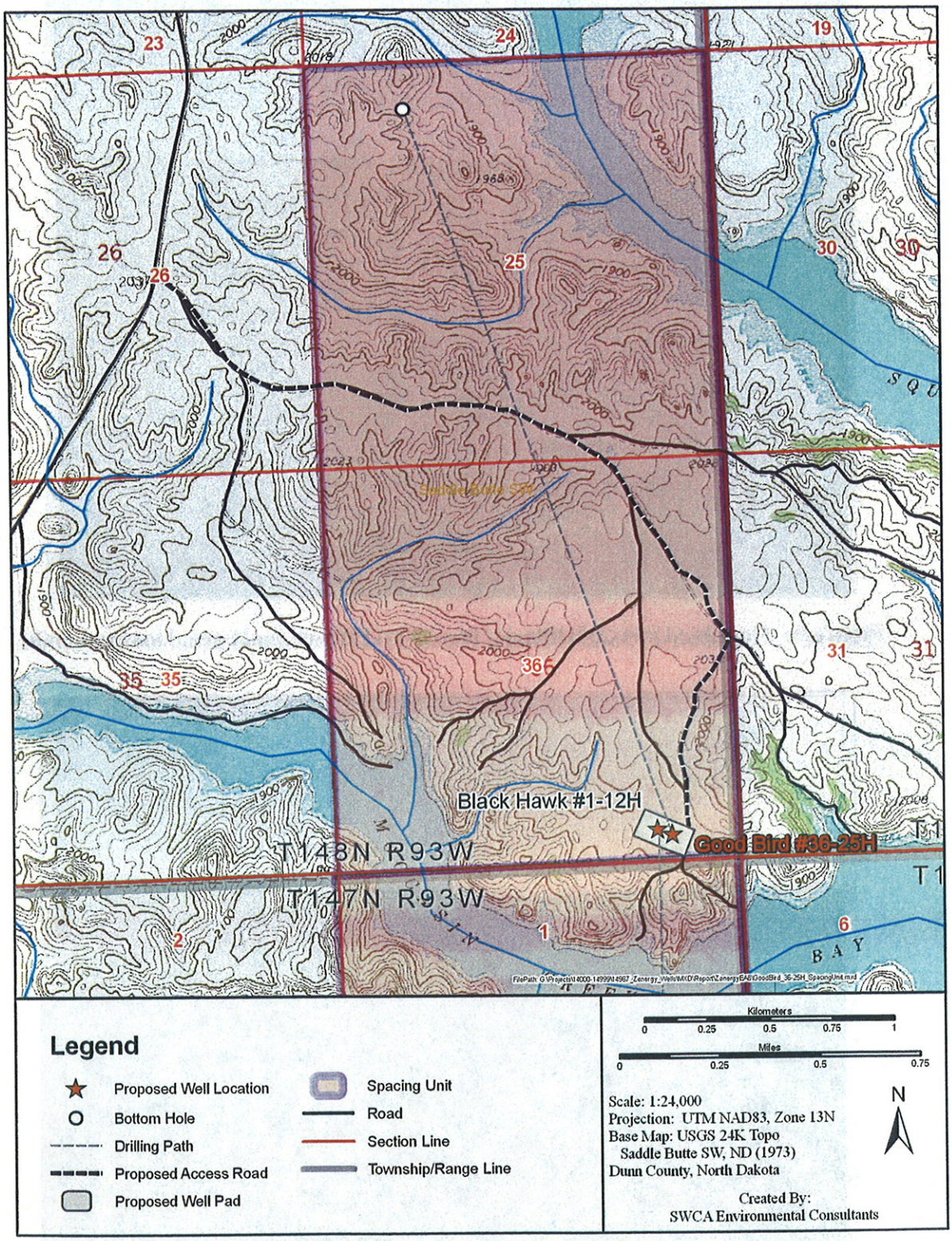


Figure 11. Goodbird #36-25H proposed location showing spacing unit and drilling target.

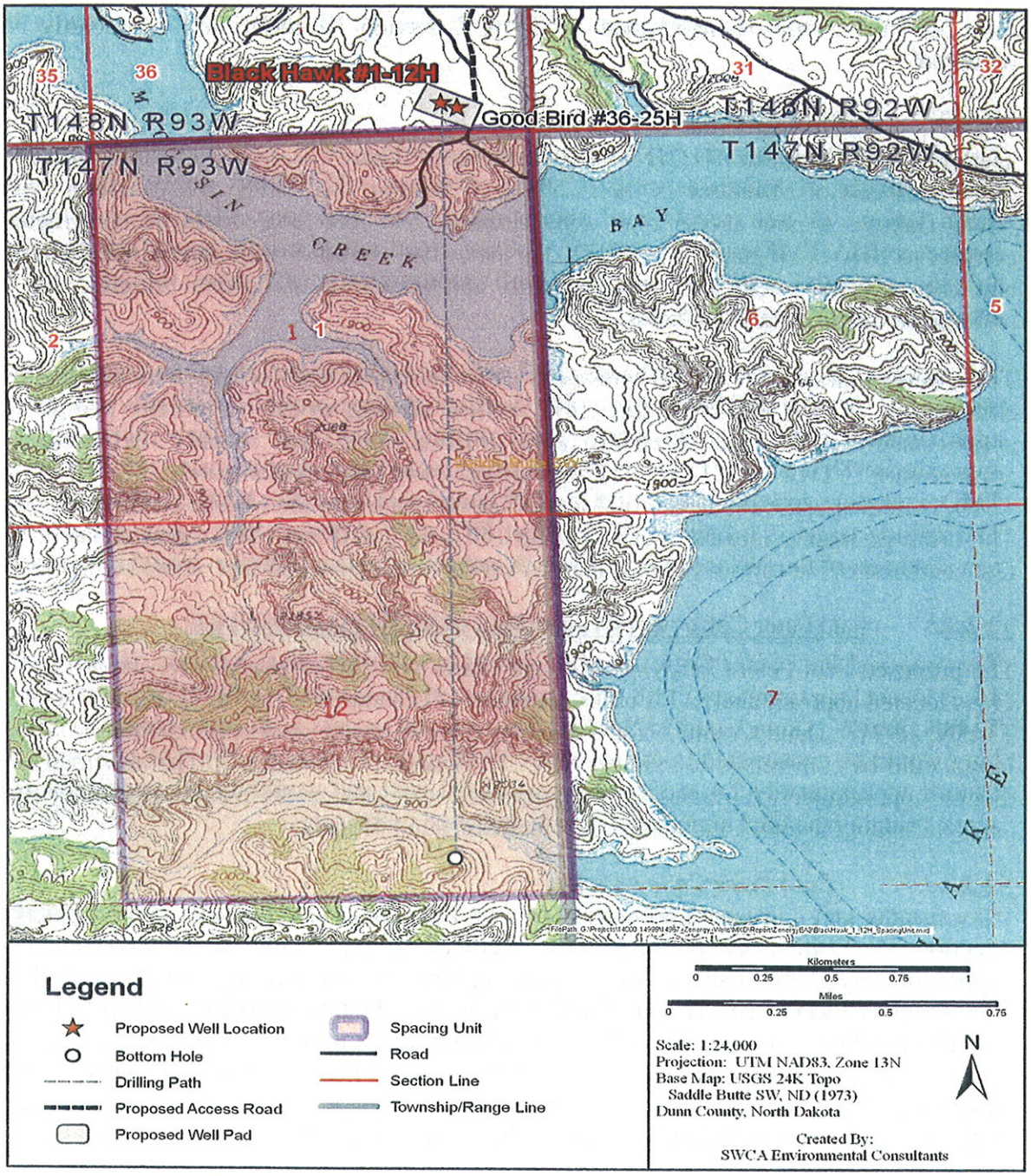


Figure 12. Black Hawk #1-12H proposed location showing spacing unit and drilling target.

2.2.8.1.2 Black Hawk #1-12H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the SE¼ SE¼ of Section 12, T147N, R93W (Figure 12). Vertical drilling would be initially completed at approximately 9,951 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,501 feet. The drill string would total approximately 20,301 feet at the TMD, including approximately 9,500 feet of lateral reach into the Middle Bakken Formation. The drilling target is located about 550 feet from the south line (FSL) and 1,220 feet from the

east line (FEL), approximately 10,394 feet south of the surface hole location. A setback of at least 550 feet would be maintained. A USACE Section 10 application is currently being prepared.

2.2.8.2 Packineau #4-32H

The proposed Packineau #4-32H well site, shown in Figure 13, is located approximately 9.2 miles southeast of Mandaree in the C NW¼ of Section 32, T149N, R92W, Dunn County, North Dakota. A new access road approximately 390 feet long would be constructed to connect to BIA 12 (Figures 14 and 15). The new road would disturb approximately 0.6 acre and the proposed well pad would disturb approximately 4.2 acres, bringing the total anticipated disturbance to 4.8 acres.

The spacing unit consists of 640 acres (+/-) with the bottom hole located in the SE¼ SW¼ of Section 32, T149N, R92W (Figure 14). Vertical drilling would be initially completed at approximately 9,921 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,771 feet. The drill string would total approximately 15,271 feet at the TMD, including approximately 4,500 feet of lateral reach into the Middle Bakken Formation. The drilling target is located about 550 feet FSL and 2,620 feet FWL, approximately 4,660 feet southeast of the surface hole location. A setback of at least 550 feet would be maintained.

2.2.8.3 Paul Peter Coffey #4-35H and Mann #16-27H Dual-Well Pad

The proposed Paul Peter Coffey #4-35H and Mann #16-27H dual-well site, shown in Figure 16, is located approximately 11.8 miles southeast of Mandaree in the SE¼ SE¼ of Section 27, T148N, R93W, Dunn County, North Dakota. A new access road approximately 1,560 feet long would be constructed to connect BIA 17 (Figures 17 through 19). The new road would disturb approximately 2.4 acres and the proposed well pad would disturb approximately 6.4 acres, bringing the total anticipated new disturbance to 8.8 acres.

2.2.8.3.1 Paul Peter Coffey #4-35H

The spacing unit consists of 640 acres (+/-) with the bottom hole located in the SE¼ SE¼ of Section 35, T148N, R93W (Figure 18). Vertical drilling would be initially completed at approximately 9,797 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,647 feet. The drill string would total approximately 15,147 feet at the TMD, including approximately 4,500 feet of lateral reach into the Middle Bakken Formation. The drilling target is located about 550 feet FSL and 550 feet FEL, approximately 7,155 feet southeast of the surface hole location. A setback of at least 550 feet would be maintained. A USACE Section 10 application is currently being prepared.

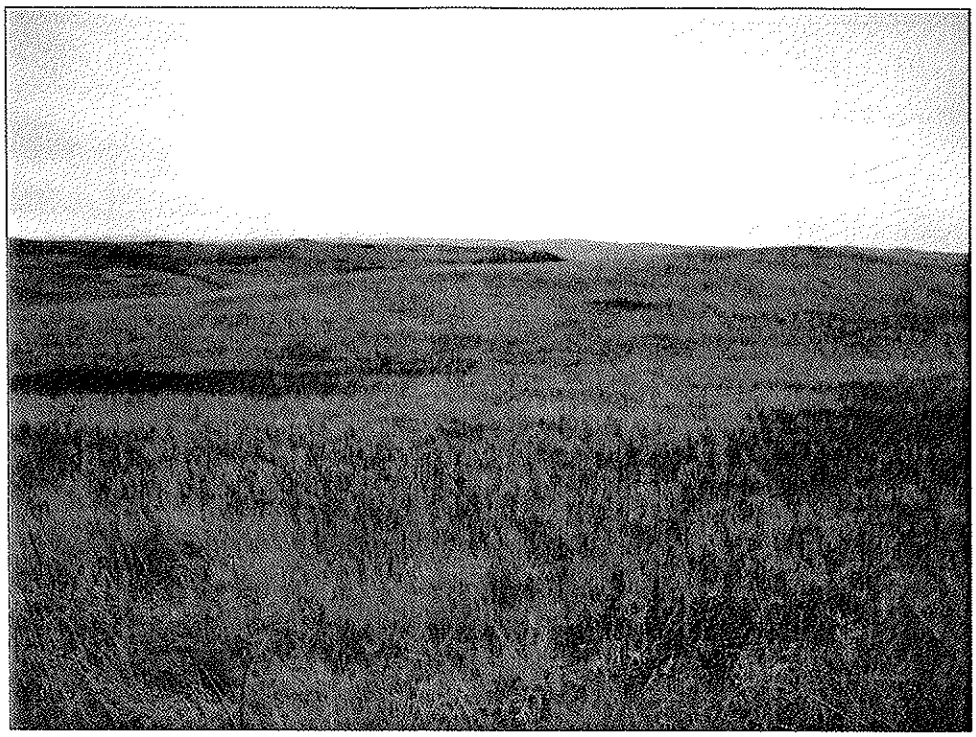


Figure 13. Packineau #4-32H well pad area, looking west.

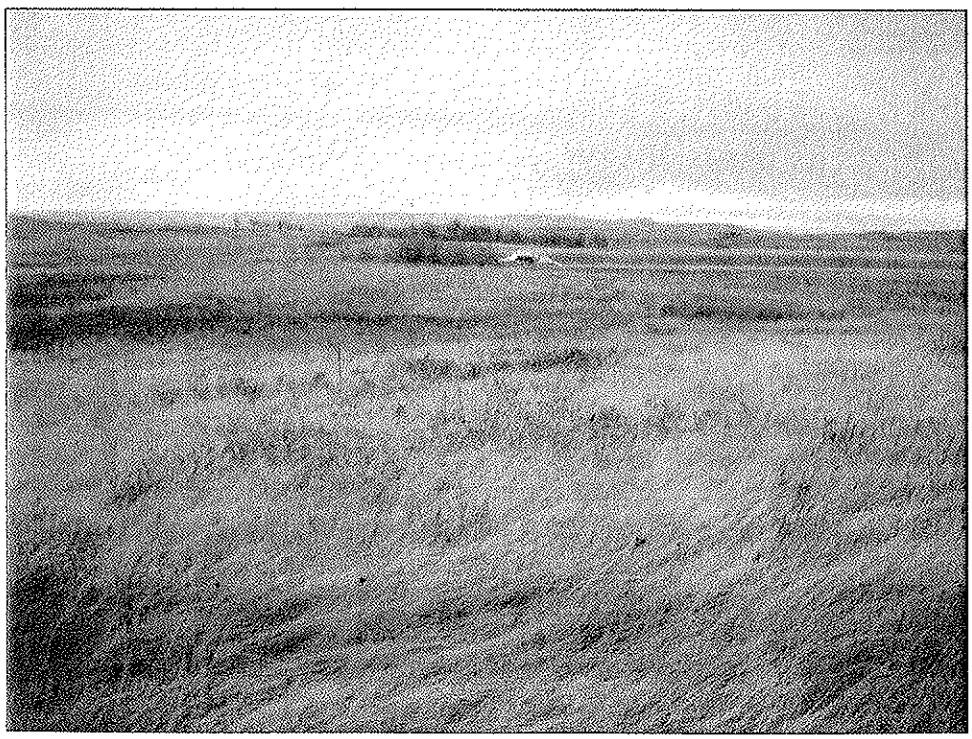


Figure 14. Packineau #4-32H access road area, looking north.

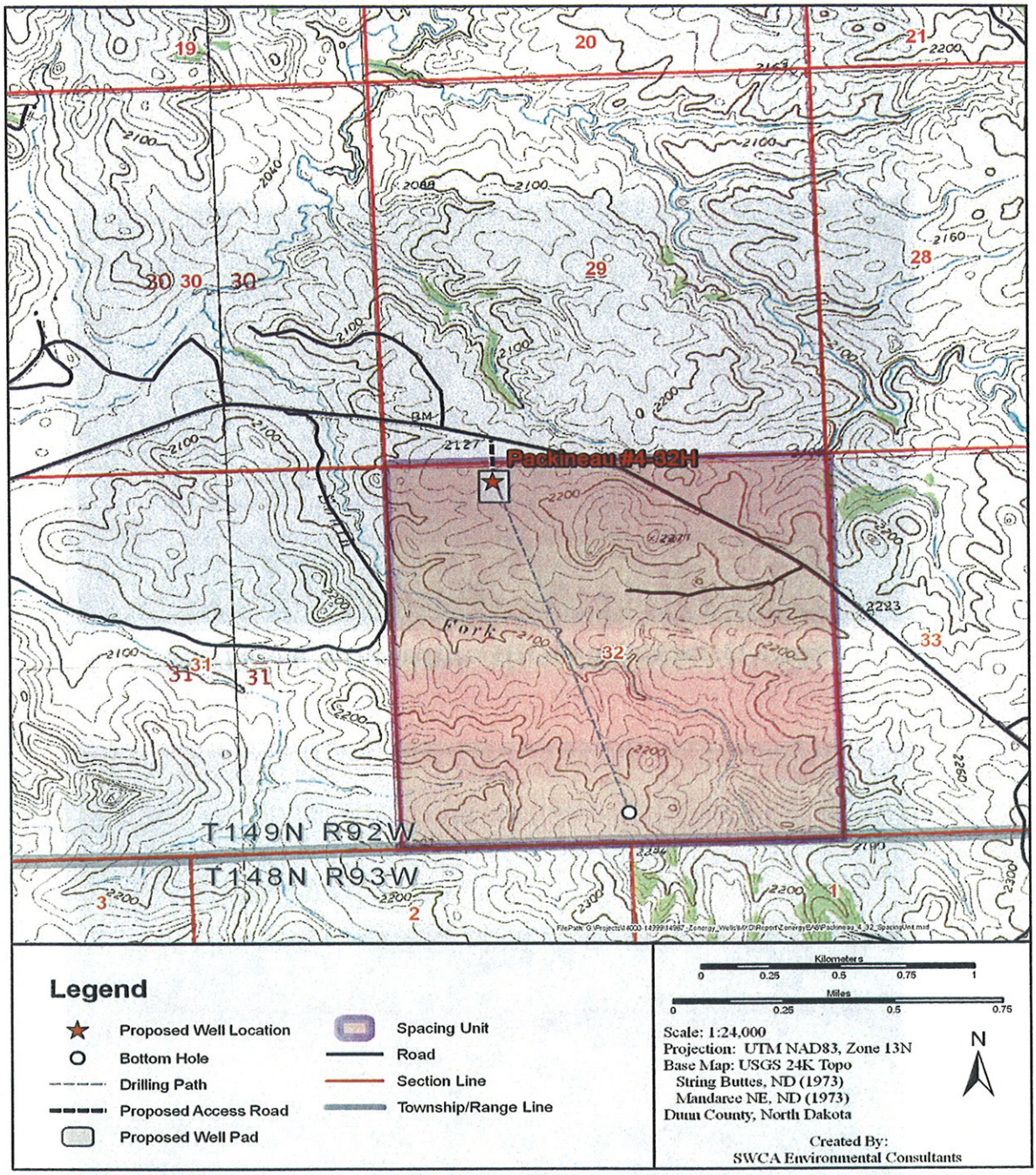


Figure 15. Packineau #4-32H proposed location showing spacing unit and drilling target.

Figure 16. Paul Peter Coffey #4-35H/Mann #16-27H well pad area, looking east.

Figure 17. Paul Peter Coffey #4-35H/Mann #16-27H access road, looking north-northwest.

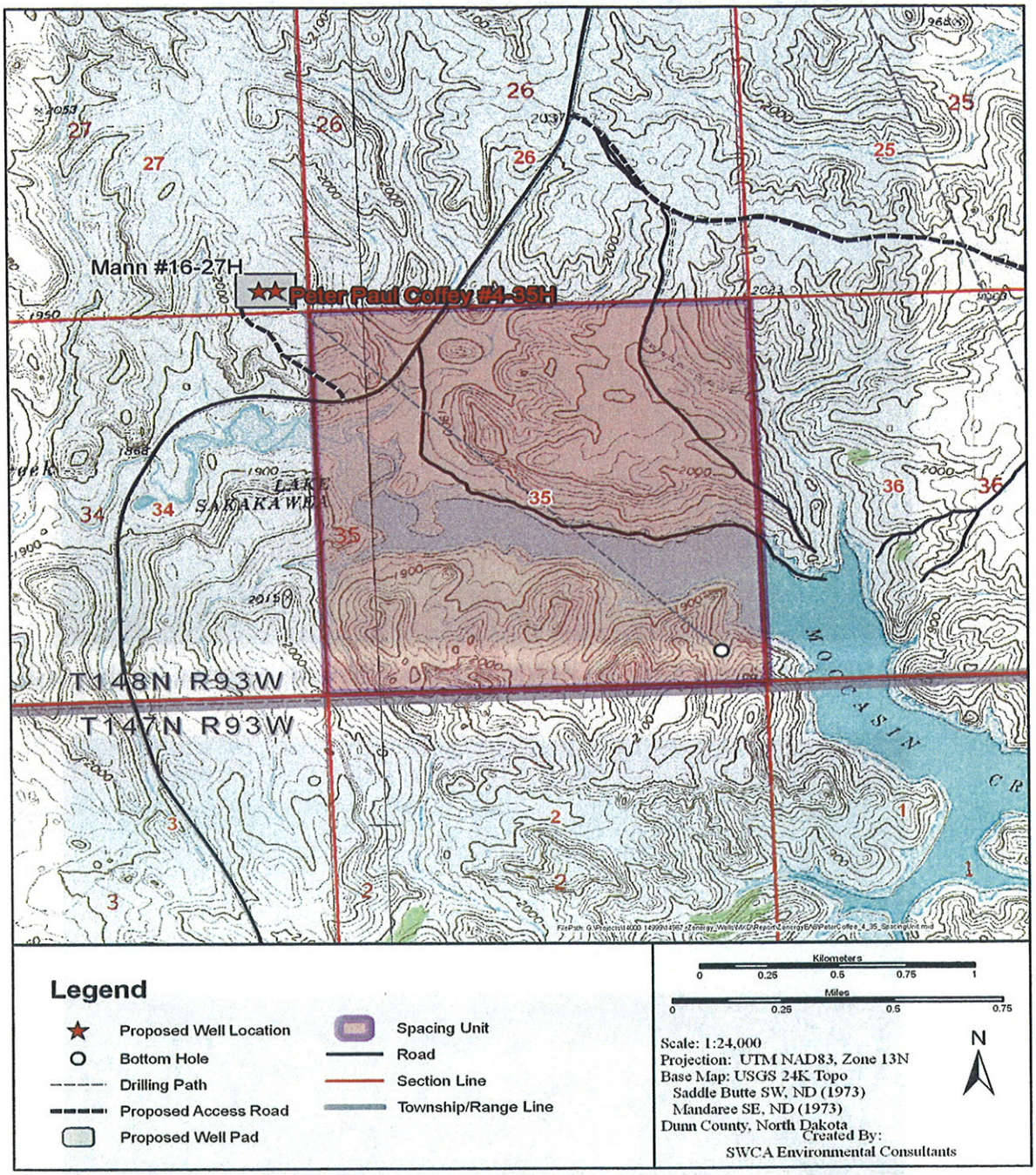


Figure 18. Paul Peter Coffey #4-35H proposed location showing spacing unit and drilling target.

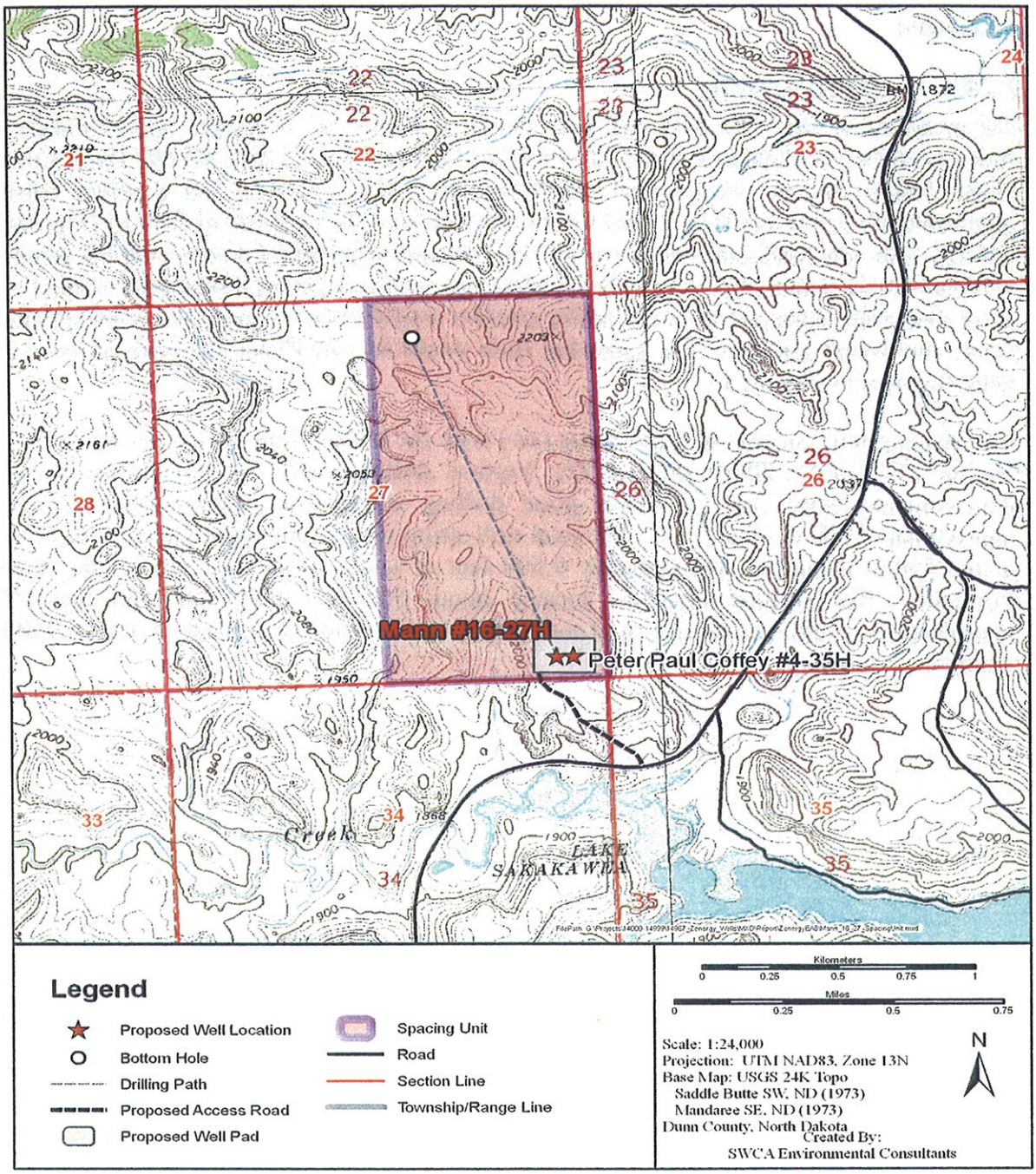


Figure 19. Mann #16-27H proposed location showing spacing unit and drilling target.

2.2.8.3.2 Mann #16-27H

The spacing unit consists of 320 acres (+/-) with the bottom hole located in the NW¼ NE¼ of Section 27, T148N, R93W (Figure 19). Vertical drilling would be initially completed at approximately 9,797 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,647 feet. The drill string would total approximately 15,147 feet at the TMD, including approximately 4,500 feet of lateral reach into the Middle Bakken Formation. The drilling target is located about 550 feet FNL and 2,090 feet FEL, approximately 4,676

feet northwest of the surface hole location. A setback of at least 550 feet would be maintained.

2.2.8.4 Wicker #34-27H

The proposed Wicker #34-27H well site, shown in Figure 20, is located approximately 6.2 miles southeast of Mandaree in the SE¼ SW¼ of Section 34, T149N, R93W, Dunn County, North Dakota A new access road approximately 2,365 feet long and a utility corridor approximately 1,336 feet long would be constructed from the well site to BIA 14 (Figures 21 and 22). The new road and corridor would disturb approximately 3.6 acres and the proposed well pad would disturb approximately 4.3 acres; the total anticipated disturbance would be 7.9 acres. Gathering lines placed in the utility corridor would include 6-inch oil, 4-inch produced water, and 6-inch gas lines. The gathering lines would tie into Phase 1B South of the Arrow gathering system (Figure 5).

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the CNW2 of Section 27, T149N, R93W (Figure 22). Vertical drilling would be initially completed at approximately 9,921 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,771 feet. The total drill string would total approximately 20,271 feet at the TMD, including approximately 9,500 feet of lateral reach into the Middle Bakken Formation. The drilling target is located about 550 feet FNL and 550 feet FWL, approximately 4,680 feet northwest of the surface hole location. A setback of at least 550 feet would be maintained.

Figure 20. Wicker #34-27H well pad area, looking south.

Figure 21. Wicker #34-27H access road area, looking north.

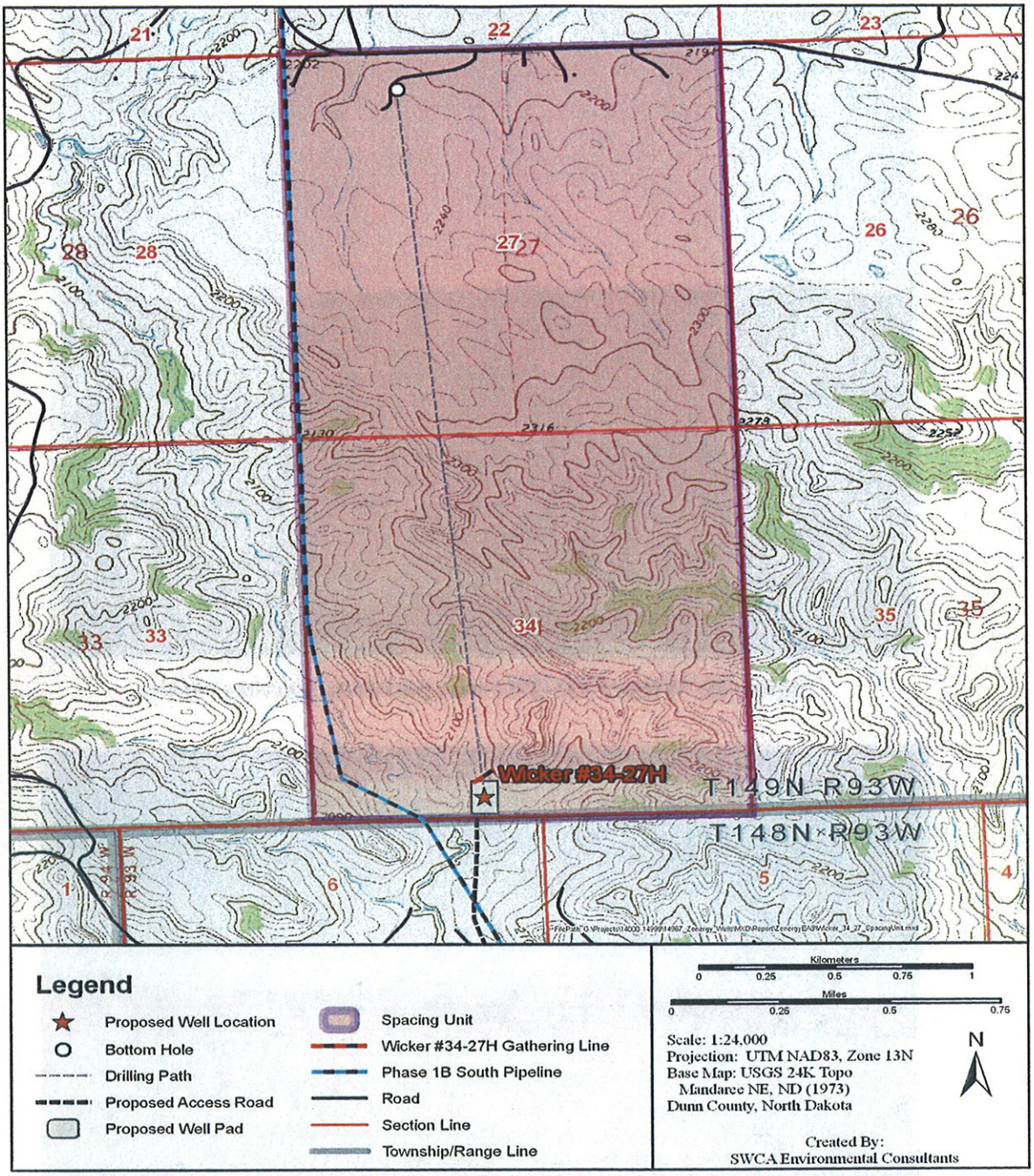


Figure 22. Wicker #34-27H proposed location showing spacing unit and drilling target.

2.2.9 Reclamation

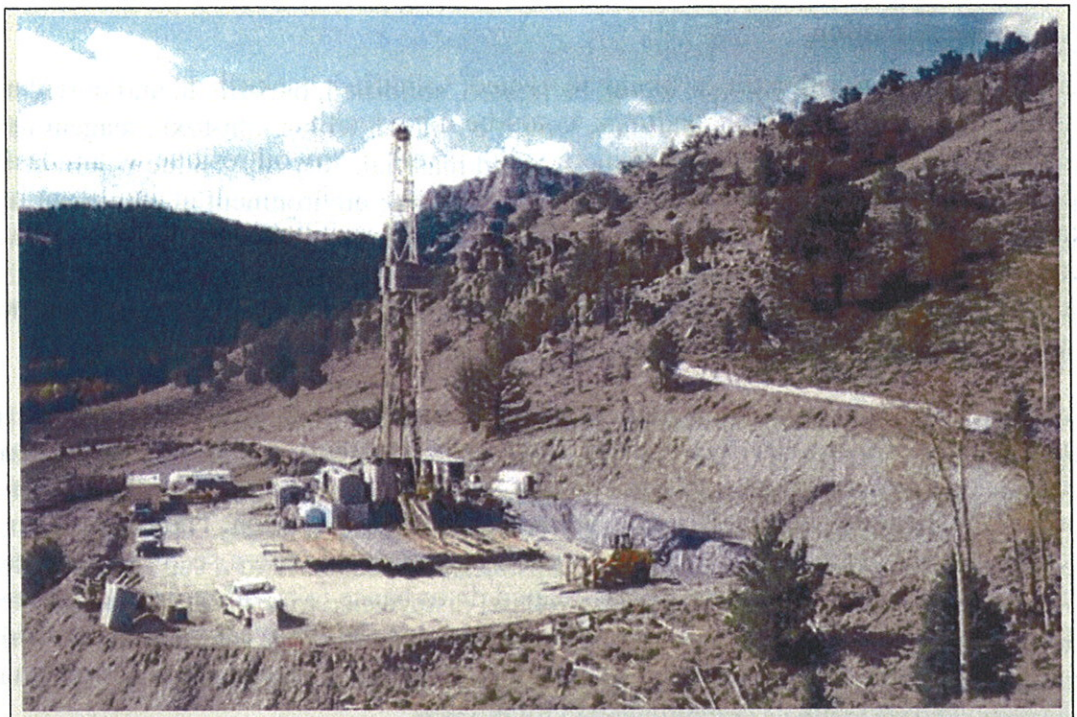
The reserve pit and drill cuttings would be treated, solidified, backfilled, and buried as soon as possible after well completion. Cuttings would be mixed with a non-toxic reagent resulting in an irreversible reaction to produce an inert, solid material. Any oil residue would be dispersed and captured, 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.

If commercial production equipment is installed, the well pad would be reduced in size to approximately 300 by 200 feet and the rest of the original pad would be reclaimed. 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 about 28 feet. Other interim reclamation measures to be accomplished within the first year include reduction of the cut-and-fill slopes, redistribution of stockpiled topsoil, installation of erosion control measures, and reseeding as recommended by the BIA.

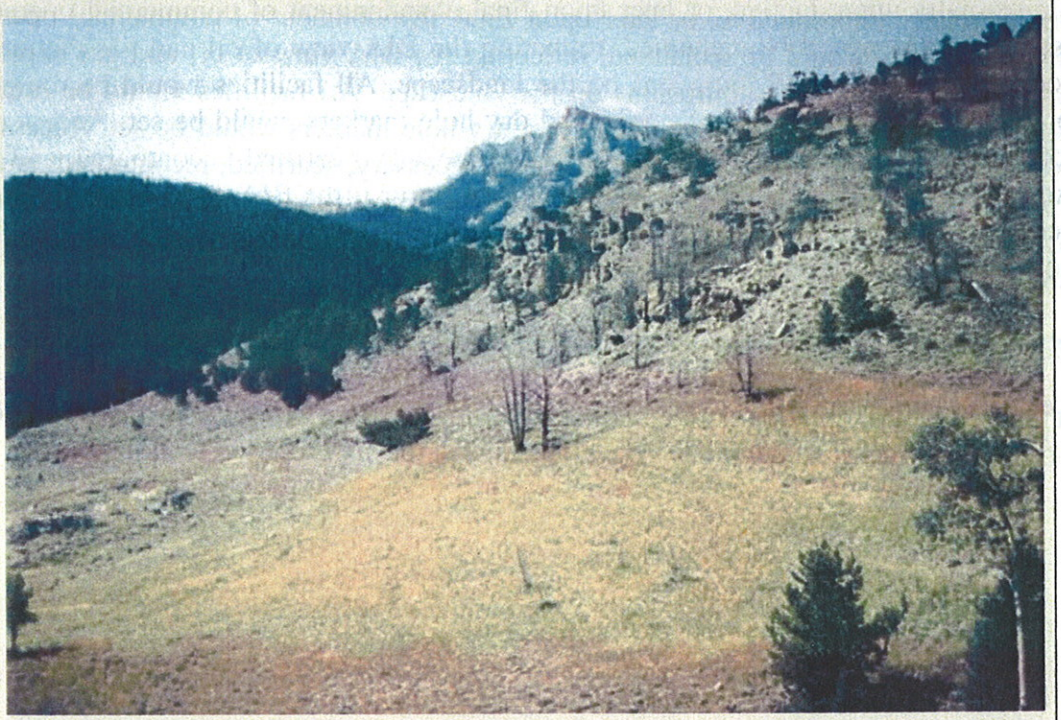
Final reclamation would occur either in the very short term if the proposed well is commercially unproductive, or later upon final abandonment of commercial operations. All disturbed areas would be reclaimed, reflecting the BIA view of oil and gas exploration and production as temporary intrusions on 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 23 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 six 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 23. Example of reclamation from the BLM Gold Book (BLM and USFS 2007).

3.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The Reservation is the home of the MHA Nation. Located in west-central North Dakota, the Reservation encompasses more than one million acres, of which almost half are held in trust by the United States for either the MHA Nation or individual allottees. The remainder of the land is owned in fee simple title, sometimes by the MHA Nation or tribal members, but usually by non-Indians. The Reservation occupies portions of six counties, including Dunn, McKenzie, McLean, Mercer, Mountrail, and Ward. In 1945, the Garrison Dam was completed, inundating much of the Reservation. The remaining land was divided into three sections by Lake Sakakawea, an impoundment of the Missouri River upstream of the Garrison Dam.

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

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

The proposed well sites and spacing units are in a rural area consisting of mostly grassland, shrubland, and cropland that is currently farmed, idle, or used to graze livestock. The landscape has been previously disturbed by dirt trails and gravel and paved roadways. Four residences are within 1 mile of the proposed well sites, the closest being 3,988 feet south of the Wicker #34-27H well site (Table 1).

Table 1. Distance and Direction from Proposed Wells to Nearest Home.

Proposed Well	Feet to Nearest Home	Direction to Nearest Home
Goodbird #36-25H/Black Hawk #1-12H	9,400	Northwest
Packineau #4-32H	4,083	West
Paul Peter Coffey #4-35H/Mann #16-27H	4,187	East
Wicker #34-27H	3,988	South

The broad definition of the human and natural environment under NEPA leads to the consideration of the following 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. Potential impacts to these elements are analyzed 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, it should be noted that a significant benefit from the project does *not* in itself require preparation of an EIS.

3.1 AIR QUALITY

3.1.1 Introduction

The federal Clean Air Act, 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 standards have been established for ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, particulate matter (PM), and lead. These standards were 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.' Some states have adopted more stringent standards for criteria pollutants, or have chosen to adopt new standards for other pollutants. For instance, North Dakota has a standard for hydrogen sulfide that the U.S. Environmental Protection Agency (EPA) does not.

3.1.2 Atmospheric Stability and Dispersion, and Pollutant Concentrations

The quantity of pollutant emissions in an area and the degree to which these pollutants disperse directly affects resulting concentrations (and hence health affects). Pollutant dispersion, in turn, is directly affected by atmospheric stability. Atmospheric stability determines the amount of vertical and horizontal air exchange, or mixing, that can occur within a given air basin. Restricted mixing and low wind speeds characterize a high degree of atmospheric stability. These conditions are characteristic of temperature inversions. The height of the inversion determines the mixing volume trapped below.

Three types of temperature inversions typically occur that affect air quality: subsidence, katabatic, and radiation. A subsidence inversion occurs when a mass of aloft high-pressure

(cold) air slowly sinks toward the surface. This causes the air underneath to heat as it is compressed. These subsiding layers are more stable than they were at their original higher altitudes. These inversions break up when a low-pressure front moves into the area and causes turbulence.

Katabatic inversions occur when air cooling at higher elevation (e.g., hills) slides, because it is more dense, down into valleys. This cool air in turn lifts warmer air, creating a strong boundary layer. If pollutants are emitted into the air near the surface after this inversion forms, there will be little vertical mixing until the inversion breaks. Katabatic inversions typically break when the sun warms the earth's surface and allow warmer air to float up through the boundary layer, thus creating vertical mixing.

Radiation inversions form when the lowest levels of the atmosphere are cooled by contact with the earth's surface, which cools by emitting radiation. Factors that help a radiation inversion form include calm winds, dry air, clear skies, long nights, and moist ground surface. Radiation inversions often occur in winter after rainstorms. They are often marked by strong surface fog. Like katabatic inversions, these inversions typically break up when the sun's energy penetrates to the surface causing vertical mixing to occur.

The winds and unstable air conditions experienced during the passage of storms result in low pollutant concentrations and excellent visibility. Between winter storms, high pressure and light winds allow cold, moist air to pool on the valley floors and in low areas. This creates strong low-level temperature inversions and very stable air conditions. This situation can lead to fog conditions. If acidic compounds are present, such as sulfur dioxide, the fog may become acidic as chemicals adsorb onto water droplets. Fog measurements in some areas of the western United States have found acid levels the same as table vinegar (ph 3.5).

Conditions favorable to fog formation are also conditions favorable to high concentrations of CO and $PM_{2.5}$. Maximum CO concentrations tend to occur on clear, cold nights when a strong surface inversion is present and large quantities of emissions are occurring. The water droplets in fog, however, can act as a sink for CO and nitrogen oxides (NOx), temporarily lowering pollutant concentrations. At the same time, however, fog can also help in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor of high winter season $PM_{2.5}$ levels.

3.1.3 Greenhouse Gas Emissions and Climate Change

In 1824, the French mathematician Joseph Fourier first postulated the ability of atmospheric gases to act as an insulator for a planet (known as the greenhouse effect). In 1896, Svante Arrhenius, a Nobel laureate, developed the mathematical equations that explain how atmospheric carbon dioxide (CO_2) and water vapor can alter surface temperature. His original equation is still in use today. The Intergovernmental Panel on Climate Change (IPCC) has researched and reported on global warming since the late 1980s. The IPCC has produced four formal reports and was awarded the Nobel Peace Prize in 2007 for this work.

CO_2 is the primary greenhouse gas (GHG), responsible for approximately 90 percent of radiative forcing (the rate of energy change as measured at the top of the atmosphere; can be positive [warmer] or negative [cooler]). 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. Nitrous oxide (N_2O) has a CO_2e value of 310. Thus, control strategies often focus on the gases with the highest CO_2e value. CH_4 is a common fugitive gas emission in oil and gas fields and is emitted at many phases of exploration and production.

In general, various terrestrial and marine systems have kept the earth's average temperature and precipitation in a narrow range for approximately the last 10,000 years. This stable climate allowed the development of agriculture and rise of the human population. Human emissions of chemical compounds into the atmosphere and land use changes (that may reduce carbon uptake and sequestration) are primary causes of climate change. Human population has increased from about 1.2 billion in 1850 to about 6.6 billion today, while atmospheric CO_2 increased from about 280 parts per million (ppm) in 1750 to 389 ppm today (June 2009) (CO2Now.org 2009). Atmospheric CO_2 levels are now higher than at any time in the last 800,000 years. The primary source of CO_2 increases is the combustion of fossil fuels that release carbon buried in the earth into the atmosphere. Release of CH_4 and other GHG compounds such as N_2O are also increasing.

What does this mean? According to the Pew Center on Global Climate Change, "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 1 degree Celsius since 1850 but some areas have seen an increase of 4 degrees. Sea levels are also rising, mountain glaciers are disappearing, and ocean currents, such as the Gulf Stream, are slowing. According to the IPCC, sea levels could rise by 2.5 feet to over 6.6 feet depending on the rate of melt in the Polar Regions. Much of the increase is due to thermal expansion. Changes of this magnitude will affect rainfall patterns worldwide.

The retreat of ice sheets at both poles also changes the earth's albedo (light reflectance) so that more sunlight is absorbed and heat retained. There is a substantial concern that, as the arctic ice melts, the tundra releases trapped CH_4, essentially creating a positive feedback loop for radiative forcing. These factors contribute to a positive feedback loop that increases the rate of polar change. If one of the polar ice sheets on Greenland or West Antarctica becomes unstable because of rapid warming, sea level is likely to continue to rise for more than a thousand years and could rise by 20 feet or more. This would permanently flood virtually all of the world's major coastal cities (IPCC 2007).

According to the Center for Integrative Environmental Research at the University of Maryland, climate change will affect the climate of North Dakota significantly over time.

> North Dakota will experience an increase in the unpredictability of droughts, floods and pests. This will make it hard for farmers—and especially small farmers—to remain in the agricultural industry. Damages to the agricultural industry will in turn have negative effects on the livestock industry. Furthermore,

the hunting, fishing and tourism industries will suffer losses due to reductions in habitats and receding water levels. These losses can, and are likely to be, devastating to North Dakota's economy, which has a small population and relies heavily on the revenue procured by these industries. (Center for Integrative Environmental Research at the University of Maryland 2008)

3.1.4 Criteria Pollutants

Ozone 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 NO_x in the presence of sunlight. Ozone's health effects can include reduced lung function, aggravated respiratory illness, and irritated eyes, nose, and throat. Chronic exposure can cause permanent damage to the alveoli of the lungs. Ozone can persist for many days after formation and travel several hundred miles.

Respirable Particulate Matter is a class of compounds that can lodge deep in the lungs causing health problems. Based on extensive health studies, particulate matter is regulated under two classes. PM_{10} is the fraction of total PM 10 microns or smaller, and $PM_{2.5}$ is two and a half microns or smaller. Respirable 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.

Nitrogen dioxide (NO_2) is a reddish-brown gas with an irritating odor. Primary sources include motor vehicles, industrial facilities, and power plants. In the summer months, NO_2 is a major component of photochemical smog. NO_2 is an irritating gas that may constrict airways, especially of asthmatics, and increase the susceptibility to infection in the general population. NO_2 is also involved in ozone smog production.

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

Sulfur dioxide (SO_2) is a colorless gas with a strong, suffocating odor. SO_2 is produced by burning coal, fuel oil, and diesel fuel. SO_2 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.

The federal and state governments have set standards based on set criteria for various air pollutants caused by human activity. Table 2 summarizes the standards for these criteria pollutants.

Table 2. Air Quality Standards and Monitored Data.

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$) or (*ppm*)	Year		
			2006	2007	2008
SO_2 (in ppm)	24-hour	*0.14*	0.011	0.011	0.009
	Annual Mean	*0.03*	0.002	0.002	0.002
PM_{10} (in $\mu g/m^3$)	24-hour	150	50	57	108
	Annual Mean	50	14	13	16
$PM_{2.5}$ (in $\mu g/m^3$)	24-hour	35	18.9	13.5	16.4
	Weighted Annual Mean	15	6.3	6.6	6.7
NO_2 (in ppm)	Annual Mean	*0.053*	0.003	0.003	0.003
O_3 (in ppm)	1-hour	*0.12*	0.076	0.076	0.069
	8-hour	*0.08*	0.067	0.065	0.063

Source: EPA 2009. $\mu g/m^3$ = micrograms per cubic meter. ppm = parts per million
Note: for $PM_{2.5}$ the 4th highest 24-hour value is reported per EPA attainment evaluation protocol.

3.1.5 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 North Dakota Department of Health (NDDH) typically reviews projects and either requires an applicant to prepare a risk assessment or assign the state engineers to do the work. The state requires that maximum individual cancer risk be calculated using its adopted protocol (the Determination of Compliance in the state's Air Toxics Policy). 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 1×10^{-5} (one in one hundred thousand).

3.1.6 Air Monitoring

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, the data are published on the World Wide Web (available from EPA and other sources). Monitoring stations near the project site include Watford City in McKenzie County, Dunn Center in Dunn County, and Beulah in Mercer County. These stations are located west, south, and southeast,

respectively, of the proposed well sites. Criteria pollutants measured include SO_2, PM_{10}, NO_2, and ozone. Lead and CO are not monitored by any of the three stations. Table 2 summarizes federal air quality standards and available air quality data from the three-county study area. The highest value at any of the three monitoring locations is shown for each year.

Note that North Dakota has separate state standards for several pollutants that are different from the federal criteria standards. These are:

- SO_2 (ppm) – 0.023 annual arithmetic mean, 0.099 24-hour concentration, and 0.273 one-hour concentration.
- H_2S (ppm) – 10 instantaneous, 0.20 one-hour, 0.10 24-hour, and 0.02 3-month arithmetic mean.

All other state criteria pollutant standards are the same as federal (shown in Table 2). North Dakota was one of 13 states that met standards for all federal criteria pollutants in 2008.

The Clean Air Act mandates prevention of significant deterioration in the designated attainment 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. Theodore Roosevelt National Park, a Class I area that covers about 110 square miles in three units within the Little Missouri National Grassland, lies between Medora and Watford City and is roughly 30 to 40 miles west of the proposed well sites. All other parts of the state, including the Reservation, are classified Class II, affording them a lower level of protection from significant deterioration.

3.1.7 Response to the Threat of Climate Change

The EPA has proposed an endangerment finding that would allow regulation of GHGs under the Clean Air Act. The first step is a regulation that requires sources emitting 25,000 tons or more CO_2e to report their emissions. 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. Many U.S. states and foreign nations have adopted goals and actions to reduce GHGs to levels scientists forecast will allow the earth's climate to stabilize at one to two degrees Celsius above the current level. Additional regulation is currently being developed by the U.S. Congress to roll back emissions to levels recommended by atmospheric scientists.

3.1.8 Project Emissions

Oil field emissions encompass three primary areas: combustion, fugitive, and vented.

- Combustion emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), GHGs, and HAPs. Sources include engine exhaust, dehydrators, and flaring.

- Fugitive emissions include criteria pollutants, H_2S, VOCs, HAPs, and GHGs. Sources include equipment leaks, evaporation ponds and pits, condensate tanks, storage tanks, and windblown dust (from truck and construction activity).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents.

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, windblown dust from disturbed areas and travel on dirt roads, evaporation from pits and sumps, and gas venting. Diesel emissions are being progressively controlled by EPA in a nationwide program. 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.

3.1.9 Regulatory Emission Controls

Under the Clean Air Act, federal land management agencies have an affirmative responsibility to help protect air quality. The tribes, federal land managers, and the State of North Dakota can make emission controls part of a lease agreement. The proposed project is similar to other projects installed nearby with state approval. State policy for permitting new oil and gas wells is as follows: Any oil or gas well production facility that emits or has the potential to emit 250 tons per year or more of any air contaminant regulated under North Dakota code must comply with state permitting requirements. The discussion outlines requirements for control of emissions from treaters, separators, flares, tanks, and other on-site equipment.

The North Dakota Air Pollution Control Rules (2009) require that the owner/operator submit an oil/gas facility registration form. This form must include an analysis of any gas produced from the well. The following sources must register oil and gas wells with the NDDH:

1. Any oil and gas well that is/was completed or recompleted on or after July 1, 1987. The registration form must be submitted within 90 days of the completion or recompletion of the well.
2. The owner or operator of any oil or gas well shall inform the NDDH of any change to the information contained on the registration form for a particular well. The owner shall submit a new gas analysis if the composition or the volume of the gas produced from the well has changed from the previous analysis, and caused an increase of 10 tons per year or more of sulfur compounds.
3. North Dakota rules require that all new sources of H_2S and VOCs be flared or treated in an equally effective manner. Flares must have an auto igniter or pilot light. The stack height of flares will be sufficient to allow dispersion of the flared gas. The gas produced from the Bakken Formation is typically low in H_2S so odors from fugitive gas leaks are not expected to be a problem.
4. Chapter 33-15.03.03 of the state rules specify that fugitive dust emissions greater than 40% opacity cannot leave the project site for more than one six-minute period per hour. This applies to all construction and unpaved road emission sources.

3.1.10 Best Management Practices

Under the Clean Air Act, 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 wells lifecycle. BMPs fall into six general categories:

- Transportation
- Drilling
- Unplanned or Emergency Releases
- Vapor Recovery
- Inspection and Maintenance
- Monitoring and repair

The BLM has developed a set of BMPs for oil and gas extraction. As documented in case studies, applying many of the recommended BMPs produced substantial savings and increased revenue from fixed assets. The leasing agent (e.g., BLM) will negotiate a set of BMPs with the applicant before final sale. These BMPs will be formally presented, in writing, to the NDDH as part of the oil/gas facility registration process. They will also run with the land so that any transfer requires the new operator to meet or exceed the same standards for emission control.

3.2 WATER RESOURCES

3.2.1 Surface Water

As shown in Figures 12, 18, and 24, although two pad locations indicate that drilling will occur under perennial waterbodies, no surface water is located in the immediate vicinity of the proposed surface disturbance. Additionally, given the topography of the individual sites over the project area, runoff occurs largely as sheet-flow and is not expected to affect these site locations. Runoff that concentrates near the proposed project well areas will flow to Lower Moccasin Creek, Skunk Creek, Upper Bear Den Creek, and Upper Squaw Creek, and subsequently into Lake Sakakawea.

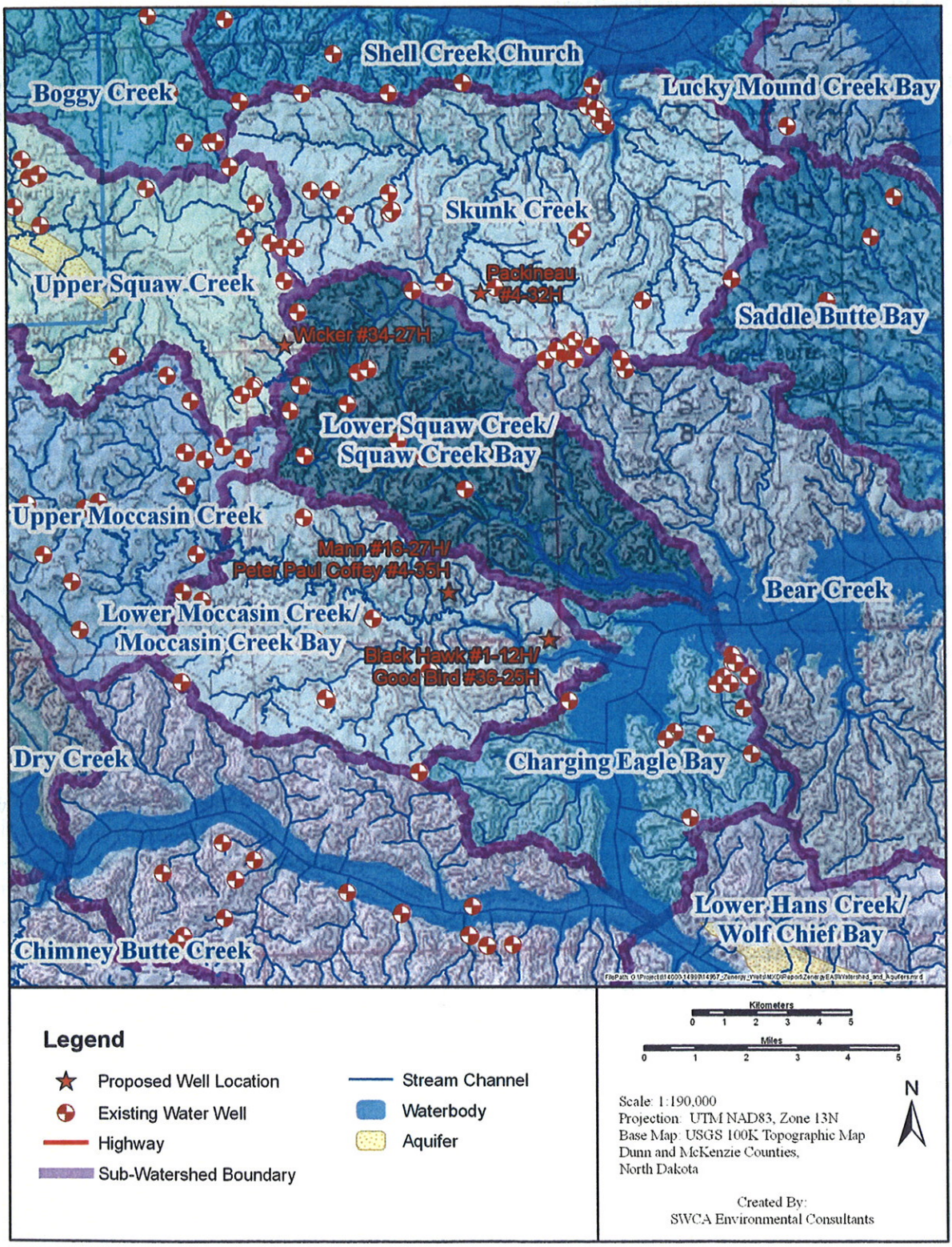


Figure 24. Watersheds, surface runoff direction, and aquifers near the project area.

The proposed Dakota-3 Goodbird #36-25H and Dakota-3 Black Hawk #1-12H are located on the same well pad, and are located in the Lower Moccasin Creek/Moccasin Creek Bay subwatershed (hydrologic unit code [HUC] 101102050605) of the Waterchief Bay Watershed (Figure 24). It is part of the Lower Little Missouri River subbasin, the Little Missouri basin and subregion, and Missouri region. Runoff from the well pad would flow to the west into an unnamed ephemeral tributary of Moccasin Creek Bay (HUC 10110205002861) and travel approximately 0.6 mile until reaching perennial waters in Lake Sakakawea (Figure 25).

The proposed Dakota-3 Peter Paul Coffey #4-35H and Dakota-3 Mann #16-27H are located on the same well pad, and are located in the Lower Moccasin Creek/Moccasin Creek Bay subwatershed (HUC 101102050605) of the Waterchief Bay Watershed (Figure 24). It is part of the Lower Little Missouri River subbasin, the Little Missouri basin and subregion, and Missouri region. Runoff from the well pad would flow to the south into an unnamed ephemeral tributary of Moccasin Creek Bay (HUC 10110205000014). Runoff will travel approximately 0.7 mile until reaching perennial waters in Lake Sakakawea (Figure 25).

The proposed Dakota-3 Packineau #4-32H is located in the Skunk Creek subwatershed (HUC 101101012102) of the Independence Point Bay Watershed (Figure 24). It is part of the Lake Sakakawea subbasin, the Lake Sakakawea basin, the Little Missouri River and subregion, and Missouri region. Runoff from the well pad would flow to the west into the South Fork of Skunk Creek (HUC 10110101003295) and travel approximately 7.9 miles until reaching perennial waters in Lake Sakakawea (Figure 25).

The proposed Dakota-3 Wicker #34-27H is located in the Upper Squaw Creek subwatershed (HUC 1011020050607) of the Waterchief Bay Watershed (Figure 24). It is part of the Lower Little Missouri River subbasin, the Little Missouri basin and subregion, and Missouri region. Runoff from the well pad will flow to the southwest into an unnamed ephemeral tributary of Squaw Creek (HUC 101102050000010) and travel approximately 11.2 miles until reaching perennial waters in Lake Sakakawea (Figure 25).

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.

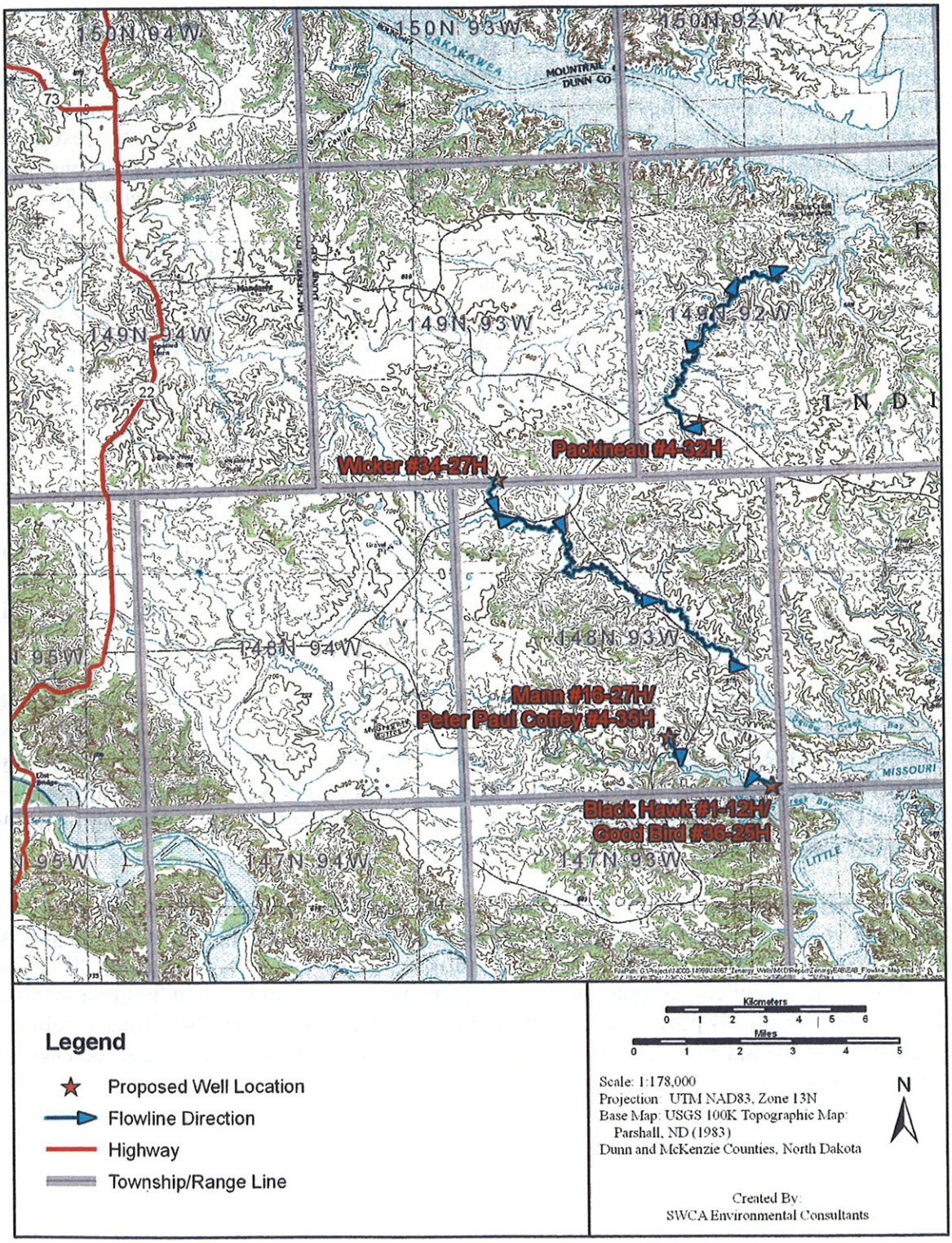


Figure 25. Drainage direction from each of the proposed well pads.

3.2.2 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). Several shallow aquifers related to post-glacial outwash composed of till, silt, sand, and gravel are located in Dunn County and McKenzie County. However, none are within the proposed project areas. The shallow Sentinel Butte Formation, commonly used for domestic supply in the area, outcrops in Dunn County and meets standards of the NDDH (Croft 1985). Detailed analyses are available from the North Dakota Geological Survey, Bulletin 68, Part III, 1976.

Table 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) and Klausing (1979).
gal/min = gallons per minute

Review of electronic records of the North Dakota State Water Commission revealed 143 existing water wells within an approximate 5-mile boundary of the proposed project areas

(Table 4). Zero water wells are found within 1 mile of Dakota-3 Goodbird #36-25H and Dakota-3 Black Hawk #1-12H; zero water wells within 1 mile of Dakota-3 Peter Paul Coffey #4-35H and Dakota-3 Mann #16-27H; two water wells within 1 mile of Dakota-3 Packineau #4-32H; and three water wells within 1 mile of Dakota-3 Wicker #34-27H. 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. Drilling would proceed in compliance with Onshore Oil and Gas Order No. 2, Drilling Operations (43 CFR 3160).

Table 4. Existing Water Wells near the Project Area.

Well Number	Owner	Date Drilled	Section	Township/ Range	Type/Use	Depth (feet)	Aquifer	Nearest Well	Miles to Proposed Well
147-092-03BDA	Charging Eagle Bay	2009	3	147/92	Domestic	125	Unknown	36-25H, 1-12H	3.6
147-092-03BDD	George Juary	2004	3	147/93	Domestic	130	Unknown	36-25H, 1-12H	3.6
147-092-03BDD	Bill Padsor	2004	3	147/94	Domestic	160	Unknown	36-25H, 1-12H	3.6
147-092-03C	Dennis Bohrere	1993	3	147/95	Domestic	80	Unknown	36-25H, 1-12H	3.5
147-092-03CC	Ervin Goedes	1988	3	147/96	Domestic	97	Unknown	36-25H, 1-12H	3.4
147-092-03CC	Edward Haag	1988	3	147/97	Domestic	95	Unknown	36-25H, 1-12H	3.4
147-092-03CC	Jim Mossett	2007	3	147/98	Stock	100	Unknown	36-25H, 1-12H	3.4
147-092-03CD	Curt Foster	1996	3	147/99	Domestic	70	Unknown	36-25H, 1-12H	3.7
147-092-03CD	Curt Foster	1993	3	147/100	Domestic	78	Unknown	36-25H, 1-12H	3.7
147-092-03CDC	C. Mossett	1969	3	147/101	Domestic	159	Sentinel Butte	36-25H, 1-12H	4.0
147-092-03D	Bob Gesing	2001	3	147/102	Domestic	100	Unknown	36-25H, 1-12H	4.0
147-092-03D	Dave Kitzen	2001	3	147/103	Domestic	90	Unknown	36-25H, 1-12H	4.0
147-092-03D	Mellmer	2001	3	147/104	Stock	80	Unknown	36-25H, 1-12H	4.0
147-092-03D	Tim Peter	2001	3	147/105	Domestic	70	Unknown	36-25H, 1-12H	4.0
147-092-07	Harley Swenson	1974	7	147/106	Domestic	86	Unknown	36-25H, 1-12H	1.3
147-092-09C	Jim Mossett	1984	9	147/107	Stock	1,040	Unknown	36-25H, 1-12H	2.2
147-092-09CCC	Jim Mossett	1998	9	147/108	Stock	1,295	Unknown	36-25H, 1-12H	3.0
147-092-09DD	Les Wasen	1977	9	147/109	Stock	65	Unknown	36-25H, 1-12H	3.6

Well Number	Owner	Date Drilled	Section	Township/ Range	Type/Use	Depth (feet)	Aquifer	Nearest Well	Miles to Proposed Well
147-092-10AC	Jeff Mossett	1976	10	147/110	Stock	1,000	Unknown	36-25H, 1-12H	4.0
147-092-15A	Pete Frederick	1976	15	147/111	Stock	1,100	Unknown	36-25H, 1-12H	4.6
147-092-21DA	Tribal	1950	21	147/112	Unknown	405	Unknown	36-25H, 1-12H	4.4
147-093-03DBB	Tribal	Unknown	3	147/93	Unused	223	Sentinal Butte	34-27H	1.6
147-093-05CDD	Carter Oil Co.	1954	5	147/93	Unused	11,105	Unknown	34-27H	3.2
147-093-15BCD	Tribal	1950	15	147/93	Unused	405	Unknown	34-27H	3.2
148-092-05DBC	Keith Mandan	1996	5	148/92	Domestic	62	Unknown	4-32H	3.2
148-092-05	Tribal	1950	5	148/92	Unused	400	Unknown	4-32H	3.1
148-092-06BDB	P. VanDike	1966	6	148/92	Stock	98	Sentinal Butte/ Tongue River	4-32H	1.9
148-092-06AAD	Rita Blackhawk	1981	6	148/92	Domestic	210	Unknown	4-32H	2.4
148-092-06ABB	USGS	1994	6	148/92	Monitoring	200	Unknown	4-32H	2.1
148-092-06ACC	Geraldine VanDike	1996	6	148/92	Stock	450	Unknown	4-32H	2.2
148-092-06BAD	G. VanDike	1967	6	148/92	Domestic/Stock	133	Sentinal Butte	4-32H	2.0
148-092-06BCA	P. VanDike	1971	6	148/92	Stock	89	Sentinal Butte	4-32H	2.1
148-093-01ADD	Geraldine VanDyke	2000	1	148/93	Domestic	548	Unknown	4-32H	1.8
148-093-04	Pat Fredericks	1985	4	148/93	Domestic	71	Unknown	34-27H	1.7
148-093-04CAB2	NDSWC	1973	4	148/93	Monitoring	190	Sentinal Butte Tongue River	34-27H	1.5
148-093-04CAB1	NDSWC	1973	4	148/93	Monitoring	340	Tongue River	34-27H	1.5
148-093-05CCA2	O. Standish	1968	5	148/93	Domestic	72	Buried Glaciao-fluvial	34-27H	0.9
148-093-05CCA1	O. Standish	Unknown	5	148/93	Unused	102	Sentinal Butte	34-27H	0.9
148-093-06CCA	Rudolph Sanders	1981	6	148/93	Stock	120	Unknown	34-27H	1.0
148-093-07ADA	R. Goodbird	Unknown	7	148/93	Unused	Unknown	Unknown	34-27H	1.3

Well Number	Owner	Date Drilled	Section	Township/ Range	Type/Use	Depth (feet)	Aquifer	Nearest Well	Miles to Proposed Well
148-093-09BBC	Tribal	1950	9	148/93	Unused	40	Buried Glaciao-fluvial	34-27H	1.7
148-093-10CCC	NDSWC	1974	10	148/93	Unused	103	Sentinal Butte	34-27H	2.9
148-093-14CDC	NDSWC	1974	14	148/93	Unused	57	Sentinal Butte	34-27H	2.0
148-093-15ACB	NDSWC	1971	15	148/93	Unknown	40	Unknown	34-27H	2.7
148-093-17BBD	J. McKinze	Unknown	17	148/93	Unused	160	Sentinal Butte	34-27H	2.2
148-093-20BCA	Tribal	1950	20	148/93	Unused	450	Unknown	34-27H	3.1
148-093-32CDB	Tribal	1950	32	148/93	Unused	400	Unknown	34-27H	2.8
148-094-01DDD	NDSWC	1971	1	148/94	Unused	80	Unknown	34-27H	1.3
148-094-02	Garland Beston	1982	2	148/94	Domestic	196	Unknown	34-27H	2.4
148-094-03ABB	Tribal	1950	3	148/94	Unused	450	Unknown	34-27H	3.3
148-094-11AAA2	USGS	1994	11	148/94	Monitoring	58	Unknown	34-27H	2.2
148-094-12DCC	USGS	1992	12	148/94	Monitoring	51	Unknown	34-27H	2.3
148-094-13AAD	Tribal	1950	13	148/94	Unused	450	Unknown	34-27H	2.4
148-094-13BBD	R. Hall	1967	13	148/94	Domestic\Stock	30	Sentinal Butte Tongue River	34-27H	2.7
148-094-14AAB	USGS	1992	14	148/94	Monitoring	315	Tongue River	34-27H	2.9
148-094-14DAC	R. Hall	1968	14	148/94	Stock	100	Buried Glacio-fluvial	34-27H	3.3
148-094-15CCC2	USGS	1994	15	148/94	Monitoring	36	Unknown	34-27H	4.8
148-94-25CCC	J. Chase	Unknown	25	148/94	Unused	120	Unknown	34-27H	4.9
149-091-30CCD	Tribal	1950	30	149/91	Unknown	375	Unlnown	4-32H	4.9
149-92-05CCC	Three Affiliated Tribes	570	5	149/92	Stock	570	Unknown	4-32H	4.1
149-092-10	John Bang	1992	10	149/92	Domestic	118	Unknown	4-32H	4.2
149-092-10	Les Simnioniw	1990	10	149/92	Domestic	190	Unknown	4-32H	4.2

Well Number	Owner	Date Drilled	Section	Township/ Range	Type/Use	Depth (feet)	Aquifer	Nearest Well	Miles to Proposed Well
149-092-10AB	Clyde Perzinski	1997	10	149/92	Domestic	140	Unknown	4-32H	4.6
149-092-10AB	Ray Gress	1999	10	149/92	Domestic	180	Unknown	4-32H	4.6
149-092-10D	Kevin Stockert	1989	10	149/92	Domestic	345	Unknown	4-32H	4.2
149-092-10DAC	Ed Burich	1987	10	149/92	Domestic	125	Unknown	4-32H	4.2
149-092-10DB	Jim Danks	1986	10	149/92	Domestic	125	Unknown	4-32H	4.3
149-092-10DD	Skunk Brother - Tom Knutson	1986	10	149/92	Domestic	135	Unknown	4-32H	4.1
149-092-10DD	Skunk Brother - Tom Knutson	1987	10	149/92	Domestic	195	Unknown	4-32H	4.1
149-092-10DDB	Dakota Poultry	1987	10	149/92	Domestic	200	Unknown	4-32H	4.1
149-092-22CDC	R. Smith	Unknown	22	149/92	Unknown	40	Sentinal Butte	4-32H	2.3
149-092-27BBA2	USGS	1994	27	149/92	Monitoring	65	Unknown	4-32H	2.2
149-092-29DCC	Tribal	Unknown	29	149/92	Unused	404	Unknown	4-32H	0.3
149-092-30DCB	Ted Linefight III	2003	30	149/92	Domestic	307	Unknown	4-32H	0.7
149-092-35BDA	Linda Baker	2008	35	149/92	Domestic	433	Unknown	4-32H	3.2
149-093-08DCC	M. Fox	1960	8	149/93	Unknown	500	Sentinal Butte Tongue River	34-27H	4.4
149-093-09CCD	St. Anthony's Mission	1952	9	149/93	Unknown	65	Sentinal Butte Tongue River	34-27H	4.2
149-093-09CCC	St. Anthony's Mission	1988	9	149/93	Domestic	440	Unknown	34-27H	4.2
149-093-09ABD	Dale McGrady	1981	9	149/93	Stock	150	Unknown	34-27H	4.8
149-093-10AAA	Tribal	1950	10	149/93	Unused	450	Unknown	34-27H	4.9
149-093-12AB	Ivan Johnson	1976	12	149/93	Stock	Unknown	Unknown	4-32H	4.3
149-093-14CDD2	USGS	1994	14	149/93	Monitoring	35	Unknown	34-27H	3.2
149-093-14CCC	Tribal	Unknown	14	149/93	Unused	432	Sentinal Butte	34-27H	3.0

Well Number	Owner	Date Drilled	Section	Township/ Range	Type/Use	Depth (feet)	Aquifer	Nearest Well	Miles to Proposed Well
149-093-16BDD	Paul Rosario	1994	16	149/93	Domestic	450	Unknown	34-27H	3.6
149-093-18DDB	Tribal	Unknown	18	149/93	Unused	465	Sentinal Butte	34-27H	4.1
149-093-21DCA	E. Wicker	Unknown	21	149/93	Unknown	35	Sentinal Butte Tongue River	34-27H	2.2
149-093-21AAD	Gerald Fox	2000	21	149/93	Domestic	99	Unknown	34-27H	2.8
149-093-22CCD	Arla Muzzy	2002	22	149/93	Domestic	92	Unknown	34-27H	2.0
149-093-23ACD	Unknown	Unknown	23	149/93	Unused	34	Sentinal Butte	34-27H	2.8
149-093-24AC	Mobile Oil	Unknown	24	149/93	Unknown	1,1331	Unknown	4-32H	2.3
149-093-24ACC2	USGS	1994	24	149/93	Monitoring	33	Unknown	4-32H	2.3
149-093-24ABB	USGS	1994	24	149/93	Monitoring	35	Unknown	4-32H	2.6
149-093-25DDD	Tribal	Unknown	25	149/93	Unused	147	Sentinal Butte	4-32H	1.3
149-093-27CAD	USGS	1994	27	149/93	Monitoring	165	Unknown	34-27H	1.3
149-093-27BAA	USGS	1994	27	149/93	Monitoring	60	Unknown	4-32H	2.6
149-093-27ABA	Patricia McKenzie	2004	27	149/93	Domestic	89	Unknown	34-27H	1.9
149-093-27ABA	M. Younbird	Unknown	27	149/93	Domestic	65	Sentinal Butte	34-27H	1.9
149-093-34ACA	Tribal	Unknown	34	149/93	Unused	357	Sentinal Butte	34-27H	0.7

Source: North Dakota State Water Commission 2009.
BIA = Bureau of Indian Affairs
NDSWC = North Dakota State Water Commission
USGS = U.S. Geological Survey

Since none of the proposed project areas 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. The majority of the identified groundwater wells may have minimal hydrologic connections due to their respective distance from the project wells.

3.3 WETLANDS, HABITAT, AND WILDLIFE

3.3.1 Wetlands

Potential impacts to wetlands within the project area would be permitted and authorized under Section 404 of the Clean Water Act (CWA) under guidance of the U.S. Army Corps of Engineers (USACE) North Dakota regulatory office in Bismarck, North Dakota. By adhering to special conditions in permits issued by the USACE for road construction, impacts to those "waters of the U.S." or any jurisdictional waters impacted by the Proposed Action would be mitigated. Section 404 of the CWA requires that a permit be issued to insure that no discharge of dredged material or fill material is allowed to enter waters of the U.S. if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. Due diligence would be performed by the Project proponent prior to Project implementation to comply with all local and federal regulations pertaining to the wetland habitats and the CWA. If jurisdictional wetlands or waters of the U.S. are identified within the Project Area through alignment- and alternative-specific wetland delineations and surveys, the appropriate permits and authorization would be obtained through the USACE prior to construction activities.

National Wetland Inventory (NWI) maps maintained by the U.S. Fish and Wildlife Service (USFWS) do not identify any jurisdictional wetlands within the proposed well pads or access roads (USFWS 2009). One wetland, not identified by the NWI maps, was observed approximately 70 feet northeast of the proposed Goodbird #36-25H/Black Hawk #1-12H well pad during field surveys conducted on August 29, 2009. Impacts to wetlands, riparian resources, and floodplains would be considered significant if there is any:

- long-term loss of wetlands or wetland function in the area; and/or
- violation of requirements of the Section 404 permit(s).

3.3.1.1 Goodbird #36-25H/Black Hawk #1-12H

According to the USFWS NWI database, Lake Sakakawea is within 0.5 mile of the access road and well pad.

3.3.1.2 Packineau #4-32H

According to the USFWS NWI database, 16 palustrine emergent seasonally flooded wetlands and one freshwater pond are located within 0.5 mile of the proposed access road and well pad. The individual wetlands are located within T149N R92W, SESE Section 30, SENE and NENE Section 31, and SENW Section 32.

3.3.1.3 Paul Peter Coffey #4-35H/Mann #16-27H

According to the USFWS NWI database, Lake Sakakawea is within 0.5 mile of the access road and well pad.

3.3.1.4 Wicker #34-27H

According to the USFWS NWI database, no wetlands occur within 0.5 mile of the proposed access road or well pad.

No construction-related activities would occur within the observed wetland nor any other nearby wetlands, as identified by the NWI maps and field surveys. No riparian or wetland habitats are anticipated to be directly or indirectly impacted by the proposed access roads or wells.

3.3.2 Wildlife

Several wildlife species that may exist in Dunn and McKenzie counties are listed as threatened or endangered under the Endangered Species Act (ESA). Listed species in Dunn and McKenzie counties include the black-footed ferret, gray wolf, interior least tern, pallid sturgeon, piping plover, and whooping crane (USFWS 2008). 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 listed species. Bald and golden eagles are afforded some protection under the Bald and Golden Eagle Protection Act (16 USC 668-668c). Tribes and states may recognize additional species of concern; such lists are taken under advisement by federal agencies, but are not legally binding in the manner of the ESA. Listed and candidate species are described below.

Bald Eagle (*Haliaeetus leucocephalus*)
Status: Delisted in 2007
Likelihood of impact: May affect, but is not likely to adversely affect

The project areas are located between 1.2 and 7.6 miles from Lake Sakakawea and do not contain suitable nesting/perching habitat, concentrated feeding areas, or other necessary habitat. Though delisted, the bald eagle is afforded some protection under the Migratory Bird Treaty Act (916 USC 703-711) and the Bald and Golden Eagle Protection Act (16 USC 668-668c). Mortality to transient bald eagles due to collisions with above-ground infrastructure is possible as a result of activities associated with the construction, production, or reclamation of the project areas. No adverse impacts to bald eagles are anticipated due to the lack of suitable habitat within the project areas.

Black-footed Ferret (*Mustela nigripes*)
Status: Endangered
Likelihood of impact: No effect

Several isolated populations are known to exist within the United States. However, this species is presumed extirpated from North Dakota because it has not been observed in the wild for over 20 years. No impacts are anticipated.

Dakota Skipper (*Hesperia dacotae*)
Status: Candidate
Likelihood of impact: May affect, but is not likely to adversely affect

The project areas are maintained for agricultural use including cultivation and pasture land. Therefore, undisturbed, native prairie areas with a high diversity of wildflowers and grasses were not observed within the proposed project areas. The absence of suitable habitat makes the presence of Dakota skippers unlikely. No impacts are anticipated.

Golden Eagle (*Aquila chrysaetos*)
Status: Unlisted; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Likelihood of impact: May affect, but is not likely to adversely affect

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 nesting habitat. The proposed project areas contain suitable nesting habitat for golden eagles; in the form of coniferous trees in wooded draws. Additionally, eagle prey species may be present within and around the project area, however no construction-related disturbance will occur within the wooded draws within the project area. Mortality due to collisions with above-ground infrastructure is possible as a result of activities associated with the construction, production, or reclamation of the project areas.

Gray Wolf (*Canis lupus*)
Status: Endangered
Likelihood of impact: No effect

The gray wolf is thought to be regionally extirpated though the potential for transient individuals is still present. Additionally, the impacted area encompasses a negligible area relative to the approximate 50 to 5,019 square miles gray wolf packs (i.e., 2 to 30 individuals) protect as their territory. Due to their extirpation and subsequent low likelihood of occurrence within the project area, no adverse impact to the gray wolf is anticipated.

Interior Least Tern (*Sterna antillarum*)
Status: Endangered
Likelihood of impact: May affect, but is not likely to adversely affect

The proposed project areas would be located in upland areas which would not provide suitable nesting habitat for the interior least tern. Key habitat includes sparsely vegetated sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines. Interior least tern nests are usually found along the shoreline and islands of Lake Sakakawea. Migrating or foraging interior least terns may transition through the project area; however, no adverse impact is expected as a result of construction, production, or reclamation activities.

Pallid Sturgeon (*Scaphirhynchus albus*)
Status: Threatened
Likelihood of impact: May affect, but is not likely to adversely affect

Activities associated with the construction, production, or reclamation of the project areas are not anticipated to adversely affect water quality and subsequently the pallid sturgeon. Pallid sturgeons prefer turbid, main stem river channels. No project area is closer than 1.2 miles from Lake Sakakawea which will reduce the likelihood of adverse affect due to activities. No impact is anticipated.

Piping Plover (*Charadrius melodus*)
Status: Threatened
Likelihood of impact: May affect, but is not likely to adversely affect

The entire shoreline of Lake Sakakawea has been designated critical habitat for piping plover. These birds nest on sparsely vegetated shoreline beaches, peninsulas, and islands composed of

sand, gravel, or shale. The nearest critical habitat would be greater than or equal to 1.2 miles from the proposed project areas. Individual piping plovers may transition across or forage at the proposed project areas during construction, drilling, production, or reclamation activities. There is little to no suitable habitat for piping plovers within the project area. Minor impacts could occur as a result of the aforementioned activities.

Whooping Crane (*Grus americana*)
Status: Endangered
Likelihood of impact: May affect, but is not likely to adversely affect

Whooping crane individuals may be present within the project area during migration. Family groups tend to feed predominately from semi-permanent to seasonally flooded palustrine emergent wetlands while non-family individuals tend to forage in cultivated crop fields. No viable habitat, including paustrine emergent wetlands, are located within the proposed project areas, therefore no impact is anticipated.

The wildlife species listed in Table 5 were observed during field visits to the proposed project areas. All species listed were visually observed by an ecologist during the field survey (i.e., primary observation). Various secondary indicators, including scat and tracks, were observed within the proposed project areas.

The primary impacts to wildlife species will come as a result of the construction of four well pad areas including the reconstruction of existing two-track roads, construction of new access roads, increased vehicular traffic density, drilling activities, and potential commercial production. No adverse 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. Ground clearing might impact habitat for unlisted species, including small birds, small mammals, and other wildlife species.

Table 5. Wildlife Observed during Field Surveys at the Proposed Project Areas.

Well Pad Area	Common Name	Scientific Name	Observation Type	Habitat
Goodbird #36-25H/ Black Hawk #1-12H	Western Meadowlark	*Sturnella neglecta*	Primary	Pasture
	Clay-colored Sparrow	*Spizella pallida*	Primary	
Packineau #4-32H	None Observed	N/A	N/A	Mixed grass prairie
Paul Peter Coffey #4-35H/Mann #16-27H	Ringneck Pheasant	*Phasianus colchicus*	Primary	Pasture
Wicker #34-27H	None Observed	N/A	N/A	Mixed grass prairie

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 Migratory Bird Treaty Act of 1918 (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.

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 continue to persist without adverse impact.

3.4 SOILS

The proposed project areas are 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.

3.4.1 Natural Resources Conservation Service Soil Data

The Natural Resources Conservation Service (NRCS 2009) soil series present on the well pads and access road areas, and the respective acreages, are summarized in Table 6. The acreage shown in Table 6 is based on the spatial extent of soil series combinations derived

from NRCS data (Figures 26 through 29), therefore the acreage is approximate and used as a best estimate of soil series distribution at each of the proposed project areas.

The following soil series descriptions represent individual soil series reported to exist within the proposed project area (NRCS 2009). Each individual soil series does not exist individually within the project areas but rather in combination with other soil types (Table 6).

Table 6. Percentage of the Project Area Comprised of Specific Soil Types.

Feature	Soil Series	Percentage of Location	Acres
Goodbird #36-25H/Black Hawk #1-12H			
New Access Road	Vebar fine sandy loams, 9 to 15 percent slopes	47.93	8.96
	Bowdle loam, 2 to 6 percent slopes	16.33	3.05
	Rhoades silt loam, 0 to 6 percent slopes	9.11	1.70
	Shambo loam, 2 to 6 percent slopes	8.41	1.57
	Ruso sandy loam, 6 to 9 percent slopes	8.36	1.56
	Pits, gravel and sand	7.39	1.38
	Cabba loam, 15 to 45 percent slopes	2.47	0.46
Well Pad	Shambo loam, 2 to 6 percent slopes	66.47	3.07
	Amor-Cabba loams, 9 to 15 percent slopes	33.53	1.55
Packineau #4-32H			
New Access Road	Williams loam, 6 to 9 percent slopes	98.22	0.87
	Zahl-Williams loams, 15 to 25 percent slopes	1.78	0.02
Well Pad	Zahl-Williams loams, 15 to 25 percent slopes	69.75	2.28
	Williams loam, 6 to 9 percent slopes	30.25	0.99
Paul Peter Coffey #4-35H/Mann #16-27H			
New Access Road	Cabba loam, 15 to 45 percent slopes	37.70	1.08
	Amor loam, 6 to 9 percent slopes	29.42	0.84
	Cherry-Vanda complex, 2 to 9 percent slopes, gullied	23.22	0.67
	Badland-Cabba-Arikara complex, 25 to 70 percent slopes	8.54	0.24
	Vebar fine sandy loams, 9 to 15 percent slopes	1.12	0.03
Well Pad	Vebar fine sandy loams, 9 to 15 percent slopes	49.81	2.33
	Amor loam, 6 to 9 percent slopes	44.65	2.09
	Cohagen-Vebar fine sandy loams, 9 to 25 percent slopes	4.84	0.23
	Badland-Cabba-Arikara complex, 25 to 70 percent slopes	0.69	0.03
Wicker #34-27H			
New Access Road	Cherry-Vanda complex, 2 to 9 percent slopes, gullied	46.05	2.09
	Cabba-Badland complex, 15 to 70 percent slopes	35.46	1.61
	Cabba loam, 15 to 45 percent slopes	18.49	0.84
Well Pad	Cabba-Badland complex, 15 to 70 percent slopes	100.00	3.26

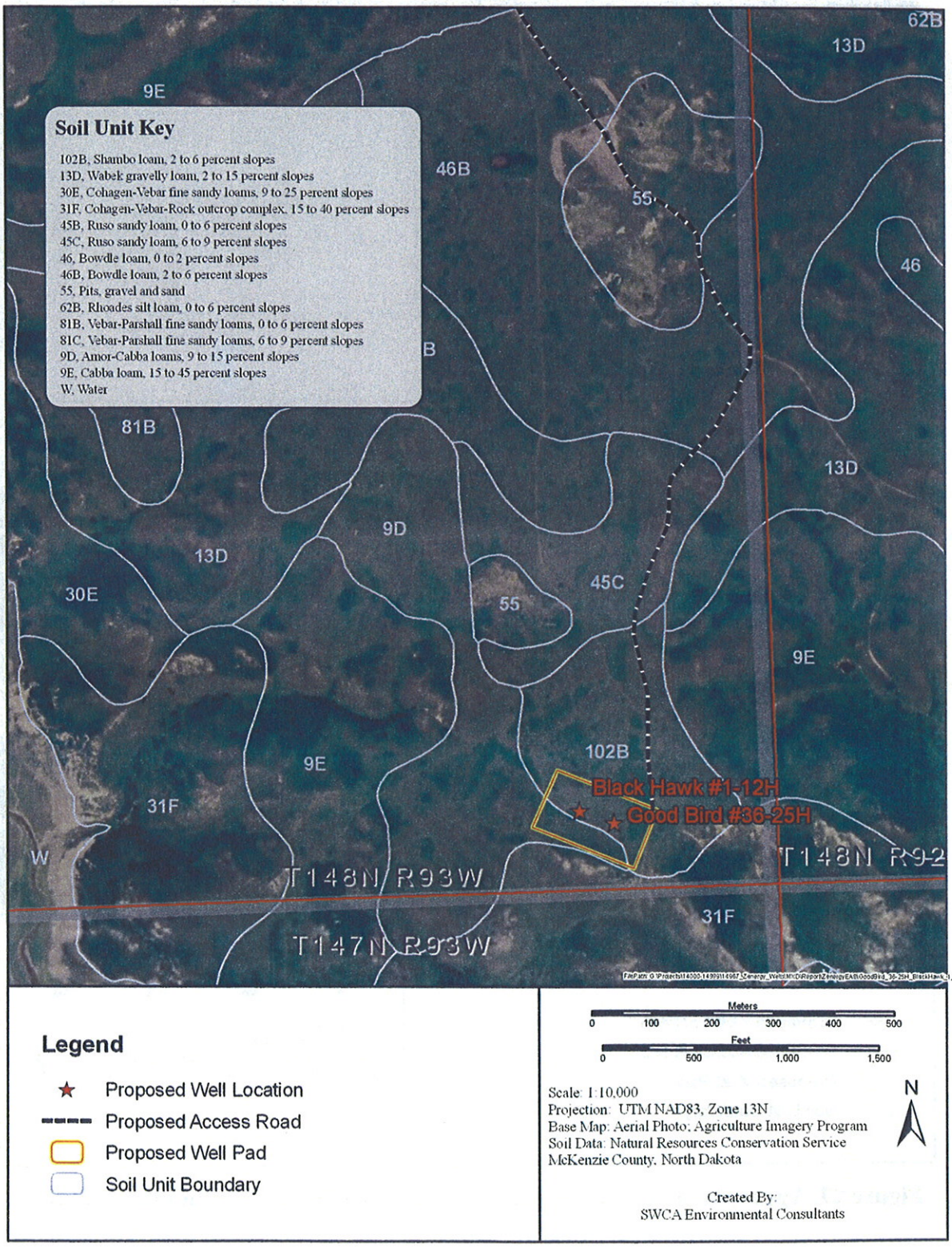


Figure 26. Approximate spatial extent of soil types within and around Goodbird #36-25H/Black Hawk #1-12H.

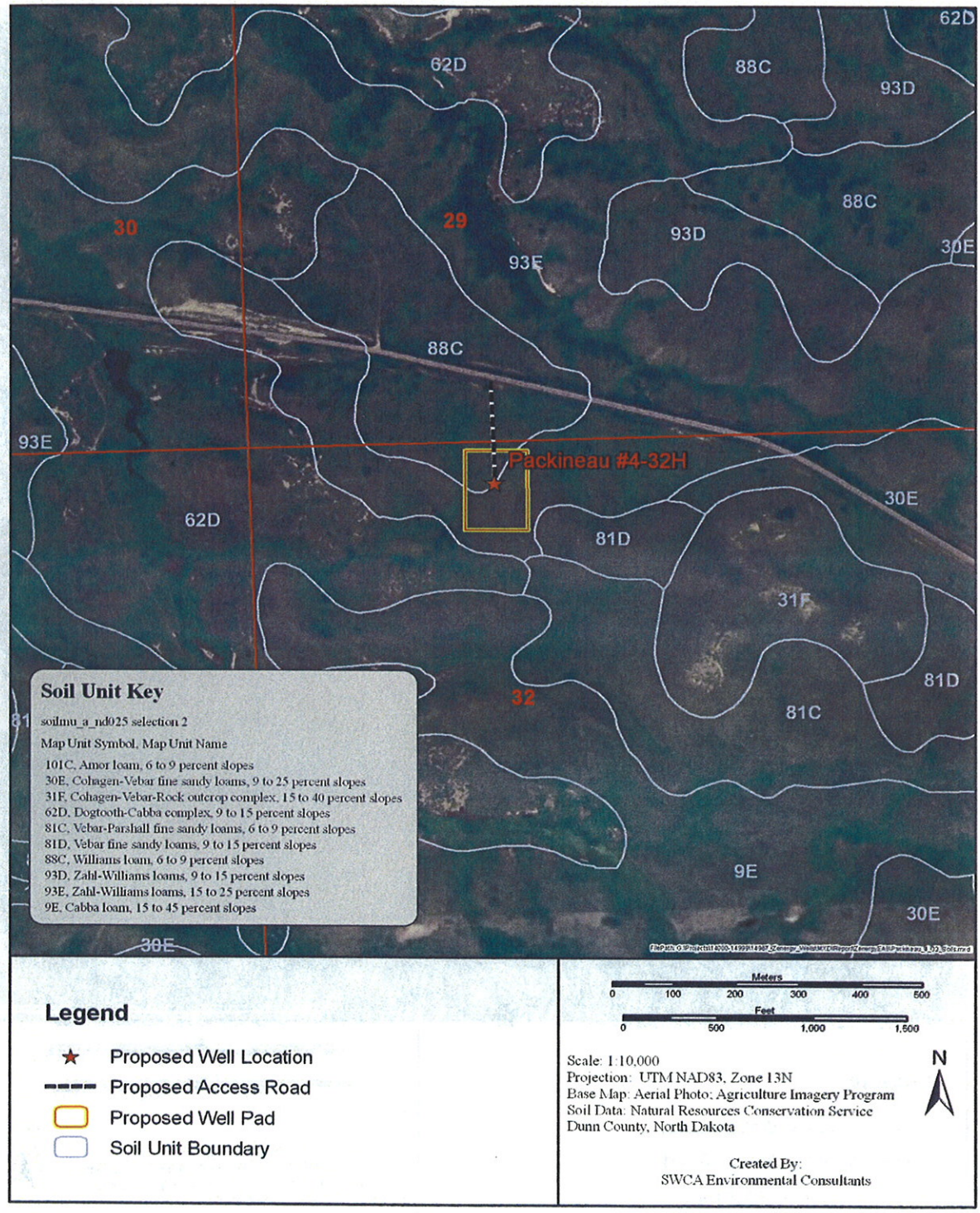


Figure 27. Approximate spatial extent of soil types within and around Packineau #4-32H.

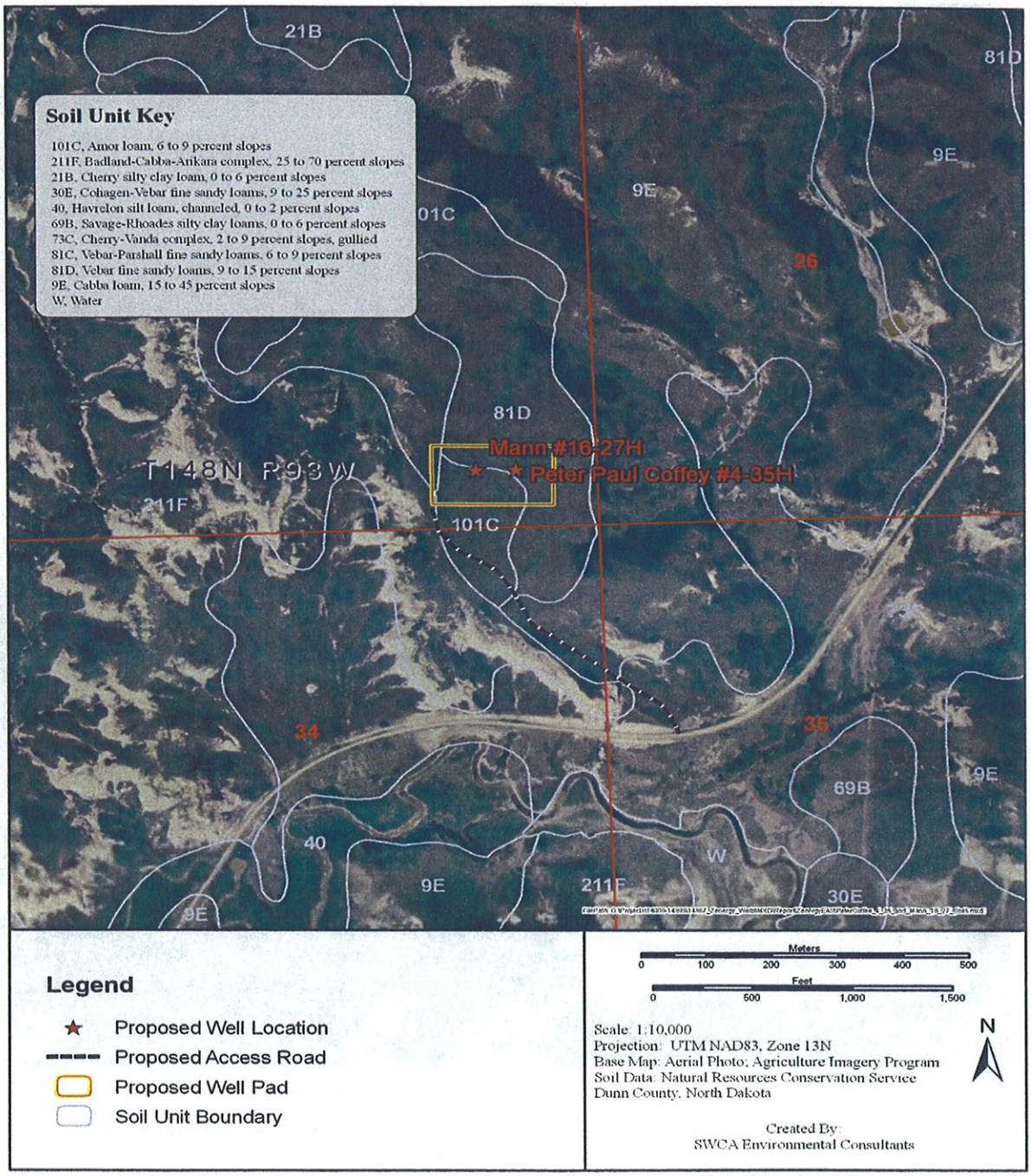


Figure 28. Approximate spatial extent of soil types within and around Paul Peter Coffey #4-35H/Mann #16-27H.

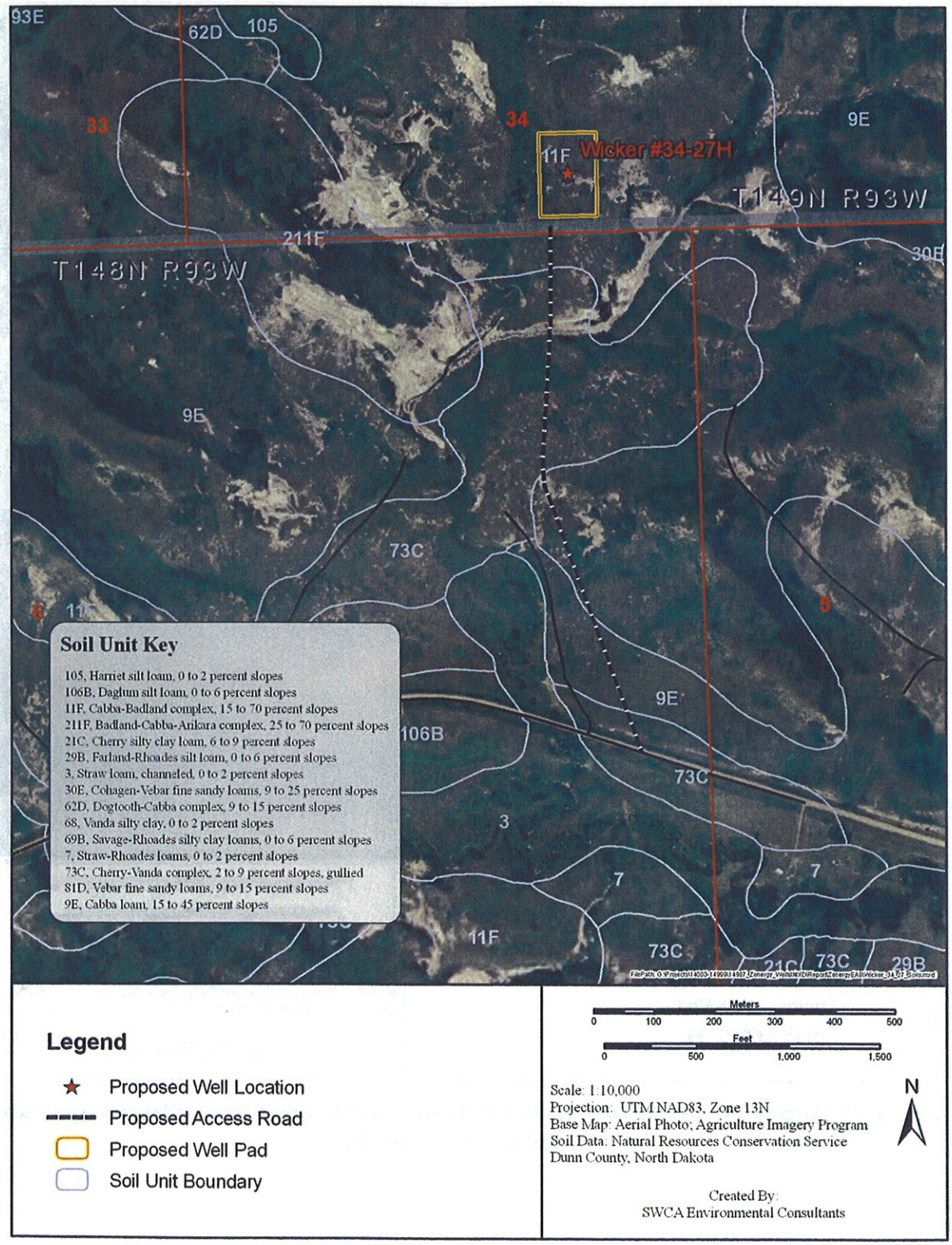


Figure 29. Approximate spatial extent of soil types within and around Wicker #34-27H.

3.4.1.1 Armor

The Amor series consists of well drained, moderately permeable soils that are moderately deep to soft sandstone bedrock. They formed in material weathered from stratified soft sandstone, siltstone, and mudstone. These soils are on uplands and have slopes of 0 to 25%. Mean annual temperature is 42°F, and mean annual precipitation is 15 inches. This soil is commonly cropped to small grains, flax, corn, hay, and grass in a crop summer fallow rotation. Native vegetation is mid and short prairie grasses such as green needlegrass (*Nasella viridula*), needle and thread (*Hesperostipa comata*), western wheatgrass (*Pascopyrum smithii*), and blue grama (*Bouteloua gracilis*) (NRCS 2009).

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%. 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 2009).

3.4.1.3 Badland (Miscellaneous Area)

Miscellaneous areas have essentially no soil and support little or no vegetation. This can be a result of active erosion, washing by water, unfavorable soil conditions, or human activities. Some miscellaneous areas can be made productive but only after major reclamation efforts.

Badland is moderately steep to very steep barren land dissected by many intermittent drainage channels. Ordinarily, the areas are not stony. Badland is most common in semiarid and arid regions where streams cut into soft geologic material. Local relief generally ranges between 10 and 200 meters. Potential runoff is very high, and erosion is active (NRCS 2009).

3.4.1.4 Bowdle

The Bowdle series consists of well drained soils formed in loamy alluvium underlain by sand and gravel. The soils are moderately deep over sand and gravel and are on outwash plains and stream terraces. Permeability is moderate in the solum and rapid or very rapid in the underlying material. Slopes range from 0 to 15 percent. Mean annual precipitation is 18 inches, and mean annual air temperature is 44°F. This soil is primarily cropped to small grain, alfalfa, and some flax and corn. Native vegetation is primarily western wheatgrass, blue grama, green needlegrass, needle and thread, forbs, and sedges (*Carex* spp.) (NRCS 2009).

3.4.1.5 Cabba

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

scoparium), green needlegrass, and other various herbs, forbs, and shrub species (NRCS 2009).

3.4.1.6 Chama

The Chama series consists of well drained soils formed in materials weathered from soft siltstone, mudstone, and shale on uplands. These soils are moderately deep to soft siltstone, mudstone, or shale. These soils are moderately or moderately slowly permeable. Slope ranges from 0 to 45%. Mean annual air temperature is 42°F, and mean annual precipitation is 15 inches. Soils are cropped to small grains, which are mostly wheat; a significant acreage is in rangeland. The native vegetation is principally western wheatgrass, needle and thread, and blue grama (NRCS 2009).

3.4.1.7 Cherry

The Cherry series consists of very deep, well drained, moderately slowly or slowly permeable soils that formed in alluvium on fans, foot slopes, dissected uplands and terraces. Slopes range from 0 to 25%. Mean annual air temperature is 42°F, and mean annual precipitation is 14 inches. Potential native vegetation is western wheatgrass, blue grama, green needlegrass, needle and thread, and a variety of forbs and shrubs (NRCS 2009).

3.4.1.8 Cohagen

The Cohagen series consists of shallow, well to excessively drained soils formed in materials weathered from soft sandstone bedrock on uplands. These soils have moderate or moderately rapid permeability. Slopes range from 3 to 70%. Mean annual air temperature is about 42°F, and mean annual precipitation is about 16 inches. Potential native vegetation is bluestem species, needle and thread, prairie sandreed (*Calalmovilfa lonifolia*), upland sedges, and western wheatgrass (NRCS 2009).

3.4.1.9 Pits, Gravel, and Sand

The pits unit is in areas from which the overlying soil material has been removed in order to mine sand, gravel, large porcelanite fragments (scoria or clinkers), or coal. The vertical walls of the pits are generally unstable and may be subject to slippage and slides. Abandoned pits are idle or are used for wildlife habitat or stock water ponds. Water seeps out of the very permeable sand, gravel, scoria, or coal and forms ponds in some mine sinks. Pits generally are not suited to cultivated crops, hay, pasture, and the trees and shrubs grown as windbreaks and environmental planting.

3.4.1.10 Rhoades

The Rhoades series consists of deep and very deep, well to moderately well drained, very slowly permeable soils found on swales and uplands with slopes ranging from approximately 0 to 25%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is 42°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass and blue grama (NRCS 2009).

3.4.1.11 Ruso

The Ruso series consists of very deep, well drained soils on outwash plains and stream terraces with slopes ranging from 0 to 9%. These soils formed in loamy alluvium over 24 to 40 inches of sand and gravel. Permeability is moderately rapid in the upper part and very rapid in the substratum. Mean annual air temperature is 40°F and mean annual precipitation is 16 inches. This soil is primarily cropped to small grains and alfalfa. Some areas are irrigated. Native vegetation consists of needle and thread grass, prairie sandreed, western wheatgrass, blue grama, little bluestem, sedges, forbs, and western snowberry (*Symphoricarpos occidentalis*).

3.4.1.12 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%. Mean annual air temperature is 42°F, and mean annual precipitation is 15 inches. Soils are cropped to small grains, hay, and pasture. Some areas are irrigated and some are in native rangeland. Native vegetation includes green needlegrass, needle and thread, western wheatgrass, junegrass (*Koeleria macrantha*), blue grama, and a variety of forbs (NRCS 2009).

3.4.1.13 Vanda

The Vanda series consists of very deep, well drained soils that formed in alluvium derived mainly from semiconsolidated sedimentary bedrock or from glaciolacustrine or glaciofluvial deposits. These soils are on alluvial fans, lake plains, sedimentary plains, drainageways, and stream terraces. Slopes are 0 to 15%. Mean annual precipitation is about 12 inches and mean annual air temperature is about 43°F. This soil type is used for mainly for range. The potential native vegetation is largely western wheatgrass, Nuttall alkaligrass (*Puccinellia nuttalliana*), big sagebrush (*Artemisia tridentata*), blue grama, alkali sacaton (*Sporobous airoides*), forbs, and shrubs (NRCS 2009).

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 slope ranging from 0 to 65%. Mean annual air temperature is 42°F, and mean annual precipitation is 16 inches. Soils are cropped to corn and small grains; some is used for hay or pasture. Native grasses are needle and thread and prairie sandreed (NRCS 2009).

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%. 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 2009).

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%. 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 2009).

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 7. 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.

Soil erodibility (or 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). T represents the maximum volume of soil loss, measured in tons/acre/year, which could occur and still allow for maintenance of high levels of crop production.

Table 7. Soil Data Obtained through the Excavation of Soil Pits within the Proposed Project Area.

Feature	Pit Depth (inches)	Soil Matrix Color (color name)	Redoximorphic Feature Color	Texture	Slope (°)	*K Factor
Goodbird #36-25H/Black Hawk #1-12H						
Well Pad	0–16	10YR 3/2 (very dark grayish-brown)	None Observed	Silty Clay Loam	3–5	0.24
Access Road	N/A	N/A	N/A	N/A	N/A	0.24
Packineau #4-32H						
Well Pad	0–20	10YR 3/1 (very dark gray)	None Observed	Clay Loam	1–10	0.28
Access Road	0–16	10YR 3/1 (very dark gray)	None Observed	Clay	1–10	0.24
Paul Peter Coffey #4-35H/Mann #16-27H						
Well Pad	0–18	10YR 3/2 (very dark grayish-brown)	None Observed	Clay Loam	5	0.20
Access Road	0–10	10YR 3/2 (very dark grayish-brown)	None Observed	Silty Clay	1–5	0.24
Wicker #34-27H						
Well Pad	0–16	10YR 3/2 (very dark grayish-brown	None Observed	Clay Loam	0–5	0.32
Access Road	0–8	10YR 4/2 (dark grayish-brown)	10YR 4/6	Clay Loam	0–3	0.32

*K Factor values derived from NRCS soil survey data.

3.4.3 Conclusions Regarding Soil Erosion Potential

3.4.3.1 Goodbird #36-25H/Black Hawk #1-12H

1. The Goodbird #36-25H/Black Hawk #1-12H access road is dominated by the Vebar fine sandy loams and by Bowdle loam (47.93% and 16.33%, respectively) (Table 6). The associated well pad is dominated by the Shambo loam, and the Amor-Cabba loams (66.47% and 33.53%, respectively).
2. These soil types should have minimal run-off depending on the slope, which ranges between 0 and 15% (NRCS 2009).
3. This location has a Soil Erodibility Factor (K) of 0.24. Using the Revised Universal Soil Loss Equation (RUSLE), there could be 1.30 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site 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.
4. These soil series are capable of supporting native short- and mid-grass prairie vegetative communities, which may substantially increase the probability for successful and permanent reclamation (NRCS 2009).

3.4.3.2 Packineau #4-32H

1. The Packineau #4-32H access road and well pad are dominated by the Zahl-Williams loams and the Williams loam (69.75% and 30.25%, respectively) (Table 6).
2. The Zahl-Williams loams soil series is found on slopes typically ranging from 15 to 25%. The Williams loam soil series is found on slopes ranging from 6 to 9% (NRCS 2009).
3. This location has a Soil Erodibility Factor (K) of 0.28. Using the RUSLE, there could be 1.51 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site 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
4. Both soil series are capable of supporting native short- and mid-grass prairie vegetative communities, which may substantially increase the probability for successful and permanent reclamation (NRCS 2009).

3.4.3.3 Paul Peter Coffey #4-35H/Mann #16-27H

1. The Paul Peter Coffey #4-35H/Mann #16-27H access road would be constructed on several different series dominated by the Cabba loam, the Amor loam, and Cherry-Vanda complex (37.7%, 29.42%, and 23.22%, respectively). The well pad would be constructed on the Vebar fine sandy loams and the Amor loam series (49.81% and 44.65%, respectively) (Table 6).
2. The soils found on well pad and access road typically have slopes ranging from 2 to 45% (NRCS 2009).
3. This location has a Soil Erodibility Factor (K) of 0.20. Using the RUSLE, there could be 3.33 tons/acre/year of soil loss from the site if it is not properly managed to prevent

such loss. The site 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.

4. These soils are capable of supporting native prairie vegetative communities, which may substantially increase the probability for successful and permanent reclamation (NRCS 2009).

3.4.3.4 Wicker #34-27H

1. The Wicker #34-27H access road is dominated by the Cherry-Vanda complex, and the Cabba-Badland complex (46.05% and 35.46%, respectively). The proposed well pad is dominated (100%) by the Cabba-Badland complex (Table 6).
2. The soils found on the well pad and access road typically have potentially wide-ranging slopes from 2 to 70% (NRCS 2009).
3. This location has a Soil Erodibility Factor (K) of 0.32. Using the RUSLE, there could be 5.57 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site 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.
4. Most of the soils 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 2009).

3.4.3.5 General

Due to the presence of loamy soils and overall minimal slopes, within each of the four proposed project areas, no limitations on construction activities within the project areas are anticipated. The soil types are not expected to create unmanageable erosion issues or interfere with reclamation of the area. Proven 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). 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. The implementation of BMPs by the operator is projected to reduce and maintain negligible levels of erosion.

3.5 VEGETATION AND INVASIVE SPECIES

The proposed project areas occur in the Missouri Plateau and River Breaks Ecoregions which consist of western mixed-grass and short-grass prairie species (USGS 2009). Native grasses include big blue stem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), blue grama (*Bouteloua gracilis*), buffalograss (*Bouteloua dactyloides*), various needlegrass species such as *Hesperostipa comata* and *Nassella viridula*, western wheatgrass (*Pascopyrum smithii*), and prairie sandreed (*Calamovilfa lonifolia*) (USGS 2009). Common wetland vegetation includes various sedge species (*Carex* spp.), bulrush (*Scirpus* spp.), and cattails

(*Typha* spp.). Common plant species found in woody draws, coulees, and drainages include chokecherry (*Prunus virginiana*), silver buffaloberry (*Shepherdia argentea*), and western snowberry (*Symphoricarpos occidentalis*). Tree species common to these ecoregions include Juniper (*Juniperus spp.*) and deciduous trees which can be found on north-facing slopes (USGS 2009).

3.5.1.1 Goodbird #36-25H/Black Hawk #1-12H

Vegetation noted at the Goodbird #36-25H/Black Hawk #1-12H project area includes green needlegrass, little bluestem, prairie sagewort (*Artemisia frigida*), blacksamson echinacea (*Echinacea angustifolia*), western snowberry, buffaloberry, and white sagebrush (*Artemisia ludoviciana*).

3.5.1.2 Packineau #4-32H

Vegetation noted at the Packineau #4-32H project area includes prairie sagewort, little bluestem, white sagebrush, field sagebrush (*Artemisia campestris*), green needlegrass, western snowberry, and western wheatgrass.

3.5.1.3 Paul Peter Coffey #4-35H/Mann #16-27H

Vegetation noted at the Paul Peter Coffey #4-35H/Mann #16-27H project area includes green needlegrass, yucca (*Yucca* sp.), prairie sagewort, little bluestem, big bluestem, Virginia rose (*Rosa virginiana*), white sagebrush, threeawn (*Aristida* spp.), western wheatgrass, western snowberry, blue grama, green ash (*Fraxinus pennsylvanica*), and downy hawthorn (*Crataegus mollis*).

3.5.1.4 Wicker #34-27H

Vegetation noted at the Wicker #34-27H project area is dominated by needle and thread, field brome (*Bromus arvensis*), leafy spurge (*Euphorbia esula*), and hardheads (*Acroptilon repens*), also known as Russian knapweed and prairie sagewort.

Noxious weeds have the potential to detrimentally affect public health, ecological stability, and agricultural practices. North Dakota currently recognizes 12 species as noxious statewide (North Dakota Department of Agriculture 2009a). These species are listed in Table 8. Four additional species are recognized in McKenzie County including black henbane (*Hyoscyamus niger*), lesser burdock (*Arctium minus*), butter and eggs (*Linaria vulgaris*), and gypsyflower (*Cynoglossum officinale*) (North Dakota Department of Agriculture 2009b). No additional species are recognized in Dunn County. Five species are known to exist in Dunn County and seven in McKenzie County. Table 8 indicates total acreage for each noxious species by county. All scientific and common names were acquired from the NRCS Plants Database available at http://www.plants.usda.gov. Additional information is available from the NRCS Plants Database for North Dakota, and the North Dakota Department of Agriculture at http://www.agdepartment.com/programs/plant/noxiousweeds.html.

Table 8. Occupied Area for Recognized Noxious Weeds in Dunn and McKenzie Counties, North Dakota.

Common Name	Scientific Name	County	
		Dunn (acres)	McKenzie (acres)
Absinthium	*Artemisia absinthium*	38,600	43
Canada thistle	*Cirsium arvense*	32,800	4,300
Dalmatian toadflax	*Linaria dalmatica*	1	--
Diffuse knapweed	*Centaurea diffusa*	--	--
Field bindweed	*Convolvulus arvensis*	33,000	--
Leafy spurge	*Euphorbia esula*	10,500	1,300
Nodding plumeless thistle	*Carduus nutans*	2	2
Purple loosestrife	*Lythrum salicaria*	--	--
Hardheads	*Acroptilon repens*	--	1
Saltcedar	*Tamarix ramosissima*	--	1
Spotted knapweed	*Centaurea stoebe*	0	1
Yellow star-thistle	*Centaurea solstitialis*	--	--

Source: North Dakota Department of Agriculture 2007

"Invasive" 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 exhibit high reproductive 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 and an increase in noxious weed populations.

Evaluation of the existing vegetation during on-site assessments conducted in May, August, September, and October 2009 indicated hardheads and leafy spurge were present at the proposed Wicker #34-27H site. Potential disturbance of approximately 20.6 acres and removal of existing vegetation may facilitate the spread of invasive species. The APD and this EA require the operator to control noxious weeds throughout the project areas. Surface disturbance and vehicular traffic must not occur outside approved ROWs or the well pad. Areas that are stripped of topsoil must be re-seeded 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 will reduce the potential establishment of invasive vegetation species.

3.6 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 a pedestrian methodology. For the D-3 Wicker #34-27H project approximately 16.5 acres were intensively inventoried on August 12, 2009 (Rose and Cooper 2009). For the D-3 Mann #16-27H and D-3 Paul Peter Coffey #4-35H dual well pad project approximately 26.33 acres were inventoried on September 18, 2009 (Lechert and Cooper 2009); for the D-3 Goodbird #36-25H and D-3 Black Hawk #1-12H dual well pad project approximately 41.3 acres were inventoried on September 24, 2009 (Rose 2009); and for the D-3 Packineau #4-32H project approximately 10.64 acres were inventoried on October 28, 2009 (Lechert *et al.* 2009). No historic properties were located within any of these project areas 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 determinations of **no historic properties affected** for these undertakings. These determinations were communicated to the THPO on January 20, 2010; however, no response was received from the THPO within the allotted 30-day comment period (see Part 4).

3.7 SOCIOECONOMICS

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

Fort Berthold Reservation (Reservation) and McKenzie, Dunn, McLean, and Mountrail counties, North Dakota. These counties were chosen for analysis because potential socioeconomic impacts would most likely be realized due to their proximity to the proposed well locations and overlap of the Reservation. These communities are collectively referred to as the Analysis Area.

This section discusses community characteristics such as population, housing, demographics, employment, and economic trends taking place in 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.

3.7.1 Employment

The economy in the State of North Dakota, including the Reservation and four counties in the Analysis Area, has historically depended on agricultural, including grazing and farming. However, energy development and extraction, power generation, and services relating to these activities have increased over the last several years. Consequently, service and trade sectors have also become increasingly important; many of the service sector jobs are directly and indirectly associated with oil and gas development. In 2007, total employment in the State of North Dakota was approximately 487,337 (U.S. Bureau of Economic Analysis 2009a). Of this, the largest employers include government and government enterprises employing 16.6% of the labor force (81,218 jobs); health care and social assistance at 11.7% of the labor force (56,990 jobs), and retail trade at 11.3% of the labor force (55,478 jobs) (U.S. Bureau of Economic Analysis 2009a). Table 9 provides total employment opportunities for the Analysis Area between 2001 and 2007.

Table 9. Total Employment for the Analysis Area and State of North Dakota, 2001 and 2007.

Location	Total Employment (2001)	Total Employment (2007)	Percent Change (+)	Unemployment Rate (2007)
Dunn County	1,941	1,961	1.0	3.8%
McKenzie County	4,164	4,600	10.4	3.1%
McLean County	5,173	5,448	5.3	4.6%
Mountrail County	3,691	3,711	0.5	5.7%
On or Near Fort Berthold Reservation	1,211	1,287*	6.2	71%
North Dakota	448,897	487,337	8.5	3.1%

U.S. Bureau of Economic Analysis 2009a.
* Bureau of Indian Affairs 2005. Represents 2005 data.

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 Three Affiliated Tribes. Additionally, 65% of the part-time faculty members are of American Indian/Alaska Native descent and all (100%) are tribal members.

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% (Bureau of Indian Affairs 2005).

3.7.2 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 (Table 11). Similarly, as presented in Table 11, 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 10. Income and Unemployment 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%
Fort Berthold 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
[4] Unemployment data reflects a percent of the civilian labor force, which was 3,993.
N/A – Data not available.

3.7.3 Population

Historic and current population counts for the Analysis Area, compared to the state, are provided below in Table 11. 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.

Table 9. Population and Demographics.

County or Reservation	Population in 2008	% of State Population	% Change Between 1990–2000	% Change between 2000–2008	Predominant Group (%)	Predominant Minority (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 Reservation[1]	11,897	1.8	178.0[2]	13.3[3]	American Indian	Caucasian (~27%)
Statewide	641,481	100	0.005	-0.1	Caucasian	American Indian (8.6%)

Source: U.S. Census Bureau 2009a.

[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 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.

[2] Bureau of Indian Affairs 2001. Reflects percent change between 1991 and 2001.

[3] Reflects percent change between 2001 and 2005.

As presented in Table 11, 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).

3.7.4 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. 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 12 provides housing unit supply estimates in the Analysis Area, including the Reservation and four overlapping counties.

Table 12. Housing Development Data for the Reservation and Encompassing Counties.

Region	Total Housing Units						%
	Occupied	Owner Occupied	Renter Occupied	Vacant	Total	Total	change 2000–2008
	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 n.d.

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.

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 13.

Table 103.Housing Development Data for the Encompassing Counties 2000-2008.

Housing Development	North Dakota County			
	Dunn	McKenzie	McLean	Mountrail
New Private Housing Building Permits 2003–2008	14	14	182	110
Housing Starts-State Rank	51 / 53	15 / 53	21 / 53	17 / 53
Housing Starts-National Rank	3,112 / 3,141	2,498 / 3,141	2,691 / 3,141	2,559 / 3,141

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

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 14, implementation of the proposed six 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 mix of local and Zenergy employees would work in the Analysis Areas. Therefore, any increase in workers would constitute a minor increase in population in the Analysis Area required for short-term operations and therefore would not create a noticeable increase in demand for services or infrastructure on the Reservation or the communities near the Analysis Area, including McKenzie and Dunn counties. Because the communities likely impacted by the proposed project have experienced a recent decline in population between 2000 and 2008 (as shown in Table 11), with the exception of the Reservation itself, and the historic housing vacancy rate (Table 12) indicates housing availability despite the growth of the population on the Reservation, these communities are 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 Analysis Area.

Table 14. 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 McKenzie and Dunn counties 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.

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

EJ is an evolving concept with potential for disagreement over the scope of analysis and the implications for federal responsiveness. Nevertheless, due to the population numbers, tribal members on the Great Plains qualify for EJ consideration as both a minority and low-income population. Table 15 summarizes relevant data regarding minority and low-income populations for the Analysis Area.

Table 15. Population Breakdown by Region and Race, 2002–2008.

Race	Dunn		McKenzie		McLean		Mountrail		North Dakota	
	2002	2008	2002	2008	2002	2008	2002	2008	2002	2008
Caucasian	3,067	2,818	4,493	4,329	8,313	7,610	4,480	4,086	587,085	586,272
African American	1	2	4	30	1	9	8	27	4,931	6,956
American Indians and Alaska Natives	469	467	1,175	1,230	558	587	1,949	2,277	31,104	35,666
Asian / Pacific Islanders	4	3	4	10	17	19	17	20	4,679	5,095
Two or More Races	1	28	32	75	118	112	68	101	6,311	7,492
All Minorities	475	500	1,215	1,345	694	727	2,042	2,425	47,025	55,209

Source: Northwest Area Foundation 2009.

In 2008, North Dakota's total minority population comprised approximately 55,209, or 8.6% of the state's total population. This is an increase of approximately 17.4% over the 2002

minority population numbers, compared with the 1.2% overall increase for the state's total population during the same time. Although 91.3% of the population in North Dakota is classified as Caucasian, this is a decrease of 1.3% from 2002. Conversely, as presented in Table 16, the minority population of the state has increased steadily since 2002. For example, the American Indian and Alaska Native population increased 0.6%, from 4.9% of the 2002 state population to 5.5% of the 2008 state population. Approximately 70% of Reservation residents are tribal members and 14% of the Dunn County population and 21.6% of the McKenzie County population comprises American Indians and Alaska Natives.

Poverty rate data for the counties in the Analysis Area are summarized in Table 16. The data show that poverty rates for Dunn County, Mountrail County, and the State of North Dakota increased from 2000 to 2007. Poverty rates have decreased for McKenzie and McLean counties.

Table 16. Poverty Rates for the Analysis Area.

Location	2000	2007
Dunn County	13.3%	13.5%
McKenzie County	15.7%	13.8%
McLean County	12.3%	10.4%
Mountrail County	15.7%	15.9%
Fort Berthold Reservation	N/A	N/A
North Dakota	10.4%	11.8%

Source: U.S. Census Bureau 2009d.

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.

Additional potential impacts to tribes and tribal members include disturbance of cultural resources. There is potential for disproportionate impacts, especially if the impacted tribes and members do not reside within the Reservation and therefore do not share in direct or indirect benefits. This potential is reduced following the surveys of proposed well locations and access

road routes and determination by the BIA that there would be no effect to historic properties. Furthermore, nothing is known to be present that qualifies as a TCP or for protection under the American Indian Religious Freedom Act. Potential for disproportionate impacts is further reduced by requirements 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.

3.9 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 Tribe 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 which documents the results of monitoring in order to adapt the projects to eliminate any adverse impact on the environment.

3.10 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 damage 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.

3.11 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 will 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.

3.12 CUMULATIVE IMPACTS

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. Past and current disturbances in the vicinity of the project area include farming, grazing, roads, and other oil and gas wells. Reasonably foreseeable future impacts must also be considered. Should development of these wells prove productive, it is likely that Zenergy and possibly other operators would pursue additional development in the area. Current farming and ranching activities are expected to continue with little change because virtually all available acreage is already organized into range units to use surface resources for economic benefit. Undivided interests in the land surface, range permits, and agricultural leases are often held by different tribal members than those holding mineral rights. Over the past several years, exploration has accelerated over the Bakken Formation. Most of this exploration has taken place outside the Reservation boundary on fee land, but for purposes of cumulative impact analyses, land ownership and the Reservation boundary are immaterial. Although it is the dominant activity currently taking place in the area, oil and gas development is not expected to have more than a minor cumulative effect on land use patterns.

There are no oil and gas wells found within 1 mile of the proposed wells. There are 45, 201, and 1,145 oil and gas wells (active, confidential, and permitted) within 5, 10, and 20 miles, respectively, of the proposed project areas (Tables 17 through 20; Figure 30).

Table 17. Confidential, Active, and Permitted Wells within a 1-mile Radius of the Project Area.

	Goodbird #36-25H/Black Hawk #1-12H		**Packinea #4-32H**		**Paul Peter Coffey #4-35H/Mann #16-27H**		**Wicker #34-27H**	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	0	0	0	0	0	0	0	0
Active Wells	0	0	0	0	0	0	0	0
Permitted Wells	0	0	0	0	0	0	0	0

Table 18. Confidential, Active, and Permitted Wells within a 5-mile Radius of the Project Area.

	Goodbird #36-25H/Black Hawk #1-12H		Packinea #4-32H		Paul Peter Coffey #4-35H/Mann #16-27H		Wicker #34-27H	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	5	0	5	0	9	0	9	0
Active Wells	2	0	6	0	3	0	6	0
Permitted Wells	0	0	0	0	0	0	0	0
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	5	0	5	0	9	0	9	0
Active Wells	2	0	6	0	3	0	6	0
Permitted Wells	0	0	0	0	0	0	0	0

Table 19. Confidential, Active, and Permitted wells within a 10-mile Radius of the Project Area.

	Goodbird #36-25H/Black Hawk #1-12H		Packinea #4-32H		Paul Peter Coffey #4-35H/Mann #16-27H		Wicker #34-27H	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	22	5	27	0	27	5	29	0
Active Wells	11	13	14	0	13	17	17	0
Permitted Wells	0	0	0	0	0	0	0	0

Table 110.Confidential, Active, and Permitted Wells within a 20-mile Radius of the Project Area.

	Goodbird #36-25H/Black Hawk #1-12H		Packinea #4-32H		Paul Peter Coffey #4-35H/Mann #16-27H		Wicker #34-27H	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	51	39	85	33	51	50	61	50
Active Wells	20	137	37	91	29	168	38	184
Permitted Wells	0	0	0	0	0	0	0	

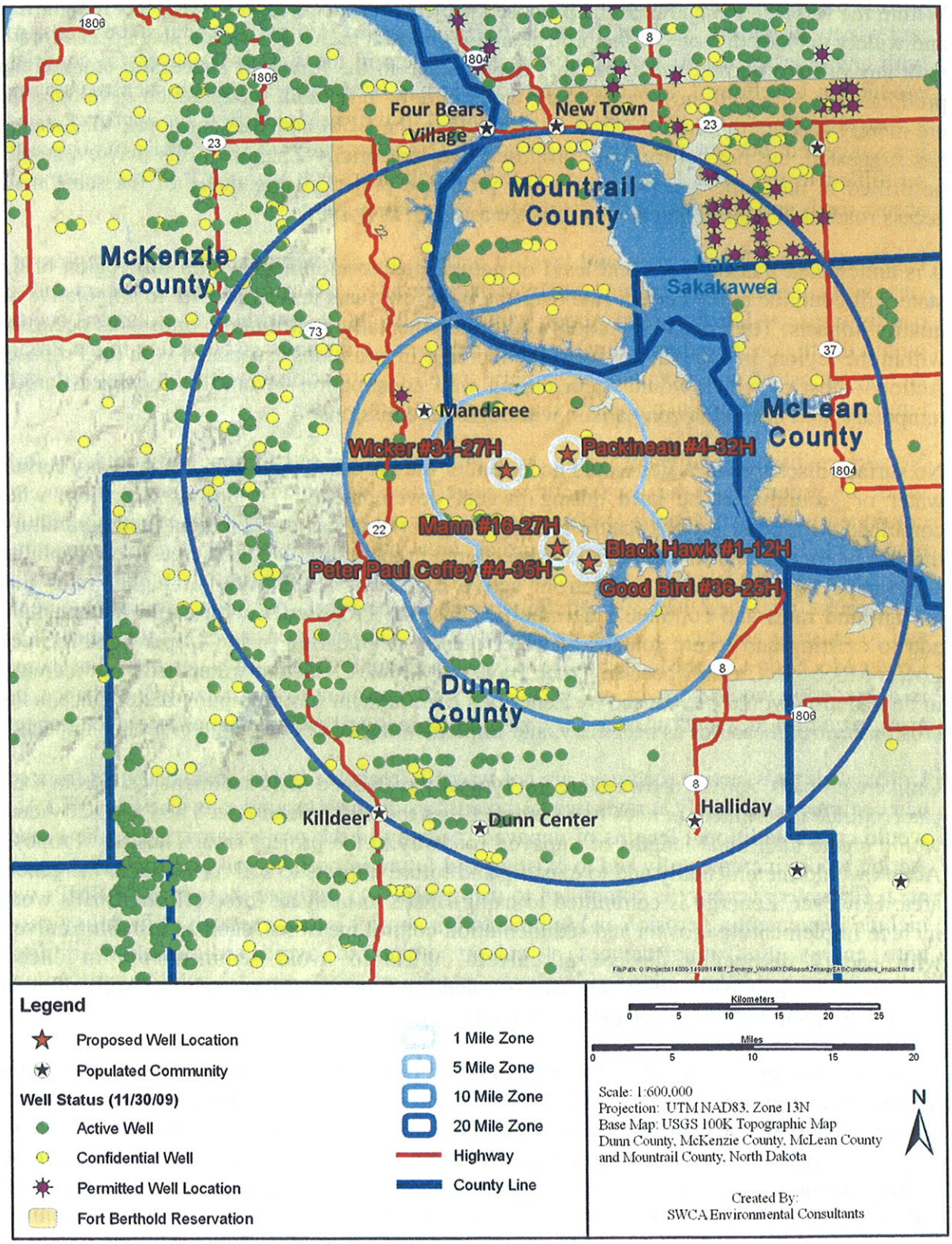


Figure 30. Active, confidential, and permitted wells within a 1-, 5-, 10-, and 20-mile radius of the proposed project locations.

Within the Reservation and near the proposed project areas, development projects remain few and widely dispersed. None of the project areas proposed in this EA would share access roads with any other proposed wells, but this may change in the future. If successful commercial production is achieved, new exploratory wells may be proposed, though such developments are merely speculation until APDs are submitted to the BLM and BIA for approval. Zenergy has suggested, but not yet formally proposed, that potentially 25 more wells may eventually be drilled in the same general area as the proposed project, using many of the same main access roads and minimizing the disturbance as much as possible.

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

No surface discharge of water would occur under the Proposed Action, nor would any surface water or groundwater be used during project development. The Proposed Action, when combined with other actions (cattle grazing, other oil and gas development, and agriculture) that are likely to occur in and near the project area in the future, would increase sedimentation and runoff rates. Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in the Upper Squaw Creek, Lower Moccasin Creek/Moccasin Creek Bay, and Skunk Creek sub-watersheds, but increases 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 additional lengths of unpaved roadway in the project area. Thus, the Proposed Action would incrementally add to existing and future impacts to soil resources in the general area. However, Zenergy is committed to using BMPs to mitigate these effects. BMPs would include implementing erosion and sedimentation control measures, such as installing culverts with energy dissipating devices at culvert outlets to avoid sedimentation in ditches, constructing water bars along side slopes, planting cover crops to stabilize soil following construction and before permanent seeding takes place.

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

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

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

Current impacts from oil and gas-related activities are still fairly dispersed, and the required BMPs would limit potential impacts. No significant negative impacts are expected to affect any critical element of the human environment; impacts would generally be low and mostly temporary. 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 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 should be submitted to all federal agencies with interests either in, near, or potentially affected by the Proposed Action.

Table 12. Scoping Comments.

Name	Organization	Comment	Response to Comment
Bagley, Lonny	Bureau of Land Management	No Comment	
Benson, Barry	Three Affiliated Tribes	No Comment	
Bercier, Marilyn	Bureau of Indian Affairs	No Comment	
Berg, George	NoDak Electric Cooperative, Inc.	No Comment	
Black, Mike	Bureau of Indian Affairs	No Comment	
Boyd, Bill	Midcontinent Cable Company	No Comment	
Brady, Perry	THPO, Three Affiliated Tribes	No Comment	
Brien, David	Chairman, Turtle Mountain Band of Chippewa	No Comment	
Brugh, V. Judy	Three Affiliated Tribes	No Comment	
Cayko, Richard	McKenzie County	No Comment	
Christenson, Ray	Southwest Water Authority	No Comment	
Cimarosti, Dan	U.S. Army Corps of Engineers	Patsy Crooke: Enclosed fact sheet to determine if permit is required.	Noted.
U.S. Army Corps of Engineers, Omaha District	Garrison Project Office	No Comment	
Danks, Marvin	Fort Berthold Rural Water Director	No Comment	
Dhieux, Joyce	U.S. Environmental Protection Agency	No Comment	
Director, Insurance and Hazard	Federal Emergency Management Agency	No Comment	
Dixon, Doug	Montana Dakota Utilities	No Comment	
Erickson, Carroll	Ward County Board of Commissioners	No Comment	
Flores, J.R.	U.S. Department of Agriculture	No Comment	
Fox, Fred	Three Affiliated Tribes	No Comment	
Glatt, David	North Dakota Department of Health	Impacts will be minor and can be controlled by proper construction methods.	Noted. BMPs discussed in APD and will be covered in Conditions of Approval.

Name	Organization	Comment	Response to Comment
Glover, John	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 project. See Wetlands section in EA.
Gorton, Candace	U.S. Army Corps of Engineers	No Comment	
Guzman, Frank	U.S. Forest Service	No Comment	
Hall, Todd	Three Affiliated Tribes	No Comment	
Hanson, Jesse	North Dakota Parks and Recreation	Project does not affect state park lands. Sensitive veg community is adjacent to project area.	Identified veg community will not be directly affected by the project.
Hauck, Reinhard	Dunn County	No Comment	
His Horse Is Thunder, Ron	Chairman, Standing Rock Sioux Tribe	No Comment	
Hoffman, Warren	Killdeer, Weydahl Field	No Comment	
Hovda, Roger	Reservation Telephone Cooperative	No Comment	
Hudson-Schenfisch, Julie	McLean County Board of Commissioners	No Comment	
Hynek, David	Chair, Mountrail Board of County Commissioners	No Comment	
Johnson, Harley	New Town Municipal Airport	No Comment	
Kadrmas, Ray	Dunn County	No Comment	
Kuehn, John	Parshall-Hankins Field Airport	No Comment	
Kulas, Cheryl	Indian Affairs Commission	No Comment	
Land Department	Northern Border Pipeline Company	No Comment	
Laux, Eric	U.S. Army Corps of Engineers	Brad Thompson: Consult with the (Jeff Klein) ND State Water Commission, EPA, USFWS, NDGF, SHPO. Charles Sorenson: Corp. recommends closed loop drilling system, and catch trenches installed. Sewage systems are closed as well (Goodbird #36-25H/Black Hawk #1-12H location).	Determined at onsite visit that closed loop system is not necessary.

Name	Organization	Comment	Response to Comment
Lindemann, Larry	Airport Manager, Barnes County Municipal Airport	No Comment	
Manager	Xcel Energy	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 Wildlife, Wetlands, and Vegetation sections in the EA. BMPs discussed in APD and will be covered in Conditions of Approval.
Mercer County	Mercer County Board of Commissioners	No Comment	
Missile Engineer, Chief	Minot Air Force Base	No Comment	
NAGPRA Office	Three Affiliated Tribes	No Comment	
Nash, Mike	Bureau of Land Management	No Comment	
Natural Resources Department	Three Affiliated Tribes	No Comment	
Nelson, Richard	U.S. Bureau of Reclamation	Ronald Melhouse: There are proposed or existing water lines in the vicinity of the Packineau 4-32H location. Please coordinate with Mr. Marvin Danks. They are providing maps.	Noted.
Obenauer, Steve	Federal Aviation Administration	No Comment	
Olson, Frances	McKenzie County	No Comment	
Paaverud, Merl	State Historical Society	Request a copy of site forms and reports.	See Cultural Resources section.
Packineau, Mervin	Three Affiliated Tribes	No Comment	
Paulson, Gerald	Western Area Power Administration	No Comment	
Pearson, Myra	Spirit Lake Sioux Tribe	No Comment	
Peterson, Walter	North Dakota Department of Transportation	No Comment	
Poitra, Fred	Three Affiliated Tribes	No Comment	
Prchal, Doug	North Dakota Parks and Recreation Department	No Comment	
Representative, Mandaree Segment	Three Affiliated Tribes	No Comment	
Rudolph, Reginald	McLean Electric Cooperative, Inc.	No Comment	

Name	Organization	Comment	Response to 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	
Svoboda, Larry	U.S. Environmental Protection Agency	No Comment	
Thorson, Gary	McKenzie Electric Cooperative	No Comment	
Towner, Jeffrey	U.S. Fish and Wildlife Service	No Comment	
Chevance, Nick	National Park Service, Midwest Region	No Comment	
Vodehnal, Dale	U.S. Environmental Protection Agency	No Comment	
Wells, Marcus	Chairman, Three Affiliated Tribes	No Comment	
Whitcalf, Frank	Three Affiliated Tribes	No Comment	
Williams, Damon	Three Affiliated Tribes	No Comment	
Wolf, Malcolm	Three Affiliated Tribes	No Comment	

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

JAN 2 0 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 three oil well pads in Dunn County, North Dakota. Approximately 75.61 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the areas depicted in the enclosed reports. No historic properties were located that 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 these undertakings. Catalogued as **BIA Case Number AAO-1740/FB/10,** the proposed undertakings, locations, and project dimensions are described in the following reports:

Lechert, Stephanie, and Judith Cooper
(2009) A Cultural Resource Inventory of the Mann 16-27H and Paul Peter Coffey 4-35H Dual Well Pad and Access Road on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

Lechert, Stephanie, Victoria Rose and Judith Cooper
(2009) A Class I and Class III Cultural Resource Inventory of the Packineau 3-32H and Packineau 4-32 Well Pads and Access Roads on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Zenergy Operating Company, LLC, Tulsa, OK.

Rose, Victoria, and Judith Cooper
(2009) A Class I and Class III Cultural Resource Inventory of the Wicker 34-27H and Wicker 4-34H Well Pads and Access Roads 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,

ACTING 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

IN REPLY REFER TO:
DESCRM
MC-208

JAN 2 0 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 a dual oil well pad in Dunn County, North Dakota. Approximately 41.3 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 that 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-1740/FB/10**, the proposed undertaking, location, and project dimensions are described in the following report:

Rose, Victoria
(2009) A Class I and Class III Cultural Resource Inventory of the Zenergy Goodbird 36-25H and Black Hawk 1-12H Dual Well Pad and Access Road, 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

List of Preparers

An interdisciplinary team contributed to this document, following guidance 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

- Joey Sheeley, Planning Specialist
  Prepared the EA.
- Michael J. Cook, Ecologist
  Reviewed field survey information.
- Matt Spann, Environmental Specialist
  Prepared field survey information for EA.
- Joshua Ruffo, Wildlife Biologist
  Conducted natural resource surveys for well pads and access roads.
- Jon Markman, Archaeologist/Field Coordinator
  Conducted cultural resource surveys for well pads and access roads.
- Todd Kohler, Archaeologist/Senior Project Manager
  Conducted cultural resource surveys for well pads and access roads.
- Stephanie Lechert, Archaeologist
  Conducted cultural resource surveys for well pads and access roads.
- Amarina Wuenschel, GIS Specialist
  Created maps and spatially derived data.
- Brent Sobotka, Hydrologist/CPESC
  Completed water resources section.
- Richard Wadleigh, NEPA Coordinator
  Reviewed document for content and adequacy.

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6.0 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
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
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
FEL	from east line
FNL	from north line
FSL	from south line
FWL	from west line
GHG	greenhouse gas
HAP	hazardous air pollutant
HUC	hydrologic unit code
IPCC	Intergovernmental Panel on Climate Change
MHA Nation	Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara Nation
N_2O	nitrous oxide
NAGPRA	Native American Graves Protection and Repatriation Act
NDDH	North Dakota Department of Health
NDIC	North Dakota Industrial Commission
NEPA	National Environmental Policy Act
NO_x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PM	particulate matter
ppm	parts per million
ROW	right-of-way
RUSLE	Revised Universal Soil Loss Equation
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Officer
TMD	total measured depth

TVD	total vertical depth
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

Notice of Availability and Appeal Rights

Zenergy: Dakota-3 Goodbird #36-25H
Dakota-3 Black Hawk #1-12H
Dakota-3 Packineau #4-32H
Dakota-3 Paul Peter Coffey #4-35H
Dakota-3 Mann #16-27H
Dakota-3 Wicker #34-27H

The Bureau of Indian Affairs (BIA) is planning to issue administrative approvals related to installation of Six oil/gas wells and as shown on the attached map. Construction by Zenergy is expected to begin in 2010.

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 March 24, 2010, 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.

Figure 1. Project location.

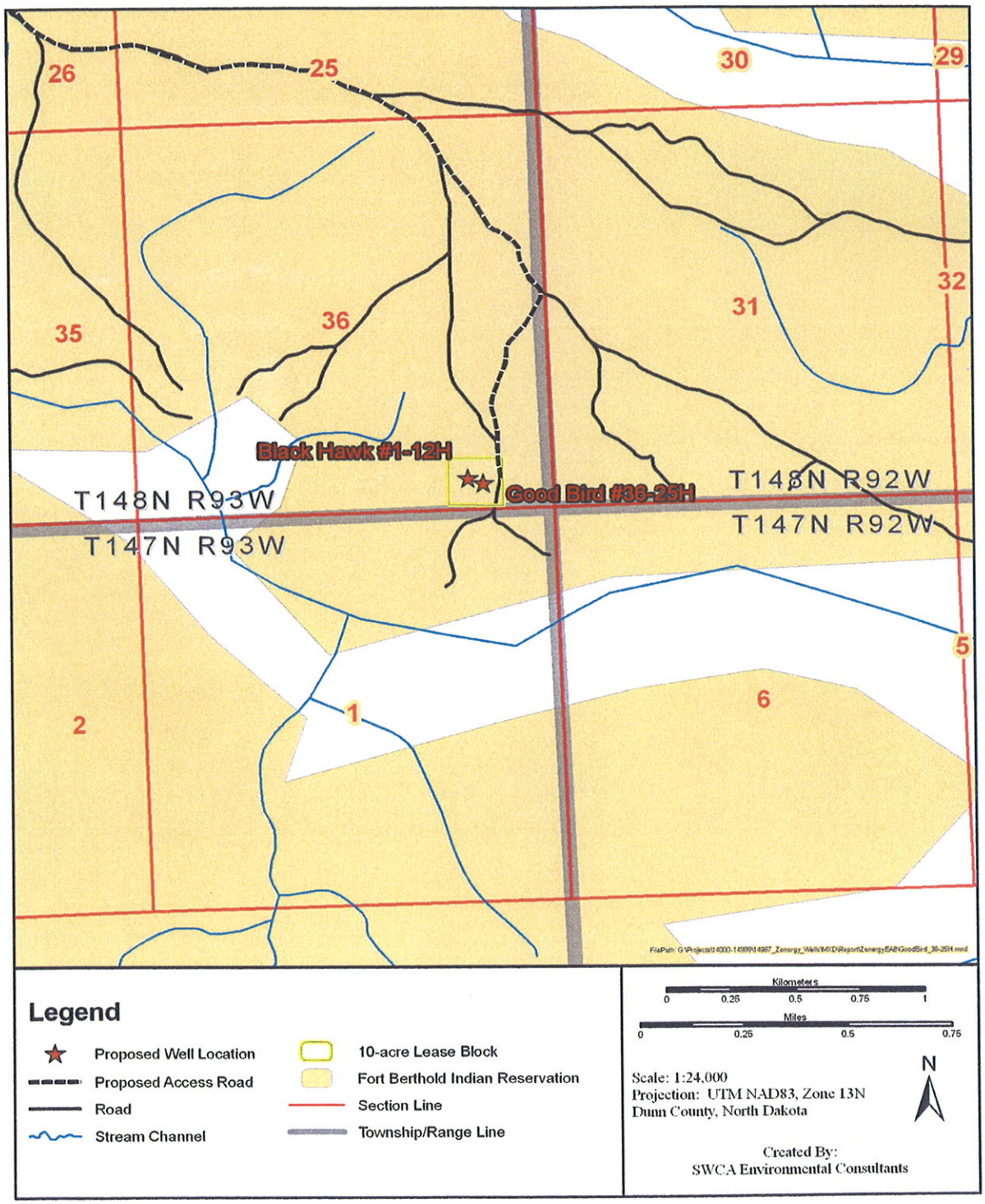

Figure 2. Goodbird #36-25H and Black Hawk #1-12H proposed locations.

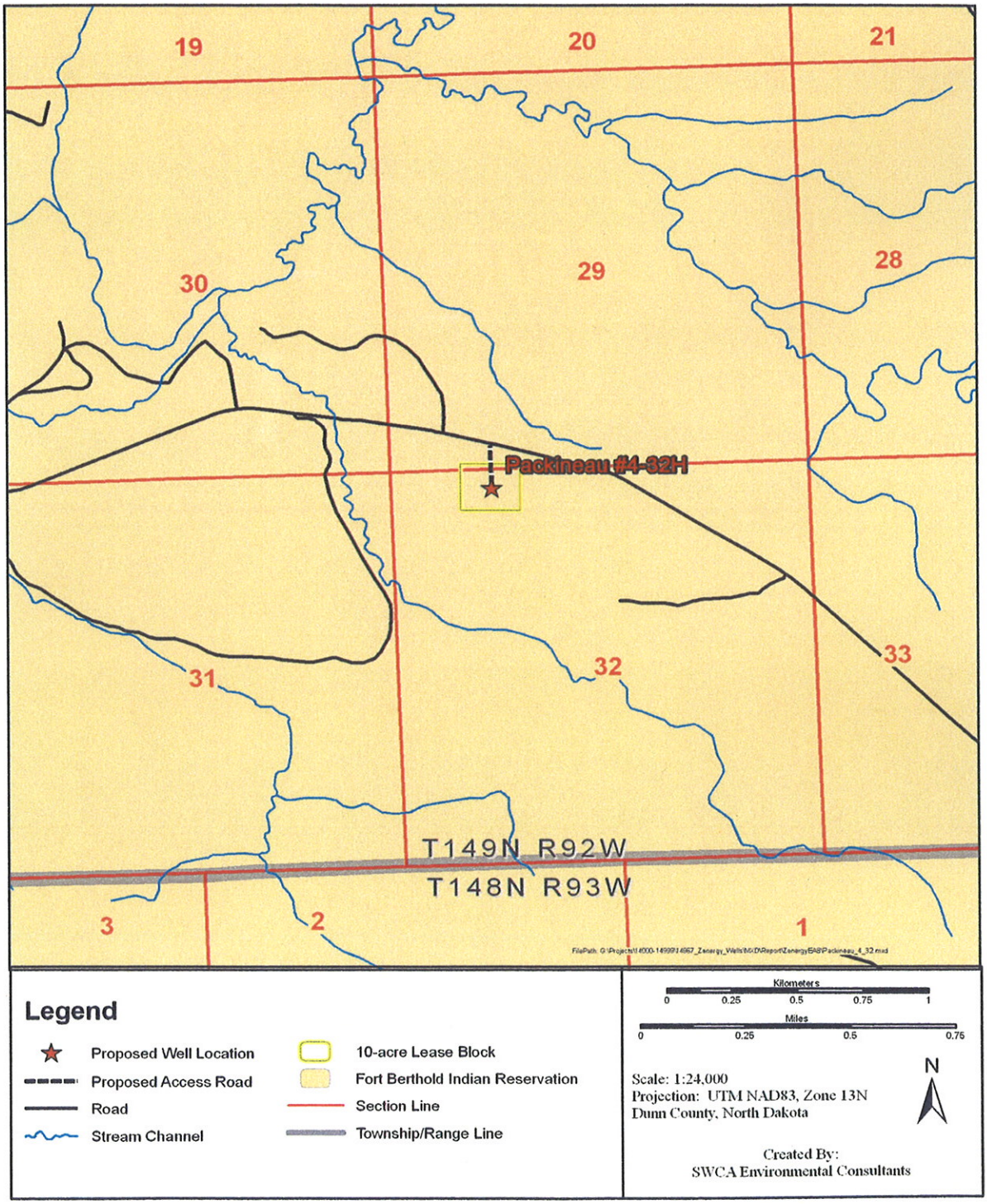

Figure 3. Packineau #4-32H proposed location.

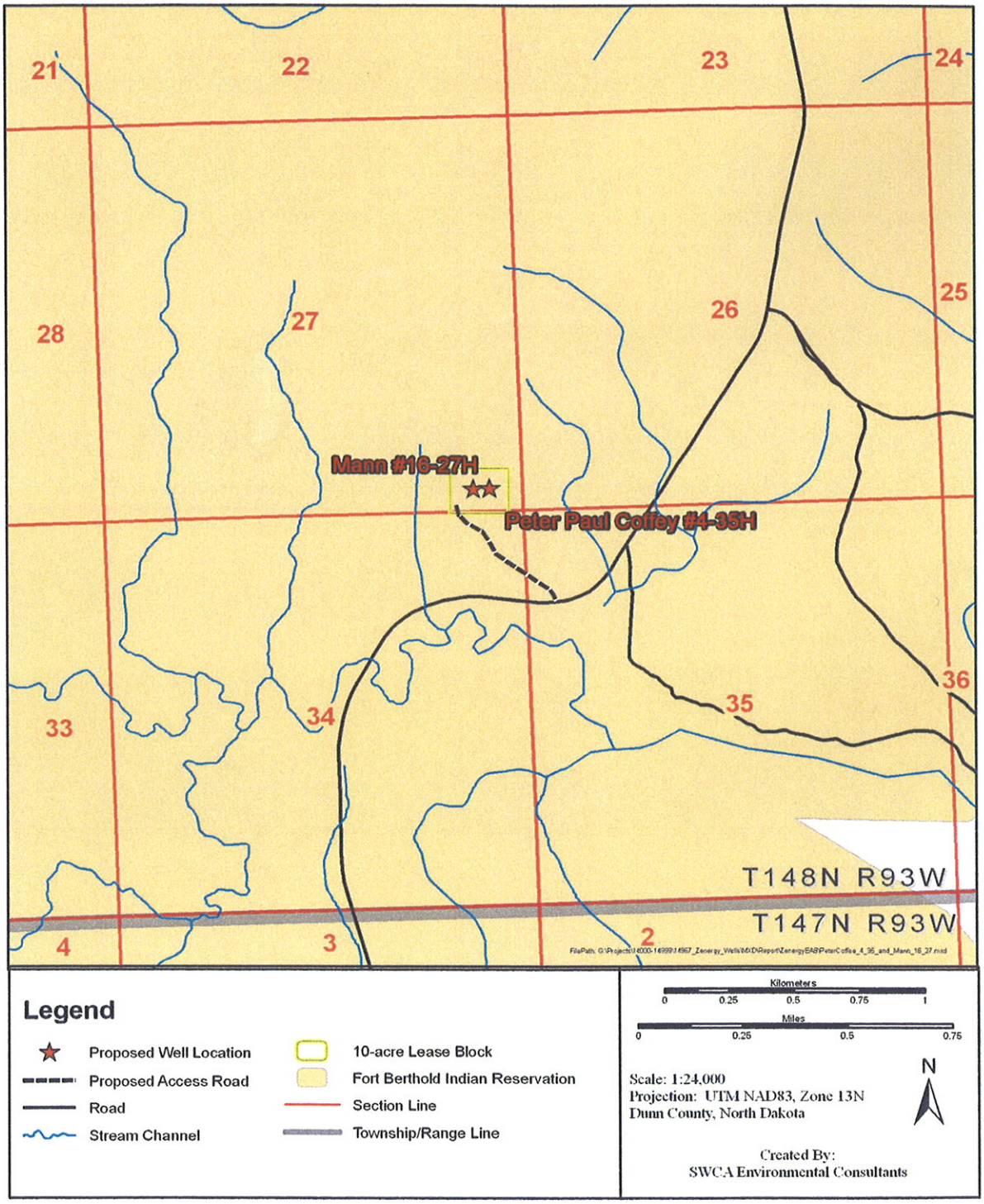

Figure 4. Paul Peter Coffey #4-35H and Mann #16-27H proposed locations.

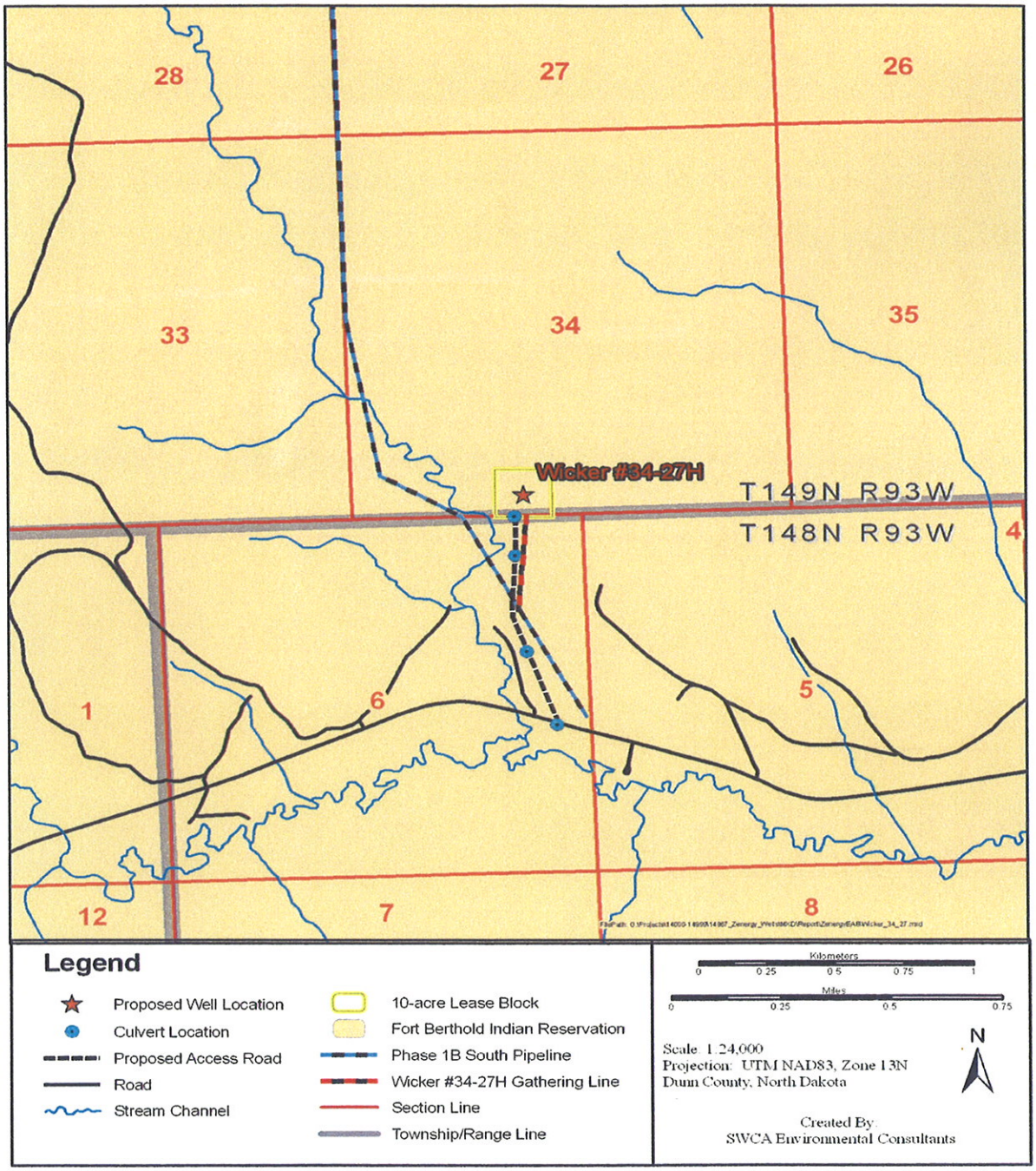

Figure 5. Wicker #34-27H proposed location.