

ENVIRONMENTAL ASSESSMENT

United States Bureau of Indian Affairs

**Great Plains Regional Office
Aberdeen, South Dakota**



**Zenergy Operating Company, LLC (Zenergy)
Four Bakken Formation Exploratory Wells at Four Locations:**

D-3 Bangen #3-14H

D-3 Fettig #14-23H

D-3 Fettig #16-22H

D-3 TAT #2-17H

Fort Berthold Indian Reservation

September 2009

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Finding of No Significant Impact

Zenergy Operating Company, LLC

D-3 Bangen #3-14H

D-3 Fettig #14-23H

D-3 Fettig #16-22H

D-3 TAT #2-17H

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

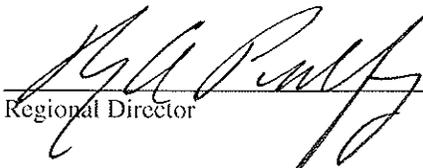
The U.S. Bureau of Indian Affairs (BIA) has received a proposal for four oil/gas wells, access roads and related infrastructure on the Fort Berthold Indian Reservation to be located in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 14, T150N, R92W (Mountrail County), the SE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 23, T149N, R93W (Dunn County), the SE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 22, T149N, R93W (Dunn County) and the NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 17, T150N, R94W (McKenzie County). Associated federal actions by BIA include determinations of effect regarding cultural resources, approvals of leases, rights-of-way and easements, and a positive recommendation to the Bureau of Land Management regarding the Application for Permit to Drill.

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, we have determined that the proposed project will not significantly affect the quality of the human environment. No Environmental Impact Statement is required for any portion of the proposed activities.

This determination is based on the following factors:

1. Agency and public involvement was solicited and environmental issues related to the proposal were identified.
2. Protective and prudent measures were designed to minimize impacts to air, water, soil, vegetation, wetlands, wildlife, public safety, water resources, and cultural resources. The remaining potential for impacts was disclosed for both the proposed action and the No Action alternative.
3. Guidance from the U.S. Fish and Wildlife Service has been fully considered regarding wildlife impacts, particularly in regard to threatened or endangered species.
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.

ACTING


Regional Director

9/8/09
Date

TABLE OF CONTENTS

| | | |
|------|---|----|
| 1. | Purpose and Need for the Proposed Action | 1 |
| 2. | Proposed Action and Alternatives | 3 |
| 2.1 | Field Camps | 3 |
| 2.2 | Access Roads | 3 |
| 2.3 | Well Pads | 4 |
| 2.4 | Drilling | 4 |
| 2.5 | Casing and Cementing | 5 |
| 2.6 | Completion and Evaluation | 5 |
| 2.7 | Commercial Production | 5 |
| 2.8 | Reclamation | 6 |
| 2.9 | Construction Details at Individual Sites | 8 |
| 2.10 | Preferred Alternative | 16 |
| 3. | The Affected Environment and Potential Impacts | 17 |
| 3.1 | No Action Alternative | 17 |
| 3.2 | Air Quality | 18 |
| 3.3 | Public Health and Safety | 19 |
| 3.4 | Water Resources | 20 |
| 3.5 | Wetland/Riparian Habitat and Threatened or Endangered Species | 28 |
| 3.6 | Soils | 30 |
| 3.7 | Vegetation and Invasive Species | 44 |
| 3.8 | Cultural Resources | 45 |
| 3.9 | Socio-Economics | 46 |
| 3.10 | Environmental Justice | 47 |
| 3.11 | Mitigation and Monitoring | 49 |
| 3.12 | Irreversible and Irrecoverable Commitment of Resources | 49 |
| 3.13 | Short-Term Use Versus Long-Term Productivity | 49 |
| 3.14 | Cumulative Impacts | 49 |
| 4.0 | Consultation and Coordination | 52 |
| 5.0 | List of Preparers | 58 |
| 6.0 | References | 60 |
| 7.0 | Abbreviations and Acronyms | 60 |

Tables

| | | |
|-------|---|----|
| 2.9 | Estimation of Acreage of Proposed Disturbances | 16 |
| 3.2 | Air Quality Standards | 18 |
| 3.4a | Distance from D-3 Bangen #3-14H to Receiving Water | 20 |
| 3.4b | Distance from D-3 Fettig #14-23H to Receiving Water | 20 |
| 3.4c | Distance from D-3 Fettig #16-22H to Receiving Water | 21 |
| 3.4d | Distance for D-3 –TAT #2-17H Receiving Water | 21 |
| 3.4e | Water Wells within 5 Miles of Proposed Well Site | 25 |
| 3.4f | Water Permits | 27 |
| 3.6a | D-3 Bangen #3-14H Site Soils and Attributes | 30 |
| 3.6b | D-3 Bangen #14-14H Site Soil Texture | 31 |
| 3.6c | D-3 Fettig #3-23 Site Soils and Attributes | 34 |
| 3.6d | D-3 Fettig #14-23H Site Soil Texture | 35 |
| 3.6e | D-3 Fettig #16-22H Sites and Attributes | 37 |
| 3.6f | D-3 Fettig #16-22H Site Soil Texture | 37 |
| 3.6g | D-3 TAT #2-17H Site Soils and Attributes | 41 |
| 3.6h | D-3 TAT#2-17H Site Soil Texture | 41 |
| 3.7 | Noxious Weeds Known to Occur in Dunn, McKenzie and Mountrail Counties | 44 |
| 3.9a | Population and Demographics | 46 |
| 3.9b | Income and Unemployment | 46 |
| 3.9c | Housing Units-2000 (U.S. Census 2007-2008) | 47 |
| 3.14a | Oil Activities Near the Proposed Well Sites | 50 |
| 3.14b | Oil and Gas Well Status in Area | 50 |

Figures

| | | |
|------|---|----|
| 1 | Project Locations | 2 |
| 2.4 | Typical Drilling Rig | 5 |
| 2.7 | Typical Commercial Operation..... | 6 |
| 2.8 | Example of Reclamation from the Gold Book..... | 7 |
| 2.9a | Aerial Photo of Bangen #3-14 | 8 |
| 2.9b | D-3 Bangen #3-14 General Appearance..... | 8 |
| 2.9c | D-3 Bangen #3-14H Project Map..... | 9 |
| 2.9d | Aerial Photo of Fettig #14-23H | 10 |
| 2.9e | D-3 Bangen #3-14 General Appearance | 10 |
| 2.9f | D-3 Fettig #14-23H Project Map | 11 |
| 2.9g | Aerial Photo of Fettig #16-22H..... | 12 |
| 2.9h | D-3 Fettig #16-22H General Appearance | 12 |
| 2.9i | D-3 Fettig #16-22H Project Map | 13 |
| 2.9j | Aerial Photo of TAT#2-17H | 14 |
| 2.9k | D-3 TAT @2-17 General Appearance | 14 |
| 2.9l | D-3 TAT @2-17H Project Map | 15 |
| 3.6a | Soil Map Units D-3 Bangen #3-14H..... | 32 |
| 3.6b | General Hydrology D-3 Bangen #3-14H | 33 |
| 3.6c | Soil Map Units D-3 Fettig #14-23H | 36 |
| 3.6d | Soil Map Units D-3 Fettig #16-22H | 38 |
| 3.6e | General Hydrology D-3 Fettig #14-23H & D-3 Fettig #16-23H | 39 |
| 3.6f | Soil Map Units D-3 TAT #2-17H | 42 |
| 3.6g | General Hydrology D-3 TAT #2-17H | 43 |
| 3.14 | Approved or Proposed Oil and Gas Projects | 51 |

1. Purpose and Need for the Proposed Action

Zenergy Operating Company, LLC (Zenergy) is proposing to drill four horizontal oil/gas wells from four locations on the Fort Berthold Indian Reservation to evaluate and potentially develop the commercial potential of natural resources. Developments have been proposed on lands held in trust by the United States in Dunn, McKenzie, and Mountrail Counties, North Dakota. The U.S. Bureau of Indian Affairs (BIA) is the surface management agency for potentially affected tribal lands and individual allotments. The BIA also holds title to the subsurface mineral rights. One well would be drilled from each surface location shown in Figures 1a. Bangen #3-14H would be drilled from a single well pad in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 14, T150N, R92W. Fettig #14-23H would be drilled from another well pad in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 23, T149N, R93W. Fettig #16-22H would be drilled from one well pad in the SE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 22, T149N, R93W. TAT #2-17H would be drilled from one well pad in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 17, T150N, R94W.

The economic development of available resources and associated BIA actions are consistent with BIA's general mission. Leasing and development of mineral resources offers substantial economic benefits to both the Three Affiliated Tribes of the Mandan, Hidatsa and Arikara Nation and to individual tribal members. Oil and gas exploration and development activities are conducted under authority of the Indian Mineral Leasing Act of 1938 (25 USC 396a, *et seq.*), the Indian Mineral Development Act of 1982 (25 USC 2101, *et seq.*), the Federal Onshore Oil and Gas Royalty Management Act of 1982 (30 USC 1701, *et seq.*), and the Energy Policy Act of 2005 (42 USC 15801, *et seq.*). BIA actions in connection with the proposed projects are largely administrative and include approval of leases, easements and rights-of-way, determinations regarding cultural resource effects and recommendations to the Bureau of Land Management (BLM) regarding approval of Applications for Permits to Drill (APDs).

These proposed federal actions require compliance with the *National Environmental Policy Act* of 1969 (NEPA) and regulations of the Council on Environmental Quality (CEQ, 40 CFR 1500-1508). Analysis of the proposed project's potential to impact the human environment will be documented and will guide federal decision making. APDs submitted by Zenergy, describe developmental, operational and reclamation procedures and practices that contribute to the technical basis of this Environmental Assessment (EA). The procedures and practices described in the applications are critical elements in both the project proposals and the BIA's decisions regarding environmental impacts. This EA will result in either a Finding of No Significant Impact (FONSI) or a decision to prepare an Environmental Impact Statement (EIS).

There are several components to each of the proposed actions. New roads are needed to access proposed well sites. Well pads would be constructed to accommodate drilling operations. Pits for drilled cuttings would be constructed, used and reclaimed. Drilling and completion information could result in long-term commercial production at some or all of the sites, in which case(s) supporting facilities would be installed. The working portions of well pads and the access roads would remain in place during commercial production. All project components would eventually be abandoned and reclaimed, as specified in this document and the APDs and according to any other federal conditions, unless formally transferred with federal approval to either the BIA or the landowner. The proposed wells are exploratory, in that results could also support developmental decisions on other leases in the surrounding area, but this EA addresses only the installation and possible long-term operation of the listed wells and directly associated infrastructure and facilities. Additional NEPA analysis, decisions and federal actions will be required prior to any other development.

Any authorized project will comply with all applicable federal, state and tribal laws, rules, policies, regulations and agreements. No construction, drilling or other ground-disturbing operations will begin until all necessary leases, easements, surveys, clearances, consultations, permissions, determinations and permits are in place.

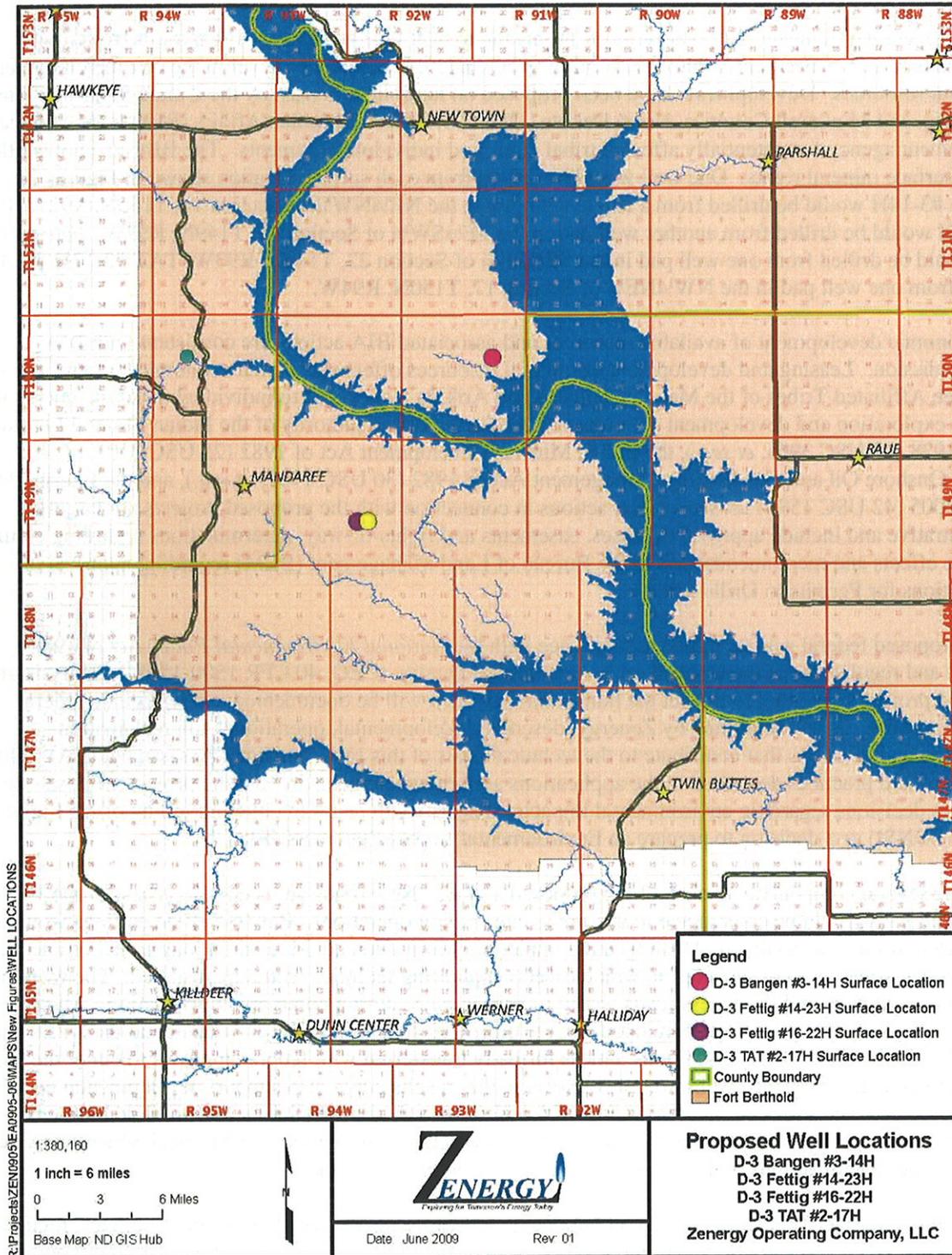


Figure 1: Project locations.

2. Proposed Action and Alternatives

The **No Action Alternative** must be considered within an Environmental Assessment. If this alternative is selected, BIA would not approve leases, rights-of-way or other administrative proposals for one or more of the proposed projects. Applications for Permits to Drill (APDs) for at least one of the listed well locations would not be approved. Current land use practices would continue at No Action sites. Development under other oil and gas leases would remain a possibility, but No Action is the only available or reasonable alternative to the specific proposals considered in this document.

This document analyzes the potential impacts of specific proposed actions - exploratory oil/gas wells on allotted surface and mineral estate within the boundaries of the Fort Berthold Indian Reservation in Dunn, McKenzie and Mountrail Counties, North Dakota. The proposed wells would test the commercial potential of the Middle Bakken Dolomite Member of the Bakken Formation. Site-specific actions would or might include several components, including access roads, construction of well pads, drilling operations, installation of production facilities, tanker traffic and reclamation.

All construction activities would follow lease stipulations, practices and procedures outlined in this document, the APDs, guidelines and standards in *Surface Operating Standards for Oil and Gas Exploration and Development* (BLM/US Forest Service, Fourth Edition, also known as the Gold Book), and any conditions added by either BIA or BLM. All lease operations would be conducted in full compliance with applicable laws and regulations, including 43 CFR 3100, *Onshore Oil and Gas Orders 1, 2, 6 and 7*, approved plans of operations and any applicable Notices to Lessees.

2.1 Field Camps

Self-contained trailers may house a few key personnel during drilling operations, but any such arrangements would be very short-term. No long-term residential camps are proposed. Construction and drilling personnel would commute to project sites, most likely from within or around the Reservation. Human waste would be collected in standard portable chemical toilets or service trailers located on-site, then transported off-site to a state-approved wastewater treatment facility. Other solid waste would be collected in enclosed containers and disposed of at a state-approved facility.

2.2 Access Roads

A total of about 9,534 feet (1.8 miles) of new road would be constructed, including 528 feet (0.1 miles) of new road into the D-3 Bangen #3-14H site, 89 feet (0.02 miles) of new road into the D-3 Fettig #14-23H site, 663 feet (0.13 miles) of new road into the D-3 Fettig #16-22H site, and 8,254 feet (1.56 miles) of new road into the D-3 TAT #2-17H site. Signed agreements are in place allowing road construction across affected surface allotments. A maximum disturbed right-of-way (ROW) width of 66 feet would result in a total of 14.45 acres of surface disturbance, including 0.80 acres at the D-3 Bangen #3-14 site, 0.14 acres at the D-3 Fettig #14-23H site, 1.00 acres at the D-3 Fettig #16-22H site, and 12.51 acres at the D-3 TAT #2-17H site. One well is planned for each of the surface locations.

Construction would follow road design standards outlined in the Gold Book. A minimum of six (6) inches of topsoil would be stripped from the access road corridors, with the stockpiled topsoil redistributed on the outslope areas of the borrow ditches following road construction. These borrow ditch areas would be reseeded as soon as practical with a seed mixture determined by the BIA. If commercial production is established from a proposed location, the access road would be graveled with a minimum of four (4) inches of gravel and the roadway would remain in place for the life of the well(s). Details of road construction for each project are addressed in the Multi-Point Surface Use and Operations Plan in the respective APD.

2.3 Well Pads

The proposed well pads would consist mainly of 1) an area leveled for the drilling rig and related equipment; and 2) a pit excavated for drilling fluids, drill cuttings and fluids produced during drilling. Well pad areas would be cleared of vegetation, stripped of topsoil and graded to the specifications in the approved APD. Topsoil would be stockpiled and stabilized until disturbed areas were reclaimed and re-vegetated. Excavated subsoils would be used in pad construction, with the finished well pads graded to ensure positive water drainage away from the drill site. Erosion control would be maintained through prompt re-vegetation and by constructing all necessary surface water drainage control features, including berms, diversion ditches and waterbars.

The level area of each well pad (including reserve pits for drill cuttings) would be about 330' x 430' (3.26 acres) to accommodate one well. Cut and fill on pad edges would result in a total disturbance of about 4 acres for four pads, in addition to the 14.45 acres for road construction. Details of pad construction and reclamation are described and diagrammed in the Surface Use Plan of each well's APD.

2.4 Drilling

After securing mineral leases, Zenergy submitted APDs to the BLM proposing to drill four wells at four locations:

- D-3 Bangen #3-14H: NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 14, T150N, R92W
- D-3 Fettig #14-23H: SE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 23, T149N, R93W
- D-3 Fettig #16-22H : SE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 22, T149N, R93W
- D-3 TAT #2-17H : NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 17, T150N, R94W

The BLM North Dakota Field Office forwarded copies of the APDs to BIA's Fort Berthold Agency in New Town, North Dakota, for review and concurrence. BLM will not approve an APD until BIA completes its NEPA process and recommends APD approval. No drilling will begin until an approved permit has been obtained from the BLM. For each well the procedure would be as follows.

Initial drilling would be vertical to about 9,500 feet. The minimum setback of 500 feet (NDCC 43-02-03-18.2) from section lines would be maintained or achieved through directional drilling. Drilling would become roughly horizontal at a measured depth of about 10,500 feet, followed by the drilling of a lateral reach of about 5,000 feet in length at depths of about 10,500 feet within the Middle Bakken Dolomite Member.

Rig transport and on-site assembly would take about seven days. Drilling operations would require about 35 days to reach the target depth, using a rotary drilling rig rated for drilling to about 15,000 feet. A typical drilling rig is shown in Figure 2.4. For the first 2,500 feet of hole drilled, a fresh-water based mud system with non-hazardous additives such as bentonite would be used to minimize contaminant concerns. Water would be obtained from a commercial source for this drilling stage, using about 8.4 gallons of water per foot of hole drilled to surface casing point (a total of about 21,000 gallons) per well.

After setting and cementing the surface casing, an oil-based mud system (about 80% diesel fuel and 20% water) would be used to drill to the intermediate casing point. Oil-based drilling fluids can reduce the potential for hole sloughing while drilling through water-sensitive formations, such as shales. About 4,720 gallons of water and 18,900 gallons of diesel fuel would be used per well to casing point and about 33,600 gallons for drilling of the lateral. Horizontal drilling would utilize saltwater-based mud drilling fluid. On the surface, toxic fluids would be contained in steel tanks placed on plastic/vinyl liners, then collected during drilling by centrifuging returns to separate the cuttings from fluids. Fluids would be recycled back into the steel tanks for re-use. Upon completion of drilling operations at each location, oil-based fluids would be collected to the extent possible and recycled for

use elsewhere. Any free fluids remaining in the reserve pits would be removed and disposed of in accordance with North Dakota Industrial Commission (NDIC) rules and regulations.

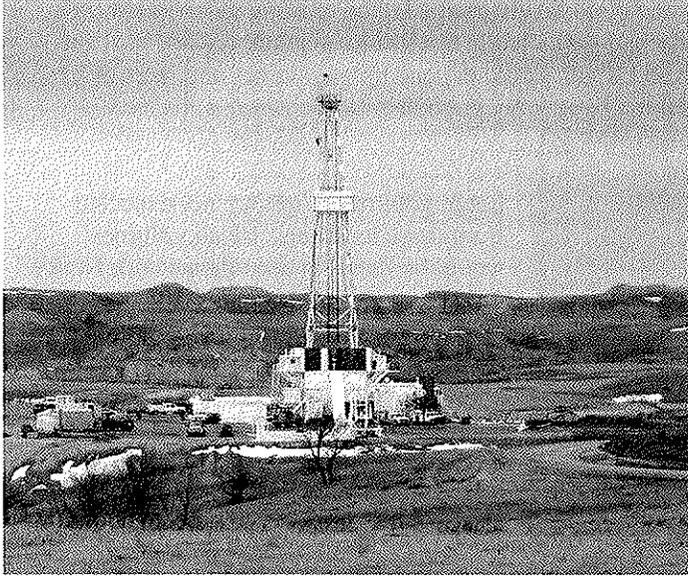


Figure 2.4: Typical drilling rig

Cuttings generated from drilling would be deposited in the reserve pit on each individual well pad. Reserve pits would be lined with an impervious (plastic/vinyl) liner to prevent drilling fluid seepage and contamination of the underlying soil. Liners would be installed over sufficient bedding (either straw or dirt) to cover any rocks, would overlap the pit walls, extend under the mud tanks, and would be covered with dirt and/or rocks to hold it in place. Prior to use, the entire location would be fenced completely with a cattle guard at the access road into location, in order to protect both wildlife and livestock. Fencing would be installed in accordance with Gold Book guidelines and maintained until the reserve pits are backfilled.

2.5 Casing and Cementing

Surface casing would be set to about 2,500 feet and cemented back to the surface during drilling, isolating all near-surface freshwater aquifers in the project area. The Dakota Formation is a potential hydrocarbon zone expected to be encountered at a depth of about 5,000 feet, so production casing would be set and cemented to about 11,400 feet. Casing and cementing operations would be conducted in full compliance with *Onshore Oil and Gas Order 2*.

2.6 Completion and Evaluation

After a well has been drilled and cased, a completion (work-over) unit would be moved onto the site. For wells of the depth proposed, about thirty (30) days are usually needed 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. If the target formation is to be fractured to stimulate production, the typical procedure is to pump a mixture of sand and a carrier (e.g., water and/or nitrogen) under extreme pressure downhole. The resulting fractures are propped open by the sand, increasing the capture zone of the well and maximizing efficient drainage of the field. After fracturing, the well is typically flowed back to the surface to recover fracture fluids and remove excess sand. Fluids utilized in the completion procedure would be captured either in the reserve pit or in tanks for disposal in strict accordance with NDIC rules and regulations.

2.7 Commercial Production

If drilling, testing and production support commercial production from any of the proposed locations, additional equipment would be installed, including a pumping unit at the well head, a vertical heater/treater, tanks (usually four 400 barrel steel tanks), and a flare/production pit. An impervious dike sized to hold 100% of the capacity of the largest tank plus one full day's production would surround production tanks and the heater/treater. Load out lines would be located inside the diked area, with a heavy screen-covered drip barrel installed under the outlet. A metal access staircase would protect the dike and support flexible hoses used by tanker trucks. The BIA would choose an inconspicuous paint color for all permanent aboveground production

facilities from colors recommended either by the BLM or the Rocky Mountain Five-State Interagency Committee. A typical producing rig is shown in Figure 2.7 and more detail is included in each APD.

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 product and water would depend upon volumes and rates of production. The duration of production operations cannot be reliably predicted, but some oil wells have pumped for more than one hundred years.

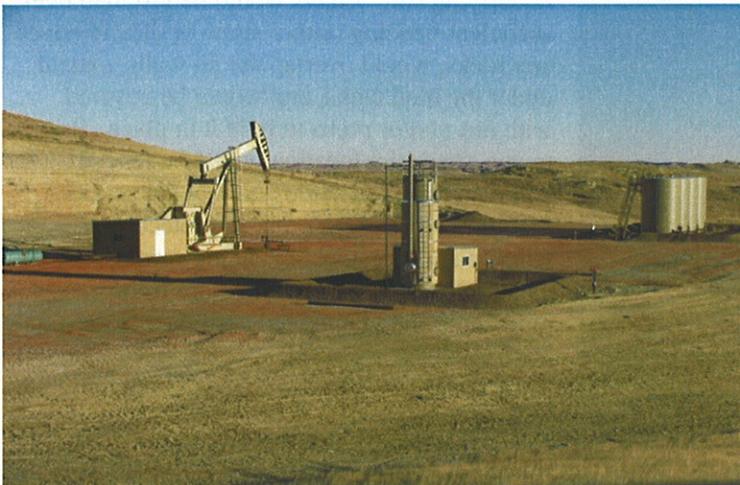


Figure 2.7: Typical commercial operation

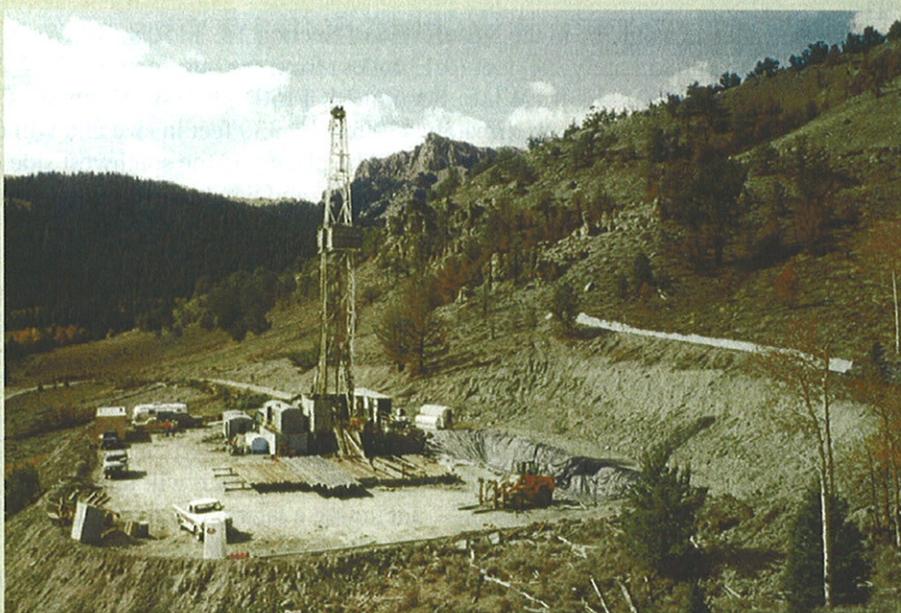
Large volumes of gas are not expected from these locations. Small volumes would be flared in accordance with Notice to Lessees (NTL) 4A and NDIC regulations, which prohibit unrestricted flaring for more than the initial year of operation (NDCC 38-08-06.4). Results could also encourage additional exploration on the Reservation. Should future oil/gas exploration activities be proposed by Zenergy on the Fort Berthold reservation, those proposals and associated federal actions would require additional NEPA analysis and BIA consideration prior to implementation.

2.8 Reclamation

The reserve pit and drill cuttings would be treated, solidified, backfilled and buried as soon as possible after well completion. Any oily residue is dispersed and captured, preventing coalescence and release to the environment at significant rates in the future. Controlled mixing of cuttings with a non-toxic reagent causes an irreversible reaction that quickly results in an inert, solid material. The alkaline nature of the stabilized material also chemically stabilizes various metals that may be present, primarily by transforming them into less soluble compounds. Treated material would then be buried in the reserve pit, overlain by at least four feet of overburden as required by NDIC regulations.

If commercial production equipment is installed, the well pad would be reduced in size to about 300' x 200', with the rest of the original pad 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. 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 reseeded with a seed mixture recommended by the BIA. The outslope portions of roads would be covered with stockpiled topsoil and re-seeded, reducing the residual access-related disturbance to about 28' wide.

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, re-contoured and re-seeded. 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. The Surface Use Plan within each APD contains additional details regarding both interim and final reclamation measures. Figure 2.8 shows an example of reclamation from the Gold Book.



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



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

Figure 2.8: Example of reclamation from the Gold Book

2.9 Construction Details at Individual Sites

One lateral wellbore will be drilled from each of the four surface locations.

D-3 Bangen #3-14H

As shown in Figure 2.9a, the well pad would be in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 14, T150N, R92W, in Mountrail County. The surface location is approximately 700 feet (0.13 miles) from the intersection of 28th Street NW and 85 $\frac{1}{2}$ Avenue NW, 410 feet FNL & 2111 feet FWL of Section 14, T150N, R92W, Mountrail County, ND (NE $\frac{1}{4}$ NW $\frac{1}{4}$). The proposed well site will be approximately 430 feet by 330 feet in size and will disturb approximately 4.2 acres (Table 2.9). Two topsoil stockpiles will be placed on the southwest side of the pad site. The proposed access road would turn west off 85 $\frac{1}{2}$ Avenue NW and would disturb approximately 0.4 acres.



Well #3-14H, showing spacing

Directional drilling would achieve and maintain the minimum 500' setback from the section boundaries of spacing units. Initial drilling will be vertical to about 9,600 feet in the wellbore. Directional drilling will result in a horizontal wellbore at a true vertical depth (TVD) of about 9500 feet. The well will total about 15,400 feet, including a lateral reach of about 5,000 feet in the Middle Bakken Member. The lateral drilling target is about 550 feet FSL and 2090 feet FEL (SE $\frac{1}{4}$) of Section 14 or about 4,500 feet southeast of the surface hole location.



Well #3-14H General Appearance: The proposed cultivated field. Photo was taken facing west at the well pad and access route.

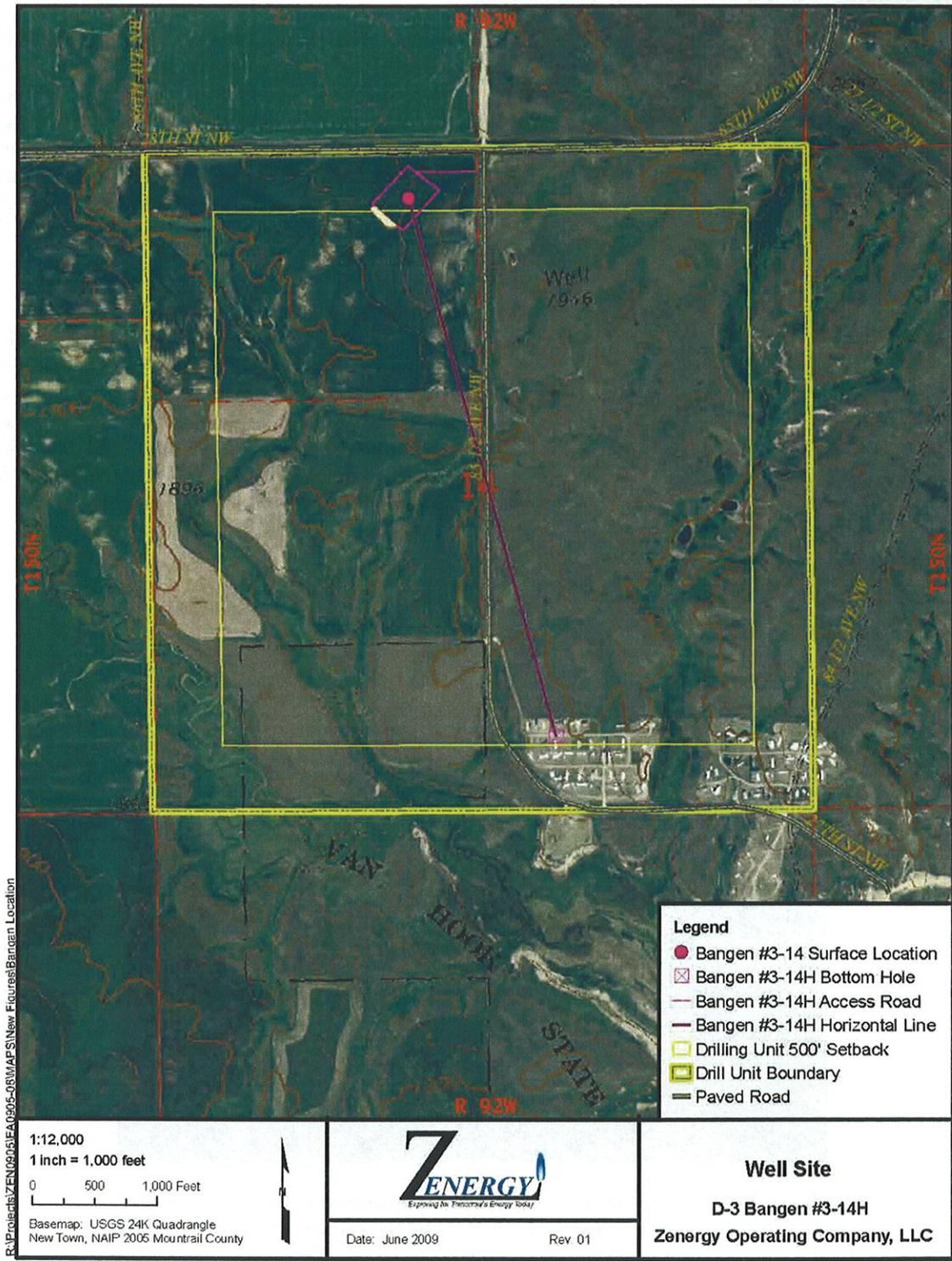


Figure 2.9c: D-3 Bangen #3-14H Project Map

D-3 Fettig #14-23H



As shown in Figure 2.9d, the site would be in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 23, T149N, R93W. The D-3 Fettig #14-23H well site is located approximately 7.5 miles from Mandaree, in Dunn County. The proposed well site will be approximately 330 feet by 430 feet in size and will disturb approximately 4.0 acres. A topsoil stockpile will be placed on the southwest side of the pad site. The proposed access road turns north off 20th Street NW in Section 26, and will disturb approximately 1.0 acres (666.42 feet long by 66 feet wide).

The surface location of the borehole will be approximately 380 feet (0.07 mile) FSL and 2130 feet (0.40 mile) FWL of section 23, T149N, R93W (SE $\frac{1}{4}$ SW $\frac{1}{4}$). The borehole will be directionally drilled horizontally to the northwest to the bottom hole target, at 550 feet (0.10 mile) FNL and 550 feet (0.10 mile) FWL, (NW $\frac{1}{4}$), or about 4,620 feet northwest of the surface hole location.

Figure 2.9d D-3 Fettig #14-23H



Figure 2.9e: D-3 Fettig #14-23H General Appearance: The proposed well site is located in a cultivated field. Photo was taken facing west at the junction of the proposed well pad and access route.

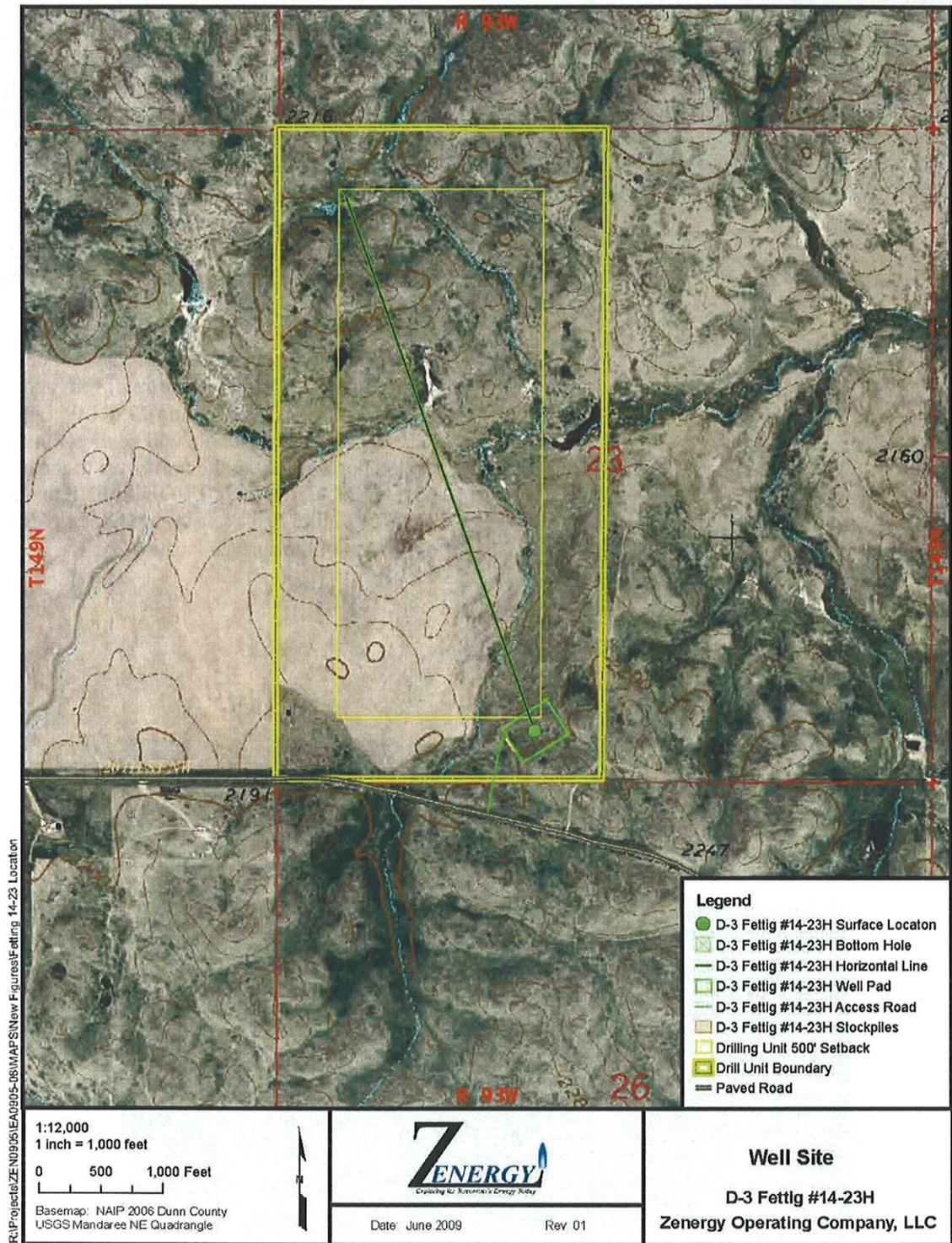


Figure 2.9f: D-3 Fettig #14-23H Project Map

D-3 Fettig #16-22H Surface Location



As shown in Figure 2.9g, the site would be in the SE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 22, T149N, R93W. The D-3 Fettig #16-22H well site is located approximately 6.9 miles from Mandaree, in Dunn County. The surface location is in the approximately 289 feet (0.05 miles) from 20th Street NW. The proposed well site will be approximately 330 feet by 430 feet in size and will disturb approximately 3.3 acres (Table 2.9). The topsoil stockpile will be placed on the north side of the pad site. The proposed access road turns north off 20th Street NW in Section 22, and will disturb approximately 0.1 acres.

The surface location of the borehole will be approximately 300 feet (0.05 mile) FSL and 550 feet (0.1 mile) FEL of section 22, R149N, R93W, (SE $\frac{1}{4}$ SE $\frac{1}{4}$). The borehole will be directionally drilled horizontally to the northwest to the bottom hole target, at 550 feet (0.10 mile) FNL and 2,090 feet (0.17 mile) FEL, (NE $\frac{1}{4}$) or about 4,690 feet northwest of the surface location.

Figure 2.9g: Aerial photo of D-3 Fettig #16-22H



Figure 2.9h: D-3 Fettig #16-22H General Appearance: The proposed well site is located in a cultivated field. Photo was taken facing southeast from the northwest pad corner. Vehicles are parked on the section corner.

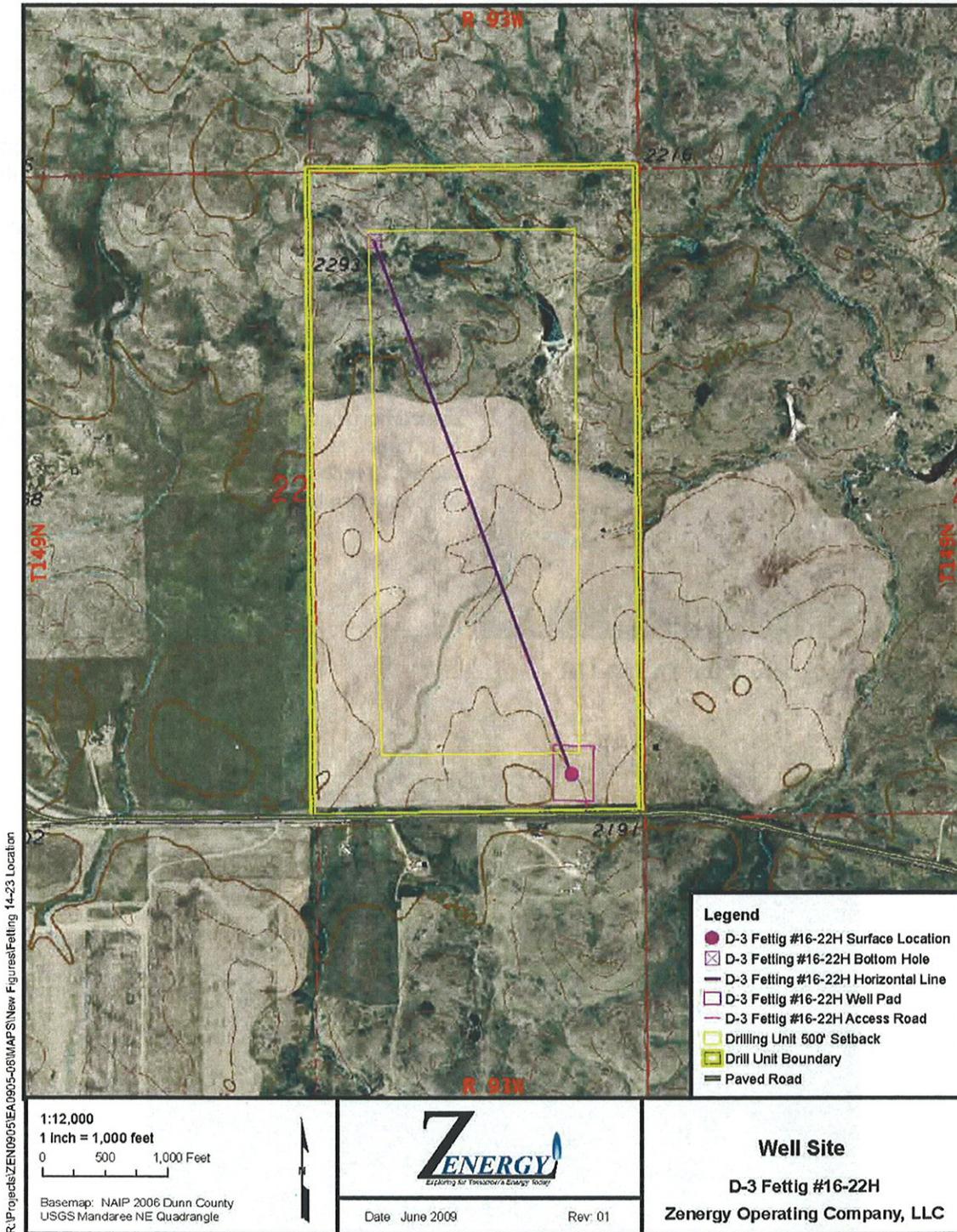
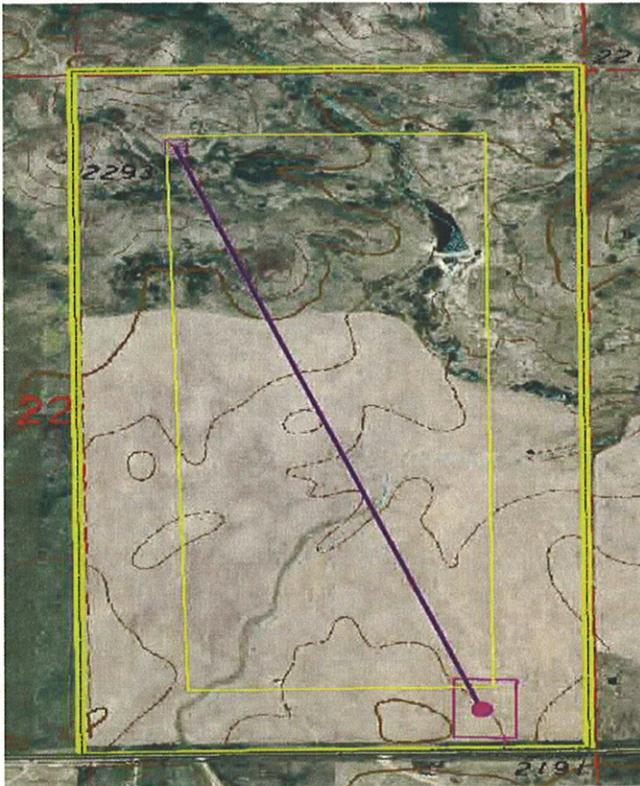


Figure 2.9i: D-3 Fettig #16-22H Project Map

D-3 TAT #2-17H Surface Location



As shown in Figure 2.9j, the site would be in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 17, T150N, R94W. The D-3 TAT #2-17H well site is located approximately 10.3 miles from Mandaree, in McKenzie County. The proposed well site will be approximately 330 feet by 430 feet in size and will disturb approximately 3.824 acres. Two topsoil stockpiles will be placed near the southeast corner along the sides of the pad site. Access to the site begins along Highway 22, and will disturb approximately 12.506 acres (8,253.95 feet long by 66 feet wide).

The surface location of the borehole will be approximately 75 feet (0.06 mile) FNL and 1,482 feet (0.28 mile) FEL, of section 17, R150N, R94W (NW $\frac{1}{4}$ NE $\frac{1}{4}$). The borehole will be directionally drilled horizontally to the southeast to the bottom hole target, at 550 feet (0.10 mile) FSL and 550 feet (0.10 mile) FEL, or about 4,750 feet northwest of the surface hole location.

Figure 2.9j: Aerial photo of D-3 TAT #2-17H



Figure 2.9k: D-3 TAT #2-17H General Appearance: The proposed well site is located on a relatively level plateau top above Bear Den Creek. Photo was taken facing east.

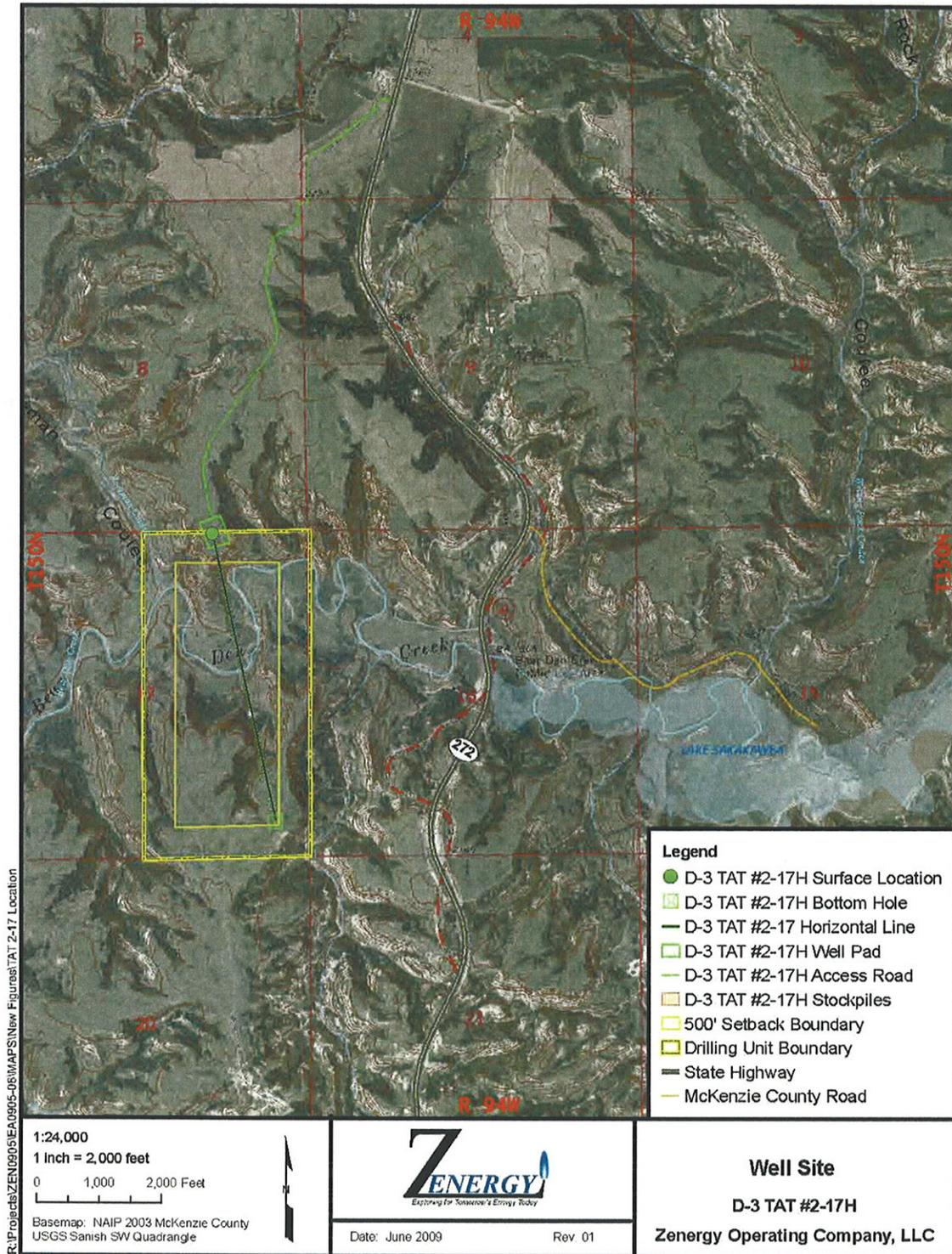


Figure 2.9I: D-3 TAT #2-17H Project Map

Table 2.9 Estimation of acreage of proposed disturbances

| Well Name | Feature | Acres | Total Disturbance (acres) |
|--------------------|--------------|-------|---------------------------|
| D-3 Bangen #3-14 | Well Pad | 4.2 | 4.6 |
| | Access Route | 0.4 | |
| D-3 Fettig #14-23H | Well Pad | 4.0 | 5.0 |
| | Access Route | 1.0 | |
| D-3 Fettig #16-22H | Well Pad | 3.3 | 3.6 |
| | Access Route | 0.1 | |
| D-3 TAT #2-17H | Well Pad | 3.8 | 16.3 |
| | Access Route | 12.5 | |

2.10 Preferred Alternative

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

3. The Affected Environment and Potential Impacts

The Fort Berthold Indian Reservation is the home of the Three Affiliated Tribes 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, impounding the Missouri River upstream and inundating much of the Reservation. The remaining land on the Reservation was divided into three sections by Lake Sakakawea.

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 projects. 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 (the part 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 formerly glaciated, gently rolling landscape ranges 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° 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 grassland, cropland and shrubland that is currently either idle, used to graze livestock or crop production. The landscape has been previously disturbed by dirt trails and graveled and paved roadways. There are no residences within 3,000 feet of the proposed well sites. Existing conditions within the proposed drilling units are described below. 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 and the Preferred Alternative. Impacts may be beneficial or detrimental, direct or indirect, and short-term or long-term. This 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 The No Action Alternative

Under the No Action Alternative, the proposed projects would not be constructed, drilled, installed, or operated. Existing conditions would not be impacted for 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, 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, trucking, and other traffic would not change from present levels. Under the No Action Alternative, the MHA Nation, Tribal members, and allottees would not have the opportunity to realize potential financial gains resulting from the discovery of resources at these well locations.

3.2 Air Quality

The North Dakota Department of Health (NDDH) network of Ambient Air Quality Monitoring (AAQM) stations includes Watford City in McKenzie County, Dunn Center in Dunn County, and Beulah in Mercer County. These stations are located west, south and southeast of the proposed well sites. Criteria pollutants tracked under National Ambient Air Quality Standards (NAAQS) of the *Clean Air Act* include sulfur dioxide (SO₂), particulate matter (PM₁₀), nitrogen dioxide (NO₂) and ozone (O₃). Two other criteria pollutants – lead (Pb) and carbon monoxide (CO) – are not monitored by any of three stations. Table 3.2 summarizes federal air quality standards and available air quality data from the three-county study area.

Table 3.2: Air quality standards and data for Dunn, McKenzie, and Mercer Counties, North Dakota

| Pollutant | Averaging Period | NAAQS (µg/m ³) | NAAQS (ppm) | County | | |
|-------------------|----------------------|----------------------------|-------------|-------------------------|-------------------------|-------------------------|
| | | | | Dunn | McKenzie | Mercer |
| SO ₂ | 24-Hour | 365 | 0.14 | 0.004 ppm | 0.004 ppm | 0.011 ppm |
| | Annual Mean | 80 | 0.030 | 0.001 ppm | 0.001 ppm | 0.002 ppm |
| PM ₁₀ | 24-Hour | 150 | -- | 50 (µg/m ³) | 35 (µg/m ³) | 35 (µg/m ³) |
| | Annual Mean | 50 | -- | -- | -- | -- |
| PM _{2.5} | 24-Hour | 35 | -- | -- | -- | -- |
| | Weighted Annual Mean | 15 | -- | -- | -- | -- |
| NO ₂ | Annual Mean | 100 | 0.053 | 0.002 ppm | 0.001 ppm | 0.003 ppm |
| CO | 1-Hour | 40,000 | 35 | -- | -- | -- |
| | 8-Hour | 10,000 | 9 | -- | -- | -- |
| Pb | 3-Month | 1.5 | -- | -- | -- | -- |
| O ₃ | 1-Hour | 240 | 0.12 | 0.071 ppm | 0.072 ppm | 0.076 ppm |
| | 8-Hour | -- | 0.08 | 0.061 ppm | 0.066 ppm | 0.067 ppm |

Source: U.S. Environmental Protection Agency (EPA) 2006. µg/m³ = micrograms per cubic meter. ppm = parts per million.

North Dakota was one of only nine states in 2006 that met standards for all criteria pollutants. The state also met standards for fine particulates and the eight-hour ozone standards established by the U.S. Environmental Protection Agency (EPA) (NDDH 2007). The three counties addressed in Table 3.2 are also in full attainment and usually far below established limits (American Lung Association 2006). The Clean Air Act mandates prevention of significant deterioration in designated attainment areas. Class I areas are of national significance and include national parks greater than 6,000 acres in size, national monuments, national seashores, and federal wilderness areas larger than 5,000 acres and designated prior to 1977. There is a Class I airshed at nearby Theodore Roosevelt National Park, which covers about 110 square miles in three units within the Little Missouri National Grassland between Medora and Watford City, 30-40 miles west of the proposed well sites. The Reservation can be considered a Class II attainment airshed, which affords it a lower level of protection from significant deterioration.

The proposed project is similar to other projects installed nearby with the approval of state offices. Construction, drilling and tanker traffic would generate temporary, intermittent and nearly undetectable gaseous emissions of particulates, SO₂, NO₂, CO, and volatile organic compounds. Road dust would be controlled as necessary and other best management practices (BMPs) implemented as necessary to limit emissions to the immediate project areas (BLM 2005). No detectable or long-term impacts to air quality or visibility are expected within the airsheds of the Reservation, state, or Theodore Roosevelt National Park. No laws, regulations or other requirements have been waived; no monitoring or compensatory measures are required.

3.3 Public Health and Safety

Health and safety concerns include naturally-occurring toxic gases, hazardous materials used or generated during installation or production, and hazards posed by heavy truck traffic associated with drilling, completion and production activities. No residences were identified within 3,000 feet of any of the proposed sites.

Hydrogen sulfide gas (H₂S) is extremely toxic in concentrations above 500 parts per million, but it has not been found in measurable quantities in the Bakken Formation. Before reaching the Bakken, however, drilling would penetrate the Mission Canyon Formation, which is known to contain varying concentrations of H₂S. Release of H₂S at dangerous concentrations is very unlikely. Contingency plans submitted to BLM comply fully with relevant portions of *Onshore Oil and Gas Order 6* to minimize potential for gas leaks during drilling. Emergency response plans protect both the drilling crew and the general public within one mile of a well; precautions include automated sampling and alarm systems operating continuously at multiple locations on the well pad. No homes are within ½ mile of any of the proposed well pads and all are typically downwind from the pad, according to 2006 data from the AAQM site at the Dunn Center monitoring site (NDDH 2007). No direct impacts from H₂S are anticipated.

Negative impacts from construction would be largely temporary. Noise, fugitive dust, and traffic hazards would be present for about sixty days during construction, drilling and well completion, after which they would then diminish sharply during commercial operations. For each of the proposed well sites, it is anticipated that about 50 trips, over the course of several days, would be required to transport the drilling rig and associated equipment to the site, with the same traffic later needed to remove the rig and other temporary facilities.

If any well proves productive, one small truck would travel to the pad each day to check the pump. Gas would be flared initially, while oil and produced water would be hauled out by tankers, with tanker traffic depending directly on productivity. A successful Bakken well usually produces both oil and water at a high rate initially. In the vicinity of the proposed projects, 500-1,000 barrels of oil per day might be expected at first, along with about 200 barrels of water. Over the next several months, daily production might drop to 200-400 barrels of oil and 30-70 barrels of water. An oil tanker can usually haul 140 barrels of oil per load, while water tankers usually hold 110 barrels. Production service might then start at 3-7 oil tankers and two water haulers in and out daily, before declining to 2-3 oil tankers and a single water load. Established load restrictions for state and BIA roadways would be followed and haul permits would be acquired as appropriate. All traffic must be confined to approved routes and conform to speed limits.

The U.S. EPA specifies chemical reporting requirements under Title III of the *Superfund Amendments and Reauthorization Act* (SARA) of 1986, as amended. No materials used or generated by these projects for production, use, storage, transport, or disposal are on either the SARA list or on EPA's list of extremely hazardous substances in 40 CFR 355. Project design and operational precautions mitigate against impacts from toxic gases, hazardous materials or traffic. All operations, including flaring, would conform to instructions from BIA fire management staff. Impacts from the proposed projects are considered minimal, unlikely and insignificant. No laws, regulations or other requirements have been waived; no compensatory mitigation measures are required.

3.4 Water Resources

Surface Water

D-3 Bangen #3-14H

The D-3 Bangen #3-14H well site is located within the Bear Den Creek Sub-Basin, the Independence Point watershed and Little Shell Creek sub-watershed. Surface water runoff from the well location flows west and southwest to an unnamed ephemeral drainage, and then flows west-southwest until veering southeast to Little Shell Creek. Little Shell Creek drains easterly to Lake Sakakawea. Drainage from the proposed well pad to Lake Sakakawea is over two miles. The existing county road prevents surface water flow to the north.

Table 3.4a Distance from D-3 Bangen #3-14H to Receiving Water

| Source - Point | Distance | |
|---|---------------|-------------|
| | feet | miles |
| Well Site to Little Shell Creek | 6,804 | 1.29 |
| Little Shell Creek to Lake Sakakawea ¹ | 4,530 | 0.86 |
| TOTAL DISTANCE | 11,334 | 2.15 |

¹Lake level based on Mountrail County Aerial Photograph (NAIP 2005)

National Wetland Inventory (NWI) maps prepared and maintained by the USFWS do not identify any wetlands on the proposed well site. The nearest wetland is approximately 1,765 feet (0.33 mile), or 2,632 feet (0.50 mile) downstream. The on-site assessment confirmed that wetlands are not located on the proposed well site or access road. There is a small drainage on the south side of the proposed pad location where water had collected during the spring snowmelt. The drainage was evaluated for wetland indicators but no wetland vegetation was present and soils were not hydric.

Risks posed to surface water from operations and spills at this location are minimal.

D-3 Fettig #14-23H

The D-3 Fettig #14-23H well site is located within the Bear Den Creek Sub-Basin, the Independence Point watershed and Skunk Creek sub-watershed. Surface water runoff from the well location flows north and follows the edge of a cultivated field north and northwest to an unnamed ephemeral stream. From that point, the flow joins a meandering ephemeral stream that flows northeast to Skunk Creek which meanders easterly to Lake Sakakawea. Drainage from the proposed well pad to Lake Sakakawea is approximately 10 miles.

Table 3.4b Distance from D-3 Fettig #14-23H to Receiving Water

| Source - Point | Distance | |
|--|---------------|-------------|
| | feet | miles |
| Well Site to north edge of field | 2,299 | 0.44 |
| Ephemeral drain to Skunk Creek | 13,045 | 2.47 |
| Skunk Creek to Lake Sakakawea ¹ | 36,377 | 6.89 |
| TOTAL DISTANCE | 51,721 | 9.80 |

¹Lake level based on Dunn County Aerial Photograph (NAIP 2006)

National Wetland Inventory (NWI) maps prepared and maintained by the USFWS do not identify any wetlands on this proposed well site. The wetland nearest to the pad site is 413 feet (0.78 mile) distant in a direct line, or 439 feet (0.83 mile) downstream. The wetland nearest to the access route is 166 feet (0.03 mile) distant in a direct line, or 335 feet (0.06 mile) downstream. The on-site assessment confirmed that wetlands are not located on the proposed well site or access road.

There will need to be a culvert placed in the access road where it crosses a small drainage. The well pad will need to be graded to direct water flow around the north and east sides. Risks posed to surface water from operations and spills at this location are minimal.

D-3 Fettig #16-22H

The D-3 Fettig #16-22H well pad is located within the Bear Den Creek Sub-Basin, the Independence Point watershed and Skunk Creek sub-watershed. Surface water runoff from the well location flows northeast to an unnamed ephemeral stream. From that point, the flow joins a meandering ephemeral stream that flows northeast to Skunk Creek which meanders easterly to Lake Sakakawea. Drainage distance from the proposed well pad to Lake Sakakawea is over 10 miles.

In addition to runoff from the well location, a large area south of 20th Street NW drains to the road ditch and passes through a culvert towards the proposed well site. Because this water would generally flow through the site, Zenergy Operating Company, LLC is planning to divert the natural drainage to the west side of the proposed well pad.

Table 3.4c Distance from D-3 Fettig #16-22H to Receiving Water

| Source - Point | Distance | |
|--|---------------|--------------|
| | feet | miles |
| Well Site to ephemeral drain | 4,450 | 0.84 |
| Ephemeral drain to Skunk Creek | 13,045 | 2.47 |
| Skunk Creek to Lake Sakakawea ¹ | 36,377 | 6.89 |
| TOTAL DISTANCE | 53,856 | 10.20 |

¹Lake level based on Dunn County Aerial Photograph (NAIP 2006)

National Wetland Inventory (NWI) maps prepared and maintained by the USFWS do not identify any wetlands on the proposed well site. The nearest wetland is approximately 1,042 feet (0.03 mile) away but is located uphill from the site. The nearest wetland downstream is 2,256 feet (0.43 mile) distant in a direct line or 3,040 feet (0.58 mile) along the drainage channel. The on-site assessment confirmed that no wetlands are located on the proposed well site or access road.

Risks posed to surface water from operations and spills at this location are minimal.

D-3 TAT #2-17H

The D-3 TAT #2-17H well location and access route are located within the Bear Den Creek Sub-Basin, the Bear Den Creek Watershed, and Bear Creek Bay sub-watershed. Surface water runoff from the well location flows 460 feet southeast to Forman Coulee. Forman Coulee meanders easterly, passing under Highway 22, to Lake Sakakawea. Drainage from the proposed well pad to Lake Sakakawea is 3.85 miles.

Table 3.4d Distance from D-3 TAT #2-17H to Receiving Water

| Source - Point | Distance | |
|--|----------|-------------|
| | feet | miles |
| Well Site to Forman Coulee | 460 | 0.09 |
| Forman Coulee to Lake Sakakawea ¹ | 19,871 | 3.76 |
| TOTAL DISTANCE | | 3.85 |

¹Lake level based on McKenzie County Aerial Photograph (NAIP 2005)

National Wetland Inventory (NWI) maps prepared and maintained by the USFWS do not identify any wetlands on the proposed well site. The nearest wetland (Forman Coulee) to the pad site is approximately 460 feet (0.09 mile). Forman Coulee is classified as a riparian wetland (NWI 2009). The nearest wetlands along the proposed access route are located approximately 600 feet (0.11 mile), and 996 feet (0.19 mile) from the proposed centerline. The on-site assessment confirmed that wetlands are not located on the proposed well site or access road.

The proposed well site is generally level; however, the side slopes of the bluff are in close proximity to the well pad. The side slopes of the bluff are very steep and drop approximately 200' to the coulee below. Spill protection will be of importance at this site, due to its location on the top of a bluff with very steep side slopes. Spills on top of the plateau can be adequately managed; however, any spill that may reach the steep side slopes has the potential to travel quickly. Remediation of soils on the side slopes will be difficult.

Groundwater

Dunn County

Ground water in Dunn County is obtainable from aquifers in the pre-glacial rocks and from aquifers in the glacial drift. Aquifers in the pre-glacial rocks have a greater areal distribution than those in the glacial drift, but those in the drift provide higher yields to individual wells. Sandstone aquifers in the pre-glacial rocks occur in the Fox Hills and Hell Creek Formations of Cretaceous age and in the undifferentiated Cannonball - Ludlow, Tongue River, and Sentinel Butte Formations of Tertiary age. Potential yields to wells tapping these aquifers range from 1 to as much as 200 gallons per minute (0.06 to 13 liters per second).

The Fox Hills Formation, which is marine in origin, underlies all of Dunn County. The depth to the top of the formation ranges from 1,330 feet (405 m) in the valley of the Little Missouri River in the northwestern part of the county to about 1,960 feet (597 m) in Section 14, T146N, R96W, also in the northwestern part of the county. The formation ranges in thickness from about 80 to 300 feet (24 to 90 m) and is composed of interbedded sandstone, shale, and siltstone. It is underlain by the Pierre Formation and overlain by the Hell Creek Formation.

The Hell Creek Formation, which is continental in origin, underlies the study area at depths ranging from about 1,150 feet (350 m) in the southeastern part of the area to about 1,730 feet (527 m) in the northwestern part. The formation ranges in thickness from about 150 to 300 feet (46 to 90 m) and is composed of interbedded siltstone, shale or claystone, poorly consolidated sandstone and a few thin lignite beds.

The Cannonball Formation, which is marine in origin, and the Ludlow Formation, which is continental in origin, are interfingered throughout Dunn County. The undifferentiated Cannonball-Ludlow Formations underlie the county at depths ranging from about 570 feet (174 m) in the southeastern corner of the county to about 1,130 feet (344 m) in the northwestern quarter of the county. The formations, which range in thickness from 495 to 660 feet (151 to 200 m), consist of interbedded siltstone, poorly consolidated sandstone, shale or clay, and lignite.

The Tongue River Formation, which is continental in origin, underlies all of Dunn County. The depth to the top of the formation ranges from about 230 feet (70 m) in the valley of the Little Missouri River in the northwestern corner of the county to about 750 feet (229 m) in Section 14, T. 146 N., R. 96 W. The formation ranges in thickness from about 290 to 490 feet (88 to 150 m), and consists of interbedded siltstone, claystone or shale, poorly consolidated sandstone, lignite, and occasional limestone lenses or concretions. The top of the formation generally consists of lignite or carbonaceous shale. The basal part of the formation generally consists of extensive, poorly consolidated sandstone.

The Sentinel Butte Formation, which is continental in origin, occurs throughout Dunn County, except where glacial melt-water channels have been eroded below the base of the formation. It is exposed except where

overlain by outliers of the Golden Valley Formation, isolated deposits of till, and (or) glacio-fluvial and alluvial deposits.

McKenzie County

Ground water suitable for domestic and livestock supplies in McKenzie County is available from three aquifer systems in semi-consolidated rocks of Late Cretaceous and Tertiary age. Ground water from aquifers in unconsolidated sand and gravel of Quaternary age is suitable for domestic, livestock, municipal, industrial, and irrigation uses.

The Fox Hills and basal Hell Creek aquifer system is used as a source for livestock and domestic supplies. It generally is 1,100 to 1,800 feet (335 to 549 meters) in depth, and the transmissivity is 200 to 300 feet squared per day (19 to 28 meters squared per day). The Fox Hills and basal Hell Creek aquifer system underlies all of McKenzie County and extends into adjoining counties. The aquifer system generally is 1,100 to 1,800 ft (335 to 549 m) below land surface. The shallowest depths are along the Little Missouri River valley, the Nesson anticline, and the shoreline of Lake Sakakawea. The aquifer matrix consists of fine- to medium-grained sandstone, siltstone, and claystone.

The Ludlow aquifer system underlies all of McKenzie County at depths of more than 500 ft (152 m). Beds equivalent to the Ludlow and overlying beds have been mapped as the Lebo, Tullock, and Cannonball Members of the Fort Union Formation in adjoining areas. The Ludlow aquifer system consists of fine- to medium-grained sandstone, siltstone, claystone, and lignite formed in meander belts, distributary channels, and fluvial deposits at the head of a delta. The aquifer system is considered to include the lower 600 ft (183 m) of the Fort Union Formation. About 75 ft (23 m) of claystone, which may be equivalent to the Lebo or the Cannonball Members, separates the Ludlow aquifer system from the overlying Tongue River aquifer system.

The Tongue River aquifer system underlies all of McKenzie County. The aquifer system is 140 to 500 ft (43 to 152 m) below land surface in most areas and consists of fine- to medium-grained sandstone, siltstone, claystone, and lignite deposited as distributary-channel, mouth-bar, and delta-plain deposits.

Mountrail County

The principal uses of ground water in Mountrail County are for domestic and livestock supplies, public supplies, industrial supplies, and irrigation. Most farm units in the area have at least one well for their domestic and livestock uses, but no records are available to accurately determine the quantity of water used. Practically all of the water used for industrial purposes in Mountrail County either is used in connection with the production of petroleum or is obtained from public supplies and no records are kept. The largest use of ground water in the county is for pressure maintenance during well drilling.

Ground water in Mountrail County is obtained from aquifers in the glacial drift of Quaternary age, the Sentinel Butte and Tongue River Formations in the Fort Union Group of Tertiary age, and the Fox Hills Formation, Hell Creek Formation, and the Dakota Group of Cretaceous age. The Dakota Group, Fox Hills Formation, Hell Creek Formation, Fort Union Group, and the glacial drift contain the only aquifers that are presently of economic importance.

The upper part of the Fox Hills Formation and the lower part of the Hell Creek Formation contain about 100 feet of sandstone in an interbedded sandstone, siltstone, and shale zone. The sandstone beds in the zone apparently are hydrologically connected and herein are referred to as the Fox Hills-Hell Creek aquifer. The top of the Fox Hills-Hell Creek aquifer generally ranges from 1,550 to 2,100 feet below land surface (altitude about 300 feet above msl) in the south-central and southwestern parts of Mountrail County. The top of the aquifer is about 1,450 to 2,100 feet below land surface (altitude about 550 feet above msl) in the southeastern part of the county.

The Fort Union Group generally underlies the glacial drift at depths of less than 100 feet throughout much of the Coteau Slope and the Drift Prairie, except in the larger ancient buried valleys. Depths to the Fort Union are

commonly more than 100 feet in the Coteau du Missouri area, but many exceptions exist. The group is subdivided into four formations in some

The Tongue River and Sentinel Butte Formations either crop out or immediately underlie the glacial drift in the report area. These units are distinguishable only on the surface in Mountrail County. Individual sand beds in the Tongue River-Sentinel Butte Formations vary greatly in thickness. Most sand beds are less than 10 feet thick but thicknesses exceeding 100 feet do occur.

Water Wells and Water Use Permits

D-3 Bangen #3-14H

There are two existing water wells and one water permit within five miles of the D-3 Bangen #3-14H proposed location (Tables 3.4e and 3.4f). There are two domestic water supply wells on record. The wells are located approximately 11.3 miles north-northwest and 11.3 miles northeast of the proposed site. A domestic well created in 1920 is located in the SW¼ of Section 16, T151N, R90W. Groundwater is extracted from the Sentinel Butte-Tongue River Aquifer (depth unknown). A domestic well created in 1988 is located in the NW¼ of Section 17, T150N, R90W. The groundwater source of this well, installed at a depth of approximately 227 feet, is the New Town Aquifer. There are no records indicating the well production rate or quality of water for these wells. The next domestic supply well for which records exist is located approximately 7.8 miles northeast of the MHA 1-08H-149-90 well site.

There are three test holes or observation well locations within 5 miles of the proposed site. There is one, active irrigation well located 2.3 miles from the proposed well site.

D-3 Fettig #14-23H and D-3 Fettig #16-22H

There are twenty four existing water wells within five miles of the D-3 Fettig #14-23H and D-3 Fettig #16-22H proposed locations. There are two domestic water supply wells on record. The wells are located approximately 11.3 miles north-northwest and 11.3 miles northeast of the proposed site. A domestic well created in 1920 is located in the SW¼ of Section 16, T151N, R90W. Groundwater is extracted from the Sentinel Butte-Tongue River Aquifer (depth unknown). A domestic well created in 1988 is located in the NW¼ of Section 17, T150N, R90W. The groundwater source of this well, installed at a depth of approximately 227 feet, is the New Town Aquifer. There are no records indicating the well production rate or quality of water for these wells. The next domestic supply well for which records exist is located approximately 7.8 miles northeast of the MHA 1-08H-149-90 well site.

There are three test holes or observation well locations within five miles of the proposed site. These include 11 wells with an unknown purpose, six sample wells, and seven observation wells of which three are currently active. There are no water permits within five miles of the well sites. The nearest domestic water well is located in the SW¼ of Section 27, T149N, R94W. It is located approximately 6.8 miles from the D-3 Fettig #16-22H, and 7.2 miles from the D-3 Fettig #14-23H. This well was created in 1973 and has a depth of 36 feet.

D-3 TAT #2-17H

There are ten water wells within five miles of the D-3 TAT #2-17H location. These include three test holes, one surface water monitoring site, one plugged observation well, four wells with unknown purposes, and one domestic well. The domestic well, located 3.6 miles from the proposed project area was created in 1973 and has a total depth of 40 feet. Two industrial water permits were issued in the early 1980's. These are over 4 miles from the proposed disturbance. One of these permits has been cancelled.

Table 3.4e Water wells within 5 miles of proposed well sites

| Well Site | LOCATION | Distance To Well (miles) | Permit Type | Aquifer | Well Depth (feet) | Date |
|--------------------|---------------------|--------------------------|-------------------------------|-----------------------------|-------------------|-----------|
| D-3 Bangen #3-14H | SE SE 34 T151N R92W | 2.6 | Observation Well - Destroyed | White Shield | 200 | 8/6/1966 |
| | SE SE 22 T151N R92W | 4.1 | Test Hole | No Obs Well Installed | 220 | 7/18/1967 |
| | NE NE 31 T151N R92W | 4.6 | Test Hole | No Obs Well Installed | 60 | 7/18/1967 |
| D-3 Fettig #14-23H | SW NW 6 T148N R92W | 4.9 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1971 |
| | SE NW 6 T148N R92W | 5.0 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1966 |
| | SE SE 1 T148N R93W | 4.9 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | NE SW 4 T148N R93W | 2.6 | Observation Well | Sentinel Butte-Tongue River | 0 | 10/1/1973 |
| | NW SW 4 T148N R93W | 2.7 | Observation Well - Plugged | Sentinel Butte-Tongue River | 920 | 10/1/1973 |
| | SW SW 10 T148N R93W | 4.1 | Observation Well - Destroyed | Sentinel Butte-Tongue River | 120 | 7/1/1974 |
| | NW NW 17 T148N R93W | 4.2 | Unknown | Sentinel Butte-Tongue River | 0 | NA |
| | NW NW 13 T148N R94W | 5.0 | Unknown | Sentinel Butte-Tongue River | 0 | NA |
| | SE SW 22 T149N R92W | 4.9 | Unknown | Sentinel Butte-Fort Union | 0 | NA |
| | NW NW 27 T149N R92W | 4.6 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | NE SW 30 T149N R92W | 2.2 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | SW NE 2 T149N R93W | 3.6 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1962 |
| | SE SW 5 T149N R93W | 4.3 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1961 |
| | SW SE 8 T149N R93W | 3.4 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1960 |
| | SW SW 9 T149N R93W | 3.0 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1952 |
| | SW NE 12 T149N R93W | 2.7 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | SW SE 21 T149N R93W | 3.0 | Unknown | Sentinel Butte-Tongue River | 0 | NA |
| | SW SE 21 T149N R93W | 1.7 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | NW NE 27 T149N R93W | 0.7 | Surface Water Monitoring Site | Surface Water | 0 | NA |

| Well Site | LOCATION | Distance To Well (miles) | Permit Type | Aquifer | Well Depth (feet) | Date |
|--------------------|---------------------|--------------------------|-------------------------------|-----------------------------|-------------------|------------|
| | NE SW 33 T150N R93W | 4.7 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1960 |
| | NW SW 4 T148N R93W | 2.7 | Observation Well - Plugged | Undefined | 0 | 10/1/1973 |
| | SE SW 4 T148N R93W | 2.8 | Observation Well - Plugged | Unnamed | 0 | 10/1/1973 |
| | NE SW 4 T148N R93W | 2.6 | Observation Well | Tongue River | 340 | 10/1/1973 |
| | SW NE 15 T148N R93W | 4.7 | Test Hole | No Obs Well Installed | 40 | 10/12/1971 |
| | SE SE 1 T148N R94W | 3.2 | Test Hole | No Obs Well Installed | 80 | 10/12/1971 |
| D-3 Fettig #16-22H | NE SW 4 T148N R93W | 2.7 | Observation Well | Sentinel Butte-Tongue River | 0 | 10/1/1973 |
| | NW SW 4 T148N R93W | 2.8 | Observation Well - Plugged | Sentinel Butte-Tongue River | 920 | 10/1/1973 |
| | SW SW 10 T148N R93W | 4.2 | Observation Well - Destroyed | Sentinel Butte-Tongue River | 120 | 7/1/1974 |
| | NW NW 17 T148N R93W | 4.2 | Unknown | Sentinel Butte-Tongue River | 0 | NA |
| | NW NW 13 T148N R94W | 4.7 | Unknown | Sentinel Butte-Tongue River | 0 | NA |
| | NE SW 30 T149N R92W | 2.5 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | SW NE 2 T149N R93W | 3.7 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1962 |
| | SE SW 5 T149N R93W | 4.0 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1961 |
| | SW SE 8 T149N R93W | 3.1 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1960 |
| | SW SW 9 T149N R93W | 2.7 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1952 |
| | SW NE 12 T149N R93W | 3.0 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | SW SE 21 T149N R93W | 1.3 | Unknown | Sentinel Butte-Tongue River | 0 | NA |
| | SW SE 21 T149N R93W | 1.4 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | NW NE 27 T149N R93W | 0.4 | Surface Water Monitoring Site | Surface Water | 0 | NA |
| | NE SW 33 T150N R93W | 4.7 | Unknown | Sentinel Butte-Tongue River | 0 | 1/1/1960 |
| | NW SW 4 T148N R93W | 2.8 | Observation Well - Plugged | Undefined | 0 | 10/1/1973 |
| | SE SW 4 T148N R93W | 2.9 | Observation Well - Plugged | Unnamed | 0 | 10/1/1973 |
| | NE SW 4 T148N R93W | 2.7 | Observation Well | Tongue River | 340 | 10/1/1973 |
| | SW NE 15 T148N R93W | 4.8 | Test Hole | No Obs Well Installed | 40 | 10/12/1971 |
| | SE SE 1 T148N R94W | 3.3 | Test Hole | No Obs Well | 80 | 10/12/1971 |

| Well Site | LOCATION | Distance To Well (miles) | Permit Type | Aquifer | Well Depth (feet) | Date |
|----------------|---------------------|--------------------------|-------------------------------|-----------------------|-------------------|------------|
| | | | | Installed | | |
| | NE NE 14 T148N R94W | 4.8 | Observation | Tongue River | 315 | 6/23/1992 |
| D-3 TAT #2-17H | NW NE 15 T150N R94W | 1.9 | Unknown | Fort Union | 414 | 1/1/1962 |
| | NW NE 21 T150N R94W | 1.4 | Unknown | Fort Union | 380 | 1/1/1964 |
| | NW SW 22 T150N R94W | 2.2 | Unknown | Fort Union | 327 | 1/1/1964 |
| | SW SE 14 T150N R95W | 3.2 | Unknown | Fort Union | 35 | 12/13/1972 |
| | NW NW 36 T151N R95W | 1.7 | Observation Well Plugged | Tongue River-Ludlow | 1280 | 5/28/1982 |
| | NW 30 T150N R94W | 3.8 | Surface Water Monitoring Site | Surface Water | NA | NA |
| | SW NE 16 T150N R94W | 0.9 | Test Hole | No Obs Well Installed | 40 | 9/11/1980 |
| | SW NE 16 T150N R94W | 0.9 | Test Hole | No Obs Well Installed | 40 | 9/11/1980 |
| | NE NE 35 T151N R95W | 4.0 | Test Hole | No Obs Well Installed | 240 | 12/13/1981 |
| | NW NE 36 T151N R95W | 3.6 | Domestic Well | Undefined | 40 | 5/22/1973 |

ND State Water Commission 2009

Table 3.4f Water Permits

| Well | D-3 Bangen #3-14H | D-3 TAT #2-17H | |
|-----------------------|------------------------------|-----------------------------|------------------------------|
| Location | SW¼ Section 34 T151N R92W | SE¼ Section 9 T150N R95W | SW¼ Section 10 T150N R95W |
| Distance to Well Site | 2.3 miles | 4.2 miles | 4.8 miles |
| Owner | J. & S. Pennington | Amerada Hess Corporation | Amerada Hess Corporation |
| Use | Irrigation | Industrial | Industrial |
| Status | Perfected / Active | Perfected / Active | Cancelled |
| Date Issued | 10/27/1970 | 12/8/1983 | 1/4/1984 |
| Source | Surface Water | Ground Water | Ground Water |
| Aquifer | NA | Sentinel Butte-Tongue River | Sentinel Butte-Tongue River |

3.5 Wetland/Riparian Habitat and Threatened or Endangered Species

National Wetland Inventory (NWI) maps maintained by the United States Fish and Wildlife Service (USFWS) do not identify any wetlands within the project areas that would be affected by construction and drilling of the four proposed wells. On-site visits conducted confirmed that no riparian or wetland habitats would be impacted by the proposed well or access road locations.

Assessments for Federally listed threatened and endangered species were conducted by evaluating historic and present occurrences, and by determining if potential habitat exists within the project area. Determinations were made concerning direct and cumulative effects of the proposed activities on each species and their habitat. Currently, seven species and one Designated Critical Habitat are listed in Mountrail County, North Dakota, and eight species and one Designated Critical Habitat in Dunn and McKenzie Counties.

County status of Endangered, Threatened, and Candidate species and Designated Critical Habitat

| Species | Status | County | | |
|---|------------|--------|----------|-----------|
| | | Dunn | McKenzie | Mountrail |
| Interior Least Tern | Endangered | X | X | X |
| Whooping Crane | Endangered | X | X | X |
| Black-footed Ferret | Endangered | X | X | |
| Pallid Sturgeon | Endangered | X | X | X |
| Gray Wolf | Endangered | X | X | X |
| Piping Plover | Threatened | X | X | X |
| W Prairie Fringed Orchid | Threatened | | | |
| Dakota Skipper | Candidate | X | X | X |
| Designated Critical Habitat - Piping Plover | | X | X | X |

¹ USFWS (updated May 15, 2009)

Species Assessments

Assessments for Federally listed threatened, endangered species were conducted by evaluating historic and present occurrences and by determining if potential habitat exists within the project area. A determination was made concerning direct and cumulative effects of the proposed activities on each species. Determinations made for federally listed species are:

- No effect
- Is not likely to adversely affect
- Is likely to adversely affect
- Is likely to jeopardize a proposed species or adversely modify critical habitat
- Is not likely to jeopardize a proposed species or adversely modify critical habitat

Gray Wolf

Gray wolves, an Endangered Species in North Dakota, were historically found throughout much of North America including the Upper Great Plains. Human activities have restricted their present range to the northern forests of Minnesota, Wisconsin, and Michigan and the Northern Rocky Mountains of Idaho, Montana, and Wyoming. They now only occur as occasional visitors in North Dakota. The most suitable habitat for the gray wolf is found around the Turtle Mountains region where documented and unconfirmed reports of gray wolves in North Dakota have occurred (Grondahl and Martin, no date). The proposed projects will have *no effect* on this species at this time.

Interior Least Tern

The interior least tern nests on midstream sandbars along the Yellowstone and Missouri River systems. Interior least terns construct bowl-shaped depression nests on sparsely vegetated sandbars and sandy beaches. Their nesting period occurs between mid-May through mid-August. The proposed projects will not disrupt the

Missouri River habitat. The proposed locations are set back from the Missouri River system (Table 4) and will have *no effect* on this species at this time.

Pallid Sturgeon

Pallid sturgeons are found within the Mississippi, Missouri, and Yellowstone River systems. Pallid sturgeon populations in North Dakota have decreased since the 1960's (Grondahl and Martin no date). The proposed projects will not disrupt the Missouri River habitat (Table 4). The proposed projects will have *no effect* on this species at this time.

Whooping Crane

The primary nesting area for the whooping crane is in Canada's Wood Buffalo National Park. Aransas National Wildlife Refuge in Texas is the primary wintering area for whooping cranes. In the spring and fall, the cranes migrate primarily along the Central Flyway. During the migration, cranes make numerous stops, roosting in large shallow marshes, and feeding and loafing in harvested grain fields. The primary threats to whooping cranes are power lines, illegal hunting, and habitat loss (Texas Park and Wildlife 2008).

The proposed well sites are located within the Central Flyway. Approximately 75% of the whooping crane sightings in North Dakota occur within a 90-mile corridor that includes the proposed well locations. Because collisions with power lines are the primary cause for fledgling mortality, any proposed power lines should be buried. If underground lines are not an option, power lines should be well-marked following specifications made by federal agencies. Following these guidelines, it is reasonable to expect that the proposed activities are not likely to adversely affect whooping cranes.

The proposed well sites have been placed in locations that will have the least impact on whooping cranes; that is near roads, power lines, and building sites. Activities may cause any migratory cranes to divert from the area but is not likely to result in any fatalities. Any sightings should be immediately reported to the USFWS, NDGFD, and/or the BIA.

Piping Plover

Piping plovers are found along the Missouri and Yellowstone River systems and on large alkaline wetlands. Nesting sites have been documented on the shorelines of Lake Sakakawea. In addition, critical habitat has been designated along Lake Sakakawea. The proposed well locations are not within line-of-sight of Missouri River habitat (Table 4).

The project will not disrupt the Missouri River habitat or any designated Critical Habitat. The proposed projects will have *no effect* on this species at this time and *no effect* on critical habitat.

Dakota Skipper

Dakota skippers are currently listed as a candidate species in North Dakota and have been documented in Mountrail County. Larvae of the Dakota skipper feed on grasses, favoring little bluestem. Adults emerge in mid-June, feeding on the nectar of flowering native forbs. Harebell (*Campanula rotundifolia*), wood lily (*Lilium philadelphicum*), and purple coneflower (*Echinacea angustifolia*) are common components of their diet (Canadian Wildlife Service, 2004). Dakota skippers are most likely to be found along river valleys or in mesic segments of mixed grass prairie.

The D-3 Bangen #3-14H and D-3 Fettig #16-22H are located on annual cropland areas and do not provide suitable habitat for the Dakota skipper. The D-3 Fettig #14-23H, and the D-3 TAT #2-17H are located on mixed grass prairie. Grazing has caused a lack of residual cover on the D-3 TAT #2-17H eliminating suitable habitat on this location. The D-3 Fettig #14-23H well site, however, is located in an area with high forb diversity and residual cover, providing suitable habitat. The D-3 Bangen #3-14H, D-3 Fettig #16-22H and D-3 TAT #2-17H well pads will have *no effect* on this species at this time. The proposed Fettig #14-23H D-3 well site may impact individuals but *are not likely to adversely affect* the population or species.

3.6 Soils

The following paragraphs discuss soils found at the individual well sites. The Natural Resource Conservation Services (NRCS) soils data was reviewed prior to the on-site assessment and verified during the field visit. Generally, the wells addressed in this report are located on fine-grained soils with moderate to high erosion potential. The sites are suitable for construction and surface soils will allow for successful reclamation. Sites should be monitored for erosion and best management practices implemented to control erosion as necessary.

D-3 Bangen #3-14H

The D-3 Bangen #3-14H well site is located on annual cropland. The NRCS has identified two Mapping Units (MUs) on the proposed well site, Williams-Zahl loams and Savage silty clay loams. Field inspection verified clay loams with trace amounts of sand. Soils in the surface horizon on the proposed site are predominantly clay loams and silty clay loams, with topsoil generally 8-12 inches thick.

The east portion of the well pad and access road are classified as Williams-Zahl loams (MU 24C). These are well drained and are found on knolls on linear or convex glacial till plains. Williams silt loams comprise 52% of the map unit, and Zahl loams comprise 35%. NRCS classifies the northwest third of the site as MU 9B Savage silty clay loam, with 0-6% slopes. These are well drained and are found on convex and linear uplands.

Soils at the proposed well site are suitable for construction and lend well to restoration. The fine-grained nature of the soils and agricultural practices makes them susceptible to erosion. Soils in the map units have Kf ratings ranging from 0.24-0.37, indicative of moderate erosion potential. Erosion potential is greatest in the interval between construction and reclamation, as vegetation and topsoil are removed. Erosion potential increases with increased slope. The east portion of the area is relatively level with slope increasing as the site drains to the west.

Table 3.6a D-3 Bangen #3-14H Site Soils and Attributes

| Soil Name ¹ | Pad Acres | Road Acres | Landscape ² | | | Erosion and Runoff Factors ³ | | | Soil Composition ⁴ | | |
|------------------------|-----------|------------|------------------------|------------------|---------|---|-----|----------|-------------------------------|--------|--------|
| | | | Land-form | Down slope Shape | % slope | Hydrologic group | Kf | T factor | % Sand | % Silt | % Clay |
| Savage | 1.0 | 0.1 | alluvial fan | convex | 2-6 | C | .32 | 5 | 17 | 50 | 33 |
| Williams-Zahl | 3.2 | 0.3 | knolls | linear | 6-9 | B | .28 | 5 | 41 | 37 | 22 |

¹ NRCS Map Units, major and minor components

² Landscape

- Landform and down slope shape are indicators of erosion and deposition characteristics.
- Slope is indicated as an average or typical gradient under which soils form.

³ Erosion and runoff factors indicate susceptibility of soils to erosion to wind or water:

- Hydrologic Soil Group (A, B, C, D) are assigned from estimates of runoff potential, based on infiltration rates of wetted soils unprotected by vegetation during long-duration storms. The rate of infiltration decreases from Group A soils (high infiltration, low runoff) to Group D soils (low infiltration, high runoff).
- Kf indicates erodibility of material less than 2 millimeters in size to sheet and rill erosion by water. Values of Kf range from 0.02 to 0.69. Higher values indicate greater erosion potential.
- T estimates maximum average annual rates of erosion by wind and water that will not affect crop productivity. Tons per acre per year values range from 1, for shallow soils, to 5, for very deep soils. Higher T soils can tolerate higher rates of erosion without loss of productivity.

⁴ Texture of surface horizon

Table 3.6b D-3 Bangen #3-14H Site Soil Texture

| Soil | MU | Depth (in) | Texture |
|--------------------|-----|------------|-----------------------------------|
| Savage | 9B | 0-7 | Clay loam, Silty clay loam |
| | | 7-25 | Clay, Silty clay, Silty clay loam |
| Williams - Zahl | 24C | 0-6 | Loam |
| | | 6-10 | Clay loam, Loam |
| | | 10-15 | Clay loam, Loam |
| | | 15-24 | Clay loam, Loam |

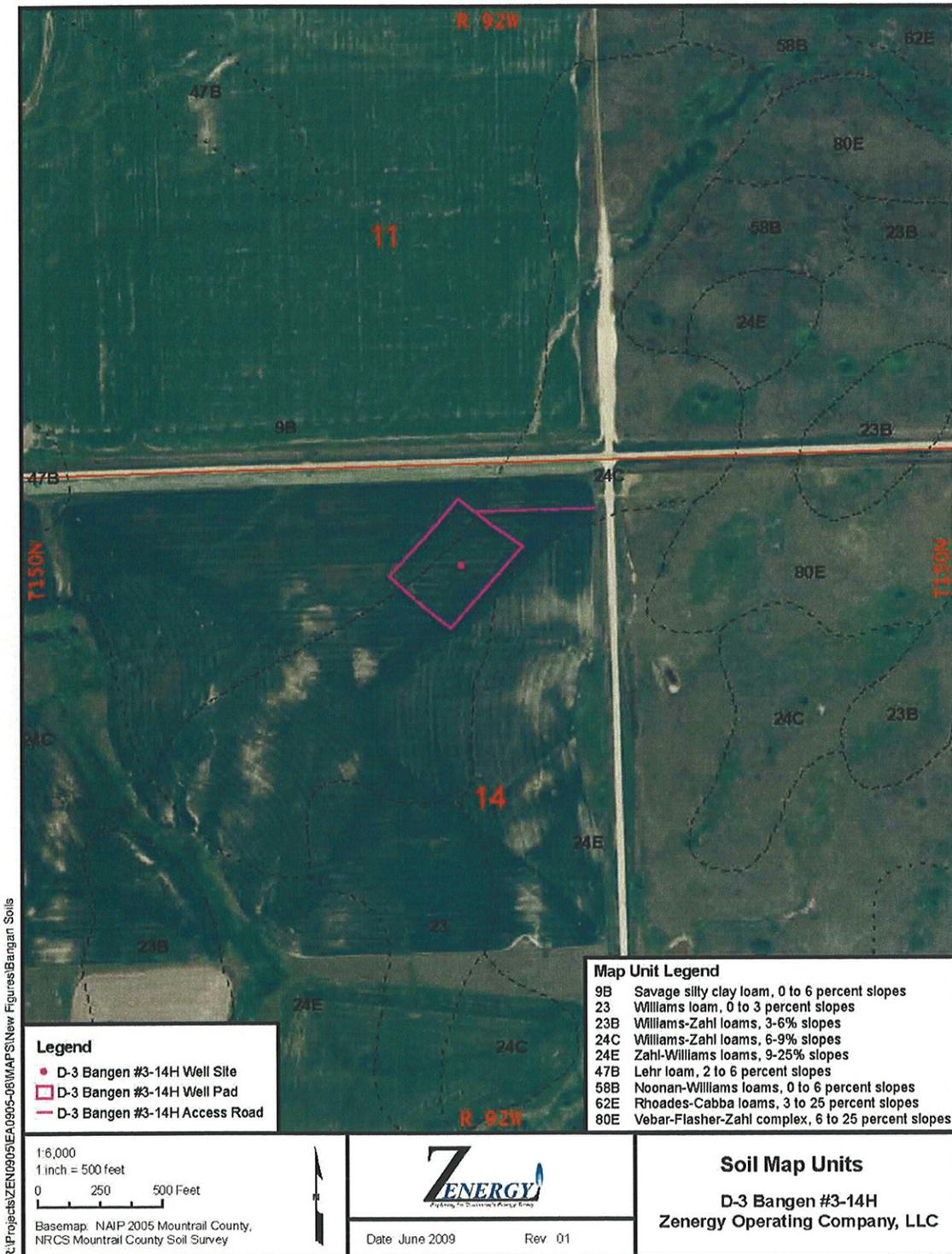


Figure 3.6a D-3 Bangen #3-14H

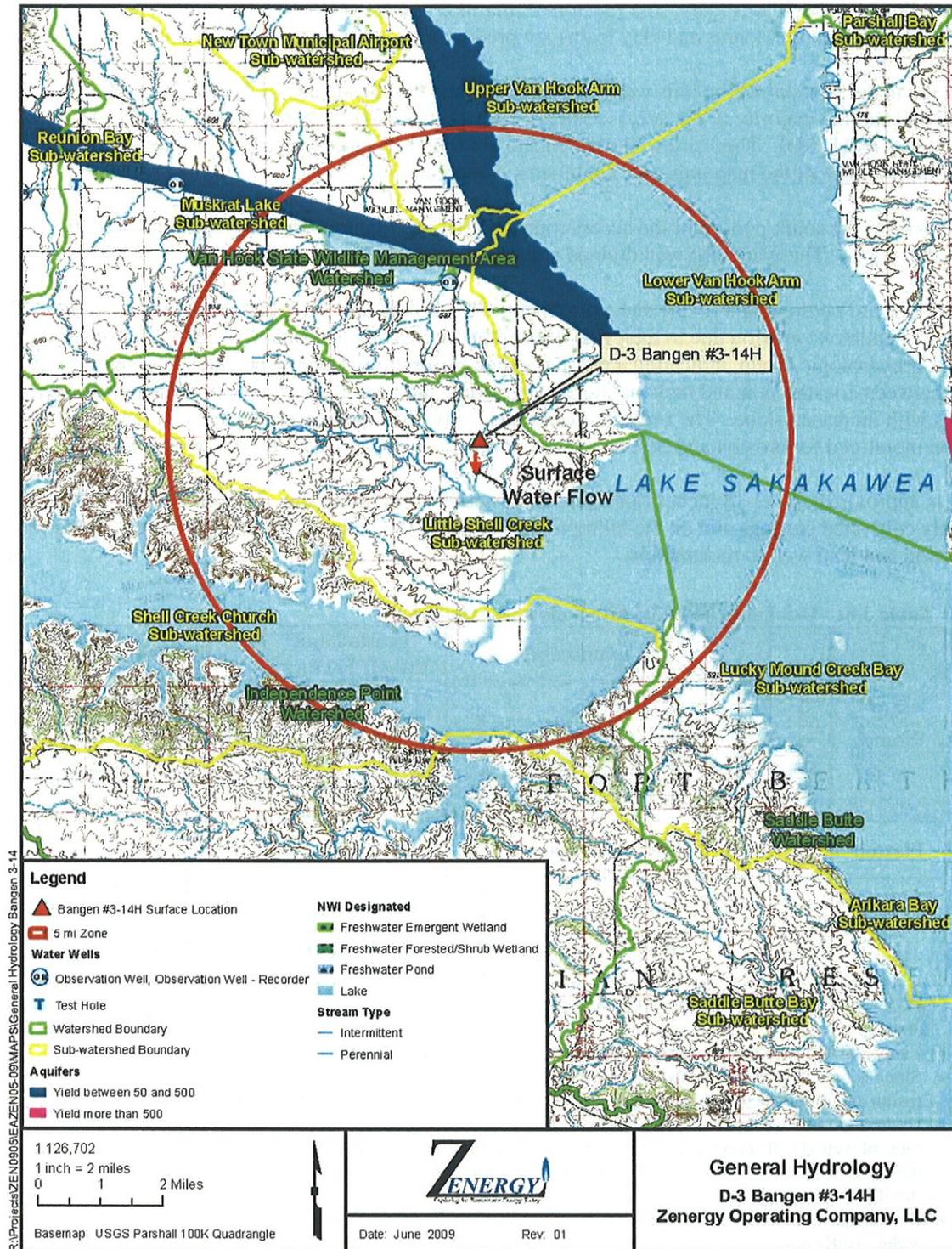


Figure 3.6b D-3 Bangen #3-14H

D-3 Fettig #14-23H

The D-3 Fettig #14-23H well site is located on perennial grasslands. The NRCS classifies the soil with two MUs, Zahl-Williams loams and Flaxton-Williams complex (NRCS 2009). Field inspection determined that loams and clay loams are predominant at the proposed location.

Soils on the upper portions of the hills were more shallow and had inclusions of sand and gravel. The well pad and the majority of the access road are classified as Zahl-Williams loams with 9 to 15 percent slopes (MU 93D). These are well drained and are found on glacial uplands. Williams silt loams comprise 40% of the map unit, and Zahl loams comprise 40% .

NRCS classifies the south portion of the access route as MU 32C Flaxton-Williams complex, with 6 to 9 percent slopes. These are also well drained and found on uplands.

Williams soils are predominant on the site, comprising 40% of both soil MUs that are found in the area. These soils are susceptible to erosion due to their fine-grained texture (Kf factor equal to 0.28). Williams soils are rated as a B hydrologic group, indicating a relatively high infiltration. Erosion potential is greatest in the interval between construction and reclamation, as vegetation and topsoil are removed. Erosion potential increases with increased slope. The well site location is fairly level, decreasing the erosion potential. The site should be monitored for erosion and best management practices implemented if erosion is detected.

Topsoil is approximately 12-18 inches thick across the native areas of the site. Topsoil is shallower on the previously cultivated sections and on the hilltops and hillside (8-10 inches). Surface soils are suitable for construction and lend well to reclamation.

Table 3.6c D-3 Fettig #14-23H Site Soils and Attributes

| Soil Name ¹ | Pad Acres | Road Acres | Landscape ² | | | Erosion and Runoff Factors ³ | | | Soil Composition ⁴ | | |
|------------------------|-----------|------------|------------------------|------------------|---------|---|-----|----------|-------------------------------|--------|--------|
| | | | Land- form | Down slope Shape | % slope | Hydrologic group | Kf | T factor | % Sand | % Silt | % Clay |
| Flaxton | 0.0 | 0.2 | rises | concave | 2-6 | C | .20 | 5 | 70 | 16 | 14 |
| Williams | 1.3 | 0.2 | knolls | linear | 6-15 | B | .28 | 5 | 41 | 37 | 22 |
| Zahl | 2.7 | 0.6 | Hills, rises | convex | 6-15 | B | .28 | 5 | 41 | 37 | 22 |

¹ NRCS Map Units, major and minor components

² Landscape

- Landform and down slope shape are indicators of erosion and deposition characteristics.
- Slope is indicated as an average or typical gradient under which soils form.

³ Erosion and runoff factors indicate susceptibility of soils to erosion by wind or water:

- Hydrologic Soil Group (A, B, C, D) are assigned from estimates of runoff potential, based on infiltration rates of wetted soils unprotected by vegetation during long-duration storms. The rate of infiltration decreases from Group A soils (high infiltration, low runoff) to Group D soils (low infiltration, high runoff).
- Kf indicates erodibility of material less than 2 millimeters in size to sheet and rill erosion by water. Values of Kf range from 0.02 to 0.69. Higher values indicate greater erosion potential.
- T estimates maximum average annual rates of erosion by wind and water that will not affect crop productivity. Tons per acre per year values range from 1, for shallow soils, to 5, for very deep soils. Higher T soils can tolerate higher rates of erosion without loss of productivity.

⁴ Texture of surface horizon

Table 3.6d D-3 Fettig #14-23H Site Soil Texture

| Soil | MU | Depth (in) | Texture |
|----------|-----|------------|----------------------------------|
| Williams | 88B | 0-6 | Loam |
| | 93D | 6-24 | Clay loam, Loam |
| Zahl | 88B | 0-5 | Loam |
| | 93D | 5-24 | Clay loam, Loam |
| Flaxton | 32C | 0-15 | Fine sandy loam |
| | | 15-22 | Fine sandy loam, Loamy fine sand |
| | | 22+ | Clay loam, Loam |

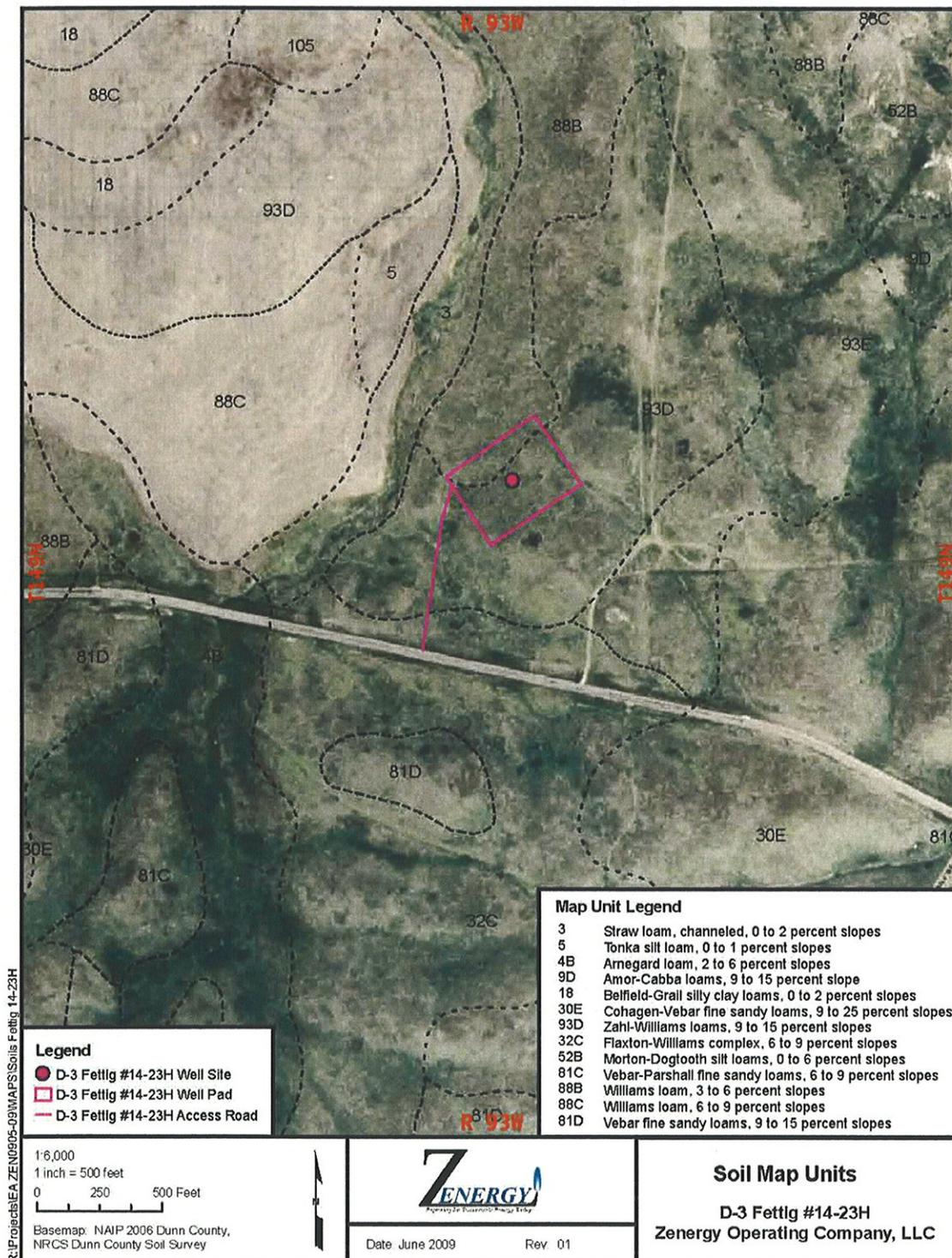


Figure 3.6c D-3 Fettig #14-23H

D-3 Fettig #16-22H

The D-3 Fettig #16-22H well site is located on annual cropland. Soils are predominately William loams, with clays more predominant in the lower horizons. Field inspection of the soils indicated a silty clay in the upper six inches most likely resulting from yearly cultivation, which has the tendency to bring heavier soils to the surface. NRCS classifies the proposed location as MU 88B. This MU is Williams soils with inclusions of Bowbells, Noonan, Tonka, Arnegard and Zahl components. Tonka soils meet hydric criteria for wetland determinations; however, none were present on the proposed location.

Soils on the proposed location are well drained with hydrologic rating of “B” indicating relatively high infiltration with low runoff. The site has a slight slope, 4%, with a linear down slope drainage. The site drains in a north-northwest direction with a moderate susceptibility to erosion. Erosion potential on the site will increase in the interval between construction and reclamation, as vegetation and topsoil are removed. The site should be monitored for erosion, during and following construction, and best management practices implemented if erosion is detected.

Topsoil is approximately 10-14 inches thick across the site. Soils at the proposed location are suitable for construction and lend well to restoration.

Table 3.6e D-3 Fettig #16-22H Site Soil and Attributes

| Soil Name ¹ | Pad Acres | Road Acres | Landscape ² | | | Erosion and Runoff Factors ³ | | | Soil Composition ⁴ | | |
|------------------------|-----------|------------|------------------------|------------------|---------|---|-----|----------|-------------------------------|--------|--------|
| | | | Land-form | Down slope Shape | % slope | Hydrologic group | Kf | T factor | % Sand | % Silt | % Clay |
| Williams-Zahl | 3.3 | 0.1 | rises | linear, concave | 3-6 | B | .20 | 5 | 41 | 37 | 22 |

¹ NRCS Map Units, major and minor components

² Landscape

- Landform and down slope shape are indicators of erosion and deposition characteristics.
- Slope is indicated as an average or typical gradient under which soils form.

³ Erosion and runoff factors indicate susceptibility of soils to erosion to wind or water:

- Hydrologic Soil Group (A, B, C, D) are assigned from estimates of runoff potential, based on infiltration rates of wetted soils unprotected by vegetation during long-duration storms. The rate of infiltration decreases from Group A soils (high infiltration, low runoff) to Group D soils (low infiltration, high runoff).
- Kf indicates erodibility of material less than 2 millimeters in size to sheet and rill erosion by water. Values of Kf range from 0.02 to 0.69. Higher values indicate greater erosion potential.
- T estimates maximum average annual rates of erosion by wind and water that will not affect crop productivity. Tons per acre per year values range from 1, for shallow soils, to 5, for very deep soils. Higher T soils can tolerate higher rates of erosion without loss of productivity.

⁴ Texture of surface horizon

Table 3.6f D-3 Fettig #16-22H Site Soil Texture

| Soil | MU | Depth (in) | Texture |
|----------------|------------|------------|-----------------|
| Williams -Zahl | 88B 93D | 0-6 | Loam |
| | | 6+ | Clay loam, Loam |

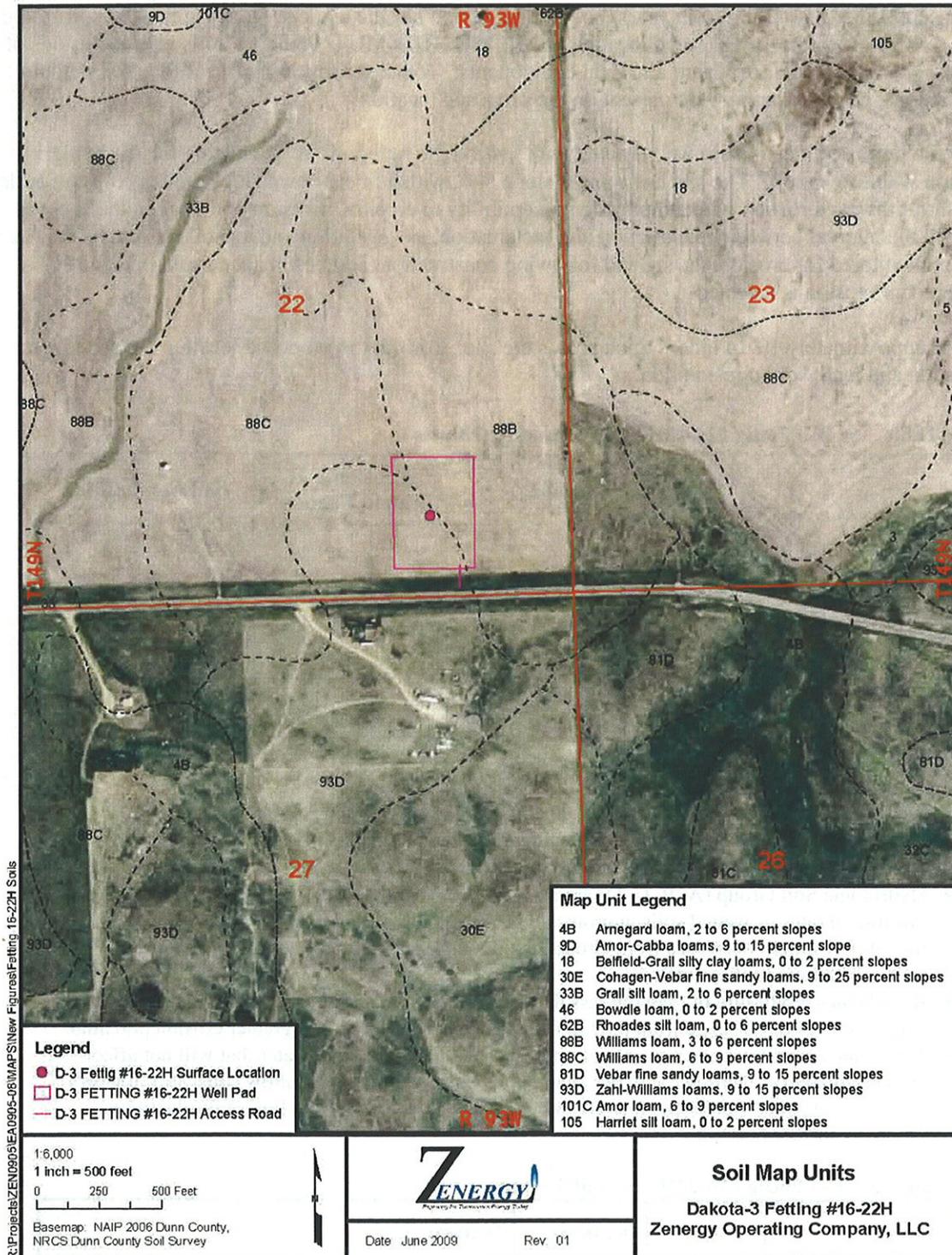


Figure 3.6d D-3 Fettig #16-22H

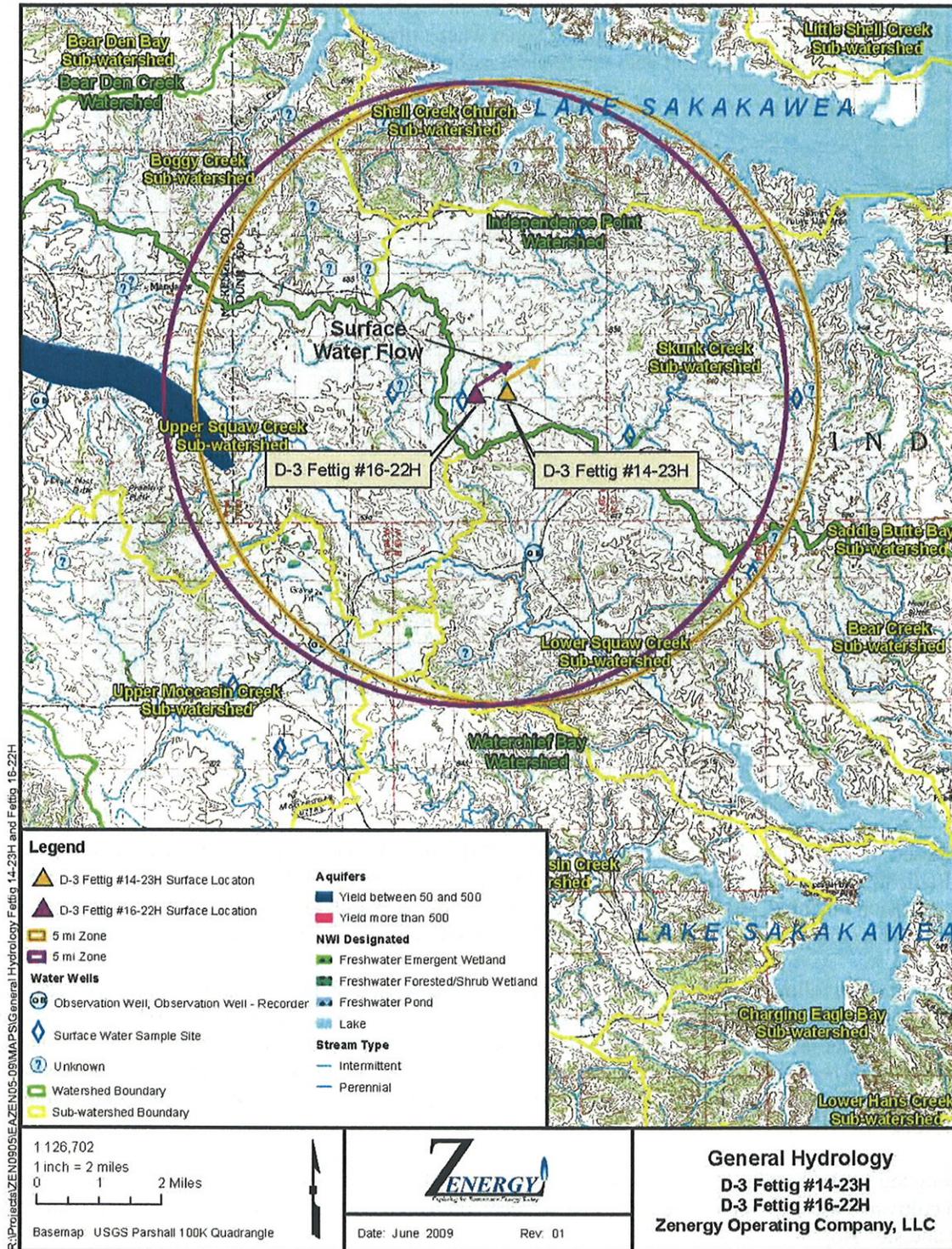


Figure 3.6e D-3 Fettig #14-23H and D-3 Fettig #16-22H

D-3 TAT #2-17H

The D-3 TAT #2-17H well site is found on a relatively level upland plateau that breaks quickly to steep-sided wooded areas and breaks. Soils on the plateau are sandy silt loams. Topsoil is thin (4-6") with calcium carbonate appearing at 12 inches. Care should be taken when stripping surface soils not to mix the topsoil with underlying layers. Mixture of topsoil with the calcium carbonate will make reclamation difficult.



D-3 TAT #2-17 Soils

Photo indicates soil layers found at the well site location. Photo was taken on the west side of the proposed site where a two-track ranch trail is located along the edge of the plateau.

The proposed well pad site is comprised of two MUs: MU 41B - Williams Bowbells loams and MU 211F-Cabba-Badland, outcrop-Arikara complex (Tables 3.6g and 3.6h). Soils on the site are well drained with moderate erosion potential. At the perimeter of the site slopes break quickly, and thus have a high erosion potential. These soils exhibit low infiltration with high runoff and are susceptible to sheet and rill erosion.

The proposed route follows an existing two-track which is established on uplands above the steeper grades. Soils along the road are predominantly classified as a variety of loams with Williams loams being the major component. Smaller inclusions of soils along the access road are classified as a Dogtooth complex and a Zahl-Cabba complex. These soils are silty loams found on steeper slopes along hillsides and drainages. Visual inspection confirmed that surface soils along the access road are silty loams with sandy clays predominant at deeper levels.

Soils along the access road have a moderate to high susceptibility to erosion. Topsoil ranges from 10 inches deep on cultivated areas to approximately 14 inches deep on native uplands. Topsoil is thinner (6 inches) on hilltops and side slopes.

Erosion potential on the site and route will increase in the interval between construction and reclamation, as vegetation and topsoil are removed. The area should be monitored for erosion during and following construction, and best management practices implemented if erosion is detected. Preventative measures are recommended to prevent runoff onto the steeper slopes.

Table 3.6g D-3 TAT #2-17H Site Soils and Attributes

| Soil Name ¹ | Pad Acres | Road Acres | Landscape ² | | | Erosion and Runoff Factors ³ | | | Soil Composition ⁴ | | |
|------------------------|-----------|------------|------------------------|------------------|---------|---|-----|----------|-------------------------------|--------|--------|
| | | | Land-form | Down slope Shape | % slope | Hydrologic group | Kf | T factor | % Sand | % Silt | % Clay |
| Williams Complexes | 3.8 | 10.0 | knolls | linear | 3-6 | B | .28 | 5 | 41 | 37 | 22 |
| Dogtooth Complex | 0.0 | 2.0 | hill, ridge | concave | 6-25 | D | .28 | 2 | 26 | 52 | 22 |
| Zahl-Cabba | 0.0 | 0.5 | ridge | convex | 9-60 | B | .28 | 5 | 41 | 37 | 22 |

¹ NRCS Map Units, major and minor components

² Landscape

- Landform and down slope shape are indicators of erosion and deposition characteristics.
- Slope is indicated as an average or typical gradient under which soils form.

³ Erosion and runoff factors indicate susceptibility of soils to erosion to wind or water:

- Hydrologic Soil Group (A, B, C, D) are assigned from estimates of runoff potential, based on infiltration rates of wetted soils unprotected by vegetation during long-duration storms. The rate of infiltration decreases from Group A soils (high infiltration, low runoff) to Group D soils (low infiltration, high runoff).
- Kf indicates erodibility of material less than 2 millimeters in size to sheet and rill erosion by water. Values of Kf range from 0.02 to 0.69. Higher values indicate greater erosion potential.
- T estimates maximum average annual rates of erosion by wind and water that will not affect crop productivity. Tons per acre per year values range from 1, for shallow soils, to 5, for very deep soils. Higher T soils can tolerate higher rates of erosion without loss of productivity.

⁴ Texture of surface horizon

Table 3.6h D-3 TAT #2-17H Site Soil Texture

| Soil | MU | Depth (in) | Texture |
|----------|---------------------------|------------|---|
| Cabba | 38F 43C 83F 145F 211F | 0-3 | Loam, Silt loam |
| | | 3-15 | Clay loam, Loam, Silty clay loam, Silt loam |
| | | 15+ | Bedrock |
| Dogtooth | 38F 145F | 0-2 | Loam, Silt loam |
| | | 2-13 | Clay loam, Silty clay, Silty clay loam |
| | | 13-21 | Loam, Silty clay, Silty clay loam |
| | | 21+ | Bedrock |
| Williams | 41B 43C 145F 211F 341C | 0-6 | Loam |
| | | 6+ | Clay loam, Loam |
| Zahl | 41B 43C 145F 341C | 0-5 | Loam |
| | | 5+ | Clay loam, Loam |

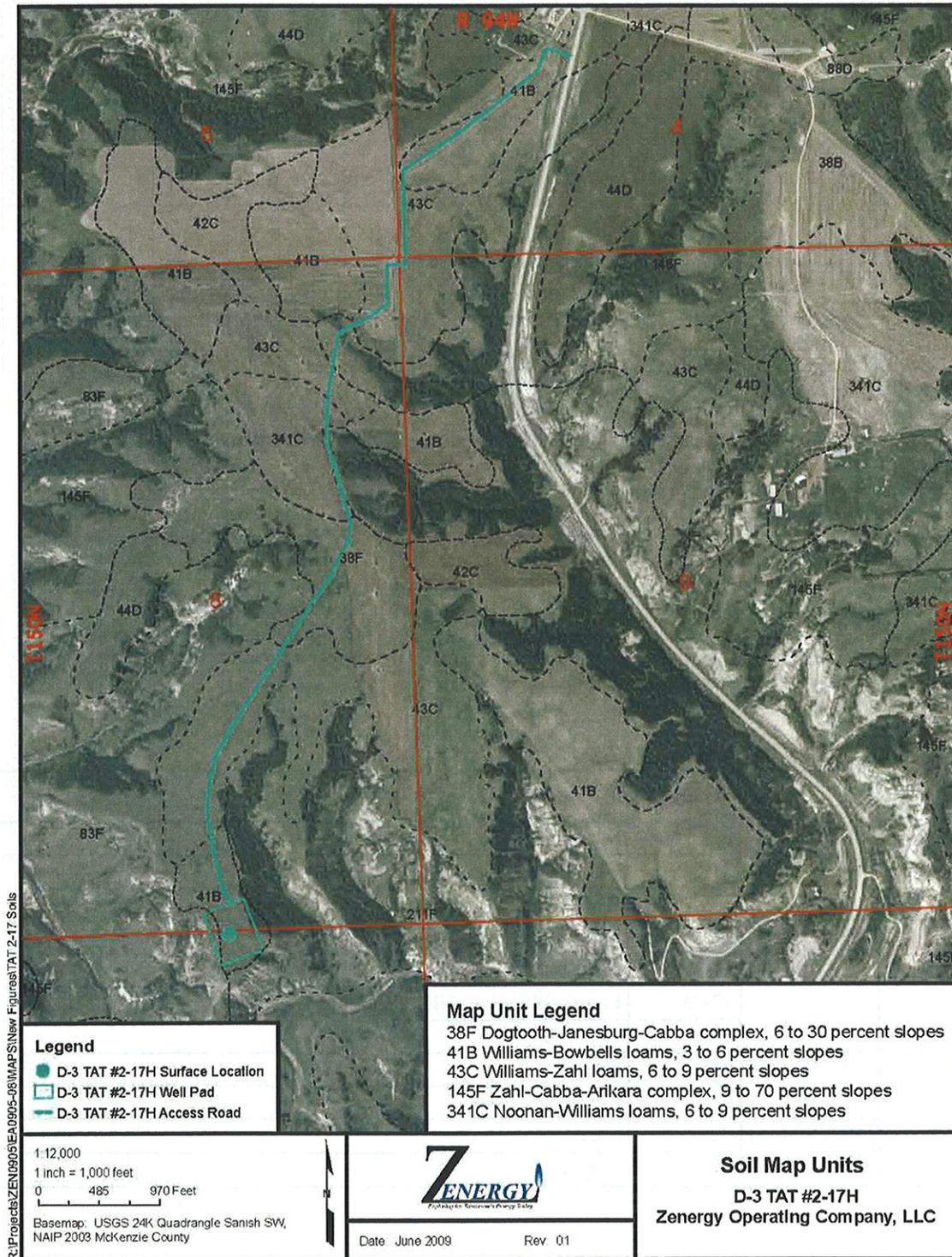


Figure 3.6f D-3 TAT #2-17H

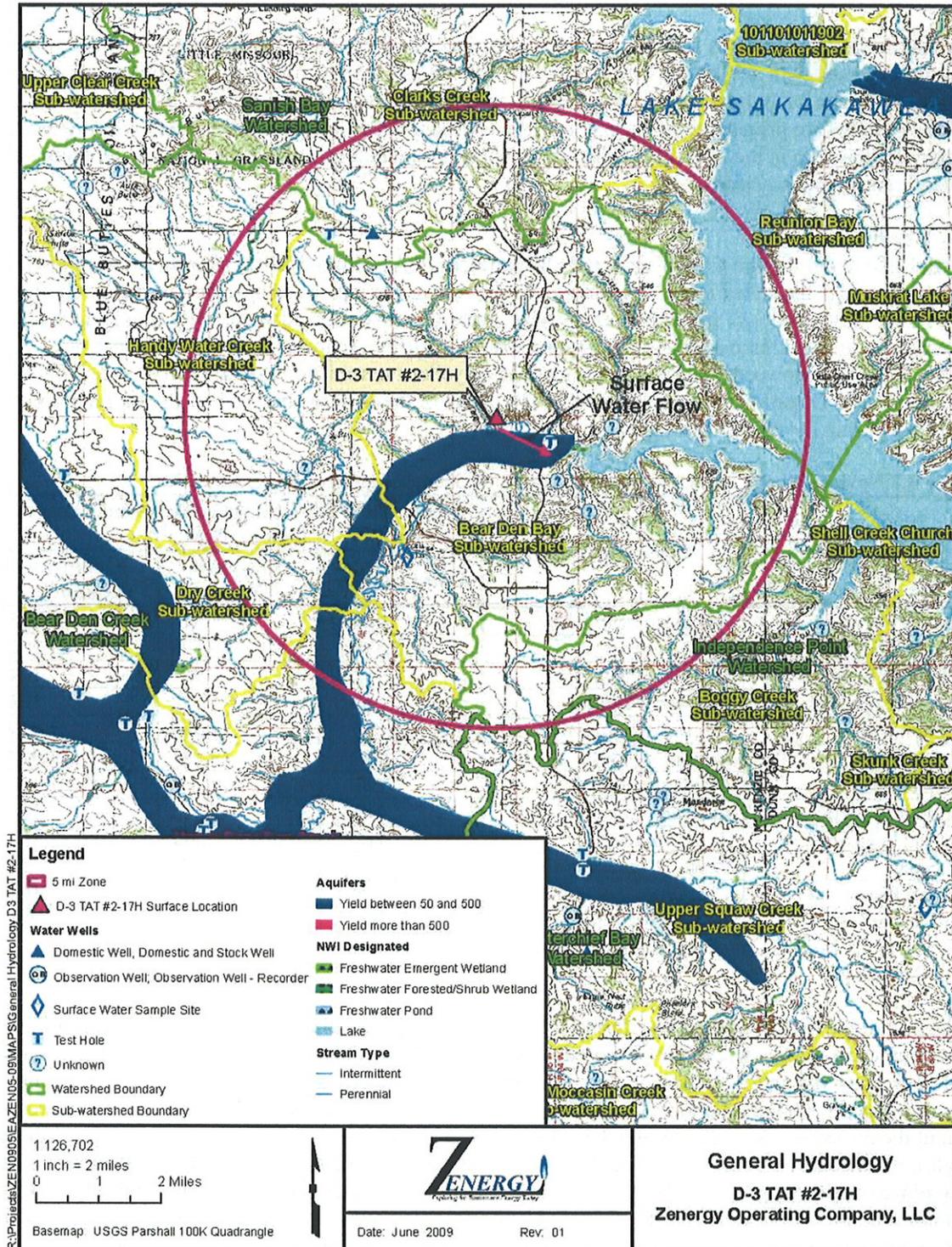


Figure 3.6g D-3 TAT #2-14H

3.7 Vegetation and Invasive Species

The Fort Berthold Reservation is located within the Missouri Slope region of North Dakota. Native grassland areas are interspersed with annual croplands. Western wheatgrass (*Agropyron smithii*), needle-and-thread (*Stipa comata*), green needlegrass (*Stipa viridula*), threadleaf sedge (*Carex filifolia*) and blue grama (*Bouteloua gracilis*) are primary components of native grassland areas in McKenzie County. Spring wheat is the primary annual crop in the area (NASS 2009). Other crops include winter wheat, Durum, dry edible peas, sunflowers, canola, and soybeans.

Noxious Weeds

The North Dakota Agriculture Commission (ND Department of Agriculture 2002) identifies twelve noxious weed plant species in the state (Table 3.7). Eleven of the twelve noxious weed species have been reported in at least one of the three counties. Absinth wormwood, Canada thistle, field bindweed, leafy spurge, and saltcedar are known to occur in all three counties. Dalmation toadflax, diffuse knapweed, musk thistle, purple loosestrife, Russian knapweed, and spotted knapweed and yellow star thistle have all been reported within the tri-county area (ND Department of Agriculture 2007). None of these were observed on any of the proposed well pad sites during the on-site assessment.

Table 3.7 Noxious weeds known to occur in Dunn, McKenzie and Mountrail Counties

| Common Name | Scientific Name | 5 year (2003-2007) Average Reported Acres of Noxious Weeds ¹ | | |
|--------------------|-------------------------------|---|-----------------|------------------|
| | | Dunn County | McKenzie County | Mountrail County |
| Absinth wormwood | <i>Artemisia absinthium</i> | 15,622 | 8,813 | 1,085 |
| Canada thistle | <i>Cirsium arvense</i> | 15,398 | 30,178 | 21,232 |
| Dalmatian toadflax | <i>Linaria genistifolia</i> | 2 | NR ² | NR |
| Diffuse knapweed | <i>Centaurea diffusa</i> | 4 | 2 | NR |
| Field bindweed | <i>Convolvulus arvensis</i> | 18,035 | 1,306 | 1,429 |
| Leafy spurge | <i>Euphorbia esula</i> | 7,244 | 19,751 | 21,928 |
| Musk thistle | <i>Carduus nutans</i> | NR | 2 | 2 |
| Purple loosestrife | <i>Lythrum salicaria</i> | NR | 3 | NR |
| Russian knapweed | <i>Acroptilon repens</i> | NR | 17 | NR |
| Saltcedar | <i>Tamarix spp.</i> | 23 | 123 | 721 |
| Spotted knapweed | <i>Centaurea maculosa</i> | NR | 4 | 164 |
| Yellow starthistle | <i>Centaurea solstitialis</i> | NR | NR | NR |

¹ North Dakota Department of Agriculture 2003-2007

² Not Reported

An evaluation of the existing vegetation during the on-site assessments did not indicate the presence of any listed noxious weed species within the proposed project areas. Potential disturbance of almost 30 acres and removal of existing vegetation present opportunities for invasive species and threaten to reduce the quality or quantity of forage or crop production. The APDs and this EA require the operator to control noxious weeds throughout the project areas. Vehicles that have been driven in areas with invasive species must be cleaned with high-pressure sprayers before entering the project area. **Surface disturbance and vehicular traffic must not take place outside approved rights-of-way or the well pad.** Areas stripped of topsoil must be re-seeded and reclaimed at the earliest opportunity. 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 reduce vegetative impacts to minimal levels, effectively negating the potential to establish or spread invasive species.

3.8 Cultural Resources

Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural and religious significance. 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. 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). As a result, BIA consults and corresponds with the THPO on all projects proposed within the exterior boundaries of the Fort Berthold Reservation. The SHPO may have useful information, but has no official role regarding proposed federal actions on trust land. The MHA Nation has also designated responsible parties for consultations and actions under NAGPRA and cultural resources generally.

Cultural resource inventories of these well pads and access roads were conducted by personnel of Beaver Creek Archaeology, Inc., using a pedestrian methodology. For the D-3 Bangen #3-14H project approximately 10 acres were intensively inventoried on April 16, 2009 (Burns 2009). For the D-3 Fettig #14-23H project approximately 10.5 acres were inventoried (Pollman 2009a); for the D-3 Fettig #16-22H project approximately 10 acres were inventoried (Pollman 2009b); and for the D-3 TAT #2-17H project approximately 28.4 acres were inventoried (Pollman 2009c). These three surveys were done on May 4, 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. This determination was communicated to the THPO for the D-3 Bangen #3-14H project on May 1, 2009, and the THPO concurred on May 7, 2009 (see Part 4). The same determination was communicated to the THPO for the other three projects on May 29, 2009. The THPO concurred with the determination for D-3 TAT #2-17H on June 12, 2009; however, no response was received from the THPO within the allotted 30-day comment period for the D-3 Fettig #14-23H and D-3 Fettig #16-22H project areas.

3.9 Socioeconomics

Socioeconomic conditions include population, demographics, income, employment, and housing. These conditions can be analyzed and compared at various scales. This analysis focuses on the reservation, the four counties that overlap most of the Reservation and the state of North Dakota. The state population showed little change between the last two censuses (1990–2000), but there were notable changes locally, as shown in Table 3.9a. Populations in Dunn, McKenzie, McLean, and Mountrail counties declined 5 to 11%, while population on the Fort Berthold Reservation increased by almost 10%. These trends are expected to continue (Rathge *et al.* 2002). While American Indians are the predominant group on the reservation, they are a minority everywhere else in the state. More than two-thirds (3,986) of the Reservation population are tribal members.

Table 3.9a: Population and Demographics

| County or Reservation | Population in 2000 | % of State Population | % Change 1990-2000 | Predominant Group | Predominant Minority |
|---------------------------|--------------------|-----------------------|--------------------|-------------------|-----------------------|
| Dunn County | 3,600 | 0.56% | - 10.1% | White | American Indian (12%) |
| McKenzie County | 5,737 | 0.89% | - 10.1% | White | American Indian (21%) |
| McLean County | 9,311 | 1.45% | - 11.0% | White | American Indian (6%) |
| Mountrail County | 6,631 | 1.03% | - 5.6% | White | American Indian (30%) |
| Fort Berthold Reservation | 5,915 | 0.92% | + 9.8% | American Indian | White (27%) |
| Statewide | 642,200 | 100% | + 0.005% | White | American Indian (5%) |

Source: U.S. Census Bureau 2007.

In addition to the ranching and farming that are employment mainstays in western North Dakota, employment on the reservation largely consists of ranching, farming, tribal government, tribal enterprises, schools, and federal agencies. The MHA Nation’s Four Bears Casino and Lodge, near New Town, employs over 320 people, 90% of which are tribal members (Three Affiliated Tribes 2008).

As shown in Table 3.9b, counties overlapping the Reservation tend to have per capita incomes, median household incomes, and employment rates that are lower than North Dakota statewide averages. Reservation residents have lower average incomes and higher unemployment rates compared to the encompassing counties. MHA Nation members are in turn disadvantaged relative to overall Reservation incomes and unemployment rates that average in non-Indian data. The most recent census found that per capita income for residents of the Reservation is \$10,291 (less than 1/3 the state average). Overcrowded housing skews the median reservation household income upward to \$26,274 (about 1/2 the state average). A BIA report in 2003 found that 33% of employed MHA Nation members were living below federal poverty levels. The unemployment rate for tribal members is 22 %, compared to 11.1% for the reservation as a whole and 4.6% statewide.

Table 3.9b: Income and Unemployment

| Unit of Analysis | Per Capita Income | Median Household Income | Unemployment Rate (2007) | Employed but Below Poverty Level | Percent of All People in Poverty |
|---------------------------|-------------------|-------------------------|--------------------------|----------------------------------|----------------------------------|
| MHA Nation members | -- | -- | 22 % | 33 % | Unknown |
| Fort Berthold Reservation | \$ 10,291 | \$ 26,274 | 11.1 % | -- | Unknown |
| Mountrail County | \$ 29,071 | \$ 34,541 | 5.8 % | -- | 15.4% |
| Dunn County | \$ 27,528 | \$ 35,107 | 3.4 % | -- | 13% |
| McKenzie County | \$ 27,477 | \$ 35,348 | 3.1 % | -- | 15.8 % |
| McLean County | \$ 32,387 | \$ 37,652 | 4.7 % | -- | 12.8% |
| North Dakota | \$ 31,871 | \$ 40,818 | 3.2 % | -- | 11.2 % |

Source: U.S. Department of Agriculture Economic Research Data 2008 and BIA 2003.

Availability and affordability of housing could impact oil and gas development and operations. Housing information is summarized in Table 3.9c. The tribal 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. Private purchase and rental housing are available in New Town. New housing construction has recently increased within much of the analysis area, but availability remains low.

Table 3.9c: Housing Units – 2000 (U.S. Census Bureau 2007 and 2008).

| Housing Development | Fort Berthold Reservation | Dunn County | McKenzie County | McLean County | Mountrail County |
|--|---------------------------|-------------|-----------------|---------------|------------------|
| Existing Housing | | | | | |
| Owner-Occupied Units | 1,122 | 1,570 | 2,009 | 4,332 | 2,495 |
| Renter-Occupied Units | 786 | 395 | 710 | 932 | 941 |
| Total | 1,908 | 1,965 | 2,719 | 5,264 | 3,436 |
| New Private Housing Building Permits 2000-2005 | -- | 18 | 4 | 135 | 113 |
| Housing Development Statistics | | | | | |
| State rank in housing starts | -- | 51 of 53 | 15 of 53 | 21 of 53 | 17 of 53 |
| National rank in housing starts | -- | 3112 / 3141 | 2498 / 3141 | 2691 / 3141 | 2559 / 3141 |

The proposed projects are not expected to have measurable impacts on population trends, local unemployment rates or housing starts. Relatively high-paying construction jobs would result from exploration and development of oil and gas reserves on the reservation, but most of these opportunities are expected to be short-term. The proposed action would require temporary employees during the well construction cycle and one to two full-time employees for the long-term production cycle. Short-term construction employment would provide some economic benefit. Long-term commercial operations would provide significant royalty income and indirect economic benefits.

3.10 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, was signed by President Clinton in 1994. The Order requires agencies to 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 U.S. Environmental Protection Agency (EPA) headed the interagency workgroup established by the 1994 Order and is responsible for related legal action. Working criteria for designation of targeted populations are provided in *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (EPA 1998). This guidance uses a statistical approach to consider various geographic areas and scales of analysis to define a particular population's status under the Order.

Environmental Justice is an evolving concept with potential for disagreement over the scope of analysis and the implications for federal responsiveness. It is nevertheless clear that tribal members on the Great Plains qualify for EJ consideration as both a minority and low-income population. The population of the Dakotas is predominantly Caucasian. While some 70% of Reservation residents are tribal members, Indians comprise only 5% of North Dakota residents and 12% of the population of Dunn County. Even in a state with relatively low per capita and household income, Indian individuals and households are distinctly disadvantaged.

There are, however, some unusual EJ considerations when proposed federal actions are meant to benefit tribal members. Determination of fair treatment necessarily considers the distribution of both benefits and negative impacts, due to variation in the interests of various tribal groups and individuals. There is also potential for major differences in impacts to resident tribal members and those enrolled or living elsewhere. A general benefit to MHA Nation government and infrastructure has already resulted from tribal leasing, fees and taxes. Oil and gas leasing has already brought much-needed income to MHA Nation members who hold mineral interests, some of whom might eventually benefit further from royalties on commercial production. Profitable production rates at proposed locations might lead to exploration and development on additional tracts owned by currently non-benefitting allottees. The absence of lease and royalty income does not, moreover, preclude other benefits. Exploration and development would provide many relatively high-paying jobs, with oversight from the Tribal Employment Rights Office.

The owners of allotted surface within the project areas may not 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 compensatory for productive acreage lost to road and well pad construction. Tribal members without either surface or mineral rights would not receive any direct benefits whatsoever. Indirect benefits of employment and general tribal gains would be the only potential offsets to negative impacts.

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 significantly reduced following the surveys of proposed well locations and access road routes and determinations by the BIA that there will be no effects to historic properties. Nothing is known to be present, furthermore, that qualifies for protection under the *American Indian Religious Freedom Act*. Potential for disproportionate impacts is further mitigated by requirements for immediate work stoppage following an unexpected discovery of cultural resources of any type. Mandatory consultations will 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 projects have not been found to pose significant impacts to any other critical element—air, public health and safety, water, wetlands, wildlife, soils or vegetation—within the human environment. Avoiding or minimizing such impacts also makes unlikely disproportionate impacts to low-income or minority populations. The proposed actions offer many positive consequences for tribal members, while recognizing Environmental Justice concerns. Procedures summarized in this document and in the APDs are binding and sufficient. No laws, regulations or other requirements have been waived; no compensatory mitigation measures are required.

3.11 Mitigation and Monitoring

Many protective measures and procedures are described in this document and in the APDs. 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.

3.12 Irreversible and Irrecoverable 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 acreage devoted to disposal of cutting, soil lost through wind and water erosion, cultural resources inadvertently destroyed, wildlife killed during earthmoving or in collisions with vehicles, and energy expended during construction and operation.

3.13 Short-Term Use Versus Long-Term Productivity

Short-term activities would not detract significantly from long-term productivity of the project areas. The small areas dedicated to the access roads and well pads would be unavailable for livestock grazing, wildlife habitat and other uses. Allottees with surface rights would be compensated for loss of productive acreage and project footprints would shrink considerably once wells were drilled and non-working areas were reclaimed and reseeded. Successful and ongoing reclamation of the landscape would quickly support wildlife and livestock grazing, stabilize the soil, and reduce the potential for erosion and sedimentation. The major long-term resource loss corresponds with the project purpose: extraction of hydrocarbons from the Bakken Formation.

3.14 Cumulative Impacts

Environmental impacts may accumulate either over time or in combination with similar activities in the area. Unrelated activities may also have negative impacts on critical elements, thereby contributing to cumulative degradation of the environment. Past and current disturbances in the vicinity of the proposed projects include farming, grazing, roads, and other oil/gas wells. Current land uses are expected to continue with little change, since undivided interests in the land surface are often held by different tribal members than those holding mineral rights. Virtually all available acreage is already organized into agricultural leases or range units to utilize surface resources for economic benefit; oil and gas development is not expected to have more than a minor effect on surface use patterns.

The landscape and vegetation of the Great Plains have undergone continual transformations due to the influences of nature and human actions. Cumulative effects have occurred as a loss and alteration of habitats caused by cultivation, range management practices, fire suppression, exotic species introductions, resource development, and other practices.

There are no wetlands, floodplains, or major drainage facilities adjacent to the proposed well sites. Current land uses are expected to continue. Increased truck traffic on adjacent roadways can be expected and has a documented negative, but manageable, impact on road conditions.

The primary industrial developments in the area are oil and gas exploration. Further oil and gas development in the area is probable but speculative at this time, however speculation related to the discovery of the Bakken Formation has led to dramatic increases in exploration. Activities near each well site vary. Currently, there are 10 active well sites within five miles of the D-3 TAT#2-27H, and the nearest well to the D-3 Bangen #3-14H is over six miles away.

Table 3.14a Oil activities near the proposed well sites.

| Well Status | D-3 Bangen #3-14H | | D-3 Fettig #14-23H | | D-3 Fettig #16-22H | | D-3 TAT #2-17H | |
|--|------------------------------|--------------------|------------------------------|--------------------|------------------------------|--------------------|------------------------------|--------------------|
| | Distance to well pad (miles) | No. within 5 miles | Distance to well pad (miles) | No. within 5 miles | Distance to well pad (miles) | No. within 5 miles | Distance to well pad (miles) | No. within 5 miles |
| Active Well Site | 6.3 | 0 | 2.8 | 1 | 2.5 | 1 | 2.4 | 10 |
| Drill Rigs | 7 | 0 | 2.9 | 2 | 3 | 2 | 9.7 | 0 |
| Confidential, Proposed and Locations with Permits to Drill | 1.3 | 4 | 2.3 | 6 | 2.2 | 8 | 3.8 | 5 |

NDIC June 2009

Oil and gas development surrounding the proposed well sites was tabulated by established distances from the proposed disturbances and well status. There are approximately 343 oil and gas wells actively operating with 20 miles of the proposed well sites and oil and gas facilities. Also within 20 miles, there are another 116 proposed well sites (not yet permitted), 22 sites that have been permitted for drilling and 35 sites where active drilling is taking place, or has recently finished. Overall, there are approximately 516 oil and gas wells that are active, proposed, or being drilled within a 20-mile radius of the proposed sites. Several of these occur outside of the Fort Berthold Reservation. On Fort Berthold, there are 151 wells that are active, proposed, or being drilled.

Table 3.14b Oil and Gas Well Status in Area

| Distance from Well Sites | All Wells | Active Wells | Confidential or Proposed Wells | Inactive or Temporarily Abandoned | Dry or Abandoned Well Sites | Permitted to Drill | Currently Drilling ¹ |
|--------------------------|-----------|--------------|--------------------------------|-----------------------------------|-----------------------------|--------------------|---------------------------------|
| 0-1 miles | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1-5 miles | 70 | 11 | 21 | 2 | 34 | 0 | 2 |
| 5-10 miles | 336 | 78 | 33 | 36 | 178 | 8 | 3 |
| 10-20 miles | 1037 | 343 | 116 | 62 | 459 | 22 | 35 |
| Fort Berthold | 420 | 69 | 41 | 73 | 196 | 17 | 24 |

NDIC June 1, 2009

¹Includes sites where the drill has been recently moved but the NDIC permit not yet received

Historically, oil and gas exploration has already affected the area. There are 62 inactive, or temporarily abandoned well sites, and an additional 459 well sites that are dry or abandoned within 20 miles of the proposed well sites.

Alone, the proposed projects will have negligible impacts on the overall landscape; however, minor disturbances over a period of time may accumulate and detrimentally affect the local environment. Careful planning and the use of best management practices (e.g. erosion control, spill containment, etc.) should be implemented during construction and operation to help decrease impacts and reduce cumulative effects. Reclamation of the sites should take place as soon as possible when oil activities have been completed. Sites should be restored to a land use similar to that which existed prior to disturbance. The proposed action has been planned to avoid impacts to wetlands, floodplains, surface water, cultural resources, and threatened and endangered species. Unavoidable impacts to these or other resources would be minimized and/or mitigated as described in this document. The operator of any facility would be required to complete interim reclamation of the road and well pad immediately following construction and

completion. Implementation of other precautionary and protective measures detailed in this EA, the APD, and applicable regulations are expected to minimize impacts to all critical elements of the human environment. Impacts from the proposed project are expected to generally be minor, temporary, manageable, and/or insignificant. No cumulative impacts are reasonably foreseen from existing and proposed activities, other than increasingly positive impacts to the reservation economy.

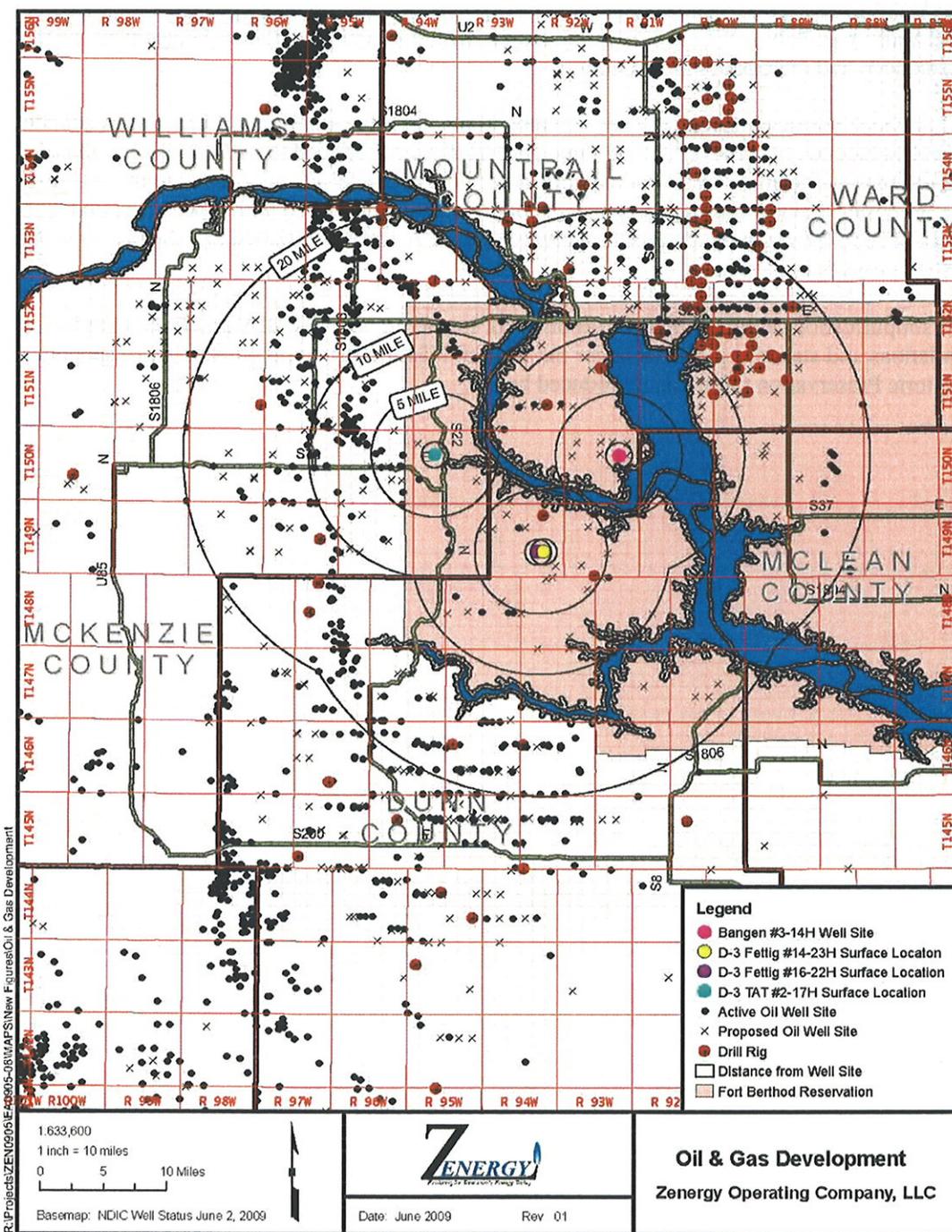


Figure 3.14: Approved or proposed oil and gas projects

4. Consultation and Coordination

The Bureau of Indian Affairs has completed many Environmental Assessments (EAs) for the oil and gas projects at Fort Berthold since 2007. For the first 18 of these projects, prior notice was sent to about 60 tribes, government agencies, non-profit organizations and individuals. BIA consulted directly and repeatedly with the U.S. Fish and Wildlife Service to identify issues and incorporate best management practices for wildlife protection. BIA also routinely cooperated on every project with the Bureau of Land Management regarding operational standards and reclamation procedures.

Responses to previous notifications quickly became repetitious, usually consisting of form letters advising BIA that the respondent had no concerns or that the same general concerns applied to every project proposal. BIA has therefore discontinued mailing of individual notices for Fort Berthold oil and gas environmental review, except where proposals include unusual components not previously considered with other interested parties. There are no such components to the proposals analyzed in the EA. BIA is satisfied that the proper scope of analysis for such projects is known.

This justified simplification of NEPA procedures does not impact in any way BIA practices regarding cultural resource regulations and standard practices under the Natural Historic Preservation Act. Correspondence with the Tribal Historic Preservation Officer is reproduced below.



IN REPLY REFER TO:
DESCRM
MC-208

United States Department of the Interior

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



MAY 01 2009

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 and access roads in Dunn and Mountrail Counties, North Dakota. Approximately 56 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the areas depicted in the enclosed reports. One isolated find (32MNx552) and one historic site (32MN798) were located in the inventories, however neither appears to be a historic property that possesses 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. Three properties were located that may qualify for protection under the American Indian Religious Freedom Act (16 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, as the three traditional cultural properties will be avoided. Catalogued as **BIA Case Number AAO-1615/FB/09**, the proposed undertakings, locations, and project dimensions are described in the following reports:

Burns, Wade

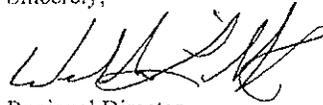
- (2009) Dakota-3 Bangen #3-14H Well Pad Survey, Mountrail County: A Class III Cultural Resource Inventory. Beaver Creek Archaeology for Zenergy, Inc., Tulsa.
- (2009) Dakota-3 Pennington #16-15H Well Pad Survey, Mountrail County: A Class III Cultural Resource Inventory. Beaver Creek Archaeology for Zenergy, Inc., Tulsa.
- (2009) Dakota-3 Wounded Face #15-15H Well Pad Survey, Dunn County: A Class III Cultural Resource Inventory. Beaver Creek Archaeology for Zenergy, Inc., Tulsa.

Page 2

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



TRIBAL HISTORIC PRESERVATION

Mandan Hidatsa Arikara

Perry 'No Tears' Brady, Director.
404 Frontage Road,
New Town, North Dakota 58763
Ph/701-862-2474 fax/701-862-2490

pbrady@mhanation.com

May 7, 2009

Mike Black
Regional Director
Bureau of Indian Affairs
Great Plains Regional Office
115 Fourth Avenue SE
Aberdeen, SD, 57401

RE: Project # AAO-1615/FB/09
Dakota 3 Bangen 3-14H
Dakota 3 Pennington 16-15H
Dakota 3 Wounded Face 15-15H

Mr. Black:

After review of the documentation provided by your Office, the Mandan Hidatsa Arikara Nations Tribal Historic Preservation Office concurs with the determination of 'No Adverse Affect'/No Historic Properties Affected' to any pre and post-historic relics, artifacts or sacred and cultural resources in the proposed Project area.

We respectfully request to be notified should any NAGPRA issue or others arise as the Project progresses.

Sincerely,


Perry 'No Tears' Brady,
Tribal Historic Preservation Officer,
Mandan Hidatsa Arikara Nations.



United States Department of the Interior

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



IN REPLY REFER TO:
DESCRM
MC-208

MAY 29 2009

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 and access roads in Dunn and McKenzie Counties, North Dakota. Approximately 48.9 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 (16 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-1623/FB/09**, the proposed undertakings, locations, and project dimensions are described in the following reports:

Pollman, Jennifer

- (2009) Dakota-3 Fettig #14-23H (856A) Well Pad and Access Road: A Class III Cultural Resource Inventory, Dunn County, North Dakota. Beaver Creek Archaeology for Zenergy Operating Company, LLC, Tulsa, OK.
- (2009) Dakota-3 Fettig #16-22H (854A) Well Pad and Access Road: A Class III Cultural Resource Inventory, Dunn County, North Dakota. Beaver Creek Archaeology for Zenergy Operating Company, LLC, Tulsa, OK.
- (2009) Dakota-3 TAT #2-17H (978A) Well Pad and Access Road: A Class III Cultural Resource Inventory, McKenzie County, North Dakota. Beaver Creek Archaeology 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.

Page 2

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



TRIBAL HISTORIC PRESERVATION

Mandan Hidatsa Arikara

Perry 'No Tears' Brady, Director.
404 Frontage Road,
New Town, North Dakota 58763
Ph/701-862-2474 fax/701-862-2490

pbrady@mhanation.com

June 12, 2009

Mike Black
Regional Director
Bureau of Indian Affairs
Great Plains Regional Office
115 Fourth Avenue SE
Aberdeen, SD, 57401

RE: Project # AAO-1623/FB/09
Dakota 3 – TAT 2-17H (978A) well pad & access road

Mr. Black:

After review of the documentation provided by your Office, the Mandan Hidatsa Arikara Nations Tribal Historic Preservation Office concurs with the determination of 'No Adverse Affect'/No Historic Properties Affected' to any pre and post-historic relics, artifacts or sacred and cultural resources in the proposed Project area.

We respectfully request to be notified should any NAGPRA issue or others arise as the Project progresses.

Sincerely,

Perry 'No Tears' Brady,
Tribal Historic Preservation Officer,
Mandan Hidatsa Arikara Nations.

5. List of Preparers

An interdisciplinary team contributed to this document, following guidance in Part 1502.6 of CEQ regulations. Portions of the documents were drafted by McCain and Associates, Inc. under contract to Zenergy Operating Company, LLC under the direction of BIA. Preparers, reviewers, consultants and federal officials include the following:

- Division of Environment, Safety and Cultural Resources Staff – BIA-GPRO.
- Kelly Bryan Williston Basin Land Manager
- Todd Hartleben Principal Engineer – McCain and Associates, Inc.

6. References and Acronyms

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- Pollman, Jennifer. 2009b. Dakota-3 Fettig #16-22H (854A) Well Pad and Access Road: A Class III Cultural Resource Inventory, Dunn County, North Dakota. Beaver Creek Archaeology for Zenergy Operating Company, LLC, Tulsa, OK.
- Pollman, Jennifer. 2009c. Dakota-3 TAT #2-17H (978A) Well Pad and Access Road: A Class III Cultural Resource Inventory, McKenzie County, North Dakota. Beaver Creek Archaeology for Zenergy Operating Company, LLC, Tulsa,
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Acronyms

| | | | |
|--------------|---------------------------------------|-------------------|---|
| AAQM | Ambient Air Quality Monitoring (site) | MHA Nation | Three Affiliated Tribes of the Mandan, Hidatsa and Arikira Nation |
| AIRFA | American Indian Religious Freedom Act | NAGPRA | Native American Graves Protection and Repatriation Act |
| APD | Application for Permit to Drill | NDCC | North Dakota Century Code |
| APE | Area of Potential Affect | NDDH | North Dakota Department of Health |
| BIA | Bureau of Indian Affairs | NDIC | North Dakota Industrial Commission |
| BLM | Bureau of Land Management | NDNH | North Dakota Natural Heritage |
| CFR | Code of Federal Regulations | ND SWC | North Dakota State Water Commission |
| EA | Environmental Assessment | NEPA | National Environmental Policy Act |
| EIS | Environmental Impact Statement | NHPA | National Historic Preservation Act |
| EPA | Environmental Protection Agency | | |
| FONSI | Finding of No Significant Impact | | |
| GPRO | Great Plains Regional Office | | |

| | | | |
|-------------|---|--------------|--------------------------------------|
| NPAL | Northern Plains Agroecosystems Laboratory | TERO | Tribal Employment Rights Office |
| NRCS | Natural Resources Conservation Service | THPO | Tribal Historic Preservation Officer |
| NRHP | National Register of Historic Places | TVD | Total Vertical Depth |
| NTL | Notice to Lessees | USC | United States Code |
| SHPO | State Historic Preservation Officer | USFS | U.S. Forest Service |
| TCP | Traditional Cultural Property | USFWS | U.S. Fish and Wildlife Service |
| | | USGS | U.S. Geological Survey |