ORIGINAL

United States Department of the Interior

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

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

JAN 2 0 2010

MEMORANDUM

TO: Superintendent, Fort Berthold Agency

FROM: ACTING Regional Director, Great Plains Region

SUBJECT: Environmental Assessment and Finding of No Significant Impact

In compliance with the regulations of the National Environmental Policy Act (NEPA) of 1969, as amended, for four proposed exploratory drilling wells, *Henry Bad Gun 8D-5-1H, Henry Bad Gun 17A-20-1H, Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H* by Simray on the Fort Berthold Reservation, an Environmental Assessment (EA) has been completed and a Finding of No Significant Impact (FONSI) has been issued.

All the necessary requirements of the National Environmental Policy Act have been completed. Attached for your files is a copy of the EA, FONSI and Notice of Availability. The Council on Environmental Quality (CEQ) regulations require that there be a public notice of availability of the FONSI (1506.6(b)). Please post the attached notice of availability at the agency and tribal buildings for 30 days.

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

Attachment

cc: Marcus Levings, Chairman, Three Affiliated Tribes (with attachment)
Perry "No Tears" Brady, THPO (with attachment)
Roy Swalling, BLM, Dickenson, ND (with attachment)
John Shelman, US Army Corps of Engineers

Finding of No Significant Impact

Simray

Henry Bad Gun 8D-5-1H
Henry Bad Gun 17A-20-1H
Henry Bad Gun 9C-4-1H
Henry Bad Gun 16B-21-1H

Fort Berthold Indian Reservation
Dunn County, 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 Section 8, T147N, R93W; Section 17, T147N, R93W; Section 9, T147N, R93W; Section 16, T147N, R93W in Dunn County. Associated federal actions by BIA include determinations of effect regarding cultural resources, approvals of leases, rights-of-way and easements, and a positive recommendation to the Bureau of Land Management regarding the Applications for Permit to Drill.

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

This determination is based on the following factors:

1. Agency and public involvement was solicited and environmental issues related to the proposal were identified.

2. Protective and prudent measures were designed to minimize impacts to air, water, soil, vegetation, wetlands, wildlife, public safety, water resources, and cultural resources. The remaining potential for impacts was disclosed for both the proposed action and the No Action alternative.

3. Guidance from the U.S. Fish and Wildlife Service has been fully considered regarding wildlife impacts, particularly in regard to threatened or endangered species.

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

5. Environmental justice was fully considered.

6. Cumulative effects to the environment are either mitigated or minimal.

7. No regulatory requirements have been waived or require compensatory mitigation measures.

8. The proposed projects will improve the socio-economic condition of the affected Indian community.

Regional Director

1/20/10
Date

ENVIRONMENTAL ASSESSMENT

United States Department of Interior
Bureau of Indian Affairs

Great Plains Regional Office
Aberdeen, South Dakota

Cooperating Agency:

Bureau of Land Management

North Dakota State Office
Dickinson, North Dakota

Simray GP, LLC

Four Bakken Formation Exploratory Oil Wells:

Henry Bad Gun 8D-5-1H
Henry Bad Gun 17A-20-1H
Henry Bad Gun 9C-4-1H
Henry Bad Gun 16B-21-1H

Fort Berthold Indian Reservation

January 2010

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

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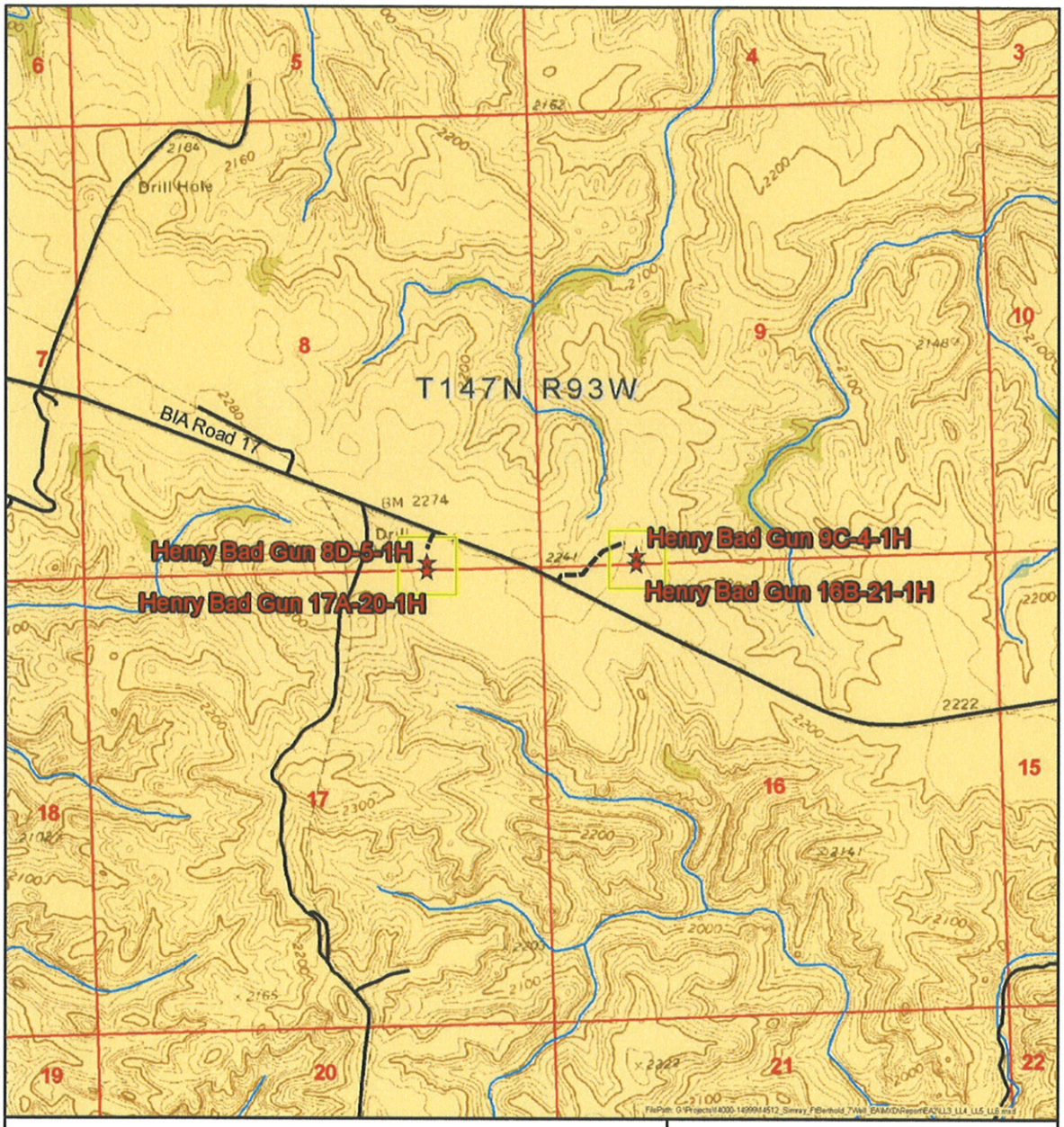
T147N R93W
BIA Road 17
Drill Hole
BM 2274
Henry Bad Gun 8D-5-1H
Henry Bad Gun 17A-20-1H
Henry Bad Gun 9C-4-1H
Henry Bad Gun 16B-21-1H
Legend
Proposed Well Location
Proposed Access Road
Road
Section Line
Stream Channel
Fort Berthold Indian Reservation
10 Acre Lease Block
Kilometers
0 0.25 0.5 0.75
Miles
0 0.25 0.5 0.75
Scale: 1:24,000
Projection: UTM NAD83, Zone 13N
Base Map: 7.5 Minute USGS Quadrangles:
Mandaree SE (1973)
Dunn County, North Dakota
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Created By:
SWCA Environmental Consultants

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Simray GP, LLC (Simray) has acquired the leases and is proposing to drill four horizontal oil and gas wells on two pad locations on the Fort Berthold Indian Reservation (Reservation) to evaluate, and possibly develop, the commercial potential of natural resources. Developments have been proposed on lands held in trust by the United States in Dunn County, North Dakota. The Bureau of Indian Affairs (BIA) is the surface management agency for potentially affected tribal lands and individual allotments. The BIA manages lands held in title by the tribe and tribal members to subsurface mineral rights. Developments have been proposed in locations that target specific areas located in the Middle Bakken member of the Bakken Formation, a known oil reserve. The following proposed well sites, shown in Figures 1 and 2, would be located within the Reservation in which the majority of the external boundaries are located above the Bakken Formation.

- **Henry Bad Gun 8D-5-1H**: SE¼ SE¼ of Section 8, Township (T) 147 North (N), Range (R) 93 West (W), Dunn County
- **Henry Bad Gun 17A-20-1H:** NE¼ NE¼ of Section 17, T147N, R93W, Dunn County
- **Henry Bad Gun 9C-4-1H**: SW¼ SW¼ of Section 9, T147N, R93W, Dunn County
- **Henry Bad Gun 16B-21-1H**: NW¼ NW¼ of Section 16, T147N, R93W, Dunn County

New access roads would be constructed in order to facilitate the construction and operation of each proposed well. Well pads would be constructed to accommodate drilling activities and well operations. Pits constructed for drilled cuttings would be used during drilling operations and reclaimed once operations have ceased. Should any of the proposed well sites result in long-term commercial production, supporting facilities may be constructed on site. All components (i.e., roads, well pads, supporting facilities) would be reclaimed upon final abandonment unless formally transferred, with federal approval, to either the BIA or the landowner. The proposed wells are exploratory; should they prove productive, further exploration of surrounding areas is possible. This environmental assessment (EA) addresses the potential impacts associated with the construction, and possible long-term operation, of the above-listed wells and directly related infrastructure and facilities. Further oil and gas exploration and development would require additional National Environmental Policy Act of 1969 (NEPA) analysis and federal actions.

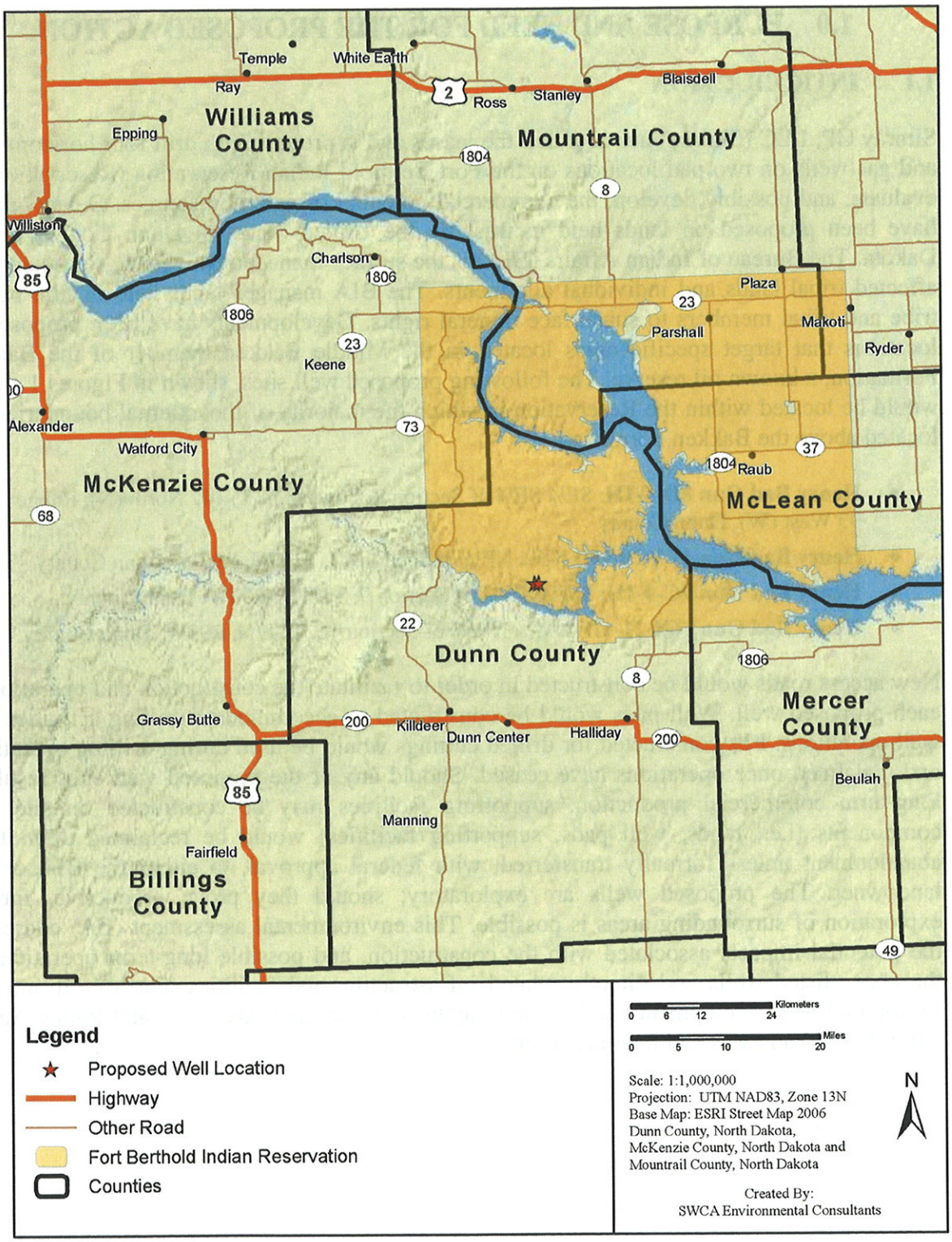

Figure 1. Project location.

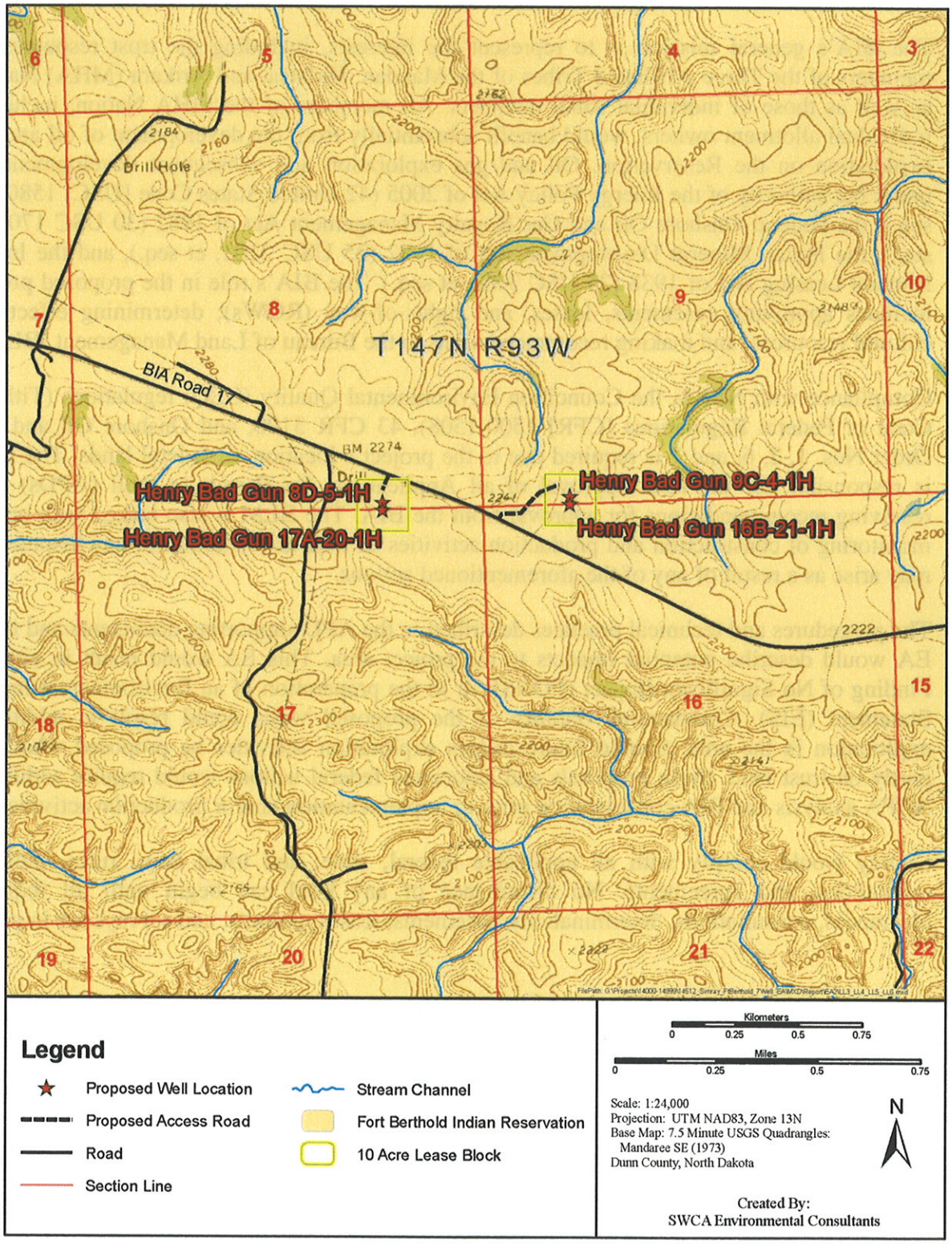

Figure 2. Proposed well locations.

1.2 FEDERAL AND OTHER RELEVANT REGULATIONS AND AUTHORITIES

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

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

The procedures and technical practices described in the APD supporting documents and in the EA would describe potential impacts to the project area. This EA would result in either a Finding of No Significant Impact (FONSI) or in the preparation of an Environmental Impact Statement (EIS). Commercial viability of the proposed wells could result in additional exploration in the area. Should future oil/gas exploration activities be proposed wholly or partly on trust land, those proposals and associated federal actions would require additional NEPA analysis and BIA consideration prior to implementation and/or production activities.

Simray would comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements. No disturbance of any kind can begin until all required clearances, consultations, determinations, easements, leases, permits, and surveys are in place.

2.0 PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

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

2.1 THE NO ACTION ALTERNATIVE

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

2.2 THE PROPOSED ACTION

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

2.2.1 Field Camps

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

2.2.2 Access Roads

Up to 1,155.2 feet (i.e., 0.22 mile) of new access roads would be constructed. A maximum disturbed ROW width of 66 feet for each access road would result in up to 1.75 acres of new surface disturbance. Signed agreements would be in place allowing road construction across

affected private and allotted land surfaces, and any applicable approach permits and/or easements would be obtained prior to any construction activity.

Construction would follow road design standards outlined in the BLM Gold Book (BLM and U.S. Forest Service [USFS] 2007). At a minimum, 6 inches of topsoil would be removed from the access road corridors. This stockpiled topsoil would then be placed on the outside slopes of the ditches following road construction. The ditches would be reseeded as quickly as possible using a seed mixture determined by the BIA. Care would be taken during road construction to avoid disturbing or disrupting any buried utilities that may exist along Highway 22 and BIA Roads 14 and 17. The access roads would be surfaced with a minimum of 4 inches of aggregate prior to commencement of drilling operations and would remain in use for the life of the wells. Details of road construction are addressed in the APD. A diagram of typical road cross sections is shown in Figure 3.

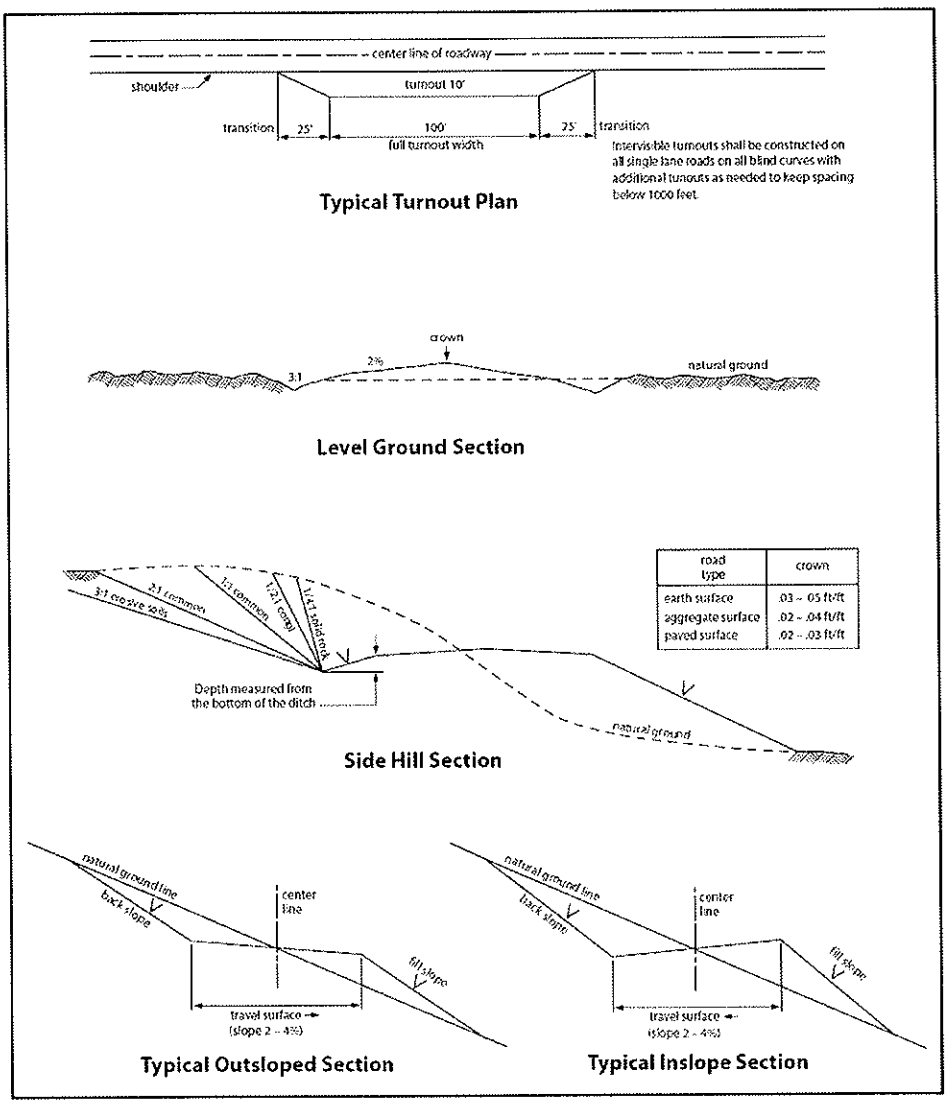

Figure 3. Typical road cross sections (BLM and USFS 2007).

2.2.3 Well Pads

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

The well pads average approximately 500 by 300 feet in size (3.44 acres per well pad). Cut-and-fill slopes, stockpiled topsoil, and reserve pit backfill placed on the edge of the pads would result in approximately 0.1 acre of additional surface disturbance per pad. Total surface disturbance would average approximately 3.5 acres per well pad and would total 7.1 acres. Details of pad construction and reclamation can be found in the APD.

2.2.4 Drilling

After securing mineral leases, Simray submitted the Notices of Staking (NOSs) to the BLM on November 10, 2009. The BIA's office in New Town, North Dakota, receives copies of the APD from the BLM North Dakota Field Office. Construction would begin only when the BIA completes the NEPA process and the APDs are subsequently approved by the BLM.

Rig transport and on-site assembly would take roughly seven days for each well; a typical drill rig is shown in Figure 4. Drilling would require approximately 35 days to reach target depth, using a rotary drilling rig rated for drilling to approximately 15,100 feet. For the first 1,980 feet drilled, a freshwater-based mud system (1.26 gallons per foot of hole drilled) with non-hazardous additives would be used to minimize contaminant concerns. Water would be obtained from a commercial source for this drilling stage.

After setting and cementing the near-surface casing, an oil-based mud system (80% to 85% diesel fuel and 15% to 20% water) would be used to drill to a 7-inch casing point at approximately 11,100 feet. Oil-based drilling fluids reduce the potential for hole sloughing while drilling through water-sensitive formations (shales). Approximately 3,360 gallons of salt water and 13,440 gallons of diesel fuel per well would be used to complete vertical drilling. The lateral reach of the borehole would be drilled using 63,000 gallons of salt water as mud and adding polymer sweeps as necessary to clean the hole.

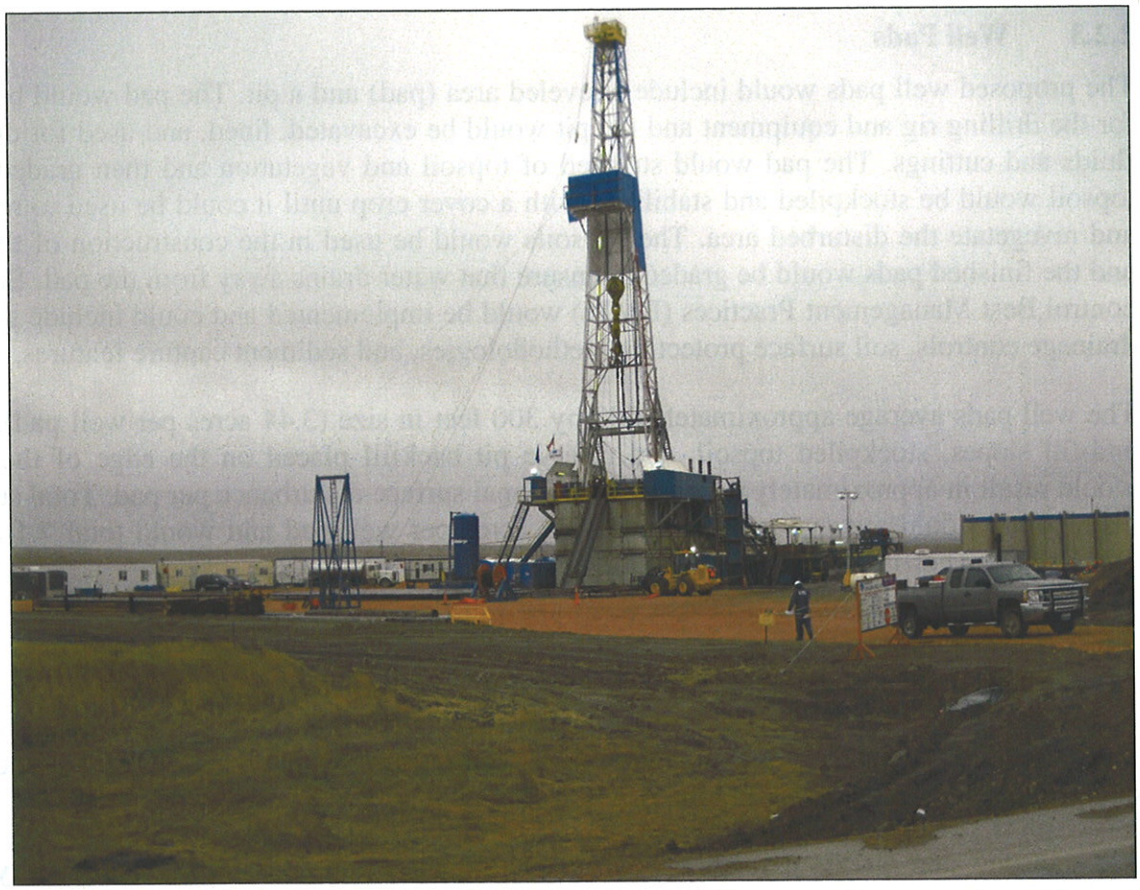

Figure 4. Typical drilling rig.

2.2.5 Casing and Cementing

Surface casing would be set at an approximate depth of 1,980 feet and cemented back to the surface during drilling, isolating all near-surface freshwater aquifers in the project area. The Fox Hills Formation/Pierre Formation would be encountered at depths of approximately 1,700 and 1,800 feet, respectively. Production casing would be cemented from approximately 11,060 feet deep to a depth of about 4,550 feet in order to isolate the hydrocarbon zone present in the Dakota Formation below a depth of 4,500 feet. Casing and cementing operations would be conducted in full compliance with Onshore Oil and Gas Order No. 2 (43 CFR 3160).

2.2.6 Completion and Evaluation

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

the surface where fracture fluids are recovered and disposed of in accordance with North Dakota Industrial Commission (NDIC) rules and regulations.

2.2.7 Commercial Production

If drilling, testing, and production support commercial production from any of the four proposed locations, additional equipment would be installed, including a pumping unit at the well head, a vertical heater/treater, tanks (usually 400-barrel steel tanks), and a flare pit (Figure 5). An impervious dike sized to hold 100% of the capacity of the largest tank plus one full day's production would surround the tanks and the heater/treater. Load out lines would be located inside the diked area and a heavy screen-covered drip barrel would be installed under the outlet. A metal access staircase would protect the dike and support flexible hoses used by tanker trucks. For all above-ground facilities not subject to safety requirements, the BIA would choose a paint color, recommended by the BLM or the Rocky Mountain Five-State Interagency Committee, that would blend with the natural color of the landscape. Commercial production would be discussed more fully in subsequent NEPA analyses.

Figure 5. Typical producing oil well pad (Sobotka 2008).

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

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

In the future, the operator may apply for ROWs for oil and water pipelines and for an electric line, all of which would likely be located within existing disturbance along access and arterial roads. This EA does not address the impacts of construction or operation of such ancillary developments.

2.2.8 Construction Details at Individual Sites

2.2.8.1 Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H Dual-Well Pad

The proposed Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H dual-well site, seen in Figure 6, is located approximately 13.2 miles southeast of Mandaree in the SE¼ SE¼ of Section 8 and the NE¼ NE¼ of Section 17, T147N, R93W in Dunn County, North Dakota. A new access road approximately 178 feet long would be constructed to connect to BIA Route 17 (Figure 7). The new road would disturb approximately 0.27 acre; the proposed well pad would disturb approximately 3.69 acres, bringing the total anticipated new disturbance to 3.96 acres.

2.2.8.1.1 Henry Bad Gun 8D-5-1H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NE¼ NE¼ of Section 5, T147N, R93W (Figure 8). Vertical drilling would be completed at approximately 10,101 feet, at which point drilling would turn roughly horizontal to an approximate total vertical depth (TVD) of 10,510 feet. The drill string would total approximately 20,538 feet at the TMD, including approximately 10,202 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 550 feet from north line (FNL) and 1,300 feet from east line (FEL), about 9,952 feet north of the surface hole location. A setback of at least 500 feet would be maintained.

2.2.8.1.2 Henry Bad Gun 17A-20-1H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the SE¼ SE¼ of Section 20, T147N, R93W (Figure 9). Vertical drilling would be completed at approximately 10,101 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,510 feet. The drill string would total approximately 20,538 feet at the TMD, including approximately 10,202 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 550 feet from the south line (FSL) and 1,300 feet FEL, about 9,944 feet south of the surface hole location. A setback of at least 500 feet would be maintained.

Figure 6. Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H dual-well pad area, looking northeast.

Figure 7. Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H well site access road, looking north.

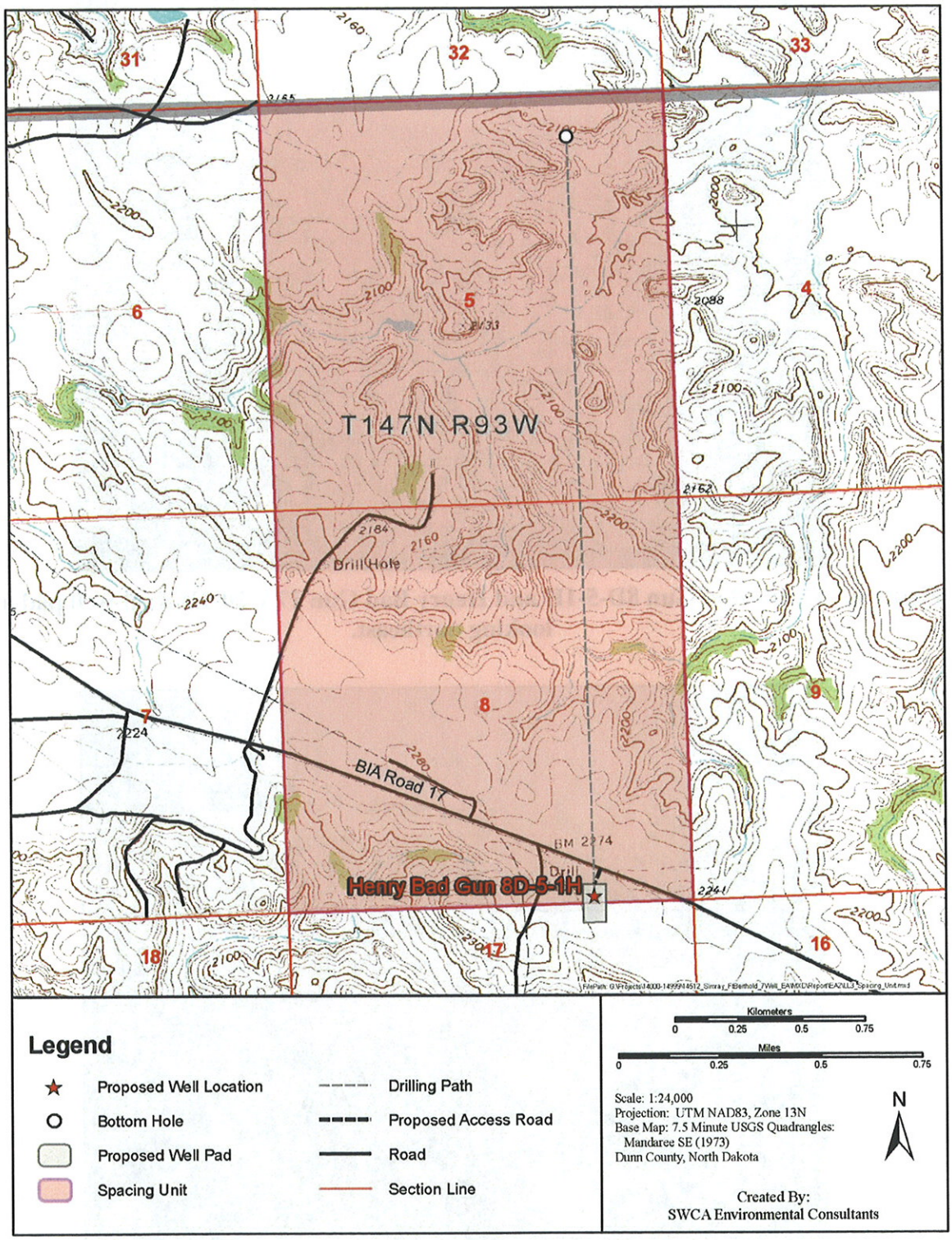

Figure 8. Henry Bad Gun 8D-5-1H proposed location showing spacing unit and drilling target.

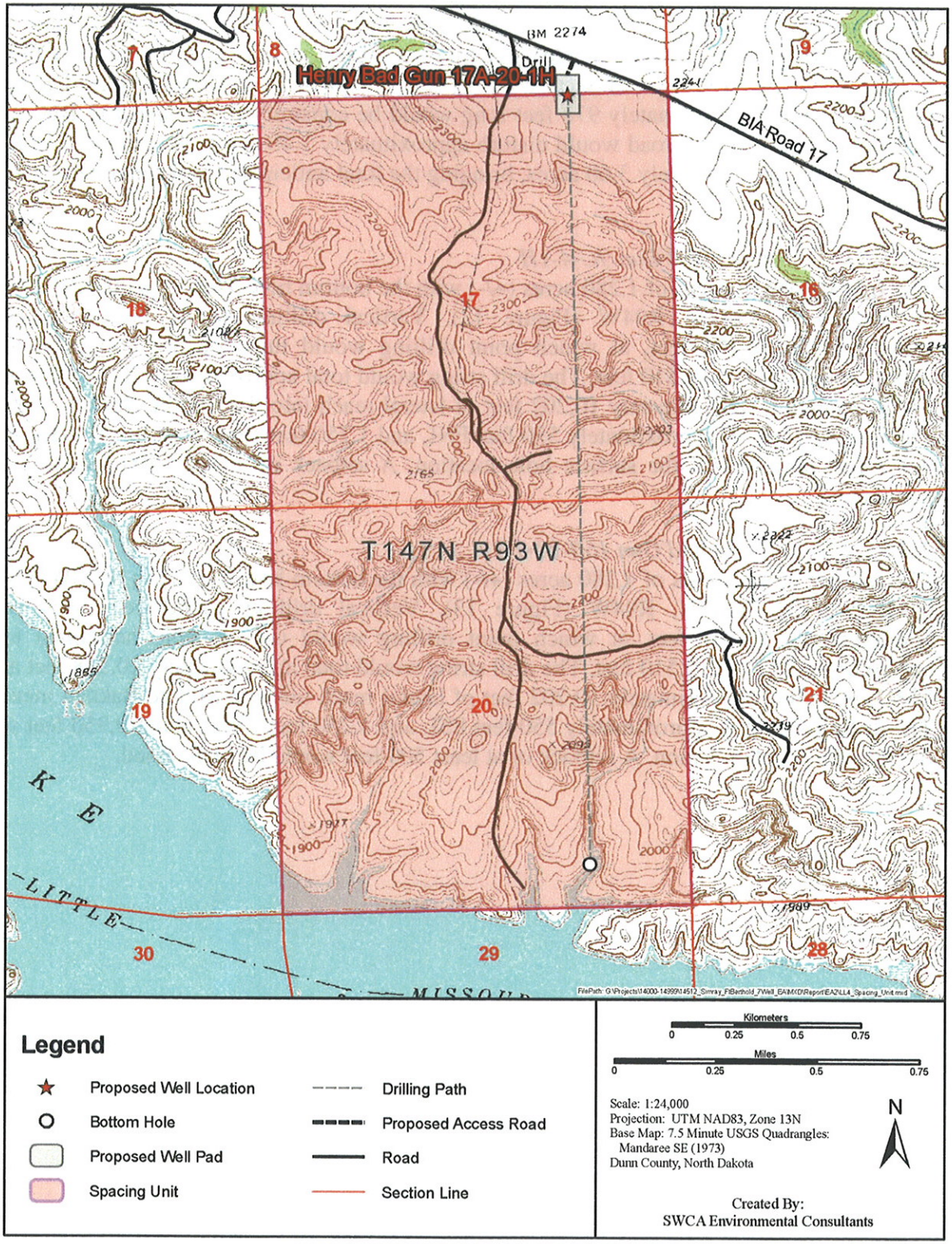

Figure 9. Henry Bad Gun 17A-20-1H proposed location showing spacing unit and drilling target.

2.2.8.2 Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H Dual-Well Pad

The proposed Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H dual-well site, seen in Figure 10, is located approximately 13.4 miles southeast of Mandaree in the SE¼ SE¼ of Section 9 and the NE¼ NE¼ of Section 16, T147N, R94W in Dunn County, North Dakota. A new access road approximately 978 feet long would be constructed to connect to BIA Route 17 (Figure 11). The new road would disturb approximately 1.48 acres; the proposed well pad would disturb approximately 3.60 acres, bringing the total anticipated new disturbance to 5.08 acres.

2.2.8.2.1 Henry Bad Gun 9C-4-1H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the NW¼ NW¼ of Section 4, T147N, R94W (Figure 12). Vertical drilling would be completed at approximately 10,101 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,510 feet. The drill string would total approximately 20,538 feet at the TMD, including approximately 10,202 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 550 feet FNL and 1,250 feet from west line (FWL), about 9,947 feet northeast of the surface hole location. A setback of at least 500 feet would be maintained.

2.2.8.2.2 Henry Bad Gun 16B-21-1H

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the SW¼ SW¼ of Section 21, T147N, R94W (Figure 13). Vertical drilling would be completed at approximately 10,101 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 10,510 feet. The drill string would total approximately 20,538 feet at the TMD, including approximately 10,202 feet of lateral reach into the Middle Bakken member. The drilling target is approximately 550 feet FSL and 1,250 feet FWL, about 9,950 feet south of the surface hole location. A setback of at least 500 feet would be maintained.

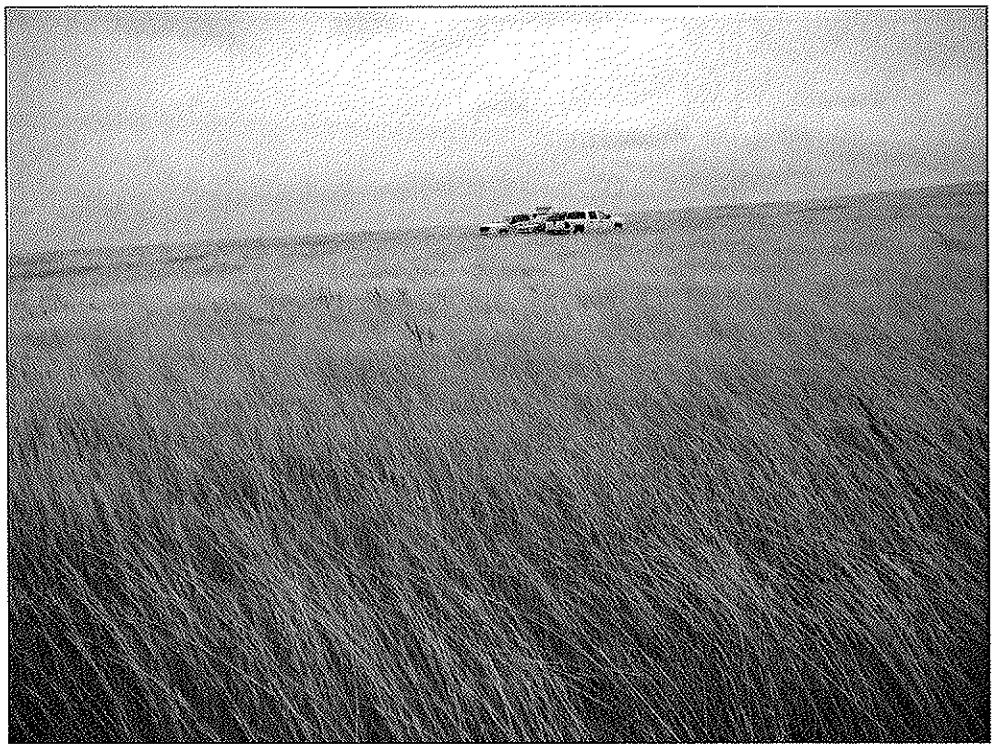

Figure 10. Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H dual-well pad area, looking east.

Figure 11. Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H well site access road area where it enters the location.

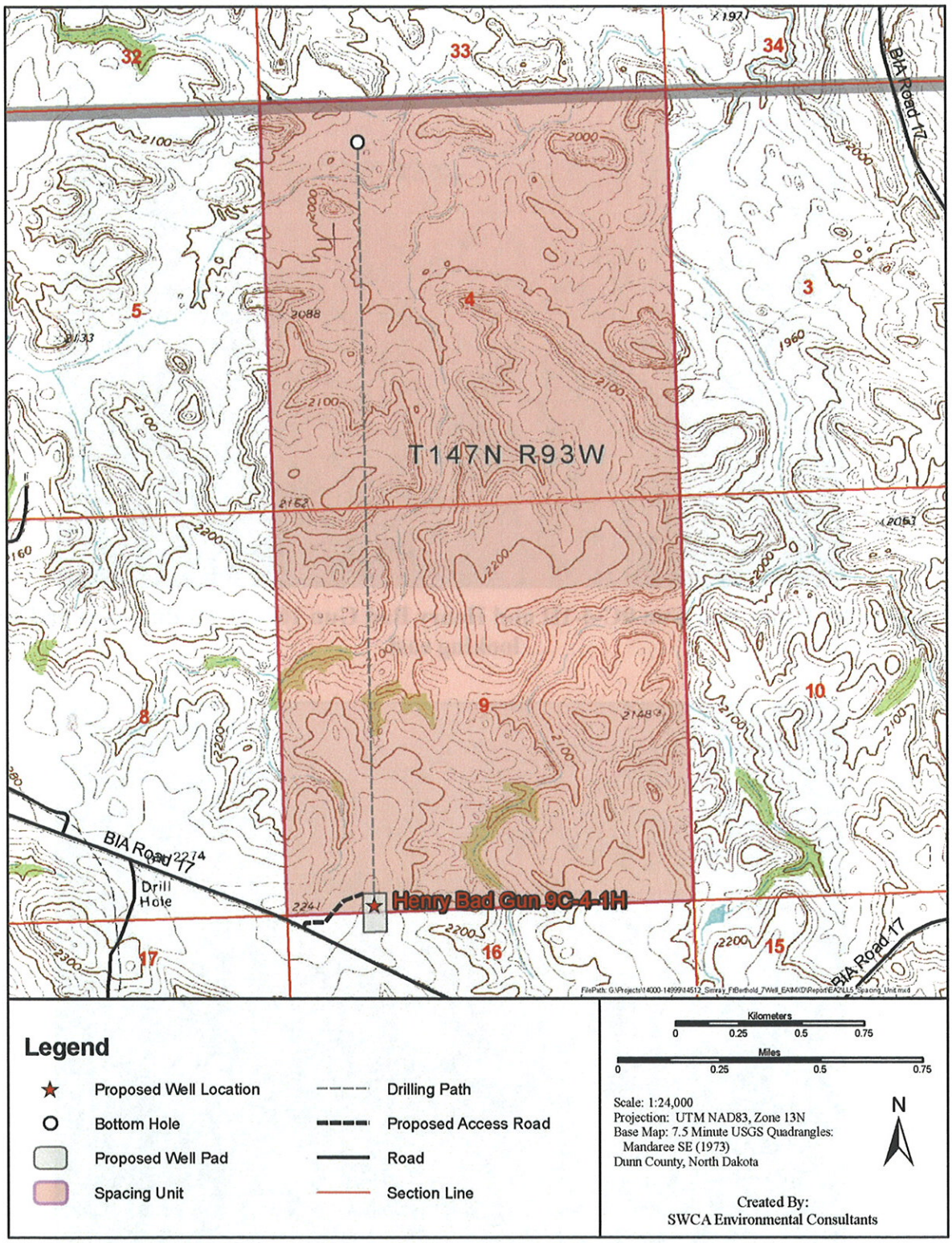

Figure 12. Henry Bad Gun 9C-4-1H proposed location showing spacing unit and drilling target.

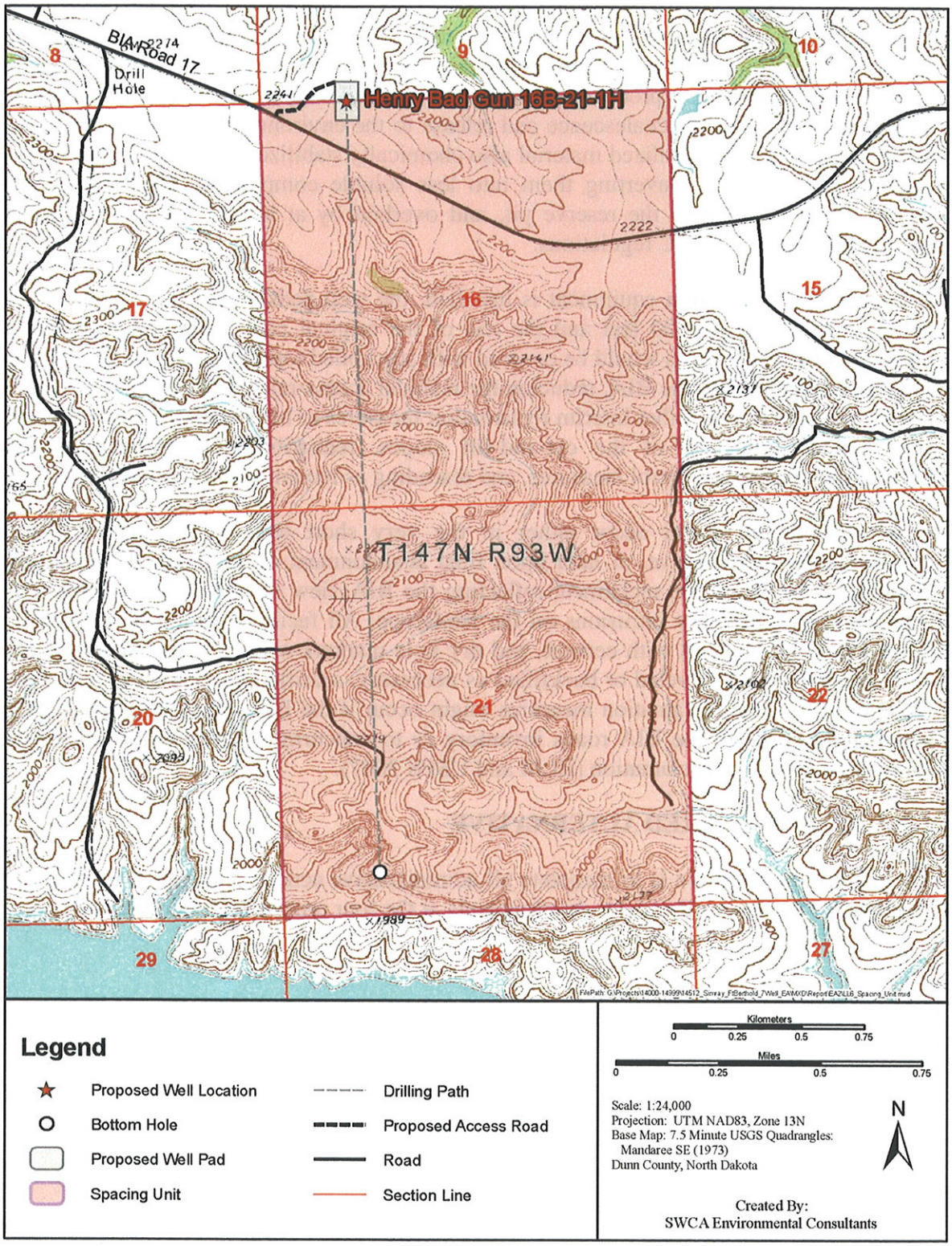

Figure 13. Henry Bad Gun 16B-21-1H proposed location showing spacing unit and drilling target.

2.2.9 Reclamation

The reserve pit and drill cuttings would be treated, solidified, backfilled, and buried as soon as possible after well completion. Cuttings would be mixed with a non-toxic reagent resulting in an irreversible reaction to produce an inert, solid material. Any oil residue would be dispersed and captured, preventing coalescence and release to the environment at significant rates. The alkaline nature of the stabilized material also chemically stabilizes various metals that may be present, primarily by converting them into less soluble compounds. The treated material would then be buried in the reserve pit, and overlain by at least 4 feet of overburden as required by adopted NDIC regulations.

If commercial production equipment is installed, the well pads would be reduced in size to approximately 350 by 200 feet and the rest of the original pads would be reclaimed. The outslope portions of roads would be covered with stockpiled topsoil and re-seeded with a seed mixture determined by the BIA, reducing the residual access-related disturbance to a width of approximately 28 feet. Other interim reclamation measures to be accomplished within the first year include reduction of the cut-and-fill slopes, redistribution of stockpiled topsoil, installation of erosion control measures, and reseeding as recommended by the BIA.

Final reclamation would occur either in the very short term if the proposed well is commercially unproductive, or later upon final abandonment of commercial operations. All disturbed areas would be reclaimed, reflecting the BIA view of oil and gas exploration and production as temporary intrusions on the landscape. All facilities would be removed, well bores would be plugged with cement, and dry hole markers would be set. Access roads and work areas would be leveled or backfilled as necessary, scarified, recontoured, and reseeded. Exceptions to these reclamation measures might occur if the BIA approves assignment of an access road either to the BIA roads inventory or to concurring surface allottees. Figure 14 shows an example of reclamation (BLM and USFS 2007).

2.3 BIA-PREFERRED ALTERNATIVE

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

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

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

Figure 14. Example of reclamation from the BLM Gold Book (BLM and USFS 2007).

3.0 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, inundating much of the Reservation. The remaining land was divided into three sections by Lake Sakakawea, an impoundment of the Missouri River upstream of the Garrison Dam.

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

The Reservation is within the northern Great Plains ecoregion, which consists of four physiographic units: 1) the Missouri Coteau Slope north of Lake Sakakawea; 2) the Missouri River trench (not flooded); 3) the Little Missouri River badlands; and 4) the Missouri Plateau south and west of Lake Sakakawea (Williams and Bluemle 1978). Much of the Reservation is on the Missouri Coteau Slope. Elevations of the glaciated, gently rolling landscape 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 degrees Fahrenheit (°F) in January and between 55 and 83°F in July, with 95 to 130 frost-free days each year (Bryce et al. 1998; High Plains Regional Climate Center 2008).

The proposed well sites and spacing units are in a rural area consisting of pasture land that is used to graze livestock. There are no residences within 1 mile of the proposed well sites; the closest residence is more than 2 miles away (Table 1).

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

Proposed Well	Feet to Nearest Home	Direction to Nearest Home
Henry Bad Gun 8D-5-1H	12,888 feet	Northwest
Henry Bad Gun 17A-20-1H	12,967 feet	Northwest
Henry Bad Gun 9C-4-1H	14,198 feet	Northwest
Henry Bad Gun 16B-21-1H	14,272 feet	Northwest

The broad definition of the human and natural environment under NEPA leads to the consideration of the following elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice. Potential impacts to these elements are analyzed for both the No Action Alternative (described in Section 2.1) and the Proposed Action. Impacts may be beneficial or detrimental, direct or indirect, and short-term or long-term. The EA also analyzes the potential for cumulative impacts and ultimately makes a determination as to the significance of any impacts. In the absence of significant negative consequences, it should be noted that a significant benefit from the project does *not* in itself require preparation of an EIS.

3.1 AIR QUALITY

3.1.1 Introduction

The federal Clean Air Act, as amended in 1990, established national ambient air quality standards for criteria pollutants to protect public health and welfare. It also set standards for other compounds that can cause cancer, regulated emissions that cause acid rain, and required federal permits for large sources. National standards have been established for ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, particulate matter (PM), and lead. These standards were set for pervasive compounds that are generally emitted by industry or motor vehicles. Standards for each pollutant meet specific public health and welfare criteria; thus, they are called the 'criteria pollutants.' Some states have adopted more stringent standards for criteria pollutants, or have chosen to adopt new standards for other pollutants. For instance, North Dakota has a standard for hydrogen sulfide that the U.S. Environmental Protection Agency (EPA) does not.

3.1.2 Atmospheric Stability and Dispersion, and Pollutant Concentrations

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

Three types of temperature inversions typically occur that affect air quality: subsidence, katabatic, and radiation. A subsidence inversion occurs when a mass of aloft high-pressure (cold) air slowly sinks toward the surface. This causes the air underneath to heat as it is compressed. These subsiding layers are more stable than they were at their original higher altitudes. These inversions break up when a low-pressure front moves into the area and causes turbulence.

Katabatic inversions occur when air cooling at higher elevation (e.g., hills) slides, because it is more dense, down into valleys. This cool air in turn lifts warmer air, creating a strong boundary layer. If pollutants are emitted into the air near the surface after this inversion forms, there will be little vertical mixing until the inversion breaks. Katabatic inversions

typically break when the sun warms the earth's surface and allow warmer air to float up through the boundary layer, thus creating vertical mixing.

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

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

Conditions favorable to fog formation are also conditions favorable to high concentrations of CO and PM2.5. Maximum CO concentrations tend to occur on clear, cold nights when a strong surface inversion is present and large quantities of emissions are occurring. The water droplets in fog, however, can act as a sink for CO and nitrogen oxides (NO_x), temporarily lowering pollutant concentrations. At the same time, however, fog can also help in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor of high winter season PM2.5 levels.

3.1.3 Greenhouse Gas Emissions and Climate Change

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

CO_2 is the primary greenhouse gas (GHG), responsible for approximately 90 percent of radiative forcing (the rate of energy change as measured at the top of the atmosphere; can be positive [warmer] or negative [cooler]). To simplify discussion of the various GHGs, the term 'Equivalent CO_2 or CO_2e' has been developed. CO_2e is the amount of CO_2 that would cause the same level of radiative forcing as a unit of one of the other GHGs. For example, one ton of methane (CH_4) has a CO_2e of 22 tons; therefore, 22 tons of CO_2 would cause the same level of radiative forcing as one ton of CH_4. Nitrous oxide (N_2O) has a CO_2e value of 310. Thus, control strategies often focus on the gases with the highest CO_2e value. CH_4 is a common fugitive gas emission in oil and gas fields and is emitted at many phases of exploration and production.

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

What does this mean? According to the Pew Center, "Over the past 50 years, the (worldwide) data on extreme temperatures have shown similar trends of rising temperatures: cold days, cold nights, and frosts occurred less frequently over time, while hot days, hot nights, and heat waves occurred more frequently (Pew Center 2009)." Generally, the earth's temperature has increased about one degree Celsius since 1850 but some areas have seen an increase of four degrees. Sea levels are also rising, mountain glaciers are disappearing, and ocean currents, such as the Gulf Stream, are slowing. According to the IPCC, sea levels could rise by 2.5 feet to over 6.6 feet depending on the rate of melt in the Polar Regions. Much of the increase is due to thermal expansion. Changes of this magnitude will affect rainfall patterns worldwide.

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

According to the Center for Integrative Environmental Research at the University of Maryland (CIERUM), climate change will affect the climate of North Dakota significantly over time. "North Dakota will experience an increase in the unpredictability of droughts, floods and pests. This will make it hard for farmers—and especially small farmers—to remain in the agricultural industry. Damages to the agricultural industry will in turn have negative effects on the livestock industry. Furthermore, the hunting, fishing and tourism industries will suffer losses due to reductions in habitats and receding water levels. These losses can, and are likely to be, devastating to North Dakota's economy, which has a small population and relies heavily on the revenue procured by these industries (CIERUM 2008)."

3.1.4 Criteria Pollutants

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

Respirable Particulate Matter is a class of compounds that can lodge deep in the lungs causing health problems. Based on extensive health studies, particulate matter is regulated under two classes. PM10 is the fraction of total PM 10 microns or smaller, and PM2.5 is two and a half microns or smaller. Respirable particulate matter can range from inorganic wind-blown soil to organic and toxic compounds found in diesel exhaust. Toxic compounds such as benzene often find a route into the body via inhalation of fine particulate matter.

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

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

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

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

Table 2. Air Quality Standards and Monitored Data.

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$) or (*ppm*)	Year		
			2006	2007	2008
SO_2 (in ppm)	24-Hour	*0.14*	0.011	0.011	0.009
	Annual Mean	*0.03*	0.002	0.002	0.002

PM_{10} (in $\mu g/m^3$)	24-Hour	150	50	57	108
	Annual Mean	50	14	13	16
$PM_{2.5}$ (in $\mu g/m^3$)	24-Hour	35	18.9	13.5	16.4
	Weighted Annual Mean	15	6.3	6.6	6.7
NO_2 (in ppm)	Annual Mean	*0.053*	0.003	0.003	0.003
O_3 (in ppm)	1-Hour	*0.12*	0.076	0.076	0.069
	8-Hour	*0.08*	0.067	0.065	0.063

Source: EPA 2009. $\mu g/m^3$ =micrograms per cubic meter. ppm=parts per million
Note: for PM2.5 the 4th highest 24-hour value is reported per EPA attainment evaluation protocol.

3.1.5 Hazardous Air Pollutants

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

Risk assessments express premature mortality in terms of the number of deaths expected per one million persons. The North Dakota Department of Health (NDDH) typically reviews projects and either requires an applicant to prepare a risk assessment or assign the state engineers to do the work. The state requires that maximum individual cancer risk be calculated using its adopted protocol (the Determination of Compliance in the state's Air Toxics Policy). For new sources emitting HAPs with known negative health effects, an applicant must demonstrate that the combined impact of new HAP emission does not result in a maximum individual cancer risk greater than 1×10^{-5} (one in one hundred thousand).

3.1.6 Air Monitoring

The NDDH operates a network of monitoring stations around the state that continuously measure pollution levels. Industry also operates monitoring stations as required by the state. The data from all these stations are subject to quality assurance, and when approved, it is published on the World Wide Web (available from EPA and other sources). Monitoring stations near the project site include Watford City in McKenzie County, Dunn Center in Dunn County, and Beulah in Mercer County. These stations are located west, south, and southeast of the proposed well sites, respectively. Criteria pollutants measured include SO_2, PM_{10}, NO_2, and ozone. Lead and CO are not monitored by any of the three stations. Table 2 summarizes federal air quality standards and available air quality data from the three-county study area. The highest value at any of the three monitoring locations is shown for each year.

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

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

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

The Clean Air Act mandates prevention of significant deterioration in the designated attainment areas. Class I attainment areas have national significance and include national parks greater than 6,000 acres, national monuments, national seashores, and federal wilderness areas larger than 5,000 acres that were designated prior to 1977. Theodore Roosevelt National Park, a Class I area that covers about 110 square miles in three units within the Little Missouri National Grassland, lies between Medora and Watford City and is roughly 30 to 40 miles west of the proposed well sites. All other parts of the state, including the Reservation, are classified Class II, affording them a lower level of protection from significant deterioration.

3.1.7 Response to the Threat of Climate Change

The EPA has proposed an endangerment finding that would allow regulation of GHGs under the Clean Air Act. The first step is a regulation that requires sources emitting 25,000 tons or more CO_2e to report their emissions. The EPA and the National Highway Traffic Safety Administration have increased corporate fuel economy standards to promote national energy security and reduce GHGs. Standards will equal 35 miles per gallon by 2020, with an estimated savings to drivers of $100 billion annually. Many U.S. states and foreign nations have adopted goals and actions to reduce GHGs to levels scientists forecast will allow the earth's climate to stabilize at one to two degrees Celsius above the current level. Additional regulation is currently being developed by the U.S. Congress to roll back emissions to levels recommended by atmospheric scientists.

3.1.8 Project Emissions

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

- Combustion emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), GHGs, and HAPs. Sources include engine exhaust, dehydrators, and flaring.
- Fugitive emissions include criteria pollutants, H_2S, VOCs, HAPs, and GHGs. Sources include equipment leaks, evaporation ponds and pits, condensate tanks, storage tanks, and windblown dust (from truck and construction activity).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents.

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

3.1.9 Regulatory Emission Controls

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

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

1. Any oil and gas well that is/was completed or re-completed on or after July 1, 1987. The registration form must be submitted within 90 days of the completion or re-completion of the well.
2. The owner or operator of any oil or gas well shall inform the Health Department of any change to the information contained on the registration form for a particular well. The owner shall submit a new gas analysis if the composition or the volume of the gas produced from the well has changed from the previous analysis, and cause an increase of 10 tons per year or more of sulfur compounds.
3. North Dakota rules require that all new sources of H_2S and VOCs be flared or treated in an equally effective manner. Flares must have an auto igniter or pilot light. The stack height of flares will be sufficient to allow dispersion of the flared gas. The gas produced from the Bakken formation is typically low in H2S so odors from fugitive gas leaks are not expected to be a problem.
4. Chapter 33-15.03.03 of the state rules specify that fugitive dust emissions greater than 40% opacity cannot leave the project site for more than one six-minute period per hour. This applies to all construction and unpaved road emission sources.

3.1.10 Best Management Practices

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

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

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

3.2 WATER RESOURCES

3.2.1 Surface Water

As shown in Figure 15, no perennial waterbodies are located near the proposed project areas. Given the topography of the individual sites over the project area, runoff occurs largely as sheet-flow. Runoff that concentrates near the proposed project well areas will flow to unnamed creeks and Moccasin Creek, and subsequently into Lake Sakakawea.

The proposed Henry Bad Gun 8D-5-1H is located in the Lower Moccasin Creek/Moccasin Creek Bay subwatershed (hydrologic unit code [HUC] 101102050605) of the Waterchief Bay Watershed (Figure 15). It is part of the Lower Little Missouri River subbasin, the Little Missouri basin and subregion, and Missouri region. Runoff from the well pad would flow to the southwest into an unnamed ephemeral tributary (HUC 10110205001626) and travel approximately 1.9 miles until reaching perennial waters in Lake Sakakawea (Figure 16).

The proposed Henry Bad Gun 9C-4-1H is located in the Lower Moccasin Creek/Moccasin Creek Bay subwatershed (HUC 101102050605) of the Waterchief Bay Watershed (Figure 15). It is part of the Lower Little Missouri River subbasin, the Little Missouri basin and subregion, and Missouri region. Runoff from the well pad would flow to the north into an ephemeral unnamed draw that flows directly into Lake Sakakawea. Runoff will travel approximately 4.7 miles until reaching perennial waters in Lake Sakakawea (Figure 16).

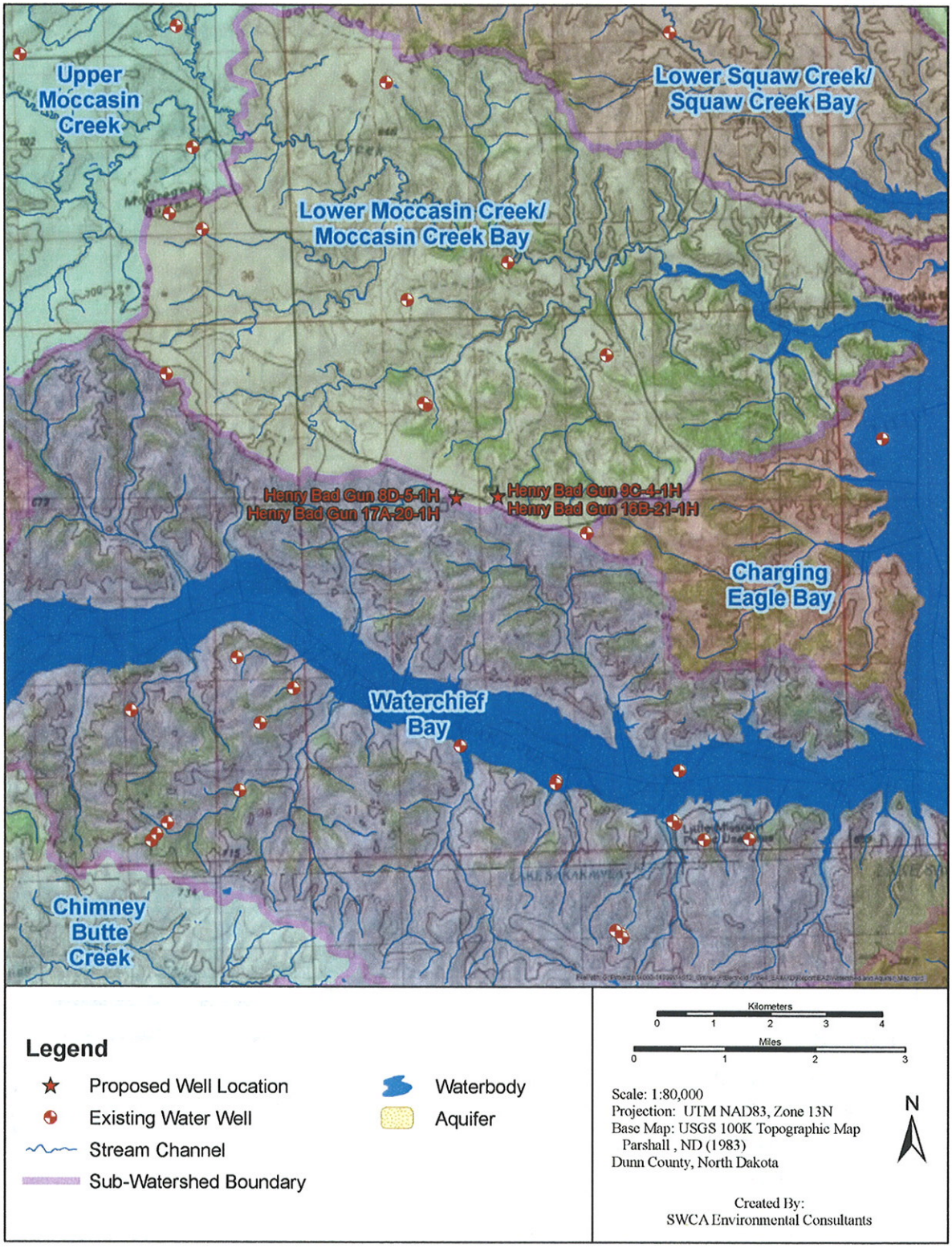

Figure 15. Watersheds, surface runoff direction, and aquifers near the project area.

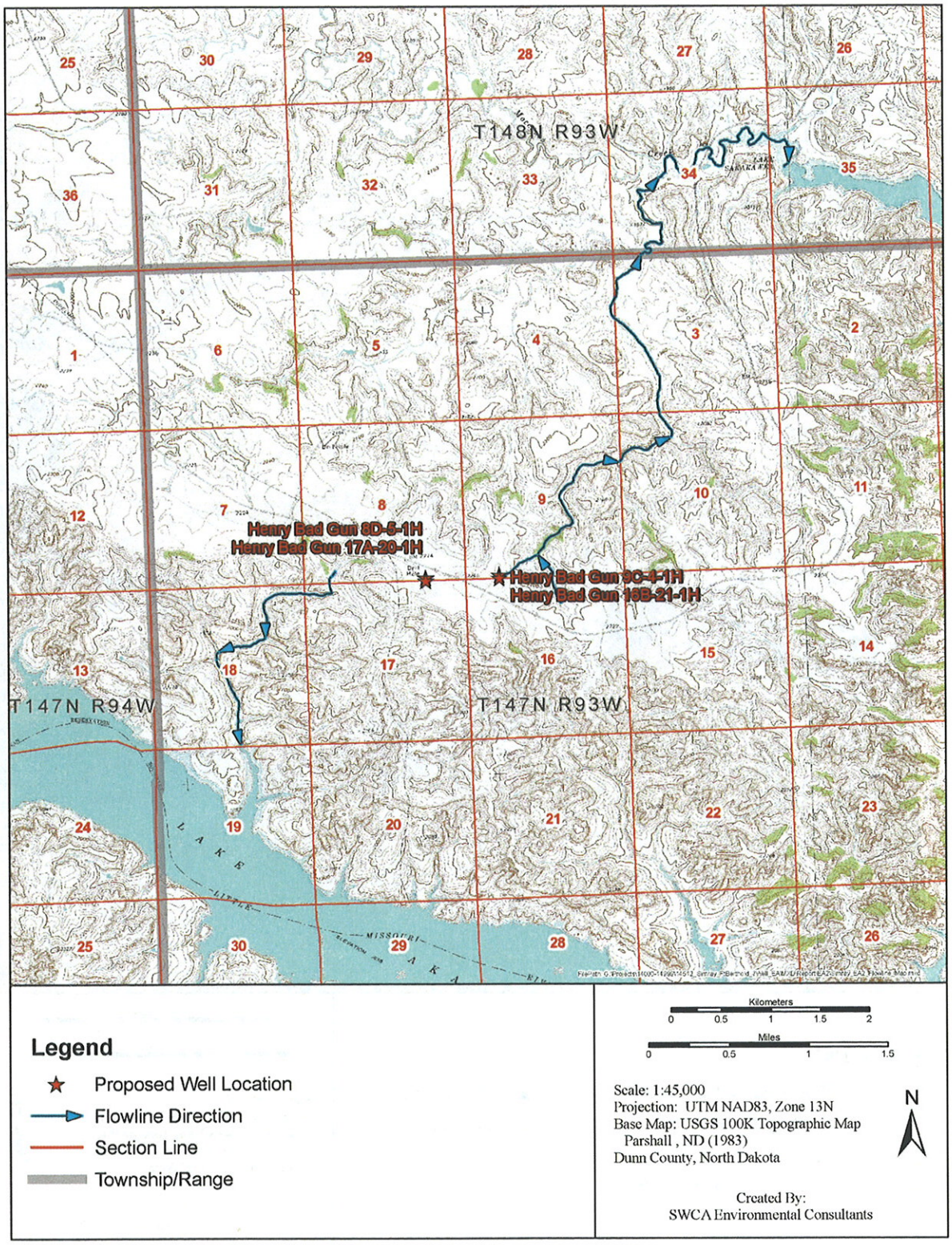

Figure 16. Drainage direction from each of the proposed well pads.

The proposed Henry Bad Gun 16B-21-1H is located in the Lower Moccasin Creek/Moccasin Creek Bay subwatershed (HUC 101102050605) of the Waterchief Bay Watershed (Figure 15). It is part of the Lower Little Missouri River subbasin, the Little Missouri basin and subregion, and Missouri region. Runoff from the well pad would flow to the north into an ephemeral unnamed tributary of Lower Moccasin Creek (HUC 10110205006070) and travel approximately 23.6 miles until reaching perennial waters in Lake Sakakawea (Figure 16).

The proposed Henry Bad Gun 17A-20-1H is located in the Lower Moccasin Creek/Moccasin Creek Bay subwatershed (HUC 101102050605) of the Waterchief Bay Watershed (Figure 15). It is part of the Lower Little Missouri River subbasin, the Little Missouri basin and subregion, and Missouri region. Runoff from the well pad would flow to the southwest into an unnamed ephemeral tributary (HUC 10110205001626) and travel approximately 1.9 miles until reaching perennial waters in Lake Sakakawea (Figure 16).

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

3.2.2 Groundwater

Aquifers in the project area include, from deepest to shallowest, the Cretaceous Fox Hills and Hell Creek formations and the Tertiary Ludlow, Tongue River, and Sentinel Butte formations (Table 3). Several shallow aquifers related to post-glacial outwash composed of till, silt, sand, and gravel are located in Dunn County. However, none are within the proposed project areas (Figure 15). The shallow Sentinel Butte Formation, commonly used for domestic supply in the area, outcrops in Dunn County and meets standards of the NDDH (Croft 1985). Detailed analyses are available from the North Dakota Geological Survey, Bulletin 68, Part III, 1976.

Review of electronic records of the North Dakota State Water Commission revealed 26 existing water wells within an approximate 5-mile boundary of the proposed project areas (Table 4). None of the water wells are within 1 mile of any of the project wells. Water quality would be protected by drilling with freshwater to a point below the base of the Fox Hills Formation, implementing proper hazardous materials management, and using appropriate casing and cementing. Drilling would proceed in compliance with Onshore Oil and Gas Order 2, Drilling Operations (43 CFR 3160).

Table 3. Common Aquifers in the Proposed Project Area and Surrounding Region.

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

Source: Croft (1985) and Klausing (1979).
gal/min = gallons per minute

Table 4. Existing Water Wells near the Project Area.

Well Number	Owner	Date Drilled	Section	Township/ Range	Type/Use	Depth (feet)	Aquifer	Nearest Well	Miles to Proposed Well
146-093-03CDD	Andrew Voigt	1972	3	146/93	Stock	1,525	Fox Hills	16B-21-1H	4.9
147-092-07	Harley Swenson	1974	7	147/106	Domestic	86		9C-4-1H	4.0
147-093-03DBB	Tribal	Unknown	3	147/93	Unused	223	Sentinel Butte	9C-4-1H	2.0
147-093-15BCD	Tribal	1950	15	147/93	Unused	405	Unknown	16B-21-1H	1.1
147-093-29DCA	A. Voight	1930	29	147/93	Stock	373	Sentinel Butte Tongue River	17A-20-1H	2.7
147-093-33A	Andrew Voigt	1989	33	147/93	Stock	1,390	Unknown	16B-21-1H	3.2
147-093-33A	Andrew Voigt	1989	33	147/93	Stock	1,250	Unknown	16B-21-1H	3.2
147-093-35BB	Corps of Engineers	1985	35	147/93	Domestic	560	Unknown	16B-21-1H	3.6
147-093-35CBC	Corps of Engineers	1989	35	147/93	Municipal	1,317	Unknown	16B-21-1H	4.0
147-093-35CD	Hansen Ranch	1990	35	147/93	Stock	1,080	Unknown	16B-21-1H	4.4
147-093-35DD	Hansen Ranch	1990	35	147/93	Stock	1,039	Unknown	16B-21-1H	4.7
147-093-35CBC	Corps of Engineers	Unknown	35	147/93	Recreation	96	Tongue River	16B-21-1H	4.0
147-094-02AD	Tribal	1950	2	147/94	Unused	315	Unknown	8D-5-1H	3.5
147-094-24C	Earl Pelton	1989	24	147/94	Stock	1,420	Unknown	17A-20-1H	3.0
147-094-25	Earl Pelton	1988	25	147/94	Stock	1,280	Unknown	17A-20-1H	3.3
147-094-25AA	Attas Boutrous	2007	25	147/94	Domestic	92	Unknown	17A-20-1H	2.7
147-094-26BCB	K. Knutson	1969	26	147/94	Stock	1,500	Fox Hills	17A-20-1H	4.3
147-094-35C	Kim Knutson	1989	35	147/94	Stock	1,560	Unknown	17A-20-1H	4.9
147-094-35CAA	Kenneth Knutson	1974	35	147/94	Monitoring	1,610	Unknown	17A-20-1H	4.7
147-094-35CAC	Paces Lodging Corp	2008	35	147/94	Domestic	807	Unknown	17A-20-1H	4.9
147-094-36B	Earl Pelton	1989	36	147/94	Stock	1,450	Unknown	17A-20-1H	4.0
148-093-20BCA	Tribal	1950	20	148/93	Unused	450	Unknown	8D-5-1H	4.7

Well Number	Owner	Date Drilled	Section	Township/ Range	Type/Use	Depth (feet)	Aquifer	Nearest Well	Miles to Proposed Well
148-093-32CDB	Tribal	1950	32	148/93	Unused	400	Unknown	8D-5-1H	2.3
148-94-25CCC	J. Chase	Unknown	25	148/94	Unused	120	Unknown	8D-5-1H	4.1
148-094-26AAA	Matt Young Bird	1973	26	148/94	Domestic	124	Unknown	8D-5-1H	4.9
148-094-26DCA	Tribal	Unknown	26	148/94	Unused	290	Sentinel Butte	8D-5-1H	4.4

Source: North Dakota State Water Commission (2009).

Since none of the proposed project area lies within the boundaries of the post-glacial outwash aquifers, low porosity bedrock near the project wells would act as confining layers to prevent impacts to groundwater resources. Additionally, well completion methods would prevent cross contamination between aquifers or the introduction of hazardous materials into aquifers. The majority of the identified groundwater wells may have minimal hydrologic connections due to their respective distance from the project wells.

3.3 WETLANDS, HABITAT, AND WILDLIFE

3.3.1 Wetlands

National Wetland Inventory maps maintained by the U.S. Fish and Wildlife Service (USFWS) do not identify any jurisdictional wetlands within the proposed well pads or access roads (USFWS 2008a). No wetlands were observed along any access road ROWs or at any of the well sites during surveys conducted in September 2009. No riparian or wetland habitats are anticipated to be directly or indirectly impacted by the proposed access roads or wells.

According to the USFWS National Wetland Inventory database, several palustrine emergent (PEM) wetlands are located between 1.55 and 1.97 miles from the proposed project areas. One PEM wetland is located at a distance of 1.56 miles and a bearing of 304.57° from the Henry Bad Gun 8D-5-1H well pad area. One PEM wetland is located at a distance of 1.56 miles and a bearing of 333.97° from the Henry Bad Gun 17A-20-1H well pad area. One PEM wetland is located at a distance of 1.96 miles and a bearing of 296.29° from the Henry Bad Gun 9C-4-1H well pad area. One PEM wetland is located at a distance of 1.97 miles and a bearing of 296.83° from the Henry Bad Gun 16B-21-1H well pad area. These PEM wetlands would not be impacted as a result of construction, drilling, or production activities associated with the proposed well pad areas and associated access roads.

3.3.2 Wildlife

Several wildlife species that may exist in Dunn County are listed as threatened or endangered under the Endangered Species Act (ESA). Listed species in Dunn County include the black footed ferret, gray wolf, interior least tern, pallid sturgeon, piping plover, and whooping crane (USFWS 2008b). Although delisted in 2007, the bald eagle remains a species of special concern to the BIA and the Department of the Interior, and is effectively treated the same as

listed species. Tribes and states may recognize additional species of concern; such lists are taken under advisement by federal agencies, but are not legally binding in the manner of the ESA. Species listed by either the USFWS are described below.

Bald Eagle (*Haliaeetus leucocephalus*)
Status: Delisted in 2007
Likelihood of impact: Not likely to adversely affect

Project areas are located between 2.1 and 2.3 miles from Lake Sakakawea and do not contain suitable nesting/perching habitat, concentrated feeding areas, or other necessary habitat. Thought delisted, the bald eagle is afforded some protection under the Migratory Bird Treaty Act (916 USC 703-711) and the Bald and Golden Eagle Protection Act (16 USC 668-668c). No impacts are anticipated.

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

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

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

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

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

The golden eagle prefers habitat characterized by open prairie, plains, and forested areas. Usually, golden eagles can be found in proximity to badland cliffs which provide nesting habitat. None of the proposed project areas contain suitable nesting habitat for golden eagles; however, eagle prey species may be present within and around the project area. No impacts are expected as a result of any activities associated with the construction, production, or reclamation of the project areas.

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

The project areas do not contain suitable habitat for occupation or colonization by gray wolves. Due to the distance of known gray wolf populations in Minnesota, Canada, Montana, and Wyoming, transient wolves are not expected to be present. No impacts are anticipated.

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

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

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

Activities associated with the construction, production, or reclamation of the project areas are not anticipated to adversely affect water quality and subsequently the pallid sturgeon. Pallid sturgeons prefer turbid, main stem river channels. No project area is closer than 2 miles from Lake Sakakawea which would reduce the likelihood of adverse affect due to activities. No impact is anticipated.

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

The entire shoreline of Lake Sakakawea has been designated critical habitat for piping plover. These birds nest on sparsely vegetated shoreline beaches, peninsulas, and islands composed of sand, gravel, or shale. The nearest critical habitat would be greater than or equal to 2 miles from the proposed project areas. Individual piping plovers may transition across or forage at the proposed project areas during construction, drilling, production, or reclamation activities. However, no impact is anticipated though minor impacts could occur as a result of the aforementioned activities.

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

No viable habitat including PEM wetlands is located within the proposed project areas. The lack of suitable foraging and nesting habitat makes the proposed project areas unsuitable for whooping cranes. No impact is anticipated.

The wildlife species listed in Table 5 were observed during field visits to the proposed project areas. All species listed were visually observed by a biologist during the field survey (i.e., primary observation). Various secondary indicators, including scat, tracks, and animal carcasses, were not observed within the proposed project areas.

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

Well Pad Area	Common Name	Scientific Name	Observation Type	Habitat
Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H	Canada goose	*Branta canadensis*	Pasture	Grazed
Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H	N/A	N/A	No Species Observed	N/A

The primary impacts to wildlife species would come as a result of the construction of two well pad areas including construction of new access roads, increased vehicular traffic density, drilling activities, and potential commercial production. No impacts to listed species are anticipated because of the low likelihood of their occurrence within the proposed project areas, confirmed by on-site assessments conducted by SWCA Environmental Consultants biologists. Ground clearing might impact habitat for unlisted species, including small birds, small mammals, and other wildlife species. Proposed projects may affect raptor and migratory bird species through direct mortality, habitat degradation, and/or displacement of individual birds. These impacts are regulated in part through the Migratory Bird Treat Act of 1918 (916 USC 703-711). Fragmentation of native prairie habitat can detrimentally affect grouse species; however, due to the ratio of each project area to the total landscape area, the overall disturbance would be negligible.

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

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

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

3.4 SOILS

The proposed project areas are located toward the center of the Williston Basin. The Greenhorn Formation, which consists of thin limestone and dark gray to black organic-rich shale, is found from the surface to a depth of approximately 4,000 feet. The Greenhorn is subdivided into lower and upper intervals of limestone and calcareous shale with a middle interval of shale. Near-surface sediment is of Recent, Pleistocene, or Tertiary age, and includes Sauk, Tippecanoe, Kaskaskia, Absaroka, Zuni, and Tejas Sequences.

3.4.1 Natural Resources Conservation Service Soil Data

The Natural Resources Conservation Service (NRCS 2009) soil series present on the well pads and access road areas, and their respective acreages, are listed in Table 6. The acreage shown in Table 6 is based on the spatial extent of soil series combinations derived from NRCS data (Figure 17); therefore, the acreage is approximate and used as a best estimate of soil series distribution at each of the proposed project areas.

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

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

Feature	Soil Series	Percentage of Location	Acres
Henry Bad Gun 8D-5-1H			
New Access Road	Williams loam, 3 to 6 percent slopes	100 %	0.27
Well Pad	Williams loam, 3 to 6 percent slopes	100 %	3.69
Henry Bad Gun 17A-20-1H			
New Access Road	Same as Henry Bad Gun 8D-5-1H	***	***
Well Pad	Same as Henry Bad Gun 8D-5-1H	***	***
Henry Bad Gun 9C-4-1H			
New Access Road	Williams loam, 3 to 6 percent slopes	94 %	1.39
New Access Road	Cabba loam, 15 to 45 percent slopes	6 %	0.09
Well Pad	Williams loam, 3 to 6 percent slopes	100 %	3.60
Henry Bad Gun 16B-21-1H			
New Access Road	Same as Henry Bad Gun 9C-4-1H	***	***
Well Pad	Same as Henry Bad Gun 9C-4-1H	***	***

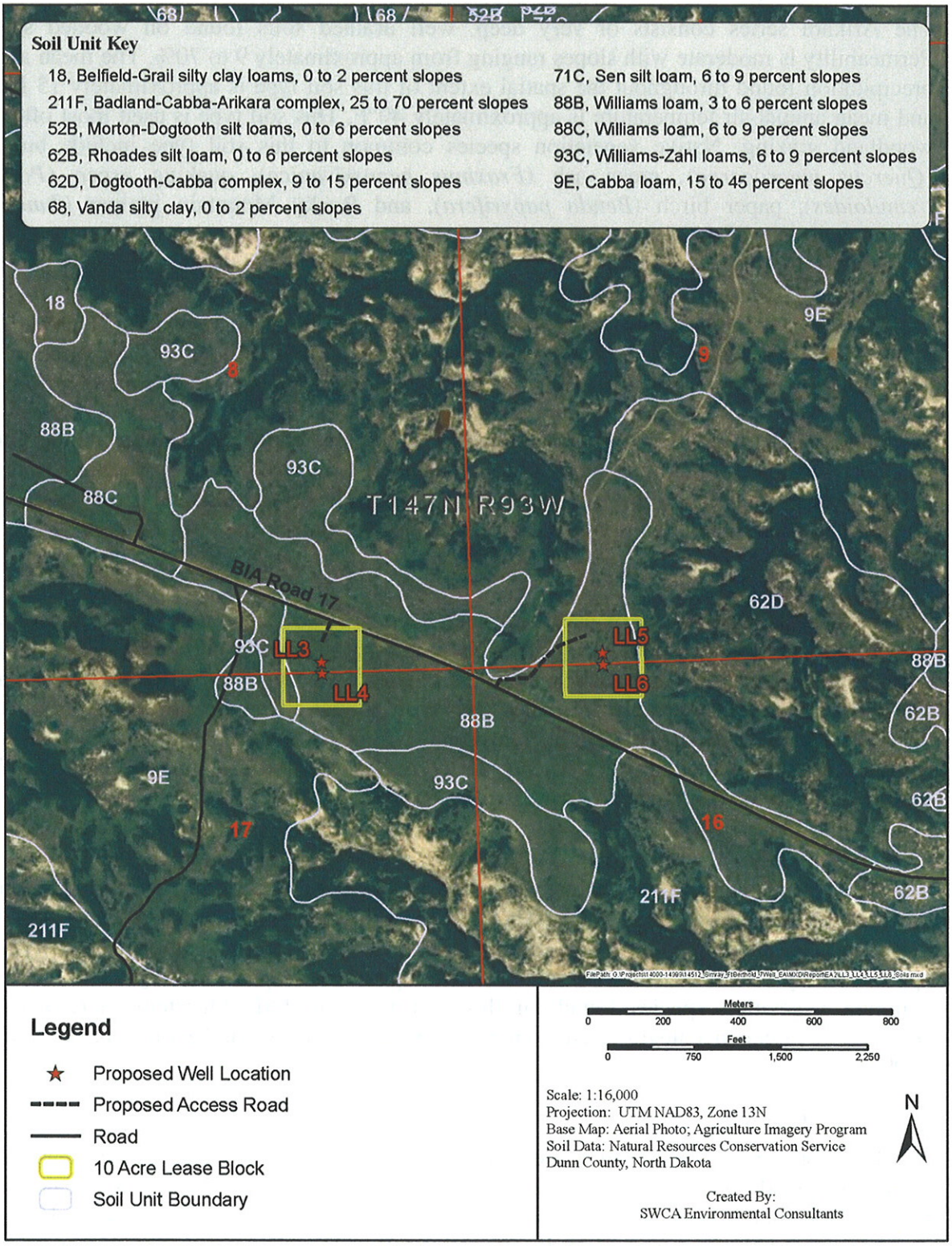

Figure 17. Approximate spatial extent of soil types within and around Henry Bad Gun 8D-5-1H, Henry Bad Gun 17A-20-1H, Henry Bad Gun 9C-4-1H, and Henry Bad Gun 16B-21-1H.

3.4.1.1 Arikara

The Arikara series consists of very deep, well drained soils found on wooded slopes. Permeability is moderate with slopes ranging from approximately 9 to 70%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 40°F. This soil type is used most often for woodland grazing. Native vegetation species common to this soil type include bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*), quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and Rocky Mountain juniper (*Juniperus scopulorum*) (NRCS 2009).

3.4.1.2 Badland (Miscellaneous Area)

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

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

3.4.1.3 Belfield

The Belfield series consists of deep and very deep, well to moderately well drained, very slowly permeable soils found on upland flats, terraces, and swales with slopes ranging from approximately 0 to 9%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 43°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), and green needlegrass (*Nasella viridula*) (NRCS 2009).

3.4.1.4 Cabba

The Cabba series consists of shallow, well drained, moderately permeable soils found on hills, escarpments, and sedimentary plains. The soil slopes broadly range between 2 and 70%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 43°F. The most common vegetation species found on this soil type are little bluestem (*Schizachyrium scoparium*), green needlegrass, and other various herbs, forbs, and shrub species (NRCS 2009).

3.4.1.5 Dogtooth

The Dogtooth series consists of moderately deep, well drained, very slowly permeable soils found in uplands where the predominant slope is between 0 and 25%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 42°F. The most common vegetation species found on this soil type are range and pasture grasses including western wheatgrass and blue grama (NRCS 2009).

3.4.1.6 Grail

The Grail series consists of deep to very deep, slowly permeable soils which are well to moderately well drained. This soil type is found on uplands with slopes ranging from 0 to 15%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for cultivating crops. Native vegetation species common to this soil type include western wheatgrass, big bluestem (*Andropogon gerardii*), and green needlegrass (NRCS 2009).

3.4.1.7 Morton

The Morton series consists of moderately deep, well drained, moderately permeable soils that formed in material weathered from soft calcareous silty shales, siltstones, and fine-grained sandstones. These soils are on uplands and have slopes of 0 to 15 percent. Mean annual air temperature is 42 °F, and mean annual precipitation is 15 inches. Cultivated areas are used for growing small grains, flax, corn, hay, and pasture. Native vegetation is mid- and short-prairie grasses such as western wheatgrass, green needlegrass, and blue grama (NRCS 2009).

3.4.1.8 Rhoades

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

3.4.1.9 Sen

The Sen series consists of well drained, moderately permeable soils that formed in calcareous siltstone or shale. They are moderately deep to soft bedrock. These soils are on upland plains and have slope of 0 to 25 percent. Mean annual air temperature is 42 °F, and mean annual precipitation is 15 inches. This soil type is used for cultivation of small grains in a crop-summer fallow rotation. Native vegetation is mid- and short prairie grasses such as green needlegrass, needle and thread (*Hesperostipa comata*), western wheatgrass, blue grama, and a variety of forbs (NRCS 2009).

3.4.1.10 Vanda

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

3.4.1.11 Williams

The Williams series consists of very deep, slowly permeable, well drained soils found on glacial till plains and moraines with slopes at approximately 0 to 35%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 14 inches and mean annual air temperature is approximately 40°F. This soil type is largely used for cultivation. Native vegetation species common to this soil type include western wheatgrass, needle and thread, blue grama, and green needlegrass (NRCS 2009).

3.4.1.12 Zahl

The Zahl series consists of very deep, slowly permeable, well drained soils found on glacial till plains, moraines, and valley side slopes at approximately 1 to 60%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 14 inches and mean annual air temperature is approximately 40°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass, little bluestem, and needle and thread (NRCS 2009).

3.4.2 Field-Derived Soil Data

Soil data derived from on-site excavated soil pits, including the matrix value, hue, chroma, and color name are summarized in Table 7. Additionally, redoximorphic features (i.e., reduced/oxidized iron or manganese deposits) and soil texture were noted at each soil pit. A Munsell Soil Color Chart was used to determine the color of moist soil samples.

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

Feature	Pit Depth (inches)	Soil Matrix Color (color name)	Redoximorphic Feature Color	Texture	Slope (°)	K Factor
Henry Bad Gun 8D-5-1H and #4						
Well Pad/ Access Road	0–8	10YR 3/1 (very dark gray)	None Observed	Silty Loam	0–1	0.28
Well Pad/ Access Road	8–16	10YR 4/2 (dark grayish brown)	None Observed	Silt Loam	0–1	0.28
Henry Bad Gun 9C-4-1H and #6						
Well Pad/ Access Road	0–10	10YR 3/1 (very dark gray)	None Observed	Silty Clay	1–3	0.28
Well Pad/ Access Road	10–16	10YR 4/3 (brown)	None Observed	Silt Loam	1–3	0.28

K Factor indicates the vulnerability of material less than 2 millimeters in size to sheet and rill erosion by water. Values can range from 0.02 (i.e., lowest erosion potential) to 0.69 (i.e., greatest erosion potential). T represents the maximum volume of soil loss, measured in

tons/acre/year, which could occur and still allow for maintenance of high levels of crop production.

3.4.3 Conclusions Regarding Possible Soil Erosion

3.4.3.1 Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H

1. The Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H well pad and the proposed new access road are dominated (100%) by Williams loam (Table 6).
2. This soil types may have variable run-off depending on the slope, which ranges between 0 and 35% (NRCS 2009).
3. Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2009).
4. This location has a Soil Erodibility Factor (K) of 0.28. The Revised Universal Soil Loss Equation (RUSLE) calculation indicates a possible 2.33 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site would be monitored during and after construction and BMPs would be used to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization.

3.4.3.2 Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H

1. The Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H well pad is dominated (100%) by Williams loam (Table 6); the access road is also dominated by Williams loam (94%) and also contains Cabba loam (6%).
2. The Williams soil series is found on slopes typically ranging from 0 to 35%. The Cabba soil series is found on slopes ranging from 2 to 70% (NRCS 2009).
3. Both soil series are capable of supporting native short- and mid-grass prairie vegetative communities, which may substantially increase the probability for successful and permanent reclamation (NRCS 2009).
4. This location has a Soil Erodibility Factor (K) of 0.28. The RUSLE calculation indicates a possible 2.33 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site would be monitored during and after construction and BMPs would be used to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization.

3.4.3.3 General

Due to the presence of loamy soils and minimal slopes within each of the two proposed project areas, no limitations on construction activities within the project areas are anticipated. The soil types are not expected to create unmanageable erosion issues or interfere with reclamation of the area. Proven BMPs are known to significantly reduce erosion of various types of soil, including those in the project area (BLM Instruction Memorandum 2004-124, www. blm.gov/bmp; BLM and USFS 2007; Grah 1997). Topsoil stripped from areas of new construction would be retained for use during reclamation. Any areas stripped of vegetation during construction would be reseeded once construction activities have ceased. The implementation of BMPs by the operator is projected to reduce and maintain negligible levels of erosion.

3.5 VEGETATION AND INVASIVE SPECIES

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

3.5.1.1 Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H

Vegetation noted at the Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H project area includes green needlegrass, western snowberry, needle-and-thread, silver sagebrush (*Artemisia cana*), purple coneflower (*Echinacea angustifolia*), little bluestem, fringed sagewort (*Artemisia frigida*), and goldenrod (*Solidago canadensis*).

3.5.1.2 Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H

Vegetation noted at the Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H project area includes green needlegrass, western snowberry, needle-and-thread, silver sagebrush, purple coneflower, fringed sagewort, and goldenrod.

Noxious weeds have the potential to detrimentally affect public health, ecological stability, and agricultural practices. North Dakota Century Code (Chapter 63-01.1) recognizes 12 species as noxious. Five species are known to exist in Dunn County. Table 8 indicates total acreage for each noxious species. Additional information is available from the NRCS Plants Database for North Dakota at http://www.plants.usda.gov.

Table 8. Occupied Area for Recognized Noxious Weeds in Dunn County, North Dakota.

Common Name	Scientific Name	Acres
absinth wormwood	*Artemisia absinthium*	38,600
Canada thistle	*Cirsium arvense*	32,800
Dalmatian toadflax	*Linaria dalmatica*	2
diffuse knapweed	*Centaurea diffusa*	--
field bindweed	*Convolvulus arvensis*	33,000
leafy spurge	*Euphorbia esula*	10,500
musk thistle	*Carduus nutans*	2
purple loosestrife	*Lythrum salicaria*	--
Russian knapweed	*Acroptilon repens*	--
salt cedar	*Tamarix ramosissima*	0
spotted knapweed	*Centaurea stoebe*	--
yellow starthistle	*Centaurea solstitialis*	--

Source: North Dakota Department of Agriculture 2007

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

Evaluation of the existing vegetation during on-site assessments conducted in September 2009 indicated no invasive species were present at any of the proposed sites. However, potential disturbance of approximately 9.0 acres and removal of existing vegetation may facilitate the spread of invasive species. The APD and this EA require the operator to control noxious weeds throughout project areas. Surface disturbance and vehicular traffic must not take place outside approved ROWs or the well pad. Areas that are stripped of topsoil must be re-seeded and reclaimed at the earliest opportunity. Additionally, certified weed-free straw and seed must be used for all construction, seeding, and reclamation efforts. Prompt and appropriate construction, operation, and reclamation are expected to maintain minimal levels of adverse impacts to vegetation and would reduce the potential establishment of invasive vegetation species.

3.6 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 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 SWCA Environmental Consultants, using a pedestrian methodology. For the Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H dual well pad project approximately 10.41 acres were intensively inventoried, and for the Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H dual well pad project approximately 12.25 acres were inventoried, both on September 21, 2009 (Lechert 2009a, 2009b). No historic properties were located within either 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 a determination of **no historic properties affected** for these undertakings. This determination was communicated to the THPO on December 14, 2009 (see Part 4); however, no response was received from the THPO within the allotted 30-day comment period.

3.7 SOCIOECONOMICS

Socioeconomic conditions are affected by population, demographics, income, employment, and housing. This analysis focuses on the Reservation, the four counties that overlap 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 at the local level (Table 9). Populations in Dunn and McKenzie counties declined by 5 to 11%, respectively, while populations on the Reservation increased by approximately 10%. These population changes are anticipated to continue (Rathge *et al.* 2002). While American Indians are the predominant group on the Reservation, they are considered the minority in all other areas of North Dakota. Over 67% of the population currently residing within the Reservation are tribal members.

Table 9. Population and Demographics.

County or Reservation	Population in 2000	% of State Population	% Change between 1990–2000	Predominant Group	Predominant Minority (Percent of Population)
Dunn	3,600	0.56	-10.1	Caucasian	American Indian (12%)
McKenzie	5,737	0.89	-10.1	Caucasian	American Indian (21%)

McLean	9,311	1.45	-11	Caucasian	American Indian (6%)
Mountrail	6,631	1.03	-5.6	Caucasian	American Indian (30%)
Fort Berthold Reservation	5,915	0.92	9.8	American Indian	Caucasian (27%)
Statewide	642,200	100	0.005	Caucasian	American Indian (5%)

Employment types on the Reservation are similar to those outside of the Reservation and include ranching, farming, tribal government, tribal private businesses, schools, and federal agencies. The MHA Nation's Four Bears Casino and Lodge, 4 miles west of New Town, employs approximately 320 people, 90% of whom are tribal members (Three Affiliated Tribes 2008).

Counties that overlap the Reservation tend to have per capita incomes, median household incomes, and employment rates below North Dakota statewide averages (Table 10). Subsequently, Reservation residents and MHA Nation members tend to have per capita incomes, median household incomes, and employment rates below the averages of the encompassing counties as well as statewide (Table 10). MHA Nation members are considered disadvantaged relative to overall lower Reservation incomes and higher unemployment rates. Per capita income for Reservation residents is approximately 32% lower than the statewide average. The median household income reported for the reservation ($26,274) is likely skewed upward due to overcrowded housing conditions, but is 64% below the statewide median. A BIA report in 2003 found that 33% of employed MHA Nation members were living below federal poverty levels. The unemployment rate reported for MHA Nation members is approximately 10.9 % and 18.8% greater than the Reservation and North Dakota statewide averages, respectively.

Table 90. 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	--	--	22.00%	33%	Unknown
Fort Berthold Reservation	10,291	$26,274	11.10%	--	Unknown
Mountrail County	29,071	$34,541	5.80%	--	15.40%
Dunn County	27,528	$35,107	3.40%	--	13.00%
McKenzie County	27,477	$35,348	3.10%	--	15.80%
McLean County	32,387	$37,652	4.70%	--	12.80%
North Dakota	31,871	$40,818	3.20%	--	11.20%

Availability and affordability of housing could impact oil and gas development and operations. The number of owner-occupied housing units (1,122) within the Reservation is approximately 57% lower than the average number of owner-occupied housing units found in the four counties that encompass the Reservation (2,601.5). Additionally, these four counties

are ranked extremely low for both the state and national housing starts (Table 11). Housing on the Reservation typically consists of mutual-help homes built with the help of various government programs, low-rent housing units, and scattered-site homes. Private purchase and rental housing are available in New Town. A marked increase in new home building can be seen throughout much of the Reservation, though availability of such homes remains low.

Adverse impacts to socioeconomic stability as a result of the proposed project are not anticipated. However, the proposed project may create relatively high-paying construction jobs, though they are likely to be only temporary during exploration or the development of oil and gas reserves on the Reservation. Long-term production would require one or two full-time employees during commercial activities. Shot-term construction employment would provide some economic benefit while long-term commercial production could result in significant royalties and indirect economic benefits.

Table 101.Housing Development Data for the Reservation and Encompassing Counties.

Housing Development	Reservation	North Dakota County			
	Fort Berthold	Dunn	McKenzie	McLean	Mountrail
New Private Housing Building Permits 2000-2005	--	18	4	135	113
Housing Starts-State Rank	--	51 / 53	15 / 53	21 / 53	17 / 53
Housing Starts-National Rank	--	3,112 / 3,141	2,498 / 3,141	2,691 / 3,141	2,559 / 3,141
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

3.8 ENVIRONMENTAL JUSTICE

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

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

various geographic areas and scales of analysis to define a particular population's status under the Order.

EJ is an evolving concept with potential for disparity concerning the scope of analysis and the implications for federal responsiveness. Nevertheless, it is clear that tribal members on the Great Plains qualify for EJ consideration as both minority and low-income populations. The majority population residing in the Dakotas is Caucasian. On the Reservation, 70% of residents are tribal members; Indians living off the Reservation comprise only 5% of the reported North Dakota population and 12% of the Dunn County population. Even in a state with relatively low per capita and household income, Indian individuals and households are distinctly disadvantaged.

However, there are some unusual considerations when proposed federal actions could benefit tribal members. Determination of fair treatment includes 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 but living elsewhere. Benefits to the MHA Nation government and infrastructure have already resulted from tribal leasing, fees, and taxes. Oil and gas leasing has also 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 of additional tracts owned by currently non-benefitting allottees. The absence of lease and royalty income for individuals does not preclude other, Reservation-wide benefits. Exploration and development could provide many relatively high-paying jobs through the involvement of the Tribal Employment Rights Office.

The owners of allotted surface within the project areas may not necessarily hold mineral rights. In such cases, surface owners do not receive oil and gas lease or royalty income and their only related income would be 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. This potential is significantly reduced following the surveys of proposed well locations and access road routes and determination by the BIA that there would be no effect to historic properties. As discussed in Section 3.7, there are no known historic properties in the project area that qualify as TCPs or for protection under the *American Indian Religious Freedom Act*. Potential for disproportionate impacts of undiscovered TCPs would be mitigated by requirements for immediate work stoppage following an unexpected discovery of cultural resources of any type. Mandatory consultation would take place during any such work stoppage, affording an opportunity for all affected parties to assert their interests and contribute to an appropriate resolution, regardless of their home location or tribal affiliation.

The proposed project poses no threat for significant impact to any other critical element including air quality, public health and safety, water quality, wetlands, wildlife, soils, or vegetation within the human environment. Through the avoidance of such impacts, no

disproportionate impact is expected to low-income or minority populations. The proposed action offers many positive consequences for tribal members, while recognizing EJ concerns. Procedures summarized in this document and in the APD are binding and sufficient. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required.

3.9 MITIGATION AND MONITORING

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

3.10 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

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

3.11 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

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

3.12 CUMULATIVE IMPACTS

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. Past and current disturbances in the vicinity of the project area include farming, grazing, roads, and other oil and gas wells. Reasonably foreseeable future impacts must also be considered. Should development of these wells prove productive, it is likely that Simray and possibly other operators would pursue additional development in the area. Current farming and

ranching activities are expected to continue with little change because virtually all available acreage is already organized into range units to use surface resources for economic benefit. Undivided interests in the land surface, range permits, and agricultural leases are often held by different tribal members than those holding mineral rights. Over the past several years, exploration has accelerated over the Bakken Formation. Most of this exploration has taken place outside the Reservation boundary on fee land, but for purposes of cumulative impact analyses, land ownership and the Reservation boundary are immaterial. Although it is the dominant activity currently taking place in the area, oil and gas development is not expected to have more than a minor cumulative effect on land use patterns.

No active wells were found within 1 mile of the project area (Table 13). There are 12, 81, and 266 oil and gas wells (active, confidential, and permitted) within 5, 10, and 20 miles, respectively, of the proposed project areas (Tables 12 through 15; Figure 18). In total, there are approximately 266 wells within a 20-mile radius of the proposed project areas, including all active, confidential, and permitted wells.

Table 112. Confidential, Active, and Permitted Wells within a 1-mile Radius of the Project Area.

	Henry Bad Gun 8D-5-1H		Henry Bad Gun 17A-20-1H		Henry Bad Gun 9C-4-1H		Henry Bad Gun 16B-21-1H	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	0	0	0	0	0	0	0	0
Active Wells	0	0	0	0	0	0	0	0
Permitted Wells	0	0	0	0	0	0	0	0

Table 123. Confidential, Active, and Permitted Wells within a 5-mile Radius of the Project Area.

	Henry Bad Gun 8D-5-1H		Henry Bad Gun 17A-20-1H		Henry Bad Gun 9C-4-1H		Henry Bad Gun 16B-21-1H	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	9	0	9	0	9	0	9	0
Active Wells	2	1	2	1	2	1	2	1
Permitted Wells	0	0	0	0	0	0	0	0

Table 134. Confidential, Active, and Permitted Wells within a 10-mile Radius of the Project Area.

	Henry Bad Gun 8D-5-1H		Henry Bad Gun 17A-20-1H		Henry Bad Gun 9C-4-1H		Henry Bad Gun 16B-21-1H	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off

Confidential Wells	20	11	20	11	21	7	21	7
Active Wells	9	40	9	40	9	37	9	37
Permitted Wells	0	0	0	0	0	0	0	0

Table 15. Confidential, Active, and Permitted Wells within a 20-mile Radius of the Project Area.

	Henry Bad Gun 8D-5-1H		**Henry Bad Gun 17A-20-1H**		**Henry Bad Gun 9C-4-1H**		**Henry Bad Gun 16B-21-1H**	
Reservation (On/Off)	On	Off	On	Off	On	Off	On	Off
Confidential Wells	38	48	38	52	38	44	38	45
Active Wells	14	164	14	164	14	144	14	144
Permitted Wells	0	0	0	0	0	0	0	0

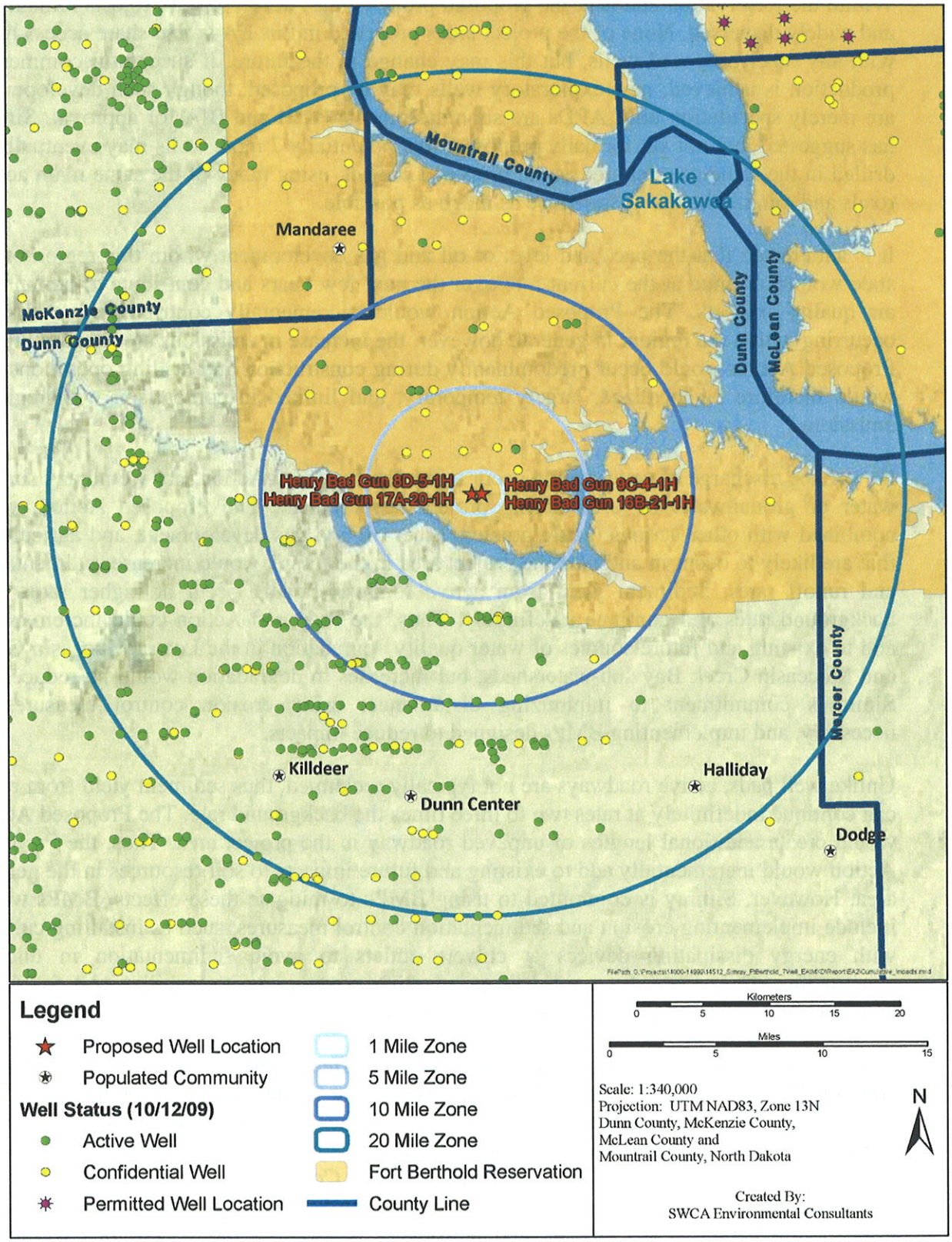

Figure 18. Active, confidential, and permitted wells within a 1-, 5-, 10-, and 20-mile radius of the proposed project locations.

Within the Reservation and near the proposed project areas, development projects remain few and widely dispersed. None of the project areas proposed in this EA would share access roads with any other proposed wells, but this may change in the future. If successful commercial production is achieved, new exploratory wells may be proposed, though such developments are merely speculation until APDs are submitted to the BLM and BIA for approval. Simray has suggested, but not yet formally proposed, that potentially 7 more wells may eventually be drilled in the same general area as the proposed project, using many of the same main access roads and minimizing the disturbance as much as possible.

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

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

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

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

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

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

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

4.0 CONSULTATION AND COORDINATION

The BIA must continue to make efforts to solicit the opinions and concerns of all stakeholders (Table 17). For the purpose of this EA, a stakeholder is considered any agency, municipality, or individual person to which the proposed action may affect either directly or indirectly in the form of public health, environmental, or socioeconomic issues. A scoping letter declaring the location of the proposed project areas and explaining the actions proposed at each site was sent in advance of this EA to allow stakeholders ample time to submit comments or requests for additional information. Additionally, a copy of this EA should be submitted to all federal agencies with interests in or near the proposed actions that could be affected by those actions.

Table 16. Scoping Comments.

Name	Organization	Comment	Response to Comment
Bagley, Lonny	Bureau of Land Management	No Comment	
Benson, Barry	Three Affiliated Tribes	No Comment	
Bercier, Marilyn	Bureau of Indian Affairs	No Comment	
Berg, George	NoDak Electric Cooperative, Inc.	No Comment	
Black, Mike	Bureau of Indian Affairs	No Comment	
Boyd, Bill	Midcontinent Cable Company	No Comment	
Brady, Perry	THPO, Three Affiliated Tribes	No Comment	
Brien, David	Chairman, Turtle Mountain Band of Chippewa	No Comment	
Brugh, V. Judy	Three Affiliated Tribes	No Comment	
Cayko, Richard	McKenzie County	No Comment	
Christenson, Ray	Southwest Water Authority	No Comment	
Cimarosti, Dan	U.S. Army Corps of Engineers	No Comment	
U.S. Army Corps of Engineers, Omaha District	Garrison Project Office	No Comment	
Danks, Marvin	Fort Berthold Rural Water Director	No Comment	
Dhieux, Joyce	U.S. Environmental Protection Agency	No Comment	
Director, Insurance & Hazard	Federal Emergency Management Agency	Major concern is whether or not project is located within a mapped Special Flood Hazard Area.	Noted. Consultations will be made.
Dixon, Doug	Montana Dakota Utilities	No Comment	
Erickson, Carroll	Ward County Board of Commissioners	No Comment	
Flores, J.R.	U.S. Department of Agriculture	John Glover: Complete FPPA if applicable	
Fox, Fred	Three Affiliated Tribes	No Comment	
Glatt, David	North Dakota Department of Health	Impacts minor and can be controlled by using proper construction methods	Noted.
Gorton, Candace	U.S. Army Corps of Engineers	No Comment	
Guzman, Frank	U.S. Forest Service	No Comment	
Hall, Todd	Three Affiliated Tribes	No Comment	
Hanson, Jesse	North Dakota Parks and Recreation	Database reviewed and no plant or animal species of concern were noted, but field surveys should be conducted.	See Affected Environment sections Wildlife and Vegetation.
Hauck, Reinhard	Dunn County	No Comment	

Name	Organization	Comment	Response to Comment
His Horse Is Thunder, Ron	Chairman, Standing Rock Sioux Tribe	No Comment	
Hoffman, Warren	Killdeer, Weydahl Field	No Comment	
Hovda, Roger	Reservation Telephone Cooperative	No Comment	
Hudson-Schenfisch, Julie	McLean County Board of Commissioners	No Comment	
Hynek, David	Chair, Mountrail Board of County Commissioners	No Comment	
Johnson, Harley	New Town Municipal Airport	No Comment	
Kadrmas, Ray	Dunn County	No Comment	
Kuehn, John	Parshall-Hankins Field Airport	No Comment	
Kulas, Cheryl	Indian Affairs Commission	No Comment	
Land Department	Northern Border Pipeline Company	No Comment	
Laux, Eric	U.S. Army Corps of Engineers	Brad Thompson: Coordinate with the EPA, USFWS, NDGF, SHPO. Consult the floodplain management office.	Necessary consultations have, or will be, made.
Lindemann, Larry	Airport Manager, Barnes County Municipal Airport	No Comment	
Manager	Xcel Energy	No Comment	
McKenna, Mike	North Dakota Game and Fish Department	Avoid construction to the extent possible within native prairie, wooded draws, riparian corridors, and wetland areas.	See Affected Environment sections Wildlife, Wetlands, and Vegetation.
Mercer County	Mercer County Board of Commissioners	No Comment	
Missile Engineer, Chief	Minot Air Force Base	No Comment	
NAGPRA Office	Three Affiliated Tribes	No Comment	
Nash, Mike	Bureau of Land Management	No Comment	
Natural Resources Department	Three Affiliated Tribes	No Comment	
Nelson, Richard	U.S. Bureau of Reclamation	No water lines in project vicinity.	
Obenauer, Steve	Federal Aviation Administration	No Comment	
Olson, Frances	McKenzie County	No Comment	
Paaverud, Merl	State Historical Society	Send copy of reports and forms to keep archives current. Consider putting TCP-related info in separate reports not sent to SHPO.	Noted

Name	Organization	Comment	Response to Comment
Packineau, Mervin	Three Affiliated Tribes	No Comment	
Paulson, Gerald	Western Area Power Administration	No Comment	
Pearson, Myra	Spirit Lake Sioux Tribe	No Comment	
Peterson, Walter	North Dakota Department of Transportation	No Comment	
Poitra, Fred	Three Affiliated Tribes	No Comment	
Prchal, Doug	North Dakota Parks and Recreation Department	No Comment	
Representative, Mandaree Segment	Three Affiliated Tribes	No Comment	
Rudolph, Reginald	McLean Electric Cooperative, Inc.	No Comment	
Schelkoph, David	West Plains Electric Cooperative, Inc.	No Comment	
Selvage, Michael	Chairman, Sisseton-Wahpeton Sioux Tribe	No Comment	
Shortbull, Marietta	Fort Berthold Agency	No Comment	
Svoboda, Larry	U.S. Environmental Protection Agency	No Comment	
Thorson, Gary	McKenzie Electric Cooperative	No Comment	
Towner, Jeffrey	U.S. Fish and Wildlife Service	No Comment	
Chevance, Nick	National Park Service, Midwest Region	No Comment	
Vodehnal, Dale	U.S. Environmental Protection Agency	No Comment	Returned – wrong address
Wells, Marcus	Chairman, Three Affiliated Tribes	No Comment	
Whitcalf, Frank	Three Affiliated Tribes	No Comment	
Williams, Damon	Three Affiliated Tribes	No Comment	
Wolf, Malcolm	Three Affiliated Tribes	No Comment	

United States Department of the Interior

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

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

DEC 14 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 two dual oil well pads in Dunn County, North Dakota. Approximately 22.66 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the areas depicted in the enclosed reports. No historic properties were located that appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for these undertakings. Catalogued as **BIA Case Number AAO-1738/FB/10,** the proposed undertakings, locations, and project dimensions are described in the following reports:

Lechert, Stephanie
(2009) A Class III Cultural Resource Inventory of the Simray Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H Dual Well Pad and Access Road on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Simray Production Company, Richardson, TX.

(2009) A Class III Cultural Resource Inventory of the Simray Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H Dual Well Pad and Access Road on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Simray Production Company, Richardson, TX.

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

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

Sincerely,

Regional Director

Enclosures

List of Preparers

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

Simray GP, LLC

- R. Gray Powers, Principal
- Charles Bray, Manager

SWCA Environmental Consultants

- Joey Sheeley, Project Manager/Planning Specialist
  Prepared the EA.
- Joshua Ruffo, Wildlife Biologist
  Conducted natural resource surveys for well pads and access roads.
- Todd Kohler, Archaeologist
  Conducted cultural resource surveys for well pads and access roads.
- Dan Hengel, Office Director
  Reviewed and edited the EA.
- Stephanie Lechert, Archaeologist
  Prepared cultural resource reports for well pads and access roads.
- Wade Epperson, GIS Specialist
  Created maps and spatially-derived data.
- Brent Sobotka, Hydrologist/CPESC
  Completed water resources section.
- Mike Cook, Ecologist
  Completed soils and vegetation resources sections.

5.0 REFERENCES

Bryce, S., J.M. Omernik, D.E. Pater, M. Ulmer, J. Schaar, J. Freeouf, R. Johnson, P. Kuck, and S.H. Azevedo. 1998. Ecoregions of North Dakota and South Dakota. Jamestown, North Dakota: Northern Prairie Wildlife Research Center Online, available at http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/index.htm. Accessed June 2008.

Bureau of Land Management (BLM). 2009. Air Resource BMPs – Best Management Practices for Fluid Minerals. Available online at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html. Accessed August, 2009.

Bureau of Land Management (BLM) and U.S. Forest Service (USFS). 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+3071/REV 07. Bureau of Land Management. Denver, Colorado. 84 pp.

Center for Integrative Environmental Research at the University of Maryland. 2008. Economic Impacts of Climate Change on North Dakota. Available online at http://www.cier.umd.edu/climateadaptation/North%20Dakota%20Economic%20Impacts%20of%20Climate%20Change%20Full%20Report.pdf. Accessed November 16, 2009.

CO2Now.org. 2009. Available online at http://co2now.org/. Accessed November 16, 2009.

Croft, M.G. 1985. Groundwater Resources of McKenzie County, North Dakota. Bulletion 80 – Part III. North Dakota Geological Survey.

Grah, O.J. 1997. Soils, Water, and Vegetation Resources Technical Report. Report prepared for the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project Environmental Impact Statement. Prepared for the Casper District Office, Bureau of Land Management and Gary Holsan Environmental Planning, Thayne, Wyoming, by ECOTONE Environmental Consulting, Inc. Logan, Utah. 101 pp.

High Plains Regional Climate Center. 2008. Historical Climate Data Summaries. Available online at http://www.hprcc.unl.edu/data/historicl. Accessed May 2008.

Intergovernmental Policy on Climate Change. 2007. *In:* Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Policy on Climate Change. Available online at http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf. Accessed November 16, 2009.

Klausing, Robert L. 1979. Groundwater Resources of Dunn County, North Dakota. Bulletin 68 – Part III. North Dakota Geological Survey.

Lechert, Stephanie. 2009a. A Class III Cultural Resource Inventory of the Simray Henry Bad Gun 8D-5-1H and Henry Bad Gun 17A-20-1H Dual Well Pad and Access Road on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Simray Production Company, Richardson, TX.

_____. 2009b. A Class III Cultural Resource Inventory of the Simray Henry Bad Gun 9C-4-1H and Henry Bad Gun 16B-21-1H Dual Well Pad and Access Road on the Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Simray Production Company, Richardson, TX.

Natural Resources Conservation Service (NRCS). 2009. Web Soil Survey. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soils data for portions of Sections 21, 22, and 27, Township 147 North, Range 91 West were downloaded from the NRCS websoil survey site in May 2009. Available online at http://websoilsurvey.ncrs.usda.gov and http://soildatamart.ncrs.usda.

North Dakota Air Pollution Control Rules. 2009. Chapters 23-25, 33-15-20, 33-15.03.03, 33-15-15, and Section 33-15-20-04. October.

North Dakota Department of Agriculture. 2007. 2006 Noxious Weed List Survey – Reported Acres. North Dakota Department of Agriculture. Bismarck, North Dakota. 2 pp. Available online at http://agdepartment.com/Programs/Plant/NoxiousWeeds.html. Accessed October 29, 2009.

North Dakota State Water Commission. 2009. North Dakota State Water Commission Mapservice. Available online at http://mapservice.swc.state.nd.us/. Accessed August 24, 2009.

The Pew Center on Global Climate Change. 2009. *Climate Change 101.* Available online at http://www.pewclimate.org/global-warming-basics. Accessed November 16, 2009.

Rathge, R., M. Clemson, and R. Danielson. 2002. North Dakota Population Projections 2005-2020. North Dakota State Data Center at North Dakota State University. Fargo, North Dakota. September.

Sobotka, Brent. 2008. Photograph of well drilling operations in Wyoming. Personal photograph by Brent Sobotka.

Three Affiliated Tribes. 2008. Mandan, Hidatsa, Arikara Website. Available online at http://www.mhanation.com/main/history_economic_social.html. Accessed April 2008.

U.S. Environmental Protection Agency (EPA). 1998. Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. Office of Federal Activities, U.S. Environmental Protection Agency. Washington, D.C. 70 pp. + appendices.

_____. 2009. Query AQ Data Website. Available online at http://www.epa.gov/aqspubl1/. Accessed October 2009.

United States Fish and Wildlife Service (USFWS). 2008a. National Wetlands Inventory: Wetlands Online Mapper. Available online at http://westlandsfew.er.usgs.gov/wtlnds/launch.html. Accessed October 9, 2009.

_____. 2008b. Dakota Skipper. Available online at http://www.fws.gov/northdakotafieldoffice/endspecies/species/dakota_skipper.htm. Accessed November 16, 2009.

University of Maryland. 2008. Economic Impacts of Climate Change on North Dakota -A Review and Assessment Conducted by The Center for Integrative Environmental Research.

Williams, B.B., and M.E. Bluemle. 1978. Status of Mineral Resource Information for the Fort Berthold Indian Reservation, North Dakota. Administrative report BIA-40. 35 pp.

6.0 ACRONYMS

°F	degrees Fahrenheit
APD	Application for Permit to Drill
APE	Area of Potential Effect
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
HUC	hydrologic unit code
IPCC	Intergovernmental Panel on Climate Change
MHA Nation	Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara Nation
NAGPRA	Native American Graves Protection and Repatriation Act
NDCC	North Dakota Century Code
NDDH	North Dakota Department of Health
NDIC	North Dakota Industrial Commission
NEPA	National Environmental Policy Act
NOS	Notice of Staking
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTL	Notice to Lessees
PEM	palustrine emergent
ppm	parts per million
ROW	right-of-way
SHPO	State Historic Preservation Officer
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Officer
TVD	total vertical depth
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

Notice of Availability and Appeal Rights

Simray:
Henry Bad Gun 8D-5-1H
Henry Bad Gun 17A-20-1H
Henry Bad Gun 9C-4-1H
Henry Bad Gun 16B-21-1H

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

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

The FONSI is only a finding on environmental impacts – it is not a decision to proceed with an action and *cannot* be appealed. BIA's decision to proceed with administrative actions *can* be appealed until February 20, 2010, by contacting:

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

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

Project locations.