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Environmental Assessment: Proposed Bakken/Three Forks Exploratory Oil and Gas Wells on One Well Pad; Slawson Exploration Company, Inc.

Torpedo Federal 1H, 2H, 3H, 4H, 5H, 6H, 7H, 8H, 9H, 10H; Rebel Federal 4-32-5TFH

DRAFT

Prepared for

United States Department of the Interior
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Prepared by

SWCA Environmental Consultants

May 2016

ENVIRONMENTAL ASSESSMENT

United States Department of the Interior
Bureau of Land Management
North Dakota Field Office
Dickinson, North Dakota

Slawson Exploration Company, Inc.

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Rebel Federal 4-32-5TFH

Fort Berthold Indian Reservation

DRAFT

May 2016

For information contact:
Bureau of Land Management, North Dakota Field Office
99 23rd Avenue West, Suite A
Dickinson, North Dakota 58601
(701) 227-7700

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1.0 PURPOSE AND NEED FOR THE PROPOSED PROJECT

1.1 INTRODUCTION

This environmental assessment (EA) has been prepared by the Bureau of Land Management (BLM), North Dakota Field Office, to analyze Slawson Exploration Company, Inc.'s (Slawson) Applications for Permits to Drill (APDs) for 11 Proposed Bakken/Three Forks Exploratory Oil and Gas Wells (Torpedo Rebel Federal) project. Slawson has acquired the leases for and is proposing to drill 11 oil wells on one well pad on fee surface within the boundaries of the Fort Berthold Indian Reservation (the Reservation) to evaluate and possibly develop the commercial potential of mineral resources. The project would include the construction of an access road, flowlines, and other associated infrastructure. The development is proposed for a location that targets specific areas in the Bakken/Three Forks Formation, a known oil reserve. The surface of the proposed well locations is privately owned. Mineral ownership directly below the proposed well locations is privately held (fee). The horizontal portion of the well bores would penetrate federally owned mineral from privately held property within the Reservation. For the Proposed Action, Slawson is considered the operator. Slawson agrees to follow and abide by all commitments and agreements discussed in this document and the associated APDs.

1.2 PROJECT LOCATION AND DESCRIPTION

The Torpedo Rebel Federal project, illustrated in Figures 1-1 and 1-2, would be located on privately held land within the Reservation. Project appurtenances would be located as follows:

- **Torpedo Federal 1H, 2H, 3H, 4H, 5H, 6H, 7H, 8H, 9H, 10H; and Rebel Federal 4-32-5TFH well pad and access road ROW:** SE¼ SE¼ Section 30, Township (T) 152 North (N), Range (R) 91 West (W), Mountrail County, North Dakota.

- Flowline ROW: E ½ Section 30 and NW ¼ Section 29 T152N, R91W, Mountrail County, North Dakota.

- Facilities pad: NW¼ of the NW¼ of Section 29, T152N, R91W

The proposed 11 oil and gas wells would be drilled on a single well pad located approximately five straight-line miles southeast of New Town, North Dakota. The project area is specifically located on the southern end of a peninsula that extends into a bay of Lake Sakakawea known as the Van Hook Arm in Mountrail County, North Dakota (see Figure 1-1). A well pad and access road would be constructed to facilitate drilling and operation of the wells. The proposed well site would also include support infrastructure or facilities, a temporary aboveground freshwater pipeline, and underground electrical and fiber optic utilities if the wells are economically feasible and completed for long-term commercial production. The proposed flowline may be used for gathering oil and gas or as a produced water flowline. The proposed wells are exploratory; should they prove economically feasible for commercial production, further exploration of surrounding areas is possible.

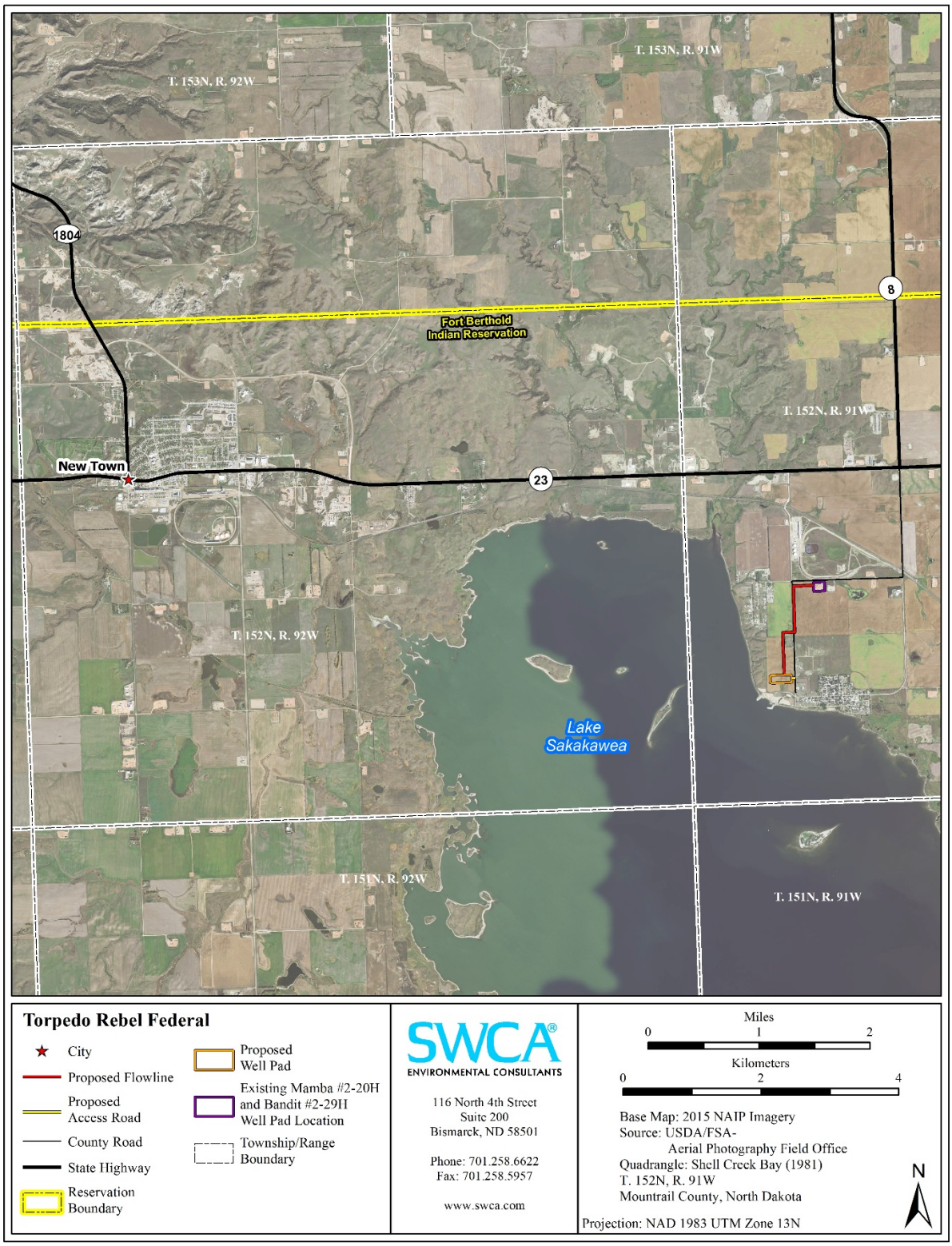

Figure 1-1. Proposed Torpedo Rebel Federal project location.

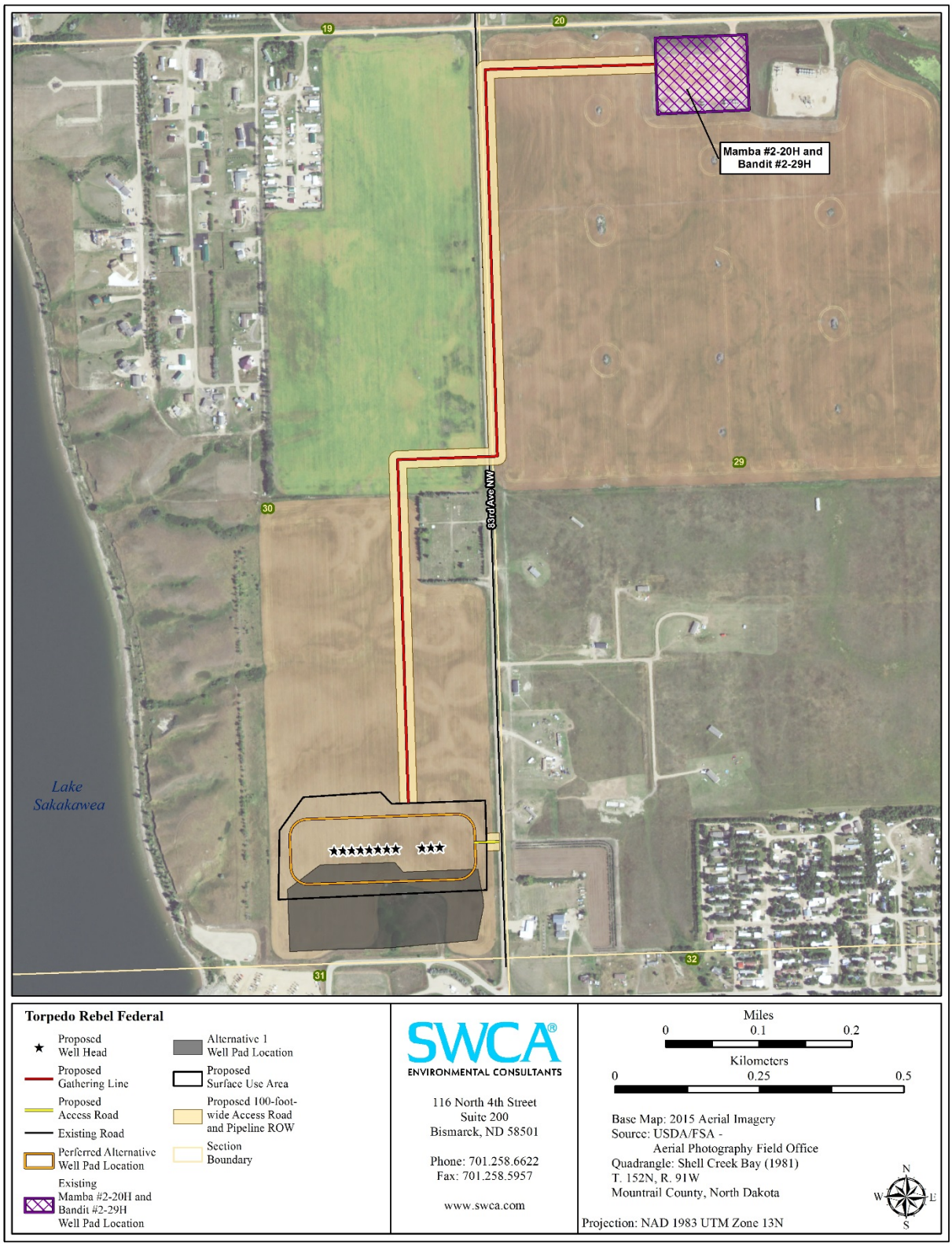

Figure 1-2. Alternative 1 and the Preferred Alternative for the Torpedo Rebel Federal well pad and infrastructure.

1.3 CONFORMANCE WITH APPLICABLE LAND USE PLAN

The BLM North Dakota Resource Management Plan (RMP) addresses future management options for approximately 67,520 acres of public land and 4.8 million acres of federal mineral real estate administered by the BLM through its Dickinson District Office in Dickinson, North Dakota (BLM 1986). The proposed project conforms to the management of resources described within the Oil and Gas lease Stipulations for Montana and the Dakotas.

1.4 PURPOSE AND NEED

The purpose of the action is to allow the lessee to develop the mineral lease described above in an environmentally sound manner. The need for the action is to furnish the global market with essential petroleum products for fuel and manufacturing. BLM Onshore Oil and Gas Orders (43 CFR 3160) require the BLM to review and approve APDs on federal mineral leases. Although the BLM has no jurisdiction over surface impacts on private lands, NEPA requires that the impacts be examined and disclosed to the public.

1.5 DECISION TO BE MADE

The BLM decision to be made is whether or not to approve the APDs. The procedures and technical practices presented here and in the APD supporting documents describe potential impacts to the project area. This EA analyzes potential impacts to elements in the natural and human environments for the No Action Alternative, Alternative 1, and Alternative 2 (Preferred Alternative or Proposed Action) (described in Section 2.0). 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. This EA analyzes impacts of the alternatives and discloses potential impacts based on existing data.

In the absence of significant adverse impacts, the EA would result in a Finding of No Significant Impact (FONSI). Should significant adverse impacts be identified as a result of the direct, indirect, or cumulative effects of the Proposed Action, then in accordance with NEPA, the BLM would prepare an environmental impact statement (EIS). It should be noted that a significant benefit from the project does not necessarily require preparation of an EIS. Additionally, infill wells may be permitted within this spacing unit in the future and would require additional NEPA analysis and BLM consideration prior to implementation or production activities.

If a FONSI is signed and the project proceeds, Slawson will comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements. Slawson also agrees to follow all best management practices (BMPs) and monitoring mitigations listed in this document. No disturbances of any kind can begin until all required easements have been granted and applicable permits obtained.

1.6 SCOPING AND PUBLIC INVOLVEMENT

The operator has provided certification of possessing a surface owner's agreement, which was received by the BLM on November 9, 2015. No issues were identified by the surface owners. Public scoping was conducted for an initial 30 days, November 9 through December 9, 2015. In response to the Friends of Lake Sakakawea's request, the BLM extended the scoping period by an additional 30 days to January 9, 2016. The following comments were received during the basic or extended comment period.

Primary concerns received from the agencies and organizations that commented included proximity to Lake Sakakawea.

The North Dakota Game and Fish Department raised concerns about proximity to the Van Hook Wildlife Management Area (WMA) and proximity to designated critical habitat of the piping plover.

The North Dakota Chapter of the Wildlife Society (TWS) expressed similar concerns; in addition to the frequency of spills and the potential to contaminate Lake Sakakawea. Although TWS did not suggest an alternate site location, it was suggested that an alternate site may offer fewer environmental hurdles.

Concerns raised by the North Dakota Wildlife Federation (NDWF) included similar issues regarding the threats of spills and the possible contamination of Lake Sakakawea. The NDWF requested the proposed well pad be relocated to a location which does not pose these levels of environmental concerns.

2.0 THE NO ACTION ALTERNATIVE, ALTERATIVE 1, AND THE PREFERRED ALTERNATIVE

The BLM, as required under 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]). The EA serves to evaluate the Proposed Action and alternatives for the likelihood of significant, irretrievable effects that warrant additional analysis in an EIS.

The preferred alternative was developed after evaluation of the operator's original proposed well pad location by the BLM and U.S Fish and Wildlife Service (FWS). In response to concerns with the original well pad location in close proximity of piping plover (*Charadrius melodus*) designated critical habitat and potential nesting sites, and within 0.5 mile of Lake Sakakawea, the pad was shifted north approximately 200 feet to minimize impacts on this and other species. The operator's original Proposed Action was to drill 13 wells; however, the new pad location would only accommodate 11 wells. The operator's Proposed Action is analyzed as Alternative 1 and includes 13 wells while the Preferred Alternative analyzes 11 wells.

Under both alternatives, the wells would be drilled and completed in full compliance with all applicable laws, regulations (43 CFR 3100), Onshore Oil and Gas Orders, the APD, and all BLM Conditions of Approval (COAs).

All aspects of Alternative 1 and the Preferred Alternative, including the well drilling sequence, well placement, timing and process alternatives have been discussed and coordinated between the BLM and FWS. The BLM's standard COA (developed in coordination with the USFWS recommendation) does not allow for construction and drilling activities within 0.5 mile of Lake Sakakawea during the piping plover (*Charadrius melodus*) breeding season. The breeding season for piping plover in North Dakota is generally between April 15 and August 31. Due to the pad location, Alternative 1 includes three phases of drilling to avoid drilling during breeding season. The Preferred Alternative was developed as a result of consultation with the USFWS and minimizes the stressors to the plovers including line of sight concerns.

2.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed project (including the well pad, wells, pipeline, and access road) would not be constructed, drilled, installed, or operated. The BLM would not approve necessary easements, leases, rights-of-way (ROWs), or APDs for the proposed locations. No impacts would occur as a result of this alternative to the following critical elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice (EJ). With the No Action Alternative, revenues from royalties and payments for work accomplished on leases that have been purchased would not be available. 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.

2.2 ALTERNATIVE 1

Alternative 1, includes 13 wells on one oil and gas well pad, an existing facilities pad, an approximately 148-foot-long access road corridor, and an approximately 1.15-mile-long flowline corridor. The temporary construction ROW associated with the access road would be 100 feet wide and have an estimated disturbance of 0.26 acre. This alternative would maintain a 50-foot-wide permanent ROW for the access road, which would equal a long-term disturbance of 0.17 acre, until the road is reclaimed or transferred to the landowner. Total estimated temporary construction disturbance for the production well pad, facilities pad, flowlines, and access road would be 23.91 acres. After interim reclamation, total disturbance for the life of the well pad, facilities pad, and access road, until reclaimed or transferred to the landowner, would be 14.58 acres. Additional NEPA review would be required for all activities associated with additional construction/expansion of Alternative 1. The surface location of these facilities are located off lease and are based on anticipated mineral resources and leases.

2.2.1 Well Site Area and Infrastructure Siting

The specific location of the production well pad , access road, facilities pad, and flowlines (see Figure 1-2) were sited in consultation with SWCA Environmental Consultants biologists, who coordinated with Juniper Archaeology LLC and BLM resource managers during a pre-clearance process that included surveys for cultural and natural (i.e., biological and physical) resources.

Interdisciplinary meetings were held on the following dates to review the proposed location and the existing literature documenting natural and cultural resources in and around the project area.

- January 14, 2013 - Torpedo onsite with the Fort Berthold Minerals Division. Mr. Carson Hood and Mr. Herbert "Jaws" Denks.
- August 14, 2013 - Discussion with Kehm Suithwain, Slawson, concerning the Torpedo location.
- November 13, 2013 - Met with Kehm Suithwain and held discussion concerning the Torpedo location.

On August 19 and December 17, 2015, surveys were conducted by SWCA to characterize the documented resources. Topography, potential drainage and erosion issues, and the locations of the well pad and related facilities (access road, pipeline, topsoil/subsoil stockpiles, tanks, etc.) were examined during the on-site meetings. On-site examination enabled discussion of measures to minimize effects on natural and cultural resources.

2.2.2 Well Pad

Activities leading up to well pad construction would be construction staking, equipment mobilization, clearing and grubbing, erosion and sediment control, and, depending on time of year, migratory bird surveys and piping plover occupancy surveys. These activities could last 4 to 6 weeks. Access road construction would occur prior to well project area construction (see Section 2.1.3).

Clearing and grubbing would be conducted according to a stockpile plan that includes soil clearance, stockpiling, and seeding for temporary stabilization.

Well pad construction would include grading, leveling, and surfacing with gravel. Stormwater and erosion BMPs would be installed and inspected according to the project Stormwater Pollution Prevention Plan (SWPPP). The BMPs could include surface drainage controls, soil surface protection methods, and sediment capture features (i.e., silt fences, straw wattles, vegetative matting, and diversion dikes). All structures used to control sedimentation and erosion would be maintained from the well pad and access road construction through interim reclamation and operations.

Presuming that drilling yields viable mineral resources, the well pad would be prepared for operations; this process would include installation of a perimeter fence. The size of the fenced area would match the approximate size of the well pad. A cattle guard would be installed at the point where the access road and fence meet.

2.2.3 Access Road

Approximately 148 feet of new access road would be constructed to connect the well pad to 83rd Avenue Northwest. With a purchased ROW (private) width of 100 feet and a planned final ROW disturbance width of 50 feet, up to approximately 0.34 acre of new surface disturbance for the access road would occur, resulting in approximately 0.17 acre of permanent, impervious surface upon construction completion.

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 proposed access road corridor. This stockpiled topsoil would then be placed on the outside slopes of the ditches following road construction. The ditches would be seeded as quickly as possible using a seed mixture determined by the landowner. Care would be taken during road construction to avoid disturbing or disrupting any buried utilities that are located along existing major roads. If the site were to be established as a commercial production site, the access road would be surfaced with a minimum of 4 inches of aggregate and remain in use for the life of the wells. Road maintenance activities such as grading and snow removal would be conducted in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas. The details of road construction are addressed in Slawson's APD. A diagram of typical road cross sections is provided in Figure 2-1.

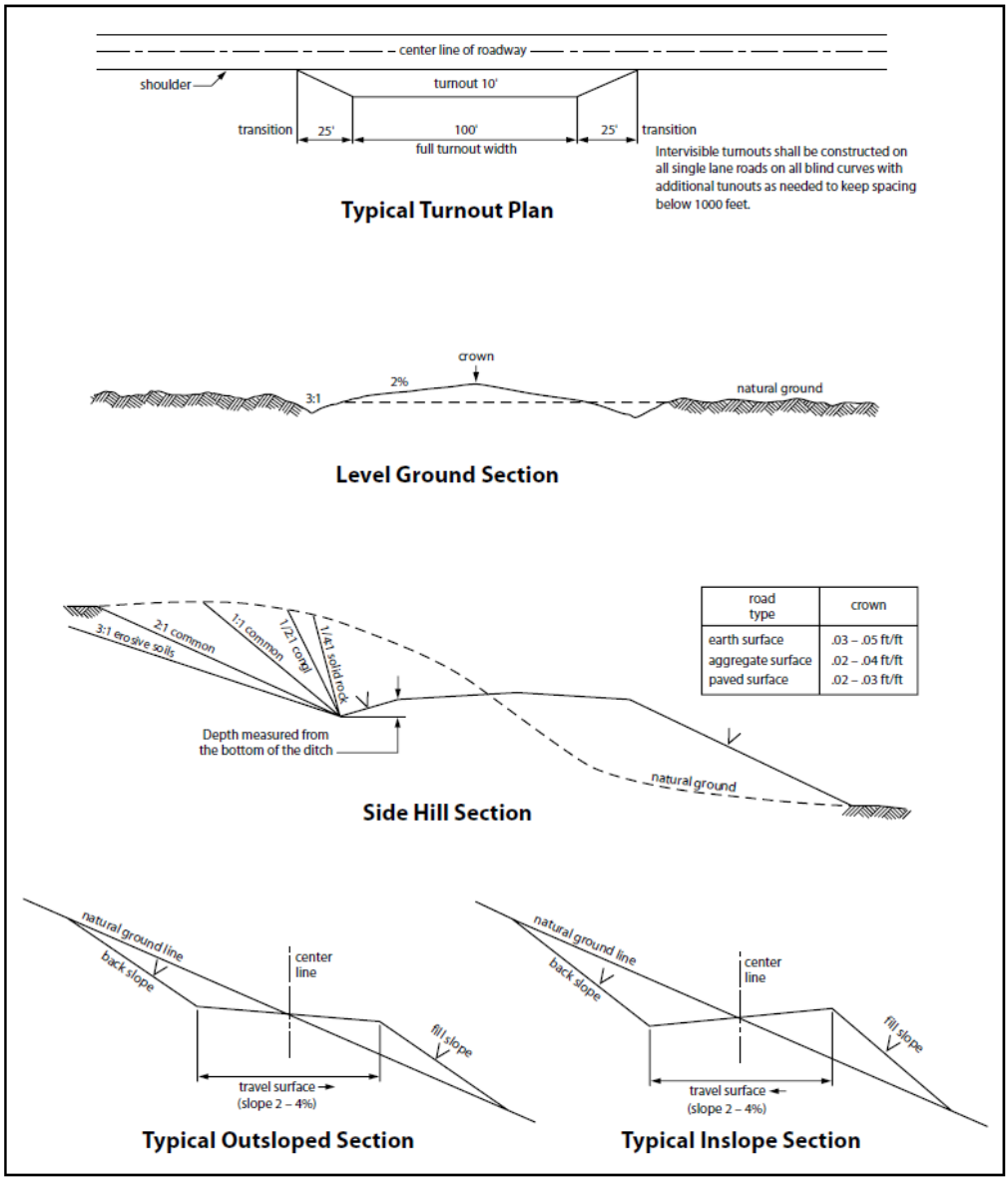

Figure 2-1. Typical road cross sections (BLM and USFS 2007).

2.2.4 Flowlines

Commercially recoverable oil and gas are expected to be discovered at the well sites. Therefore, flowlines would be installed on private lands within a purchased ROW width of 100 feet, with a final ROW disturbance width of 75 feet. . The proposed flowline corridor would consist of three 4-inch steel pipelines, two 6-inch steel pipelines, and one 8-inch steel pipeline. The pipelines would be steel PBE X-52 grade with 12 to 16 mils of fusion bonded epoxy (FBE) exterior coating and 10 to 15 mils of FBE interior coating. Each pipeline would transport produced fluids 1.15 miles from the wells to the production facilities pad. . All pipe fittings would be American National Standards Institute 900 series, and the system would be designed for a maximum operating pressure of 2,160 pounds per square inch. The pipelines would be spaced 1 to 2 feet apart in a common ditch and buried 5 feet deep from top of pipe

to ground level. The pipelines would be cathodically protected using deep anode beds with impressed current rectifiers. A pig launcher and receiver would be installed at each end of the pipeline corridor, allowing for biannual pigging operations to clean and inspect each pipeline. Slawson would install and use supervisory control and data acquisition (SCADA) systems to continuously monitor pressure in each pipeline as a means of leak detection. Check valves also would be installed as a preventive measure to mitigate back flow, should any pipeline experience a leak. Any additional ROW purchases that could potentially occur near the proposed project on tribally owned land (trust land) would require additional NEPA analysis and BLM and Bureau of Indian Affairs (BIA) action prior to construction.

2.2.5 Facilities Pad

An existing facilities pad of approximately 5 acres is located approximately 0.9 mile northeast of the proposed well pad in the NW¼ of the NW¼ of Section 29, T152N, R91W. This project area is located on the existing Mamba #2-20H/Bandit #2-29H (Mamba/Bandit) dual well location and would contain all of the necessary tank battery facilities. All oil, water, and natural gas would be piped to this off-site production facility for treatment, separation, and sales. The oil and natural gas would be transported via pipeline for sales. The produced water would be trucked from this facility to a saltwater disposal site. Access to the facilities pad would use the existing access to the Mamba/Bandit well pad. Activities leading up to the installation of the facilities would be construction staking, equipment mobilization, and erosion and sediment control. This could last 3 to 5 weeks. The construction of the facilities area would take approximately 3 to 4 months to complete.

2.2.6 Drilling

The 13 wells would be drilled and completed in full compliance with all applicable laws, regulations (43 CFR 3100), Onshore Oil and Gas Orders, the APDs, and the BLM COA.

The BLM COA does not allow for construction and drilling activities within 0.5 mile of Lake Sakakawea during the piping plover breeding season. The breeding season for piping plover in North Dakota is generally April 15 through August 31.

Under the Alternative 1, three cycles of pad construction and well drilling, outside of the typical piping plover breeding season, are proposed. The rig-on/rig-off sequence is expected to span 30 months. A variance to the timeframe restriction may be implemented within the breeding period if surveys conducted by a qualified avian biologist reveal the action area immediately adjacent to the proposed pad and access road are not occupied by piping plovers or interior least terns (*Sternula antillarum*).

The first activity cycle is anticipated to be September 1, 2016, to April 14, 2017. The drill rig may be moved to the site earlier if field surveys indicate that breeding piping plovers are not present in the immediate vicinity of the drill pad. In the first activity cycle one well pad would be constructed and four wells would be drilled and completed. Figure 2-2 provides an example of a typical drilling rig.

Figure 2-2. Typical drilling rig.

The second timeframe for rig-on is anticipated to be September 1, 2017, to April 14, 2018. During the second timeframe, the drill and completion rigs would be constructed/de-constructed and four to five additional wells would be drilled and completed.

The third rig-on timeframe is anticipated to be September 1, 2018, to April 14, 2019. During the third timeframe, the drill and completion rigs would be constructed/de-constructed and the remaining two to three wells would be drilled and completed.

Slawson would use a contracted 1,500-horsepower diesel/AC drill rig to access the mineral deposits. Drilling operations require a 20-person crew. The height of the rig is approximately 140 feet from the ground to the crown of the derrick. The drilling rig generates power for its own use. Additional power would come from the electrical grid as needed.

Approximately 23 delivery loads of equipment and machinery will be hauled onto the well pad for each well drilled. Each well also requires approximately two loads for surface pipe, eight loads for intermediate pipe, four loads for liner pipes, 15 loads for sanitation and electrical, 50 loads for drill cuttings and landfill, 16 loads for cementing, 15 loads for casing running, four loads for construction, four loads for inspection crews, 12 loads for hotshots/tools and 15 loads for water/diesel fuel. Drilling operations are expected to require a total of approximately 175 semi-truck deliveries for each activity cycle totaling approximately 525 loads to fully complete 13 wells.

The drilling operations would start upon receipt of an approved permit, the closing of the piping plover breeding season, or confirmation that the habitats surrounding the proposed location are not occupied. All wells would be horizontally drilled into the middle Bakken Formation using a closed-loop system with appropriately sized well control equipment in

place. Slawson does not anticipate hydrogen sulfide gas (H_2S) to be encountered, but has submitted to the BLM an H_2S Contingency Plan for the wells.

Drilling operations would begin with the use of a spud rig to drill a 13½-inch hole and set conductor pipe for each well. The spud rig would then drill the vertical surface segment to a depth that is 100 feet below the Pierre Salt (base of the Fox Hills formation) and cement 9⅝-inch surface pipe in place. Cement for all surface pipe would come to the surface protecting identified freshwater zones. This step would be completed for each well bore consecutively and would take approximately 2 to 3 days per well after which the spud rig would no longer be needed and would be removed from location.

The primary drill rig would be trucked to location and assembled within approximately 1 week. The rig would then drill the intermediate well bore to the planned depth and cement 7-inch intermediate pipe in place, taking approximately 7 to 12 days per well. The intermediate segment for each well would be drilled consecutively. Following the intermediate segment, the horizontal section for each well would be drilled to the planned bottom hole location in approximately 11 to 15 days per well. The well bore then would be secured and the primary drill rig moved off location.

Using a closed-loop drilling fluids system, a freshwater-based mud system would be used while drilling down to the surface casing setting depth, and an oil-based mud system would be used for drilling the remaining vertical section. The horizontal section of the wells would use a brine drilling fluid. The wells would be fracture stimulated and completed for production.

No water wells would be drilled on location. Freshwater would be transported by lay-flat pipeline from local water suppliers. No cutting pits would be used on the location. Drilling cuttings would be contained in steel containers, hauled off location, and disposed of at an approved third-party disposal facility. All solids and liquids for disposal (drilling fluids/cuttings, produced water, trash, sewage and chemicals) would meet all state, federal, and county requirements. Produced fluids would be placed in test tanks on location. An impermeable steel berm would be constructed around the test tanks to serve as secondary containment.

During drilling, completion, and production phases, measures would be implemented to contain all fluids, including produced fluids, rainwater, and run-on water that comes into contact with the well project area surface. A 2-foot tall clay berm would surround the entire project area during drilling, completion (fracture stimulation), and production. The 2-foot berm would remain in place while the wells are producing in the interim reclamation phase. A containment trench also would be constructed on the down-gradient side of the location, just outside of the secondary containment berm in the event any liquids are released. This would serve as an additional fluid capture point, making efforts to clean up any undesirable release of fluids quicker and more efficient.

2.2.7 Casing and Cementing

Surface casing would be set at depth of approximately 2,000 feet and cemented back to the surface during drilling, isolating all near-surface freshwater aquifers in the project area. Production casing would be cemented from a depth of approximately 10,295 feet up to about

4,000 feet in order to isolate the hydrocarbon zone present in the Dakota Formation below a depth of 4,500 feet. Casing and cementing operations would be conducted in full compliance with Onshore Oil and Gas Order No. 2 (43 CFR 3160).

2.2.8 Completion and Evaluation

Bakken wells typically undergo fracture stimulation as part of the well completion process. Fracture stimulation (i.e., hydraulic fracturing [HF] or "fracking") is a process used to maximize the extraction of underground resources by allowing oil or natural gas to move more freely from the rock pores to production wells that bring the oil or gas to the surface. Prior to HF, equipment and facilities (tanks, flare stack, flowback equipment, SCADA equipment) would be installed in the well pad.

To create or enlarge fractures, fluid composed of water and additives is pumped into the productive formation at a gradually increasing rate and pressure. HF fluid is approximately 98% water and propping agents, such as sands or ceramic beads, with the balance comprised of chemical additives. Chemicals used in stimulation fluids include acids, friction reducers, surfactants, potassium chloride, gelling agents, scale inhibitors, corrosion inhibitors, antibacterial agents, and pH adjusting agents and typically comprise less than 2% of the total fluid. When the pressure exceeds the rock strength, the fluids create or enlarge fractures that can extend several hundred feet away from the well. As the fractures are created, a propping agent is pumped into the fractures to keep them from closing when the pressure is released. After fracturing is completed, the majority of the injected fracturing fluids returns to the well bore and is reused or disposed of at an approved disposal facility.

A typical fracture stimulation technique involves 30 to 45 stages, per well bore. The well bore is partitioned into segments which are fractured separately and sequentially. This allows for more efficient use of HF fluid and proppant, and a more evenly distributed treatment of the full length of the well bore. This multi-stage HF allows development of mineral resources, such as the Bakken Formation.

Over a period of 5 to 7 days, the completion contractor would mobilize equipment onto the location following each drilling cycle. The equipment would include a Sand Master, pump trucks, and approximately 15 fracking water tanks and associated equipment (piping, chemicals, etc.).

The completion process for the wells would take place 1 to 2 weeks after the drilling and takes 6 to 7 days per well. An additional 35 fracking water tanks would be located offsite at the Bandit/Mamba production pad. Water would be carried to the completion site via lay-flat pipeline along the production pipeline corridor or approved road routes. Each well would have the planned amount of sand and water pumped down the well bore into 42 separate staged areas within the horizontal section of the well bore. Each well requires approximately 200,000 barrels of freshwater (this equates to 1,818 truckloads that are mitigated by the lay-flat pipeline system) and 6.0 to 7.2 million pounds of sand. About 15% of the pumped water volume is recovered during flowback. Some of this water is collected in steel tanks on the well pad, with the remaining volume flowing through the production piping and collected at the facilities pad.

The completion fleet would include 24 trucks: 14 pump trucks, 1 blender truck, 1 chemical truck, 1 iron truck, 1 manifold truck, 1 hydration unit, 1 data van, and 4 sand units. Each fracking session would require 150 loads of sand per well, 15 loads for the onsite fracking tanks, and 10 truckloads per well for flowback, wire line, miscellaneous trailers, and a water heater. In total, each well completion would require approximately 160 truckloads.

Typical chemical additives used in the HF fluids are listed in Table 2-1.

Table 2-1. Common Additives of Hydraulic Fracturing Fluid

Additive Type	Main Compound	Common Use of Main Compound
Acid	Hydrochloric acid or muriatic acid	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Cold sterilant in health care industry
Breaker	Sodium chloride	Food preservative
Corrosion inhibitor	N,n-dimethylformamide	Crystallization medium in pharmaceutical industry
Friction reducer	Petroleum distillate	Ingredient in cosmetics including hair, make-up, nail, and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickener in cosmetics, sauces, and salad dressings
Iron control	2-hydroxy-1,2,3-propanetricaboxylic acid (citric acid)	Lime deposit remover (lemon juice ~7% citric acid)
Oxygen scavenger	Ammonium bisulfite	Ingredient in cosmetics
Proppant	Ceramic beads	Not applicable
Scale inhibitor	Ethylene glycol	Automotive antifreeze and de-icing agent

Source: Arthur et al. 2008.

2.2.9 Commercial Production

Figure 2-3 provides an example of a producing well pad. A high-efficiency flare would be installed at the facilities pad. . An impervious dike sized to hold 110% of the capacity of the largest tank plus 1 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 aboveground facilities not subject to safety requirements, the BLM would choose a paint color recommended by the Rocky Mountain Five-State Interagency Committee that would blend with the natural color of the landscape.

Figure 2-3. Typical producing oil well pad.

The duration of production operations cannot be reliably predicted, but some oil wells have been pumping for more than 30 years. The operator estimates that each of the wells would yield approximately 450 barrels of oil per day and 100 barrels of water per day during the first year of production. After the first year, the operator estimates production would decrease to approximately 250 barrels of oil per day and 50 barrels of water per day. Produced water consists mostly of recovered fracturing fluids and is expected to become minimal after 2 years.

Large volumes of gas are not expected from these locations. Gas would be carried to market via existing pipelines, and flaring would be minimal. Depending on pipeline capacity, small volumes may be flared in accordance with Notice to Lessees 4A and adopted North Dakota Industrial Commission (NDIC) regulations, which prohibit unrestricted flaring for more than the initial year of operation (North Dakota Century Code 38-08-06.4).

2.2.10 Housing and Waste Management

A few personnel would be housed in self-contained trailers during construction; long-term housing is not proposed. Most personnel, both construction and drilling, would commute to the site. Human waste would be collected on site in portable toilets and trailers and 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.

2.2.11 Drill Hole Bottom Locations

Alternative 1 proposes 13 wells from one surface location. Each spacing unit, including the bottom hole and drilling target locations, for Alternative 1 is described below and illustrated in Figure 2-4.

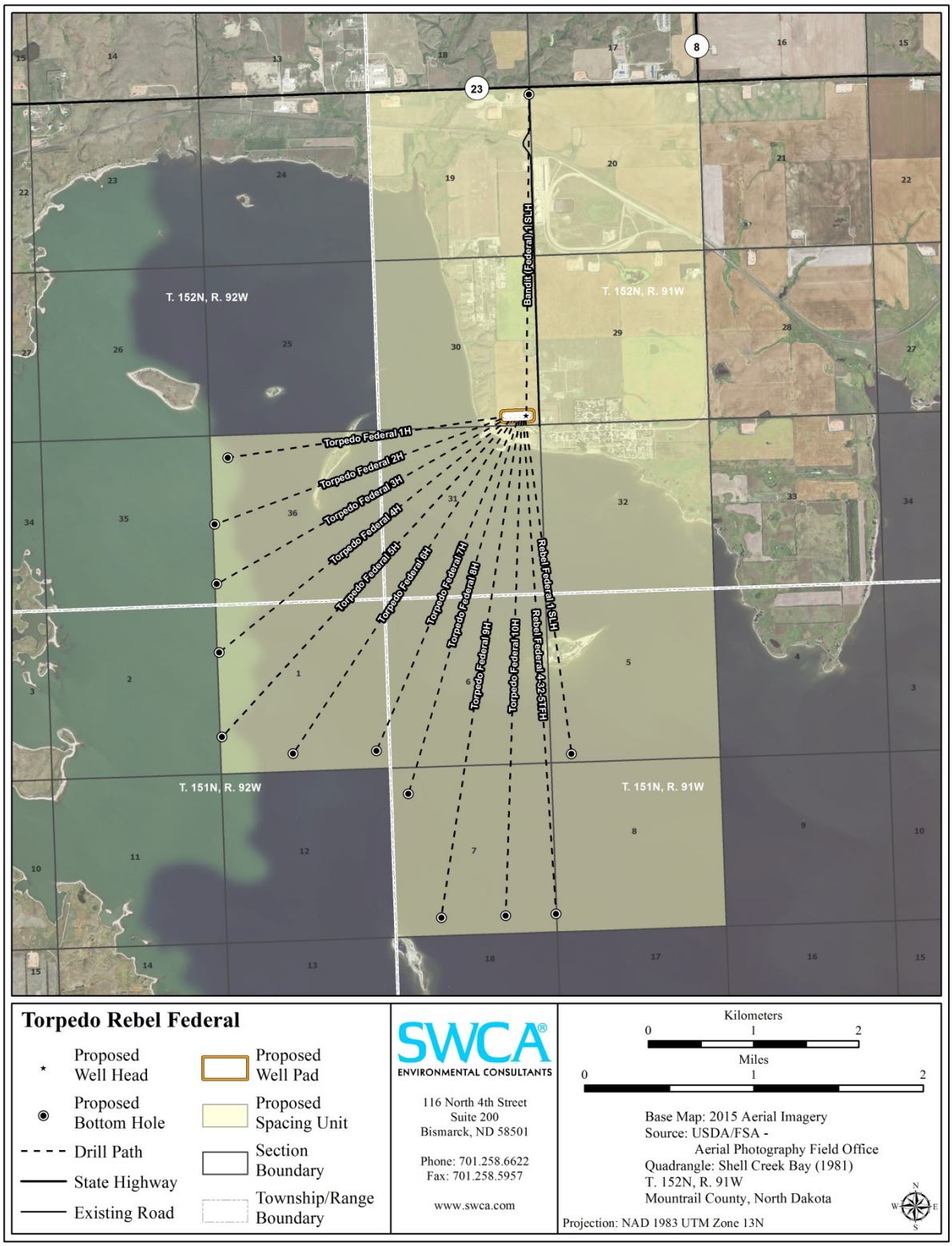

Figure 2-4. Alternative 1 Torpedo Rebel Federal well spacing unit boundary.

- **Torpedo Federal 1H:** The proposed bottom hole would be located in the NW¼ of the NW¼ of Section 36, T152N, R92W, Mountrail County, North Dakota, approximately 660 feet from the north line (FNL) and 550 feet from the west line (FWL). The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet from the south line (FSL) and 998 feet from the east line (FEL).
- **Torpedo Federal 2H:** The proposed bottom hole would be located in the NW¼ of the SW¼ of Section 36, T152N, R92W, Mountrail County, North Dakota, approximately 2,504 feet FSL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 248 feet FEL.
- **Torpedo Federal 3H:** The proposed bottom hole would be located in the SW¼ of the SW¼ of Section 36, T152N, R92W, Mountrail County, North Dakota, approximately 641 feet FSL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 898 feet FEL.
- **Torpedo Federal 4H:** The proposed bottom hole would be located in the SW¼ of the NW¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 1,492 feet FNL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 848 feet FEL.
- **Torpedo Federal 5H:** The proposed bottom hole would be located in the SW¼ of the SW¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 1,143 feet FSL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 798 feet FEL.
- **Torpedo Federal 6H:** The proposed bottom hole would be located in the SE¼ of the SW¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 550 feet FSL and 2,275 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 748 feet FEL.
- **Torpedo Federal 7H:** The proposed bottom hole would be located in the SE¼ of the SE¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 550 feet FSL and 398 feet FEL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 698 feet FEL.
- **Torpedo Federal 8H:** The proposed bottom hole would be located in the NW¼ of the NW¼ of Section 7, T151N, R91W, Mountrail County, North Dakota, approximately 830 feet FNL and 550 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 648 feet FEL.

- **Torpedo Federal 9H:** The proposed bottom hole would be located in the SE¼ of the SW¼ of Section 7, T151N, R91W, Mountrail County, North Dakota, approximately 550 feet FSL and 1,451 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 598 feet FEL.
- **Torpedo Federal 10H:** The proposed bottom hole would be located in the SW¼ of the SE¼ of Section 7, T151N, R91W, Mountrail County, North Dakota, approximately 550 feet FSL and 1,572 feet FEL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 548 feet FEL.
- **Rebel Federal 4-32-5TFH:** The proposed bottom hole would be located in the SE¼ of the SE¼ of Section 7, T151N, R91W, Mountrail County, North Dakota, approximately 550 feet FSL and on the east line. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 498 feet FEL.
- **Rebel Federal 1 SLH:** The proposed bottom hole would be located in the SW¼ of the SW¼ of Section 5, T151N, R91W, Mountrail County, North Dakota, approximately 250 feet FSL and 660 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 448 feet FEL.
- **Bandit (Federal) 1 SLH:** The proposed bottom hole would be located in the NE¼ of the NE¼ of Section 19, T152N, R91W, Mountrail County, North Dakota, approximately 250 feet FNL and on the east line. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 398 feet FEL.

2.2.12 Reclamation

Reclamation would continue over the life of the well pad and would include the interim phase of the return of topsoil, contouring, and seeding for the reestablishment of native vegetation. Interim reclamation would be required 6 months after construction, if environmentally feasible, and then following any maintenance work or additions of infrastructure. Final reclamation would be required before abandonment of the decommissioned well pad. Successful reclamation would at all times be the responsibility of the operator.

2.2.12.1 Interim Reclamation

Interim reclamation would occur on the portion of the well pad and ROWs not needed for production and includes recontouring, reestablishing erosion and sediment control, spreading topsoil, seeding, and recontouring of drainage management.

Maintaining topsoil integrity would be a primary goal of the staging of interim reclamation. Construction staging would be managed to eliminate the potential for rill erosion and subsequent loss of soil during spring snow melt and precipitation events. If post-construction backfilling was initiated on frozen ground, frozen topsoil would be used to the extent possible, and then BMPs would be immediately implemented for temporary control until final

backfilling occurred under thawed conditions. Final topsoil placement would then occur after snowmelt runoff and soil is amenable to movement. All backfilled areas would be prepared using equipment and practices to maintain or establish standard soil bulk densities acceptable for vegetation establishment.

Short- and long-term BMPs would be used in accordance with the SWPPP to minimize and control erosion in disturbed areas, and maintain the site until final seedbed preparation would occur.

Final seedbed preparation would occur immediately and in advance of seeding. Fall seeding would occur after September 1 and prior to ground frost. If applicable, spring seeding would be completed after the frost has left the ground and prior to June 15. Slawson would control noxious weeds within the project areas by approved chemical or mechanical methods. If growing season constraints prevent seeding of the ROW, Slawson would deploy approved weed-free hay across the entire ROW. The presence of hay across the ROW would reduce the potential for excessive erosion as a result of spring snow melt and precipitation.

The project areas would be monitored for erosion, subsidence, and noxious weeds. In areas where problems are found to occur, reclamation efforts would continue until the BLM is satisfied and the reclamation standards are met. Reclamation is considered successful when:

- seeded areas are established;
- adjacent vegetative communities spread back into the disturbed areas; and
- noxious weeds are under control.

If after two growing seasons the new seeding is not successful, the BLM may require additional efforts to establish vegetation. For noxious weeds, a survey would be conducted on all project areas prior to construction commencing. The BLM has developed a weed management plan to treat known or likely to occur noxious weed species. Short- and long-term BMPs would be used in accordance with the SWPPP to minimize and control erosion in disturbed areas and maintain the site until final seedbed preparation could occur. Only weed-free temporary mulch material would be accepted.

Staging areas would be managed to eliminate the potential for rill erosion and subsequent loss of soil during spring snow melt and precipitation events, along with separation of uncontaminated stormwater from any precipitation that may come into contact with hazardous materials.

2.2.12.2 Final Reclamation

Final reclamation would occur when the well pad is decommissioned (See Figure 2-5). The general phases would be removal of facilities and aggregate (as directed by the landowner); purging of the pipeline within the access road ROW; and reclaiming the well and facilities pads and access road (if the road is not assigned for new use) to preexisting conditions. The access road and work areas would be leveled or backfilled as necessary, scarified, recontoured, and seeded according to the surface owner’s specifications.

Prior to commencement of seeding operations on and along the reclaimed well location and access road route, water bars would be constructed at least 1 foot deep on the contour with approximately 2 feet of drop per 100 feet of water bar to ensure drainage, and extended into established vegetation.

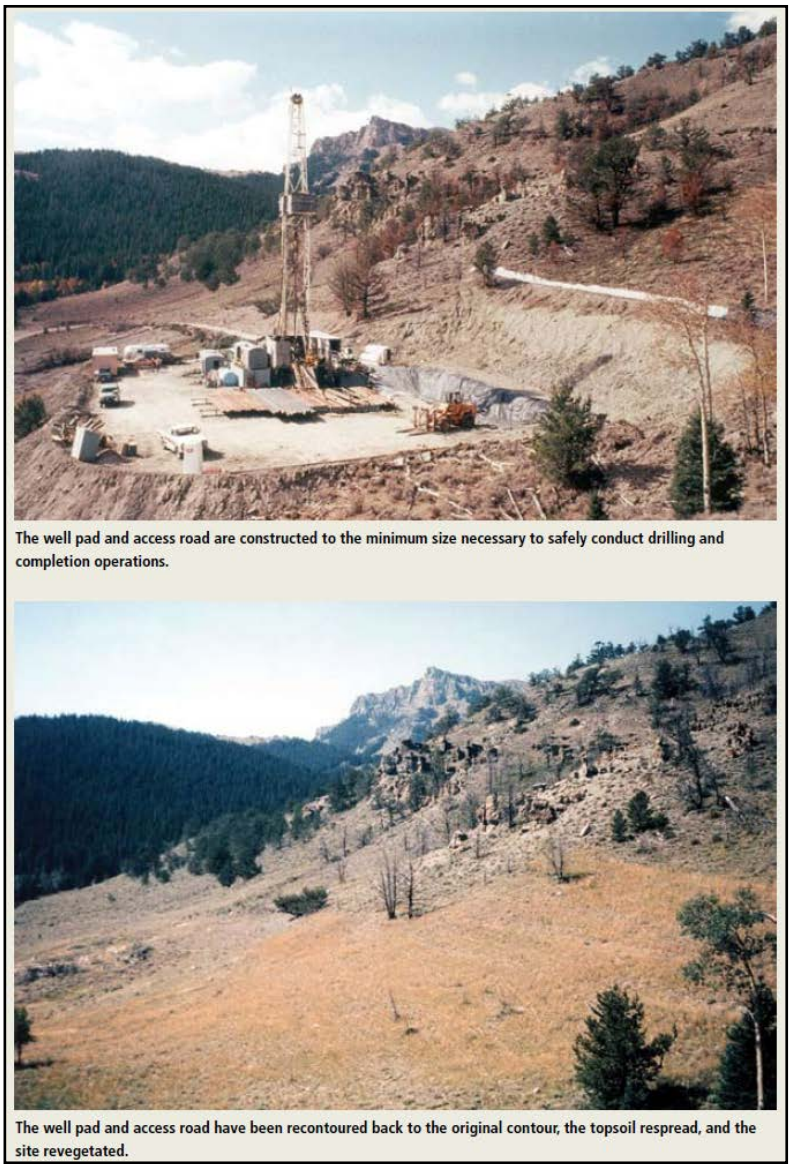

Figure 2-5. Example of reclamation from the BLM Gold Book (BLM and USFS 2007).

2.2.13 Applicant-Committed Best Management Practices

2.2.13.1 General Best Management Practices

Slawson has committed to implementing specific mitigation measures and BMPs in an effort to minimize disturbance to natural and cultural resources. Although largely project specific, there are a number of BMPs that can, and should, be considered on development projects in general. The following are examples of general BMPs.

- Design roads and facility sites to minimize visual impacts.
- Use existing roads to the extent possible, upgrading as needed.
- Minimize the size of facility sites and types of roads to reduce surface disturbance.
- Minimize topsoil removal.
- Stockpile stripped topsoil and protect piles from erosion until reclamation activities commence. At that time, the soil would be redistributed and seeded on the disturbed areas. The reclaimed areas would be protected and maintained until the sites are fully stabilized.
- Avoid removal of, and damage to, trees, shrubs, and groundcover where possible. Trees near construction areas would be marked clearly to ensure that they are not removed.
- Mow the facility or well site instead of clearing vegetation to accommodate vehicles or equipment.
- Maintain buffer strips or use other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Implement an erosion control plan.
- Store chemicals properly (including secondary containment).
- Keep sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a State-approved sanitary landfill.
- Conduct snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.
- Avoid or minimize topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Maintain buffers around work areas where there is a risk of fire as a result of construction activities.
- Require construction crews to carry fire extinguishers in their vehicles and/or equipment.
- Require construction crews be trained in the proper use of fire extinguishers.
- Contract with the local fire district to provide fire protection.
- Plan transportation to reduce vehicle density.
- Post speed limits on roads.
- Avoid construction and vehicle traffic during wet conditions, which could result in excessive rutting.
- Practice dust abatement on roads.
- Contour disturbed areas to approximate the original contours of the landscape.
- Develop a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.

- Locate proposed well pad and access road in area with existing disturbances to the extent possible.
- Install covers under drip buckets and spigots.
- Use a closed-loop drilling system.
- Construct berms and install wattle on the downslope sides of the proposed well pad.
- Follow the contour (form and line) of the landscape.
- Co-locate multiple utility lines in the same trench.
- Use natural (topography, vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations.
- Paint facilities a color that would blend in with the environment.
- Conduct interim reclamation of at least one-half of the disturbed area.
- Conduct reclamation without delay if a well is determined to be unproductive, or upon completion of commercial production.
- Lay matting and/or conduct hydro-seeding on the fill side of the pad.
- Construct water diversion ditch and install rip rap at drainage point.
- Grind trees and other woody material removed from the pad and add to the topsoil.
- Implement approved SWPPP and BMPs for the construction of the proposed well pad and access road to prevent erosion and sedimentation.
- Install appropriately sized culverts or other stable stream crossings for any intermittent stream crossings.
- Avoid locating ROWs on steep slopes.

Whenever possible, Slawson commits to implementing all BMPs identified during the on-site inspection that can be used to mitigate environmental concerns specific to projects associated with belowground linear alignments, such as those included in the proposed utility corridor.

2.2.14 Mitigation and Spill Plans

2.2.14.1 Spill Prevention, Control, and Countermeasure Plan

Slawson has developed a Spill Prevention, Control, and Countermeasure (SPCC) plan, the General Williston Basin Field Plan, which has been in place since 2011 across the region. The plan includes updated emergency response contacts, facility information and diagrams, potential spill rates, inspection forms, and prevention logs.

In addition to the General Williston Basin SPCC Plan, Slawson developed a site-specific SPCC protocol to react to the inadvertent release of materials at the site location. The plan includes measures to address releases of oil from the proposed facilities; protect the public; and minimize damage to the environment by providing a timely, efficient, coordinated, and effective action plan to respond to all oil discharges.

Slawson developed the site-specific plan while considering the potential impacts that the introduction of oils, grease, diesel fuel, or other chemicals from construction- and operation-related activities could have on water and fish and wildlife habitats in Lake Sakakawea. Both SPCC plans would be stored on location in case of an emergency.

Slawson's response procedures are highlighted below and provided in their entirety in Appendix C. Tank batteries would be inspected daily during the work week, and flowlines would be inspected by visual inspection. In the event of a discharge, the first priority is to stop the product flow and to shut off all ignition sources, followed by the containment, control, and mitigation of the discharge.

Specifically, the following response procedures would be implemented:

Detection:

1. Notify the Response Coordinator that an oil spill has occurred (provide location, source, amount, nearby areas of concern, etc.).

2. Shut off ignition sources (motors, electrical circuits, open flames).

3. Turn off pumping unit that charges or provides flow to the flowlines.

4. Locate the source of flowline leak.

5. Attempt to stop the source of the leak, if it can be done safely.

6. Initiate containment.

Assessment and Notifications:

1. Investigate the discharge to assess the actual or potential threat to human health or the environment.

2. Mobilize the Emergency Response Team if necessary.

3. Make appropriate notifications to federal, state, and local agencies.

4. Request outside assistance from local emergency responders, as needed.

5. Communicate with property owners regarding the discharge and proposed actions taken to mitigate the damage.

Control and Recovery:

An Environmental Incident Report would be filled out by the Slawson team member Environmental Regulatory Analyst and maintained on file in the Denver Office. Any other documentation regarding the oil discharge would also be kept on file. In addition, all rig contractors conducting drilling and workover operations at Slawson facilities would install a BOP assembly and well control system before drilling below any casing string or during workover operations.

See Appendix A for diagram of the BOP that will be installed for proposed project. Every BOP (completion stack) is tested when delivered to location, and a Test Chart is kept in the Crew Trailer until it is sent in for maintenance. BOPs are replaced approximately every 7 to 8 completion jobs (BOPs are sent to service shops for maintenance and testing).

Safety procedures for drilling and BOP testing and maintenance require the following procedures.

Slawson's testing requirements occur as follows:

1. Full test on every rig up.
2. Full test every 30 days if a project runs past the last full test.
3. Test on every new component or new break in the stack arrangement if it occurs during the 30-day window.

The most common failures occur in the rubber elements of the ram bodies and annular elements and are changed out as needed. The rubber elements are typically replaced once per year. Other failures occur in connections, flanges, and piping that require new ring gaskets, re-torqueing, or packing elements. All of these are common and are more general maintenance items vs. failures.

Since 2004, Slawson has drilled and completed 518 wells in the Williston Basin. In that time, there were three events that resulted in a loss of well control, and of those only one resulted in a release of fluids off location. BOPs have multiple levels of safety mechanisms, and known incidents of failure are due to human error rather than mechanical failure. (See Appendix A for Slawson Project Risk Mitigation.)

2.2.14.2 Pipeline Marking Procedures

Slawson adheres to the requirements of 49 CFR 192.707 with regard to the marking of buried pipelines. Specifically, Slawson would place pipeline markers within 1,000 feet of one another at all public road crossings, railroad crossings, creek crossings, and fence crossings, and at all points of major direction change.

2.2.14.3 Quality Control/Quality Assurance Measures

The flowlines would be steel PBE X-52 grade with 12 to 16 mils of FBE exterior coating and 10 to 15 mils of FBE interior coating. Each pipeline would transport produced fluids from the various well heads in the project area to the production facility project area. All pipe fittings would be American National Standards Institute 900 series, and the system would be designed for a maximum operating pressure of 2,160 pounds per square inch.

During construction, qualified professionals would visually inspect all welds for quality and completeness. Once welds have passed visual inspection, they would be subjected to 100% non-destructive testing. After passing these tests, the weld areas would be covered for corrosion protection. The external coating of the pipe would inspected using a jeepmeter to detect holes and cracks. The pipe would be lowered into the trench and buried. Prior to being put into service, the steel pipe would be hydrotested to approximately 1.5 times the minimum

design pressure of 1,180 pounds per square inch gauge (psig). The produced water pipe would be designed to sustain a minimum pressure of 750 psig and would be hydrotested to approximately 900 psig before being approved for service.

2.2.14.4 Valve Locations

A valve would be installed at each end of each proposed pipeline. Specifically, one valve would be installed at the well location, and another valve would be installed at the facilities pad. The installation of these valves would allow Slawson to isolate any given flowline, if required.

2.2.14.5 Reclamation

Refer to Section 2.1.12 for a description of interim and final reclamation procedures. The decommissioned pipelines would be proposed for abandonment in place. It is economically and environmentally infeasible to excavate and remove the decommissioned pipelines. The pipelines would be purged of residual oil and gas, and all residue and other materials used to purge the pipelines would be collected and disposed of in accordance with permit requirements.

2.3 ALTERNATIVE 2- PREFERRED ALTERNATIVE

The Preferred Alternative addresses the concerns for impacts to piping plover brought forward during the (Endangered Species Act, section 7 consultation process between BLM and FWS. This alternative differs from Alternative 1 by shifting the well pad slightly north to be further from the edge of Lake Sakakawea and farther from designated critical habitat and potential breeding areas of the threatened piping plover. This shift of the pad location also allows for continuous drilling without seasonal restrictions. The proposed well pad location under this alternative would only accommodate 11 wells and therefore the Rebel Federal 1 and Bandit Federal 1 wells are not included. The remaining aspects of the preferred alternative are generally the same as Alternative 1.

2.3.1 Well Site Area and Infrastructure Siting

The Preferred Alternative well pad location is located approximately 340 feet to the north of Alternative 1 and would include the drilling, completion, and production of 11 oil and gas wells. The Preferred Alternative location was aligned in consultation with SWCA biologists, who coordinated with the USFWS, Juniper Archaeology LLC, and BLM resource managers during a pre-clearance process that included surveys for cultural and natural (i.e., biological and physical) resources (see Figure 1-2). The Preferred Alternative fenced area of the well pad location is approximately 600 feet (at its closest point) from the edge of Lake Sakakawea.

Total estimated temporary construction disturbance for the production well pad, facilities pad, flowlines, and access road would be 25.81 acres (0.17 acre for the access road, 12.99 acres for the flowlines, and 12.65 acres for the well pad). After interim reclamation, total disturbance for the life of the well pad, facilities pad, and access road, until reclaimed or transferred to the landowner, would be 8.80 acres (0.08 acre for the access road and 8.72 acres for the production well pad).

No new surface disturbance from the facilities pad would occur.

2.3.2 Well Pad

The permanent size of the Preferred Alternative well pad project area would be approximately 8.72 acres and would include a leveled area that would be used for the drilling, completion, and production activities of the wells. Activities leading up to well project area construction would be the same as Alternative 1 described in Section 2.2.2.

2.3.3 Access Road

Approximately 143.45 feet of new access road would be constructed. With a purchased ROW width of 100 feet and a planned final ROW disturbance width of 50 feet, up to approximately 0.34 acre of new surface disturbance for the access road would occur, resulting in approximately 0.08 acre of permanent, impervious surface upon construction completion.

Construction would follow road design standards outlined in the BLM Gold Book as described in Section 2.2.3.

2.3.4 Flowlines

Commercially recoverable oil and gas reserves are expected to be discovered at the well sites. Therefore, flowlines would be proposed on private lands within a purchased ROW width of 100 feet, with a final ROW disturbance width of 75 feet and approximately 13.00 acres of new disturbance. The proposed flowline corridor would be constructed using methods and materials described in Section 2.2.4.

2.3.5 Facilities Pad

The Preferred Alternative would use the same Mamba/Bandit dual well location facilities pad. A detailed description of the facilities pad is provided in Section 2.2.5.

2.3.6 Drilling

The Preferred Alternative would allow for one continuous drill cycle through the nesting season that would begin no sooner than July 15, 2016, unless a survey by a qualified avian biologist indicates all piping plovers have hatched and are mobile. Surveys would begin on July 1, 2016, to determine presence and status of hatched or fledged individual piping plovers and least terns. If surveys reveal presence of hatched and mobile chicks, Slawson would be allowed to begin construction.

The wells for the Preferred Alternative would be drilled and completed in full compliance with all applicable laws, regulations (43 CFR 3100), Onshore Oil and Gas Orders, the APD, and all BLM COAs as noted above in Section 2.2.6

2.3.7 Casing and Cementing

Casing and cementing for the Preferred Alternative wells would be the same techniques described in Section 2.2.7.

2.3.8 Completion and Evaluation

The Preferred Alternative wells would be completed and evaluated using the same techniques described in Section 2.2.8.

2.3.9 Commercial Production

Should drilling, testing, and production support commercial production from the Preferred Alternative well pad, the commercial production of hydrocarbons would follow the same methods as described in Section 2.2.9 and in accordance with Notice to Lessees 4A and adopted NDIC regulations, which prohibit unrestricted flaring for more than the initial year of operation (North Dakota Century Code 38-08-06.4).

Under the Preferred Alternative, the wells would be produced using an artificial lift rod pump Rotaflex 1100 pumping unit (or equivalent artificial lift pumping unit). These pumping units would offer less movement and operate at a lower decibel than typical oil pumping units. The operation of the Rotaflex on the well pad would reduce the disturbance from movement and sound emitted from the well pad. The Rotaflex is an electric driven long stroke pumping unit powered by a 100-kilowatt motor. The well site would have existing electrical service to operate each of the Rotaflex units. A pump off controller and variable speed drive would be installed to control the pumping unit. The unit is controlled by a variable frequency drive that monitors the downhole conditions of the pump.

A typical Rotaflex unit is illustrated in Appendix A. The vertical components of the Rotaflex 1100 pumping unit (including the base support structure) typically measure 44.3 feet tall by 8.5 feet wide by 23.6 feet in length. The Rotaflex foundation typically measures 24.0 feet long by 8.5 feet wide by 1.0 foot tall. The total structure height, including graded earth pad (typically 1 foot above the finished pad grade level), structural foundation, and structure, is approximately 46.3 feet above ground level. The pumping units would be painted a color specified by the BLM Field Office to blend with the natural background. The belt drive portion of the Rotaflex pumping units would be oriented north to reduce the visual moving parts from the south or the nesting area utilized by plovers.

2.3.10 Housing and Waste Management

Employee housing and waste management would be the same as described in Section 2.2.10.

2.3.11 Drill Hole Bottom Locations

The 11 wells would be drilled into spacing units consisting of approximately 3,200 acres. Each well is listed here with its bottom hole and drilling target locations, are described below and illustrated in Figure 2-6.

- **Torpedo Federal 1H:** The proposed bottom hole would be located in the NW¼ of the NW¼ of Section 36, T152N, R92W, Mountrail County, North Dakota, approximately 660 feet FNL and 550 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 998 feet FEL.

- **Torpedo Federal 2H:** The proposed bottom hole would be located in the SW¼ of the SW¼ of Section 36, T152N, R92W, Mountrail County, North Dakota, approximately 2,504 feet FSL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 635 feet FSL and 898 feet FEL.
- **Torpedo Federal 3H:** The proposed bottom hole would be located in the SW¼ of the SW¼ of Section 36, T152N, R92W, Mountrail County, North Dakota, approximately 641 feet FSL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 898 feet FEL.
- **Torpedo Federal 4H:** The proposed bottom hole would be located in the SW¼ of the NW¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 1,492 feet FNL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 848 feet FEL.
- **Torpedo Federal 5H:** The proposed bottom hole would be located in the SW¼ of the SW¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 1,143 feet FSL and 75 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 798 feet FEL.
- **Torpedo Federal 6H:** The proposed bottom hole would be located in the SE¼ of the SW¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 550 feet FSL and 2,275 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 748 feet FEL.
- **Torpedo Federal 7H:** The proposed bottom hole would be located in the SE¼ of the SE¼ of Section 1, T151N, R92W, Mountrail County, North Dakota, approximately 550 feet FSL and 398 feet FEL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 698 feet FEL.
- **Torpedo Federal 8H:** The proposed bottom hole would be located in the NW¼ of the NW¼ of Section 7, T151N, R91W, Mountrail County, North Dakota, approximately 830 feet FNL and 550 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 648 feet FEL.
- **Torpedo Federal 9H:** The proposed bottom hole would be located in the SE¼ of the SW¼ of Section 7, T151N, R91W, Mountrail County, North Dakota, approximately 550 feet FSL and 1,451 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 598 feet FEL.

- **Torpedo Federal 10H:** The proposed bottom hole would be located in the SW¼ of the SE¼ of Section 7, T151N, R91W, Mountrail County, North Dakota, approximately 550 feet FSL and 1,572 feet FEL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 548 feet FEL.
- **Rebel Federal 1 SLH:** The proposed bottom hole would be located in the SW¼ of the SW¼ of Section 5, T151N, R91W, Mountrail County, North Dakota, approximately 250 feet FSL and 660 feet FWL. The proposed surface hole would be located in the SE¼ of the SE¼ of Section 30, T152N, R91W, Mountrail County, North Dakota, approximately 289 feet FSL and 448 feet FEL.

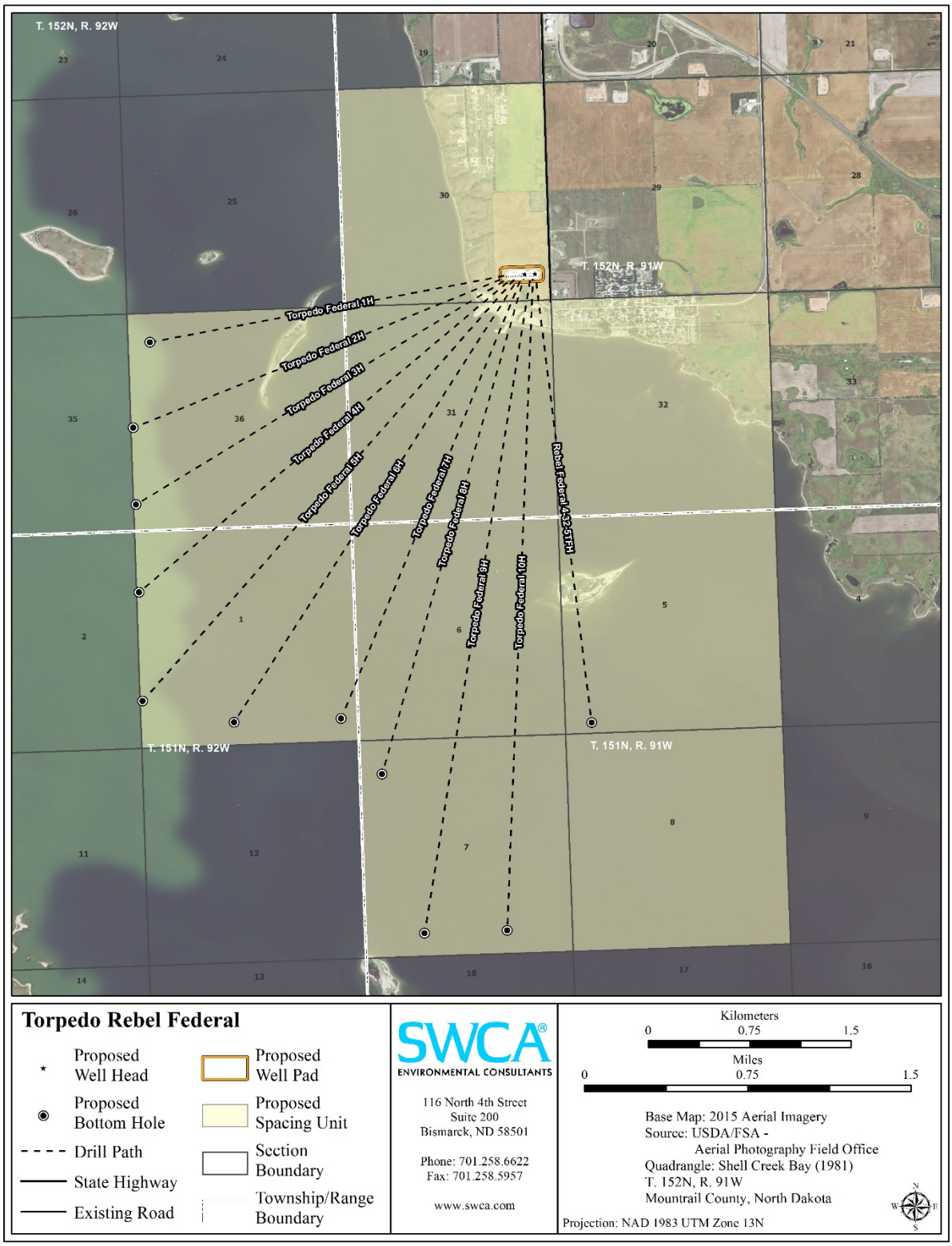

Figure 2-6. Preferred Alternative Torpedo Rebel Federal well pad spacing unit boundary.

2.3.12 Reclamation

Please refer to Section 2.2.12 for a description of interim and final reclamation of the well pad, access road and flowline ROWs, and facilities pad.

2.3.13 Applicant-Committed Best Management Practices

2.3.13.1 General Best Management Practices

Although largely project specific, there are a number of BMPs that can, and should, be considered on development projects in general. Refer to Section 2.2.13.1 for a detailed list of BMPs.

Whenever possible, Slawson commits to implementing all BMPs identified during the on-site inspection that can be used to mitigate environmental concerns specific to projects associated with belowground linear alignments, such as those included in the proposed utility corridor.

2.3.14 Mitigation and Spill Plans

2.3.14.1 Spill Prevention, Control, and Countermeasure Plan

The Preferred Alternative fenced area of the well pad location is approximately 600 feet (at its closest point) away from the edge of Lake Sakakawea. Refer to Section 2.2.14.1 for additional information on Slawson's SPCC plan.

2.3.14.2 Pipeline Marking Procedures

Slawson adheres to the requirements of 49 CFR 192.707 with regard to the marking of buried pipelines. Specifically, Slawson would place pipeline markers within 1,000 feet of one another at all public road crossings, railroad crossings, creek crossings, and fence crossings, and at all points of major direction change.

2.3.14.3 Quality Control/Quality Assurance Measures

The flowlines for the Preferred Alternative would meet all quality standards and inspections as outlined in Section 2.2.14.3.

2.3.14.4 Valve Locations

A valve would be installed at each end of each proposed flowline. Specifically, one valve would be installed at the well location, and another valve would be installed at the facilities pad. The installation of these valves would allow Slawson to isolate any given flowline, if required.

2.3.14.5 Reclamation

Refer to Section 2.2.12 for a description of interim and final reclamation procedures. The decommissioned pipelines would be proposed for abandonment in place. It is economically and environmentally infeasible to excavate and remove the decommissioned pipelines. The pipelines would be purged of residual oil and gas, and all residue and other materials used to purge the pipelines would be collected and disposed of in accordance with permit requirements.

3.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

This chapter includes a brief description of the environment that is likely to be affected by the No Action Alternative, Alternative 1, or the Preferred Alternative. The description of the affected environment is limited to the information that is relevant to understanding the potential impacts of the project. Certain resources were considered but are not carried forward for further analysis because they are not present or would not be affected, including wilderness, land use plans, and timber harvesting.

Effects on environmental resources or values resulting from implementation of the No Action Alternative, Alternative 1, or the Preferred Alternative may be either beneficial or detrimental and may vary in duration from short term (during the first five years) to long term (throughout the project life) and may be permanent in the absence of successful restoration or reclamation. Effects anticipated for this project are likely to be negligible (little or no effect on the resource), low (effects are difficult to detect and cause minimal change to the resource), and moderate (effects are readily apparent but do not meet the criteria of significant impacts). Effects may be direct, occurring at the same time and place as the project, or indirect, occurring at another time or location.

The analysis of effects takes into consideration project design elements, BMPs, and applicant-committed measures to minimize impacts described in Chapter 2. Any unavoidable impacts may require additional mitigation.

3.1 LAND RESOURCES

3.1.1 Topography

3.1.1.1 Affected Environment

Western North Dakota is part of the relatively flat Great Plains, which slope gently upward toward the Rocky Mountains. The land surface in this area consists of hilly to gently rolling plains with occasional buttes. The surface, including the North Dakota Badlands, has local relief, shaped by erosion, of 300 to 500 feet. The Missouri Coteau is a 30- to 70-mile-wide strip extending diagonally from the northwest corner of the state to the south-central border, which marks the farthest advance of glacial ice. The local relief is primarily used as cropland.

3.1.1.2 Environmental Consequences

No Action Alternative

No effects on topography would occur under the No Action Alternative.

Alterative 1

Although some ground surface disturbance would occur under Alternative 1, drill rigs would be placed on the constructed well pad, and no changes in existing topography are planned. There would be impact to existing hills by cutting and grading. The topography of the location would be partially reestablished during interim reclamation and fully reestablished upon final reclamation. Therefore, through reclamation efforts, topography would remain unaffected from Alternative 1.

Preferred Alternative

The Preferred Alternative would include comparable amounts of ground surface disturbance as for Alternative 1. Therefore, through reclamation efforts, topography would remain unaffected from the Preferred Alternative.

3.1.2 Soils

3.1.2.1 Affected Environment

The project area consists of till plains, shallow upland soils, and deep alluvial deposits developed from a variety of landforms, including floodplains and bottomlands; alluvial deposits along fans, pediments, and terraces; and gentle sloping plains and rises (3%–6% slopes) to steeper hill slopes and ridges (6%–15% slopes). Textures are primarily loams to silty clays in soils derived from alluvium, residuum, and colluvium weathered from sedimentary rock and glacial deposits (Natural Resources Conservation Service [NRCS] 2014a). Mean annual precipitation throughout the project area ranges from 13 to 18 inches, and mean annual air temperature ranges from 39 degrees Fahrenheit (°F) to 45°F. Vegetation common to these soils includes range and pasture grass species of the mid-grass prairie and woodland vegetation on steeper, wetter slopes. Soils in and surrounding the project area are often cultivated for grain or hay and pasture, with frost-free periods ranging from 120 to 135 days.

The soil series and components that occur within the proposed project area are a result of weathering of several geomorphic features with differentiated geologic substrate, which have been categorized into the backslopes and summits soil groups (Tables 3-1 and 3-2).

Table 3-1. Soil Groups within the Alternative 1 Project Area

Soil Group	Soil Map Units	Surface Runoff	Erodibility Rating	Reclamation Potential	Ecological Sites	Surface Disturbance (acres)	% of Surface Disturbance
Backslopes and summits	C132B	Medium	Slight	Fair	R053BY011ND - Loamy	9.81	38.21
					R053BY015ND - Thin Loamy		
					R053BY005ND - Loamy Overflow		
					R053BY004ND - Limy		
					R053BY019ND - Wet Meadow		
					R053BY002ND - Claypan		
Backslopes	C132C	Medium	Slight	Fair	R053BY011ND - Loamy	8.24	36.36
					R053BY015ND - Thin Loamy		
					R053BY005ND - Loamy Overflow		
					R053BY004ND - Limy Subirrigated		
					R053BY025ND - Shallow Marsh		
					R053BY002ND - Claypan		
Backslopes and summits	C210A	Low	Slight	Fair	R053BY011ND - Loamy	5.86	25.43
					R053BY005ND - Loamy Overflow		
					R053BY015ND - Thin Loamy		
					R053BY004ND - Limy Subirrigated		
					R053BY002ND - Claypan		
					R053BY019ND - Wet Meadow		
					R053BY010ND - Shallow Gravel		
					R053BY025ND - Shallow Marsh		
Total						**23.91**	**100.00**

Table 3-2. Soil Groups within the Preferred Alternative Project Area

Soil Group	Soil Map Units	Surface Runoff	Erodibility Rating	Reclamation Potential	Ecological Sites	Surface Disturbance (acres)	% of Surface Disturbance
Backslopes and summits	C132B	Medium	Slight	Fair	R053BY011ND - Loamy	10.25	40.64
					R053BY015ND - Thin Loamy		
					R053BY005ND - Loamy Overflow		
					R053BY004ND - Limy		
					R053BY019ND - Wet Meadow		
					R053BY002ND - Claypan		
Backslopes	C132C	Medium	Slight	Fair	R053BY011ND - Loamy	9.22	34.29
					R053BY015ND - Thin Loamy		
					R053BY005ND - Loamy Overflow		
					R053BY004ND - Limy Subirrigated		
					R053BY025ND - Shallow Marsh		
					R053BY002ND - Claypan		
Backslopes and summits	C210A	Low	Slight	Fair	R053BY011ND - Loamy	6.34	25.07
					R053BY005ND - Loamy Overflow		
					R053BY015ND - Thin Loamy		
					R053BY004ND - Limy Subirrigated		
					R053BY002ND - Claypan		
					R053BY019ND - Wet Meadow		
					R053BY010ND - Shallow Gravel		
					R053BY025ND - Shallow Marsh		
Total						**25.81**	**100.00**

Field-Derived Soil Data

Soil data derived from on-site excavated soil pits for Alternative 1 and the Preferred Alternative, including the matrix value, hue, chroma, and color name, are summarized in Table 3-3 and Table 3-4. A Munsell soil color chart was used to determine the color of moist soil samples.

Table 3-3. Soil Data Obtained through the Excavation of Soil Pits within the Alternative 1 Project Area

Pit Depth (inches)	Soil Matrix Color (color name)	Redoximorphic Feature Color	Texture
0 to 20	10YR 2/1 (black)	None observed	Silty loam
0 to 15	10YR 3/1 (dark gray)	None observed	Silty loam
0 to 20	10YR 2/1 (black)	None observed	Clay loam

Table 3-4. Soil Data Obtained through the Excavation of Soil Pits within the Preferred Alternative Project Area

Pit Depth (inches)	Soil Matrix Color (color name)	Redoximorphic Feature Color	Texture
0 to 8	10YR 2/1 (black)	None observed	Silty loam

3.1.2.2 Environmental Consequences

No Action Alternative

No effects on soils would occur as a result of the No Action Alternative.

Alternative 1

Alternative 1 would involve short-term impacts on soil resources, which could result in the potential reduction of soil quality. Impacts would result from soil disturbance due to the use of heavy machinery, the removal of vegetation, and intermixing of topsoil and subsoil during grading and stockpiling. Important factors in determining the occurrence of soil impacts include the characteristics of the major soil types, vegetative cover, and slope. This section discusses potential soil impacts throughout the proposed project location.

Sensitive soils typically include soils that have shallow depth to bedrock; minimal surface-layer, sodic, or hypersaline soils with limited exchange capacity; soil textures that are more easily detached and eroded; or are on steep slopes (greater than 25%) (NRCS 1998). Susceptibility to erosion may substantially increase when particular features are in combination. The soil map unit rates all soils on their susceptibility to water erosion. Wind erosion may also be a hazard, particularly when surface litter and vegetation are removed by surface-disturbing activities.

As vegetative cover is removed and the structural stability of the soil is disrupted, the potential for erosion increases. This potential degree of erosion depends upon slope, runoff probability, soil texture, and soil structure. Finely textured soils with poor structure are

generally more prone to water erosion than coarse, sandy soils. Silt loams and silty clay loams are particularly vulnerable to water erosion due to their fine particle size and decreased cohesiveness. However, elevated sandy textures make soils more sensitive to wind erosion. The project area includes soils that are susceptible to erosive forces, especially in the absence of vegetative cover due to grading and compaction from heavy machinery. Steep slopes can be highly susceptible to erosion, regardless of soil texture.

Soils in the Alternative 1 project location may have increased concentrations of salts or sodium, creating saline or sodic conditions. Due to surface leaching and the mitigating effects of soil organic matter, surface soils typically have lower salt concentrations than subsoils. However, salvage and reclamation can often lead to topsoil and subsoil mixing, which elevates surface soil concentrations to levels that exceed salt thresholds of most upland plants. Additional BMPs may be necessary to remediate impacts of saline or sodic soils.

Some potential for erosion may exist in the proposed project location, depending on surface disturbance, site-specific slope, soil type, erosion risk, construction technique, and long-term maintenance. Soil erodibility ratings are determined by evaluating the erosion susceptibility (i.e., wind and water erosion factors) with terrain slope and content of rock fragments (NRCS 1998). Erosion risk in Alternative 1 soils are rated as slight (Table 3-1). Slight ratings indicate that no erosion is likely. Alternative 1 is not anticipated to create unmanageable erosion issues or interfere with reclamation of the area. Reclamation potential is rated as fair for the soils in the project area.

Keeping in mind the general and site-specific measures identified in Section 2.2.12, the potential impacts from erosion for the proposed project include the following.

- The Alternative 1 project would be constructed in soils that are predominantly Williams-Zahl loams (approximately 37.04%), soils with fair reclamation potential.
- Soils in the Alternative 1 project location have low to medium surface runoff potential and a slight erosion risk.
- During construction, temporary surface disturbance of 23.91 acres would occur (Table 3-5).
    - At the well pad approximately 7,585 cubic yards of topsoil would be salvaged to a depth of 6 inches and stored at a maximum depth of 10 feet. The slope in the project area ranges from 1% to 14% on and around the pad but would require some site leveling with a cut of 56,745 cubic yards of earth and fill of 37,515 cubic yards, with 7,585 cubic yards of excess unbalance, known as spoils, of which 390 cubic yards would be used to construct the access road.

The overall percentage of surface disturbance for each soil series is based on the spatial extent of soil series derived from NRCS data. The soil map units are approximations of the existing soils across the landscape acreage and, therefore, are used to make best estimates to describe the soil distribution for the Alternative 1 project location. A number of soil series occurs within the Alternative 1 project location as a result of weathering of surfaces of several geomorphic features with differentiated geologic substrates (Figure 3-1).

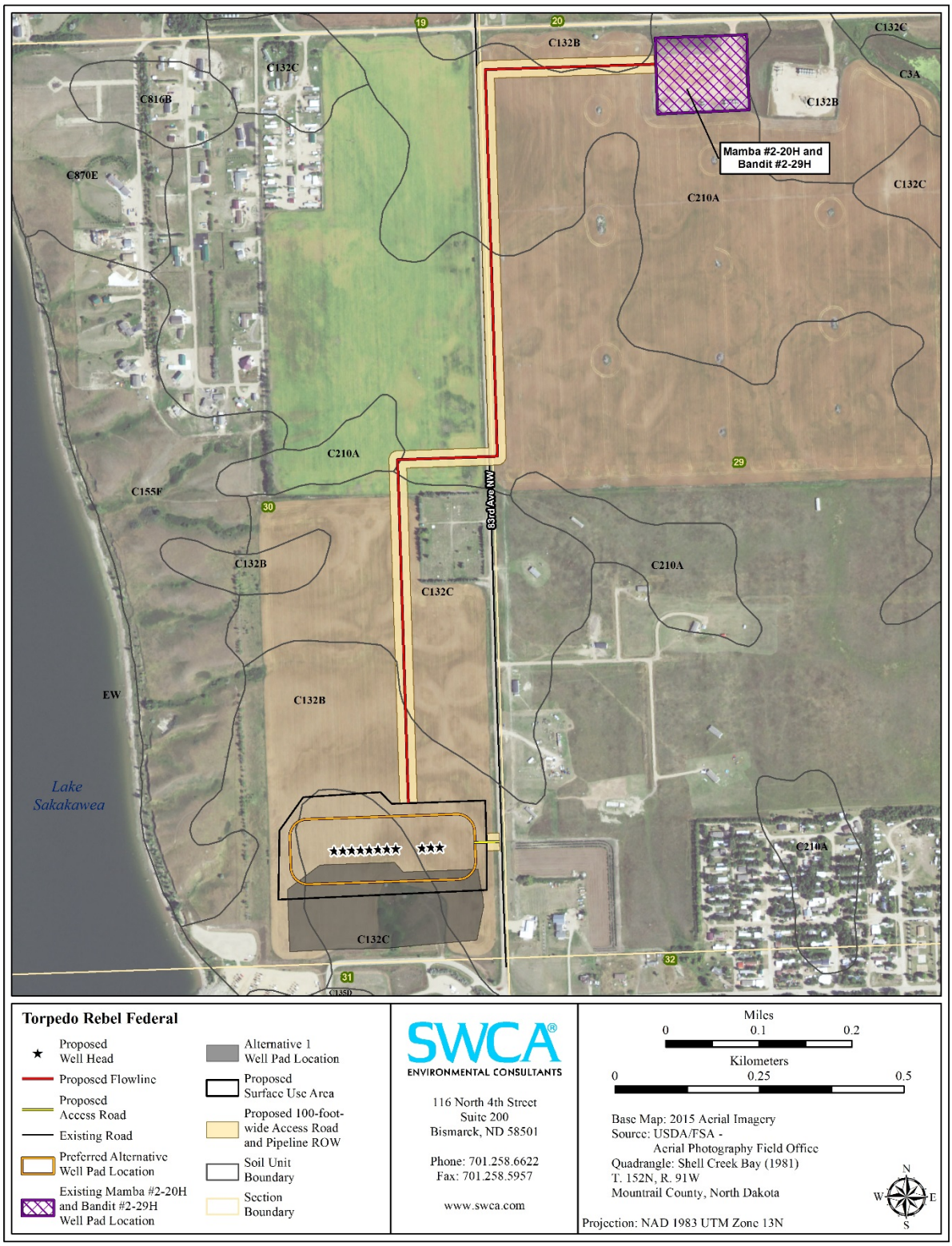

Figure 3-1. Approximate spatial extent of soil types within and around the Alternative 1 and Preferred Alternative Torpedo Rebel Federal well pad and access road/utility corridor.

Preferred Alternative

The Preferred Alternative project location is positioned approximately 340 feet north of Alternative 1, therefore the Preferred Alternative shares many of the same environmental properties. Keeping in mind the general and site-specific measures identified in Section 2.2.12, the potential impacts from erosion for the proposed project include the following.

- The Preferred Alternative project would be constructed in soils that are predominantly Williams-Zahl loams (approximately 40.64 %), soils with fair reclamation potential.
- Soils in the Preferred Alternative project location have low to medium surface runoff potential and a slight erosion risk.
- During construction, temporary surface disturbance of 25.81 acres would occur.
    - At the well pad, approximately 9,320 cubic yards of topsoil would be salvaged to a depth of 6 inches and stored at a maximum depth of 10 feet. The slope in the project area ranges from 1% to 14% on and around the pad, but requires some site leveling, with a total cut of 72,470 cubic yards of earth, and fill of 47,855 cubic yards, with 9,320 cubic yards of excess unbalance, known as spoil, of which 940 cubic yards would be used to construct the access road.

The overall percentage of surface disturbance for each soil series is based on the spatial extent of soil series derived from NRCS data. The soil map units are approximations of the existing soils across the landscape acreage and, therefore, are used to make best estimates to describe the soil distribution for the Preferred Alternative project location. A number of soil series occurs within the Preferred Alternative project location as a result of weathering of surfaces of several geomorphic features with differentiated geologic substrates (see Figure 3-1).

Natural Resources Conservation Service Soil Data

The NRCS (2013) soil series present within the well pad and access road/utility corridor and their respective acreages for Alternative 1 and the Preferred Alternative are illustrated in Figure 3-1 and summarized in Tables 3-5 and 3-6. The acreage shown is based on the spatial extent of soil series combinations derived from NRCS data; therefore, the acreage is approximate and used as a best estimate of soil series distribution at the proposed project area. The Williams-Bowbells loams, with 0% to 3% slopes, dominate the flowline corridor. The well pad is generally split among two different loam complexes, ranging from flat to 3% to 6% slopes.

Table 3-5. Soil Series within the Alternative 1 Project Area

Project Component	Symbol	Type	Slope (%)	Disturbance Area (acres)	Area of Disturbance (%)
Flowline	C132B	Williams-Zahl loams	3 to 6	5.95	19.24
	C132C	Williams-Zahl-Zahill complex	6 to 9	3.34	10.81
	C210A	Williams-Bowbells loams	0 to 3	3.27	10.58
Well pad	C132B	Williams-Zahl loams	3 to 6	7.90	25.56
	C132C	Williams-Zahl-Zahill complex	6 to 9	3.19	10.32
Access road	C132B	Williams-Zahl loams	3 to 6	0.26	0.84
Total				**23.91**	**100.00**

Table 3-6. Soil Series within the Preferred Alternative Project Area

Project Component	Symbol	Type	Slope (%)	Disturbance Area (acres)	Area of Disturbance (%)
Flowline	C132B	Williams-Zahl loams	3 to 6	4.45	22.76
	C210A	Williams-Bowbells loams	0 to 3	3.75	13.57
	C132C	Williams-Zahl-Zahill complex	6 to 9	2.96	10.70
Well pad	C132C	Williams-Zahl-Zahill complex	6 to 9	7.95	28.77
	C132B	Williams-Zahl loams	3 to 6	6.53	23.61
Access road	C132B	Williams-Zahl loams	3 to 6	0.17	0.60
Total				**25.81**	**100.00**

3.1.3 Agriculture

3.1.3.1 Affected Environment

The project is located within the Great Plains Level I Ecoregion, which has been divided locally into four Level IV ecoregions. The largest ecoregion is the Missouri Coteau Slope, which occurs north and east of Lake Sakakawea. Agriculture is the main land use of this unit. Planted crops include wheat (*Triticum aestivum*), barley (*Hordeum* spp.), alfalfa (*Medicago sativa*), and corn (*Zea mays*). Grazing also occurs in this unit. The southern portion of the Reservation is located in the Missouri Plateau ecoregion. Dry-land farming and livestock grazing are the predominant land uses in this ecoregion. The River Breaks ecoregion is along the periphery of Lake Sakakawea and the Missouri River. This unit is characterized by steep slopes, which limit the land use to livestock grazing. The Little Missouri Badlands ecoregion is in the southwestern portion of the Reservation along the Little Missouri River. The primary land uses in this unit are limited to ranching and recreation (Bryce et al. 1998).

Prime farmland and statewide important soils comprise land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops (NRCS 2014a). They have the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. These lands are generally classified as prime farmland, or farmland of statewide importance.

Prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks (NRCS 2014a). They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. Coordination with the NRCS is necessary when implementing management plans or development projects that involve prime farmland. Within the proposed project area, there are no acres of prime farmland.

Farmland of statewide importance, or of local importance, is land other than prime farmland or unique farmland that is also highly productive (NRCS 2014a). These lands typically approach the productivity of lands in their area that meet criteria for prime farmland and unique farmland.

3.1.3.2 Environmental Consequences

No Action Alternative

No effects on agriculture would occur as a result of the No Action Alternative.

Alternative 1

Under Alternative 1, the proposed project location would add 23.91 acres of temporary surface disturbance within agricultural fields, which 19.32 acres are considered farmland of statewide importance. These areas would no longer be available for agricultural practices or grazing livestock; however, because of the large proportion of area available outside the fenced exclusion area for agriculture and grazing livestock, this would not be a significant impact. Alternative 1 would not disturb soils classified as prime farmland. The NRCS is responsible under the Farmland Protection Policy Act (FPPA) in documenting conversion of farmland to nonagricultural use. Conversion of prime farmland and farmland of statewide importance is protected under the FPPA (NRCS 2014b). Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. Assistance from a federal agency includes providing technical assistance, which the BIA does in cases of Indian Trust lands. However, several years ago when oil and gas development was increasing in North Dakota and the Bakken field, the Bismarck NRCS field office contacted the NRCS National Technical Center to discuss applicability of the FPPA to these activities in the Bakken. The NRCS National Technical Center directed the Bismarck field office to apply the FPPA only to projects that received federal funding (NRCS 2014c). According to the NRCS National Technical Center, because Alternative 1 is not federally funded, no FPPA coordination with the NRCS is required.

Preferred Alternative

Under the Preferred Alternative, the proposed project location would add 25.81 acres of temporary surface disturbance within agricultural fields, all of which is considered farmland of statewide importance. Environmental consequences would be the same as those described for Alternative 1.

3.1.4 Geology

3.1.4.1 Affected Environment

Geology

Alterative 1 and the Preferred Alternative are located in the central portion of the Williston Basin, west of the Nesson Anticline, a north–south-trending asymmetrical fold that began forming in what is now North Dakota during the early Phanerozoic and continued until the mid-Tertiary. The basin consists of deep layers of sedimentary rock deposited over time above a Precambrian geologic basement (Figure 3-2). These sedimentary units consist of thick accumulations of limestone and dolomite that were deposited within the basin during the

Cambrian, Ordovician, Silurian, and Devonian periods, interspersed with thinner deposits of sandstone, siltstone, shales, and salts (Peterson 1995). Deposition has continued in the basin through the current geological epoch, with the maximum depth of sedimentary deposits of approximately 16,000 feet in the area of Williston, North Dakota (Peterson 1995).

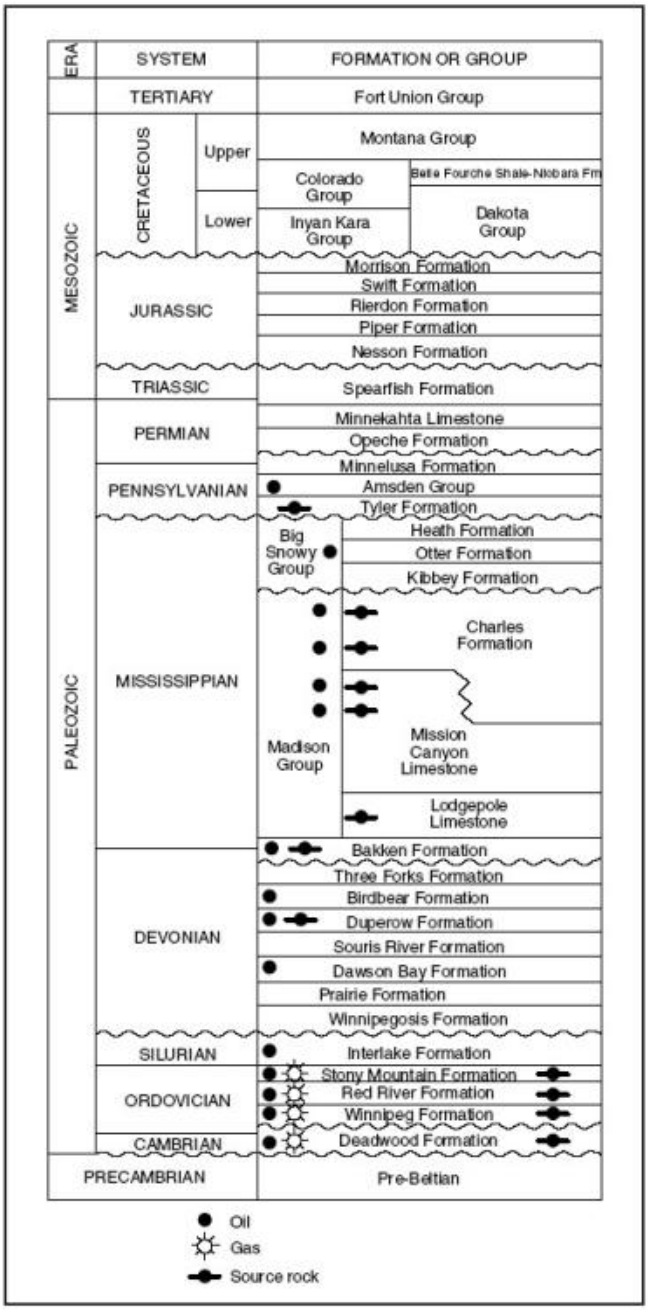

Figure 3-2. Typical stratigraphic column of the Williston Basin, with oil- and gas-bearing formations (Peterson 1995).

The underlying Bakken and Three Forks Formations are well-known sources of hydrocarbons within the Williston Basin. 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 these formations more feasible.

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

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

The land within the Reservation consists of four Level IV ecoregions: 1) the Missouri Coteau Slope north of Lake Sakakawea, 2) the Missouri River Breaks along the shores of Lake Sakakawea, 3) the Little Missouri River Badlands southwest of Lake Sakakawea, and 4) the Missouri Plateau south and west of Lake Sakakawea (Bryce et al. 1998). Elevations differ across these topographically variable ecoregions, from a normal pool elevation of 1,838 feet at Lake Sakakawea to approximately 3,300 feet in the Killdeer Mountains, thereby exposing thick sequences of sedimentary rocks in some areas.

Based on published geologic mapping (Bluemle 1971, 1989; Carlson 1973, 1985; Clayton 1972; Murphy 2001), three Paleocene- to Eocene-age geologic formations and numerous late Tertiary and Quaternary surficial deposits are exposed at the surface within the Reservation. These are, in ascending stratigraphic order, the Paleocene-age Bullion Creek (Tongue River) and Sentinel Butte Formations, Paleocene- to Eocene-age Golden Valley Formation, unnamed late Tertiary and early Pleistocene sands and gravels, Pleistocene-age Coleharbor Formation, and Holocene-age alluvial deposits, including those of the Walsh and Oahe Formations. The Paleocene- and Eocene-age units were deposited in a terrestrial setting after the Western Interior Seaway, which had covered much of central North America during the Cretaceous, underwent its final major regressive depositional cycle. During the Quaternary, deposition occurred in a glaciated environment, often resulting in thick sequences of glacially derived sedimentary deposits. From the Quaternary to recent times, the landscape has been altered as the result of erosion by water and wind, and the modern topography was formed.

3.1.4.2 Environmental Consequences

No Action Alternative

There would be no effects on geologic resources as a result of the No Action Alternative.

Alternative 1

Oil and gas resources located in Alternative 1 target areas would be permanently depleted. Sand, gravel, and other materials used for construction of the well pad would be permanently relocated and converted to hard surface. Use of these local materials would have minor effects on geologic resources due to the small size of Alternative 1 compared with the size of the Reservation (over 1 million acres).

Preferred Alternative

The Preferred Alternative target areas would be permanently depleted. Sand, gravel, and other materials used for construction of the well pad would be permanently relocated and converted to hard surface. Use of these local materials would have minor effects on geologic resources due to the small size of the Preferred Alternative compared with the size of the Reservation (over 1 million acres).

3.2 WATER RESOURCES

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

Water resources in the proposed project area would be managed and protected in accordance with existing federal laws and policies regarding the use, storage, and disposal of this resource during the construction and operation of the project. Surface water resource use and protection is administered under the following federal laws:

- Clean Water Act (CWA) of 1972, as amended (33 United States Code [USC] 1251 et seq.)
- Federal Land Policy and Management Act of 1976 (43 USC 1711–1712)
- NEPA of 1969, as amended (42 USC 4321)
- Safe Drinking Water Act of 1974, as amended (42 USC 300 et seq.)

Water quality is protected under the Federal Water Pollution Control Act (as amended), otherwise known as the CWA. The CWA has developed rules for regulating discharges of pollutants into waters of the U.S., and also regulates water quality standards for surface waters. The CWA has also made it unlawful to discharge any pollutant from a point source, including stormwater discharges, into any water of the U.S., unless a permit has been obtained from the National Pollutant Discharge Elimination System (NPDES) program. The Environmental Division of the Three Affiliated Tribes (TAT) of the Mandan, Hidatsa, and Arikara Nation (MHA Nation) has had an application pending with the U.S. Environmental Protection Agency (EPA) since 1996 for delegation of authority to set federally approved

water quality standards on the Reservation. In the absence of tribal authorities to oversee surface water quality, enforcement of federal environmental laws regarding surface water on the Reservation is accomplished through permitting, inspection, and monitoring activities of the NPDES program, as administered by the EPA.

Stormwater discharges from oil and gas exploration, production, processing, or treatment operations are generally exempt from filing a notice of intent to discharge pursuant to NPDES requirements, provided that the stormwater does not come into contact with such things as product or waste products, or mingle with other discharges like production water. Under this exemption, a permit is not required unless reportable quantities of oil or other hazardous materials are discharged, or the discharge contributes to violation of a water quality standard.

3.2.1 Surface Water

3.2.1.1 Affected Environment

Surface water is abundant within 0.5 mile of the project area for Alternative 1 and the Preferred Alternative and is shown in Figure 3-3 (North Dakota Department of Health [NDDH], Division of Water Quality 2011). Runoff from the well pad would flow overland approximately 400 feet south to Lake Sakakawea (see Figure 3-3).

The Alternative 1 and Preferred Alternative Torpedo Rebel Federal well pad and the majority of the access road and flowline corridor would be constructed within the Upper Van Hook Arm (hydrologic unit code 101101012705) sub-watershed, the Van Hook State Wildlife Management Area (hydrologic unit code 1011010127) watershed, and the Lake Sakakawea (hydrologic unit code 10110101) drainage basin (see Figure 3-3). No intermittent or perennial waterbodies were recorded within the proposed project area; however, runoff from the project area could flow through a ditch that leads to Lake Sakakawea.

Uses of the Lake Sakakawea watersheds are generally referred to as agriculture, fish/aquatic biota, fish consumption, industrial, municipal/domestic, and recreation. The Water Quality Assessment Status for Lake Sakakawea in reporting year 2012 lists the status of fish consumption as “impaired” due to mercury levels (EPA 2014a). No ongoing discharge of water to surface waters of the U.S. would be required for this project. Although an NPDES permit might not be required for stormwater discharges, BMPs and erosion and sediment controls would be implemented to minimize impacts to stormwater quality (see Section 3.2).

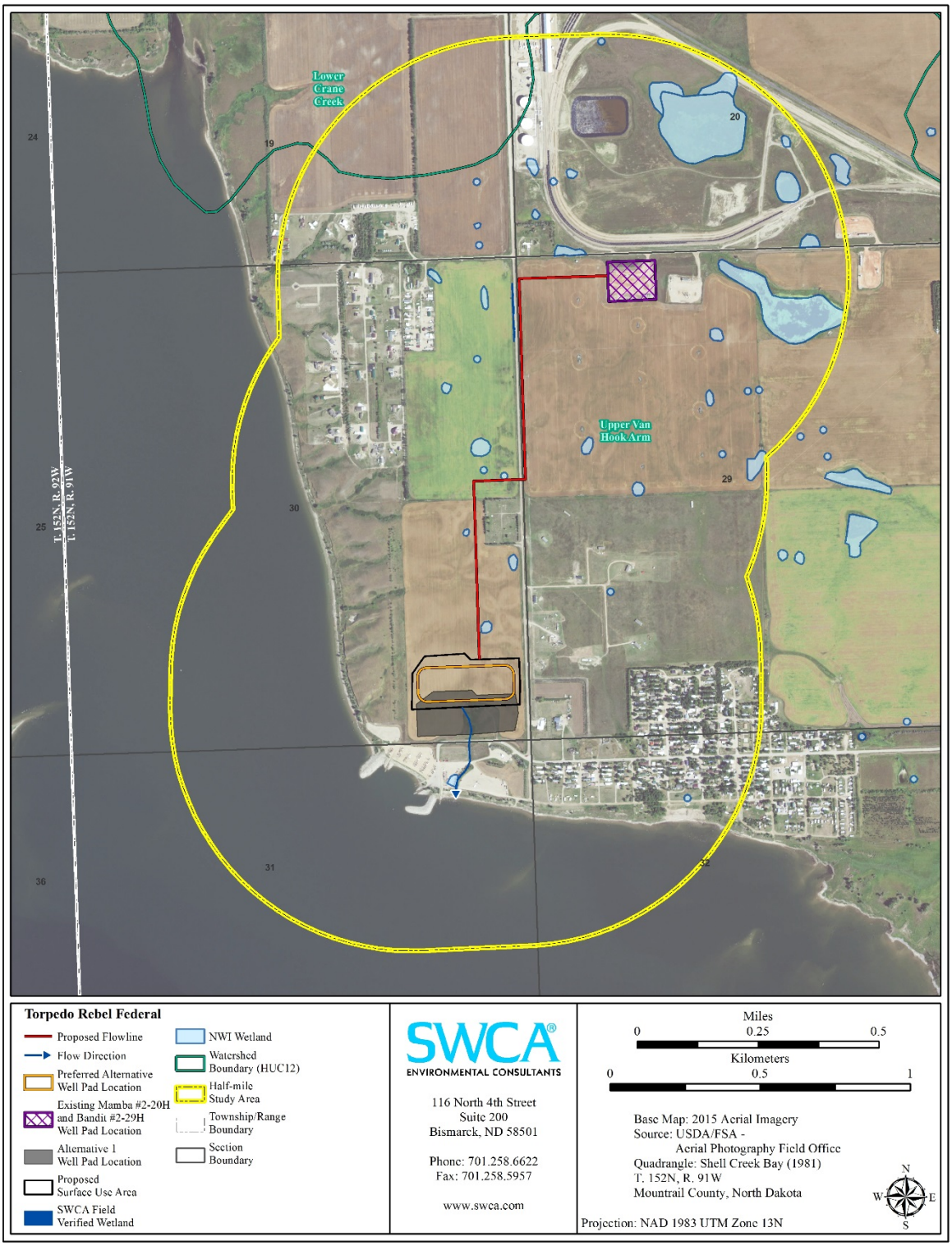

Figure 3-3. Watersheds and surface runoff directions in vicinity of Torpedo Rebel Federal Alternative 1 and Preferred Alternative well pad.

3.2.1.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, impacts to water resources within the project area would continue at existing levels, without any additional impacts that may result from the Proposed Action.

Alternative 1

Alternative 1 has the potential to impact surface water as a result of soil erosion and stormwater runoff within the project area. Development of Alternative 1 would result in 23.91 acres of short-term surface disturbance and 14.58 acres of long-term surface disturbance. Slawson has adopted construction BMPs and site-specific erosion protection measures, identified in Section 2.2.13, that would avoid, reduce, or minimize surface and stormwater runoff and potential surface water degradation from construction and operation of Alternative 1. During construction and operation of the proposed project, Slawson would implement all BMPs, erosion control measures, and spill prevention practices. These measures would reduce long-term erosion and runoff from the sites, thus providing adequate protection to surface water resources.

Alternative 1 also has the potential to result in degradation of water quality due to project-related spills of fuel or other hazardous chemicals. The potential for surface water impacts from project-related spills has been reduced through project siting and Slawson's mitigation and safety measures outlined in Section 2.2.14. Siting of the well pad away from wooded draws and perennial streams would reduce the potential for and volume of project-related erosion or spills from reaching surface water resources. The proposed Alternative 1 well pad and facilities pad locations are approximately 400 feet and 1 mile, respectively, from Lake Sakakawea. Alternative 1 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.

The potential for surface water impacts from drilling fluids and cuttings would be reduced by Slawson's use of a closed-loop drilling system. With the use of a closed-loop drilling system, all drilling fluids and cuttings would be contained in on-site tanks on the production pad and then hauled to and disposed of at approved off-site disposal facilities.

The potential for erosion and spills would also be reduced through the construction of a 2-foot-tall berm around the pad location, sloping of the drilling pad away from drainageways, and construction of a tank battery containment system designed to hold 110% of the capacity of the largest tank plus 1 day's production to prevent hazardous runoff or spills. In addition, any chemicals or potentially hazardous materials would be handled in accordance with the operator's SPCC plan. Provisions established under this plan would minimize potential impacts to any surface waters associated with an accidental spill. With the implementation of erosion control, closed-loop drilling, and spill prevention measures, Alternative 1 is not expected to result in impacts to surface water quality.

Water would be obtained from permitted commercial municipal or industrial water depots not associated with Alternative 1. These water depots would supply the operation with water via

lay-flat hose from two local water suppliers located approximately 3 and 6 miles north of the project location. Through the use of a closed-loop drilling plan, the operator's BMPs, and SPCC plans, Alternative 1 would have no effect on surface water quality.

Preferred Alternative

Under the Preferred Alternative, impacts to surface water would be similar to Alternative 1. The fenced area for the well pad is located approximately 600 feet (at its closest point) from the shores of Lake Sakakawea. The Preferred Alternative has the potential to impact surface water as a result of soil erosion and stormwater runoff within the project area. Development of the Preferred Alternative would also involve the placement of a "stop gate" type structure that can be opened and closed on the culvert under the entrance road to the boat ramp in case an undesirable release of fluids leaves the bermed pad. The Preferred Alternative would result in 25.81 acres of short-term surface disturbance and 14.48 acres of total area of loss (fenced right-of-way). . Through the use of a closed-loop drilling plan, the operator's BMPs, and SPCC plans, the Preferred Alternative would have no effect on surface water quality.

3.2.2 Groundwater

3.2.2.1 Affected Environment

Groundwater Aquifers and Typical Groundwater Quality

Aquifers in the Alternative 1 and the Preferred Alternative area and surrounding region include, from deepest to shallowest, the Cretaceous Fox Hills and Hell Creek Formations and the Tertiary Cannonball/Ludlow, Tongue River, and Sentinel Butte Formations (Table 3-7). The aquifers in question lie at depths from 670 to 2,000 feet below the surface. Shallow post-glacial outwash aquifers are located elsewhere in the Williston Basin but do not occur within the proposed project location. Shallow wells drilled to the upper member of the Fort Union Group and the Tongue River Formation at depths ranging from 100 to 750 feet below the surface are often used for cattle watering. These wells typically contain total dissolved solids levels of less than 3,000 parts per million (ppm). The shallow Sentinel Butte Formation is commonly used as a domestic water source in McKenzie County and meets standards of the NDDH (Croft 1985).

Many wells are drilled for domestic purposes throughout the Williston Basin in the basal Fox Hills Sand at depths ranging from 1,300 to 400 feet. The total dissolved solids level of the Fox Hills aquifer normally ranges from 2,500 to 3,000 ppm, producing quality drinking water. Detailed analyses are available from the North Dakota Geological Survey, Bulletin 68, Part III (Klausing 1979).

Existing Groundwater Wells

Data from the North Dakota State Water Commission (2014) indicate that no existing groundwater wells are within 1 mile of Alternative 1 or the Preferred Alternative project areas(Tables 3-8 and 3-9).

Table 3-7. Common Aquifers in the Proposed Project Areas and Surrounding Region

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

Sources: Croft (1985); Klausing (1979)

Table 3-8. Existing Water Wells within 5 Miles of Alternative 1

Section	Township/ Range	Type	Depth (feet)	Aquifer	Miles to Well Pad
21	152/91	Domestic well	102	Sand Sediments	1.74
18	152/91	Domestic well, plugged	360	Fort Union	1.99
13	152/92	Domestic well	75	Fort Union	2.12
18	152/91	Domestic well	100	Sand Sediments	2.13
21	152/91	Domestic well	165	Fort Union	2.13
17	152/91	Stock well	156	Sentinel Butte-Tongue River	2.24
17	152/91	Domestic well	136	Sentinel Butte-Tongue River	2.24
14	152/92	Test hole	100	No observation well installed	2.67

Section	Township/ Range	Type	Depth (feet)	Aquifer	Miles to Well Pad
8	152/91	Domestic well	225	Sentinel Butte-Tongue River	3.15
15	152/91	Domestic well	145	Sand Sediments	3.21
15	152/91	Stock well	102	Fort Union	3.52
26	152/91	Stock well	0	Shell Creek	3.99
8	152/91	Observation well, plugged	230	Sentinel Butte-Tongue River	4.01
8	152/91	Observation well, plugged	60	Sentinel Butte-Tongue River	4.01
3	151/92	Test hole	300	No observation well installed	4.13
25	152/91	Test hole	74	No observation well installed	4.28
5	152/91	Domestic well	92	Sentinel Butte-Tongue River	4.48
24	152/91	Domestic well	56	Unknown	4.57
13	152/91	Test hole	84	No observation well installed	4.66
24	152/91	Domestic well	480	Shell Creek	4.69
24	152/91	Observation well	100	Shell Creek	4.72
29	152/92	Observation well, destroyed	140	New Town	4.78
24	152/91	Observation well	30	Till	4.82
24	152/91	Observation well	95	Shell Creek	4.87

Table 3-9. Existing Water Wells within 5 Miles of the Preferred Alternative

Section	Township/ Range	Type	Depth (feet)	Aquifer	Miles to Well Pad
21	152/91	Domestic well	102	Sand Sediments	1.74
18	152/91	Domestic well, plugged	360	Fort Union	1.99
13	152/92	Domestic well	75	Fort Union	2.12
18	152/91	Domestic well	100	Sand Sediments	2.13
21	152/91	Domestic well	165	Fort Union	2.13
17	152/91	Stock well	156	Sentinel Butte-Tongue River	2.24
17	152/91	Domestic well	136	Sentinel Butte-Tongue River	2.24
14	152/92	Test hole	100	No observation well installed	2.67
8	152/91	Domestic well	225	Sentinel Butte-Tongue River	3.15

Section	Township/ Range	Type	Depth (feet)	Aquifer	Miles to Well Pad
15	152/91	Domestic well	145	Sand Sediments	3.21
15	152/91	Stock well	102	Fort Union	3.52
26	152/91	Stock well	0	Shell Creek	3.99
8	152/91	Observation well, plugged	230	Sentinel Butte-Tongue River	4.01
8	152/91	Observation well, plugged	60	Sentinel Butte-Tongue River	4.01
3	151/92	Test hole	300	No observation well installed	4.13
25	152/91	Test hole	74	No observation well installed	4.28
5	152/91	Domestic well	92	Sentinel Butte-Tongue River	4.48
24	152/91	Domestic well	56	Unknown	4.57
13	152/91	Test hole	84	No observation well installed	4.66
24	152/91	Domestic well	480	Shell Creek	4.69
24	152/91	Observation well	100	Shell Creek	4.72
29	152/92	Observation well, destroyed	140	New Town	4.78
24	152/91	Observation well	30	Till	4.82
24	152/91	Observation well	95	Shell Creek	4.87

3.2.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, impacts to water resources within the proposed project area would continue at existing levels without any additional impacts that may result from the Proposed Action.

Alternative 1

Development of Alternative 1 has the potential to affect surface water and groundwater resources near the proposed project location through erosion, spills of chemicals and petroleum products, and improper handling and disposal of waste.

Shallow Groundwater Wells

Drinking water aquifers are primarily located at depths less than 2,000 feet, including water-bearing parts of the Sentinel Butte, Tongue River, Cannonball/Ludlow, Hell Creek, and Fox Hills Formations. Water quality of future groundwater wells in the vicinity would be protected by drilling with freshwater to a point below the base of the Fox Hills Formation, implementing proper hazardous materials management, and using appropriate casing and cementing to permanently seal the well shaft from any surrounding aquifers. Surface casing would be employed to a depth of 2,500 feet below ground surface to isolate and protect all

near-surface aquifers from contamination during drilling, as described in Section 2.2.7 of this document, and to protect the potable water aquifers from any potential contamination during the drilling and operations phases.

Hydraulic Fracturing

The HF slurry opens or enlarges fractures that can extend several hundred feet from the well shaft, which is oriented laterally within the target formation. New fractures that extend vertically to overlying water-bearing formations, or connect existing fractures between formations, create a potential for contamination of potable water supplies by chemical additives, hydrocarbons, or poor-quality water in hydrocarbon-bearing formations.

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

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

The EPA has studied the effects of coalbed methane well fracturing, and published the results in a report (EPA 816-R-04-033) titled *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (EPA 2004). The report has received both internal and external peer review, as well as public comment, on its research design and incident information. Based on its research, the EPA concluded that there was negligible risk of HF fluid contaminating underground sources of drinking water during HF of coalbed methane production wells, which are significantly more shallow than the Bakken and Three Forks Formations. However, the EPA continues to monitor the effects of HF in coalbed methane well completion (EPA 2004). The EPA is currently undertaking a study to evaluate the effect of oilfield HF technology, processes, and fluids on potable water aquifers. The draft EPA study was released in June 2015 (EPA 2015).

Oil-bearing formations typically occur much deeper than potable water aquifers. The Bakken Formation lies approximately 4,000 feet below drinking water formations. The EPA coalbed methane study found through direct measurements that fractures created during HF extended less than 1,000 feet from the well bore. In addition, the unique geological position of the Bakken Formation places it immediately beneath the Madison Group, as shown in Figure 3-2. The Mississippian-age Madison Group is several thousand feet thick and includes three geological formations that have properties that greatly limit the possibility of HF fractures extending vertically into shallower geological formations that contain potable water. The following characteristics of the three members of the Madison Group show extremely high resistance to fracturing or vertical transmission of fluids.

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

Like the Lodgepole Limestone, the *Mission Canyon* is a dense limestone formation with very low porosity that ranges from 500 to 800 feet thick (see Figure 3-2). Any HF pressures within the Bakken Formation that might be sufficient to initiate fracturing of the Lodgepole Limestone are assumed to be greatly reduced before reaching the Mission Canyon Limestone Formation, and the HF pressures are very unlikely to cause any fracturing or transmission of fluids.

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

<u>Summary of Potential to Impact Shallow Groundwater Resources</u>

Impact to shallow groundwater resources and drinking water aquifers can occur through well casing failure during drilling or operations, extension of fractures into shallow rock units, and accidental spills of HF fluids. No direct or indirect impacts to groundwater resources would be anticipated from drilling the proposed wells, HF completions, or operation of the proposed wells due to the following.

- The geological setting of the Bakken and Three Forks Formations has extremely tight capping formations of the Madison Unit, forming an impermeable barrier to upward fracturing or fluid movement.
- Potable water aquifers lie approximately 4,000 feet above the Bakken Formation. Available literature suggests fractures are limited to within 1,000 feet of the well bore. Although large volumes of proppant are used in the modern, multistage fracture stimulations, relatively small amounts of proppant are used per stage and are specifically designed to limit fracture growth.
- Closed-loop drilling, construction BMPs, and spill prevention planning would be used during the construction phase of the project, as detailed in Section 2.2.
- Protective casings would be used on the well shafts to depths of 2,500 feet to protect shallow water-bearing rock formations during drilling and operation of the oil wells.

No mitigation measures have been identified for water resources. Applicant-committed protective measures are expected to avoid and minimize impacts to water resources.

Preferred Alternative

Development of Preferred Alternative has the same potential to affect groundwater resources near the proposed project location through the wells for the Preferred Alternative would be drilled and HF in the same way as described above for Alternative 1. Potential impacts to groundwater would be very similar for the Preferred Alternative.

3.3 AIR QUALITY

Alternative 1 and the Preferred Alternative have the potential to release regulated pollutants into the atmosphere and degrade air quality. The primary factors that influence regional ambient air quality are the location of air pollution sources, the quantity and chemical characteristics of pollutants emitted by those sources, the topography of the region, and local meteorological conditions.

The analysis area is a 50-kilometer (km) (approximately 31-mile) radius around Alternative 1 and the Preferred Alternative. The existing, affected environment and the environmental consequences of the project and its potential impacts to air quality and climate change, are discussed in this section, as well as the effects on air quality of the No Action Alternative.

3.3.1 Affected Environment

3.3.1.1 Climate

North Dakota's climate is characterized by great temperature variation across all time scales, which is perhaps the climate's most important feature. Throughout a typical year in North Dakota, the daily average temperature fluctuates between 13.0°F and 69.0°F, for an annual average temperature of 41.5°F. The state's climate is also characterized by light to moderate, irregular precipitation; plentiful sunshine; and nearly continuous wind (since no barriers to the north or south inhibit air masses), often resulting in large day-to-day temperature fluctuations. On average, about 75% of the annual precipitation falls during April to September, and for the coldest months (November through February), precipitation averages only about 0.5 inch per month, mostly as snow. The average annual precipitation is 16.17 inches. Representative climate conditions in the proposed project area are presented in Table 3-10.

Table 3-10. Representative Climate Conditions in the Alternative 1 and Preferred Alternative Project Area

Month	Average Temperature (degrees Fahrenheit)	Average Precipitation (inches)
January	13.0	0.46
February	17.8	0.40
March	28.7	0.75
April	42.4	1.22
May	53.4	2.31
June	62.7	3.15
July	69.0	2.53
August	67.8	1.67
September	56.6	1.37
October	43.1	1.23

Month	Average Temperature (degrees Fahrenheit)	Average Precipitation (inches)
November	28.1	0.61
December	15.5	0.46

Source: North Dakota State Climate Office (2012).
Note: Historical weather data averaged for North Dakota Regions 1, 4, and 7 (western North Dakota) from 1981 to 2010.

3.3.1.2 Legal and Regulatory Framework

The Clean Air Act of 1970 (42 USC 7401 et seq.) (CAA), as amended in 1977 and 1990, is the basic federal statute governing air pollution. Provisions of the CAA that potentially are relevant to the Proposed Action are the National Ambient Air Quality Standards (NAAQS), the Prevention of Significant Deterioration (PSD) action, New Source Review (NSR) process, the Federal Implementation Plan (FIP) for the Reservation, conformity regulations, the New Source Performance Standards (NSPS), and the National Emission Standards for Hazardous Air Pollutants (NESHAPs).

Air Emission Sources at Oil and Gas Sites

The typical sources of air emissions that could be used at the proposed site include:

- heater-treaters;
- compression and spark ignition engines for compression and power generation;
- fugitive emissions;
- tanks;
- small gas plants;
- dehydrators;
- control devices such as flares and combustors; and
- vapor recovery units and vapor recovery towers.

New Source Performance Standards

The EPA has promulgated regulations that reduce air pollution from oil and gas production. The new standards reduce emissions of smog-forming volatile organic compounds (VOCs) and the carcinogen benzene. Methane (CH_4), an important greenhouse gas (GHG) that is more potent than carbon dioxide (CO_2), will be reduced under NSPS as an added benefit. The standards would rely on the best available control technology and BMPs that members of industry throughout the United States are presently using to capture and sell natural gas, which normally would be allowed to escape to the atmosphere. The EPA NSPS rules that would most likely apply to this project are as follows.

- 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE). Subpart IIII applies to owners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are manufactured after April 1, 2006, and are not fire pump engines. This subpart sets emission standards for oxides of nitrogen and non-methane hydrocarbons, nitrogen oxides (NOx), carbon monoxide (CO), and particulate matter (PM).

- 40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE). Subpart JJJJ applies to owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured on or after July 1, 2007. This subpart sets emission standards for NOx, CO, and VOCs.
- 40 CFR 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution. This subpart establishes emission standards and compliance schedules for the control of VOCs and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification, or reconstruction after August 23, 2011. These new regulations require VOC reductions from hydraulically fractured completions of new gas wells and HF or refracturing of existing gas wells, centrifugal and reciprocating compressors, pneumatic controllers, condensate and crude oil storage tanks, and natural gas processing plants.

National Emissions Standards for Hazardous Air Pollutants

Emissions of hazardous air pollutants (HAPs) are regulated under NESHAPs, codified in 40 CFR 61 and 40 CFR 63, promulgated in 1985, which regulate eight types of hazardous substances (asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride). Examples of HAPs from the oil and gas industry include formaldehyde; benzene, toluene, and ethylbenzene, which are isomers of xylene compounds; and n-hexane.

Applicable NESHAPs for the proposed project, based on the types of emission units and the expected date of installation, would include, but not be limited to, the following.

- NESHAP Subpart HH – National Emission Standards for HAPs from Oil and Natural Gas Production Facilities. Subpart HH applies to facilities located in a major or area source of HAPs and that process, upgrade, or store hydrocarbon liquids or that process, upgrade, or store natural gas prior to the point at which natural gas enters the natural gas transmission and storage source category or is delivered to a final end user.
- NESHAP Subpart ZZZZ – National Emission Standards for HAPs for Reciprocating Internal Combustion Engines (RICE). Subpart ZZZZ applies to any existing, new, or reconstructed stationary RICE located in a major or area source of HAP emissions. This subpart sets operating limitations and emission limitations for CO and formaldehyde, as well as management practices and work practice standards.

Engine Emission Standards

The following provides a list of regulations that are applicable to engines currently used on the Reservation. These regulations provide stringent emission and performance standards for engines for both the manufacturer and operator to reduce emissions of VOCs, NOx, CO, PM, and GHGs. Operators with engines operating on the Reservation are required to adhere to the following regulations, based on the various applicability requirements of each regulation. Parts 89 and 1048 typically apply to engines that are in portable and temporary use for operations such as power generation and various uses on drilling rigs.

- NSPS Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.

- NSPS Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.
- NESHAP Subpart HH – National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities.
- NESHAP Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines.
- Part 89 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines.
- Part 1048 – Control of Emissions from New, Large Nonroad Spark-Ignition Engines.

National Ambient Air Quality Standards

Title I of the CAA requires the EPA to establish NAAQS for pollutants considered harmful to public health and the environment. The EPA established NAAQS for six common, principal pollutants ("criteria" pollutants). Criteria pollutants include CO, nitrogen dioxide (NO_2), SO_2, ozone (O_3), lead, and PM, including PM equal to or less than 10 microns in diameter (PM_{10}) and 2.5 microns in diameter ($PM_{2.5}$).

The CAA identifies two types of NAAQS—primary and secondary. Primary standards provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The NDDH Air Quality Division regulates air quality throughout the state, except in connection with Native American reservations. The Reservation is regulated under the NAAQS. Although the Proposed Action is within the Reservation, information about surrounding air quality and regulations characterizes the immediate environment. North Dakota has promulgated state ambient air quality standards (AAQS) in addition to NAAQS. Those standards include hydrogen sulfide, but for all other pollutants, the NAAQS are equivalent to or more stringent than the North Dakota AAQS. Table 3-11 summarizes the AAQS for criteria pollutants.

Table 3-11. National and State Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS Primary Standard	NAAQS Secondary Standard	North Dakota AAQS Level
CO	1-hour	35 ppm	–	35 ppm
	8-hour	9 ppm	–	9 ppm
Lead	3-month	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$
NO_2	1-hour	100 ppb	–	0.100 ppm
	Annual	53 ppb	53 ppb	0.053 ppm
O_3	8-hour	0.070 ppm	0.070 ppm	0.070 ppm
PM_{10}	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	35 $\mu g/m^3$	35 $\mu g/m^3$
	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$	15.0 $\mu g/m^3$

Pollutant	Averaging Time	NAAQS Primary Standard	NAAQS Secondary Standard	North Dakota AAQS Level
SO_2	1-hour	0.075 ppm	–	0.075 ppm
	3-hour	–	0.5 ppm	0.5 ppm
H_2S	Instantaneous	–	–	10.0 ppm
	1-hour	–	–	0.20 ppm
	24-hour	–	–	0.10 ppm
	3-month	–	–	0.02 ppm

Sources: U.S. Environmental Protection Agency (2013); North Dakota Administrative Code 33-15-02.
$\mu g/m^3$ = microgram per cubic meter
ppb = parts per billion
ppm = parts per million

The state of North Dakota is in attainment for all AAQS for criteria pollutants. The existing air quality can be characterized by the ambient air quality background values. The NDDH operates ambient monitoring sites designed to characterize regional background concentrations of criteria pollutants. The EPA selected the Dunn Center monitor as the most appropriate background site for the Reservation in development of the FIP because it is a rural background monitor that is influenced by regional energy development activity (*Federal Register* 2013). This monitor would also be used to characterize background ambient air quality data for the Proposed Action. The representative background concentrations for the Proposed Action are presented for comparison with the Dunn Center monitoring site and ambient air quality standards in Table 3-12. There is no indication in the data collected by the NDDH that the increase in oil production as a result of this Proposed Action would contribute to a violation of the O_3, NO_2, PM_{10}, or $PM_{2.5}$ NAAQS or North Dakota AAQS.

Table 3-12. Comparison of Reservation Air Quality Data for 2012 with Ambient Air Quality Standards

Criteria Pollutant	Averaging Period	NAAQS	Dunn Center
SO_2	1-hour	75 ppb	13.0
	3-hour	500 ppb*	14.1
	24-hour	140 ppb*	4.8
	Annual	30 ppb*	0.41
PM_{10}	24-hour	150 $\mu g/m^3$	19.8
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	15.0
	Annual	12 $\mu g/m^3$	6.1
NO_2	1-hour	100 ppb	11.0
	Annual	53 ppb*	1.92
O_3	8-hour	70 ppb*	56.0

Source: U.S. Environmental Protection Agency (2013); North Dakota Department of Health (2012).
* Actual standard based as equivalent value in parts per million (ppm) (1,000 ppb is equivalent to 1 ppm).
$\mu g/m^3$ = microgram per cubic meter
ppb = parts per billion

Greenhouse Gas Emissions and Responses to the Threat of Climate Change

Gases that trap heat in the atmosphere are often called GHGs. Some GHGs, such as CO_2, occur naturally and are emitted into the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The EPA (2014b) identifies the principal GHGs that enter the atmosphere because of human activities as the following.

- **CO_2** enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **CH_4** is emitted during the production and transport of CH_4, coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices and from the decay of organic waste in municipal solid waste landfills.
- **NOx** is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- **Fluorinated gases** (i.e., hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are typically emitted in small quantities, but are potent GHGs thought to contribute significantly to global warming processes (EPA 2012).

CO_2 is the primary GHG. It is responsible for approximately 90% of radiative forcing, which is the rate of energy change as measured at the top of the atmosphere. Radiative forcing can be positive (warmer) or negative (cooler) (EPA 2012). To simplify discussion of the various GHGs, the term *equivalent CO_2* or *CO_2e* has been developed.

Equivalent CO_2 or 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, 1 ton of CH_4 has a CO_2e of 22 tons; therefore, 22 tons of CO_2 would cause the same level of radiative forcing as 1 ton of CH_4. Nitrous oxide has a CO_2e value of 310 (EPA 2012). These GHGs are all positive radiative-forcing GHGs. Thus, control strategies often focus on the gases with the highest positive CO_2e values (EPA 2014b). This document incorporates by-reference–cited studies and reports from the Pew Center (2009) and the Intergovernmental Panel on Climate Change (2007) concerning GHGs and their impacts.

On May 13, 2010, the EPA issued a final rule that establishes thresholds for GHG emissions that define when permits under the NSR PSD and Title V Operating Permit programs are required for new and existing industrial facilities (EPA 2014c). This final rule "tailors" the requirements of these CAA permitting programs to limit which facilities will be required to obtain NSR PSD and Title V permits. Facilities responsible for nearly 70% of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities. Emissions from small farms, restaurants, and all but the very largest commercial facilities will not be covered by these programs at this time; however, the EPA

recently initiated additional hearings to help determine the types of industries to be held to new standards under these federal permits (EPA 2014c).

Energy production and supply were estimated to emit up to 25.9% of GHGs worldwide in 2004 (Pew Center 2009). CH_4, with a high radiative-forcing CO_2e ratio, is a common fugitive gas emission in oil and gas fields (EPA 2014c). Oil and gas production, however, is highly variable in potential GHG emissions. Oil and gas producers in the United States are not considered large GHG emitters by the EPA.

Prevention of Significant Deterioration

New projects within attainment or unclassified areas must demonstrate conformance with limits defined under the PSD program. Although the Proposed Action is not a PSD source, the PSD program is intended in part to prevent violations of the NAAQS and to the environment in general, including protecting the air quality and visibility in special designated areas.

The PSD requirements provide maximum allowable increases in pollutant concentrations for areas that are already in compliance with the NAAQS. These limited increases occur in designated increments, and as a new PSD source is permitted, the amount of available incremental change allowable in an airshed is reduced. Certain sensitive areas, defined as Class I areas under the CAA, have a smaller allowable incremental increase in new emissions than Class II and Class III areas. Class II areas are not as established as Class I areas and are allowed more moderate pollution increases. Class III areas are not subject to any air quality standards, and the air quality may be degraded to levels in line with the NAAQS. To date, no Class III areas have been designated. The maximum allowable PSD increments over baseline are presented in Table 3-13.

Table 3-13. Prevention of Significant Deterioration Class I and II Increments

Pollutant	Averaging Time	PSD Increments Class I (µg/m^3)	PSD Increments Class II (µg/m^3)
PM_{10}	Annual	4	17
	24-hour	8	30
SO_2	Annual	2	20
	24-hour	5	91
	3-hour	25	512
NO_2	Annual	2.5	25
CO	8-hour	NA	NA
	1-hour	NA	NA

µg/m^3 = microgram per cubic meter
NA = not applicable

To assess impacts to Class I areas, the standard visual range (SVR) is used to quantify existing visibility conditions. The SVR is the greatest distance (in km) at which a large, dark object can be seen. Nitrogen and sulfur deposition from emissions may have a impact on air quality related values (AQRVs).

The nearest designated Class I area to the Proposed Action is the Theodore Roosevelt National Park (TRNP), which covers about 110 square miles in three units within the Little

Missouri National Grassland. The TRNP is located approximately 16.0 miles south of Watford City, North Dakota, and approximately 32.5 miles west-southwest of the proposed project location. In the TRNP, the means of the values for days with the worst visual range (the lowest twentieth percentile) have remained relatively unchanged since 2001 through 2010, with an average SVR value of 69.5 km. During days with the best visual range (the highest twentieth percentile), SVR has improved from 189.2 km in 2001, to 222.5 km in 2010. For all days, the SVR has remained relatively flat from 2001 to 2010, with an average of 130.5 km (Interagency Monitoring of Protected Visual Environments 2011). Generally, the levels of dry and wet deposition in the western United States (including western North Dakota) are much lower than the eastern United States. The total (dry and wet) sulfur deposition for TRNP in 2011 (as measured by the active TRNP Painted Canyon station) is 1.3 kilograms per hectare per year (kg/ha/yr) and the total nitrogen deposition is 3.0 kg/ha/yr. For comparison, the 2009–2011 mean for the eastern United States was 5.3 kg/ha/yr, and for the western United States, 0.8 kg/ha/yr. In the western United States, total sulfur deposition has declined by 35% since 1996–1998, and total nitrogen deposition decreased by 22% over a 16-year period (AMEC Environment & Infrastructure, Inc. 2013).

Indian Country Minor Source Rule

On July 1, 2011, the EPA promulgated in 40 CFR Parts 49 and 51 the Review of New Sources and Modification in Indian Country; Final Rule. This rule requires oil and gas sources operating in Indian Country to obtain pre-construction permits beginning September 4, 2014. The EPA is also in the process of preparing a general permit for oil and gas sources operating in Indian Country. It is anticipated that further emission reductions and increased monitoring, recordkeeping, and reporting will be provided in both the construction permits and general permits to be issued.

Federal Implementation Plan

Pursuant to the CAA, the EPA promulgated the *Federal Implementation Plan for Oil and Natural Gas Production Facilities on the Fort Berthold Indian Reservation*, which was published in the *Federal Register* on March 22, 2013. The FIP is a federal rule that applies only to oil and natural gas operations producing on the Reservation. The FIP requires owners and operators of well production facilities for oil and natural gas to reduce emissions of VOCs from oil and natural gas well completions, recompletions, and production and storage operations that were performed on or after August 12, 2007.

Conformity Determination

The general conformity rule was created to ensure that actions by the federal government will neither cause nor aggravate a violation in air quality standards, nor delay timely attainment of standards. Section 176(c) of the CAA prohibits federal agencies from taking actions in nonattainment and maintenance areas unless the emissions from the actions conform to the implementation plan for the area.

3.3.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, there would be no additional impacts on the existing air quality.

Alternative 1

Based on the existing air quality of the region, typical air levels and types of emissions from similar oil field projects, and Slawson's commitment to implementation of BMPs and FIP requirements, Alternative 1 would not produce significant increases in criteria pollutants, GHGs, or HAPs. Contribution of Alternative 1 to incremental increases of unregulated GHG emissions is expected to be minor.

Preferred Alternative

The Preferred Alternative would contribute similar levels of air pollution as Alternative 1. Therefore, contribution of the Preferred Alternative to incremental increases of unregulated GHG emissions is expected to be minor.

3.4 BIOLOGICAL RESOURCES

This section discusses the ecosystems, habitats, vegetation, and wildlife in the proposed project location. The area described varies between resources and is described in more detail below.

3.4.1 Ecosystems, Habitats, and Vegetation

Both aquatic and terrestrial habitats exist within the vicinity of the proposed project location.

3.4.1.1 Affected Environment

Aquatic Habitats

Lake Sakakawea was created by the impoundment of the Missouri River and the closing of the Garrison Dam in 1956. The lake is considered the premier water resource in the state of North Dakota, covering over 307,000 acres in the central portion of the state. Lake Sakakawea offers an array of recreation activities, including fishing, camping, hiking, boating, and water sports, to the people of North Dakota and surrounding states. The lake also supports a variety of game fish species including walleye (*Sander vitreus*), northern pike (*Esox lucius*), small mouth bass (*Micropterus dolomieu*), and large-mouth bass (*Micropterus salmoides*) as well as the endangered pallid sturgeon (*Scarphirhynchus albus*).

Situated within the central flyway for migrating and local waterfowl, Lake Sakakawea provides habitat for a wide variety of breeding and migrating waterfowl, shorebirds, and wading birds, including the endangered whooping crane (*Grus americana*), and the threatened rufa red knot (*Calidris canutus*), among others.

Generally, wetlands are areas where water saturation is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil

and on its surface (Cowardin et al. 1979). Wetlands vary widely due to regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors. In order to be classified as a wetland under federal definition, an area must meet three requisite criteria: have a plant community dominated by hydrophytic vegetation, contain wetland hydrology, and be composed primarily of hydric soils. Each of these criteria may be met by the area containing at least one primary indicator or two secondary indicators of each criterion. Wetlands that meet all three criteria may be subject to regulation by the U.S. Army Corps of Engineers under Section 404 of the CWA (33 CFR 1251 et seq.). The regulatory status of wetlands and other potential waters of the U.S. under the CWA is determined by the U.S. Army Corps of Engineers and EPA.

Wetland types are classified by the USFWS, which maintains the National Wetlands Inventory (NWI) database. The NWI is a general database that identifies potential wetland areas and categorizes them based primarily on aerial imagery interpretation. The USFWS developed its wetland classification system using the Cowardin classification (Cowardin et al. 1979) of wetland and deepwater habitats. One NWI signature partially lies within 0.5 mile of the project area.

Palustrine freshwater emergent wetlands are characterized by erect, rooted, herbaceous aquatic plants, excluding mosses and lichens (Cowardin et al. 1979). These wetlands are usually dominated by perennial plants, which are present for most of the growing season. Agricultural activities such as hay production and livestock grazing are common in these wetland types. Dominant species may include meadow foxtail (*Alopecurus pratensis*), obligate or facultative wet sedges (*Carex* spp.), scratchgrass (*Muhlenbergia asperifolia*), cattails (*Typha* spp.), bluegrasses (*Poa* spp.), reed canarygrass (*Phalaris arundinacea*), and bulrushes (*Scirpus* spp.).

Natural resource surveys confirmed the presence of one semi-permanent wetland north of the proposed well pad location for Alternative 1 and the Preferred Alternative, and beyond the project footprint. The fenced area for Alternative 1 is located approximately 400 feet (at its closest point) from the lakeside. The Preferred Alternative fenced area is located approximately 600 feet (at its closest point) from the shores of Lake Sakakawea.

Terrestrial Habitats

The proposed project locations for Alternative 1 and the Preferred Alternative occur in the Northwestern Great Plains ecoregion, which is a western mixed-grass and short-grass prairie ecosystem (Bryce et al. 1998). Native grasses common to the area include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), blue grama (*Bouteloua gracilis*), side-oats grama (*Bouteloua curtipendula*), green needlegrass (*Nasella viridula*), and western wheatgrass (*Pascopyrum smithii*). Common wetland vegetation in the region includes various sedge species, prairie cordgrass (*Spartina pectinata*), bulrush, and cattails. Common plant species found in woody draws, coulees, and drainages include chokecherry (*Prunus virginiana*), silver buffaloberry (*Shepherdia argentea*), and western snowberry (*Symphoricarpos occidentalis*).

Vegetation within the footprint for Alternative 1 includes mixed-grass prairie and an active agricultural field (Figure 3-4 and Figure 3-5). Vegetation within the project area consisted of

native and non-native grasses and forbs including crested wheatgrass (*Agropyron cristatum*), foxtail barley (*Hordeum jubatum*), green needlegrass, junegrass (*Koeleria macrantha*), Kentucky bluegrass (*Poa pratensis*), little bluestem, smooth brome (*Bromus inermis*), and western wheatgrass.

The Preferred Alternative well pad footprint is entirely within an active agricultural field (Figure 3-6 and Figure 3-7).

Shrubland communities that exist throughout the survey area consist of upland areas dominated by woody-stemmed vegetation including chokecherry, green ash (*Fraxinus pennsylvanica*), Siberian elm (*Ulmus pumila*), and blue spruce (*Picea pungens*).

Figure 3-4. Vegetation within the Alternative 1 location, facing west (photo taken August 7, 2015).

Figure 3-5. Vegetation within the 200-foot-wide survey corridor for the proposed flowline, facing north from the Alternative 1 location (photo taken August 7, 2015).

Figure 3-6. Vegetation within the Preferred Alternative location, facing south (BLM, photo taken March 18, 2016).

Figure 3-7. Vegetation within the Preferred Alternative location, facing west (BLM, photo taken March 18, 2016).

Noxious Weeds

During field surveys conducted by SWCA biologists, no noxious weeds were documented.

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

The North Dakota Century Code (Chapter 63-01.1) and North Dakota Department of Agriculture (NDDA) recognize 11 species as noxious, as shown in Table 3-14 (NDDA 2015). Each county has the authority to add additional species to its list of noxious weeds. Mountrail County does maintain a list of other noxious species. Those species include houndstongue (*Cynoglossum officinale*) and common tansy (*Tanacetum vulgare*) (NDDA 2015). In 2015, state and county listed noxious weed species were found on 14,568 acres in Mountrail County (see Table 3-14) (NDDA 2015).

Table 3-14. Recognized Noxious Weed-Occupied Area in Mountrail County, North Dakota

Common Name	Scientific Name	Mountrail County (acres)
State Listed Noxious Weeds		
Absinth wormwood	*Artemisia absinthium*	1,200
Canada thistle	*Cirsium arvense*	268
Dalmatian toadflax	*Linaria dalmatica*	0
Diffuse knapweed	*Centaurea diffusa*	0
Leafy spurge	*Euphorbia esula*	8,100
Musk thistle	*Carduus nutans*	0
Purple loosestrife	*Lythrum salicaria*	0
Russian knapweed	*Acroptilon repens*	0
Salt cedar	*Tamarix ramosissima*	0
Spotted knapweed	*Centaurea stoebe*	0
Yellow toadflax	*Linaria vulgaris*	0
County Listed Noxious Weeds		
Common tansy	*Tanacetum vulgare*	1,500
Houndstongue	*Cynoglossum officinale*	3,500
Total		14,568

Source: North Dakota Department of Agriculture (2015).

3.4.1.2 Environmental Consequences

No Action Alternative

No impacts on ecosystems, habitats, or vegetation would occur as a result of the No Action Alternative.

Alternative 1

Aquatic

No impacts on wetlands are anticipated as a result of Alternative 1. As discussed in Section 3.4.1, the fenced area for Alternative 1 is located approximately 400 feet (at its closest point) from the lakeside.

To prevent any impacts to waterways, including Lake Sakakawea, and to prevent any direct or indirect impacts to wetlands that could result from construction, drilling, or production activities, Slawson would implement standard BMPs and other site-specific erosion-control measures, as discussed in Section 2.2.13. Therefore, no impacts to Lake Sakakawea or other aquatic resources are anticipated.

Terrestrial

Alternative 1 would result in 23.91 acres of disturbance initially and 14.58 acres of long-term loss of the mixed-grassland vegetation and croplands described in Section 3.4.1. Removal of existing vegetation could facilitate the spread of invasive species and adversely affect undisturbed grassland and other surrounding vegetation. The operator is required to control noxious weeds throughout the project area. If a noxious weed community is found, it would

be eradicated unless the community is too large, in which case it would be controlled or contained to prevent further growth. The services of a qualified weed-control contractor would be used.

Surface disturbance and vehicular traffic would be limited to the approved ROWs for the proposed project. Areas stripped of topsoil would be seeded and reclaimed at the earliest opportunity. Additionally, certified weed-free straw and certified noxious-weed-free native grass seed would be used for all construction, seeding, and reclamation efforts. Prompt and appropriate construction, operation, and reclamation are expected to maintain minimal levels of adverse impacts to vegetation and would reduce the potential establishment of invasive vegetation species.

Rapid reclamation and the implementation of BMPs and applicant-committed measures as described in Section 3.9 would minimize any long-term loss of soil resources and degradation of vegetation in the project area. Construction of the proposed project would result in long-term disturbance of vegetation because these facilities would be only partially reclaimed and would be in continuous use for the life of the project. With implementation of BMPs and noxious weed management guidelines, the proposed project would result in negligible levels of vegetation disturbance and would not result in significant adverse impacts to vegetation resources.

Preferred Alternative

Aquatic

No impacts on wetlands are anticipated as a result of the Preferred Alternative. As discussed in Section 3.4.1, Lake Sakakawea is approximately 600 feet (from its closest point) of the Preferred Alternatives fenced area.

To prevent any impacts to waterways, including Lake Sakakawea, and to prevent any direct or indirect impacts to wetlands that could result from construction, drilling, or production activities, Slawson would implement standard BMPs and other site-specific erosion-control measures, as discussed in Section 2.2.14. Therefore, no impacts to Lake Sakakawea or other aquatic resources are anticipated.

Terrestrial

The Preferred Alternative would result in 25.81 acres of disturbance initially and 14.56 acres (fenced) of long-term loss of croplands described in Section 3.4.1. Removal of existing vegetation could facilitate the spread of invasive species and adversely affect undisturbed grassland and other surrounding vegetation. The operator is required to control noxious weeds throughout the project area. If a noxious weed community is found, it would be eradicated unless the community is too large, in which case it would be controlled or contained to prevent further growth. The services of a qualified weed-control contractor would be used.

3.4.2 Wildlife

3.4.2.1 Affected Environment

SWCA conducted field surveys for the Alternative 1 and the Preferred Alternative well pad, flowlines, and facilities pad area on August 7 and September 29, 2015, and March 28, 2016 to conduct a wildlife and cursory threatened and endangered species survey and habitat

assessment. Site layout maps of the survey area and natural resources features identified during the field surveys are provided in Appendix B. Raptor, eagle, and migratory bird habitat surveys were also conducted within a 0.5-mile line of sight of the project area. The North Dakota Natural Heritage Program database was also checked for sensitive species within 0.5 mile of the project area. No sensitive species occur within the 0.5-mile buffer (North Dakota Parks and Recreation 2016).

General Wildlife

Several species common to the surrounding area include, but are not limited to, mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), American badger (*Taxidea taxus*), and grassland songbirds such as western meadowlark (*Sturnella neglecta*) and loggerhead shrike (*Lanius ludovicianus*).

As discussed in Section 3.4.1, Lake Sakakawea is known as the premier fishing destination in North Dakota, and fish stocking programs there are closely managed and highly productive. Lake Sakakawea is known nationwide for its trophy sport fishing which supports recreation and economies in all reaches of the reservoir.

Migrating waterfowl such as the Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), ring-necked duck (*Aythya collaris*), snow goose (*Chen caerulescens*), American widgeon (*Anas americana*), and a multitude of other waterfowl use Lake Sakakawea during migration for forage and rest. Other seasonally resident and/or migratory avian species such as the great blue heron (*Ardea herodias*), American avocet (*Recuvirostra americana*), marbled godwit (*Limosa fedoa*), red-winged blackbird (*Agelaius phoeniceus*), and killdeer *(Charadrius vociferus*) are common residents on Lake Sakakawea's shorelines and islands.

Threatened, Endangered, and Other Federally Protected Species

In Mountrail County, eight species are listed under the Endangered Species Act (ESA): the gray wolf (*Canis lupus*), whooping crane, piping plover and its designated critical habitat, interior least tern, pallid sturgeon, Dakota skipper (*Hesperia dacotae*), northern long-eared bat (*Myotis septentrionalis*), and rufa red knot. The Sprague's pipit was removed from the candidate list on April 5, 2016 (USFWS 2016).

A complete assessment of potential effects to threatened and endangered species was conducted and presented in a biological assessment (SWCA 2016), which is included in Appendix E. In summary of the results of the biological assessment, the project was found to have "no effect" on the gray wolf or Dakota skipper. The project was found to "may affect, but is not likely to adversely affect" the whooping crane, least tern, pallid sturgeon, northern-long eared bat, rufa red knot, piping plover, and its designated critical habitat.

Wetland areas and the shoreline and islands of the lake in the vicinity of the project may provide suitable habitat for whooping cranes, piping plovers, and interior least terns. Cropland in the project area and vicinity may provide suitable foraging habitat for whooping crane.

The federal Bald and Golden Eagle Protection Act (16 USC 668–668d, 54 Sta. 250) and the Migratory Bird Treaty Act of 1918 (916 USC 703–711) protect eagles and their nests and migratory bird species and their active nests, respectively.

Surveys for species protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act were also conducted. The surrounding cliffs and wooded draws adjacent to Lake Sakakawea provide suitable nesting and brooding habitat for many local resident raptor species. The summary of findings and potential effects is provided in Table 3-15 and is discussed in detail in the biological assessment (SWCA 2016) in Appendix E.

Table 3-15. Summary of Potential Effects from Alternative 1 and the Preferred Alternative on Eagles and Migratory Birds

Species	Act	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Impact Determination
Bald eagle (*Haliaeetus leucocephalus*)	BGEPA and MBTA	Raptor habitat survey was conducted. Suitable nesting and foraging habitat was observed with 0.5 mile of the project area around the edges of Lake Sakakawea. Therefore, transient and foraging individuals may enter the project area on occasion.	A 0.5-mile line of sight survey was conducted during the field surveys. No nests were detected.	No unauthorized take is anticipated
Golden eagle (*Aquila chrysaetos*)	BGEPA and MBTA	Habitat capable of supporting golden eagle nests was observed within 0.5 mile of the project area to the south and east. Golden eagles may occasionally visit or forage within or around the project area.	A 0.5-mile line of sight survey was conducted during the initial field survey. No nests were detected.	No unauthorized take is anticipated
Migratory birds	MBTA	Suitable habitat for nesting migratory grassland birds occurs in the project area and on Lake Sakakawea.	Slawson would: 1) conduct construction outside of the migratory bird breeding season (i.e., between July 16 and January 31), **or** 2) conduct an avian survey no more than 5 days prior to construction and postpone construction until any active nests observed have been abandoned. In addition the preferred alternative proposes the pad will be located entirely in an agricultural field.	No unauthorized take is anticipated

BGEPA = Bald and Golden Eagle Protection Act
MBTA = Migratory Bird Treaty Act

3.4.2.2 Environmental Consequences

No Action Alternative

No impacts to wildlife would occur as a result of the No Action Alternative.

Alternative 1

Designated critical habitat for piping plover occurs within the viewshed of Alternative 1. The shorelines of Lake Sakakawea are approximately 400 feet from the edge of the Alternative 1 well pad location. Potential spills or erosion from the proposed project (at its closest point) would have to travel 400 feet before reaching designated critical habitat. Lake Sakakawea may provide possible stopover habitat for rufa red knots during the migration season. Although none of the ESA species were observed during field surveys, designated critical habitat for the piping plover is present within the action area (½ mile buffer). Suitable habitat for the least tern was also observed within 0.5 mile of Alternative 1. Drilling would be in phases and would not occur during piping plover and tern breeding and nesting season.

Preferred Alternative

The Preferred Alternative location was designed to avoid adverse impacts to the designated critical habitat for piping plover. The Preferred Alternative shifts the well pad approximately 600 feet from the edge of Lake Sakakawea, which decreases the potential for impacts (e.g., spills and erosion) to critical habitat. The elevational difference between the pad location and the critical habitat would keep the Preferred Alternative out of the line-of-sight, and therefore should not result in a visual disturbance to piping plovers. Lake Sakakawea may provide possible stopover habitat for rufa red knots during the migration season. Although none of the ESA species were observed during field surveys, designated critical habitat for the piping plover is present within the 0.5 mile. Suitable habitat for the least tern was also observed within 0.5 mile of the Preferred Alternative. Drilling would occur continuously, unless surveys indicate that piping plovers and terns are nesting (i.e., eggs have not hatched, chicks are not mobile).

3.5 CULTURAL RESOURCES

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations, and agreements. Section 106 of the National Historic Preservation Act of 1966 (16 USC 470 et seq.) requires, for any federal, federally assisted, or federally licensed undertaking, that the federal agency take into account the effect of that undertaking on any district, site, building, structure, or object that is included in the National Register of Historic Places (NRHP) before the expenditure of any federal funds or the issuance of any federal license. Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural, and religious significance. Eligibility criteria (36 CFR 60.4) 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 in the NRHP if they lack diagnostic artifacts, subsurface remains, or structural features, but those considered eligible are treated as though they were listed in the NRHP, even when no formal nomination has been filed. The 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 of any federal undertaking must also be evaluated for significance to Native Americans from a cultural and religious standpoint. Sites and practices may be eligible for protection under the American Indian Religious Freedom Act of 1978 (42 USC 1996). Sacred sites may be identified by a tribe or an authoritative individual (Executive Order 13007). Special protections are afforded to human remains, funerary objects, and objects of cultural patrimony under the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.).

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

3.5.1 Affected Environment

Under BLM Fieldwork Authorization #s MT-030-M99326-2820 and MT-030-M107276-4134, cultural resource inventories were completed in May 2010, September 2015, and October 2015 for the proposed Alternative I and Preferred Alternative locations. No cultural resources have been identified in the direct area of potential effects (Rohe and Morrison 2015). In total, 44 non-overlapping acres were inventoried for the project. Two reports have been submitted to the BLM regarding the Alternative I and Preferred Alternative locations. Copies of both reports and finding have been submitted to the MHA Nation THPO's office (February 9, 2016 and April 26, 2016, respectively). The MHA Nation THPO has not issued response or raised issues regarding the proposed action or Class III survey to date. A finding of "No Historic Properties Affected" is recommended if the proposed project proceeds as planned.

3.5.2 Environmental Consequences

No Action Alternative

No effects on cultural or historic resources would occur as a result of the No Action Alternative.

Alternative 1

No known cultural or historic resources are located within the direct area of potential effects. However, two sites are located within 100 feet of Alternative 1 location. Both sites remain *Unevaluated* for NRHP, and must be avoided during construction activities. Monitoring during well pad construction activities will be required. If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BLM and THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BLM consultation with all appropriate parties. Following any such discovery, operations would not resume without written authorization from the BLM. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required.

Preferred Alternative

No cultural resources are located within the direct area of potential effects for this Alternative. However, three known resources are within the indirect area of potential effects. One site is located within 100 feet of the Preferred Alternative location. The site is located on United States Army Corps of Engineers managed surface, and remains *Unevaluated* for inclusion to the NRHP. As such the site must be avoided, and will require archaeological monitoring for the duration of well pad construction. If additional cultural resources are discovered during construction or operation of the Preferred Alternative, Slawson will follow the methods outlined above for Alternative 1.

3.6 SOCIOECONOMICS

This section discusses community characteristics such as employment, income, population, demographics, housing, lifestyle, community infrastructure, and economic trends within the socioeconomic analysis area. These local data are compared to information for the state of North Dakota and the United States for context. EJ impacts are analyzed at the end of this section, as well. Information in this section was obtained from various sources, including but not limited to the U.S. Census Bureau, the U.S. Bureau of Economics, and the North Dakota State Government.

3.6.1 Socioeconomics Analysis Area

The geographic scope of analysis for social and economic impacts consists of the Reservation and four North Dakota counties: McKenzie, Dunn, McLean, and Mountrail. These counties were included in the analysis area because of their proximity to the proposed project location and overlap with the Reservation. This scope of analysis is often referred to as the socioeconomic analysis area or analysis area.

3.6.2 Affected Environment

3.6.2.1 Employment

The economy in North Dakota, including the Reservation and the four counties in the analysis area, has historically depended on agriculture, grazing, and farming as one of the key industry sectors for employment. Although the agriculture sector only represents 9% of employment in North Dakota, the sector accounts for 29% of employment in Dunn County, 25% in McKenzie County, 22% in McLean County, 20% in Mountrail County, and 13% on the Reservation (Economic Profile System [EPS] 2012). Retail trade did not represent a significant amount of employment in the analysis area in 2010; however, energy development and extraction, power generation, and services related to these activities have become increasingly important over the past several years, and many service-sector jobs are directly and indirectly associated with oil and gas development.

In June 2013, total employment in North Dakota was 415,263, and the statewide unemployment rate was 3.8% (Table 3-16) (Bureau of Labor Statistics 2013). With the exception of McLean County, unemployment rates within analysis area counties were lower than the state average during the same time period.

Table 3-16. Total Employment, Average Weekly Wages, and Unemployment Rates

Location	Total Employment (June 2013)[1]	Average Weekly Wage (Q1 2013)[1]	Unemployment Rate (June 2013)[1]	Change in Unemployment Rate (2009–2013)[1]
United States	132,327,062	$989	9.4%	+4.3%
North Dakota	415,263	$885	3.8%	+0.4%
Dunn County	3,894	$1,314	1.5%	−0.1%
McKenzie County	7,146	$1,266	1.5%	−1.1%
McLean County	4,221	$875	4.5%	−1.2%
Mountrail County	7,381	$1,165	1.9%	−3.6%
Fort Berthold Indian Reservation	2,466[2, 3] (2010)	Not applicable	44.1%[3] (2010)	−26.9%[3, 4] (when comparing 2005 to 2010)

[1] Bureau of Labor Statistics (2013).
[2] U.S. Census Bureau (2010).
[3] Bureau of Indian Affairs (2014a).
[4] Bureau of Indian Affairs (2005).

In 2010, 4,411 residents (over 16 years old) of the Reservation constituted the total available workforce. Unemployment on the Reservation was the highest in the analysis area at 44.1% (BIA 2014b).

Residents of the Reservation are employed in industries similar to those outside the Reservation. Typical employment includes ranching, farming, tribal government, tribal enterprises, schools, federal agencies, and, recently, employment related to conventional energy development. The MHA Nation's Four Bears Casino and Lodge, located 4 miles west of New Town, employs approximately 320 people, of which 90% are tribal members (Fort Berthold Housing Authority 2008).

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

In 2012, the TAT Council established an employment rights office and passed a Tribal Employment Rights Ordinance (TERO) and TERO Regulations (TERO 2012). The purpose of the TERO is "to increase employment of Indian workers and businesses and to eradicate employment discrimination within the exterior boundaries of the Fort Berthold Reservation" (TERO 2012:1). The TAT Council TERO and TERO Regulations require private employers conducting work on the Reservation to give preference to qualified Indians, with the first preference to local Indians, in all hiring, promotion, training, lay-offs, and all other aspects of employment. The TERO office certifies Indian-owned businesses, monitors compliance with the TERO and TERO regulations, establishes and collects fees, and provides specialized training to enrolled members of recognized Tribal Nations and their spouses, among other duties.

The TERO and TERO Regulations also require that contracts or subcontracts for supplies, services, labor, and materials of $5,000 or more, where the majority of the work will occur within the Reservation, give preference to qualified firms that are certified by the TERO as 51% or more Indian-owned and controlled (TERO 2012:7).

3.6.2.2 Income

Per-capita income, median household income, and poverty rates for the analysis area and North Dakota are presented in Table 3-17. All four counties in the analysis area reported a per-capita income in 2012 that was 3% to 57% greater than the North Dakota state average, while median household income varied from 4% less to 26% higher than the North Dakota state average. In comparison, Reservation residents had per-capita incomes and median household incomes of 67% and 24%, respectively, below the statewide average.

All analyzed counties, the Reservation, and North Dakota showed a substantial increase in per-capita income between 2000 and 2012 (see Table 3-17), largely due to oil and gas development. However, although per-capita income on the Reservation increased 104% between the 2000 Census and the 2010 Census, it was still 21% to 32% lower than in the four counties in the analysis area and the state.

Poverty rate data for the analysis area are summarized in Table 3-17. Approximately 10% to 12% of households in Dunn, McKenzie, McLean, and Mountrail Counties were below the poverty threshold in 2012, while 26% of Reservation households were below the poverty threshold. Poverty rates decreased by 15% to 32% in the analysis area between 2000 and 2012. In comparison, the poverty rate for the state of North Dakota increased by 0.8% during the same time period.

Table 3-17. Income and Poverty in Analysis Area

Location	Per-Capita Income[1] in 2000	Per-Capita Income[1] in 2012	Median Household Income[2] (2012)	% of All People in Poverty[2] in 2000	% of All People in Poverty[2] in 2012
Dunn County	$20,973	$86,205	$62,424	13.3	10.1
McKenzie County	$22,238	$82,171	$67,995	15.7	11.3
McLean County	$22,768	$56,568	$52,548	12.3	10.5
Mountrail County	$22,968	$83,320	$59,583	15.7	11.6
Fort Berthold Indian Reservation	$8,855[3]	$18,059[2] (2010 Census)	$41,658 (2010 Census)	38.0[3] (includes tribal members on and off-Reservation)	26.0[4] (2010 Census)
North Dakota	$25,592	$54,871	$54,579	10.4	11.2
United States	$29,676	$27,915	$52,762	12.2	15.9

[1] U.S. Bureau of Economic Analysis (2013).
[2] U.S. Census Bureau (2010, 2013a. The poverty threshold is based upon median household incomes below $23,624 (for a family of four).
[3] Fort Berthold Housing Authority (2008).
[4] U.S. Department of Agriculture (2011).

3.6.2.3 Population and Demographic Trends

Historical and current population counts for the analysis area, compared with the state, are provided below in Table 3-18. The state population showed little change between the previous two census counts (1990–2000); however, in 2010, the state population increased by 2.7% to 659,858 (EPS 2012). Since 2000, populations in McKenzie and Mountrail Counties have increased by 10.3% and 14.6%, respectively, while populations in McLean and Dunn Counties declined by 3.8% and 1.8%, respectively (EPS 2012). Population on the Reservation increased approximately 4.2% between 2000 and 2010 (EPS 2012).

Table 3-18. Population and Demographic Trends in the Analysis Area

Location	Population in 2010	% State Population	% Change 1990–2000	% Change 2000–2010	Predominant Group in 2010 (% of Total Population)	Predominant Minority in 2010 (% of Total Population)
Dunn County	3,536	0.54	−10.1	−1.8	Caucasian (84.9)	American Indian (12.7)
McKenzie County	6,360	0.96	−10.1	10.3	Caucasian (75.3)	American Indian (22.2)
McLean County	8,962	1.36	−11.0	−3.8	Caucasian (91.0)	American Indian (7.0)
Mountrail County	7,673	1.16	−5.6	14.6	Caucasian (65.6)	American Indian (30.6)
Fort Berthold Indian Reservation	6,162	0.93	178.0[1]	4.2	American Indian (63.0)	American Indian (63.0)
North Dakota	659,858	100.00	0.5	2.71	Caucasian (90.5)	American Indian (5.3)

Sources: Economic Profile System (2012); U.S. Census Bureau (2013b).
[1] Reflects percent change between 1991 and 2001 (BIA 2001).

3.6.2.4 Housing

Table 3-19 provides housing unit supply estimates for the analysis area. Overall, the number of owner-occupied units increased between 2000 and 2010, with the exception of those in McLean County. The number of renter-occupied units also increased between 2000 and 2010, with the exception of those in Dunn County. Approximately 18% to 38% of counties' housing units were vacant in 2010, whereas 36% of housing units on the Reservation were vacant during the same time period. In comparison, North Dakota housing vacancy was 12% in 2010 (EPS 2012).

Table 3-19. Housing Data for the Reservation and Analysis Area

Location	Owner Occupied Units		Renter Occupied Units		Vacant Units		Total Housing Units		% Change in Total (2000–2010)
	2000	2010	2000	2010	2000	2010	2000	2010	
Dunn County	1,102	1,119	276	199	587	799	1,965	2,117	+7.74
McKenzie County	1,589	1,687	562	781	568	551	2,719	3,019	+11.03
McLean County	3,135	3,123	680	814	1,449	1,591	5,264	5,528	+5.02
Mountrail County	1,859	2,065	701	786	878	1,098	3,438	3,949	+14.86
Fort Berthold Indian Reservation	1,122	1,157	786	975	973	1,190	2,881	3,322	+15.31
North Dakota	171,299	184,117	85,853	92,525	32,525	36,219	289,677	312,861	+8.00

Sources: Economic Profile System (2012); U.S. Census Bureau (2011).

Most rental housing and homes available for private purchase are located in New Town. However, over the past 12 years, new housing construction has increased in much of the analysis area. New building permits issued in 2012 increased substantially over 2005 permit numbers (Table 3-20). The median rent for analysis area counties also increased by up to 94% from 2000 to 2012 (Table 3-21).

Table 3-20. Housing Development Data for the Analysis Area, 2005–2012

County	New Building Permits in 2005	New Building Permits in 2012
Dunn	4	46
McKenzie	1	71
McLean	20	92
Mountrail	19	90

Source: U.S. Census Bureau (2013c).

Table 3-21. Rent Data for the Analysis Area, 2000–2012

County	Median Rent in 2000	Median Rent in 2012
Dunn	$231	$448
McKenzie	$274	$470
McLean	$291	$463
Mountrail	$337	$547

Source: U.S. Census Bureau (2014a, 2014b).

3.6.2.5 Lifestyle and Cultural Values

The current lifestyle and cultural values in the analysis area counties are mostly reflective of an agricultural and rural lifestyle, although increasing oil and gas development has, in some cases, influenced residents' lifestyles and values. As noted in the Proposed Clean Fuels Refinery Final EIS, "there is a perception among some individuals that other energy-related

industrial activities may be incompatible with maintaining the quality of the natural environment. Other people, however, in the area support industrial development for its economic effects."

The MHA Nation is comprised of three separate tribes that have distinct cultural values but share some overall lifestyle and cultural values. Tribal sovereignty and self-determination are important to the MHA Nation, as are economic development and environmental protection. Social issues on the Reservation are similar to many reservations, including high levels of unemployment, poverty, and certain types of health issues. The most recent status of factors that affect lifestyles and cultural values is discussed in the following subsections of this EA.

- All of the other Socioeconomics subsections: Employment; Income; Population and Demographic Trends; Housing, Community Infrastructure, Public Utilities, and Services; and Environmental Justice
- Cultural Resources (Section 3.5)
- Recreation (Section 3.7.1.1) and Transportation Networks (Section 3.7.1.3)
- Noise and Light, Visual, and Public Health and Safety (Section 3.7.2.3)

3.6.2.6 Community Infrastructure, Public Utilities, and Services

Community infrastructure and public services and utilities in the analysis area are provided by various levels of government. These public infrastructure and services include:

- law enforcement, emergency response (fire and ambulance), and emergency medical services;
- medical services;
- public utilities such as electricity, water, wastewater, and solid waste; and
- public education.

Law enforcement in the analysis area is provided by the MHA Nation, county sheriffs' departments, and North Dakota highway patrol. MHA Nation law enforcement does not have jurisdictional authority over non-tribal members. Much of the analysis area is remote enough that county and state law enforcement cannot quickly access it, especially areas of the Reservation. To address traffic safety, the MHA Nation recently passed a Civil Motor Vehicle Code that: 1) adopted the North Dakota traffic laws, including fines and penalties; and 2) granted tribal law enforcement officers the ability to detain persons committing criminal offenses on the Reservation until they can be transferred to the appropriate agency with criminal jurisdictional authority (MHA Nation 2011).

Emergency fire, ambulance, and medical services in the analysis area are provided by the MHA Nation and the major communities in the four counties of the analysis area. As with law enforcement services, time to access remote parts of the analysis area can be lengthy due to distances traveled and conditions of the roads.

Public utilities (water, wastewaters, and solid waste) are also provided by the tribe and communities within the four counties of the analysis area. The communities of New Town and Parshall sell fresh water to oil and gas operators for use in the drilling and completion phases. Wastewater collection, treatment, and disposal on the Reservation are generally

accomplished by septic systems in rural areas, and by centralized collection and lagoon treatment systems in communities such as New Town and Parshall. Electrical services in the analysis area are provided by publicly owned electric cooperatives: McKenzie, Roughrider, McLean, and Mountrail-Williams. At this time, electrical services do not extend to the most rural and remote parts of the analysis area.

There are five public school districts in the analysis area and the Fort Berthold Community College. All but one of the school districts serves kindergarten through twelfth-grade students.

Under the tax agreement between the MHA Nation and the State, the tribe will receive one-half of the 11.5% maximum oil production and extraction tax. The agreement states that a minimum 10% of the tribe's tax revenue will be spent on Reservation infrastructure projects and that the tribe will provide an annual report to the State detailing these expenditures. This agreement also clarifies that the tribe will receive a one-time $100,000 fee per well; this fee includes the TERO and Tribal Application fees (TAT and State of North Dakota 2013).

3.6.2.7 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 that federal agencies advance EJ by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of environmental consequences from federal programs, policies, decisions, or operations. Meaningful involvement means that federal officials actively promote opportunities for public participation and that federal decisions can be materially affected by participating groups and individuals.

Based on demographic data, the analysis area contains both a minority and a low-income population. In some cases, individuals may fall into both categories. Table 3-22 summarizes relevant data regarding minority populations for the analysis area (EPS 2012; U.S. Census Bureau 2000).

The predominant minority group in each county as of 2010 was American Indians and Alaska Natives, ranging from 7% in McLean County to 28% in Mountrail County, compared with the state, which was 5% (see Table 3-22) (EPS 2012; U.S. Census Bureau 2000). As discussed earlier, American Indians represent 63% of the overall population on the Reservation (see Table 3-18).

As previously discussed and summarized in Table 3-17, approximately 10% to 12% of households in Dunn, McKenzie, McLean, and Mountrail Counties were below the poverty threshold in 2012, whereas 26% of Reservation households were below the poverty threshold.

Race and Hispanic origin statistics are provided by the U.S. Census Bureau. Race data refer to global origin of populations, and here are referred to as ethnicity. Collectively, non-Caucasian groups have been a minority of the U.S. population historically, and are the focus of EJ. Ethnicity data are provided here to evaluate the effects of the Proposed Action on EJ (see Table 3-22). U.S. Census Bureau classification broadly groups the U.S. population as Latin American origin (Hispanic) or non-Hispanic. The Hispanic population is quite low in the analysis area and North Dakota in general (1%–2%), and although between 7,000 to 12,000

persons declared Hispanic origin in North Dakota from 2000 to 2010, only a handful of those were in the analysis area (EPS 2012; U.S. Census Bureau 2000).

North Dakota's total minority population in 2010 consisted of approximately 62,466 persons, or 9.5% of the state's total population. This represents an increase of 27.4% over the year 2000 minority population of the state. In the analysis area, the number of Caucasian residents decreased slightly, whereas minorities in nearly all categories increased from 2000 to 2010. The minority populations of Dunn, McKenzie, McLean, and Mountrail Counties increased by 6.8%, 10.8%, 3.2%, and 7.3%, respectively, compared with the statewide increase of 27% (see Table 3-22) (EPS 2012; U.S. Census Bureau 2000).

Table 3-22. Minority Population Breakdown by North Dakota County and Race, 2000–2010

Population Sector	Dunn		McKenzie		McLean		Mountrail		North Dakota	
	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010
Total Population	3,600	3,477	5,737	6,004	9,311	8,861	6,631	7,228	642,200	659,858
Non-Hispanic or Hispanic										
Non-Hispanic	3,573	3,401	5,679	5,875	9,230	8,748	6,544	7,009	634,414	646,980
Hispanic or Latino[1]	27	76	58	129	81	113	87	219	7,786	12,878
Races										
Caucasian	3,117	2,961	4,438	4,565	8,615	8,143	4,376	4,806	593,181	597,392
African American	1	8	4	14	2	29	6	35	3,916	7,034
American Indians and Alaska Natives	448	326	1,215	1,284	554	623	1,988	2,052	31,329	34,798
Asian / Pacific Islanders	3	14	4	58	12	9	17	9	3,836	6,571
Some other race or two or more races	31	168	76	83	128	57	244	326	9,938	14,063
All minorities (sum of races other than Caucasian)	483	516	1,299	1,439	696	718	2,255	2,420	49,019	62,466
Percent minority population	13.4	14.8	22.6	24.0	7.5	8.1	34.0	33.5	7.9	9.5
Percent change in minority population (2000–2010)	+6.8		+10.8		+3.2		+7.3		+27.4	

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

Sources: Economic Profile System (2012); U.S. Census Bureau (2000).

Poverty rate data for the counties in the analysis area are summarized above in Table 3-17. The data show that poverty rates generally decreased in the analysis area between 2000 and 2012. All counties in the analysis area have higher median household incomes than the statewide household income of $54,579; however, the median family household income on the Reservation is approximately 24% lower than the statewide figure.

It is appropriate to evaluate impacts to EJ populations because some portion of the analysis area population qualifies as minority or low-income, or both.

3.6.3 Environmental Consequences

3.6.3.1 No Action Alternative

Under the No Action Alternative, sources of employment and income would likely remain the same, or could continue to increase if other oil and gas development occurs in the area. The demand for housing would also likely continue to be influenced by oil and gas development; the need for housing to support other developments could keep demand high even if the project were not implemented. There would be no additional effects from the project on lifestyle and cultural values, community infrastructure, or public services and utilities under the No Action Alternative. The MHA Nation would not receive tax or fee revenue from the oil production and extraction of the proposed wells under the No Action Alternative. The No Action Alternative would not disproportionately impact or benefit EJ populations.

3.6.3.2 Alternative 1

Implementation of Alternative 1 would allow the MHA Nation to pursue economic development opportunities in keeping with its tribal sovereignty. In addition, the project would provide jobs and income to residents of the Reservation as well as Dunn, McKenzie, McLean, and Mountrail Counties. The economic benefits from construction activities would occur over a 1-year construction period. Impacts from operation would occur for the life of each well, which could be well over 30 years if the well were productive. Alternative 1 could also affect population, availability of housing, lifestyles, public service demand, and EJ populations. These effects are discussed in more detail in the sections that follow.

Employment

Up to 42 workers would be employed per well during the construction, drilling, and completion of the wells. Long-term production activities would require between one and four full-time employees to staff operations. It is anticipated that a mixture of local and Slawson employees would staff the proposed wells.

Based on unemployment rates in 2010 (see Table 3-16), there is an adequate workforce available in the analysis area to support the proposed project. Slawson would work with the TAT-TERO to ensure that Slawson complies with the requirements of the TERO ordinance and regulations. As a result, employment associated with well construction and production could have a beneficial effect on unemployment in the analysis area and increase the employment of TAT members and certified Indian companies, if Slawson chose to train and use the local unemployed workforce.

Additionally, while it is possible that job seekers from other localities could relocate to the area in search of employment, existing industry expertise and services in the analysis area are generally adequate to support additional oil and gas development.

Income

Salaries provided to hired workers could increase per-capita income during the construction period for those that were previously unemployed or underemployed. Spending by contractors and workers for materials, supplies, food, and lodging in the analysis area, which would be subject to sales and lodging taxes, would also directly increase revenue and taxes on the Reservation and nearby counties for the duration of construction activities. Development of the well pad would provide long-term royalty revenues to individuals and revenue to the MHA Nation. Under the tax agreement between the MHA Nation and the state, the tribe would receive one-half of the 11.5% maximum oil production and extraction tax as well as a one-time $100,000 fee per well (TAT and State of North Dakota 2013).

Revenue and jobs from additional spending in the local area by businesses and individuals who would earn wages from construction activity could indirectly improve local economic conditions. Other state, local, and Reservation taxes and fees would be incurred as a result of the project, with a percentage of these revenues distributed back to the local economies, including to the MHA Nation.

Population and Demographic Trends

Alternative 1 would be unlikely to result in any measurable population increases in the analysis area. Employment-related increases from the project would represent less than a 1% increase in population, compared with the population in the analysis area (approximately 30,000 residents in 2010; see Table 3-18).

Housing

Based on the number of vacant properties as of 2010 (see Table 3-19), there is adequate housing for workers. However, median rents have continued to rise. Therefore, workers who do not own their housing could be subject to high rental rates during the construction period.

Lifestyle and Cultural Values

The following sections discuss the impacts to resources that are integral to area lifestyle and cultural values.

- All of the other Socioeconomics subsections: Employment, Income, Population and Demographic Trends, Housing, Community Infrastructure, and Environmental Justice
- Cultural Resources (Section 3.5)
- Recreation (Section 3.7.1.1) and Transportation Networks (Section 3.7.1.3)
- Noise and Light, Visual, and Public Health and Safety (Section 3.7.2.3)

Residents of the analysis area have expressed concerns related to the effects discussed in these sections. Coordination efforts (including the MHA Nation, BIA, and local, state, and federal governments) are underway to address these public concerns. The 2013 agreement defining

the tribe's portion of the oil production and extraction tax and one-time per-well fee could help offset some of these impacts for residents, but not all concerns are economically driven (TAT and State of North Dakota 2013).

Community Infrastructure, Public Utilities, and Services

Employment-related increases would represent less than a 1% increase in population, which would not likely increase the demand for services or infrastructure on the Reservation or the communities near the project area.

Water used during the drilling and completion phases would be obtained from a commercial source. Human and solid waste would be periodically trucked from the project site to the nearest State-approved solid waste facility, where it would be properly disposed. As described in Section 1.2, underground electric utilities eventually would be constructed within the access road ROW, possibly extending the availability of electricity to this rural area. Some portion of the revenue generated by the tribe and State from oil and gas taxes and fees would be used to fund improvements to community infrastructure and public utilities and services.

3.6.3.3 Preferred Alternative

Construction of the Preferred Alternative would have the same socioeconomic effects to employment, income, population and demographics, housing, lifestyle and cultural values, and community infrastructure as Alternative 1.

3.7 RESOURCE USE PATTERNS

3.7.1 Affected Environment

3.7.1.1 Recreation

Hunting (big game, small game, fur-bearer) and fishing are available on the Reservation for tribal members and non-member residents with a license from the TAT Fish and Wildlife Division. Other outdoor recreation includes hiking, camping, boating, and wildlife viewing. Recreation within the Reservation is concentrated along Lake Sakakawea at Four Bears State Park, Antelope Creek State Game Management Area, the Van Hook State Game Management Areas, Deepwater Creek State Game Management Area, and the Beaver Creek State Game Management Area, which are open to the public.

3.7.1.2 Mineral Extraction

Ownership of mineral estates on the Reservation is diverse, including tribal, federal, state, and private lands. The Bakken Formation under the Reservation is considered to be one of the largest oil-producing formations in the lower 48 states, and the BIA has approved over 1,700 oil and gas leases (BIA 2014c). In May 2014, there were 988 producing wells, 90 wells being drilled, and 410 permitted wells on the Reservation (Tallsalt Advisors 2014a). The producing well are extracting approximately 171,260 barrels of oil per day (Tallsalt Advisors 2014b).

3.7.1.3 Transportation Networks

Transportation around the project area is predominantly by private automobiles and commercial trucks on a network of state highways, county roads, and BIA routes. Major

federal highways surrounding the project area include U.S. Highway 2, which is an east–west route to the north of the Reservation; U.S. Highway 83, a north–south route to the east of the Reservation; and U.S. Highway 85, a north–south route to the west of the project area. Interstate 94 to the south of the project area provides access to Bismarck and other interstate transportation links. Federal highways outside of the Reservation boundaries are built and maintained through the Federal Highway Administration (FHWA) and North Dakota Department of Transportation (NDDOT) funding and guidelines.

The Reservation is bisected by North Dakota state and county roads, which link the area with the goods, services, and markets in North Dakota and beyond, as shown in Figure 3-8. State Highway 22 traverses the Reservation from north to south, passing west of Mandaree. State Highway 23 is an east–west route passing through New Town, North Dakota. State Highway 200 is an east–west route traversing the area south of the Little Missouri River. State Highway 73 provides access to the Reservation from the west, in the area south of Lake Sakakawea, and State Highway 1804 intersects State Highway 23 near New Town, providing access from the north. State Highway 8 provides access from the south.

In addition to providing the Reservation's main north–south route and access to the town of Mandaree, State Highway 22 is designated by North Dakota Parks and Recreation as part of the Killdeer Mountain-Four Bears Scenic Byway, known for its scenic, cultural, and historical importance to North Dakota (North Dakota Parks and Recreation 2011a). The North Dakota Scenic Byways and Backways Program encourages all development projects within the immediate and distant viewshed of State Highway 22 to conserve the visual and aesthetic quality of the area (North Dakota Parks and Recreation 2011b). Main access to the proposed well pad site is described below.

State Highway 22 provides the primary transportation link to the proposed project location. The proposed project location is 7.2 straight-line miles east from State Highway 22 and 6.2 straight miles southeast of Mandaree (see Figure 3-8). The proposed access road (148 feet) would connect the location to the existing County Road 83rd Ave NW.

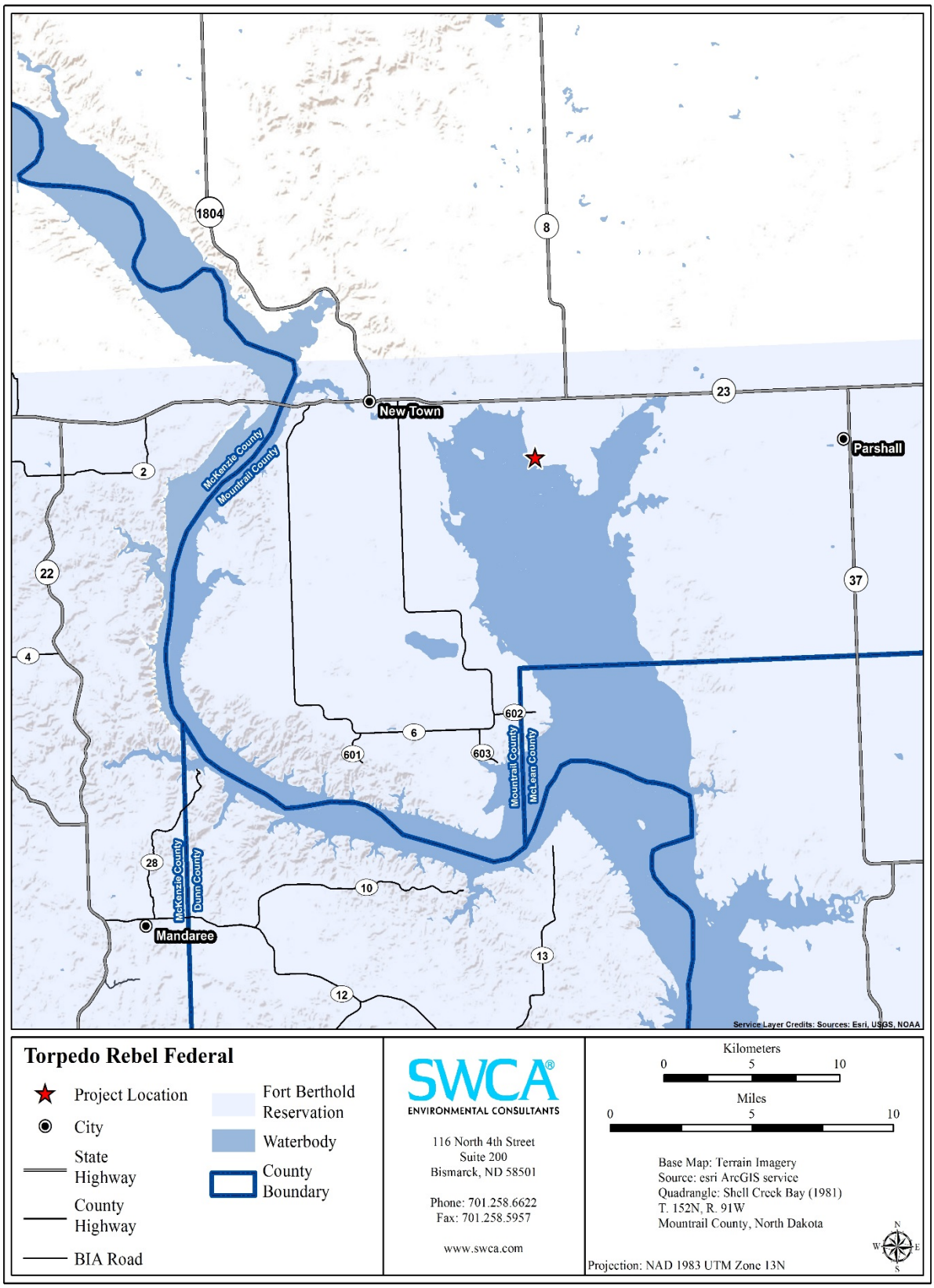

Figure 3-8. Fort Berthold Indian Reservation major roads and highways.

Indian Reservation Roads Program

Approximately 2,733.5 miles of roads within the Reservation are under the jurisdiction of the BIA Indian Reservation Roads (IRR) Program (IRR 2011). These IRR roads provide access to all areas of the Reservation with paved, all-weather roads, as well as numerous non-paved improved roads that serve as access to energy exploration and development and other activities surrounding the project area (IRR 2011). Figure 3-8 provides an overview of these primary and secondary roads on the Reservation, but does not attempt to show the many primitive roads or well pad and pipeline access roads that are on the Reservation.

The BIA and the MHA Nation retain planning and maintenance responsibility over this roadway system on the Reservation through the IRR Program of the FHWA. The IRR Program addresses transportation needs of tribes by providing funds for planning, design, construction, and maintenance activities. The program is jointly administered by the FHWA and the BIA. The IRR roads are all public roads that provide access to and within Indian reservations, Indian Trust land, restricted Indian land, and Alaska Native villages. IRR funds can be used for any type Title 23 transportation project providing access to or within federal or Indian lands and may be used for the state/local matching share for apportioned federal-aid highway funds (FHWA 2010).

The most recent IRR inventory for the Reservation roads was conducted in 2006. The 2006 inventory shows that the Reservation is bisected by approximately 6,600 road segments ranging in length from 0.01 mile to 15.00 miles. Approximately 284.63 miles of BIA roads consist of paved surface types, and 671.00 miles consist of improved gravel roads. The remaining roads are primitive or other unimproved road types.

Trends in Traffic Volume

Table 3-23 provides summary information for 15 BIA road segments for which average daily traffic (ADT) measurements have been recorded since 1994. Since the available IRR data only reflect volumes through 2006, it is not possible to determine whether ADT is increasing on BIA roads.

Table 3-23. ADT Data for BIA Roads within the Reservation

Road Name	IRR Class	Surface Type	Section Length (miles)	Road Width (feet)	ADT	% Trucks	ADT Year
BIA 1	Rural, local traffic	Gravel	3.8	25 and 26	150	15	1994
BIA 1	Rural, local traffic	Paved >2 inches thick	6.1	24	839	2	2006
BIA 1	Rural, major collector	Paved >2 inches thick	1.0	24 and 30	839	2	2006
BIA 2	Rural, major collector	Paved >2 inches thick	4.9	20	656	2	2006
BIA 6	Rural, local traffic	Paved >2 inches thick	11.2	24	139	2	2006
BIA 10	Rural, local traffic	Gravel	5.7	20	102	2	2006
BIA 12	Rural, major collector	Paved >2 inches thick	1.2	24	944	2	2006

Road Name	IRR Class	Surface Type	Section Length (miles)	Road Width (feet)	ADT	% Trucks	ADT Year
BIA 12	Rural, major collector	Paved >2 inches thick	18.4	24	398	2	2006
BIA Route 1	Rural, local traffic	Gravel	6.5	24	100	5	2000
BIA 14	Rural, major collector	Gravel	12.3	22	198	2	2006
BIA 18	Rural, major collector	Paved <2 inches thick	8.8	30	114	2	2006
BIA 18	Rural, major collector	Paved >2 inches thick	3.0	28	114	2	2006
BIA 22	Rural, major collector	Paved >2 inches thick	2.8	28	757	2	2006
BIA 22	Rural, major collector	Paved >2 inches thick	0.2	27	504	2	2006
BIA 27	Rural, local traffic	Gravel	3.7	20	137	2	2006

Source: Indian Reservation Roads (2011).
ADT = average daily traffic
BIA = Bureau of Indian Affairs
IRR = Indian Reservation Roads

ADT was recorded at traffic counter stations along eight NDDOT highway segments within the Reservation between 2005 and 2010 (Table 3-24). Traffic volumes vary greatly along the NDDOT highways that pass through the Reservation. Some primary highways show consistent increases each year and have experienced significant increases in ADT and in truck ADT since 2005. Significant increases ranging from more than 73% to 700% in passenger vehicle traffic volume were experienced on State Highways 22, 23, 73, and 8. The same highways experienced increases in truck traffic volumes, ranging from 344% to 2,500% over the same period, indicating that industrial activity, most likely the increased oil and gas development, has had a significant effect on traffic within the Reservation. Some NDDOT highways, however, had limited data available and failed to show clear trends for traffic increase, or even showed a decrease in ADT for the period.

Table 3-24. Changes in ADT along NDDOT Highways within the Reservation, 2005–2010

NDDOT Highway	Segment	2005		2006		2008		2009		2010		% Change in Traffic	
		ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT
ND 22	RP 126.5–156.05	NA	NA	635	60	NA	NA	1,330	305	2,130	680	235.4	1033.3
South Reservation boundary north to ND 23 (29.55 miles)												Traffic increases	
ND 23	RP 35.6–80.6	2,200	180	NA	NA	2,450	375	2,970	560	3,810	800	73.2	344.4
Reservation west boundary to east boundary (45.0 miles)												Traffic increases	
ND 37	RP 0.0–30.0	715	175	NA	NA	631	85	NA	NA	NA	NA	−11.7	−51.4
ND 23 south and Reservation east boundary (30.0 miles)												Decreased traffic based on 2008 data	
ND 73	RP 7.3–11.32	NA	NA	200	30	NA	NA	680	140	1,605	780	702.5	2500.0
Reservation boundary to ND 22 (4.02 miles)												Traffic increases	
ND 1804	RP 247.145–248.6	1,625	205	NA	NA	1,355	300	NA	NA	NA	NA	−16.6	46.3
Reservation west and north boundaries to ND 37 (1.45 miles)												Mixed result based on 2008 data	
ND 1804	RP 192.1–213.688	NA	NA	235	70	NA	NA	245	35	NA	NA	4.3	−50.0
ND 23 (New Town) to Reservation north boundary (21.59 miles)												Mixed result based on 2009 data	
ND 8	RP 123.7–132.12	NA	NA	125	15	NA	NA	170	20	NA	NA	36.0	33.3
Reservation boundary north to Lake Sakakawea (8.42 miles)												Traffic increases	
ND 8	RP 132.121–133.7	640	110	NA	NA	1,440	490	1,870	700	2,245	1,000	250.8	809.1
ND 23 north to Reservation boundary (1.58 miles)												Traffic increases	

Source: North Dakota Department of Transportation (NDDOT) (2011).
ADT = average daily traffic
NA = not applicable

Trends in Traffic Safety

Traffic accident data were not available for BIA roads. Accident data were obtained for seven NDDOT highway sections on the Reservation from January 2008 through May 2011, as shown in Table 3-25 (NDDOT 2011). NDDOT statistics suggest that traffic accidents have increased on the approximately 141.6 miles of state roads within the boundaries of the Reservation from January 2008 to May 2011. In addition to trends in overall accidents and accidents involving fatalities or injuries on state highways, the incidence of accidents or injuries involving truck-tractors and two- or three-axle trucks were evaluated as indicators of safety issues from increased oil and gas activity within the Reservation.

The monthly average was determined for each measure, and the percentage departure from the monthly average was calculated to assess the overall yearly relationship to the 41-month average. In general, 2008 and 2009 showed below-average accident rates, injuries and fatalities, truck accidents, and truck accidents involving injuries, compared with the 41-month average, while 2010 and the 5-month period of 2011 showed above-average accident and injury rates (see Table 3-25). State Highways 23, 73, and 8 each experienced increased ADT and truck ADT, and also experienced above-average crashes and truck-involved traffic accidents. State Highway 22 was an exception, since traffic volumes increased significantly but no corresponding increase in crashes occurred. State Highway 37 was also an exception to increased traffic contributing to increased crashes, since this highway segment saw a decrease in ADT and truck ADT, but experienced above-average crashes and truck-involved crashes during 2010 and 2011.

The data suggest that a combination of overall increased passenger traffic and increased truck traffic may be contributing to above-average accidents in recent years; however, it will take several additional years of data collection to establish a clear connection, and poor road repair condition, weather, and driver error may contribute to accidents as much as traffic volume.

Table 3-25. 41-month Safety Trends on NDDOT Roads within the Reservation

State Highway Number and Accident Breakdown	41-month Totals		2008		2009		2010		2011 (Jan–May)	
	Accidents	Average	Accidents	% Change from Average	Accidents	% Change from Average	Accidents	% Change from Average	Accidents	% Change from Average
ND 22: RP 126.5–156.05 (29.55 miles)										
Total	34	0.83	8	−19.61	6	−39.71	16	60.78	4	−3.53
Truck Involved	9	0.22	2	−24.07	1	−62.04	5	89.81	1	−8.89
Fatality or Injury	13	0.32	4	5.13	4	5.13	4	5.13	1	−36.92
Truck & Injury	4	0.10	1	−14.58	1	−14.58	2	70.83	0	−100.00
Year Performance			Below Average		Below Average		Above Average		Below Average	
ND 23: RP 35.6–80.6 (45 miles)										
Total	117	2.85	32	−6.55	27	−21.15	37	8.05	21	47.18
Truck Involved	28	0.68	5	−38.99	3	−63.39	15	83.04	5	46.43
Fatality or Injury	41	1.00	13	8.33	13	8.33	12	0.00	3	−40.00
Truck & Injury	11	0.27	2	−37.88	3	−6.82	4	24.24	2	49.09
Year Performance			Below Average		Below Average		Above Average		Above Average	
ND 37: RP 0.0–30.0 (30 miles)										
Total	22	0.54	4	−37.88	6	−6.82	8	24.24	4	49.09
Truck Involved	12	0.29	1	−71.53	2	−43.06	5	42.36	4	173.33
Fatality or Injury	8	0.20	1	−57.29	2	−14.58	0	−100.00	4	310.00
Truck & Injury	7	0.17	1	−51.19	1	−51.19	2	−2.38	3	251.43
Year Performance			Below Average		Below Average		Below Average		Above Average	
ND 73: RP 7.3–11.32 (4.02 miles)										
Total	6	0.15	0	−100.00	2	13.89	3	70.83	1	36.67
Truck Involved	1	0.02	0	−100.00	1	241.67	0	−100.00	0	−100.00
Fatality or Injury	2	0.05	0	−100.00	1	70.83	0	−100.00	1	310.00
Truck & Injury	0	NA	0	NA	0	NA	0	NA	0	NA
Year Performance			Below Average		Above Average		Below Average		Above Average	
ND 1804: Two segments (RP 247.145–248.6 [1.45 miles]; RP 192.1–213.688 [21.59 miles])										
Total	13	0.32	6	57.69	2	−47.44	3	−21.15	2	26.15
Truck Involved	1	0.02	0	−100.00	0	−100.00	1	241.67	0	−100.00
Fatality or Injury	7	0.17	4	95.24	2	−2.38	1	−51.19	0	−100.00
Truck & Injury	1	0.02	0	−100.00	0	−100.00	1	241.67	0	−100.00
Year Performance			Below Average		Below Average		Above Average		Below Average	

State Highway Number and Accident Breakdown	41-month Totals		2008		2009		2010		2011 (Jan–May)	
	Accidents	Average	Accidents	% Change from Average	Accidents	% Change from Average	Accidents	% Change from Average	Accidents	% Change from Average
ND 8: Two segments (RP 123.7–132.120 [8.42 miles]; RP 132.121–133.7 [1.58 miles])										
Total	10	0.24	0	−100.00	3	2.50	4	36.67	3	146.00
Truck Involved	5	0.12	0	−100.00	0	−100.00	2	36.67	2	228.00
Fatality or Injury	2	0.05	0	−100.00	0	−100.00	2	241.67	0	−100.00
Truck & Injury	1	0.02	0	−100.00	0	−100.00	0	−100.00	1	720.00
Year Performance			Below Average		Below Average		Above Average		Above Average	
All Reservation NDDOT Roads										
All Accidents	202	4.93	50	−15.43	46	−22.19	71	20.09	35	42.08
Truck Involved	56	1.37	8	−51.19	7	−57.29	28	70.83	12	75.71
Fatality or Injury	73	1.78	22	2.97	22	2.97	19	−11.07	9	1.10
Truck & Injury	19	0.46	4	−28.07	5	−10.09	9	61.84	6	158.95
All NDDOT Roads Year Compared to Average			Below Average		Below Average		Above Average		Above Average	

Source: North Dakota Department of Transportation (NDDOT) (2011).

NA = not applicable.

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

Under the No Action Alternative, recreation, mineral extraction, and transportation networks would not be affected. No oil and gas resources would be extracted from the proposed project location.

3.7.2.2 Alternative 1

Recreation

Noise, human presence, increased traffic, and associated activities may affect the recreational setting near the project area. Habitat disturbance and activity during well development would potentially affect the number and distribution of game species in the area and the quality of the hunting experience, particularly within the Van Hook Game Management Area. The project would be visible to recreating fisherman within the Van Hook Arm and across Lake Sakakawea to the south. In addition, recreationists using the Van Hook boat ramp would have visibility of the proposed project from the Van Hook Marina area. Impacts would decrease after the construction and drilling phase, as human activity and traffic decrease.

Mineral Extraction

The project would be conducted in accordance with the Mineral Leasing Act of 1920 (30 USC 181, et seq.) and the Indian Mineral Leasing Act of 1938 (25 USC 396a, et seq.). The 13 proposed wells could increase the amount of oil and gas extraction from available reserves by approximately 173 barrels per well per day based on production data for March 2014 (Tallsalt Advisors 2014b).

Transportation Networks

Transportation impacts could include increased traffic volumes on primary and secondary highways, and resource and collector roads; an increased need for maintenance of existing roadways; or an increase in two-track and off-road vehicle travel. The NDDOT vehicle accident data for the Reservation do not necessarily indicate that there would be an increase in vehicle accidents and livestock/wildlife-vehicle collisions correlated with a temporary increase in ADT due to project activities. However, road surface condition and construction could be affected by the addition of many heavy loads associated with well drilling, dirt moving, and HF activities.

The proposed project would add new traffic volume to State Highways 22, 73, and 23, before entering County Road 83rd Ave NW and then the proposed access road to the proposed well pad. Potential short-term impacts from added traffic would occur during construction, drilling, and completion of the wells. Project-related truck traffic includes heavy trucks and pick-up trucks. This increase in traffic would occur over an approximate 30-month period. Traffic would decrease during production. Wells and pipelines would receive regularly scheduled inspection and maintenance, but would not require a regular workforce.

As outlined in Section 2.0, Slawson has planned transportation to reduce vehicle density. The use of a multi-well pad concentrates development and reduces traffic, compared with multiple single-well pads spread across the drilling unit. Avoiding travel during wet conditions would

reduce excessive rutting that could result in additional road maintenance. Speed limits would be posted on roads to increase safety. The use of SCADA systems would minimize the need for personnel to drive to the site for monitoring during the production phase. The expected level of added road use may be inconvenient to the residents living near the proposed project location, but would be unlikely to result in serious road degradation or other long-term impacts on traffic. No additional mitigation is proposed.

Cooperative efforts by operators, agencies, and the tribe are currently being developed and implemented across the Reservation. Construction personnel are to stay within the ROW or follow designated access roads. By increasing pipeline infrastructure, centralizing water depots, and developing salt-water disposal wells, operators, agencies, and the tribe are reducing the overall truck traffic and road degradation. The one-time per-well TERO fee would be used for oil and gas activities; MHA Nation funds and IRR funds would be used to increase the pace of maintenance and repair of roads impacted by increased truck traffic and unusually adverse weather conditions.

3.7.2.3 Preferred Alternative

Under the Preferred Alternative, impacts to recreation, mineral extraction, and transportation networks would be similar to Alternative 1.

Recreation

Noise, human presence, increased traffic, and associated activities may affect the recreational setting near the project area. Habitat disturbance and activity during well development would potentially affect the number and distribution of game species in the area and the quality of the hunting experience, particularly within the Van Hook Game Management Area. The Preferred Alternative production pad is located north of Alternative 1, and is farther from Lake Sakakawea and the Van Hook Marina. Visual impacts would be reduced compared to Alternative 1.

Mineral Extraction

The Preferred Alternative would be conducted in accordance with the Mineral Leasing Act of 1920 (30 USC 181, et seq.) and the Indian Mineral Leasing Act of 1938 (25 USC 396a, et seq.). The 11 proposed wells could increase the amount of oil and gas extraction from available reserves by approximately 173 barrels per well per day based on production data for March 2014 (Tallsalt Advisors 2014b).

Transportation Networks

Transportation impacts from the Preferred Alternative would be the same as Alternative 1.

3.8 OTHER VALUES

3.8.1 Affected Environment

3.8.1.1 Noise and Light

The proposed project would be located in a predominantly rural setting, adjacent to the Van Hook boat ramp. This area sees significant vehicle traffic with associated low levels of

ambient noise and artificial light sources. The primary sources of human-made ambient noise and light emissions are vehicular traffic, agricultural activity, and oil and gas drilling and well pad construction activities (bulldozers, drill rigs, diesel engines, flaring of gas). Drilling activities typically take place 24 hours per day, and drill rigs are fitted with lighting for nighttime work.

3.8.1.2 Visual

Lake Sakakawea and rolling plains on the Reservation are typical views available to residents and travelers along area highways and roads near the proposed project location. State Highway 23 is approximately 2 miles to the north of the proposed Alternative 1 and the Preferred Alternative well pads. County Road 83rd Ave NW would be the primary access to both proposed well pads and would see a significant increase in traffic during the construction and drilling phases.

Agricultural fields and existing oil and gas-related development (well pads, access roads, utility corridors, and other facilities) are also present and influence the viewshed and scenic quality of the project area.

3.8.1.3 Public Health and Safety

Alternative 1 and the Preferred Alternative would be located in a remote area with one residence within 1 mile of the proposed project location. The nearest home is approximately 420 feet to the east of the nearest well head of Alternative 1. While the nearest home is approximately 530 feet northeast of the nearest well head of the Preferred Alternative. Health and safety concerns include natural gas, or any gas containing H_2S gas, that could be released as a result of drilling activities; hazards introduced by heavy truck traffic; and hazardous materials used or generated during construction, drilling, and production activities.

H_2S is extremely toxic in concentrations above 500 ppm. Before reaching the Bakken, however, drilling would penetrate the Mission Canyon Formation, which is known to contain varying concentrations of H_2S. Contingency plans submitted to the BLM comply fully with relevant portions of Onshore Oil and Gas Order No. 6 to minimize potential for gas leaks during drilling. Emergency response plans protect both the drilling crew and the general public within 1 mile of a well; precautions include automated sampling and monitoring by drilling personnel stationed at each well site.

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

3.8.1.4 Indian Trust Resources

Alternative 1 and the Preferred Alternative would be situated on private lands within the boundaries of the Reservation, which encompass more than 1 million acres; almost one-half of this acreage is held in trust by the United States for either the MHA Nation or individual allottees. It is the BIA's general mission is to represent Indian trust resources, both surface and subsurface. Oil and gas leases are subsurface Indian trust resources for which the BIA is responsible. Royalty revenues from oil and gas leases can be a source of income for the MHA Nation and individual allottees. Per an agreement between the MHA Nation and State of North Dakota, one-half of the oil production and extraction tax revenue from Fort Berthold Indian Trust resources will be paid to the MHA Nation, in addition to a one-time per-well fee charged by the tribe (TAT and State of North Dakota 2013).

3.8.2 Environmental Consequences

3.8.2.1 No Action Alternative

Under the No Action Alternative, there would be no additional noise, light, visual, or health and safety impacts in the proposed project location. Because no surface activities would occur under the No Action Alternative, no surface lands that are Indian Trust resources would be impacted. The royalty, tax, and fee revenues that could be generated from the commercialization of these federal leases would not be realized under the No Action Alternative.

3.8.2.2 Alternative 1

Noise and Light

Construction, drilling, and completion of the proposed project would result in increased noise and light emissions from truck traffic and equipment operation. Noise impacts from actions at the proposed project location would be localized and would likely go unnoticed by the public. The EPA standard for acceptable environmental noise is 55 A-weighted decibels because noise levels greater than this threshold could disturb local residents and displace area wildlife. Noise levels decrease over distance; noise levels from drill rigs are typically less than 55 A-weighted decibels at 0.25 mile from the noise source (BLM 2006). The nearest home is approximately 420 feet to the east of the nearest well head of Alternative 1. The Van Hook summer community would be the most impacted by noise and light. Light and sound would still ruminate from the top of the drilling unit.

Heavy truck traffic leaving the site would create more widespread and intermittent noise impacts as trucks travel through the Reservation. The construction through completion phases would have the most noise from heavy truck traffic due to the number of required trips. Additionally, suitable mufflers would be installed on all internal-combustion engines and certain compressor components to minimize noise levels. Producing wells would be monitored remotely using SCADA systems to reduce traffic noise.

Drilling rig lights and vehicle lights would increase area light emissions and could be noticeable during nighttime conditions from nearby residents, recreationists, and travelers along area roads. These light sources would be consistent with other existing light sources in the area, however, and would be temporary.

Visual

Construction of Alternative 1 would increase the visual presence of oil and gas development in the area. Surface disturbance would contrast with the natural environment. However, facilities would be painted a color that would blend with the environment and successful final reclamation would allow disturbed areas to be quickly absorbed into the natural landscape. The proposed project would be located approximately 1 mile south of State Highway 23, but likely would not be visible from this road. Based on operator measures that minimize visual impacts, including final reclamation, these facilities would not result in any long-term adverse effects on the viewshed of the Killdeer Mountain-Four Bear Scenic Byway. As mentioned in Section 3.8, recreationists who access the Van Hook Marina, as well as home owners accessing the Van Hook summer community, would have to pass the proposed project location to reach their destinations.

Public Health and Safety

Under Alternative 1, spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations. Sewage would be contained in a portable chemical toilet during drilling. All trash would be stored in a trash cage and hauled to an appropriate landfill during and after drilling and completion operations.

Bakken and Three Forks wells typically produce both oil and water at a high rate initially. Gas would be flared initially and intermittently, while oil and produced water would be stored on the well pad in tanks and then hauled out by tankers until the wells are connected to oil and gas pipelines shortly after drilling and completions. Up to 20 400-barrel oil tanks and water tanks would be located on the pad inside a 2-foot-high, 12-gauge steel containment structure with a 24-millimeter load out liner and concrete footer. This structure would be designed to hold 110% of the capacity of the largest tank plus 1 day's production.

Conformance to hazardous materials requirements (described in Section 3.8.1.3) would reduce potential project risk to public health and safety. Standard mitigation measures would be applied, and because release of H_2S at dangerous concentration levels is very unlikely, no direct impacts from H_2S are anticipated with implementation of the project.

Other potential health and safety effects on nearby residents from construction would consist of temporary increases in noise, fugitive dust, fire risk, and traffic hazards. These effects would be present during construction, drilling, and well completion as equipment and vehicles move on and off the site, and then diminish sharply during production operations. If a well proved productive, one small pumper truck would visit the well once a day to check the pump. All traffic would be confined to approved routes and conform to established load restrictions and speed limits for state and BIA roadways and haul permits would be acquired as appropriate.

Indian Trust Resources

Members of the MHA Nation would benefit, in accordance, with the 2013 agreement, by receiving one-half of the maximum 11.5% oil production and extraction tax and a one-time-per-well fee of $100,000 (TAT and State of North Dakota 2013).

3.8.2.3 Preferred Alternative

Under the Preferred Alternative, impacts from noise and light, visual, public health and safety, and Indian trust resources would be very similar to Alternative 1. However, the Preferred Alternative is located approximately 200 feet farther away from the edge of Lake Sakakawea, and the high recreational area at the Van Hook Marina. The elevational difference between the Preferred Alternative and the shore of the Lake does not provide direct line-of sight. This lack of-line-of –sight would reduce the noise and light and visual impacts compared to Alternative 1.

3.9 MITIGATION AND MONITORING

Many protective measures and procedures are described in this document and in the COAs for the associated APDs. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. Each phase of construction and development through production would be monitored by the BLM and representatives of the MHA Nation to ensure the protection of cultural, archaeological, and natural resources. In conjunction with 43 CFR 46.30, 46.145, 46.310, and 46.415, a report would be developed by the BLM that documents the results of monitoring in order to adapt the project to minimize any adverse impacts on the environment.

Mitigation opportunities that apply to both Alternative 1 and the Preferred Alternative are described in Section 2 (see sections 2.2.12, 2.2.13, and 2.2.14) and below. BMPs are loosely defined as techniques used to lessen the visual and physical impacts of development. The BLM has created a catalog of BMPs that, when properly implemented, can assist industry in a project's design, scheduling, and construction techniques. Many of these are required by the BLM when drilling federal or tribal leaseholds and can be found in the surface use plan in the APD. The regulatory agency provides COA with permitting, and enforcement would occur as a result of non-compliance; this adds incentives for strict adherence to the BMPs.

3.9.1 Biological Resources Mitigation Measures

Slawson has committed to mitigation measures for potential impacts to soil and water resources (see Section 2.2.14). These measures would serve to mitigate potential direct impacts to habitat from the project area, including native grassland, wetlands, and streams.

Surface disturbance and vehicular traffic would not take place outside approved ROWs for the well pad and access road. Areas that are stripped of topsoil must be 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. Rapid reclamation and the implementation of BMPs would minimize any long-term loss of soil and degradation of vegetation resources in the proposed ROW. The loss of acres of habitat, with implementation of BMPs and noxious weed management guidelines, would mitigate impacts resulting from vegetation conversion and disturbance, and would not result in significant adverse impacts to vegetation resources.

Final reclamation would begin without delay if a well is determined to be unproductive, or upon completion of commercial production.

3.9.1.1 Wildlife

No Action Alternative

Under the No Action Alternative, there would be no impacts to wildlife in the proposed project location.

Alternative 1

The following mitigation measures have been incorporated into the project description to avoid and reduce the potential impact to protected species.

<u>Bald and Golden Eagle and Migratory Bird Protective Measures</u>

- SWCA biologists conducted a 0.5-mile line-of-sight survey for eagles and nests during their on-site environmental survey. No eagles or nests were observed within 0.5 mile of the proposed project area.
- Slawson would conduct all construction outside of the migratory bird breeding season (between February 1 and July 15); or, if construction occurs during bird breeding season, Slawson would conduct an avian survey of the project area no greater than 5 days before construction begins, and if nests are discovered, notify the BLM and USFWS.

<u>ESA Protective Measures</u>

- Piping plover and its designated critical habitat, interior least tern, and pallid sturgeon: Slawson commits to constructing a 24-inch berm for controlling runoff, and additional berms, as needed and agreed to during the on-site inspection, which would hold a minimum 110% of the capacity of the largest tank plus one full day's production, placed around the location to prevent any accidental release of drilling fluids or hazardous materials into the watershed of Lake Sakakawea. Slawson would also construct a 3-foot metal containment berm around the tank battery, and a diversion ditch around the northwest and southwest sides of the location with BMPs such as straw rolls.
- Drilling would be in phases and would not occur during piping plover and tern breeding and nesting season.
- Whooping crane: If a whooping crane is sighted within 1 mile of the proposed project area, work would be stopped and the BLM and USFWS would be notified. In coordination with the BLM and USFWS, work may resume after the bird(s) leaves the area.

Preferred Alternative

In addition to the protective measures for Alternative 1, the following mitigation measures were agreed upon to reduce the potential impact to protected species.

ESA Protective Measures

- A continuous drill cycle through the nesting season would begin no sooner than July 15 , unless a survey by a qualified avian biologist indicates all piping plovers and least terns have hatched and are mobile. Surveys would begin on July 1, 2016, to determine presence and status of hatched or fledged individual piping plovers and least terns. If surveys reveal presence of hatched and mobile chicks, Slawson would be allowed to begin construction.
- A 24-inch berm would be constructed around the completed well pad to hold surface water and any possible contaminants on location.
- Diligent implementation and maintenance of the SWPPP, discussed in Section 2.2.13.
- Prompt interim reclamation of the area surrounding the pad, discussed in Section 2.2.12.
- Well pumps will be the Rotaflex type, which is essentially vertical with a belt that moves up and down. The belt and moving parts will be oriented to the north or away from potential piping plover and least tern nesting habitat to reduce any possible disturbance.
- The final aggregate used on the pad will be coarse in nature to prevent the attraction of piping plovers to the newly constructed pad. The size of aggregate will be no smaller than 1.5 inch in diameter.
- Slawson has agreed to work with the county road superintendent or equivalent to place a "stop gate" type structure that can be opened and closed on the culvert under the entrance road to the boat ramp in case an undesirable release of fluids leaves the bermed pad (see Figure -9). (The migration distance from the surface use area to Lake Sakakawea through this culvert is 1,082 feet.)

Figure 3-9. View north from boat ramp parking area, straight south of well pad center. Culvert in center will be fitted with "stop gate."

A copy of the biological assessment and USFWS letter of concurrence is provided in Appendix E.

3.9.2 Mitigation and Safety Measures Committed to by Slawson

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

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

Efforts to reduce potential contact with animals include:

- locating the well pad in areas with existing disturbances;
- installing covers under drip buckets and spigots; and
- conducting interim reclamation of at least half the disturbed area.

3.9.2.1 Air Quality

Slawson commits to the following.

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions
    - Use directional drilling to drill multiple wells from a single well pad;
    - use centralized water storage and delivery, well fracturing, gathering systems;
    - use water or dust suppressants to control fugitive dust on roads; and
    - control road speeds.
- Drilling BMPs to reduce rig emissions
    - Electric drill rigs will be utilized for drilling.
- Unplanned or emergency releases
    - Use high-temperature flaring if gas is not recoverable.
- Vapor recovery
    - Use enclosed tanks instead of open pits to reduce fugitive VOC emissions; and
    - use vapor recovery units on storage tanks.
- Inspection and maintenance

- Use and maintain proper hatches, seals, and valves.

3.9.2.2 Dust Control

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

3.9.2.3 Utility Lines

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

3.9.2.4 Fire Control

Slawson would implement fire prevention and control measures, including:

- requiring construction crews to carry fire extinguishers in their vehicles and/or equipment;
- training construction crews in the proper use of fire extinguishers; and
- contracting with the local fire district to provide fire protection.

3.9.2.5 Traffic

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

3.9.2.6 Closed-Loop System

Slawson commits to using a closed-loop system.

3.9.2.7 Cultural Resources

Slawson recognizes the need to protect cultural resources within the project area and has committed to the following.

- If cultural resources are discovered during construction or operation, Slawson will immediately stop work, secure the affected site, and notify the BLM and the THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BLM consultation with all appropriate parties. Following any such discovery, operations would not resume without written authorization from the BLM. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance.

3.10 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

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

4.0 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 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. The cumulative impact analysis area (CIAA) may vary, depending on the particular resource under consideration. Some effects are localized, while others may be felt as far as 20 miles from the proposed project (Figure 4-1). For purposes of cumulative impact analyses, land ownership and the Reservation boundary are immaterial. Farming and grazing are unlikely to contribute significantly to cumulative effects. Therefore, cumulative impacts focus on oil and gas development.

The Reservation and surrounding area is currently experiencing one of the largest oil and natural gas booms the United States has ever experienced. In May 2014, there were 988 producing wells, 90 wells being drilled, and 410 permitted wells on the Reservation (Tallsalt Advisors 2014a). In 2013, there were 6,862 producing wells in North Dakota. The BIA does not have jurisdiction over wells outside the Reservation boundaries or on fee land, though these wells are considered in the cumulative effects analysis. There are 17 active and confidential wells within a 1-mile CIAA, as shown in Table 4-1. The cumulative total of active and confidential wells within a 5-mile CIAA is 190; 876 active and confidential wells within a 10-mile CIAA; and 2,590 active and confidential wells within a 20-mile CIAA.

Reasonably foreseeable future cumulative impacts must also be considered. For purposes of cumulative impact analyses, the density of active and permitted oil wells and associated facilities (including access and utility corridors) is expected to increase steadily within the CIAA over the next decade. From 2010 to 2029, it is estimated that 8,460 total new exploratory and development wells (on 6,765 pads) will be drilled. Of those exploratory and development pads, 5,711 pads will remain active and producing (BLM 2011). Specifically, on the Reservation, the EPA estimates that there could be approximately 2,000 new wells (or 1,000 well pads) between 2010 and 2029 (EPA 2012).

The cumulative impacts from oil and gas development would be dispersed and passive in nature. Dispersed location of well pads is achieved through the use of federal planning units, called spacing units, designed to maintain productivity of future wells. The dominant spacing units are 1,280 acres, although 2,560-acre, 640-acre, and 320-acre units also may exist.

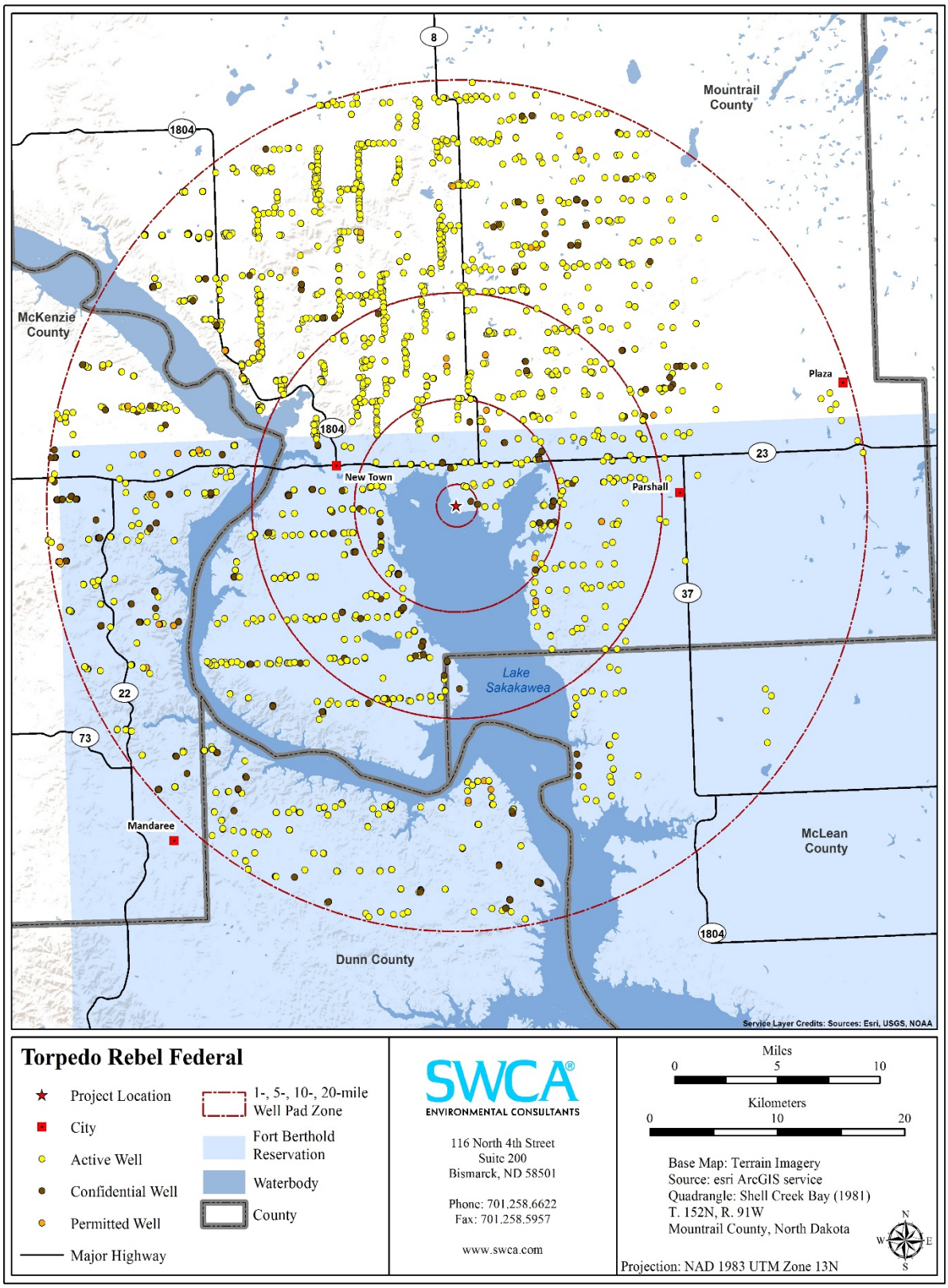

Figure 4-1. Existing and projected future oil and gas development within a 1-, 5-, 10-, and 20-mile radius of the proposed project.

Table 4-1. Number of Confidential, Active, and Permitted Wells Surrounding the Project Area

Well Type	On Reservation	Off Reservation
1-mile CIAA		
Active wells	4	0
Confidential wells	13	0
Permitted wells	0	0
Cumulative total active and confidential wells within 1-mile CIAA: 17		
5-mile CIAA		
Active wells	94	19
Confidential wells	75	2
Permitted wells	1	2
Cumulative total active and confidential wells within 5-mile CIAA: 190		
10-mile CIAA		
Active wells	440	253
Confidential wells	172	11
Permitted wells	6	5
Cumulative total active and confidential wells within 10-mile CIAA: 876		
20-mile CIAA		
Active wells	946	1,088
Confidential wells	378	178
Permitted wells	51	71
Cumulative total active and confidential wells within 20-mile CIAA: 2,590		
Cumulative total permitted wells within 20-mile CIAA: 122		

CIAA = cumulative impact analysis area

4.1 CUMULATIVE EFFECTS ON LAND RESOURCES

4.1.1 Topography

4.1.1.1 No Action Alternative

Under the No Action Alternative, there would be no changes to topography within the proposed project area.

4.1.1.2 Alternative 1

Topographic changes resulting from construction-related excavation, including buildings, roads, well pads, and pipelines, from cumulative projects would result in minor, but long-term impacts to the topography on the Reservation and throughout the CIAA.

4.1.1.3 Preferred Alternative

Under the Preferred Alternative, impacts to topography would be similar to Alternative 1.

4.1.2 Soils

4.1.2.1 No Action Alternative

Under the No Action Alternative, there would be no changes to soils within the proposed project area.

4.1.2.2 Alternative 1

Soils across the project area could be affected as a result of soil loss, compaction, and disturbance of quality topsoil that has been largely undisturbed by development activities, grazing, and agriculture. Alternative 1 would result in 14.58 acres of long-term disturbance associated with the well pad fenced area and access road, out of a total of 1,211,219 acres of land within a 20-mile radius of the proposed project. Similar levels of soil disturbance have occurred at 2,590 existing wells within the 20-mile radius and another 122 permitted wells, as indicated in Table 4-1. Existing and future foreseeable oil and gas development is estimated to result in long-term disturbance to approximately 25,530 acres (10 acres per well), or approximately 2.10% of the available surface area within the 20-mile radius. The proposed project would result in an estimated relative incremental increase of 0.001% long-term disturbance when added to the existing surface disturbance.

4.1.2.3 Preferred Alternative

Under the Preferred Alternative, impacts to soils would be similar to Alternative 1. The Preferred Alternative would result in 14.56 acres of long-term disturbance associated with the well pad fenced area and access road.

4.1.3 Agriculture

4.1.3.1 No Action Alternative

Under the No Action Alternative, there would be no impacts to agriculture within the proposed project area.

4.1.3.2 Alternative 1

Given the expected dispersal of future oil and gas well development, the current pattern of farming and ranching activities is expected to continue as the secondary economic activity in the CIAA with little change because virtually all available acreage is already organized into range units to use surface resources for economic benefit. The same economic incentives for coexisting agricultural land uses and oil and gas development may not occur off the Reservation on private lands, and agriculture and grazing may be reduced in the future as the economic benefits of oil production increase. Most agricultural lands on the Reservation are located on the east side, outside the areas where most oil and gas development is located and anticipated, and would not experience associated cumulative impacts. However, some agricultural lands on and off the Reservation would be directly impacted due to displacement for oil and gas well pads and roads, or indirectly impacted due to increased dust and spread of weeds. The proposed project would convert approximately 10.9 (fenced) acres for a period of approximately 50 years. Because of the availability of other areas on the Reservation for agriculture and the relatively small size of the project in comparison, Alternative 1 would not contribute to cumulative effects.

4.1.3.3 Preferred Alternative

Under the Preferred Alternative, impacts to agriculture would be similar to Alternative 1. The Preferred Alternative would convert approximately 14.56 (fenced) acres for a period of approximately 50 years. Because of the availability of other areas on the Reservation for agriculture and the relatively small size of the project in comparison, the Preferred Alternative would not contribute to cumulative effects.

4.1.4 Geology and Paleontology

4.1.4.1 No Action Alternative

Under the No Action Alternative, there would be no changes to geology and paleontology within the proposed project area.

4.1.4.2 Alternative 1

Oil and gas resources located on the Reservation are currently being developed, and it is reasonably foreseeable that this trend will continue at least through 2030. Sand and gravel removed from land areas for construction of access roads and well pads would be permanently relocated and converted to hard surface. Oil and gas removal is anticipated to continue with respect to the Reservation's resources and once depleted, is not renewable. Although Alternative 1 represents a very small portion of the eventual overall oil and gas extraction and production of the Reservation's resources, it would result in an incremental contribution to cumulative effects on geology overall. Potential for encountering paleontological resources is increasing as subsurface disturbance increases throughout the region, and these resources could be adversely affected if they are not managed appropriately.

4.1.4.3 Preferred Alternative

Under the Preferred Alternative, impacts to geology and paleontology would be similar to Alternative 1. The Preferred Alternative would result in an incremental contribution to cumulative effects on geology overall.

4.2 CUMULATIVE EFFECTS ON WATER RESOURCES

4.2.1 No Action Alternative

Under the No Action Alternative, there would be no changes to water resources within the proposed project area.

4.2.2 Alternative 1

No surface discharge of water would occur under Alternative 1. Any surface or groundwater used during project development would come from an approved commercial source. When combined with other actions (cattle grazing, other oil and gas development, and agriculture) that are likely to occur in and near the proposed project location in the future, Alternative 1 may increase sedimentation and runoff rates. Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, Alternative 1 is not expected to incrementally add to existing and future sources of water quality degradation in the watershed. Any increases in degradation would be reduced by Slawson's commitment

to minimizing disturbance, using erosion-control measures (such as installing matting and straw rolls on exposed slopes), and implementing BMPs designed to reduce impacts.

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

4.2.3 Preferred Alternative

Under the Preferred Alternative, impacts to water resources would be similar to Alternative 1. The fenced area for the well pad is located approximately 600 feet (at its closest point) from the shore of Lake Sakakawea. No adverse impacts to potable water aquifers and associated groundwater wells are anticipated from the development of the proposed new wells. As a result, it can be reasonably assumed that there would be no cumulative impacts as a result of current and future oil and gas development on the Reservation, which targets deep geological formations such as the Bakken and Three Forks.

4.3 CUMULATIVE EFFECTS ON AIR QUALITY

4.3.1 No Action Alternative

Under the No Action Alternative, there would be no changes to air quality within the proposed project area.

4.3.2 Alternative 1

If drilling, testing, and completion of a well were to support commercial production from the proposed location, additional equipment would be installed, including pumping units at the well heads, vertical heater/treaters, and tanks (usually 400-barrel steel tanks) on the facilities pad. This equipment and associated activities have the potential to release regulated air pollutants. During a 10-year period ending in 2008, approximately 91% of wells drilled and completed in North Dakota were successful, and this value is predicted to improve (BLM 2009).

During completion and production of a well, exhaust from vehicles and equipment can release regulated pollutants. A smaller “completion rig” is moved on-site to bring the well to production but requires a much smaller engine capacity than the drilling rig (Eastern Research Group, Inc. 2009). General material and equipment movement (including trucking the oil and produced water off-site) is another source of combustion emissions.

Nearly 30% of North Dakota gas is currently being burned off each month as a product of oil production. For comparison, Alaska and Texas flare less than 1% of the natural gas produced. This is because oil production from the Bakken is much more recent than in those areas, and the area lacks gathering infrastructure for capturing natural gas. The Reservation FIP and NSPS Subpart OOOO require operators to capture produced natural-gas emissions, as opposed to routing the emissions to a control device, whenever economically feasible (EPA

2012). As the area becomes more developed and gathering infrastructure is installed, the percentage of natural gas flared can be expected to decrease.

With the expected growth in oil and gas exploration, and the potential subsequent extraction and production of these resources, the cumulative effects of the emissions from these sources would be expected to decrease air quality. Alternative 1 represents a small portion of the potential cumulative effects of increased oil and gas activities on air quality in the analysis area, and would result in an incremental contribution to cumulative effects on air quality overall. This incremental contribution would not be expected to have a significant impact on cumulative effects on air quality.

4.3.3 Preferred Alternative

Under the Preferred Alternative, impacts to air quality would be similar to Alternative 1. The Preferred Alternative represents a small portion of the potential cumulative effects of increased oil and gas activities on air quality in the analysis area, and would result in an incremental contribution to cumulative effects on air quality overall. This incremental contribution would not be expected to have a significant impact on cumulative effects on air quality.

4.4 CUMULATIVE EFFECTS ON BIOLOGICAL RESOURCES

4.4.1 Ecosystems, Habitats, and Vegetation

4.4.1.1 No Action Alternative

Under the No Action Alternative, there would be no changes to ecosystems, habitats, and vegetation within the proposed project area.

4.4.1.2 Alternative 1

No direct wetland impacts would occur as a result of Alternative 1. Wetlands in the CIAA could be affected primarily by erosion, sedimentation, and spills or other indirect effects on surface water quality. Past, present, and reasonably foreseeable future oil and gas drilling activities within the area has the potential to lead to increased sediment loads being deposited in wetlands and streams. Adherence to BMPs and site-specific erosion-control measures identified for the proposed project (see Section 2.2.13) would prevent or reduce long-term erosion and sedimentation from the proposed project and, therefore, would not contribute significantly to a cumulative effect. The use of similar site-specific measures for all future permitted and proposed well drilling would provide strong protections that would keep erosion at very low levels and keep future development from adversely affecting wetland functions or quality.

Vegetation resources across the Alternative 1 location may 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 and noxious weed species. Continued oil and gas development within the Reservation could result in the loss, and further fragmentation, of

native mixed-grass prairie habitat. As described above in Section 4.1.1.1, the proposed project would disturb less than 0.001% of the overall land area. Because of the small size in relation to the overall land area, Alternative 1 would not significantly contribute to cumulative effects.

4.4.1.3 Preferred Alternative

Under the Preferred Alternative, impacts would be similar to Alternative 1. No direct wetland impacts would occur as a result of the Preferred Alternative. Adherence to BMPs and site-specific erosion-control measures identified for the proposed project (see Section 2.2.13) would prevent or reduce long-term erosion and sedimentation from the proposed project and, therefore, would not contribute significantly to a cumulative effect. The use of similar site-specific measures for all future permitted and proposed well drilling would provide strong protections that would keep erosion at very low levels and keep future development from adversely affecting wetland functions or quality. Because of the small size in relation to the overall land area, the Preferred Alternative would not significantly contribute to cumulative effects.

4.4.2 Wildlife

4.4.2.1 No Action Alternative

Under the No Action Alternative, there would be no impacts to wildlife within the proposed project area.

4.4.2.2 Alternative 1

Overall, oil and gas development on the Reservation is affecting wildlife and their habitats due to conversion of existing undeveloped areas, where wildlife have unrestricted access, to developed areas with disturbance such as habitat conversion, noise, human activities, vehicles, etc. The impacts include habitat fragmentation, loss of breeding and foraging habitat, and behavioral changes. The trend on the Reservation indicates that oil and gas development (extent unknown) will continue to increase, and these effects on wildlife and their habitats would be expected to become more noticeable. However, Alternative 1 would implement BMPs and other measures (see Section 2.2.13) to minimize potential effects on wildlife and habitats. In addition, with the relatively small size of Alternative 1's long-term (fenced area and road) disturbance (11.07 acres) and the availability of other Reservation habitats for wildlife to use, the incremental contribution from Alternative 1 to cumulative effects would not be considered significant.

4.4.2.3 Preferred Alternative

Under the Preferred Alternative, impacts to wildlife would be similar to Alternative 1. However, the Preferred Alternative's nearest point of fence line is located approximately 200 feet further away from the edge of Lake Sakakawea. The elevational difference between the pad location and the shoreline habitats would not provide line-of-sight, and would presumably not result in a visual disturbance to piping plovers and other wildlife.

4.5 CUMULATIVE EFFECTS ON CULTURAL RESOURCES

4.5.1 No Action Alternative

Under the No Action Alternative, there would be no impacts to cultural resources within the proposed project area.

4.5.2 Alternative 1

The number of oil wells, both active and permitted, is used as an indicator of the extent of all development activities that might affect cultural resources. Significant archaeological resources are irreplaceable and often unique; any damage or destruction of such resources can be expected to diminish the archaeological record as a whole. Unlike biological resources, cultural resources are historic point locations, fixed in place, that do not respond to outside influence. As such, cumulative effects can be avoided through the required field evaluation and shifting of disturbance to avoid identified resources. Therefore, no cumulative impacts to the archaeological record would occur as a result of Alternative 1. If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and the THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties. Following any such discovery, operations would not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing.

4.5.3 Preferred Alternative

Under the Preferred Alternative, impacts to cultural resources would be similar to Alternative 1. As with Alternative 1, no cumulative impacts to the archaeological record would occur as a result of the Preferred Alternative. If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and the THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties. Following any such discovery, operations would not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing.

4.6 CUMULATIVE EFFECTS ON SOCIOECONOMICS

4.6.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts to socioeconomics.

4.6.2 Alternative 1

Alternative 1 would incrementally add to existing and future socioeconomic impacts in the CIAA, which is the same as the analysis area for socioeconomics. Alternative 1 would contain 13 wells, which would be an additional source of revenue for the MHA Nation and for some allottees. Alternative 1 would also, in conjunction with other oil and gas developments,

increase short-term employment opportunities and income for Reservation residents. The addition of these actions, when considered with other development in the CIAA, is expected to result in beneficial cumulative economic effects, based on improving economic trends as a result of oil and gas development throughout the CIAA over the past decade.

No changes to population, housing, or demand for community infrastructure and public services are anticipated for Alternative 1. Changes to lifestyle and cultural values from current oil and gas development are occurring in the analysis area. These changes affect the day-to-day lives of analysis area residents, including MHA Nation members. However, participation of the BIA and MHA Nation staff in the site-specific planning for Alternative 1 and surrounding oil and gas development is intended to minimize social and cultural impacts and avoid adverse impacts to the overall character of the analysis area. Therefore, the incremental contribution from Alternative 1 to cumulative effects for these social aspects would not be considered significant.

Discussion of cumulative effects involving non-socioeconomic resources potentially affecting EJ—air quality, water quality, noise, hazardous materials—is provided in other sections. However, because the addition of these actions the effects from Alternative 1 would not result in significant cumulative effects for any of the above-listed resources. Alternative 1 also would not result in significant cumulative effects for EJ.

4.6.3 Preferred Alternative

Under the Preferred Alternative, impacts to socioeconomics would be similar to Alternative 1. The Preferred Alternative would incrementally add to existing and future socioeconomic impacts in the CIAA, which is the same as the analysis area for socioeconomics. No changes to population, housing, or demand for community infrastructure and public services are anticipated for the Preferred Alternative. As with Alternative 1, the effects from the Preferred Alternative would not result in significant cumulative effects for any of the above-listed resources. The Preferred Alternative also would not result in significant cumulative effects for EJ.

4.7 CUMULATIVE EFFECTS ON RESOURCE USE PATTERNS

4.7.1 Recreation

4.7.1.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts to resource use patterns.

4.7.1.2 Alternative 1

Oil and gas development associated with Alternative 1 would contribute incrementally to cumulative impacts to recreation within the area surrounding the project area. There are 193 active, confidential, and permitted wells within 5 miles of the proposed project location (see Table 4-1). The proposed development, in combination with these existing and anticipated oil and gas developments, would likely reduce some recreational opportunities and the quality of the recreational experience. Surface disturbance and construction, drilling, and completion

activities could alter habitat for game species, causing them to disburse to other areas within and outside the Reservation. Hunting opportunities could be reduced on the Reservation and the setting for those seeking a sense of naturalness and solitude during recreational activities also could be reduced. Due to the relatively small size of Alternative 1 and the availability of undisturbed areas available in the area of the proposed project location, the incremental contribution from Alternative 1 to cumulative effects would not be considered significant.

4.7.1.3 Preferred Alternative

Under the Preferred Alternative, impacts to resource use patterns would be similar to Alternative 1. However, the Preferred Alternatives nearest point of fence line is located approximately 200 feet further away from the edge of Lake Sakakawea, and the high recreational area at the Van Hook Marina. This lack of line of sight would reduce the long-term cumulative effects from the Preferred Alternative.

4.7.2 Mineral Extraction

4.7.2.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts to mineral extraction.

4.7.2.2 Alternative 1

Oil and gas development associated with Alternative 1 would contribute incrementally to cumulative impacts from extraction and consumption of oil and natural gas from the Bakken Formation. There are currently 2,712 active, confidential, and permitted wells within 20 miles of Alternative 1 extracting oil from the Bakken (see Table 4-1). On the Reservation, the EPA estimates that there could be approximately 2,000 new wells between 2010 and 2029 (EPA 2012). Overall production in 2013 for North Dakota was 297,576,174 barrels from 6,862 producing wells (North Dakota Oil and Gas Division 2014).

4.7.2.3 Preferred Alternative

Under the Preferred Alternative, cumulative impacts to mineral extraction would be similar to Alternative 1. However, the Preferred Alternative is only proposing 11 new wells to be drilled.

4.7.3 Transportation

4.7.3.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts to transportation.

4.7.3.2 Alternative 1

Oil and gas development associated with Alternative 1 would contribute incrementally to cumulative impacts to transportation. Traffic would increase on roads within the 20-mile CIAA due to existing, proposed, and future well development. Trucks, including those with heavy loads, will use state, county, and BIA roads to access the 2,590 existing and permitted wells, the proposed wells, and future wells within 20 miles of Alternative 1. NDDOT highways within this CIAA include Highways 22, 23, and 73. Truck traffic along these

highways and secondary roads may be noticeable to individuals who live and work in Four Bears Village, New Town, and Mandaree, especially those who use BIA Road 14.

Existing major highways and paved county and BIA roads may be adequate to handle anticipated increases in passenger traffic volume and size. Although Alternative 1 would not result in a significant contribution to traffic impacts, when combined with projected heavy truck traffic from hundreds of other new wells previously authorized on and off the Reservation, potential exists for short-term adverse impacts to these roads, particularly gravel roads. Without additional funding for road repair and improvement projects, these cumulative impacts could become prolonged for many of the state highways, county, and BIA roads. Operators, agencies, and the MHA Nation are developing and implementing cooperative efforts to address road conditions and traffic; these efforts will address past activities and continue to minimize and mitigate potential future activities.

4.7.3.3 Preferred Alternative

Under the Preferred Alternative, impacts to transportation would be similar to Alternative 1. Oil and gas development associated with the Preferred Alternative would contribute incrementally to cumulative impacts to transportation. Traffic would increase on roads within the 20-mile CIAA due to existing, proposed, and future well development.

4.8 CUMULATIVE EFFECTS ON OTHER VALUES

4.8.1 Noise and Light

4.8.1.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts to noise and light.

4.8.1.2 Alternative 1

Alternative 1 would contribute incrementally short-term cumulative impacts from noise associated with construction, drilling, and completion activities. Artificial lighting and flaring associated with drilling and completion operations within the CIAA would also increase light emissions and impact viewing of the night sky. Approximately 28 drill rigs on the Reservation were cumulatively contributing to noise and night lighting as of April 2014 (North Dakota Oil and Gas Division 2014). Due to the relatively small size of Alternative 1 and limited sources of existing noise and light emissions, the incremental contribution to cumulative effects would not be considered significant.

4.8.1.3 Preferred Alternative

Under the Preferred Alternative, impacts to noise and light would be similar to Alternative 1. As with Alternate 1, the Preferred Alternative would contribute incrementally short-term cumulative impacts from noise associated with construction, drilling, and completion activities. Artificial lighting and flaring associated with drilling and completion operations within the CIAA would also increase light emissions and impact viewing of the night sky. Due to the relatively small size of the Preferred Alternative and limited sources of existing noise and light emissions, the incremental contribution to cumulative effects would not be considered significant.

4.8.2 Visual

4.8.2.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts to visual resources.

4.8.2.2 Alternative 1

Alternative 1 would contribute incrementally to cumulative impacts from oil and gas development in the CIAA. There are 17 existing well locations with associated roads and infrastructure within 1 mile of Alternative 1 that could impact the area's scenic quality. However, this level of dispersed development would have a low level of visual impact to residents or recreationists in the 1-mile CIAA or those driving through the CIAA on State Highway 23. Due to the relatively small size of Alternative 1, the incremental contribution to cumulative effects would not be considered significant.

4.8.2.3 Preferred Alternative

Under the Preferred Alternative, impacts to visual resources would be similar to Alternative 1. However, the Preferred Alternatives nearest point of fence line is located approximately 200 feet further away from the edge of Lake Sakakawea, and the high recreational area at the Van Hook Marina. This lack of line of sight would reduce the long-term cumulative visual impacts from the Preferred Alternative.

4.8.3 Public Health and Safety

4.8.3.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts to public health and safety.

4.8.3.2 Alternative 1

The main cumulative effect of the existing and proposed wells and other foreseeable future well-field development on public health and safety is related to the possibility of accidental release of petroleum, drilling or HF fluids, or H_2S into the environment. Alternative 1 would add 13 new wells to the cumulative total of 2,590 existing active and confidential wells located within 20 miles of the Alternative 1 location. Maintaining adequate setbacks from residences, along with adequate spill prevention measures (surface casing, blow out preventers, adherence to Onshore Orders) and other emergency plans, would generally prevent hazardous materials from coming into direct contact with drinking water, surface water, or groundwater or with residential populations. However, the risk of accidental release of toxic or hazardous substances is never completely eliminated. Therefore, Alternative 1 would incrementally contribute to a low-level, cumulative impact on public health and safety in the CIAA.

4.8.3.3 Preferred Alternative

Under the Preferred Alternative, impacts to public health and safety would be similar to Alternative 1. However, the Preferred Alternative is only proposing 11 new wells to be added to the cumulative total of 2,590 existing active and confidential wells within 20 miles of the

Preferred Alternative. As with Alternative 1, the risk of accidental release of toxic or hazardous substances is never completely eliminated. Therefore, the Preferred Alternative would incrementally contribute to a low-level, cumulative impact on public health and safety in the CIAA.

4.8.4 Indian Trust Resources

4.8.4.1 No Action Alternative

Under the No Action Alternative, there would be no cumulative impacts Indian trust resources.

4.8.4.2 Alternative 1

As with the soils and vegetation resources, Alternative 1 would result in short-term disturbance of less than 0.001% of the overall surface land area, when added to the existing surface disturbance. No significant long-term effects on surface Indian Trust resources are anticipated because all disturbed areas not needed for operations, after completion of construction and drilling, would be revegetated. Similar to the socioeconomic impacts, Alternative 1 would incrementally add to the existing and future income to the tribe and members of the MHA Nation via royalty, tax, and fee revenues from production and extraction of subsurface Indian trust oil resources. Due to the relatively small size of Alternative 1 and limited contribution to the broader economy, however, the incremental contribution to cumulative effects would not be considered significant.

4.8.4.3 Preferred Alternative

Under the Preferred Alternative, impacts to Indian trust resources would be similar to Alternative 1.

5.0 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

Table 5-1. Tribes, Individuals, Organizations, or Agencies Consulted

Name/Agency	Authority	Result
American Rivers	Kristen McDonald	No Comment
Associated Press		No Comment
Badlands Conservation Alliance	Jan Swenson	No Comment
Badlands Shooting Club	Mark Spravzoff	No Comment
BIA Fort Berthold Agency	Howard Bemer	No Comment
BIA Great Plains Regional Office	William Benjamin	No Comment
BIA Standing Rock	Robert Demery	No Comment
Bismarck Tribune		No Comment
Bureau of Land Management	Lonny Bagley	No Comment
Dakota Cyclery	Jennifer Morlock	No Comment
Dakota Prairie Grasslands	Sherri Schwenke	No Comment
Dakota Resource Council	Mark Trechock	No Comment
Fort Berthold Agency	Earl Silk	No Comment
Friends of Lake Sakakawea	Terry Fleck	Request for public meetings and scoping extension due to risks posed from proximity to Lake Sakakawea. Request for extension granted by BLM.
Independent Water Providers	Steve Mortenson	No Comment
McKenzie County Water Resource District	Denton Zubke	No Comment
McKenzie County Commissioners	Linda Svihovec	No Comment
McKenzie County Extension Agent	Kimberly Neprash	No Comment
McKenzie County Farmer		No Comment
McKenzie County Grazing Association	Kieth Winter	No Comment
McKenzie County Weed Board	Cherri Weyrauch	No Comment
Medora Grazing Association	Kathryn Easton	No Comment
Mule Deer Foundation	Marshall Johnson	No Comment
National Audubon Society	Matthew Mecklenburg	No Comment
National Wildlife Federation	Kimberly Graber	No Comment
Natural Resources Conservation Service	Kyle Hartel	No Comment
Natural Resources Conservation Service	Mary Podoll	No Comment
NDSU Department of Soil Science	Department Chair	No Comment
North Dakota Bowhunters Association	Darrell Belisle	No Comment
North Dakota Chapter of the Wildlife Society	Allyn Sapa	Contamination of Lake Sakakawea, impacts to recreational value, designated piping plover habitat.
North Dakota Council of Humane Societies	Leo Keelan	No Comment

Name/Agency	Authority	Result
North Dakota Department of Health	David Glatt	Air quality, contamination of Lake Sakakawea, storm water runoff, suggest proper surveillance of pipelines and a spill response plan.
North Dakota Farm Bureau		No Comment
North Dakota Forest Service	Larry Kotchman	No Comment
North Dakota Game & Fish Department	Terry Steinwand	No Comment
North Dakota Game & Fish Department	Steve Dyke	No Comment
North Dakota Game & Fish Department	Dave Fryda	No Comment
North Dakota Game & Fish Department	Bruce Kreft	No Comment
North Dakota Game & Fish Department	Kent Luttschwager	No Comment
North Dakota Game & Fish Department	Fred Ryckman	No Comment
North Dakota Game & Fish Department	Greg Link	Proximity to designated critical piping plover habitat.
North Dakota Industrial Commission	Bruce Hicks	No Comment
North Dakota Industrial Commission	Lynn Helms	No Comment
North Dakota Parks & Recreation Dept.	Kathy Duttenhefner	No Comment
North Dakota Parks & Recreation Dept.	Jesse Hanson	No Comment
North Dakota Petroleum Council	Ron Ness	No Comment
North Dakota State Historical Society	Susan Quinnell	No Comment
North Dakota State Land Department	Mike Brand	No Comment
North Dakota State Office	Mary Podoll	No Comment
North Dakota State Water Commission	John Paczkowski	No Comment
North Dakota Tourism Division	Sarah Otte-Coleman	No Comment
North Dakota Wildlife Federation	Mike McEnroe	Contamination of Lake Sakakawea, impacts to recreational value, designated piping plover habitat.
Office of Surface Mining Reclamation	Jeffery Fleischman	No Comment
Parshall Bay Recreation Area		No Comment
Pheasants Forever	Hal Swearson	No Comment
Public Lands Advocacy	Claire Mosley	No Comment
Rutland Sportsman	Andy Hoflen	No Comment
Sierra Club, North Dakota Office	Blaine Nordwall	No Comment
Sierra Club, Teddy Roosevelt Group	Wayde Schafer	No Comment
Theodore Roosevelt National Park	North Unit Distric Staff	No Comment
Theodore Roosevelt National Park	Wendy Ross	No Comment
U.S. Army Corps of Engineers	Dan Cimarosti	Requested information on bore alignments to determine if a Section 10 permit would be required. Information was provided; permit not required.
U.S. Army Corps of Engineers	Patricia McQueary	Section 10/Section 404 permit would not be required.
U.S. Fish and Wildlife Service	Kevin Shelley	BA/BO
USDA Forest Service McKenzie Ranger District	Ron Hecker	No Comment

Name/Agency	Authority	Result
U.S. Department of Agriculture	Wade Bott	Wetlands be avoided.
Van Hook Resort		No Comment
Watford City Wildlife Club	LeRoy DeFoe	No Comment
Wild West Institute	Jeff Juel	No Comment
Williams County Board of Commissioners	Roger Chinn	No Comment
Williams County Water Resource Board	Corey Paryzek	No Comment

6.0 LIST OF PREPARERS AND REVIEWERS

Table 6-1. Document Preparers

Name	Title	Responsibility for the Following Section(s) of the Document
Jeff Towner, SWCA Environmental Consultants	Consultant for the operator	Environmental Documentation
Ashley Persinger, SWCA Environmental Consultants	Consultant for the operator	Project Manager/Field Surveys
Mike Sobiech, SWCA Environmental Consultants	Consultant for the operator	GIS Documentation
Juniper Archaeology, LLC	Consultant for the operator	Cultural Resource Documentation

Table 6-2. List of Agency Reviewers

Reviewer	Title	Assignment	Initials and Date
Tim Zachmeier	Wildlife Biologist	Wildlife Resources	
Annette Neubert	Archaeologist	Cultural Resources	
Paul Kelley	Natural Resource Specialist	NEPA, Recreation, VRM, Invasive Species	

An interdisciplinary team contributed to this document in accordance with guidance provided in Part 1502.6 of the Council on Environmental Quality regulations. This document was drafted by SWCA under the direction of the BLM. Information was compiled from various sources within SWCA.

SWCA Environmental Consultants

- Ashley Persinger, Natural Resources Project Manager
  Prepared the EA, attended meetings
- Dillon Belisle, Natural Resources Field Lead
  Conducted natural resource surveys
- Jeff Towner, Natural Resources Team Lead, Senior Reviewer
  Reviewed and edited the EA
- Mike Sobiech, Geographic Information System Specialist
  Created maps and spatially derived data

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8.0 ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AAQS	ambient air quality standards
ADT	average daily traffic
APD	Application for Permit to Drill
AQRV	air quality related value
BGEPA	Bald and Golden Eagle Protection Act
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practice
CAA	Clean Air Act
CFR	Code of Federal Regulations
CH_4	methane
CIAA	cumulative impact analysis area
CO	carbon monoxide
CO_2	carbon dioxide
COA	Conditions of Approval
CO_2e	equivalent carbon dioxide
CWA	Clean Water Act
EA	environmental assessment
EIS	environmental impact statement
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
EPS	Economic Profile System
ESA	Endangered Species Act
FBE	fusion bonded epoxy
FONSI	Finding of No Significant Impact
FEL	from the east line
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FNL	from the north line
FPPA	Farmland Protection Policy Act
FSL	from the south line
FWL	from the west line
GHG	greenhouse gas
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HF	hydraulic fracturing
IRR	Indian Reservation Roads
km	kilometer
MHA Nation	Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara Nation
N	North
NAAQS	National Ambient Air Quality Standards
NDDA	North Dakota Department of Agriculture
NDDH	North Dakota Department of Health

NDDOT	North Dakota Department of Transportation
NDIC	North Dakota Industrial Commission
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NWI	National Wetlands Inventory
O_3	ozone
PM	particulate matter
PM_{10}	particulate matter 10 microns or smaller
$PM_{2.5}$	particulate matter 2.5 microns or smaller
ppm	parts per million
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
R	Range
Reservation	Fort Berthold Indian Reservation
ROW	right-of-way
SCADA	supervisory control and data acquisition
Slawson	Slawson Exploration Company, Inc.
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SVR	standard visual range
SWCA	SWCA Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
T	Township
TAT	Three Affiliated Tribes
TERO	Tribal Employment Rights Ordinance
THPO	Tribal Historic Preservation Officer
TRNP	Theodore Roosevelt National Park
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
W	West

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APPENDIX A

Project Plats and Diagrams

APPENDIX B

Project Maps

APPENDIX C

Slawson Exploration Company, Inc., Spill Contingency Plan

APPENDIX D
MHA THPO Consultation Letter

APPENDIX E

Biological Assessment and U.S. Fish and Wildlife Service Letter of Concurrence

APPENDIX F

General Scoping Letter and Responses