

**PLAN OF DEVELOPMENT**  
**MONETA DIVIDE GAS AND OIL DEVELOPMENT PROJECT**

**JUNE 22, 2012**

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# 1 INTRODUCTION

Encana Oil & Gas (USA), Inc. (Encana) and Burlington Resources Oil and Gas Company, LP (Burlington) (the Proponents) propose to develop oil and gas resources in an area including, and immediately adjacent to, the Madden Oil Field located in central Wyoming (Project Area). The proposed oil and gas development project is herein referred to as the Moneta Divide Natural Gas and Oil Development Project (Moneta Divide Project).

The Project Area is located approximately 40 miles northwest of Riverton, Wyoming, includes the towns of Lysite and Lost Cabin, Wyoming, and covers approximately 265,152 acres of federal, state, and private lands located in Fremont and Natrona counties. Federal lands, consisting of about 167,782 acres (63%), are administered by the U.S. Bureau of Land Management (BLM) Lander (LFO) and Casper (CFO) Field Offices. Wyoming State lands, consisting of about 26,615 acres (10%), are administered by the Wyoming Office of State Lands & Investments. The remaining 70,755 acres (27%) of the Project Area are privately held. These lands consist of all, or portions of, 414 sections in Township 36 North to Township 39 North, and Range 88 West to Range 92 West of the 6th Principal Meridian (see Figure 1).

Encana and Burlington each have differing unit agreement obligations, technological preferences, development objectives, and geologic conditions prevailing in their specific land positions. At the same time, numerous common elements exist between the requirements of each Proponent. As much as possible these common elements will be addressed together. Where elements differ, these will be addressed separately.

Approximately 820 oil and gas wells have been drilled to-date within the Project Area. The current plan, subject to change as conditions warrant, is to drill a maximum of 4,250 wells over fifteen years, at an average rate of 280 to 300 wells per year. Associated construction will generally include well pads, access roads, pipelines, compressor stations and ancillary facilities. The total number of wells drilled, as well as the annual drilling rate, will depend largely on factors beyond the Proponent's control, such as new geologic information and associated successes, engineering technological development, national and international economic factors, regulatory permitting, availability of equipment and a trained workforce, performance of commodity markets, contract lease, and unit stipulations and restrictions. Encana plans to drill 4,100 wells, and Burlington plans to drill 150 wells, of the total proposed wells on their respective acreage within the Project Area. Most wells will be drilled vertically on single well locations. Some wells will be drilled directionally from multi-well surface locations, to accommodate topographic, geologic, environmental, or other design constraints.

Section 2 of this plan describes the design features and Standard Operating Procedures (SOPs) common to both the Encana and Burlington development plans. Section 3, describes design features specific to Encana, and Section 4 describes design features specific to Burlington.

For all project components, the estimated initial surface disturbance within the Project Area is estimated to be 26,491 acres (less than 10 percent) of the project surface acreage. After completion of final reclamation, surface disturbance within the Project Area will be reduced to an estimated 8,611 acres (approximately 3 percent) of the total project area needed for wells, maintenance, and production-related facilities. Outside the Project Area initial surface disturbance is estimated to be 3,121 acres which will reduce to 1,927 after reclamation. Encana recognizes that BLM will be required to analyze the potential impacts of activities inside and outside of the Project Area, thus the Project Area combined with the areas outside of the Project Area that will be impacted by proposed operations shall be known as the Analysis Area.

## **2 DESIGN FEATURES AND STANDARD OPERATING PROCEDURES COMMON TO ALL DEVELOPMENT PLANS**

### **2.1 General Requirements**

Proposed project development will require the appropriate level of environmental review in accordance with applicable federal, state, and local regulations. Where determined by the BLM Administrative Officer (AO), areas to be disturbed will require inventories and/or special studies to determine the extent of site-specific impacts and appropriate mitigation. Removal and disturbance of vegetation will be minimized to the extent that it is safe and practical through construction site management (*e.g.*, using previously disturbed areas and existing easements, limiting equipment/materials storage yard and staging area size, etc.)

The following sections address Federal lands and minerals specifically except where otherwise noted. On Wyoming State land/minerals, or private lands/minerals, procedures and activities would be adapted to comply with any differing regulations or requirements as appropriate.

### **2.2 Preconstruction Activities**

Prior to the start of construction activities, the Proponents will

- stake and survey the location and access road;
- submit a Notice of Staking or APD and ROW application(s), as applicable, to the BLM;
- participate in an on-site evaluation;
- submit site-specific applications (*e.g.*, 12-Point Surface Use Plan) and modify them, as needed;
- submit detailed construction plans, as needed; and
- perform surveys for cultural resources, biological resources, and/or other resources, as required.

#### ***2.2.1 Application for Permit to Drill or Notice of Staking***

For wells with underlying federal minerals, all Proponents will obtain a permit from the BLM before surface-ground disturbance takes place. To initiate the permitting process, the Proponents will file either a Notice of Staking or an APD. These documents will be filed with the Casper or Lander FO as appropriate. The BLM will process applications and confirm that they meet all requirements.

#### ***2.2.2 On-site Inspections and Conditions of Approval***

Prior to APD approval, but after the proposed location and access road are staked, on-site review inspections will be conducted for every well drilled on federal minerals or surface, to assess potential impacts and determine methods to mitigate impacts and establish them as Conditions of Approval (COAs) attached to the APD. The objectives of the on-site inspection are to review the proposed location, well access road, and pipeline route in consideration of the topography, location of topsoil/subsoil stockpiles, natural drainage and erosion control, flora, fauna, habitat, historical and cultural resources, paleontological resources, and any other surface issues that may become apparent. The attendees of the on-site inspection can include representatives of the Proponents; a survey crew; the private landowner, if applicable; representatives of non-BLM cooperating regulatory agencies; and representatives of the relevant BLM FO staff.

Site-specific COAs identified by the BLM are subsequently incorporated into the APD. Environmental protection measures address all aspects of oil and gas development including construction, drilling, production and reclamation, and abandonment. Appropriate changes or modifications are made only if needed to avoid or mitigate impacts to resources such as drainages, archaeological sites, threatened and endangered species, BLM sensitive species, wildlife, and/or areas with seasonal timing restrictions. Excess cut and fill and other issues are also addressed, as appropriate.

### **2.2.3 Site-specific Applications and Plans**

A technically and administratively complete APD normally consists of a 12-Point Surface Use Plan, a 9-Point Technical (Drilling) Plan, evidence of bond coverage, and accompanying information/exhibits/maps required by the BLM. A Surface Use Plan contains information that describes construction operations, access roadways and pipeline corridors, water supply and haul route, well site layout, production facilities, waste disposal, and restoration/revegetation or reclamation associated with the site-specific well development proposal. The drilling plan typically includes information that describes the technical aspects of the specific proposal for drilling, including subsurface resource protection, and royalty accountability. Determination of the suitability of the Proponents' design, construction techniques, and procedures is made by the BLM during the permitting review process. Individual road design plans for new and/or improved roads will be submitted for approval as components of APDs or ROW permits.

## **2.3 Construction Activities**

Construction or surface-disturbing activities typically will occur during daylight hours and only after approval of an APD by the BLM. Infrequent circumstances could require construction to occur on either side of daylight hours.

### **2.3.1 Pipelines and Communication Lines**

Pipeline ROWs will be located to minimize soil disturbance. Pipelines will be located adjacent to existing linear facilities wherever practical. Mitigation will include locating pipeline ROWs adjacent to access roads to minimize ROW disturbance widths, or routing pipeline ROWs directly to minimize disturbance lengths. Clearing of pipeline and communication line ROWs will be accomplished with the least degree of disturbance to topsoil. Where topsoil removal is necessary, it will be stockpiled (wind-rowed) and re-spread over the disturbance after construction and backfilling are completed. Vegetation removed from the ROW will also be required to be re-spread to provide protection, nutrient recycling, and a seed source.

Temporary disturbances which do not require major excavation (*e.g.*, small pipelines and communication lines) may be stripped of vegetation to ground level using mechanical treatment, leaving topsoil intact and root mass relatively undisturbed.

To promote soil stability, compaction of backfill over the trench will be required (not to extend above the original ground level after the fill has settled). Wheel or other methods of compacting the pipeline trench backfill will be performed in two "lifts" (levels) to reduce trench settling and water channeling; the first compaction after 3 feet of fill has been replaced, and the subsequent compaction within 6 to 12 inches of the surface. Water bars, mulching, and terracing will be required, as needed, to minimize erosion. In-stream protection structures (*e.g.*, drop structures) may be required in drainages crossed by a pipeline to prevent erosion. Fencing of linear disturbances near livestock watering areas may be required temporarily.

On ditches exceeding 24 inches in width, 6 to 12 inches of surface soil will be salvaged where possible on the entire ROW. When pipelines and communication lines are buried, there will be at least 30 inches of

backfill on top of the pipe. Backfill should not extend above the original ground level after the fill has settled. Guides for construction and water bar placement are found in the most current version of the BLM's *Surface Operating Standards for Oil and Gas Exploration and Development (4th Edition, Revised 2007)*, or the "Gold Book." Bladed surface materials will be re-spread upon the cleared route once construction is completed. Disturbed areas that have been reclaimed may need to be fenced when the route is near livestock watering areas.

Channel crossings by pipelines will be constructed so that the pipe is buried at a depth sufficient to ensure the pipeline does not become exposed, as dictated by site-specific conditions. Channel crossings by roads and pipelines will be constructed perpendicular to flow whenever possible. Streams/channels crossed by roads will have culverts installed at all appropriate locations as specified in the *BLM Manual 9100—Facilities Planning, Design, and Construction* (BLM 2008) and *Manual 9113—Roads* (BLM 2011); *BLM Handbook 9113 Road Design* (BLM 2011). Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.

Wetland areas will be crossed during dry conditions when possible (*i.e.*, late summer, fall, or dry winters); winter construction activities will occur only prior to soil freezing or after soils have thawed whenever possible. Operators will obtain necessary approval from the U.S. Army Corps of Engineers.

Where applicable and/or required by law, streams at pipeline crossings will be protected from contamination by pipeline shutoff valves or other systems capable of minimizing accidental release. If drilling reserve pit leakage is detected, operations at the site will be curtailed, as directed by the BLM, until the leakage is corrected.

### **2.3.2 Roads**

Existing roads will be incorporated into access road planning to the maximum extent practicable and upgraded as necessary. Roads will be located adjacent to existing linear facilities wherever practical. Main artery roads, regardless of primary user, will be crowned, ditched, drained, and, if deemed appropriate by the BLM AO, surfaced with gravel.

Individual road design plans for new and/or improved roads will be submitted for approval as components of APDs or ROW permits. Plans must be approved prior to initiation of work. Operators will schedule a review of plans with sufficient time to obtain BLM approval prior to commencement of work. All development activities along approved ROWs will be restricted to areas authorized in the approved ROW.

Design, construction, and maintenance of the road will be in compliance with the standards contained in *BLM Manual 9113—Roads* (BLM 2011), and in the latest version of the Gold Book (BLM 2007). New main artery roads will be designed to reduce sediment, salt, and phosphate loading to Class I waters. Running surfaces of the roads will be graveled where necessary, such as when the base does not already contain sufficient aggregate.

To control or reduce sediment from roads, BLM will provide guidance involving proper road placement and associated construction practices. Construction may also be prohibited during periods when soil material is saturated, frozen, or when watershed damage is likely to occur. BLM will require in-use roads to be redesigned or closed when unnecessary or undue environmental impacts (such as sedimentation) have not been alleviated through use of other mitigations and where the detrimental impacts of the existing road outweighs the impacts associated with new surface disturbance to rebuild the road.

Available topsoil will be stripped from all road corridors prior to commencement of construction activities and will be redistributed and reseeded on backslope areas of the borrow ditch after completion

of road construction activities. Borrow ditches will be reseeded in the first appropriate season after initial disturbance.

On newly constructed roads and permanent roads, the placement of topsoil, seeding, and stabilization will be required on all cut-and-fill slopes unless prohibited by existing conditions (*e.g.*, rock). No unnecessary side-casting of material (*e.g.*, maintenance) on steep slopes will be allowed. Snow removal plans may be required so that snow removal does not adversely affect reclamation efforts or resources adjacent to the road.

Crossings of ephemeral, intermittent, and perennial streams associated with road and utility line construction will be restricted when reasonable and practicable until after spring runoff and normal flows are established. At the discretion of the BLM AO, road construction may be required to be monitored by a qualified individual agreed to by the BLM AO and the operator. Compaction of the sub-grade with water and heavy equipment to a density higher than the surrounding subsurface is required during construction.

Operators will comply with existing federal, state, and county requirements and restrictions to protect road networks and the traveling public. The operator will regularly maintain all lease roads in a safe, usable condition. A regular maintenance program will include, but not be limited to, blade grading, ditching, culvert installation, drainage installation, surfacing, and cattle guards, as needed.

As deemed necessary by the BLM AO, operators and/or their contractors will post appropriate warning signs and require project vehicles to adhere to appropriate speed limits on project-required roads.

Construction-related activity shall be restricted to approved routes. Cross-country vehicle travel shall not be permitted. Project-related travel will be limited to only that necessary for efficient project operation during periods when soils are saturated and excessive rutting could occur. Truck traffic will not be allowed under conditions where the total volume of traffic creates ruts of 3 inches or greater on roads that are not graveled or otherwise approved for all-season use.

Where deemed necessary and effective by the BLM AO, locked gates will be installed on oil field roads (with structures added to prevent drive-around) to reduce traffic and protect other resources (*e.g.*, wildlife, cultural resources, etc.) from impacts caused by increased vehicle traffic and human presence. The need and location of locked gates will be determined during the transportation planning process. The selective use of locked gates, where practicable, could be used to protect significant cultural sites found during inventories. This approach is more commonly used as a seasonal restriction to protect wildlife during winter months, but some applications may also present themselves from a cultural resources standpoint.

### **2.3.3 Well Drilling and Completion**

All drilling operations would be conducted in compliance with all applicable Federal Oil and Gas Onshore Orders, Wyoming Oil and Gas Conservation Commission (WOGCC) rules and regulations, and all applicable county/municipality/participating agency rules and regulations. In the Proponents' proposal, each operator will fully evaluate existing data to consider the mitigating effects of reduced surface disturbance and the possibility of directional drilling, especially in the area around the Bridger Trail to maintain compliance with the applicable Memorandum of Agreement (MOA).

Construction of well pads typically will begin with stripping and stockpiling topsoil according to a previously defined, site specific, reclamation plan. During frozen ground conditions, a rotomill would be used, as needed, to separate topsoil from subsoil. Topsoil (suitable for plant growth) will be removed per plan requirements from areas to be disturbed, and stockpiled in a designated area, usually adjacent to the pad. The stockpiled topsoil will be seeded (with interim seed mixes specified and discussed in Section 2.4, Interim Reclamation) and left in place for use in reclamation at the end of the life of the well. Track-

mounted and rubber-tired bulldozers, scrapers, and road graders will then grade and level the site. Water will be used to control dust during construction. The well pad will be constructed so that the drilling rig sits on solid ground (cut material) and not on fill. This location procedure ensures that the foundation of the drilling substructure does not lean or topple due to settling of soil.

Although tank-based drilling mud systems are encouraged in BLM Instructional Memorandum WY-2012-007, field experience has shown that tanks are often insufficient to contain influxes of large volumes of shallow artesian water encountered while setting surface casing for wells in the Project Area. The resulting overflow conditions can create violations of the WDEQ *General Permit for Surface Discharge*. To avoid this situation, drilling reserve pits will usually be required to contain potentially large volumes of water entering the drilling rig mud system while setting surface casing.

Drilling reserve pits will be approximately 100 feet by 80 feet by 10 feet deep, and will be constructed in cut rather than fill material whenever practicable. Tank systems will be used only when cut material locations are deemed infeasible. To prevent loss of drilling fluids, drilling reserve pits will be lined with a synthetic reinforced liner a minimum of 16 mils thick, with sufficient bedding used to cover rocks. The liner will overlap the drilling reserve pit walls and will be covered with dirt and/or rocks to hold it in place. No trash or scrap capable of puncturing the liner will be placed in the drilling reserve pit. In some instances, removal of bedrock through pulverizing may be required to construct the drilling reserve pit. Drilling reserve pits may be divided into compartments separated by berms for the proper management of derived waste (e.g., drill cuttings, mud, and produced water).

Drilling a typical well will require transport of approximately 35 truckloads of drilling-related equipment and materials to facilitate the operation, depending on the development area. This includes transportation of the drill rig, drill pipe, drilling fluid products, and related support equipment but does not include the truck traffic required for resupplying the operation (e.g., fuel, drilling fluid additives, etc.). The extent of additional traffic will depend on the phase of the drilling operation, but would not include more than six or seven vehicles per day per drill site throughout the drilling operation.

Completion operations will use flare-less flow back technologies to reduce NO<sub>x</sub> and VOC emissions for all traditional wells; flare-less flowback may not be practical or possible for wells drilled to the deeper, Madison Formation. Well flow back will utilize closed vessels for high pressure separation of flow back products prior to production processing. Produced natural gas, liquids, oil, and water will be routed to appropriate pipelines, or tank storage on location. No flow back products will be routed to the drilling reserve pits except under upset/emergency conditions. Regular truck service will haul stored liquids offsite to sales or processing as appropriate.

Production equipment layout typically will include a series of valves designed to control pressures and regulate flows at the wellhead (Christmas tree), and a three-phase separator capable of segregating and measuring the natural gas, oil, and water. Once measured, the produced gas and fluids will flow through pipelines to central facilities.

Production resulting from well development activities will necessitate installation of production and gathering equipment at new locations. This equipment typically will include, but not be limited to, compressors, dehydrators, additional separators, and storage tanks. All long-term production facilities will be located on existing cut portions of the well pad. All tank batteries and facilities designed to contain fluids will be surrounded by containment dikes designed to contain a minimum of 110% of the contents of the largest vessel.

All tank batteries, treaters, dehydrators, and/or other production facilities installed on location, that have the potential to leak or spill oil, glycol, produced water, or other fluid constituting a hazard to public health or safety, would comply with all applicable Spill Prevention, Control and Countermeasure (SPCC)

regulations or prevailing federal and state regulations. Where applicable, SPCC plans will be in effect throughout drilling, completion, and production operations.

The SPCC plan outlines the methodology to be used in containing hydrocarbon spills and facilitating rapid cleanup of hydrocarbon spills. To prevent spilled hydrocarbon liquids from reaching ground, surface, or navigable waters, containment structures will be impervious to oil, glycol, produced water, or other liquid for a minimum of 72 hours and will be constructed so that spills from a primary containment, such as a tank or pipe, will not drain, infiltrate, or otherwise escape to ground, surface, or navigable waters before cleanup is completed.

Production locations will be constructed and operated in accordance with applicable Presumptive Best Available Control Technology (Presumptive BACT) requirements in accordance with Wyoming Department of Environmental Quality (WDEQ), Air Quality Division Chapter 6, Section 2. Emission controls for Volatile Organic Compounds (VOC) will be installed as required by WDEQ.

Notice of any spill or leakage, as defined in BLM Notice to Lessee 3A (NTL 3A), will be immediately reported by the operator to the BLM AO and other federal and state officials (*e.g.*, WDEQ) as required by law.

All above ground permanent facilities (*i.e.* facilities remaining longer than 90 days) will be painted a standard environmental color specified by the BLM (*e.g.*, Carlsbad Canyon, Covert Green) that blends with, but is slightly darker than, the surrounding landscape, except for structures that require safety coloration to comply with Occupational Safety and Health Administration (OSHA) regulations.

Production storage tanks, drilling reserve pits, and equipment staging areas will be located away from drainages to prevent potential contamination of surface waters. Drilling reserve pits will be constructed on the cut portion of the well pad and will maintain a minimum of 2 feet of freeboard. Only materials and wastes generated by oil and gas exploration, development, and production activities will be considered for disposal in the drilling reserve pit. In the event any hydrocarbon material is released into a drilling reserve pit, it will be removed as soon as possible by skimming or other appropriate means. Produced water from newly completed wells may be temporarily stored in the drilling reserve pit for up to 90 days as authorized by Oil and Gas Onshore Order No. 7. A sundry notice must be submitted and approved prior to drilling reserve pit closures and associated reclamation. Prior to the end of the 90 days, the operator shall submit the sundry notice for approval of a permanent water disposal method using the methods described below.

The Proponents will continue to meet or exceed BLM minimum standards of performance when conducting drilling and operations involving oil or gas that are known or could reasonably be expected to contain hydrogen sulfide (H<sub>2</sub>S), or that result in the emission of sulfur dioxide as a result of flaring H<sub>2</sub>S.

All new production facilities construction which has open-vent exhaust stacks will be equipped to prevent bird and bat entry or perching on the stack.

All secondary containment structures specifically used for methanol containment will be designed to prevent bird, animal, or livestock entry.

### **2.3.4 Water Supply**

Water for hydrostatic testing and drilling operations will be obtained from valid existing water rights, usually by groundwater pumping or treated produced water. The Proponents will voluntarily evaluate a wide range of options pertaining to the reuse/recycling of water for drilling and completion operations as

part of the APD process. If viable and/or alternative uses are identified and proven to be successful, the BLM may consider these as preferred design features.

Disposal of water (hydrostatic test water, storm water, produced water) will be conducted in conformance with WDEQ-Water Quality Division (WQD), BLM Onshore Oil and Gas Order No. 7, and WOGCC rules and regulations. Operators and pipeline contractors will comply with state and federal regulations for water discharged into established drainage channels. The rate of discharge will not exceed the capacity of the channel to convey the increased flow. Waters that do not meet applicable state or federal standards will be evaporated, treated, or disposed in accordance with WDEQ permits and regulations. Water Supply and Disposal are discussed in more detail under each Development Plan. All bare ground on a well pad that does not have active development (drilling, completion, and construction) and is not required for production activities will have at least 70% protective cover that may include but not be limited to organic mulch, herbaceous vegetation, jute matting, or other erosion-preventative fabric.

### **2.3.5 Waste Generation, Handling, and Disposal**

No extremely hazardous substances, as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), will be used, generated, stored, transported, or disposed in association with drilling, testing, or completion of wells. The appropriate management agencies (including BLM and WDEQ) will be notified as soon as possible after a release of a reportable quantity of a CERCLA Hazardous Substance, hydrocarbon liquid, or produced water is identified. Spills will be cleaned up as soon as practicable and contaminated material will be disposed in accordance with agency requirements. In accordance with 29 CFR 1910.1200, a Material Safety Data Sheet (MSDS) for every chemical brought on site will be kept on file at the operator's field office. Disclosure of materials used in completions operations would comply with all WOGCC regulations and applicable Federal regulations.

Should reportable quantities of chemicals on the EPA "Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act of 1986" (SARA Title III) be used, produced, stored, transported, or disposed of in association with drilling, testing, or completion of wells, all SARA Title III reporting requirements will be met. Chemical and hazardous materials will be inventoried and reported in accordance with the SARA Title III (40 CFR 335). If quantities exceeding 10,000 pounds or the threshold planning quantity are to be produced or stored, the appropriate Section 311 and 312 forms will be submitted at the required times to the State and County Emergency Management Coordinators and the local fire departments. Hazardous wastes, as defined by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, will be stored, transported, and treated/disposed in accordance with all applicable federal, state, and local regulations.

Hydrocarbon material remaining in the drilling reserve pit will be removed as soon as practicable and processed or disposed at an approved commercial treatment, storage, and disposal (TSD) facility. All remaining drilling fluids will be recycled or hauled to an approved commercial TSD facility. Cuttings generated during the drilling process will be buried in the drilling reserve pit following evaporation or removal of free liquids.

Operators will use WDEQ-approved portable sanitation facilities at drill sites; place warning signs near hazardous areas and along roadways; place dumpsters at each construction site to collect and store garbage and refuse; transport all refuse and garbage to a State-approved sanitary landfill for disposal; and institute a Hazard Communication Program for employees and require subcontractor programs in accordance with OSHA regulations (29 Code of Federal Regulations [CFR] 1910.1200).

## **2.4 Production and Maintenance**

### **2.4.1 Well Production Facilities**

Well production facilities will be installed as shown on the approved APD, with secondary containment structures built to conform with BLM, state, and other federal requirements. As described above, facilities on the well pad will typically include wellhead valves and piping; artificial lift, separation, dehydration, and metering equipment; oil and water production tanks, a methanol storage tank and pump, telemetry equipment, and cathodic protection equipment. Production equipment will be powered by natural gas or electricity. Telemetry equipment is currently used or planned for use by most operators to improve well evaluation, operational efficiency, and to minimize well visits. No production pits will be used. Flare-less completions technologies will be used (as described previously). Well site compression may be utilized on an as-needed basis.

Artificial lift equipment is installed when production volumes drop to a level that prevents efficient removal of liquids from the well bore using reservoir energy alone. Artificial lift is presently limited to the use of plunger lift equipment, which is a passive hydraulic means of removing liquids from the well bore and does not require any increase in the disturbed surface area. Gas lift, down-hole pumps, or other technology may also be employed.

All constructed or installed permanent structures (on site six months or longer) will be painted a flat, non-reflective earth-tone color as specified by the BLM. All new project facilities requiring painting will be painted within six months of installation.

### **2.4.2 Maintenance**

New wells typically will be visited daily or less frequently after well performance has stabilized and telemetry equipment is installed.

Road travel will be restricted to the width of the running surface of the road. Maintenance on project roads during drilling and construction will be the responsibility of the operators and will be consistent with the Transportation Plan, annual road plan, well-specific project plan, and BLM specifications. During the duration of the proposed project, the operators will monitor the project roads and perform appropriate repairs. Repairs may be necessary to correct excessive soil movement, rutting, braiding around problem areas, and/or damage to cattle guards or gates.

### **2.4.3 Workovers**

Workover of wells may be required to restore or enhance well performance. A well servicing rig is used for such operations to perform tasks such as well bore or surface equipment repairs, reservoir evaluation, or stimulation treatments to restore or enhance well performance. Workover operations are typically performed during daylight hours and are of short duration; however, depending on the scope of the work to be performed, workover operations can sometimes take from several days to several weeks to be completed. Workover operations typically require from five to 10 workers on location at any given time unless fracture stimulation is required. During fracture treatments, an additional 10 to 20 individuals could be present on location. Additional surface disturbance is rarely necessary to conduct workover operations. Approval from the BLM Authorized Officer (AO) will be requested should the need for new surface disturbance arise as required by 43 C.F.R. §§ 3162.3-2, 3162.3-3.

## 2.5 Reclamation

An approved WDEQ Storm Water Pollution Prevention Plan (SWPPP) is required prior to construction of the location. This plan requires frequent monitoring of all active sites, including reclaimed sites. Sites are monitored for erosion and BMPs are implemented to prevent erosion in potential areas. Once vegetation has reached 70% coverage in reference to background, the site is eligible for release. This provides an excellent method to monitor the success of the reclamation. If deemed necessary, the area may be reseeded to assist in controlling erosion.

The operator, grantee, or lessee will be responsible for the control of all noxious weed infestations on surface disturbances attributable to oil and gas operations and coordinating with the local weed and pest control district, as necessary. Prior to any treatment, the operator, grantee, or lessee will be responsible for submission of Pesticide Use Proposals and subsequent Pesticide Use Reports. Control measures will adhere to those allowed in the Final *Programmatic EIS Vegetation Treatments Using Herbicides On Bureau of Land Management Lands In 17 Western States* (June 2007) and Record of Decision (ROD) (September 2007), or the Regional Northwest Area Noxious Weed Control Program EIS (U.S. Department of the Interior 1987). Herbicide approvals and treatments will be monitored by the BLM AO. Aerial application of chemicals will be prohibited within 0.25 mile of special status plant locations, and hand application will be prohibited within 500 feet.

### 2.5.1 Interim Reclamation

The interim reclamation process will follow BLM 2007 Gold Book (and other applicable standards), which require that the size of the initial disturbance at each drilling location be reduced by approximately 25% following the completion of a well and subsequent installation of production equipment. However, variations in the final disturbance can result from surrounding topography constraints. Key steps in the process are as follows:

- Netting or other appropriate avian deterrents are installed at the drilling reserve pit.
- All hydrocarbons are skimmed from the surface of the drilling reserve pit.
- Liquids within the drilling reserve pit are evaporated using spray systems or solidified in place.
- Pits are backfilled and location is re-contoured to blend with surrounding topography.
- Topsoil is replaced on re-contoured ground according to interim reclamation plan.
- Location is re-vegetated as specified in the approved APD.

Appropriate avian deterrents will be installed at both the freshwater and cuttings sides of the drilling reserve pits to comply with requirements of the Migratory Bird Treaty Act. These could include but would not be limited to netting or “bird avert” systems to discourage and prevent birds from landing in the drilling reserve pit. Drilling reserve pits will be checked regularly to confirm that deterrents are in place and operative.

Any hydrocarbons present in the drilling reserve pits will be removed as soon as possible by skimming with a vacuum truck. Non-hydrocarbon liquids within the drilling reserve pits will be evaporated using a spray system to mist the liquid to expedite the evaporation process. Spray systems will be monitored daily to confirm that all liquids remain within the area of disturbance. If windy conditions cause liquids to leave the drilling reserve pit, the systems are shut off. Once liquids have been removed, the drilling reserve pits will be backfilled and the location re-contoured. Re-contouring will use original materials excavated during pad construction. Slopes will be reduced to grades less than 25% during final re-contouring.

Oil and gas exploration and production wastes, such as drilling fluids and cuttings, have been exempted by Congress and by the U.S. Environmental Protection Agency (EPA) from federal regulation under RCRA Section 3001(b)(2)(A) and Section 8002(m). Management of potentially hazardous substances is, however, regulated under various federal and state codes, such as CERCLA, RCRA, SARA, the Clean Water Act, BLM Onshore Oil and Gas Orders, the National Pollutant Discharge Elimination System, an SWPPP, and WOGCC regulations and licensing.

Prior to reclamation of any drilling reserve pit, an on-site meeting shall be held between the operator, surface owner, and BLM to determine drilling reserve pit closure procedures. In addition, a composite sample of the cuttings shall be analyzed using the Toxic Characteristic Leaching Procedure (TCLP) (see 40 CFR 261–Appendix II) for the presence of heavy metals. The sample also shall be tested for chlorides and Total Petroleum Hydrocarbons (TPH). If the analysis shows toxicity levels above regulatory levels established by EPA or WDEQ, a plan for disposal and/or treatment of the cuttings shall be submitted to the AO for approval.

Requirements of the site-specific and applicable “field-wide” interim reclamation plan will be followed, including replacement of any topsoil, re-contouring of the location, and other required measures. Surface land within the anchor pattern—typically an area measuring about 175 × 175 feet will remain in use until the end of the well’s productive life, and will be reclaimed during plugging and abandonment. The lifespan of individual wells vary; however, the typical life span of a well is estimated to be approximately 40 years.

A seed mixture is usually listed in the COA attached to the approved APD. In most cases, each location has a specified mixture to be used. Only certified seed is used and only at the approved application rate. The current practice is to drill the seed in using a “no-till” rangeland drill. In areas that are too steep to drill, the seed is broadcasted through varying appropriate methods at a rate that is two times the drilled rate. After the seed is broadcasted, it is covered by raking or through use of a drag.

All bare ground on a well pad that does not have active development (drilling, completion, and construction) and is not required for production activities will have at least 70% protective cover that may include but not be limited to organic mulch, herbaceous vegetation, jute matting, or other erosion-preventative fabric. On producing locations, operators will be required to reduce slopes to near original contours. Areas not used for production purposes will be backfilled and blended into the surrounding terrain, reseeded, and erosion control measures installed. Erosion control measures will be required after slope reduction. Facilities will be required to approach zero runoff from the location. Mulching, erosion control measures, and fertilization may be required to achieve acceptable stabilization.

Reclamation activities will begin on disturbed wetland areas immediately after completion of project activities. Streams, wetlands, and riparian areas disturbed during project construction will be restored to as near pre-project conditions as practical and, if impermeable soils contributed to wetland formation, soils will be compacted to reestablish impermeability. Wetland topsoil will be selectively handled.

## **2.5.2 Final Reclamation**

BLM will require each individual ROW, APD, or other application to include a reclamation plan approved by the BLM. Where appropriate, operators will consult with private surface owners within the Project Area and coordinate reclamation efforts to accommodate and meet the expectations and requirements of private surface owners. Current BLM policy recognizes that there may be more than one correct way to achieve successful reclamation, and a variety of methods may be appropriate to varying circumstances encountered within in the Project Area. The operators assume that BLM will continue to allow applicants to use their own expertise in recommending and implementing construction and

reclamation projects. These allowances would still hold the applicant responsible for final reclamation standards of performance. In general, final reclamation will include the following:

- Upon completion of construction and/or production activities, operators will restore the topography, disturbed channel beds, to near pre-existing contours at well sites, access roads, pipelines, and other facility sites.
- Disturbances will be reclaimed or managed to approach zero sediment discharge. All excavations and drilling reserve pits will be closed by backfilling and contouring to conform to surrounding terrain. On well pads and larger locations, the surface use plan will include objectives for successful reclamation including: soil stabilization, plant community composition, and desired vegetation density and diversity.
- Abandoned sites must be satisfactorily rehabilitated in accordance with a plan approved by the BLM. Soil samples may be analyzed to determine reclamation potential, appropriate reseeding species, and nutrient deficits. Tests may include: pH, mechanical analysis, electrical conductivity, and sodium content. Terraces or elongated water breaks will be constructed after slope reduction.
- All reclamation is expected to be accomplished as soon as practicable after the disturbance occurs with efforts continuing until a satisfactory revegetation cover is established and the site is stabilized.
- On all areas to be reclaimed, seed mixtures will be required to be site-specific, composed of native or other appropriate species, and will be required to include species promoting soil stability. Livestock palatability and wildlife habitat needs will be given consideration in seed mix formulation along with other Federal, State, and local guidelines for seeding.
- Interseeding, secondary seeding, or staggered seeding may be required to accomplish revegetation objectives. During rehabilitation or areas in important wildlife habitat, provision will be made for the establishment of native species, if determined to be beneficial for the habitat affected. Follow-up seeding or corrective erosion control measures may be required on areas of surface disturbance which experience reclamation failure.
- Mulch and mineral material (sand and gravel) used will be certified weed-free and free from mold or fungi. Mulch may include native hay, small grain straw, wood fiber, live mulch, cotton, jute, synthetic netting, and rock. Straw mulch should contain fibers long enough to facilitate crimping and provide the greatest cover.
- Operators will monitor noxious weed occurrence within the Project Area and implement a noxious weed control program in cooperation with the BLM and Fremont and Natrona counties to control the spread of noxious weeds. Weed-free certification by county extension agents will be required for grain or straw used for mulching re-vegetated areas. Gravel and other surfacing materials used for the Project will be reasonably free of noxious weeds.
- Herbicide applications will be kept at least 500 feet from known special status plant species populations or other distance deemed safe by the BLM AO.
- All oil and gas roads on federal lands not required for routine operation and maintenance of producing wells, ancillary facilities, livestock grazing administration, or necessary recreation access will be reclaimed as directed by BLM. These roads will be permanently blocked, re-contoured, reclaimed, and re-vegetated by the operators, as will disturbed areas associated with permanently plugged and abandoned wells.

- Reclamation of abandoned roads will include requirements for reshaping, re-contouring, resurfacing with topsoil, installation of water bars, and seeding on the contour. Road beds, well pads, and other compacted areas will be ripped to a depth of 2 feet on 1.5-foot centers to reduce compaction prior to spreading the topsoil across the disturbed area. Stripped vegetation will be spread over the disturbance for nutrient recycling, where practical. Fertilization or fencing of these disturbances will not normally be required. Additional erosion control measures (*e.g.*, fiber matting) and road barriers to discourage material transport may be required. As deemed necessary by the BLM AO, graveled roads, well pads, and other sites will be stripped of usable gravel and hauled to new construction sites prior to ripping. The removal of structures such as bridges, culverts, cattle guards, and signs usually will be required.

## 2.6 Abandonment

### 2.6.1 Well Plugging Abandonment

All oil and gas wells will be cased and cemented to protect subsurface mineral and freshwater zones. Unproductive wells and wells that have completed their intended purpose will be properly abandoned and plugged using procedures identified by the Office of State Oil and Gas Supervisor, Rules and Regulations of WOGCC and BLM.

## 2.7 Regulatory Requirements, BLM Policy Guidelines, Standard Operating Procedures and Applicant-Committed Best Management Practices for Resource Protection that are Common to All Operator Development Plans

Table 1 outlines the regulatory requirements, BLM policy guidelines, and standard operating procedures, as well as the applicant-committed BMPs for resource protection that are common to Encana and Burlington Development Plans. Additional resource protection methods by operator are detailed in each respective operator section (Sections 3, 4, and 5 of this document).

The regulatory requirements and BLM policy guidelines listed below are a reflection of SOPs and management policies currently being implemented within the Lander and Casper FO through various laws, regulations, Onshore Oil and Gas Orders, lease stipulations, resource management plan (RMP) decisions, and COAs. The operator is responsible for knowing and complying with all local, state, tribal and federal laws, regulations, and permitting requirements (*e.g.*, Clean Air Act, Clean Water Act). Specific state permits may be required when the state has primary authority, under federal or state law or regulation, to enforce the provision in question. Permits issued by federal agencies other than the BLM can include permit conditions that are more stringent than those presented below.

The applicant-committed BMPs listed below are those activities, procedures, and design features to which the operator has committed beyond the regulatory requirements, to minimize or eliminate impact on resources.

**Table 1. Regulatory Requirements, BLM Policy Guidelines, Standard Operating Procedures, and Applicant-Committed BMPs Common to All Operator Development Plans**

<b>AIR QUALITY</b>	
<b>Regulatory Requirements and BLM Policy Guidelines</b>	
43 CFR 3101.1-2 (as cited in CFO and LFO BMP lists)	During dry periods, all appropriate measures shall be taken to control fugitive dust. These measures may include, but are not limited to, the application of water or chemical dust suppressants.
<b>Applicant-committed BMPs</b>	
In accordance with Wyoming Air Quality Standards and Regulations Chapter 3, Section 2(f), the emission of fugitive dust will be limited by all persons handling, transporting, or storing any material to prevent unnecessary amounts of particulate matter from becoming airborne to the extent that ambient air standards described in these regulations are exceeded.	
Necessary air quality permits to construct, test, and operate facilities will be obtained from the WDEQ-Air Quality Division. All internal combustion equipment will be kept in good working order.	
Operators will comply with all applicable local, state, tribal, and federal air quality laws, statutes, regulations, standards, and implementation plans, including Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS).	
<b>CULTURAL RESOURCES</b>	
<b>Regulatory Requirements and BLM Policy Guidelines</b>	
RMP Appendix 2, 43 CFR 3101.1-2 (as cited in CFO and LFO BMP lists)	The Operator shall avoid known cultural properties where possible for all surface-disturbing activities conducted in connection with a federal action.
RMP Appendix 2, 43 CFR 3101.1-2 (as cited in CFO and LFO BMP lists)	When a proposed discretionary land use has potential for affecting the characteristics which qualify a cultural property for the National Register of Historic Places, mitigation will be considered. In accordance with Section 106 of the National Historic Preservation Act (NHPA), procedures specified in 36 CFR 800 will be used in consultation with the Wyoming State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required
43 CFR 3101.1-2 (as cited in CFO and LFO BMP lists)	The BLM and the Operator shall pursue the renewal of the prehistoric cultural resources protection MOA. In the interim the Operator will continue to implement measures to identify, evaluate, and protect prehistoric cultural resources according to existing MOAs.
43 CFR 3101.1-2 (as cited in CFO and LFO FO BMP lists)	Any cultural and/or paleontological resource (historical or prehistoric site or object or fossil) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the BLM AO. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the AO. An evaluation of the discovery will be made by the AO to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures shall be made by the AO after consulting with the holder. An evaluation of the discovery will be made by the AO to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures shall be made by the AO after consulting with the holder.
<b>Applicant-committed BMPs</b>	
Operators will follow the NHPA Section 106 compliance process prior to any surface-disturbing activity and will either avoid or protect cultural resources properties.	
In culturally sensitive soils, if cultural resources are located within frozen soils or sediments precluding the ability to adequately record or evaluate the find, construction work will cease and the site will be protected for the duration of frozen soil conditions. Following natural thaw, recordation, evaluation, and recommendations concerning further management will be made to the BLM AO, who will consult with affected parties. Construction work will be suspended until management of the threatened site has been finalized.	

Should future work identify any traditional Native American religious or sacred sites, consultation among the BLM, the affected Native American group, the Wyoming SHPO and the project proponent will occur to resolve conflicts. This consultation will occur on a case-by-case basis.

Operators should inform their employees, contractors, and subcontractors about relevant federal regulations intended to protect archaeological and cultural resources. All personnel should be informed that collecting artifacts (including arrowheads) is a violation of federal law.

Equipment operators should be informed that a cultural resource could be found anywhere; and if they uncover a site during construction, surface-disturbing activities at the site must be immediately halted and the BLM notified.

Historical trails will be protected in accordance with the applicable MOA between each respective oil and gas operator and appropriate State of Wyoming and federal agencies.

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**HAZARDOUS SUBSTANCES, HAZARDOUS MATERIALS, AND HAZARDOUS WASTE DISPOSAL**

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**Regulatory Requirements and BLM Policy Guidelines**

29 CFR 1910.1200	A Material Safety Data Sheet for every chemical or hazardous material brought on-site will be kept on file at the Operator's field office
Regulations (40 CFR 335) implementing Title III, Superfund and Reauthorization Act of 1986 (42 USC 103)	Chemical and hazardous materials will be inventoried and reported in accordance with the SARA Title III (40 CFR 335). If quantities exceeding 10,000 lbs or the threshold planning quantity are to be produced or stored, the appropriate Section 311 and 312 forms will be submitted at the required times to the State and County Emergency Management Coordinators and the local fire departments.
EPA Resource Conservation and Recovery Act (42 USC 6901, et seq.) DOT (49 CFR 177)	Any hazardous wastes, as defined by the EPA Resource Conservation and Recovery Act of 1976, as amended, will be transported and/or disposed of in accordance with all applicable federal, state, and local regulations
EPA Spill Prevention Control and Countermeasure Regulations (40 CFR 112)	Owners or operators of onshore facilities (any facility of any kind, or drilling or workover rigs) that, due to their location, could reasonably be expected to discharge oil in harmful quantities (as defined in 40 CFR 110 and 40 CFR 112.3), into or upon navigable waters of the U.S. or adjoining shorelines, will prepare a SPCC Plan in accordance with 40 CFR 112.7. Owners or operators of drilling or workover rigs need not prepare a new SPCC Plan each time the facility is moved to a new site. The SPCC Plan may be a general plan, using good engineering practice (40 CFR 112.3(a), (b), and (c)). Owners or operators of a facility for which an SPCC Plan is required will maintain a complete copy of the Plan at such facility if the facility is normally attended at least eight hours per day, or at the nearest field office if the facility is not so attended (40 CFR 112.3(e)).

**Applicant-committed BMPs**

Operators will utilize WDEQ-approved portable sanitation facilities at drill sites; place warning signs near hazardous areas and along roadways; place dumpsters at each construction site to collect and store garbage and refuse; ensure that all refuse and garbage is transported to a State-approved sanitary landfill for disposal; and institute a Hazard Communication Program for its employees and require subcontractor programs in accordance with OSHA regulations (29 CFR 1910.1200).

SPCC Plans will be implemented and adhered to in a manner such that spills or accidental releases of oil will be remediated. An orientation will be conducted by the Operators to make project personnel aware of the potential impacts that can result from accidental spills, and that they know the appropriate response when a spill occurs. Where applicable and/or required by law, streams at pipeline crossings will be protected from contamination by pipeline shutoff valves or other systems capable of minimizing accidental release. If reserve pit leakage is detected, operations at the site will be curtailed, as directed by the BLM, until the leakage is corrected.

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**LIVESTOCK GRAZING**

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**Regulatory Requirements and BLM Policy Guidelines**

Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 ( <i>as cited in CFO and LFO BMP lists</i> )	All pits and open cellars will be fenced to limit access by livestock. Fencing will meet BLM specifications.
43 CFR 3101.1-2, 2 (as cited in CFO and LFO BMP lists)	To facilitate re-vegetation, the operator shall install a temporary fence around the outer disturbed perimeter of the well site. The fence shall conform to BLM standards and shall be maintained until successful re-vegetation as determined by the AO has occurred.

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**Applicant-committed BMPs**

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All range improvements (stock water tanks, pipelines, corrals, etc.) will be avoided by 500 feet unless no other alternative is available and impacts can be mitigated per the BLM AO and/or consent of the grazing lessee or surface owner as appropriate.

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**PALEONTOLOGICAL RESOURCES**

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**Regulatory Requirements and BLM Policy Guidelines**

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43 CFR 3101.1-2 (as cited in CFO and LFO BMP list)

**Reconnaissance:** The paleontologist will be on site at least one working day prior to initiating construction to conduct pre-construction reconnaissance activities. The paleontologist will notify the authorized officer prior to beginning reconnaissance activities. If potentially significant paleontological resources are identified during the reconnaissance, the paleontologist shall consult with the AO to determine if construction should be suspended. The AO will evaluate, or will have evaluated, such discoveries not later than five working days after being notified, and will determine what action shall be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse effects to significant paleontological resources will be made by the AO after consulting with the operator. The operator shall be responsible for the cost of any investigations necessary for the evaluation, and for any mitigative measures

**Monitoring:** Following results of the reconnaissance inventory, the paleontologist will monitor ground-disturbing activities in those areas identified as having the potential to contain buried paleontological resources. Construction methods shall be utilized which will allow the identification of paleontological resources without endangering the personnel monitoring the construction activities. If potentially significant paleontological resources are identified, and the paleontologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The AO will evaluate, or will have evaluated, such discoveries not later than five working days after being notified, and will determine what action shall be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse effects to significant paleontological resources will be made by the AO after consulting with the holder. The holder shall be responsible for the cost of any investigations necessary for the evaluation, and for any mitigative measures

A report of all paleontological activities will be submitted to the AO within 30 days of completion of the fieldwork.

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**Applicant-committed BMPs**

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If effects to paleontological values, objects of historical or scientific interest, are observed, the Operator will be required to immediately contact the BLM, and the Operator will be required to cease any operations that will result in adverse impact to or the destruction of these values.

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In areas where paleontological resources are likely to be found and disturbed by oil and gas operations, a determination will be made by the BLM as to whether a survey by a qualified paleontologist is necessary prior to the disturbance. In some cases, construction monitoring, project relocation, data recovery, or other mitigation will be required to protect significant paleontological resources during construction

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**RECREATION**

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**Applicant-committed BMPs**

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Operators will notify employees and contractors regarding restrictions for off-road vehicle activity by employees and contract workers to the immediate area of authorized activity or existing roads and trails.

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**SOILS AND GEOLOGY**

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**Regulatory Requirements and BLM Policy Guidelines**

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Decision Record 1020 RMP (as cited in CFO BMP list)

Minimize the disturbance to highly erosive soils. Proposed surface-disturbing activities will be modified (located) to avoid areas of highly erosive soils to the greatest extent practicable.

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Decision Record 1024 RMP (as cited in CFO BMP list)

Complete reclamation activities (final contouring, replacing topsoil, reseeding, and surface treatment) on all disturbed areas within three growing seasons.

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Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	To the extent practical, locations selected for surface-disturbing activities including but not limited to well sites, access roads, tank batteries, pits, pipelines, power lines, and compressor stations shall be planned to minimize long-term disruption of the surface resources and promote successful reclamation.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Interim reclamation shall be initiated on exposed soils on portions of the disturbance no longer needed for operations (e.g., cut-and-fill slopes, reserve pits, portions of well pads not needed for production operations) within one growing season of the time the disturbance is no longer needed for operations. Interim reclamation (i.e., site stabilization/soil retention seeding) shall be conducted on disturbed areas that are needed for future planned operations but will not be occupied for one or more growing seasons.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Prior to any surface-disturbing activity, topsoil depth will be determined and the appropriate amount of topsoil shall be stockpiled for future use. Prior to reseeding, the Operator shall re-spread topsoil to a uniform depth on all areas of the well site not needed for production operations. Where feasible, topsoil stockpiles will be designed to maximize surface area to reduce impacts to soil microorganisms.
RMP Appendix 2 (as cited in LFO BMP list)	No surface disturbance is permitted on slopes in excess of 25%.
LFO and CFO BLM lists (no source cited)	The Operator is responsible for all erosion control resulting from surface-disturbing activities.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Operator will avoid adverse impacts to soils by <ul style="list-style-type: none"> <li>• using appropriate erosion and sedimentation control techniques, including but not limited to silt fencing, riprap, and matting; and</li> <li>• applying biodegradable mulch, netting, or soil stabilizers.</li> </ul>
RMP Appendix 2, (as cited in LFO and CFO BMP lists)	No vehicle travel, construction, or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support vehicles and/or construction equipment as determined by the BLM AO. Vehicle travel must be confined to the approved access road and well pad at all times.
RMP Appendix 2, (as cited in LFO and CFO BMP lists)	Surface-disturbing activities are prohibited during periods when the soil is frozen, and watershed damage is likely to occur.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Prior to the application of topsoil and reseeding the Operator shall rip the soils to a depth of at least 12 inches to break up compaction.
Gold Book 4 <sup>th</sup> Edition, BLM 9113 Road Standards Manual, 43 CFR 3101.1-2 (as cited in CFO and LFO BMP lists)	All roads shall be constructed in accordance with the BLM 9113 Road Standards Manual and guidelines provided in the BLM Gold Book to prevent sediment movement off-site.

**Applicant-committed BMPs**

Site Stabilization:

- All bare ground on a well pad that does not have active development (drilling, completion, and construction) and is not required for production activities will have at least 70% protective cover that may include but not be limited to organic mulch, herbaceous vegetation, jute matting, or other erosion-preventative fabric.
- Access road(s) leading to the temporarily stabilized well pad will have protective cover to the same levels required on the well pad.

Where appropriate, operators will consult with private surface owners within the Project Area and coordinate reclamation efforts to accommodate and meet the expectations and requirements of private surface owners.

Disturbed channel beds will be reshaped to their approximate original configuration.

**VEGETATION**

**Regulatory Requirements and BLM Policy Guidelines**

Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	During reclamation, a variety of native forage species will be used to return disturbed areas to conditions similar to those that existed before the proposed project or to a desired plant community designated in the Natural Resources Conservation Service Ecological Site Description.
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Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 ( <i>as cited in LFO and CFO BMP lists</i> )	During interim reclamation, native plant species and natural revegetation are emphasized in the support of sustaining ecological functions and site integrity. Where reseeding is required, on land treatment efforts, emphasis will be placed on using native plant species. Seeding of non-native plant species will be considered based on local goals, native seed availability and cost, persistence of non-native plants and annuals and noxious weeds on the site, and composition of non-natives in the seed mix.
43 CFR 3101.1-2 (as cited in LFO and CFO BLM lists)	Any weeds resulting from disturbance associated with the proposed Project would be controlled in accordance with guidelines established by the EPA, BLM, or appropriate authorities. Prior to the use of any herbicide, the applicator must have a valid certified applicators license and have a current approved Pesticide Use Proposal (PUP) for the chemical being applied, submitted to and approved by BLM.

**Applicant-committed BMPs**

On all areas to be reclaimed, seed mixtures will be required to be site-specific, composed of native or other appropriate BLM-approved species, and will be required to include species promoting soil stability. Livestock palatability and wildlife habitat needs will be given consideration in seed mix formulation. BLM guidance for native seed use is BLM Manual 1745 (Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants), and Executive Order No. 11987 (Exotic Organisms).

Interseeding, secondary seeding, or staggered seeding may be required to accomplish revegetation objectives. During rehabilitation or areas in important wildlife habitat, provision will be made for the establishment of native species, if determined to be beneficial for the habitat affected. Follow-up seeding or corrective erosion control measures may be required on areas of surface disturbance which experience reclamation failure.

Any mulch and mineral material (sand and gravel) used will be certified weed free and free from mold or fungi. Mulch may include native hay, small grain straw, wood fiber, live mulch, cotton, jute, synthetic netting, and rock. Straw mulch should contain fibers long enough to facilitate crimping and provide the greatest cover.

Operators will monitor noxious weed occurrence on the Project Area and implement a noxious weed control program in cooperation with the BLM and Fremont and Natrona Counties to ensure noxious weed invasion does not become a problem. Weed-free certification by county extension agents will be required for grain or straw used for mulching re-vegetated areas. Gravel and other surfacing materials used for the Project will be reasonably free of noxious weeds.

Herbicide applications will be kept at least 500 feet from known special status plant species populations or other distance deemed safe by the BLM AO.

**VISUAL RESOURCES**

**Regulatory Requirements and BLM Policy Guidelines**

Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 ( <i>as specified in LFO and CFO BMPs</i> )	Excavations and other disturbed areas will be re-contoured to existing grades.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 ( <i>as specified in LFO and CFO BMPs</i> )	Every reasonable attempt will be made to allow for visual absorption of facility features into the background and to minimize sky lining of structures.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 ( <i>as specified in LFO and CFO BMPs</i> )	Roads, pipeline corridors, drill rigs, wellheads, and production facilities will be screened to the extent feasible, as specified by the BLM. All permanent aboveground structures that will remain longer than six months will be painted Covert Green (18-0617 TPX) or another standard color required by the BLM. This measure will not apply to structures that require safety coloration, as prescribed by OSHA.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 ( <i>as specified in LFO and CFO BMPs</i> )	Materials needed for resurfacing of the roadway and for installation of the production facilities will be purchased from suppliers having a permitted source of materials and will have a color blended to match the surrounding terrain.

**Applicant-committed BMPs**

Within Visual Resource Management (VRM) Class III and IV areas, the BLM and Operators will utilize existing topography to screen roads, pipeline corridors, drill rigs, wells, and production facilities from view, where practical.

New roads and pipeline corridors, to the extent practicable, will follow contours and use topography as screening. New pipelines will be combined with existing or proposed roads, where practical and feasible.

**WATER RESOURCES**

**Groundwater and Surface Water**

**Regulatory Requirements and BLM Policy Guidelines**

Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Channel crossings will be designed according to BLM standards to minimize changes to channel geometry, subsequent alteration in flow hydraulics, and prevent soil erosion.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Disturbed channels will be re-graded to the original geometric configuration and will contain the same or similar bed material.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Where pipelines cross channels, pipe will be buried below the scouring depth.
Onshore Order #2, as cited in LCO and CFO BMP lists)	To minimize impacts to aquifers, wells will be cased during drilling and cemented in accordance with Onshore Order No. 2. Well casings and welding will be of sufficient integrity to contain all fluids under high pressure during drilling and well completion.
Onshore Order #7 (as cited in LFO and CFO BMP lists)	Any changes in the produced water disposal method or location will be approved in writing by the BLM before the changes take place.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Reserve pit liners must be installed so they will not leak and must be composed of materials compatible with all substances to be placed in the pit. Synthetic liners shall be a minimum 12 mil in thickness and must be resistant to ultraviolet radiation, weathering, chemicals, punctures, and tearing. Suitable bedding material, such as sand, clay, or felt liners should be used in areas where the base rock might puncture the liner.

**Applicant-committed BMPs**

- All water wells put to beneficial use, including produced water associated with this Project, will be under the jurisdiction of the Wyoming State Engineer's Office as required by applicable Wyoming law.
- All water used for the drilling of the surface casing must comply with all requirements concerning water quality as set forth by the WOGCC Regulations.
- Operators will prepare SWPPPs for their respective areas of field development as required by WDEQ National Pollutant Discharge Elimination System permit requirements
- Notice of any spill or leakage, as defined in BLM NTL 3A, will be immediately reported by the Operator to the AO and other such federal and state officials (e.g., WDEQ) as required by law. Verbal notice will be given as soon as possible, but within 24 hours, and verbal notices will be confirmed in writing within 72 hours of any such occurrence. Any accidental soil contamination by spills of petroleum products or waste materials will be cleaned up and the soil disposed of or rehabilitated according to WDEQ Solid Waste Guidelines (#2) for petroleum-contaminated soils.

**Wetlands, Riparian Areas, and Floodplains**

**Regulatory Requirements and BLM Policy Guidelines**

LFO RMP Appendix 2 (as cited in LFO BMP list)	All surface disturbance, permanent facilities, etc., will remain a minimum of 500 feet away from the edge of surface waters, riparian areas, wetlands, and 100-year floodplains unless it is determined through site-specific analysis, approved in writing by the BLM AO, that there is no practicable alternative to the proposed project. If such a circumstance exists, then all practicable measures to mitigate possible harm to these areas must be employed. These mitigating measures will be determined on a case-by-case basis and may include, but are not limited to, diking, lining, screening, mulching, terracing, and diversions.
ROD 1035 RMP (as cited in CFO BMP list)	All surface disturbance, permanent facilities, etc., will have a 500-foot No Surface Occupancy for Class I and II waters as determined in the RMP.
Floodplain Executive Order 11988 (Section 2.a.(2)) (as cited in Operators BMP list)	If the head of the agency finds that the only practicable alternative consistent with the law and the policy set forth in the Order requires siting in a floodplain, the agency will, prior to taking action, 1) design or modify its action in order to minimize potential harm, and 2) prepare and circulate a notice containing an explanation of why the action proposed is to be located in the floodplain.

Floodplain Executive Order 11988 (Section 3) (as cited in Operators BMP list)	Agencies will, if facilities are to be located in a floodplain (i.e., no practicable alternative), apply flood protection measures to new construction or rehabilitate existing structures, elevate structures rather than fill the land, provide flood height potential markings on facilities to be used by the public, and when the property is proposed for lease, easement, right-of-way, or disposal, the agency has to attach restriction on uses in the conveyance, etc., or withhold from such conveyance.
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**Applicant-committed BMPs**

Floodplains by their very nature are unsafe locations for permanent structures. With an inundation of flood waters, soils disturbed by construction could experience a rate of erosion greater than undisturbed sites. There is an additional concern over the potential for flood waters to aid in the dispersal of materials that may be stored within such structures. Therefore, federally managed 100-year floodplains will have no permanent structures constructed within their boundaries unless it can be demonstrated on a case-by-case basis that there is no physically practical alternative. In cases where floodplain construction is approved, additional constraints could be applied.

Any disturbances to wetlands and/or waters of the U.S. will be coordinated with the U.S. Army Corps of Engineers, and Section 404 permits will be secured as necessary prior to disturbance.

Operators will evaluate all Project facility sites for occurrence of waters of the U.S., special aquatic sites, and wetlands, per U.S. Army Corp of Engineer requirements. All Project activities will be located outside of these sensitive areas, to the greatest extent practicable.

Where disturbance of wetlands, riparian areas, streams, and ephemeral/intermittent stream channels cannot be avoided, U.S. Army Corp of Engineer Section 404 permits will be obtained by the Operator as necessary.

Streams, wetlands, and riparian areas disturbed during Project construction will be restored to as near pre-project conditions as practical, and if impermeable soils contributed to wetland formation, soils will be compacted to reestablish impermeability.

Wetland topsoil will be selectively handled.

Reclamation activities will begin on disturbed wetland areas immediately after completion of project activities.

**WILDLIFE AND THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES**

**General**

**Regulatory Requirements and BLM Policy Guidelines**

43 CFR 3101.1-2, as cited in LFO and CFO BMP lists)	All production facilities shall be equipped to sufficiently restrict noise to 49 dBAa at a distance of 2,500 feet from the facility.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	All pits containing fluids will be flagged or netted to minimize access by migratory birds and wildlife. Production pits will require netting. Pits containing oil or hazardous substances, as defined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), section 101 (14), as determined by visual evaluation or testing will require netting.
Gold Book 4 <sup>th</sup> Edition, 43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	All pits and open cellars will be fenced to limit access by wildlife. Fencing will meet BLM specifications.
Avian Power Line Interaction Committee (APLIC 2006) (as cited in LFO and CFO BMP lists)	Unless otherwise agreed to by the AO in writing, power lines shall be constructed in accordance with the Avian Power Line Interaction Committee (APLIC) <i>Suggested Practices for Avian Protection on Power Lines—The State of the Art in 2006</i> (APLIC 2006).
RMP Appendix 2, 43 CFR 3101.1-2, (as cited in LFO BMP list)	Surface-disturbing activities in crucial winter range for antelope will be prohibited during the period of November 15 to April 30. The operator may request an exception in writing to the condition at any time. Any exception to the condition must be approved in writing by the AO prior to conducting any surface-disturbing activities or prior to conducting activities disruptive to wildlife. The exception request must explain the reason(s) for the exception and explain why the proposed activities will not impact the species or their habitat.
ROD 4043 RMP (as cited in CFO BMP list)	No surface-disturbing or wildlife-disturbing activities are allowed from November 15 through April 30 on all crucial big game winter ranges. This restriction will not apply to the Salt Creek and Wind River management areas. The AO can grant exceptions. (ROD 4043 RMP)
BLM 6840 Manual – Special Status Species Management (as cited in LFO and CFO BMP list)	A habitat review will be conducted for special status species before construction activities begin.

ESA (as cited in LFO and CFO BMP lists)	If threatened, endangered, candidate, or proposed species are discovered at any time during construction, all construction activities will be stopped and the BLM will be immediately notified. Work will not resume until a Notice to Proceed is issued by the BLM.
ESA (as cited in LFO and CFO BMP lists)	If, while conducting operations, substantial unanticipated environmental effects to listed, proposed, or candidate species are observed (whether effects are direct or indirect), formal consultation with U.S. Fish and Wildlife Service (USFWS) will be initiated immediately in addition to cessation of all such operations.
BLM 6840 Manual – Special Status Species Management (as cited in CFO and LFO BMP lists)	Surveys for threatened and endangered (T&E) and candidate wildlife species will be implemented in areas of potential habitat prior to disturbance. If T&E and/or candidate species are found in the area, consultation with the USFWS will be initiated, and construction activities will be curtailed until there is concurrence between BLM and USFWS and the BLM issues a Notice to Proceed.
BLM 6840 Manual – Special Status Species Management (as cited in CFO and LFO BMP lists)	Site-specific surveys for special status plant species will be conducted prior to any surface disturbance in areas determined by the BLM to contain potential habitat for such species. These surveys will be completed by a qualified botanist and data from these surveys will be provided to the BLM.

**Applicant-committed BMPs**

USFWS and BLM consultation and coordination will be conducted for all mitigation activities relating to raptors and T&E species and their habitats, and all permits required for movement, removal, and/or establishment of raptor nests will be pursued if they meet USFWS migratory bird office requirements.
Well locations and associated road and pipeline routes will be selected and designed to avoid disturbances to areas of high wildlife value (e.g., raptor nest sites, wetland areas).
Companies will avoid activities and facilities that create barriers to the seasonal movements of big game and livestock.
Reserve, workover, and production pits potentially hazardous to wildlife will be adequately protected (e.g., fencing, netting, flagging) to prohibit wildlife access as directed by the BLM.
Wildlife-proof fencing may be utilized on reclaimed areas, in accordance with standards specified in BLM Fencing Handbook 1741-1, if it is determined that wildlife species are impeding successful vegetation establishment.
ROW fencing associated with this Project will be kept to a minimum and, if necessary, fences will consist of four-strand barbed wire meeting Wyoming Game and Fish approval and BLM Fencing Handbook 1741-1 standards for facilitating wildlife movement.
Unless otherwise agreed between a particular operator and the BLM with respect to certain operations or designated areas, operators will finance site-specific surveys for T&E and BLM sensitive species prior to any surface disturbance in areas determined by the BLM to contain potential habitat for such species (BLM Manual 6840). Data from these surveys will be provided to the BLM, and if any occupied habitats for T&E and BLM sensitive species are found, BLM recommendations for avoidance or mitigation will be implemented.

**Raptor and Migratory Birds**

**Regulatory Requirements and BLM Policy Guidelines**

43 CFR 3101.1-2 (as cited in LFO and CFO BMP lists)	Potential (active) mountain plover nesting habitats will be avoided during project activities within 0.25 mile from April 10 to July 10. The operator may request an exception in writing to the condition at any time. Any exception to the condition must be approved in writing by the AO prior to conducting any surface-disturbing or prior to conducting activities disruptive to wildlife. The exception request must explain the reason(s) for the exception and explain why the proposed activities will not impact the species or their habitat. Surveys to determine presence/absence of the plover will be conducted and data supporting the exception must accompany the written request.
ROD 4047 and 4058 RMP (as cited CFO BMP list)	Avoid surface-disturbing activities occupancy within either 0.25 mile or 0.50 mile depending on the species. To protect special status raptor nesting habitats, activities, or surface use will not be allowed from February 1 through July 31 within certain areas. The BLM AO, who will consider topography and special status raptor prey (excluding bald eagles) habitats surrounding the nest site will determine the size of a buffer zone on a case-by-case basis. Usually the buffer zone will be 0.25 to 0.5 mile. The operator may request an exception in writing to the condition.
RMP Appendix 2, 43 CFR 3101.1-2 (as cited in LFO BMP list)	Surface-disturbing activities within 0.75 mile of known active raptor nests shall be prohibited during the nesting period from February 1 to July 31. The operator may request an exception in writing to the condition at any time. Any exception to the condition must be approved in writing by the AO prior to conducting any surface-disturbing activities or prior to conducting activities disruptive to wildlife. The exception request must explain the reason(s) for the exception and explain why the proposed activities will not impact the species or their habitat. Data supporting the exception must accompany the written request.

ROD 4012 and 4013 RMP (as cited in CFO BMP list)	Prohibit surface development on public lands in an area from 0.5 to 1.0 mile of known or discovered bald eagle nests. The specific distance and dimensions of the area on which surface development will be prohibited will be determined on a case-by-case basis after consultation with the USFWS in accordance with the ESA. As specified in the Bald Eagle Habitat Management Plan (HMP) all roosts outside the Jackson Canyon Area of Critical Environmental Concern (ACEC) are withdrawn from locatable mineral entry and closed to disposal of mineral materials. Develop, revise, update, and consolidate HMPs to include management objectives and prescriptions for wildlife.
BLM 6840 Manual – Special Status Species Management (as cited in LFO BMP list)	If detected during preconstruction surveys, burrowing owls nests will be avoided to the extent possible.
BLM 6840 Manual – Special Status Species Management (as cited in LFO and CFO BMP lists)	USFWS consultation and coordination will be conducted for all permits required for movement, removal, and/or establishment of raptor nests.

**Applicant-committed BMPs**

Unless otherwise approved by the BLM, all surface-disturbing activity, including construction of roads, pipelines, well pads, drilling, completion, or workover operations, will be seasonally restricted from February 1 through August 15 within 1.0 mile of all active bald eagle nests.

Except for bald eagles which are discussed above, raptor nest surveys will be conducted for active nests within a 0.5- to 1.0-mile radius of proposed surface use or activity areas if such activities are proposed to be conducted between February 1 and July 31, unless otherwise approved by the BLM

Unless otherwise approved by the BLM, all surface-disturbing activity (e.g., road, pipeline, well pad construction, drilling, completion, workover operations) will be seasonally restricted from February 1 through July 31 within a 0.5-mile radius of all occupied raptor nests, except ferruginous hawk nests, for which the seasonal buffer will be 1.0 mile. The seasonal buffer distance and exclusion dates applicable may vary depending on such factors as the activity status of the nest, species involved, prey availability, natural topographic barriers, line-of-site distance(s), and other conflicting issues such as cultural values, steep slopes, etc. The operator may request an exception in writing to the condition. Any exception to the condition must be approved in writing by the AO prior to conducting any surface disturbing activities or prior to conducting activities disruptive to wildlife. The exception request must explain the reason(s) for the exception and explain why the proposed activities will not impact the species or their habitat. Data supporting the exception must accompany the written request. USFWS consultation and coordination will be conducted.

Unless otherwise approved by the BLM, surface-disturbing and disruptive activity will be prohibited within 0.5 mile of occupied burrowing owl nests from April 1 through August 15. Surveys may be required to determine nesting status.

Unless otherwise approved by the BLM, for surface-disturbing activities, surveys will be conducted as necessary within suitable plover habitat by a qualified biologist in accordance with USFWS 1999 guidelines (a copy of the guidelines may be obtained from the USFWS, BLM, or WGFD). Two types of surveys may be conducted: 1) surveys to determine the presence/absence of breeding plovers (i.e., displaying males and foraging adults), or 2) surveys to determine nest density. Unless otherwise approved by the BLM, if surface-disturbing activity is requested to take place in mountain plover habitat between April 10 and July 10, presence/absence surveys are required. Survey results will determine when activities are allowed.

**Sage Grouse**

**Regulatory Requirements and BLM Policy Guidelines**

43 CFR 3101.1-2, (as cited in CFO and LFO BMP lists)	Raptor perching deterrents will be used on power lines structures within 0.5 mile of active sage-grouse leks to minimize raptors perching in the immediate area of the lek and reduce the potential for increased raptor predation during the sage-grouse breeding season
RMP Appendix 2 (as cited in LFO BMP list)	A 0.25-mile buffer zone will be established around known sage-grouse leks, and all construction and surface occupancy will not be allowed within this buffer zone.
RMP Appendix 2, 43 CFR 3101.1-2 (as cited in CFO and LFO BMP lists))	A 2-mile buffer zone will be established around known sage-grouse leks, and construction activity in this buffer zone will be restricted between March 15 and July 15 to minimize effects to nesting sage-grouse. The operator may request an exception in writing to the condition at any time. Any exception to the condition must be approved in writing by the authorized officer prior to conducting any surface-disturbing activities or prior to conducting activities disruptive to wildlife. The exception request must explain the reason(s) for the exception and explain why the proposed activities will not impact the species or their habitat.

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**Applicant-committed BMPs**

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If existing information is not current, field evaluations for greater sage-grouse leks and/or nests may be conducted by a qualified biologist prior to the start of activities in potential greater sage-grouse habitat. These field evaluations for leks and/or nests will be conducted if Project activities are planned in potential greater sage-grouse habitat between March 15 and July 15. BLM wildlife biologists will ensure that such surveys are conducted using proper survey methods.

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To avoid potentially significant noise impacts, regional compressor stations will be located 2,500 feet or more from active sage-grouse leks.

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**Prairie Dog**

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**Regulatory Requirements and BLM Policy Guidelines**

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BLM 6840 Manual –  
Special Status Species  
Management ( *as cited in  
LFO BMP list*)

If detected during preconstruction surveys, white-tailed prairie dog colonies will be avoided to the extent possible.

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ROD 4015 and 4060 RMP  
(*as cited in CFO BMP list*)

Prairie dog control within the planning area may be initiated as follows:

- 1) The Animal and Plant Health Inspection Services or their authorized agent carry out prairie dog control actions.
- 2) No prairie dog control measures will be carried out on prairie dog towns that are more than 0.5 mile from private land, unless a human health or safety concern is documented, or where resource damage occurs and is documented by the BLM.
- 3) Treatment of prairie dog towns will be considered only if a written request is received from the owner of adjacent property. The BLM will not conduct treatment unless adjacent private lands are treated concurrently.
- 4) No treatment will occur in areas identified for black-footed ferret reintroduction, except when public health and safety risks warrant control.

Surface-disturbing and disruptive activities should be designed in a manner that avoids prairie dog towns and complexes. Where this is impractical, the disturbance should be located in a manner where it will have the least amount of impact to prairie dogs. No surface occupancy or use (NSO) is allowed on designated critical habitat for threatened or endangered species. Areas known or suspected to contain essential habitat for special status species will be subject to a Controlled Surface Use restriction, requiring the proponent to conduct inventories or studies to verify the presence or absence of special status species.

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**Applicant-committed BMPs**

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Proposed construction sites in the development area will be examined prior to surface-disturbing activities to confirm the presence or absence of prairie dog colonies, where appropriate. To the extent not already block-cleared by the USFWS and/or the WGFD, confirmation will be made of white-tailed prairie dog colony/complex size, burrow density, and any other data to indicate whether the criteria for black-footed ferret habitat, established in the USFWS guidelines, are present.

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## **3 ENCANA DEVELOPMENT PLAN**

### **3.1 Development Area Surface Ownership**

Oil and gas leases have been issued within the Project Area by the BLM, the State of Wyoming, and by private landowners. The proposed action would authorize Encana to continue to develop oil and gas resources on leasehold within the Project Area. Encana's operated acreage within the Project Area consists of a total of 177,867 acres, including 112,372 acres of Federal lands, 18,723 acres of State lands, and 46,772 acres of private lands. Approximately 385 oil and gas wells have been drilled to-date on Encana's acreage within the Project Area.

### **3.2 Proposal Overview**

Encana's proposal would develop up to 4,100 new oil and gas wells during a 15-year development period. The proposed wells would be permitted, drilled, and completed to recover oil, natural gas, and associated liquid reserves from the Lower Fort Union and Lance Formations at depths ranging from about 7,000 to 15,000 feet or deeper. Initial natural gas production from each well may range from 1 to 2 million cubic feet of natural gas per day (MMcfd). Actual production rates could be higher or lower, depending on subsurface reservoir conditions encountered in each well bore. It is also possible that fewer than the proposed 4,100 wells will be drilled in the Project Area in response to economic conditions, and other circumstances beyond Encana's control.

Up to 300 new wells could be drilled in any particular year. Actual surface location design could vary according to geological considerations, environmental constraints, topography and regulatory requirements. Final location design would be subject to additional analysis including on-site inspection reviews, APD processes conducted by the BLM pursuant to Onshore Order No. 1 and other regulatory requirements.

Wells that have been directionally drilled and completed from multi-well pads in the recent past have been shown to be extremely difficult to drill. This is due, in large part, to naturally occurring fractures, secondary pressure compartments, loss circulation intervals and other geologic factors contributing to wellbore stability problems and other hindrances to directional drilling. In addition, there is a significant amount of the Project Area that is un-drilled and, therefore, very little is known about the Geologic complexity that will be encountered in these undeveloped areas. Therefore, current technical limitations and unknown geologic risks require that the majority of wells be drilled using vertical drilling techniques from single well locations in order to ensure the viability of the project. Directional techniques will be employed when necessary to address significant topographic constraints, environmental concerns, and regulatory requirements. It is also possible that fewer than the proposed 4,100 wells will be drilled in the Project Area in response to economic conditions, and other circumstances beyond Encana's control.

Proposed facilities associated with this oil and gas development could include access roadways, electrical distribution lines, a central gas plant, gas and/or oil gathering pipeline infrastructure, product pipelines for transmission of natural gas and associated liquids, oil, and condensate storage tank batteries, in-field compression facilities, dehydration facilities, and electrical power or power generation facilities. Encana will construct multiple water treatment plants to treat produced water to WDEQ Class 1 standards and multiple pipelines for transportation of the treated water to Boysen Reservoir via routes parallel to Alkali Creek and Poison Creek. Encana will also construct multiple sub-surface injection facilities within the Analysis Area with associated pipelines for deep well disposal of treated and un-treated produced water.

In addition, Encana may require additional evaporation and retention ponds for standalone use and in conjunction with sub-surface injection facilities. Pipeline and truck transport of natural gas, oil, liquids, and water to processing and injection facilities across lease boundaries and/or unit boundaries may be required.

### **3.3 Design Features Specific to the Encana Development Plan**

#### **3.3.1 Well Drilling and Completion**

Water or mineral oil-based drilling mud will be used during drilling operations. Drilling reserve pits will usually be required to contain potentially large volumes of water entering the drilling rig mud system while setting surface casing. Field experience has shown that tank-based mud systems are often insufficient to contain shallow artesian water volumes resulting in overflow conditions. These overflow conditions can cause violations of conditions of the WDEQ General Permit for Surface Discharge.

Flare-less completion technologies will be employed to reduce emission of NO<sub>x</sub> and VOCs. Well flow back will be routed to closed vessels for high pressure separation of flow back products prior to production processing. Produced natural gas, liquids, oil, and water would be routed to appropriate pipelines, or tank storage on location. No flow back products will be routed to drilling reserve pits except under upset/emergency conditions. Regular truck service would haul stored liquids offsite to sales or processing as appropriate.

Drill cuttings will be collected at each location in a lined drilling reserve pit. Drilling reserve pits will be secured with appropriate avian deterrents. Any hydrocarbons present in the drilling reserve pits will be removed as soon as possible by skimming and vacuum collection. During winter, hydrocarbons will be skimmed using a tracked excavator (track hoe) to skim hydrocarbons trapped on top of the ice. Frozen materials will be heated in an on-site tank(s). Resulting liquids will be transferred to a storage tank or centrifuge for hydrocarbon recovery, storage, and sale.

#### **3.3.2 Production**

Production equipment will typically include a series of valves designed to control pressures and regulate flows at the wellhead (Christmas tree), and a separator for segregation and measurement of natural gas, oil, and water. Production facilities could include, but would not be limited to, above ground tanks for short-term storage of oil, condensate and produced-water. After separation and measurement, gas and associated liquids will flow through pipelines to central facilities for further processing. Oil and condensate will be transported by pipeline to sales, or stored on location in above ground storage tanks for periodic trucking to sales, depending on proximity to infrastructure. Emission controls will be installed in accordance with applicable regulations and requirements, including the "Oil and Gas Production Facilities" Permitting Guidance, Chapter 6, Section 2, promulgated by WDEQ. Later in the life of each well, artificial lift equipment may be required. Artificial lift equipment could consist of plunger lift, gas lift, down-hole pumps, or other technologies deemed appropriate for enhancing well production.

#### **3.3.3 Midstream and Pipeline Infrastructure**

New infrastructure will be required both inside and outside of the Project Area. Infrastructure could include, but would not be limited to: gas and/or oil gathering pipelines, in-field compression facilities, electrical power or power generation facilities, centralized treating, dehydration, and processing facilities and product pipelines necessary for transport of natural gas and associated liquids, condensate, and oil.

Locations for new infrastructure would be surveyed and staked prior to the start of any construction activities. Prior to installation, detailed design plans would be submitted to BLM by Encana during the APD and ROW application processes.

Construction of gathering pipelines generally will occur adjacent to access roads within a 25 foot pipeline ROW for a total road/pipeline ROW of 50 feet. Construction of pipelines consolidating multiple locations generally will occur adjacent to collector roads within a 55 foot pipeline ROW for a total road/pipeline ROW of 80 feet. Pipeline trenches, up to 6 feet in depth and 18 to 36 inches wide, will be excavated mechanically with a backhoe or trencher.

It is estimated that five to 10 permanent compression facilities (50 acres each), and 10 to 20 temporary compression facilities (10 acres each), will be needed within the Project Area to accommodate production. These facilities may also include equipment needed for dehydration, oil handling, water treatment, and electrical power or power generation. Power lines may also be required to distribute power to facilities outside the footprint of permanent compression sites. Such distribution lines will be routed along existing rights-of-way wherever practicable.

Midstream plant facilities will be required to treat, dehydrate, process and re-compress the natural gas. These facilities may contain gas compression equipment and produced-water treating facilities (described below), and may be built in stages as field development progresses. The compression and water facilities will be co-located such that no more than an estimated 50 acres of disturbed surface area per site will be required to accommodate full development.

Pipelines will be needed to transport natural gas and associated produced liquids, condensate, and oil from facilities. Full development could require up to four product pipelines and associated booster stations. Three of the pipelines may be sized up to a maximum of 36 inches in diameter, and one may be sized up to 24 inches in diameter. Pipeline construction is expected to occur within a single ROW corridor and will closely follow an existing pipeline route. The route may follow either the Lost Creek Gathering Company pipeline, delivering products to downstream pipelines near Wamsutter, Wyoming, or the Colorado Interstate Gas Company pipeline, delivering products to downstream pipelines near Rawlins, Wyoming (see Figure 1).

### **3.3.4 Power Lines and Power Facilities**

Full project development could require that externally generated electrical power be brought into the Project Area (see Figure 1). This will require construction of one or more substations (5 acres each) near existing or new power lines within the Project Area. From each substation, distribution lines will be routed along a 150-foot ROW to compression, water treatment, gas treatment, and other types of facilities within the Project Area. Locations for new infrastructure will be surveyed and staked prior to the start of any construction activities. Prior to installation, Encana would submit detailed design plans to the BLM during the APD and ROW application processes.

### **3.3.5 Ancillary Facilities**

Additional well development and oil and gas production will require installation of new facilities at multiple locations. Facilities such as equipment/pipe storage yards, a bio-composting (remediation) facility, and a workforce facility (ten acres each) could be constructed within the Project Area.

### 3.3.6 Surface Disturbance

Each single-well vertical pad will have an average initial surface disturbance of approximately 4 acres, while each multi-well directional pad location will have an average initial surface disturbance of approximately 7.5 acres. Actual pad sizes will depend on terrain limitations and other site-specific conditions.

Surface disturbance estimates for well pad, road and pipeline corridors, facilities, and infrastructure anticipated for the new field development are provided in Table 2. Surface disturbance for the proposed development is estimated to include 25,826 acres of initial surface disturbance and 8,236 acres of long-term (life of project) disturbance after interim reclamation.

Table 2. Summary of Surface Disturbance from the Encana Development Plan

	Wells - % Directional vs. % Vertical	Wells	Wells/Pad	Pads	Well Pad - Initial Disturbance	Well pad - Long Term Disturbance	Road - Initial Disturbance	Road - Long Term Disturbance	Pipeline - Initial Disturbance	Pipeline - Long Term Disturbance	Total - Initial Disturbance	Total - Long Term Disturbance
Directional Wells	33.3%	1,365	4	341	2,559	630	724	724	931	0	4,214	1,354
Vertical Wells	66.7%	2,735	1	2,735	10,940	1,641	2,901	2,901	3,730	0	17,570	4,542
Total Drilling Disturbance	100.0%	4,100		3,076	13,499	2,271	3,625	3,625	4,660	0	21,784	5,896
Total Facility Disturbance											4,042	2,340
<b>Total Encana Disturbance</b>											<b>25,826</b>	<b>8,236</b>

### 3.3.7 Water Supply

Fresh water will be used to drill and set surface casing for protection of groundwater aquifers in each well. Produced water will be used to drill the remainder of each well. Produced water will also be used in all completion operations. Produced water would be used for drilling and completion operations to the maximum extent possible. Ideally, produced water would be transported to well pads using pipelines. A combination of pipelines and trucks could also be used. Use of fresh water will be minimized whenever possible.

Based on existing operations, the average water supply requirements of drilling and completion operations is estimated to be approximately 175,000 barrels total per well. Approximately 170,000 barrels (97%) consist of treated or produced water and about 5,000 barrels (3%) consist of fresh water used to install surface casing. Assuming a peak development rate of up to 300 wells per year, annual water usage could reach 52.5 million barrels per year consisting of around 51.0 million barrels of treated and reused produced water and 1.5 million barrels of fresh water.

### **3.3.8 Produced Water Disposal**

The Lower Fort Union and Lance Formations within the Project Area contain significant quantities of oil, natural gas, and water at depths ranging from 7,000 to 15,000 feet. Recent statistics show that approximately one barrel of water is produced for each 1,000 cubic feet of gas. Estimates indicate that each Encana well initially could produce as much as 3,000 barrels of water per day, declining thereafter over the life of the well. Over the life of the project, total water production could average as high as approximately 1 million barrels per day. Transport of produced water by pipeline or truck across lease boundaries may be required.

The majority of the water produced within the Project Area would be transported via pipeline to one of several treatment facilities. Residual hydrocarbon liquids would be separated, stored at the facility, and eventually transported to sales. Residual natural gas would be separated and re-compressed into the gas gathering system for sales. Remaining produced water would be treated, managed and discharged in accordance with Wyoming Pollution Discharge Elimination System (WYPDES) permits granted by the WDEQ. Treatment would generate three liquid byproduct streams. The vast majority ~90% of produced water will be treated to Class 1 standards. The other two liquid streams would consist of brine, and effluent by-products. Treated water will either be reused in drilling and completion operations described above or will be managed using one of the methods described below. The brine and effluent by-products will be injected, as described in section 3.3.8.3 below. All treatment, reuse, recycling and injection will be conducted in accordance with applicable rules and regulations.

#### **3.3.8.1 RECYCLING AND REUSE**

Recycling and reuse of produced water is an important aspect of this project. Treated Class 1 water would be used whenever possible for drilling and completion operations. Treated Class 1 water could also be used, without limitation, to support reclamation activities and for the benefit of wildlife and livestock in the area.

#### **3.3.8.2 RESERVOIR DISCHARGE**

Treated Class 1 water, not consumed by, and/or used in connection with, operations, reclamation or wildlife will be transported via several 24- to 36-inch feeder pipelines, along 50-foot-wide corridors for up to 3 miles where they would connect with one or two main transport lines. These transport lines (24 to 42-inch diameter) will run parallel to the Alkali Creek and Poison Creek drainages respectively. Each of these pipelines will occupy a 50-foot-wide corridor running for 30 to 40 miles to outfalls at Boysen Reservoir (see Figure 1). Outfalls will be permitted and managed in accordance with all requirements from applicable regulatory agencies.

#### **3.3.8.3 INJECTION**

Brine, and occasionally, treated or untreated produced water, will be transported via 8- to 16-inch pipeline(s) (30-foot-wide corridor of 10 to 20 miles in length) to multiple subsurface injection wells. Injection wells (5 acres of initial surface disturbance each) will be required over the 15-year project period. Construction and installation of necessary pipelines and associated disposal well facilities/equipment (*e.g.*, pump stations, etc.) could require additional surface disturbance, depending on the specific surface locations. Injection wells will be located in or near the project area, as appropriate, to handle water disposal needs. All injection wells will be permitted through the WOGCC Underground Injection Control regulatory process with final approval required prior to any subsurface disposal. The disposal wells will generally be located south of the primary development area indicated in Figure 1.

#### **3.3.8.4 EVAPORATION PONDS**

Encana will continue to use three existing evaporation ponds to manage produced water. These ponds could serve as both evaporation and holding facilities for water intended for sub-surface injection. Additional ponds (approximately 5 acres each) could be needed for expanded water evaporation and storage for sub-surface injection. New ponds will be constructed and operated in compliance with WDEQ permitting requirements.

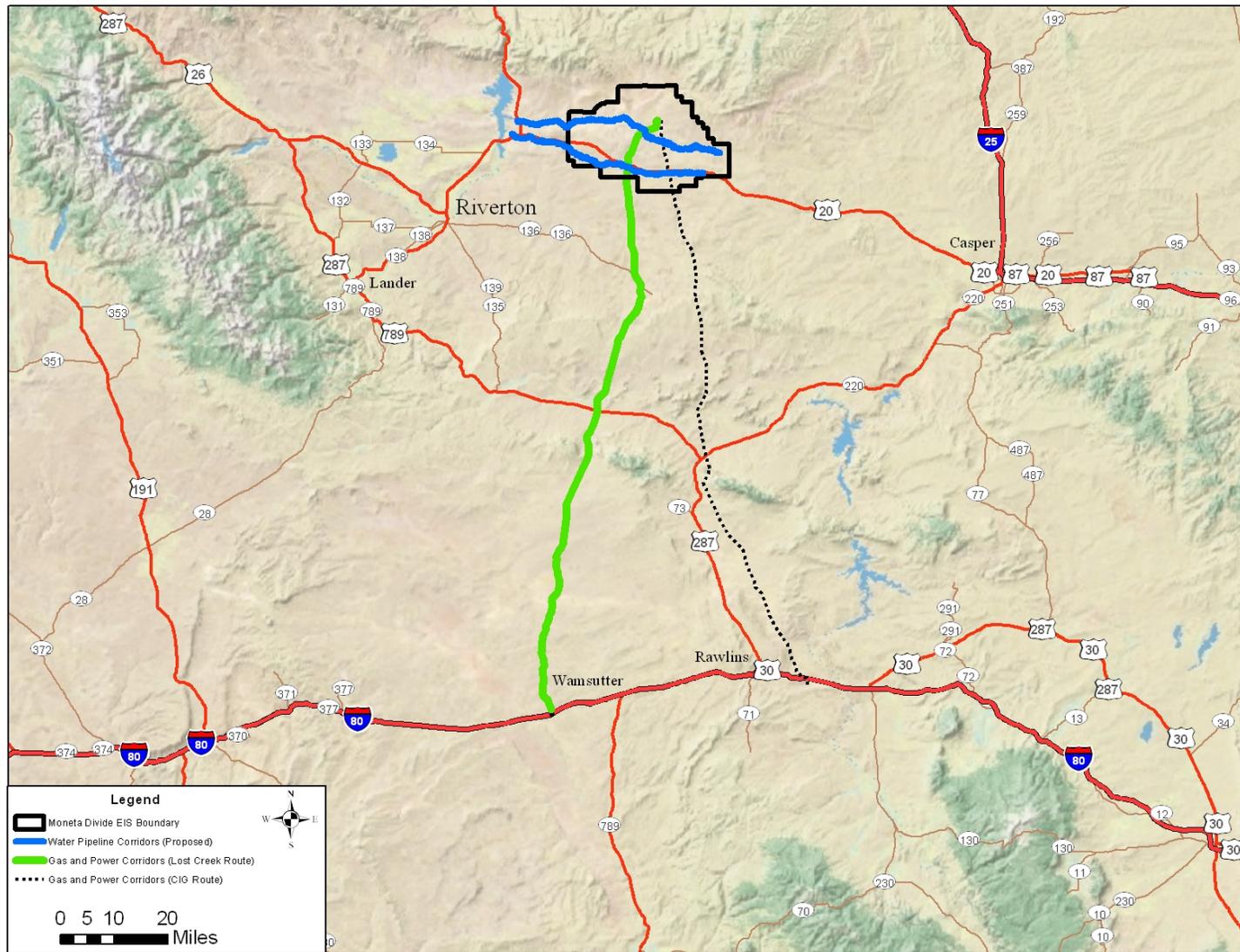


Figure 1 Proposed Pipeline and Power Corridor Map for Encana Development Plan

### **3.3.8.5 TRUCKING**

Effluent by-product will be transported by truck for off-site disposal at permitted third party facilities. Testing of effluent by-product will be conducted to confirm compliance with regulatory requirements prior to disposal.

### **3.3.8.6 SURFACE DISCHARGE**

Encana will continue to dispose of produced water using surface discharge authorized by WDEQ under WYPDES permit WY-0002062. Encana currently discharges all produced water under this permit with an average rate (in 2011) of approximately 68,000 barrels of water per day within the Gun Barrel Unit. Under the proposed action, Encana will reduce this amount as much as practicable, using the other methods described.

As a condition of the existing WYPDES permit, WDEQ has imposed a limit on the total discharged load of Total Dissolved Solids (TDS). This limit serves to effectively curtail the allowable surface discharge flow to "pre-2009" levels. Encana's current discharge rate noted above is within compliance limitations and all future discharge rates will also stay within prescribed limits. By January 1, 2013, Encana's TDS discharge limit will be lowered to 908 tons/day. This reduced TDS load limit will effectively reduce discharge amounts to approximately 22,000 barrels per day without considering discharge of low TDS treated water. Encana will use water treatment options and injection wells in conjunction with surface discharge to comply with the TDS load limit. In addition to the existing WYPDES permit(s), a WDEQ-approved Channel Stability and Monitoring Protocol management plan will be implemented to maintain long-term channel stability of discharge outfalls into Alkali Creek. Encana will continue to manage, monitor, and discharge produced water in various parts of the Project Area over the life of the project.

## **4 BURLINGTON DEVELOPMENT PLAN**

### **4.1 Development Area Surface Ownership**

In the Companies' proposal, Burlington would continue its overall hydrocarbon development operations on its leases in the Madden Deep Unit. The Madden Deep Unit comprises approximately 80,077 acres with surface-land ownership consisting of 50,253 acres (62.7%) administered by the BLM Lander and Casper FOs, 7,892 acres (9.8%) administered by the State of Wyoming, and 21,932 acres (27.4%) of private fee holdings.

### **4.2 Proposal Overview**

Burlington's proposal would develop a maximum of 150 new vertically or directionally drilled natural gas wells on 150 new pad locations over a 10 to 15-year period. Between five and 25 new wells would be drilled per year and would generally follow a 20- to 40-acre surface density, depending on environmental constraints and requirements. Exact placement of future well locations are unknown at this time, but the final locations would be subject to additional environmental analysis and any environmental constraints that may be identified during the APD process and the on-site inspection reviews conducted by the BLM. It is anticipated most new wells will be drilled within the currently developed portions of the Madden Deep Unit.

The proposed wells would be drilled and completed to recover natural gas and associated liquid reserves in the Shotgun, Waltman, Lower Fort Union, Lance, Cody, Mesaverde, Frontier and Madison reservoirs at total depths ranging from approximately 3,500 to 28,000 feet. Initial production for each well would range from 0.5 to approximately 30.0 MMcf/d, but production may be higher or lower, depending on the reservoir conditions at each well site. Additional exploratory wells to test deeper horizons may also be planned in the future as technical and economic conditions warrant. A very limited number (not more than ten) of the gas wells proposed for the Madden Deep Unit may also produce H<sub>2</sub>S, or "sour gas." This toxic gas is contained in the Madison reservoir, a natural resource that is already being produced by Burlington. The vast majorities of the wells in the Madden Deep Unit target the Shotgun, Waltman, Lower Fort Union, Lance, Cody, Frontier and Mesaverde formations and are not expected to produce H<sub>2</sub>S.

### **4.3 Design Features Specific to the Burlington Development Plan**

#### **4.3.1 Well Drilling**

Water or oil-based drilling mud would be used, and waste mud would be collected in an earthen drilling reserve pit with an impermeable lining. Appropriate bird deterrent devices would be installed. Hydrocarbons would be removed from the surface by skimming and vacuum collection. Following successful completion of a well, the drilling reserve pit containing drilling mud and cuttings would be reclaimed after fluid removal.

### 4.3.2 Pipelines and Roads

A gathering pipeline would carry untreated gas from each well location to a larger main gathering loop. Access roads would be located adjacent to gathering pipelines in a ROW approximately 50 feet wide. The Madden Deep Unit average road and gathering pipeline length would vary, depending on the well location.

Main trunk roads and transmission pipelines may be constructed in certain portions of the Madden Deep Unit. The road and transmission pipeline ROW would be 80 feet wide, with trench widths of 48 to 60 inches and a minimum depth of 72 inches with normal soil cover. Following construction of the pipelines, the ROW would be reclaimed in its entirety.

### 4.3.3 Power Lines and Power Facilities

Electrical servicing for new wells and other facilities generally would be underground and would be collocated within the road ROW.

### 4.3.4 Surface Disturbance

Each new well location would have an initial surface disturbance range of 2.30 to 14.65 acres, depending on horizon tested. Proposed facilities associated with the gas development include gas gathering pipeline infrastructure, roads, electrical distribution lines, gas transmission pipelines, compression facilities, dehydration facilities, and water treatment facilities. Surface disturbance estimates for the proposed new well development and other associated facilities would total approximately 665 acres of initial surface disturbance and 429 acres of final permanent disturbance after interim reclamation. Surface disturbance estimates for the proposed new well development and associated roads and pipeline corridors are provided in Table 4.

**Table 3.** Summary of Surface Disturbance from the Burlington Development Plan

	No. of Wells	No. of Well Pads	Initial Disturbance (acres)	Reclaimed (acres)	Long-term Disturbance (acres)
Vertically drilled wells	150	150	387	221	166
New access roads/pipeline (23 miles)			277	69	208
<b>Total Disturbance (acres)</b>			<b>2,491</b>	<b>1,342</b>	<b>374</b>

Assumptions used for calculations:

- Depending on horizon tested, each new location would have an average initial surface disturbance of 2.58 acres per well.
- Following successful completion of a well, the disturbed area would be reduced.
- An access road and gathering pipeline would be constructed in a 50-foot-wide ROW. The Burlington Project Area-wide average road and gathering pipeline length would vary, depending on well location. Following successful completion of a well, the ROW disturbance would be reduced.
- Main trunk roads and transmission pipeline ROW would be 80 feet wide. Following successful completion of a well, the ROW disturbance would be reduced by interim reclamation.
- Calculated average linear feet for pipeline and road ROW disturbance is 800 feet per well.

### **4.3.5 Water Supply and Produced Water Disposal**

#### **4.3.5.1 WATER SUPPLY**

Based on existing operations, the average water estimate for the drilling and completion requires approximately 20,000 barrels of water per well during drilling. Future water needs would be obtained from either existing water supply wells or purchased from a private fee landowner source. Annual water use to drill and complete 150 wells would be approximately 375,000 to 500,000 barrels.

#### **4.3.5.2 PRODUCED WATER DISPOSAL**

The amount of produced water varies by formation and individual well. Based on 2007 preliminary operational records from the WOGCC, each proposed gas well may result in an estimated 45 barrels per well per day, for a total of approximately 6,750 barrels total of additional produced water for reinjection per day.

Burlington is currently permitted to inject produced water through the use of existing WOGCC permits. Burlington currently holds ten existing approved permits, of which ten are active. Existing injection wells are expected to accommodate the additional produced water. If additional injection wells are necessary, Burlington will be permitted by the WOGCC and the BLM as appropriate. Water is currently transported to the injection wells via pipelines and occasionally trucks. Burlington may additionally treat a relatively small portion of produced water using a reverse osmosis system permitted and approved by the WDEQ separately from this project. The treated water would be used for agricultural irrigation, domestic livestock, and possibly enhanced reclamation activities primarily on privately owned lands within the Madden Deep Unit. Treated water could be transported via existing irrigation ditches within the Madden Deep Unit so additional surface-disturbing operations or increased truck traffic is unlikely.

### **4.3.6 Handling of Hydrogen Sulfide**

As of March 2009, Burlington has nine active sour gas wells in the Madden Deep Unit, including associated infrastructure for gathering and processing sour gas and processes for safely disposing of the solid sulfur by-product. Burlington also has a current Emergency and Contingency Plan in place for managing any accidental releases of H<sub>2</sub>S. Carbon dioxide is a secondary economic gas contained in the Madison Formation. The addition of new Madison production wells would not require additional gas plant capacity or new injection wells. Handling of hazardous H<sub>2</sub>S during proposed drilling and production on the Madden Deep Unit would be conducted in accordance with specific regulations imposed by BLM Onshore Oil and Gas Order No. 6 (43 CFR 3160). The Onshore Oil and Gas Order is in place to protect public health and safety and those personnel essential to maintaining control of the well. An H<sub>2</sub>S Drilling Operations Plan and Public Protection Plan is reviewed and approved on an annual basis by an Authorized Officer of the BLM. Specific requirements would be met for the handling of drilling mud, flares, metallurgical equipment standards, and well testing in the H<sub>2</sub>S environment.

## 5 SUMMARY OF PROPOSED OIL AND GAS DEVELOPMENT ACTIVITIES

Table 4. Summary of the Proposed Project

	Total	Madden Deep Unit	Encana Operated Acreage
Total Acreage	265,152 <sup>1</sup>	80,077	177,867
Private	70,755 <sup>1</sup>	21,932	46,772
Federal/BLM	167,782 <sup>1</sup>	50,253	112,372
State	26,615 <sup>1</sup>	7,892	18,723
Wells drilled to-date	820	435	385
Proposed new wells	4,250	150	4,100
Total proposed wells over Life of Project	5,070	585	4485
Proposed new wells per year	Up to 325	Up to 25	Up to 300
Estimated water required per drilled and completed well (barrels)	20k – 175k	20,000	175,000
Estimated maximum annual drilling/completion water requirement (barrels)	53 million	500,000	52.5 million
Estimated maximum daily volume of produced water (barrels)	1.02 million	20,700	1 million
Proposed initial surface disturbance (acres) <sup>2</sup>	26,491	665	25,826
Total proposed Life of Project surface disturbance (acres) <sup>2</sup>	8,611	375	8,236

<sup>1</sup>As of 6/14/2012, Project Area also includes 7,208 acres of un-leased lands (consisting of 2,051 acres private, 5,157 acres Federal, and 0 acres State)

<sup>2</sup>includes disturbance estimates for proposed production facilities, plants, compression, power, etc.

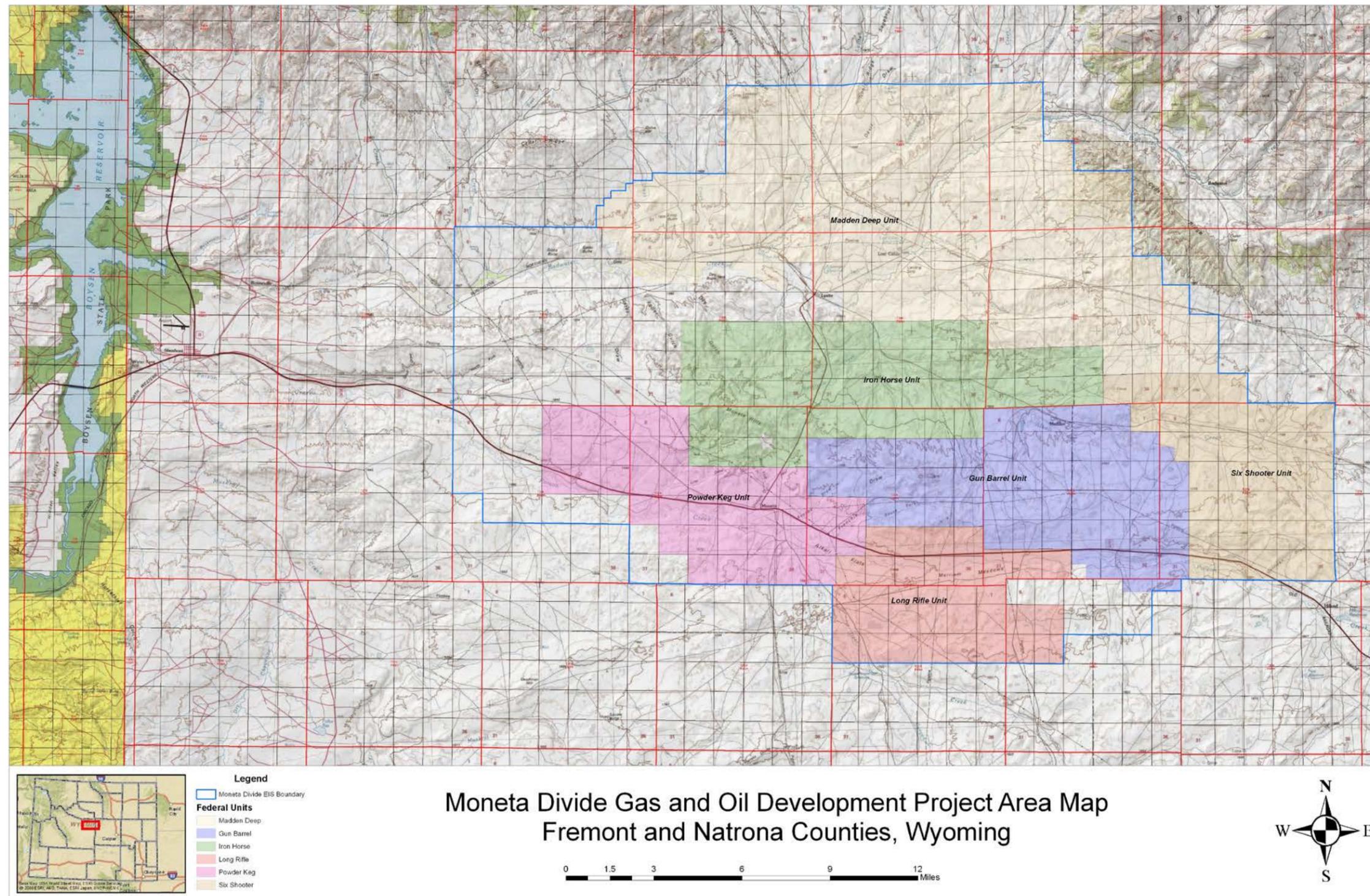


Figure 2 Moneta Divide Project Location Map