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Burlington Resources Oil & Gas Company, LLC
Sunray 1M Natural Gas Well Project

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

Burlington Resources Oil & Gas Company LP (Burlington) has filed an application for permit to drill APD, for the Sunray 1M natural gas well with the Bureau of Land Management's Farmington Field Office (FFO). The proposed well, the Sunray 1M, would require a new stand alone well location. The proposed action would include the construction of a well pad, the drilling, production, and final abandonment of a Basin Dakota/Blanco Mesaverde gas well, and the construction of the associated well-tie pipeline. This action is being proposed on public lands with federal minerals both administered by the Bureau of Land Management (BLM).

The proposed Sunray 1M well and associated facilities are proposed for development within the San Juan Basin of northwestern New Mexico, approximately 16 miles east of Bloomfield, in San Juan County, New Mexico (Figure 1). The legal location description for the proposed Sunray 1M well project is as follows:

> 999' FNL and 699' FEL of Section 5 in Township 29N, Range 08W, New Mexico Principal Meridian (NMPM), in San Juan County, New Mexico.

The proposed well would be directionally drilled to a bottom hole location with the following legal location:

> 1956' FNL and 751' FEL of Section 5 in Township 29N, Range 08W, New Mexico Principal Meridian (NMPM), in San Juan County, New Mexico.

An approved APD, issued by the BLM, would authorize Burlington to construct, drill, operate and finally abandon the proposed well and any on-lease access road and associated facilities. The Sunray 1M gas well would allow Burlington to develop their lease and provide additional natural gas for the national energy market, which would also generate federal and state tax revenue as well as revenue for Burlington.

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS) (BLM 2003a). The PRMP/FEIS is available for review at the Farmington Field Office, Farmington, New Mexico, or on the World Wide Web at http://www.nm.blm.gov/ffo/ffo_home.html. This environmental assessment (EA) addresses site-specific resources and effects of the proposed action that were not specifically covered within the PRMP/FEIS, as required by the National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91-90, 42 United States Code [USC] 4321 et seq.).

1.2. Purpose and Need for Action

The purpose of the action is to provide Burlington with reasonable access to their mineral lease. The need for the action is established by the BLM's responsibility to respond to the APD under the Mineral Leasing Act of 1920, as amended (30 USC 181 et seq.).

1.3. Conformance with Applicable Land Use Plan(s)

The Proposed Action is in conformance with the September 2003 Farmington Resource Management Plan (RMP) with Record of Decision (ROD), as updated in December 2003 (BLM 2003b). The proposed action is located in an area identified in the ROD as open to oil and gas leasing and development (BLM 2003b, p. 3). It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs, while at the same time minimizing environmental damage and providing for the rehabilitation of affected lands (BLM 2003c, p. 2-2).

The proposed action would be located within BLM/FFO designated potential habitat for the BLM Special Management Species and State of New Mexico Endangered Brack's hardwall cactus (*Sclerocactus*

cloveriae ssp. *brackii*) and Aztec gilia (*Aliciella formosa*). Per the BLM/FFO Instruction Memorandum No. NM-200-2008-001, proposed projects within Brack's cactus and Aztec gilia habitat will require a biological survey. When individual plants or suitable habitat for these plants are found within designated potential habitat, the company proposing the pad or pipeline will be given the following options:

1. Relocate the pad or pipeline to miss the plants or habitat and drill conventionally.
2. Relocate the pad and directionally drill to the target area.
3. Transplant Brack's cactus, and where appropriate, stockpile and re-spread soil. In occupied habitat for Brack's cactus and Aztec gilia, a biological consultant approved by BLM must be on site to monitor mitigation. The biological consultant will be on site for the scraping, stockpiling, and re-spreading of the suitable soil. A monitoring report will be submitted by the biological consultant to BLM.

Every effort to relocate the proposed pad must be explored before BLM will approve option 3.

The proposed action would also be located within 1/3 mile of an historic golden eagle nest. Per the BLM/FFO Instruction Memorandum No. NM-200-2008-001, no construction, drilling, or completion activities shall be conducted between February 1 and June 30 within 1/3 mile of an active or historic nest. FFO may release the proposed action Feb.1-June 30 when FFO determines that the young of the year have fledged and left the area, or that surveys have conclusively determined the nest is not active.

1.4. Relationship to Statutes, Regulations or Other Plans

BLM regulates oil and gas development so as to minimize environmental effects to public lands as required by numerous federal laws, including:

- The Endangered Species Act of 1973 (P.L. 94-325),
- The Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712),
- The Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668-668d),
- The Federal Water Pollution Control Act of 1948 (Clean Water Act), as amended (33 U.S.C. Chap. 26),
- The Clean Air Act of 1963, as amended (P.L. 88-206),
- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 U.S.C. Chap. 103),
- The Antiquities Act of 1906, as amended (P.L. 52-209),
- The National Historic Preservation Act of 1966, as amended (P.L. 89-665),
- The Archaeological and Historic Preservation Act of 1974 (P.L. 86-253),
- The Archaeological Resources Protection Act of 1979, as amended (P.L. 96-95),
- The American Indian Religious Freedom Act of 1978, as amended (42 U.S.C. 1996), and
- The Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601).

Burlington would comply with all applicable federal and State of New Mexico laws and regulations (Appendix B). Non-point source pollution is an identified problem in the planning area that is directly associated with soil stability and water quality. The New Mexico Energy, Minerals and Natural Resources Department requires operators to follow "pit rule" guidelines contained within NMAC 19.15.17 in an effort to reduce ground water contamination from industry related activities. Mandated by the Clean Water Act (CWA), efforts to reduce non-point source pollution through implementation of erosion control and management practices are an important part of BLM's management activities. Industrial activities disturbing land may require permit coverage through a National Pollution Discharge Elimination System (NPDES) storm water discharge permit. Oil and gas development in New Mexico, however, is exempt from NPDES regulation per 40 CFR Part 122. Upon determination, a U.S. Army Corps of Engineers Section CWA 404 Permit for the discharge of dredge and fill materials may also be required. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

Consultation with the USFWS, as required by Section 7 of the Endangered Species Act (ESA) of 1973, was conducted as part of the Farmington PRMP/FEIS (Consultation No. 2-22-01-I-389) to address cumulative effects of RMP implementation on federally listed threatened and endangered species or

designated critical habitat. The consultation is summarized in Appendix M of the PRMP/FEIS. Farmington Field Office staff reviewed the action alternatives and determined they would be in compliance with threatened and endangered species management guidelines outlined in the September 2002 Biological Assessment (Consultation No. 2-22-01-I-389). Water for well construction would be source from the Manzanares Water Well #1, an existing (declared) source that has been filed with the New Mexico State Engineer's Office. No new water depletions would result. No further consultation with the U.S. Fish and Wildlife Service is required.

The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful. Executive Order (EO) 13186 was signed on January 10, 2001, directing executive departments and agencies of the federal government to take certain actions to further implement the MBTA including developing and implementing a Memorandum of Understanding (MOU) with the USFWS that would promote the conservation of migratory bird populations. A MOU was developed and entered into by the BLM and the USFWS on April 12, 2010 to accomplish EO 13186 and to ensure the successful implementation of BLM and USFWS migratory bird conservation responsibilities. The MOU To Promote the Conservation of Migratory Birds presents collaborative methods to promote the conservation of migratory bird populations by identifying and implementing strategies which avoid or minimize adverse impacts to migratory birds. The BLM and USFWS have agreed that implementation of the MOU will be in harmony with existing agency missions, and the MOU does not supersede any legal requirements or existing species conservation processes and procedures such as ESA recovery plans. It is also understood that the BLM may not be able to fulfill all aspects of the MOU upon signing (MOU Section IX (I)).

The MOU to Promote the Conservation of Migratory Birds entered into by the BLM and the USFWS was not completed during the development of the revised FFO RMP. Consultation on the Biological Assessment (BA) with the USFWS for the RMP was completed on October 2, 2002, the Environmental Impact Statement (EIS) was completed in March 2003, and the Record of Decision (ROD) for the RMP was signed in September of 2003. There are no management constraints or mitigation measures pertaining to the MBTA listed within the RMP, BA, EIS, or ROD. Revision and/or adoption of some elements of the MOU into the RMP may be required. Currently, effects to migratory birds are addressed and mitigated at the project level as outlined in the Migratory Bird Treaty Act – BLM/FFO Interim Management Policy (Instruction Memorandum No. NM-F00-2010-001, BLM 2010).

Until such time as further guidance related to the MOU is issued, the BLM will continue to analyze impacts to migratory birds in NEPA documents, list the MBTA as a Law the owner of any BLM permit must comply with, and utilize best management practices and mitigation measures that minimize impacts to migratory birds as outlined in Instruction Memorandum No. NM-F00-2010-001.

Compliance with Section 106 responsibilities of the National Historic Preservation Act are adhered to by following the BLM – New Mexico State Historic Preservation Office (SHPO) protocol agreement, which is authorized by the National Programmatic Agreement between the BLM, the Advisory Council on Historic Preservation, and the National Conference of Council of State Historic Preservation Officers.

Additionally, the APD Operator shall:

- Comply with all applicable Federal, State of New Mexico and local laws and regulations. A listing of selected federal laws and regulations applicable to the proposed action can be found in Appendix B.
- Obtain the necessary permits for the construction, drilling, completion, production and abandonment of this well and pipeline tie including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
- Certify that a Surface Use Agreement has been reached with private landowners where required.
- Obtain any relevant and/or required New Mexico Environment Department (NMED) air quality permits.

The State of New Mexico Oil Conservation Commission (NMOCC) has assigned spacing rules for producing oil and gas formations. Recently, the NMOCC has authorized infill provisions for the increased

density for the Basin Dakota, Blanco Mesaverde, and Basin Fruitland Coal pools. This has resulted in numerous wells being proposed and approved within the proposed project area and throughout the San Juan Basin. Minimum spacing is currently at 80 acres per well for both the Basin Dakota and Blanco Mesaverde pools. Burlington proposes to drill one Basin Dakota/Blanco Mesaverde natural gas well. Burlington has opted to combine and develop the Mesaverde and Dakota formations together (commingle) instead of constructing two (2) separate wells.

This EA considers the requirements of these and other laws and regulations, as applicable. The proposed action, including environmentally-protective design features, complies with the laws and regulations indicated above. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

1.5. Scoping, Public Involvement, and Issues

Scoping is the initial means by which the BLM identifies potential issues related to a proposed action. Internal scoping was initiated when the project was presented by Burlington to the FFO. External scoping was conducted through posting this project on the FFO's on-line NEPA logs (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html). The logs track initiation and approval of environmental documents that are being or have been completed as part of the BLM's responsibilities under NEPA. The public is encouraged to provide comments or request information on projects listed in the logs. Public comments are considered during the NEPA analysis and decision-making process for the applicable project, contingent on the project's schedule status. No public comments have been received to date.

Additional issues identification occurs during the planning level in-field onsite inspection. During the onsite inspection, all areas of proposed surface disturbance are inspected to ensure that potential effects to natural resources and other elements of the human environment would be minimized. Potential issues identified during initial scoping are evaluated at the ground level. Other issues not identified during initial scoping are addressed. Alternatives to the different aspects of the proposed action are considered or developed as needed. These alternatives are carried forward as design features of the proposed action, viable alternatives to the proposed action, or as alternatives considered but not analyzed in detail.
Based on internal scoping and FFO experience with previous APD approvals, the following issues have been identified and addressed in this EA in relation to the proposed action:

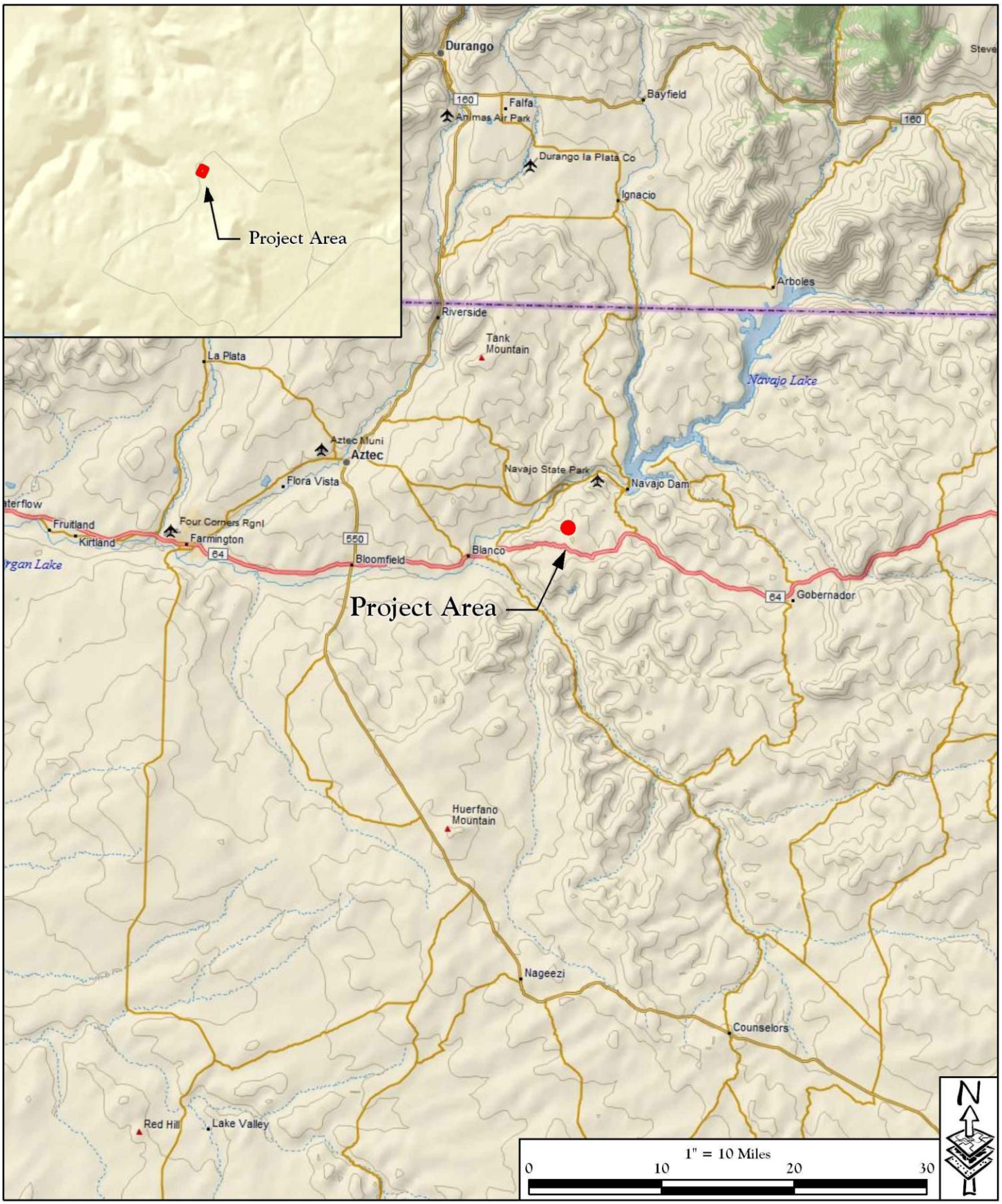
- *Air Quality and Climate* – Would the proposed action affect air quality by increasing dust and other pollutants, or result in a changed climate of the region?
- *Water Quality* –What risks do drilling and production activities pose to groundwater quality?
- *Vegetation* – How would the proposed action alter area vegetation? How would the proposed action affect the spread of noxious weeds in the action area?
- *Special Status Species* – How would the proposed action affect Special Status Species habitat and prey distribution?
- *Migratory birds* – How would the proposed action affect migratory bird nesting, habitat, species composition and distribution?
- *Cultural* – Would the proposed action impact any cultural resources eligible for inclusion on the National Register of Historic Places?

1.5.1. Issues Considered but Not Analyzed

Native American Religious Concerns – For the proposed action, identification efforts were limited to reviewing existing published and unpublished literature (e.g. Van Valkenburgh 1941, 1974; Brugge 1993; Kelly et al 2006), the site-specific Class III survey report prepared for the proposed action, and a review by the BLM's cultural resources program regarding the presence of TCPs identified through ongoing BLM tribal consultation efforts. There are currently no known remains that fall within the purview of the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) or the Archaeological Resources Protection Act (ARPA; 16 USC 470) within the proposed action area. The proposed action would not impact any known Traditional Cultural Properties, prevent access to sacred sites, prevent the possession of sacred objects, or interfere with or hinder the performance of traditional ceremonies and

rituals pursuant to the American Indian Religious Freedom Act of 1978 (42 USC 1996) or Executive Order (EO) 13007.

No issues with other resources such as soils, surface waters, general wildlife, livestock, or socioeconomics were identified during initial and internal scoping. There are no unique situations with regards to the proposed action that would warrant the analysis of additional resources. Refer to the 2003 PRMP/FEIS for an analysis of impacts to resources not discussed herein.



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ROAD/VICINITY MAP

SUNRAY 1M
ENVIRONMENTAL ASSESSMENT

FIGURE 1

Sources: ESRI, DeLorme, AND, Tele Atlas, First American, ESRI Japan, UNEP-WCMC, USGS, METI, ESRI Hong Kong, ESRI Thailand, Procalculo Prosis

PROJECT LOCATION:

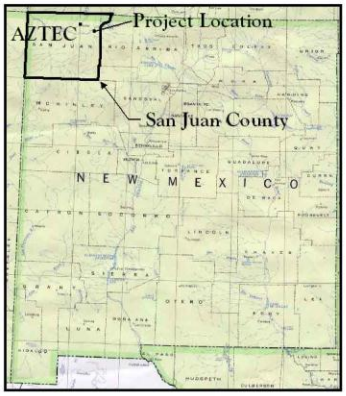
Township 27 North, Range 08 West, Section 5.
New Mexico Principal Meridian,
San Juan County, New Mexico.

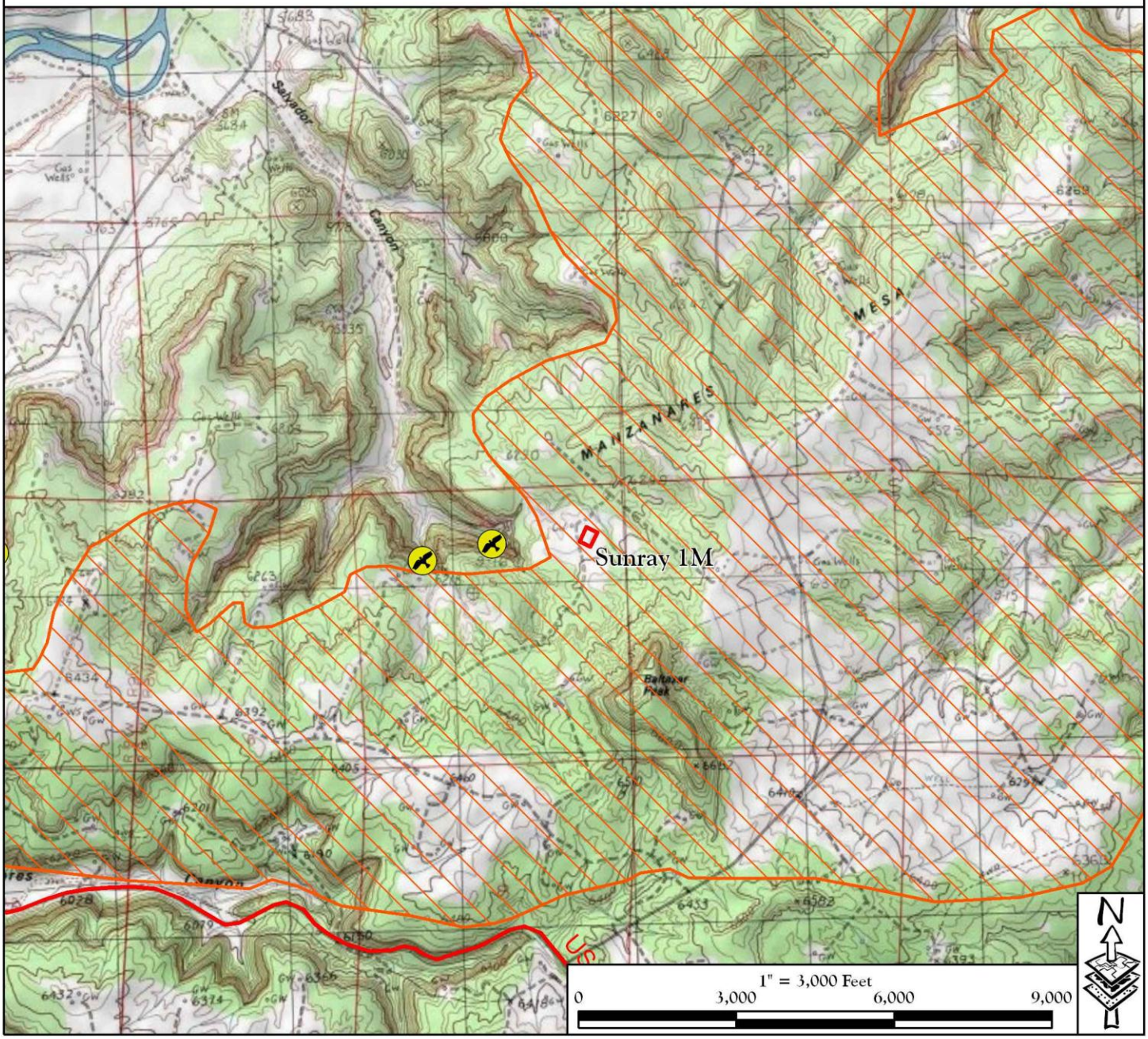
WELLHEAD LOCATION:

Latitude: 36.758416° N
Longitude: 107.691575° W

Legend

- Proposed Well Pad
- Potential SMS Plant Habitat
- Historic Golden Eagle Nest





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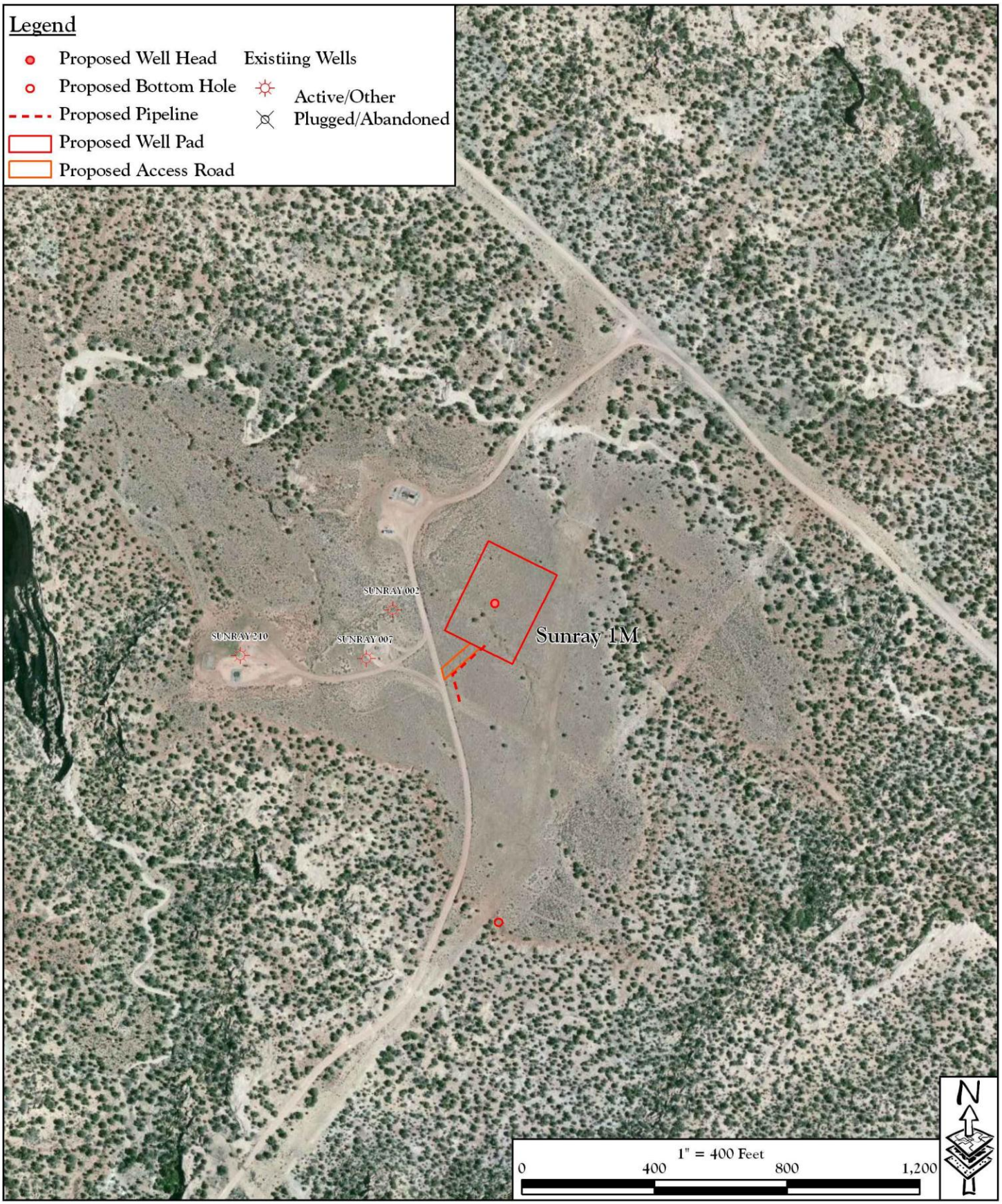
PROJECT LOCATION MAP

SUNRAY 1M
ENVIRONMENTAL ASSESSMENT

FIGURE 2

Source: Archuleta, New Mexico
7.5' USGS Quadrangle
Copyright: © 2010 National Geographic Society



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AERIAL SITE MAP

SUNRAY 1M
ENVIRONMENTAL ASSESSMENT

FIGURE 3

Source: Aerial photo provided by Bing Maps 2010 (http://www.bing.com/maps/).

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Proposed Action

BLM proposes to approve Burlington's APD for the Sunray 1M. Developing the proposed Sunray 1M would involve constructing a well pad, drilling and completing the well, and constructing and installing associated facilities including a well-tie pipeline. The proposed pipeline would be owned and operated by Enterprise Field Services, LLC.

The proposed Sunray 1M well and associated facilities would be located Manzanares Mesa between US Highway 64 1.4 miles to the south and the San Juan River 2.4 miles to the northwest as depicted on the Archuleta, New Mexico, 7.5-minute United States Geological Service (USGS) quadrangle map (Figure 2). The project area elevation is 6,284 feet above mean sea level.

The geographic coordinates for the surface location of the proposed wellhead are:
Latitude: 36.758416° N
Longitude: 107.691575° W (NAD 83)

The proposed well would be directionally drilled to the following bottom hole location:
Latitude: 36.755786° N
Longitude: 107.691597° W (NAD 83)

2.1.1. Construction Phase

The proposed action would include the construction of a level well pad surface of approximately 230 feet by 300 feet. Unless limited by surface resources, there would be an additional 50-foot construction zone around the perimeter of the proposed pad to contain the cut and fill slopes and top soil storage. The well pad would be constructed using a D-8 bulldozer. Clearing for the well pad is needed to provide space and a level surface for a drilling rig, completion rig and other heavy equipment to safely access and drill the well. The maximum cut would be 6 feet at the south corner (Corner No. 3) and the maximum fill would be 8 feet at the north corner (Corner No. 6). The well location, including the construction zone, would require a total of approximately 3.03 acres of land for construction.

A new access road 121 feet in length, 30 feet in width, would be required to access the proposed Sunray 1M well pad. The proposed access road would be constructed to current BLM "Gold Book" standards (USDI/USDA 2007) including crowning, ditching, and the installation of cross-drain features. Disturbance for the construction of the access road would be approximately 0.08 acres. Approximately 1.1 miles of the existing access road to the south of the Sunray 1M would be upgraded as needed to "Gold Book" standards as part of the proposed action.

An associated 230-foot pipeline tie would be constructed tying the proposed Sunray 1M gas well to the existing Sunray No. 7 pipeline. The pipeline would parallel the existing access road from the existing Sunray No. 7 pipeline north to the proposed access road, then follow the proposed access road to the proposed well pad (see Figure 3 below and the Sunray 1M survey plats located in Appendix A). The pipeline would be constructed within a 40-foot wide right-of-way (ROW). Approximately 20 feet of the ROW width would overlap the existing and proposed access roads. New surface disturbance for the proposed pipeline would be 0.11 acres.

Total surface disturbance associated with the Sunray 1M well pad, access road, and pipeline tie would be no more than 3.26 acres as some of the proposed disturbances overlap. New surface disturbance associated with the proposed action would be 3.22 acres as a portion of the proposed pipeline would overlay an existing access road.

For a detailed description of design features and construction practices associated with the well proposed under the proposed action, refer to the subject APD on file at the FFO, Farmington, New Mexico. For the

proposed well, recommended design features shall be implemented as Conditions of Approval (COAs) attached to the approved APD. A summary of the approximate acreage of disturbance associated with the proposed action is contained in Table 1 below.

Table 1. Cumulative Acreages for the Proposed Sunray 1M Well Pad, Access Road, and Pipeline Tie.

Project Components	New Disturbance Acreage	Existing Disturbance Acreage	Total Acreage* "footprint"
Well Pad	3.03		3.03
Access Road	0.08		0.08
Pipeline Tie	0.11	0.11	0.15
TOTALS	3.22	0.04*	3.26
* Total accounts for project components that overlap.			

2.1.2. Drilling and Completion

After the well pad is constructed, a drilling rig would be moved onto the location and assembled. Drilling to the Basin Dakota and Blanco Mesaverde formations would require approximately 14-21 days. After the well has been drilled, completion would take approximately an additional 14-21 days. The total time for construction, drilling, and completion is expected to last four (4) to eight (8) weeks. During the construction, drilling, and completion phase, both heavy equipment and light vehicles would use the proposed and existing BLM roads to access the well site. Traffic would include drilling rigs, large tractor-trailers, construction equipment, water trucks, drilling and production equipment and supplies, tanks, and numerous light pick-ups. Fresh water for drilling and completion will be sourced from permitted sources only.

Burlington will set surface well bore casing at a depth specified by the FFO to protect shallow groundwater aquifers. During drilling and completion, a trash receptacle and a chemically treated portable toilet would be on location for trash and sewer disposal. Produced hydrocarbons would be put in tanks on location during completion work. Produced water would be put in onsite tanks or within a lined reserve pit during completion work. All wastes would be disposed of in a proper manner as required by federal and state law and as described in the COAs.

2.1.3. Production Phase

After the well is completed, the portions of the pad not required for production equipment and vehicular access would be re-contoured and seeded with an approved FFO seed mix. Reclamation and reestablishment of vegetation will reduce erosion and replace habitat thereby reducing effects to water resources, soils, vegetation, wildlife, livestock, and visual resources. Approximately 1.66 acres of the well location would remain in use for production equipment. These areas would not be reclaimed until final abandonment of the individual well. After production of the well begins, normal upkeep would be required. One pick-up truck would visit the well site approximately every other day during the normal work week to check on production and resolve any problems that may occur at the well. Trucks would be used to remove produced water stored in tanks on the site. The frequency of water hauling would depend on the amount of water the well produces and may vary from once a day to once a month. Surface effects of a work-over rig would be similar to the effects described for drilling, although usually to a lesser degree. The estimated production phase of the well is 20 to 30 years.

2.1.4. Abandonment Phase

When the well is no longer commercially viable, it would be plugged and abandoned. Down-hole well abandonment would be carried out under current BLM regulations for plugging of the well and surface restoration. Surface equipment would be removed, except for an aboveground marker that would contain individual well identification information including the location of the plugged hole. The underground pipeline ties are usually plugged and left in place. The well pad and access road, if not needed for other

purposes, would be re-contoured and re-vegetated as specified in the approved COAs and ROW grant stipulations in order to diminish evidence of the previous activities.

2.1.5. Design Features

Field resource investigations of the proposed well pad were conducted on February 13, 2013 and March 13, 2014 by specialists from the BLM and SME Environmental, Inc. At the onsite inspection, all areas of proposed surface disturbance were inspected to ensure that potential effects to natural resources would be minimized. Additional resource protection design features determined at the March 13, 2014 onsite include:

- All project activities will be confined to the permitted areas only.
- No construction, drilling, or completion activities shall be conducted between February 1 and June 30 to protect nearby nesting golden eagles unless the FFO determines that the young of the year have fledged and left the area, or that surveys have conclusively determined the nest is not active.
- All available topsoil, along with trees, brush, and slash, will be stockpiled for redistribution during reclamation. This will improve the success of revegetation and reduce erosion.
- Excavated materials from the cuts shall be used on the fill portions of the location.
- A stormwater diversion ditch will be constructed above the cut slope on the southeast side of the proposed well pad in order to drain stormwater to the north and south around the pad. This will minimize erosion in the project area and improve reclamation success.
- Cut material from the reserve and burn pits will be stockpiled on the location or used to construct the back-walls of the burn pit.
- The reserve pit will be lined with an impervious material, at least 20 mils thick in order to reduce the risk of groundwater contamination.
- All pits and holes on the proposed well pad will be fenced to exclude livestock and wildlife in order to prevent injury to animals.
- Pits that contain petroleum will be netted to exclude birds, especially any protected under the Migratory Bird Treaty Act (MBTA).
- Large permanent storage tanks will have a secondary containment structure in order to contain any accidental leaks from the tank thereby protecting surface and ground water resources.
- Fluids either stored on location or associated with the pipeline will be contained in tanks during all operations in order to reduce the risk of soil and water contamination.
- Escape ramps suitable for wildlife and livestock will be constructed every 100 feet in pipeline trenches left open overnight.
- The existing access road will be crowned, ditched and upgraded to meet BLM “Gold Book” standards. This will reduce erosion and improve the integrity of the road.
- The proposed access road will be constructed and maintained to BLM “Gold Book” standards. This will include, but is not limited to, culverts, as well as crowning and ditching.
- One 24” diameter corrugated metal pipe culvert will be installed in the proposed access road where it enters the proposed well pad. A second 24” culvert would be placed in the proposed access road where it leaves the existing roadway.
- One 24” minimum diameter corrugated metal pipe culvert will be installed in the existing access road west of Corner 5 (west corner) of the proposed well pad to create cross drainage and reduce erosion along the road. The road will need to be built-up above the grade of the surrounding area in order to create effective cross drainage. Material will be sourced from other areas of the existing access road that will require grading as part of proposed maintenance.
- Additional culverts for the access road and other necessary hydrologic BMPs will be installed as necessary for proper drainage and sediment management.
- Upon interim reclamation, the reserve and blow pits will be filled utilizing existing disturbance only.
- Slopes to be reclaimed will be re-contoured to pre-construction topographical contours.
- All disturbed areas not needed for vehicle travel surfaces or aboveground production equipment will be reclaimed and seeded as described in Appendix D.
- Removed topsoil and vegetation will be placed on reclamation areas to aid in re-vegetation and erosion control. Small trees and brush may be shredded and incorporated into the redistributed topsoil.

- It would be the operator's responsibility to monitor, control, and eradicate all invasive, non-native plant species within the proposed project area throughout the life of the proposed project. The operator would contact the BLM-FFO regarding acceptable weed-control methods. If the operator does not hold a current Pesticide Use Permit, a Pesticide Use Permit would be submitted prior to pesticide application. Only pesticides authorized for use on BLM lands would be used. The use of pesticides would comply with federal and state laws. Pesticides would be used only in accordance with their registered use and limitations. The operator would contact the BLM-FFO prior to using these chemicals. (Appendix D of the BLM/FFO Bare Soil Reclamation Procedures (BLM 2013b)).
- Aboveground equipment, specifically tanks, will be low profile to reduce visual effects.
- Above ground structures shall be painted to blend with the natural color of the landscape. Paint color will be Covert Green as depicted on BLM's Standard Environmental Colors Chart (BLM Publication BLM/WY/ST-08/015+8450).

Standard FFO stipulations to be included herein as design features include, but are not limited to:

- All aspects of the proposed action will be in compliance with all applicable federal and State of New Mexico regulations.
- All pits will meet State of New Mexico, Oil Conservation Division (NMOCD) pit guidelines and requirements, NMAC 19.15.17.
- Any compressors installed onsite will be limited to emissions of no more than 2 grams per horsepower-hour of nitrogen oxides (NOx) for engines of 300 horsepower or less to limit cumulative air quality effects.
- All FFO cultural resources stipulations will be followed as indicated in the Cultural Resource Records of Review, attached to the COA in the APD/ROW as the case may be. These stipulations may include, but are not limited to temporary or permanent fencing or other physical barriers, monitoring of earth disturbing construction, project area reduction and/or specific construction avoidance zones, and employee education. All employees, contractors, and sub-contractors of the project will be informed by the project proponent that cultural sites are to be avoided by all personnel, personal vehicles, and company equipment, and that it is illegal to collect, damage, or disturb cultural resources, and that such activities are punishable by criminal and or administrative penalties under the provisions of the Archaeological Resources Protection Act (16 U.S.C. 470aa-mm). In the event of a cultural resources discovery during construction, the project proponent will immediately stop all construction activities in the immediate vicinity of the discovery and immediately notify the archaeological monitor, if present, or the BLM. The BLM would then evaluate or cause the site to be evaluated. Should a discovery be evaluated as significant (e.g., National Register, NAGPRA, ARPA), it will be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.
- If impacts to federally threatened, endangered, proposed, or candidate species; FFO Special Management Species; or migratory birds, nests, or eggs are observed during the implementation of the proposed action, the FFO will be notified, and specific mitigation measures directed at the species' needs will be implemented under the direction of the FFO.
- If an active bird nest is observed during construction, construction activities that could result in take as defined by the MBTA would halt until practicable or reasonable avoidance alternatives are identified, the birds have fledged, or a migratory bird take permit has been granted from the USFWS.
- If significant amounts of chemicals are stored on-site, governmental agencies will be notified as required under the Emergency Planning and Community Right to Know Act (1986). The notification of releases such as natural gas, natural gas liquids, and petroleum, outside the facility site is required under the Comprehensive Environmental Response Compensation and Liability Act, 1980 (CERCLA) and under BLM NTL-3A. The well location will have an informational sign, as directed under 43 CFR 3160.
- All FFO paleontological resources stipulations will be followed as indicated in the COAs attached to the APD. All employees, contractors, and sub-contractors of the project will be informed by the project proponent that paleontological sites are to be avoided by all personnel, personal vehicles, and company equipment, and that it is illegal to collect, damage, or disturb the resource. Such activities are punishable by criminal and or administrative penalties under the provisions of the Paleontological

Resources Preservation Act of 2009 (Sections 6301-6312 of the Omnibus Public Lands Act of 2009, 16 USC 470aaa).

2.2. No Action

The No Action alternative would deny the approval of the proposed application, and the current land and resource uses would continue to occur in the proposed project area. No mitigation measures would be required. The No Action Alternative provides a baseline reference, enabling decision makers(s) to compare the magnitude of environmental effects of the alternatives.

2.3. Alternatives Considered but Eliminated from Detailed Study

Alternatives to the proposed action are developed to explore different ways to accomplish the purpose and need while responding to potentially controversial issues related to the proposed action. Alternatives to the proposed action were considered. No other reasonable alternatives to the proposed action were apparent during or after the on-site of the Sunray 1M project.

Numerous alternative well locations were previously investigated for the proposed well. Initially, an attempt was made to twin or co-locate existing well pads west of the currently proposed well location. It was determined that twinning or co-locating the nearby Sunray No. 2 was not possible as the proposed well would have been located in a large depression which contains an ephemeral drainage. There would not be enough material to build the pad up to the level of the existing pad, and the ephemeral drainage would have to be diverted around the entire pad. It was for these reasons that this location was determined to be impractical.

Two other alternative locations would have utilized the Sunray No. 7 or Sunray No. 210 well locations. It was determined in the field, however, that there was no space to adequately locate the proposed well. Each of the existing wells is adjacent to existing pipeline infrastructure and very steep topography. Twinning or collocating one of these wells would require excessive amounts of fill material from an offsite location and the relocation of pipelines not owned or operated by Burlington.

A fourth alternative location was staked south of the proposed location in the vicinity of the proposed bottom hole location. The location was staked in an area of steep adobe soils that were heavily bisected by a number of drainages. A well pad in this location would have required a longer access road and pipeline, extensive cutting, and filling and would have required the diversion of a number of drainages. It was determined upon field investigation of the staked location, that the alternative location would be difficult to maintain due to excessive erosion potential, and the currently proposed location would be preferable as there would be less impact on local resources including topography, hydrology, and vegetation.

No other alternatives were identified that would create less disturbance to the human environment while facilitating an appropriate location suitable to reach the targeted formation and drilling window.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the environment that would be affected by implementation of the proposed action and any alternatives described in Section 2. The No Action alternative reflects the current situation within the project area and will serve as the baseline for comparing the environmental impacts of the analyzed alternatives. Aspects of the affected environment described in this section focus on the relevant major resources or issues.

3.1. Air Resources

3.1.1. Affected Environment

The proposed well is located in San Juan County, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the Farmington PRMP/FEIS. In addition, new information about greenhouse gases (GHGs), and their effects on national and global climate conditions has emerged since this document was prepared. On-going scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO_2) methane (CH_4); nitrous oxide (N_2O); water vapor; and several trace gases on global climate. Through complex interactions on a global scale, GHG emissions may cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably, and may contribute to overall climatic changes, typically referred to as global warming.

Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Quality Technical Report; BLM 2013). This document summarizes the technical information related to air resources and climate change associated with oil and gas development and the methodology and assumptions used for analysis.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including six nationally regulated ambient air pollutants (criteria pollutants). These criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2) and lead (Pb). EPA has established National Ambient Air Quality Standards (NAAQS) for criteria air pollutants. The NAAQS are protective of human health and the environment. EPA has approved New Mexico's State Implementation Plan and the state enforces state and federal air quality regulations on all public and private lands within the state, except for tribal lands and within Bernalillo County. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. EPA has proposed or completed actions recently to implement Clean Air Act requirements for greenhouse gas emissions. Climate has the potential to influence renewable and non-renewable resource management.

Air Quality

Criteria Air Pollutants

The Air Quality Technical Report describes the types of data used for description of the existing conditions of criteria pollutants, how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current national and state standards (BLM 2013). The EPA Green Book web page reports that all counties in the analysis area, San Juan, McKinley, Rio Arriba, and Sandoval Counties in New Mexico and La Plata County, Colorado, are in attainment of all National Ambient Air Quality Standards (NAAQS) as defined by the Clean Air Act. The area also does not violate

any New Mexico Ambient Air Quality Standards (NMAAQS). The current criteria pollutant "design concentrations" in the analysis area are described below. Design Concentrations are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. **Error! Reference source not found.** shows monitored design values for ozone in recent years for each of the three San Juan County ozone monitoring stations.

Table 2. Reported Ozone Values for San Juan County Ozone Monitoring Stations

State Air Monitoring Station	8-hour Ozone Design Value (ppm[1])				NAAQS[2]
	2007-2009	2008-2010	2009-2011	2010-2012	2008
Substation	0.067	0.063	0.063	0.067	0.075
Bloomfield	0.061	0.060	0.061	0.067	0.075
Navajo Lake	0.069	0.066	0.068	0.071	0.075

Source: United State Environmental Protection Agency Air Quality System Preliminary Design Value Report, Mar. 22, 2013
(1) parts per million
(2) NAAQS – National Ambient Air Quality Standards

Error! Reference source not found.3 summarizes monitored design values for other criteria pollutants in San Juan County.

Table 3. Criteria Pollutant Design Value Concentrations monitored in San Juan County

Pollutant	Design Value	Averaging Time	NAAQS	NMAAQS
NO_2	13 ppb	Annual	53 ppb	50 ppb
NO_2	39 ppb	1-hour	100 ppb[1]	0.10 ppm (24-hour)
PM_{10}	Data incomplete	24-hour	150 µg/m^3 [3]	150 µg/m^3 [2,3]
$PM_{2.5}$	4.5µg/m^3	Annual	12 µg/m^3 [2,4]	60 µg/m^3 [2,3]
$PM_{2.5}$	14µg/m^3	24-hour	35 µg/m^3 [1,2]	
SO_2	0.001ppm	Annual	None	0.02 ppm
SO_2	20ppb	1-hour	75 ppb[5]	None
SO_2	0.008 ppm	24-hour	None	0.10ppm

Source: EPA, 2012
(1)98th percentile, averaged over 3 years
(2)Not to be exceeded more than once per year on average over 3 years
(3)The NMAAQS is a standard for total suspended particulate matter
(4)Annual mean, averaged over 3 years
(5)99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

In 2005, the EPA estimated that there was less than 0.01 ton per square mile of lead emitted in the analysis area, which is less than 2 tons total (BLM 2013). There is no monitoring conducted for lead and CO in northwestern New Mexico; however, concentrations of these pollutants are expected to be low in rural areas and are therefore not monitored.

Hazardous Air Pollutants

The Air Quality Technical Report discusses the relevance of hazardous air pollutants (HAPs) to oil and gas development and the particular HAPs that are regulated in relation to these activities (BLM 2013). EPA has identified 187 toxic air pollutants as HAPs. In March 2011, the EPA published the fourth in a series of National Scale Air Toxics Assessments (NATA) that quantifies HAP emissions for 2005 by U.S. counties. The purpose of the NATA is to identify areas where HAP emissions result in high health risk. Computer models are used to develop estimates of risk of cancer or other health impacts. NATA presents risk hazard indexes for cancer, neurological, and respiratory problems for each county and census tract. Because techniques have changed over the years, each NATA is not comparable to those previously issued. EPA also cautions that because data availability varies from state to state, the results are not necessarily comparable from one geographic area to another. The 2005 NATA analysis estimated tract level total cancer risk for the analysis area as 25 to 50 per one million, and the estimated tract level total respiratory hazard index was zero to 1. The EPA estimates the average national cancer

risk for 2005 was 50 per one million, meaning 1 person out of every 20,000 had an increased likelihood of contracting cancer from breathing air toxics from outdoor sources if exposed to 2005 emission levels over their lifetime. A respiratory hazard index below 1 indicates that exposures in the area do not exceed reference levels that would have adverse effects for human health.

Climate

The analysis area is located in a semiarid climate regime typified by dry windy conditions and limited rainfall. Summer maximum temperatures are generally in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100°F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico. **Error! Reference source not found.** shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 4. Climate Normals for the Farmington Area, 1981-2010

Month	Average Temperature (^{O}F [(1)])	Average Maximum Temperature (^{O}F)	Average Minimum Temperature (^{O}F)	Average Precipitation (inches)
January	30.5	40.8	20.3	0.53
February	35.8	46.8	24.8	0.59
March	43.2	56.1	30.3	0.78
April	50.4	64.7	36.2	0.65
May	60.4	74.8	46.1	0.54
June	69.8	85.1	54.5	0.21
July	75.4	89.6	61.2	0.90
August	73.2	86.5	59.8	1.26
September	65.4	79.1	51.7	1.04
October	53.3	66.4	40.1	0.91
November	40.5	52.2	28.8	0.68
December	31.0	41.2	20.7	0.50

Source: BLM 2013; data collected at New Mexico State Agricultural Science Center - Farmington
[(1)] degrees Fahrenheit

3.1.2. Impacts from the Proposed Action

Methodology and assumptions for calculating air pollutant and greenhouse gas emissions are described in the Air Resources Technical Report (BLM 2013). This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one conventional gas well. The calculators give an approximation of criteria pollutant, HAP, and greenhouse gas (GHG) emissions to be compared to regional and national emissions levels (BLM 2013). Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (BLM 2013).

Direct and Indirect Impacts

Criteria Air Pollutants

Error! Reference source not found.5 shows estimated emissions from one proposed conventional gas well for criteria pollutants, volatile organic compounds (VOC), and greenhouse gasses (GHG). For comparison, **Error! Reference source not found.** shows total human-caused emissions for each of the counties in the FFO and La Plata County, Colorado, based on USEPA's 2008 emissions inventory (USEPA 2011).

Table 5. Criteria Pollutant and VOC Emissions Estimated for Construction of One Conventional Gas Well; Average 9 Days to Drill and Complete

Activity	NOx	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH4	CO2
One time operations (tons)*								
Construction	1.98	0.54	0.18	0.90	0.10	0.04	0.003	215.55
Completion	0.18	0.04	0.01	0.01	0.01	-	-	19.80
Interim Reclamation	0.006	0.006	0.006	0.001	-	0.003	-	1.24
Final Reclamation	0.008	0.008	0.008	0.001	-	0.004	-	1.66
Ancillary Operations (tons)								
Workover	0.129	0.04	0.01	0.01	0.01	-	-	10.59
Road Maintenance	-	-	-	-	-	-	-	0.26
Road Traffic	-	-	-	-	-	-	-	0.06
Annual operations (tons/yr)								
Equipment Leaks	-	-	-	-	-	-	0.013	-
Field Compression	0.14	0.29	0.10	0.01	0.01	-	-	19.30
Total	**2.44**	**0.92**	**0.31**	**0.93**	**0.13**	**0.05**	**0.02**	**268.46**

Table 6. Analysis Area Emissions in Tons/Year, 2008

County	NOX(1)	CO(2)	VOC(3)	PM_{10}(4)	$PM_{2.5}$(5)	SO_2(6)
McKinley	12,595.0	31,885.2	37,509.0	66,590.7	6,977.5	1,659.8
Rio Arriba	4,276.6	27,352.9	45,841.5	46,321.6	4,746.2	89.1
San Juan	35,651.7	54,549.5	46,994.9	69,655.7	8,108.3	11,471.0
Sandoval	4,780.1	33,290.5	31,733.6	36,232.3	4,056.3	123.4
Total	**57,303.4**	**147,078.1**	**160,079**	**218,800.3**	**23,897.3**	**13,343.3**

Source: EPA 2008 National Emissions Inventory (http://www.epa.gov/ttn/chief/net/2008inventory.html)
(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(6) SO_2 – sulfur dioxide

Error! Reference source not found. displays the percent increase in total emissions in the analysis area from the proposed action to construct and operate one conventional gas well.

Table 7. Percent Increase in Analysis Area Emissions from the Proposed Action

	NOX(1)	CO(2)	VOC(3)	PM_{10}(4,5)	$PM_{2.5}$(5,6)	SO_2(5,7)
Total Emissions	57,303.4	147,078.1	160,079.0	218,800.3	23,897.3	13,343.3
Conventional Gas Well Emissions	2.44	0.92	0.31	0.93	0.13	0.05
Percent Increase	**.004**	**.0006**	**.0002**	**.0004**	**.0005**	**.0004**

(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.
(6) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(7) SO_2 – sulfur dioxide

Hazardous Air Pollutants

The formulas used for calculating HAPs in the calculators are very imprecise. For many processes, it is assumed that emission of HAPs will be equivalent to 10 percent of VOC emissions. Therefore, the estimated HAP emissions of 0.031 tons/year reported here should be considered a very gross estimate.

Total Greenhouse Gases

The available statewide GHG summary (NMED 2010) combines GHG emissions from CO_2 and CH_4. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, CO_2e emissions for both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO_2e (76.2 million metric tons; NMED 2010). The estimated CO_2e metric tons emissions from one conventional gas well (243.5 metric tons) would represent a 0.0003 percent increase in New Mexico CO2 emissions.

Cumulative Impacts

The FFO manages Federal hydrocarbon resources in San Juan, Sandoval, Rio Arriba, and McKinley counties. There are approximately 23,522 wells in the San Juan Basin. About 16,435 of the wells in these counties are Federal wells. Analysis of cumulative impacts for reasonable development scenarios and RFDS of oil and gas wells on public lands in the FFO was presented in the 2003 RMP. This included modeling of impacts on air quality. A more detailed discussion of Cumulative Effects can be found in the Air Resources Technical Report (BLM 2013).

The primary activities that contribute to levels of air pollutant and GHG emissions in the Four Corners area are electricity generation stations, fossil fuel industries, and vehicle travel. The Air Quality Technical Report includes a description of the varied sources of national and regional emissions that are incorporated here to represent the past, present, and reasonably foreseeable impacts to air resources (BLM 2013). It includes a summary of emissions on the national and regional scale by industry source. Sources that are considered to have notable contributions to air quality impacts and GHG emissions include electrical generating units, fossil fuel production (nationally and regionally), and transportation.

The emissions calculator estimated that there could be very small direct and indirect increases in several criteria pollutants, HAPs, and GHGs as a result of implementing the proposed alternative. The very small increase in emissions that could result would not be expected to result in exceeding the NAAQS for any criteria pollutants in the analysis area.

The very small increase in GHG emissions that could result from implementing the proposed alternative would not produce climate change impacts that differ from the No Action alternative. This is because climate change is a global process that is impacted by the sum total of GHGs in the Earth's atmosphere. The incremental contribution to global GHGs from the action alternatives cannot be translated into effects on climate change globally or in the area of this site-specific action. It is currently not feasible to predict with certainty the net impacts from the action alternatives on global or regional climate.

The Air Resources Technical Report (BLM 2013) discusses the relationship of past, present, and future predicted emissions to climate change and the limitations in predicting local and regional impacts related to emissions. It is currently not feasible to know with certainty the net impacts from particular emissions associated with activities on public lands.

3.2. Groundwater Resources

3.2.1. Affected Environment

The proposed project area overlays the Uinta-Animas aquifer. The Uinta-Animas aquifer contains fresh to moderate saline water. In general, areas of the aquifer that are recharged by infiltration from precipitation or surface water sources contain relatively fresh water. Groundwater depth in the project

area was researched utilizing the Office of the State Engineer's (OSE) New Mexico Water Rights Reporting System database and New Mexico Oil Conservation Division (OCD) online records for other nearby gas wells (Don Turietta 1, Hill 1A, and Sunray 2, 2A, 7, & 210). OCD records of four cathodic wells associated with nearby gas wells show ground water depth to range between 50 and 370 feet deep at 630 feet to 850 feet west of the proposed well site. OSE data of the seven nearest permitted water wells (1.6 miles to 2.4 miles away) shows an average depth to ground water of 110 feet. Water for drilling will be sourced from the Manzanares Water Well #1.

3.2.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Stimulation (i.e., hydraulic fracturing or "fracking") is a process used to maximize the extraction of underground resources by allowing oil or natural gas to move more freely from the rock pores to production wells that bring the oil or gas to the surface. Fluids, commonly made up of water (99 percent) and chemical additives (1 percent), are pumped into a geologic formation at high pressure during hydraulic fracturing (USEPA 2004). Chemicals added to stimulation fluids may include friction reducers, surfactants, gelling agents, scale inhibitors, acids, corrosion inhibitors, antibacterial agents, and clay stabilizers. When the fracking pressure exceeds the rock strength, the fluids open or enlarge fractures that typically extend several hundred feet away from the well bore, and may occasionally extend up to 1,000 feet from the well bore. After the fractures are created, a propping agent (usually sand) is pumped into the fractures to keep them from closing when the pumping pressure is released. After fracturing is completed, a portion of the injected fracturing fluids returns to the wellbore and is recovered for future fracturing operations (USEPA 2004) or disposal. Stimulation techniques have been used in the United States since 1949 and in the San Juan Basin since the 1950s. Over the last 10 years, advances in multi-stage and multi-zone hydraulic fracturing have allowed development of gas fields that previously were uneconomic, including the San Juan Basin.

Hydraulic fracturing is a common process in the San Juan Basin and applied to nearly all wells drilled. The producing zone targeted by the proposed action is well below any underground sources of drinking water. No impacts to freshwater-bearing groundwater aquifers are expected to occur from hydraulic fracturing of this proposed well.

Cumulative Impacts

No cumulative impacts to usable groundwater aquifers are expected as no direct or indirect impacts are expected.

3.3. Upland Vegetation

3.3.1. Affected Environment

Vegetation within the proposed project area is comprised of a sagebrush (*Artemesia tridentata*) shrubland with a grassy understory. There are approximately 435,500 acres of sagebrush or desert scrub habitat in the BLM/FFO planning area (BLM 2003a, pg 3-31). Slopes surrounding the small bench on which the project is situated are dominated by coniferous woodland. Approximately three small juniper (*Juniperus osteosperma*) trees are located in the immediate project area. BLM GIS data does not show that the project area has been treated in any way to reduce sagebrush cover, but field analysis shows many of the sagebrush shrubs within the majority of the project area to be dead as if treated with a woody shrub herbicide such as Tebuthiuron. In these areas, live vegetative cover is dominated by cheatgrass (*Bromus tectorum*) a class 3 noxious weed. Other prominent plant species in the project area include galleta grass (*Hillaria jamesii*), broom snakeweed (*Gutierreza sarothroe*), yucca (*Yucca baccata*), and alyssum (*Alyssum simplex*), an introduced non-native species. The overall vegetative cover for the proposed project is 60 percent. See Appendix C for a detailed list of vegetation observed in the project area.

3.3.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Effects to vegetation would result from the removal and modification of vegetation. Construction of the proposed action would result in 3.26 acres of surface disturbance. The proposed action would remove all vegetation within the 3.26 acres of the proposed action area. Approximately 3.22 acres of new surface disturbance would remove previously undisturbed native vegetation. The remainder of the proposed action would disturb a native surface dirt road. The area of native vegetation to be removed would be minimal relative to the overall area of similar habitat in the FFO planning area. With the implementation of design features, the proposal is projected to have moderate short and low long term effects on area vegetation.

Following completion of the proposed well, disturbed areas not needed for operations and vehicular traffic will be immediately re-contoured and seeded with an FFO prescribed seed mixture (approximately 1.56 acres). The re-establishment of vegetation is expected to take at least three (3) to five (5) growing seasons, depending on precipitation. Initial vegetation in interim reclaimed areas is likely to be dominated by grasses of the reclamation seed mix and ruderal forbs. Natural re-establishment of the native sagebrush shrubland may take 15 to 30 years (Bunting 1984). During the production phase of the proposed well, vehicular activity would be restricted to the existing and proposed access roads and turn-around area on the proposed well pad. The remaining long term disturbances will be reclaimed upon final project abandonment as outlined in the APD COAs and pipeline ROW grant stipulations.

Cumulative Impacts

Past, present, and reasonably foreseeable actions affecting vegetation in the action area can include wildfires, prescribed fires, mechanical and chemical vegetation treatments, grazing, recreation, firewood gathering, and oil and gas development. There was no evidence of recent wildfires in the action area, and BLM GIS data of known fires does not indicate any documented wildfires or prescribed burn in the action area in recent history. As described above, an herbicide may have been applied in the action area in the past. There were also no signs of effects to vegetation from recreation or firewood gathering in the action area.

Analysis of cumulative effects for reasonably foreseeable development of 9,942 new oil and gas wells on public lands in the San Juan Basin was presented in the Farmington PRMP/FEIS, Chapter 4. This proposed action is included in the total analyzed. The reasonably foreseeable development scenario developed for the Farmington RMP demonstrated 522 wells would be drilled annually for federal minerals. Current APD permitting trends within the FFO confirm that these assumptions are still accurate.

Total surface disturbance projected by the PRMP/FEIS was 18,577 acres with 805 miles of new roads over twenty years. The Upper San Juan watershed, where the proposed action is located, contains approximately 657,318 acres with an estimated 3,853 existing oil and gas wells and 24,978 acres of existing long-term oil and gas disturbance (BLM 2003a). Based on the reasonable foreseeable development predictions in the 2003 RMP/FEIS, the projected number of wells with potential to occur in the Upper San Juan watershed is estimated to increase to 6,001 wells, an increase of 2,148 wells. With the addition of these wells and approximately 174 miles of well roads, future long-term disturbance is estimated to increase by 5,717 acres to 30,695 acres. The proposed action, at 1.66 acres of long-term disturbance, would add to the existing and future disturbance by less than 0.01%. Proposed new long term surface disturbance would not have a noticeable incremental impact on vegetation when added to other past, present, and reasonably foreseeable oil and gas development related impacts to vegetation.

The incremental effects on vegetation when added to ongoing livestock grazing would not be noticeable due to the limited scope of the proposed action and BLM management oversight of grazing activities in the action area. The proposed action would not have a noticeable incremental impact on vegetation when added to other past, present, and reasonably foreseeable actions.

3.4. Migratory Birds

3.4.1. Affected Environment

Executive Order 13186 dated January 17, 2001 calls for increased efforts to more fully implement the Migratory Bird treaty Act of 1918. In keeping with this mandate, the BLM/FFO has issued an interim policy to minimize unintentional take as defined by the EO 13186 and to better optimize migratory bird efforts related to BLM/FFO activities (BLM 2010). In keeping with this policy, a list of priority birds of conservation concern which occur in similar eco-regions as the proposed action area was compiled through a review of existing bird conservation plans including:

- Fish and Wildlife Service (USFWS) Birds of Conservation Concern (BCC)
- New Mexico Partners in Flight (NMPIF) New Mexico Bird Conservation Plan
- Comprehensive Wildlife Conservation Strategy for New Mexico (CWCS)
- Gray Vireo Recovery Plan
- The North American Waterbird Conservation Plan
- Recovery plans and conservation plans/strategies prepared for federally-listed candidate species.

The selected species have a known distribution in the FFO area and may be affected by various types of perturbations. These species and a brief assessment of their habitat are as follows:

Table 8. Migratory Birds with Potential to Occur in the Proposed Action Area

Species Name	Habitat Associations	Potential to Occur in the Proposed Action Area
Bendire's thrasher (*Toxostoma bendirei*)	On the Colorado Plateau, inhabits open sagebrush with scattered junipers; sparse or degraded understory, lower elevations. Avoids riparian areas and arroyos with dense shrub cover	There is no dry open habitat typical of the preferred habitat.
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	Grassy understory cover of project area not typical of preferred habitat.
Brewer's sparrow (*Spizella breweri*)	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.	Degraded sagebrush cover in the analysis area limits suitable habitat for the species.
Burrowing owl (*Athene cunicularia*)	Open grasslands or desert scrub. Presence of suitable nest burrow is critical prerequisite (often prairie dog burrows).	There were no suitable burrows present within the study area.
Ferruginous hawk (*Buteo regalis*)	Grasslands and semi-desert shrub; occasionally piñon-juniper edge habitat.	Proposed action area contains limited suitable habitat for foraging, no nesting habitat.
Golden eagle (*Aquila chrysaetos*)	Open habitats including grasslands, sagebrush, farmlands, and tundra. Nests in cliffs or occasionally trees in rugged country.	Proposed action area contains limited suitable habitat for foraging, suitable nesting habitat occurs ¼ mile to the west; known nesting occurs 0.3 mile to the west.
Gray vireo (*Vireo vicinior*)	In northern NM, stands of piñon pine and Utah juniper 5800 - 7200 ft, open with a shrub component and mostly bare ground; antelope bitterbrush, mountain mahogany, Utah serviceberry and big sagebrush often present. Broad, flat or gently sloped canyons, in areas with rock outcroppings, or near ridge-tops.	Suitable habitat may occur in the piñon-juniper woodlands fringing the analysis area.
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.	Open foraging habitat is limited in the analysis area which is surrounded by woodland, nesting unlikely due to limited foraging habitat.
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.	Mix of woodland and open sagebrush-grassland in the analysis area provides suitable habitat for the species.

Species Name	Habitat Associations	Potential to Occur in the Proposed Action Area
Mourning dove (*Zenaida macroura*)	Open country, scattered trees, and woodland edges. Feeds on ground in grasslands and agricultural fields. Roost in woodlands in the winter. Nests in trees or on ground.	Open sagebrush-grassland and woodland edges in the analysis area could provide suitable habitat for the species.
Sage sparrow (*Amphispiza belli*)	Large and contiguous areas of tall and dense sagebrush. Negatively associated with seral mosaics and patchy shrublands and abundance of greasewood.	Lack of well developed sagebrush in the analysis area limits suitable habitat for the species.
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush. Positively correlated with sagebrush cover, shrub height, horizontal patchiness, and bare ground; negatively correlated with annual grass cover.	Lack of well developed sagebrush in the analysis area limits suitable habitat for the species.
Scaled quail (*Callipepla squamata*)	Brushy arroyos, cactus flats, sagebrush or mesquite plains, desert grasslands, Plains grasslands, and agricultural areas. Good breeding habitat has a diverse grass composition, with varied forbs and scattered shrubs.	Lack of significant open plains limits suitable habitat.
Swainson's hawk (*Buteo swainsoni*)	A mixture of grassland, cropland, and shrub vegetation; nests on utility poles and in isolated trees in rangeland. Nest densities higher in agricultural areas.	Open sagebrush-grassland is limited in the analysis area, nesting unlikely.
Vesper sparrow (*Pooecetes gramineus*)	Dry montane meadows, grasslands, prairie, and sagebrush steppe with grass component; nests on ground at base of grass clumps.	Open sagebrush-grassland is limited in the analysis area, but may provide limited suitable habitat.

A complete list of migratory birds observed in the project area can be found in Appendix C.

3.4.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The proposed action would remove approximately 3.22 acres of degraded sagebrush shrubland with a prominent short grass component. Approximately 3 small juniper trees would be removed. The removal of project area sagebrush-grassland could decrease potential foraging habitat for birds such as the mountain bluebird that frequent such habitats. The amount of projected habitat removal is negligible when compared to the total amount of available habitat. Based on the information available from the North American Breeding Bird Survey routes, it appears that the likelihood of more than one migratory bird nest in the project area is low. No old nests or other signs of nesting from previous breeding seasons were detected during the biological surveys conducted March 13, 2014.

Direct effects to adult birds are unlikely due to their agility and ability to avoid equipment and activities. Direct effects to nests, eggs, or young could be avoided through resource specific stipulations and design features. Indirect effects on birds in the project area are difficult to predict. Ongoing studies have shown mixed effects of oil and gas development, including compressor noise on nesting migratory birds. Frances and Ortega (2006 unpublished report to BLM) found no significant difference in nest density or nest success between sites with or without wellhead compressors. Some species, such as black-chinned hummingbird (*Archilocus alexandri*) and house finch (*Carpodacus erythrinus*), were more common on sites with compressors while others, such as mourning dove (*Zenaida macroura*) and spotted towhee (*Pipilo erythrophthalmus*), appeared to either avoid or nest further from compressors. Holmes and King (2006) found that sage sparrow had lower nest survival in an area with ongoing gas development, while Brewer's sparrow (*Spizella breweri*) had higher survival rates when compared with populations in an undeveloped control area. Short term construction activities may temporarily disrupt birds and bird nesting. Long term disturbance within the project area would be negligible and would be associated with intermittent noise from well equipment and periodic maintenance activities.

Due to the limited scope of the proposed action, the relatively small area of disturbance, and the availability of adjacent suitable habitat, the anticipated effects on migratory bird populations and species as a whole would be low in the short term and long term.

If an active nest is observed during construction, construction activities that could result in take as defined by the MBTA would halt until practicable or reasonable avoidance alternatives are identified, the birds have fledged, or a migratory bird take permit has been granted from the USFWS.

Cumulative Impacts

Past, present, and reasonably foreseeable actions affecting migratory birds in the action area include vegetation treatments, grazing, hunting, and oil and gas development. Vegetation treatments, grazing and hunting in the action area are managed by the BLM and State of New Mexico respectively.

Cumulative effects to migratory birds could result from impacts to individual animals, loss of habitat, and fragmentation of habitat. Cumulative habitat loss and fragmentation can also decrease habitat functionality. The proposed action is unlikely to directly impact individual animals, but the proposed action would result in a minute incremental increase in habitat loss (Section 3.3.2 - Cumulative Effects). The cumulative effects of the proposed action from fragmentation would be limited as the proposed well lies immediately adjacent to an existing access road and across from an existing well pad.

3.5. Special Status Species

3.5.1. Affected Environment

In accordance with BLM Manual 6840, the Farmington Field Office of the Bureau of Land Management (FFO) has prepared a list of special management species to focus species management efforts toward maintaining habitats under a multiple use mandate, called FFO Special Management Species (SMS). The BLM manages certain sensitive species not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered in the future. The authority for this policy and guidance is established by the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and Department of Interior Manual 235.1.1A. FFO SMS and BLM Sensitive Species (SS) are listed below in Table 9.

Table 9, listed below, provides an evaluation of the potential for Special Management Species and Sensitive Species to occur in the proposed action area. None of these species were observed during the field survey of the proposed action, and their potential presence determination is based on evaluation of the proposed action area habitat and the known habitat requirements of the listed species. Refer to the Biological Survey Report prepared for the proposed action on file with the BLM/FFO for more information.

Table 9. Special Management Species (SMS) and Sensitive Species (SS) of the BLM/FFO and their Potential to Occur in the Action Area

Species	Conservation Status		Habitat Associations	Potential to Occur in the Proposed Action Area
	BLM/ FFO	New Mexico		
Mammals				
Spotted bat (*Euderma maculatum*)	SS	NM-T	Roost in cracks and crevices within rocky cliffs, typically near open water. Show apparent seasonal change in habitat, occupying ponderosa pine woodlands in the reproductive season and lower elevations at other times of the year.	Sandstone cliffs at the western edge of the action area may provide suitable roost habitat, water is lacking.

Species	Conservation Status		Habitat Associations	Potential to Occur in the Proposed Action Area
	BLM/ FFO	New Mexico		
Birds				
American peregrine falcon (*Falco peregrinus anatum*)	SMS	NM-T	Open country near lakes or rivers with rocky cliffs and canyons. Tall city bridges and buildings also inhabited.	Proposed action area contains some suitable habitat for foraging and nearby nesting.
Bald eagle (*Haliaeetus leucocephalus)*	SMS/ SS	NM-T	Near lakes, rivers and cottonwood galleries. Nests near surface water in large trees. May forage terrestrially in winter	Proposed action area does not contain suitable habitat for nesting, rare winter foraging possible.
Ferruginous hawk *(Buteo regalis)*	SMS		Grasslands and semi-desert shrub; occasionally piñon-juniper edge habitat. Nest on rock spires in NW New Mexico.	Proposed action area contains limited suitable habitat for foraging, nesting unlikely.
Golden eagle (*Aquila chrysaetos*)	SMS		In the West, mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and trees.	Nesting documented and species observed during field surveys. Proposed action area contains some suitable habitat for foraging.
Piñon jay (*Gymnorhinus cyanocephalus*)	SS		Large areas of piñon-juniper woodland. Reliant on piñon seeds.	Suitable woodland habitat may occur on the fringes of the action area. No suitable habitat occurs within or adjacent to the project area.
Prairie falcon *(Falco mexicanus)*	SMS		Arid, open country, grasslands or desert scrub, rangeland; nests on cliff ledges, trees, power structures.	Proposed action area contains limited suitable habitat for foraging and nearby nesting.
Plants				
Aztec gilia (*Aliciella formosa*)	SMS/ SS	NM-E	Salt desert scrub communities in soils of the Nacimiento Formation (5,000-6,000 ft).	No Nacimiento formation outcrops were observed in the proposed action area.
Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*)	SMS/ SS	NM-E	Sandy clay of the Nacimiento Formation in sparse shadscale scrub (5,000-6,000 ft).	No Nacimiento formation outcrops were observed in the proposed action area.

BLM/FFO 2008, BLM/FFO 2012

3.5.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The proposed action would not result in direct effects on any SMS/SS or their nests, burrows, or roosts. Indirect effects of the proposed action would include changes in vegetation composition and a temporary increase of human intrusion into the area with associated increases in noise, dust, and vehicle traffic. Construction and drilling activities would potentially displace raptor prey base species until the completion of drilling. Affected raptors could include American peregrine falcon, prairie falcon, golden eagle, bald eagle, and ferruginous hawk. With required design features to protect nesting golden eagles (Section 2.1.5), the effects to SMS/SS are anticipated to be low to negligible in the short and long term.

Cumulative Impacts

Past, present, and reasonably foreseeable actions affecting foraging raptors primarily include those actions that would affect prey species (primarily small mammals) and the habitat of prey species. Activities resulting in the alteration or removal of vegetation and to a lesser extent increased human activity could affect prey species. Past, present, and reasonably foreseeable actions affecting prey species in the action area include grazing and oil and gas development.

As described above in Section 3.3.2 (Cumulative Effects), the proposed action would result in a minute incremental increase in long-term surface disturbance when added to past, present, and reasonably foreseeable future oil and gas development. The incremental effects on the raptor prey base when added to ongoing livestock grazing would not be noticeable due to the limited scope of the proposed action and BLM management oversight of grazing activities in the action area. The proposed action would not have a noticeable incremental impact on SMS or SS when added to other past, present, and reasonably foreseeable actions.

3.6. Cultural Resources

3.6.1. Affected Environment

The proposed action is located within the archaeologically rich San Juan Basin of northwest New Mexico. In general, the history of the San Juan Basin can be divided into five major periods: PaleoIndian (ca. 10000 B.C. to 5500 B.C.), Archaic (ca. 5500 B.C. to A.D. 400), Basketmaker II-III and Pueblo I-IV periods (aka Anasazi; A.D. 1-1540), and the historic (A.D. 1540 to present), which includes Native American as well as later Hispanic and Euro-American settlers. Detailed descriptions of these various periods are provided in the Bureau of Land Management Farmington Field Office Final Environmental Impact Statement (2003) and will not be reiterated here. Additional information can also be found in an associated documented, Cultural Resources Technical Report (SAIC 2002).

Cultural sites vary considerably, and can include but are not limited to simple artifact scatters, domiciles of various types with a myriad of associated features, rock art and inscriptions, ceremonial/religious features, and roads and trails.

The entire Area of Potential Effect (APE) for the proposed action was archaeologically surveyed by La Plata Archaeological Consultants (LAC) at a BLM Class III level (100%) and a report was prepared and submitted to the BLM in accordance with the Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities (BLM 2005

The Class III inventory identified no cultural sites within the APE (LAC Report 2012-13LL, BLM Report 2013(II)023F).

3.6.2. Impacts from the Proposed Action

Direct and Indirect Impacts

There are no cultural sites within the APE. The proposed action will have no direct or indirect impacts on cultural sites.

Cumulative Impacts

There will be no negative cumulative impact on cultural resources as no cultural sites are present. A positive cumulative effect is the additional scientific information yielded by the archaeological survey.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

Table 10. Summary of Public Contacts Made During Preparation of the EA

Public Contact	Title	Organization	Present at Onsite?
None	NA	NA	NA

4.2. List of Preparers

Table 11. Summary of Document Preparers

ID Team Member	Title	Organization	Present at Onsite?
Mike Flaniken	Resource Protection Specialist	BLM	yes
Sam Jaquez	COPC Representative	Jaquez Consulting	yes
John Kendall	T&E Species Coordinator	BLM	no
Jeff Tafoya	Supervisory Rangeland Management Specialist	BLM	no
Nathan Kirker	Biologist	SME	yes
Jim Copeland	Archaeologist	BLM	no
Sheila Williams	District Botanist	BLM	no
Amanda Nisula	Planning & Environmental Coordinator	BLM	No
Dale Wirth	Branch Chief	LBM	no

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APPENDIX A. SURVEY PLATS

APPENDIX B. LAWS AND REGULATIONS THAT GOVERN FEDERAL OIL AND GAS DEVELOPMENT

Table B1. Laws and Regulations that Govern Federal Oil and Gas Development

LAW/REGULATION	RESOURCE PROTECTED	AUTHORITY
Clean Air Act (CAA)	Air Quality, Air Emissions and Permits.	New Mexico Environment Department (NMED)
Clean Water Act (CWA) 1977, as amended. Section 404 Permits.	Surface waters of the U.S., crossing/diversion of ephemeral washes	U.S. Army Corps of Engineers
Federal Water Pollution Control Act and Section 404 of the CWA.	Discharges into surface waters from point sources	New Mexico Water Quality Control Commission (NMWQCC)
Storm Water Pollution Prevention Plan (SWPPP), Section 402 of the CWA	Construction projects disturbing greater than 5 acres. Minimize erosion	USEPA
Safe Drinking Water Act 1974, as amended.	Surface and ground water	U.S. Environmental Protection Agency (USEPA)
Colorado River Salinity Control Act 1974, amendment of 1984: Public Law 93-320	Mandated Control of Salinity Runoff into the Colorado River Basin	BLM
Federal Land Management and Policy Act (FLPMA) of 1976.	BLM unique areas, ACECs. Issuing of energy related ROWS. Wilderness Areas	BLM
Surface Mining Control and Reclamation Act (SMCRA) of 1977.	Prime and Unique Farm Lands.	Natural Resource Conservation Service (NRCS)
Executive Order 11988 as amended.	Floodplains	All Agencies
Executive Order 11990.	Wetlands/Riparian Zones	All Agencies
Wild and Scenic Rivers Act of 1968 as amended.	Wild and Scenic Rivers	All Agencies
National Historic Preservation Act of 1966 as amended. Antiquities Act of 1906.	Cultural resources	All Agencies
American Indian Religious Freedom Act 1978. Native American Graves Protection and Repatriation Act (NAGPRA) 1990.	Native American Religious Concerns	All Agencies
Endangered Species Act (ESA) 1973 as amended. (Section 7)	Threatened and Endangered plant and animal species	U. S. Fish and Wildlife Service (U.S. FWS)
Bald and Golden Eagle Protection Act	Protection of Eagles	
Migratory Bird Treaty Act	Protection to Migratory Birds, Nests and Eggs.	U.S. FWS
National and New Mexico BLM Instruction Memoranda	BLM and New Mexico State Sensitive Species and Habitat.	BLM
Resource Conservation and Recovery Act (RCRA) of 1976	Use of Hazardous Materials	USEPA
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 660 as amended.	Use and Disposal of listed Hazardous Materials.	USEPA

LAW/REGULATION	RESOURCE PROTECTED	AUTHORITY
Executive Order #22898, February 1994.	Environmental Justice for environmental and health conditions in minority and low-income communities.	All Agencies
Federal Noxious Weed Act 1974, as amended and Executive Order 13112.	Designated Certain Plants as Noxious Weeds.	All Agencies
New Mexico Noxious Weed List	Noxious weeds for the State of New Mexico.	New Mexico Department of Agriculture.
Mineral Leasing Act (MLA) 1929, as amended. Associated Onshore Orders; National, State and Local.	Issue and managed federal oil and gas leases and related transportation pipelines.	BLM

APPENDIX C. PLANTS AND WILDLIFE OBSERVED IN THE PROJECT AREA

Table C1. Plant Species

Scientific Name	Common Name
Graminoid	
Bromus tectorum	Cheatgrass
Elymus elymoides	bottlebrush
Pleuraphis jamesii	Jame's galleta
Forbs	
Alyssum simplex	wild alyssum
Cymopterus bulbosus	spring parsley
Echinocereus triglochidiatus	Claret cup cactus
Erodium cicutarium	Redstem filaree
Gutierrezia sarothrae	Broom snakeweed
Salsola iberica	Russian thistle
Sisymbrium altissimum	tumble mustard
Shrubs	
Artemesia tridentata	Big sagebrush
Yucca baccata	banana yucca
Trees	
Juniperus osteosperma	Utah juniper

Table C2. Wildlife Species

Scientific Name	Common Name
Mammals	
Canis latrans	Coyote
Cervus elaphus	Elk
Lepus californicus	Black-tailed jackrabbit
Neotoma sp.	Wood rats, Pack rats
Odocoileus hemionus	Mule deer
Peromyscus sp.	Deer mouse
Sylvilagus sp.	Cottontail
Birds	
Aphelocoma coerulescens	Scrub jay
Aquila chrysaetos	Golden eagle
Baeolophus ridgwayi	Juniper titmouse
Corvus corax	Common raven
Sialia currucoides	Mountain bluebird

APPENDIX D. REVEGETATION PLAN

D.1. Site Description

The proposed project is located in an open shrubland dominated by sagebrush (*Artemesia tridentata*) and grasses. Previous disturbances include cattle grazing and possibly some type of herbicide application that impacted sagebrush vigor. SME did not identify any New Mexico Department of Agriculture listed Class A or Class B noxious weed species within the project area. See Appendix C of the Sunray 1M EA for a list of vegetation observed in the project area. The following photos of the project area were taken by an SME Environmental, Inc. (SME) biologist on March 13, 2014 prior to project implementation:

Figure D1. Photo from existing Sunray No. 2 well pad facing southeast towards the proposed well (arrow).

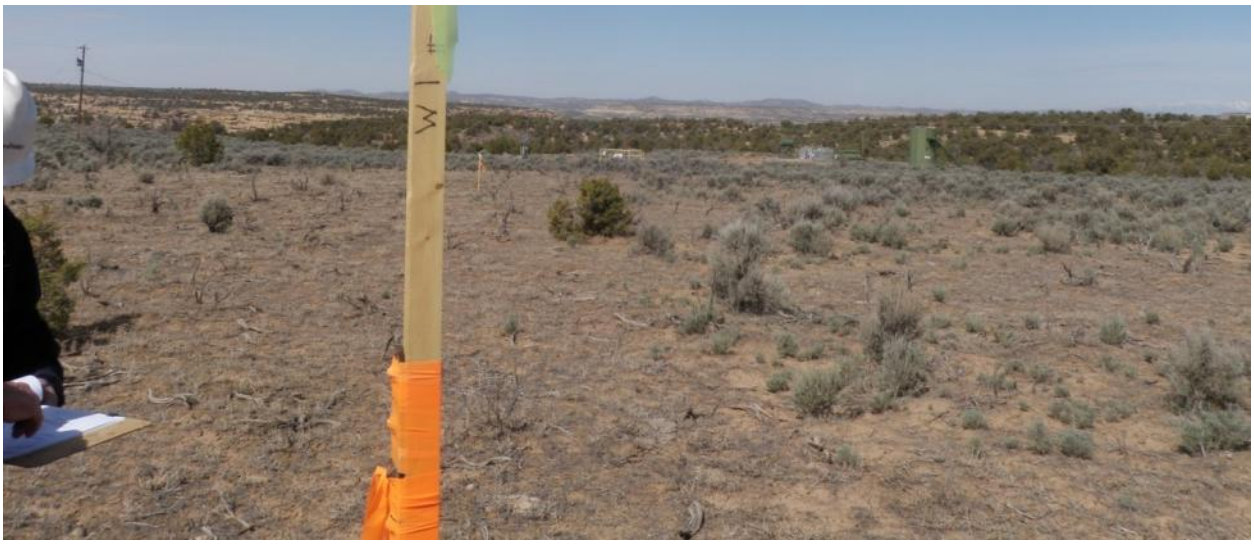

Figure D2. Photo from proposed wellhead stake facing northwest towards the Sunray No. 2 well pad.

Figure D3. Photo from proposed wellhead stake facing northeast. Note grassy understory. Grazing was evident in the general area of the well pad.

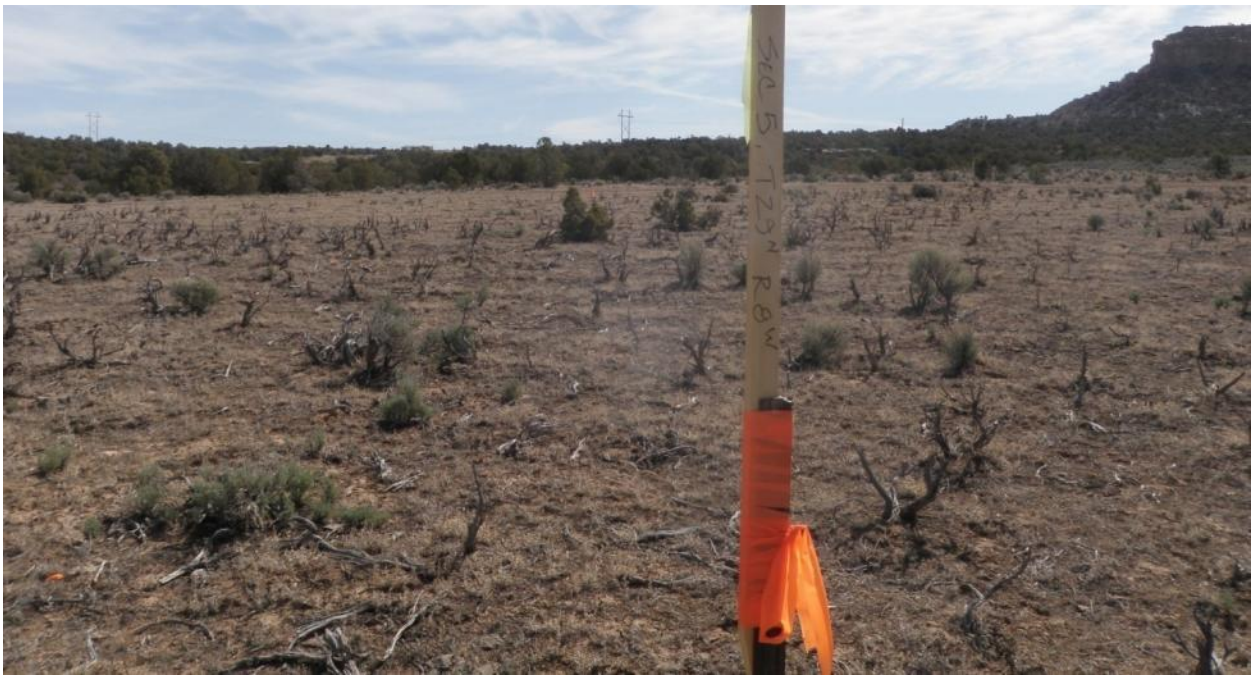

Figure D4. Photo from proposed wellhead stake facing southeast. Note many dead sagebrush stems.

D.1.1. Vegetation Community

A SME biologist, in coordination with BLM and the project proponent, determined the vegetation community within the proposed project area is best described by the **Sagebrush Community** based on observations made during the survey on March 13, 2014.

The sagebrush/grass vegetation community comprises approximately 551,198 acres (approximately 39%) of the Farmington Field Office (FFO) Area. This community is comprised primarily of Wyoming big sage with lesser amounts of basin big sage and minor areas of black sage. This plant community occupies vast areas of relatively open rolling hills to the south of Farmington and numerous mesas and canyon bottoms to the east and north. It is found on all aspects from about 5,000 to 7,200 feet but is most

common on southerly and western aspects. Soils vary from clayey to fine sandy loam to loamy in texture with loamy sites being more pervasive. In general, the soils underlying this plant community are moderately deep (20 to 54 inches thick) and well drained. Typical soil series in the FFO area where the sagebrush/grass plant community is found include Penistaja, Buckle, Doak, Blancot and Orlie. The precipitation regime varies from 7 to 14 inches (BLM 2013a).

D.2. Reclamation

D.2.1. Seed Mix

The following seed mix (Table D1) was chosen from the BLM's "seed menu" for the Sagebrush Community (BLM 2013a) during the March 13, 2014 onsite. The seed mix will be that used to re-vegetate the areas not needed for production/operation of the proposed action.

Table D1. Selected Seed Mix and Minimum Application Rate for the Reclamation of the Sunray 1M.

Common Name	Scientific Names	Variety	Season	Form	PLS lbs/acre*
Shrubs					
Fourwing saltbush	*Atriplex canescens*	VNS	Cool	Shrub	2.0
Antelope bitterbrush	*Purshia tridentata*	VNS	Cool	Shrub	2.0
Grasses					
Indian ricegrass	*Achnatherum hymenoides*	Paloma or Rimrock	Cool	Bunch	4.0
Blue grama	*Bouteloua gracilis*	Alma or Hachita	Warm	Sod-forming	2.0
Sand dropseed	*Sporobolus cryptandrus*	VNS	Warm	Bunch	0.5
Bottle brush squirreltail	*Elymus elymoides*	Tusas or VNS	Cool	Bunch	3.0
Forbs					
Small burnet	*Sanguisorba minor*	Delar	Cool	Forb	2.0
Rocky Mtn. bee plant	*Cleome serrulata*	Local collection or VNS	Cool	Forb	0.25
*Based on 60 pure live seeds (PLS) per square foot, drill seeded. Double this rate (120 PLS per square foot) if broadcast or hydro-seeded.					

D.2.2. Reclamation Techniques

No unique soil reclamation techniques, such as the use of soil amendments or sterile cover crops, are planned for the reclamation of the proposed Sunray 1M. See Section 2.1.5 *Design Features* of the Sunray 1M EA for standard reclamation techniques (stockpiling topsoil, mulching, etc.) to be used in the proposed project area.

D.2.3. Challenges

Challenges to successful reclamation may include grazing, rapid run-off, low precipitation, and clayey soils. The proposed action is located within the FFO Baltzar Peak Grazing Allotment No. 5088. The grazing authorization for the allotment permits the grazing of up to 118 head of cattle across 11,624 acres for a period from November 1 through May 15 annually.

D.3. Monitoring and Reporting Requirements

Monitoring and reporting on the success of reclamation efforts will be completed according to FFO Bare Soil Reclamation **Procedure B** as outlined in the *Farmington Field Office Bare Soil Reclamation Procedures* (BLM 2013b). Requirements include:

- Establish monitoring sites after seeding is completed.
- Conduct annual monitoring starting two calendar years after seeding is completed.
- Evaluate monitoring reports.
- Compile and present documentation that percent vegetation cover standards have been attained.
- Request concurrence from the FFO that percent vegetation cover standards have been attained.
- FFO will provide concurrence (or not) that percent vegetation cover standards have been attained.
- Develop remedy plans to correct impacts to revegetation that may prevent the revegetated area from attaining per cent vegetation cover standards.
- Conduct long term monitoring after per cent vegetation cover standards have been attained.

D.4. Standards

Requirements for determining if reclamation is successfully completed in the Sagebrush vegetation community are outlined in Table D2. The percent cover standards listed in Table D2 must be attained prior to FFO approval of reclamation, or an exception must be granted from FFO.

Table D2. Reclamation Goal for Foliar Cover for the Sunray 1M.

Functional Group	Percent (%) Foliar Cover	Common Species
Trees/Shrubs/Grasses/Forbs	>35	Utah Juniper-Pinyon pine; big sagebrush, four-wing saltbush, antelope bitterbrush, alkali sacaton, Western wheatgrass, Indian ricegrass, galleta, sand dropseed, scarlet globemallow, wooly Indianwheat , fleabane, Penstemon spp., buckwheat, threadleaf groundsel.
Invasive/undesirables **10% allowed toward meeting standard of 35%.**	≤10	Plants that have the potential to become a dominant species on a site where its presence is a detriment to revegetation efforts or the native plant community. Examples of invasive species include cheatgrass, Russian thistle, kochia.

D.5. Final Abandonment and Relinquishment

Monitoring requirements remain in effect as long as the permit, grant, or authorization remains in force, and until all associated facilities or infrastructure is abandoned by established BLM procedure and a final abandonment notice (FAN) or relinquishment is issued by the FFO. Until such time, the project proponent will follow the Vegetation Reclamation **Procedure B** as detailed in the *Farmington Field Office Bare Soil Reclamation Procedures* (BLM 2013b). The percent cover standards listed in Table D2 must be attained prior to FFO approval of final abandonment/relinquishment, or an exception must be granted from FFO.

D.6. References

BLM. 2013a. Updated Reclamation Goals. Available at: http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_planning/surface_use_plan_of/updated_reclamation.html. Accessed February 2013.

BLM.2013b. *Farmington Field Office Bare Soil Reclamation Procedures*. Available at :http://www.blm.gov/pgdata/etc/medialib/blm/nm/field_offices/farmington/farmington_planning/surface_us

e_plan_of.Par.69026.File.dat/FFO%20Bare%20Soil%20Reclamation%20Procedures%202-1-13.pdf. Accessed February 2013.