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Burlington Resources' Huerfanito Unit 99N Natural Gas Well, Access Road, and Pipeline Tie, San Juan County, New Mexico

FEDERAL MINERAL LEASE NUMBER USA SF-078135

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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) with the Bureau of Land Management (BLM) Farmington Field Office (FFO) for the construction, drilling, production, and final abandonment of one Blanco Mesaverde/Basin Dakota natural gas well, the proposed Huerfanito Unit 99N. Enterprise Field Services (Enterprise) has proposed construction and operation of the associated pipeline tie, which is needed to transport produced gas to a main transport pipeline. The approved APD, issued by the BLM, would authorize Burlington and Enterprise to drill the well; construct the well pad, access road, and pipeline; install necessary facilities; and ultimately abandon the endeavor responsibly. It is anticipated that if the APD is approved, construction of the proposed well would commence following approval. The proposed well would be drilled and located on federal mineral lease number USA SF-078135, issued February 1, 1948.

The proposed project area (PPA) is located in the north-central portion of the San Juan Basin in northwestern New Mexico. It is approximately 13.5 miles south of Blanco, New Mexico. In general, the PPA would be accessed south of New Mexico Highway 64 from existing improved roads (Figure 1). The legal description for the location of the Huerfanito Unit 99N is 2,633 feet from the south line (FSL) and 1,854 feet from the west line (FWL) of Section 35, Township 27 North, Range 9 West.

SWCA Environmental Consultants (SWCA) conducted a biological survey of the PPA and the results of that survey are included in the appropriate sections of this environmental assessment (EA). Photographs were taken of the PPA and are included in Appendix A. A complete set of survey plats, maps, and driving directions for the well are included in Appendix B. A listing of selected federal laws and regulations applicable to the Proposed Action can be found in Appendix C. Additionally, SWCA prepared a cultural resources inventory for the well pad, which is on file with the BLM FFO. SWCA attended an on-site visit with the operator and the BLM on January 22, 2013.

This EA complies with the requirements of the National Environmental Policy Act of 1969 (NEPA) and federal regulations found in 40 Code of Federal Regulations (CFR) Chapter V. The project record contains an interdisciplinary analysis to support the findings in this document and is located at the BLM FFO. This EA analyzes the site-specific impacts associated with the Proposed Action and its alternatives, identifies mitigation measures to potentially reduce or eliminate those impacts, and provides agency decision-makers with detailed information upon which to approve or deny the Proposed Action or an alternative.

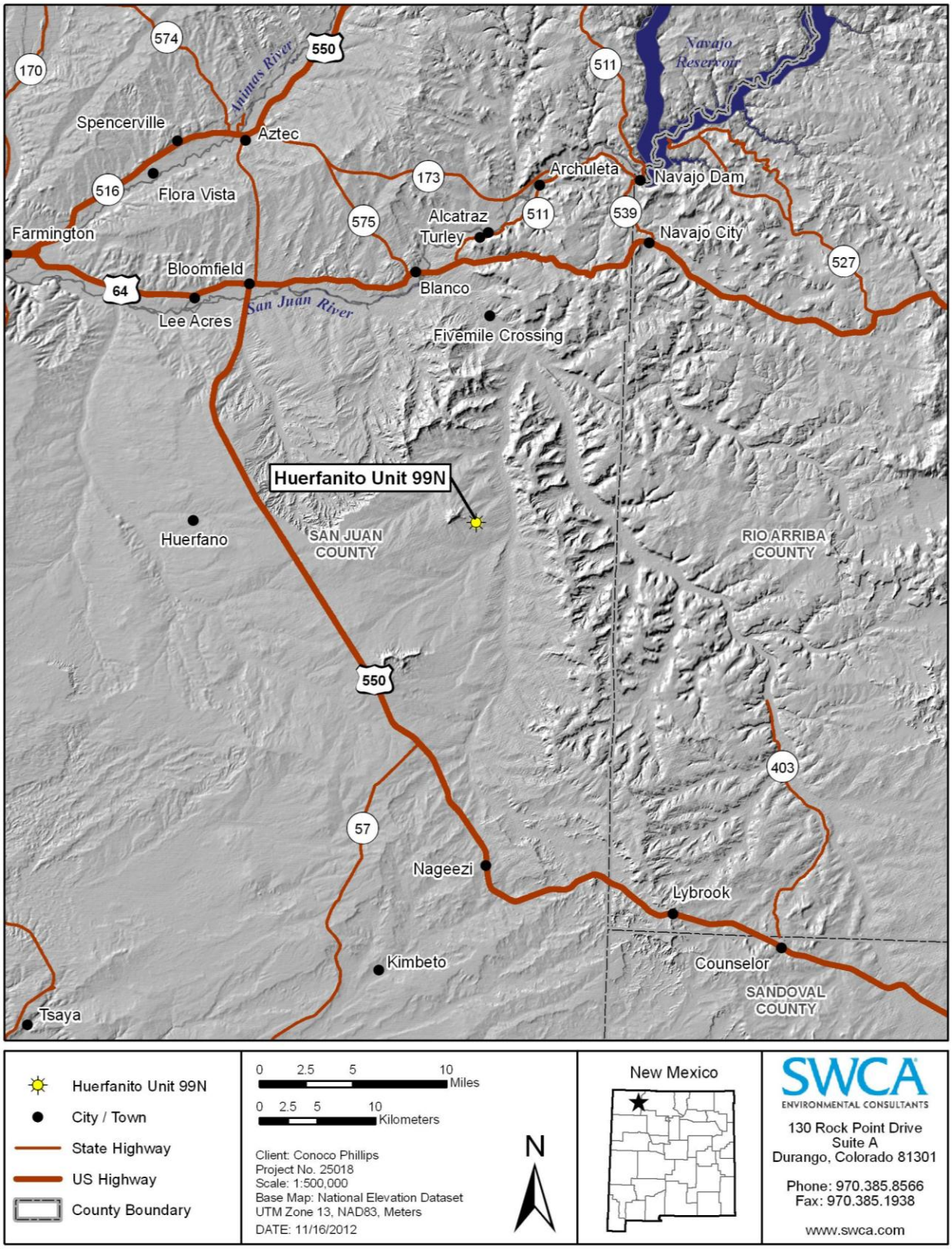

Figure 1. General location map.

1.2 Purpose and Need for Action

The BLM's purpose is to allow the operator to have access for the exploration and production of fluid minerals from the subject lease, which is an integral part of the BLM's oil and gas leasing program under authority of the Mineral Leasing Act of 1920 (as amended), the Federal Land Policy and Management Act of 1976, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

The BLM's need is based on its prior decision to issue federal oil and gas lease USA SF-077764, which conveys the right to use, in an environmentally responsible manner, the portion of the surface necessary to efficiently develop the leased federal minerals. The purpose of and need for the Proposed Action are to allow for development of the existing lease rights while protecting the surface resources to the maximum extent possible. The Mineral Leasing Act of 1920, as amended, authorizes the BLM to issue federal oil and gas leases for mineral extraction. A federal lease is a binding legal contract that allows the leaseholder to develop the federal mineral estate, subject to the terms and stipulations of the lease instrument and current laws and regulations.

1.3 Decision to be Made

The BLM decision to be made in this EA is whether to approve the APD, and under what terms and conditions. The BLM Responsible Official will decide:

- to approve the APD as submitted using the mitigation contained in the Surface Use Plan of Operations (SUPO); or
- to approve the APD with additional modifications, mitigation, and Conditions of Approval (COAs); or
- to not approve the APD and analyze the effects in an environmental impact statement (EIS).

Onshore Oil and Gas Order 1 (specifically 43 CFR 3160 subpart 3161.2) requires the BLM Responsible Official to approve, inspect, and administer operations subject to the regulation, and to require that all such operations, among other requirements, "be conducted in a manner which protects other natural resources and the environmental quality." This regulation establishes procedures for obtaining approval of an APD on existing onshore federal and Indian oil and gas leases and requires a specific SUPO for each APD submitted for approval. The plan must address 13 specific points concerning use of the surface (43 CFR 3160).

The analyses contained in this EA provide information needed by the BLM Manager, as the Responsible Official, to determine whether the Proposed Action may have significant impacts and would require an EIS. If it is determined that the impacts would not be significant, the Responsible Official will decide what COAs will be required with the proposed SUPO. The Responsible Official must also determine whether the decision is in conformance with the BLM FFO's 2003 Resource Management Plan (RMP) (as amended) (BLM 2003a).

1.4 Conformance with Applicable Land Use Plan(s)

Oil and gas exploration and development are recognized as an appropriate use of public lands by the BLM FFO's 2003 RMP (BLM 2003a:1, 2-2), which provides management direction for the leased area. The BLM will consider approval of the proposed drilling in a manner that avoids or reduces impacts to other resources, is consistent with the lease rights granted to the applicant, and prevents unnecessary or undue degradation of public lands. The BLM FFO completed the RMP by signing the Record of Decision on September 29, 2003 (BLM 2003a). The RMP provides for the integrated multiple use and sustained yield of resources for the planning area.

The Proposed Action is in conformance with the goals and objectives of the RMP, which states that "dual completion, re-completion and commingling (both downhole and at the surface) will be encouraged and permitted in order to reduce the number of new well pads and consequent surface disturbance. This in turn, will reduce impacts to soils and vegetation, reduce air impacts caused by fugitive dust, reduce habitat fragmentation and offer less opportunity for the spread of noxious weeds" (BLM 2003a:4).

1.5 Relationship to Statutes, Regulations, or Other Plans

1.5.1 Council on Environmental Quality Regulations

Parts 1500 through 1508 of the Council on Environmental Quality (CEQ) regulations (40 CFR 1500.3) provide stipulations applicable to and binding for all federal agencies for implementing the procedural provisions of NEPA, "except where compliance would be inconsistent with other statutory requirements."

Additionally, the APD operator and right-of-way grant holder are required to:

- comply with all applicable federal, state, and local laws and regulations (a listing of selected federal laws and regulations applicable to the Proposed Action can be found in Appendix C);
- obtain the necessary permits for the drilling, completion, and production of this well, including water rights appropriations, permits for the installation of water management facilities, water discharge permits, and relevant air quality permits; and
- implement the Proposed Action in a way that is as consistent as possible with local, county, or state plans.

1.5.2 New Mexico Administrative Code 19.15.17 (the "Pit Rule")

Changes in New Mexico Oil Conservation Division (NMOCD) regulations that were not in effect for consideration during the 2003 RMP process must also now be included in the analysis of natural gas development projects. Most relevant, 19.15.17 New Mexico Administrative Code (the "Pit Rule") regulates permitting, construction, operation, and subsequent closure of temporary pits within NMOCD District 3. The Proposed Action analyzed in this EA would be consistent with the Pit Rule and the applicable Memorandum of Understanding between the BLM FFO and the NMOCD, signed May 5, 2009.

1.5.3 Endangered Species Act of 1973

The Endangered Species Act of 1973 (ESA) requires all federal departments and agencies to conserve threatened, endangered, and critical and sensitive species and the habitats on which they depend, and to consult with the U.S. Fish and Wildlife Service (USFWS) on all actions authorized, funded, or carried out by the agency to ensure that the action would not likely jeopardize the continued existence of any threatened and endangered species or adversely modify critical habitat. Consultation with the USFWS, as required by Section 7 of the ESA, was conducted as part of the Farmington Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS) (Consultation No. 2-22-01-I-389) to address cumulative effects of RMP implementation (BLM 2003b). The consultation is summarized in Appendix M of the PRMP/FEIS. FFO staff reviewed the action alternative and determined it 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). No further consultation with the USFWS is required.

1.5.4 Clean Air Act

The Clean Air Act of 1970, as amended, establishes National Ambient Air Quality Standards (NAAQS) to control air pollution. The New Mexico Air Quality Bureau (NMAQB) oversees air quality regulations and standards for stationary sources of air pollution. Impacts to air quality from oil and gas exploration and development are controlled by mitigation measures developed on a case-by-case basis. As part of the planning and decision-making process, the BLM must consider and analyze the potential effects of its activities on air resources. This EA discusses the contributions of the Proposed Action to regulated air pollutants and greenhouse gas (GHG) emissions and includes general discussion of potential impacts. Additional general information on air quality in the area is contained in Chapter 3 of the PRMP/FEIS (BLM 2003b).

1.5.5 National Historic Preservation Act

Heritage resources are protected by the National Historic Preservation Act of 1966 (NHPA) (Public Law [PL] 89-665), as amended, and its implementing regulations (36 CFR 800) and other legislation, including NEPA (PL 91-852) and its implementing regulations (40 CFR 1500–1508). Other relevant laws include the Antiquities Act of 1906 (PL 52-209), the Archaeological and Historical Conservation Act of 1974 (PL 93-291), the Archaeological Resources Protection Act of 1979 (ARPA) (PL 96-95) and its regulations (36 CFR 296), the American Indian Religious Freedom Act (42 United States Code [USC] 1996), and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (PL 101-601). Executive Order (EO) 11593 of 1971 also requires that cultural resources be protected. Compliance with Section 106 responsibilities of the NHPA is achieved by following the BLM–New Mexico State Historic Preservation Office protocol agreement, which is authorized by the National Programmatic Agreement between the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.

1.5.6 Clean Water Act

The Federal Water Pollution Control Act, commonly known as the Clean Water Act (codified at 40 CFR 112), protects surface water resources from pollution. Under Section 402 of the Clean Water Act (as amended), the U.S. Environmental Protection Agency (EPA) was directed to develop a phased approach to regulate stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) program. Industrial activities that disturb land may require an NPDES permit for stormwater discharge. Depending on the acreage disturbed, either a Phase I industrial activity (5 or more acres of disturbance) or a Phase II small construction activity (between 1 and 5 acres of disturbance) permit may be required. Additionally, a U.S. Army Corps of Engineers Section 404 permit for the discharge of dredged and fill materials may also be required. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

1.6 Scoping, Public Involvement, and Issues

Appropriate scoping helps identify resources and resource uses that could be impacted, reducing the chances of overlooking a potentially significant issue or reasonable alternative. The BLM's Interdisciplinary Team (ID Team) of resource specialists discussed the Proposed Action on January 14, 2013. The issues discussed are listed below. In addition, the BLM FFO publishes a NEPA log for public inspection. This log contains a list of proposed and approved actions in the FFO. The log is located on the BLM New Mexico website (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html). No public comments were received for this Proposed Action.

1.6.1 Issues

During the on-site inspection—attended by resource specialists who are familiar with the issues and resources of the area, including representatives from the BLM, SWCA, and Burlington—the following relevant issues or concerns were discussed and subsequently brought forward for detailed analysis in this EA.

- Air Resources: How would construction activities, as well as production of natural gas, affect air resources?
- Soils: How would surface disturbance associated with the Proposed Action impact soils and erosion?
- Water Quality: How would drilling to subsurface natural gas bearing formations impact freshwater aquifers? Would surface disturbance impact surface water quality?
- Vegetation: How would surface disturbance associated with the Proposed Action impact vegetation?
- Invasive and Non-native Species: How would the Proposed Action contribute to the spread of invasive or non-native species?
- Wildlife and Migratory Birds: How would the Proposed Action impact habitat for wildlife, such as migratory birds and mule deer (*Odocoileus hemionus*)?
- Special Management Species: How would the Proposed Action impact special management species with the potential to occur in the project area?

- Cultural Resources: How would surface-disturbing activities affect cultural resources? Are there any places of Native American religious concern to address?
- Visual Resources: How would project construction and ongoing monitoring activities impact visual values?
- Mineral Resources: Extraction of natural gas is an irretrievable commitment of resources; what is the potential scale of this impact?
- Livestock Grazing: Grazing is an important economic activity in northwest New Mexico; how does this well affect grazing in the vicinity of the PPA?
- Socioeconomics: Oil and gas industry activities create employment opportunities; how does this one well contribute to the economy?

1.6.2 Issues Considered but Not Analyzed

Several resources commonly analyzed under the NEPA either do not occur within the vicinity of the PPA or would otherwise not experience impacts from the Proposed Action and therefore have not been brought forward for detailed analysis. These are listed here with supporting rationale.

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 Traditional Cultural Properties identified through ongoing BLM tribal consultation efforts. There are currently no known remains that fall within the purview of NAGPRA or ARPA within the PPA. 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 EO 13007.

Areas of Critical Environmental Concern (ACECs)—Section 202 of the Federal Land Policy and Management Act requires the BLM to give priority to designation and protection of any ACEC during the land use planning process. An ACEC is an area within public lands where special management attention is required to protect and prevent irreparable damage to important values or other natural systems or processes and protect life and safety from natural hazards. ACECs differ from other special management designations, such as wilderness areas, in that the ACEC designation, by itself, does not automatically prohibit other uses in the area. The PPA is not within any ACEC. The nearest ACEC is the Crow Canyon ACEC, which is approximately 7 miles east of the PPA. Because this ACEC is beyond the visual and auditory vicinity of the PPA, ACECs are therefore not analyzed for possible impacts in this EA.

Environmental Justice—EO 12898 requires federal agencies to assess projects to ensure there are no disproportionately high or adverse environmental, health, or safety effects on minority and low-income populations (EPA 2008a). Minorities, predominantly Native Americans and Hispanics, constitute a large portion of the population residing inside the boundaries of the BLM FFO's jurisdiction. The latest census data indicate that approximately 20.8% of San Juan County's population is considered to be below the poverty level (U.S. Census Bureau 2012).

The PPA is in an established oil and gas area with no nearby residences, and hence no minority or low-income populations reside in the vicinity of the PPA. Therefore, the project would have no direct effect on any communities protected by EO 12898. The project may have beneficial indirect effects, such as increased overall employment opportunities related to the oil and gas and service support industry in the region, as well as economic benefits for state and county governments from royalty payments and severance taxes. Any effects related to environmental justice would apply to all public land users in the PPA, not just low-income or minority populations. The Proposed Action would have no disproportionately significant impact to any minority or low-income populations.

Recreation—The PPA is not in a high-use or destination area for recreation. While some hunters or all-terrain vehicle users may occasionally be in the area, there is no impact to recreation expected from the Proposed Action.

Threatened and Endangered Species—Under Section 7 of the ESA, as amended, the BLM is required to consult with the USFWS on any proposed action that may affect federally listed threatened or endangered species or species proposed for listing. SWCA conducted biological surveys of the Huerfanito Unit 99N well pad on November 8, 2012. No USFWS-listed threatened or endangered species or their habitats were found in the PPA during the biological surveys. BLM FFO staff has reviewed the Proposed Action and determined it 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) conducted for the PRMP/FEIS (BLM 2003b). No further consultation with the USFWS is required.

2 PROPOSED ACTION AND ALTERNATIVE

2.1 Proposed Action

Burlington proposes the drilling, production, and final abandonment of a natural gas well. The Huerfanito Unit 99N would be directionally drilled into the Blanco Mesaverde/Basin Dakota Formation. Enterprise also proposes construction and operation of the associated pipeline tie. The PPA is located completely within San Juan County. The proposed well pad sits on BLM lands and natural gas would be produced from federal mineral estate. The center stake is at 6,375 feet above mean sea level (amsl). See Appendix B for a complete set of surveys, plats, and maps for the Proposed Action.

The maximum surface disturbance associated with the Proposed Action would be approximately 3.17 acres (Figure 2). The Huerfanito Unit 99N proposed well pad would be 230 by 300 feet in size with a 50-foot-wide construction buffer around the perimeter, creating a 3.03-acre footprint. A 136-foot access road would be constructed to connect the proposed well pad to an existing roadway, creating 0.06 acre of disturbance. The construction buffer and portions of the well pad and access road not needed for production would be reclaimed after successful initiation of the well production phase. A 215-foot pipeline tie would be constructed to connect the proposed Huerfanito Unit 99N well to an existing main transport pipeline, creating an additional 0.08 acre of disturbance. The pipeline disturbance would be completely reclaimed following construction.

Table 1 compares the site disturbance of both alternatives.

Table 1. Summary of New Disturbance from the Proposed Action

Facility	Total Acres Immediately Disturbed	Acres of Disturbance after Initial Reclamation	Acres of Disturbance after Final Abandonment
No Action			
Well pad	0.00	0.00	0.00
Access road	0.00	0.00	0.00
Pipeline tie	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0.00**
Proposed Action			
Well pad	3.03	1.00*	0.00
Access road	0.06	0.03	0.00
Pipeline tie	0.08	0.00	0.00
Total	**3. 17**	**1.03**	**0.00**

* Total area disturbed after initial reclamation is based on an industry average obtained from the operator. Actual disturbance of the well pad following successful initial reclamation may be less than 1.00 acre (personal communication, Virgil Chavez 2008).

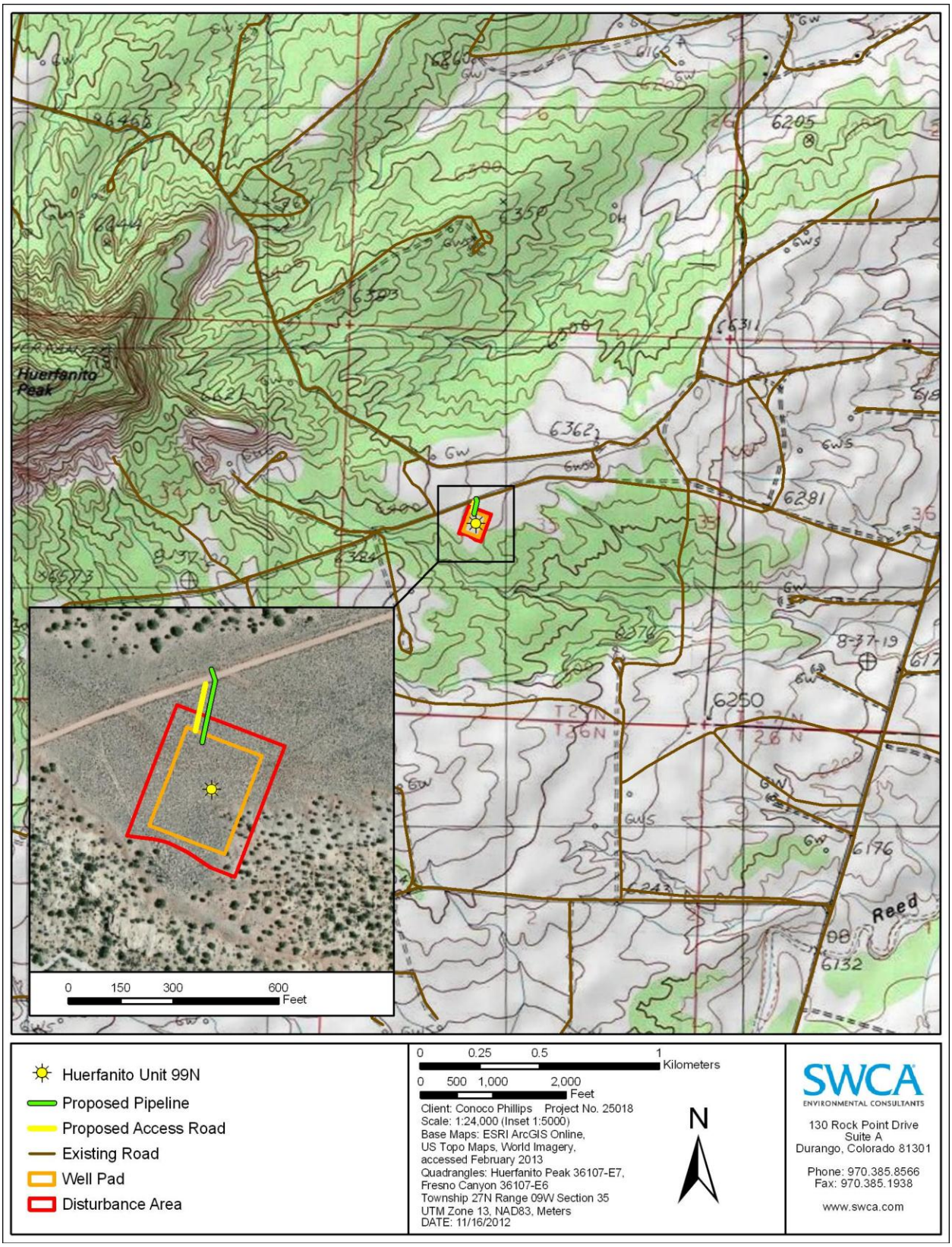

Figure 2. Project location map with aerial photograph inset.

2.1.1 Project Construction

Under the Proposed Action, a 3.03-acre well pad and 0.06-acre access road would be constructed using a D-8 bulldozer. It would be necessary to clear vegetation for the well pad and access road 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 cuts and fills and topsoil storage would be contained within the construction buffer. The pipeline trench would be dug using a backhoe or trencher. Typical wastes associated with the Proposed Action include trash, sanitary wastes, produced water, and produced hydrocarbons. Sanitary wastes would come from 15 to 20 people working for 4 to 8 weeks for the well. Trash would be generated during drilling and completion work (4–8 weeks) and would be stored in containers so that debris does not get scattered by wind or small animals. During drilling and completion, a trash receptacle and a chemically treated portable toilet would be on location for trash and sanitary waste disposal.

After the well pad is constructed, a drilling rig would be moved to the location and assembled. Drilling into the Blanco Mesaverde Formation would require approximately 14 days. After the well has been drilled, completion would take approximately 14 additional days. The entire construction and drilling process is anticipated to take between 4 and 8 weeks. During the construction, drilling, and completion phases, both heavy equipment and light vehicles would use existing roads to access the PPA. Traffic would include drilling rigs, large tractor-trailers, construction equipment, water trucks, drilling and production equipment and supplies, tanks, and various light pickup trucks.

Design Features

The Proposed Action includes the following project design features that mitigate or lessen impacts to resources:

- The top 6 inches of topsoil on the proposed well pad would be stockpiled on-site for redistribution during well pad reclamation.
- All aboveground production facilities would be low profile and painted Juniper Green to blend with the surrounding environment.
- After construction, all disturbed areas not needed for production would be revegetated using a BLM-approved seed mixture. Culverts would be installed as necessary for proper drainage. A 36-inch culvert would be installed at the beginning of the access road.
- Silt traps would be installed as necessary to reduce erosion.
- Drilling fluids, production waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas would be placed in tanks or in a lined reserve pit on location during completion work.
- All produced hydrocarbons would be put in tanks or in a lined reserve pit on location during drilling and completion work. If the well becomes productive, any produced water would be placed in on-site tanks or pumped to an approved disposal well. In the event of a spill or release, the proper reporting and cleanup procedures would be followed. All waste would be disposed of in the proper manner as required by federal and state law and as described in the COAs.
- The reserve pit would be designed and operated as indicated on the well pad diagram (see Appendix B) and would be lined with a 20-mil liner and then fenced. The reserve pit would be constructed in accordance with the Pit Rule and would be sited, fenced, revegetated, and marked as directed in that regulation.
- A diversion ditch would be designed and constructed as prescribed by the BLM.
- A compressor may also be required to pressurize gas for delivery to the transportation pipeline. If required, the compressor would conform to BLM FFO Noise Notice to Lessees (NTL) standards.
- Compressor emissions would be limited to no more than 2 grams per horsepower-hour of nitrogen oxides (NO_x) for engines with 300 horsepower or less.
- All downhole mitigation is ensured by the BLM's review of the proposed casing and cementing program as required by 43 CFR 3160 and Onshore Oil and Gas Order No. 2, Drilling Operations: B. Casing and Cementing Requirements (BLM 1988).
- The construction, drilling, and operation of the proposed well would meet all federal, state, and local health and safety requirements for waste handling and disposal. Drilling operations on federal and

Indian oil and gas leases would be conducted in accordance to the BLM's Onshore Oil and Gas Order No. 2 (BLM 1988).

- Disposal of produced water would be handled pursuant to the BLM's Onshore Oil and Gas Order No. 7 (BLM 1993). In addition, the proposed well would be routinely monitored by Burlington for safety until the well has been plugged and officially abandoned.
- Any permanently open pits would be netted and vent caps would be placed on all open pipes to prevent bird entry and nesting (BLM 2012)
- A pre-disturbance noxious weed inventory was conducted to determine the presence of noxious weeds in the PPA prior to beginning the project and to determine whether treatment is needed prior to disturbance. In accordance with the State of New Mexico's noxious weed list memorandum (New Mexico Department of Agriculture [NMDA] 2009), the operator would be responsible for pretreating the PPA to control the spread of noxious weeds. Also, the operator would be responsible for weed control for the life of the proposed well and would be required to use weed seed–free hay, mulch, and straw in erosion control.
- The construction buffer zone around the discovered cultural site would be rounded to avoid impacts to a discovered site.
- All FFO cultural resources stipulations would be followed as indicated in the Cultural Resource Record of Review (BLM 2013) attached to the COA in the APD. These stipulations include, temporary fencing, monitoring of earth disturbing construction, 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 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.

2.1.2 Production Phase

If the well proves productive, the portion of the pad not required for production equipment and vehicular access would be reclaimed and seeded with a BLM-approved seed mixture. Reclamation usually includes the portions of the pad outside the *teardrop*—the area needed for production operations, usually encircled by the access road. The teardrop area would not be reclaimed until final abandonment of the well. Typical production equipment would be assembled on the well pad, such as a wellhead, production separator, a cathodic station, a meter run with electronic telemetry, and one to two 500-barrel storage tanks per well. A compressor may also be required to pressurize gas for delivery to the transportation pipeline. The compressor size would be dependent on production.

After production begins, normal maintenance would be required and would consist of one pickup truck visiting the well approximately every other day during the work week to check on production and resolve any problems that may occur at the well. Trucks would be used to remove wastewater stored in tanks on-site. No sanitary wastes would be generated during the production phase. No garbage containers would be located on-site during the production phase. 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. A work-over rig could occasionally be required for downhole maintenance. Surface impacts of a work-over rig would be similar to the effects described for drilling, although usually to a lesser degree. The estimated production phase is expected to last 20 to 30 years.

2.1.3 Abandonment Phase

When the well is no longer commercially viable, it would be plugged and abandoned in accordance with BLM regulations and as specified by the BLM FFO in the COAs. Downhole well abandonment would be carried out under current BLM regulations for plugging of the well. Surface equipment would be removed,

except for an aboveground marker that would contain well identification information, including the location of the plugged hole. The underground pipeline tie is usually plugged and left in place. The well pad, if not needed for other purposes, would be recontoured and revegetated, as specified in the approved COAs and right-of-way grant stipulations. Final abandonment would be complete when successful reclamation of all disturbed areas is achieved to BLM Gold Book standards and guidelines.

2.2 No Action

The BLM NEPA Handbook H-1790-1 states that for EAs on externally initiated proposed actions, the No Action alternative generally means that the proposed activity would not be approved (BLM 2008:52). This option is provided in 43 CFR 3162.3-1(h)(2). Under this alternative, the BLM would deny the approval of the proposed APD, Burlington would retain its lease rights, and gas production in the area would continue at its current rate. If the APD is not approved, natural gas would not be extracted from the proposed well, the associated surface disturbance would not occur, and current uses in the area would continue to occur. The construction of the well and pipeline tie, production of natural gas from the well, and final abandonment of the well, access road, and pipeline would not occur. The No Action alternative is presented for baseline analysis of resource impacts.

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 minimizing environmental impacts and resource conflicts and meeting other objectives of the RMP. Consistent with BLM NEPA Handbook H-1790-1, the agency “need only analyze alternatives that would have a lesser effect than the proposed action” (BLM 2008:80). Those with greater adverse resource impacts are not considered for this analysis. Alternative locations are generally considered at the BLM on-site visit with the operator. Limitations of other nearby equipment, pipelines, access, and safety are considered, as well as resource conflicts that may require mitigation, such as rotating the well pad to protect cultural sites.

For the Huerfanito Unit 99N, locations were considered during the on-site visit with the BLM and Burlington on January 22, 2013, which would twin the well on an existing pad. However, no nearby existing well pad would be feasible because of constraints in reaching the bottom hole. The proposed Huerfanito Unit 99N location minimizes the length of the access road and pipeline, does not impact any Specially Designated Areas (SDAs), and would result in minimal new long-term surface disturbance. No issues or concerns were identified to necessitate an additional alternative; as such only the No Action and Proposed Action alternatives were brought forward for detailed analysis.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the environment that would be affected by implementing the alternatives described in Chapter 2. The resource issues under analysis were identified in Chapter 1. Aspects of the affected environment described in this chapter focus on the relevant major resources or issues/concerns. NEPA requires that the discussion of issues and concerns are commensurate with the potential impacts: "1500.4 (c) Impacts shall be discussed in proportion to their significance." On the basis of CEQ guidance and BLM NEPA Handbook H-1790-1, the following discussion is limited to those resources that could be impacted to a degree that detailed analysis is warranted (40 CFR 1502.15) (BLM 2008:96).

This EA addresses the resources and impacts on a site-specific basis as required by NEPA. Pursuant to 40 CFR 1508.28 and 1502.21, this site-specific EA tiers to the information and analysis contained in the FFO's PRMP/FEIS (BLM 2003b). For the purposes of providing baseline data for the affected environment and identifying potential impacts, a project area for each resource was delineated, as appropriate. The affected environment description is followed by a discussion of potential impacts from the Proposed Action, including cumulative impacts.

The cumulative impact analysis contained in the PRMP/FEIS, coupled with the level of development proposed by the 20-year Reasonably Foreseeable Development (RFD) scenario developed for the 2003 RMP, accounts for the broader impacts of oil and gas development (Engler et al. 2001). Analysis of cumulative impacts for the RFD of 9,942 new oil and gas wells on public lands in the San Juan Basin was presented in the PRMP/FEIS (BLM 2003b). This total is broken out by watershed. The PPA is within the Blanco watershed, which allows siting of 677 new natural gas wells for a total of 2,514 acres of new disturbance over the 20-year period (BLM 2003b:4-7). It is likely that at the time of writing, slightly less than half of the total wells have been drilled and/or permitted. The proposed Huerfanito Unit 99N and associated surface disturbance is included in the total analyzed in the RMP. Within a 2-mile radius of the PPA, there are 94 existing well pads and approximately 50 miles of roads. The Huerfanito Unit 99 N well is proposed in a section containing eight existing well pads and approximately 33 acres of disturbance, including well pads and roads (4.8 miles of roads).The Proposed Action would account for 3.17 acres of total surface disturbance within the watershed as analyzed in the PRMP/FEIS. Therefore, the Proposed Action's contribution to the cumulative impact of oil and gas development is minimal. Resource-specific cumulative impacts analysis is included below in the appropriate sections.

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 BLM FFO PRMP/FEIS (BLM 2003b). In addition, new information about GHGs and their effects on national and global climate conditions has emerged since this document was prepared. Ongoing 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 the Air Quality Technical Report; BLM 2011). 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 EPA has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants (criteria pollutants). Regulation of air quality is also delegated to some states, of which New Mexico is one. 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. GHGs and the potential effects of GHG emissions on climate are not regulated by the EPA; however, climate has the potential to influence renewable and non-renewable resource management.

Air Quality

Criteria Air Pollutants

The Air Quality Technical Report details the types of data used for describing the existing conditions of criteria pollutants, explains 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 2011). The EPA Green Book webpage 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 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 concentrations in the analysis area are described below. Total emissions of criteria pollutants from each source sector were calculated by adding together the emissions from San Juan, McKinley, Rio Arriba, and Sandoval Counties.

Table 2 shows monitoring 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)			NAAQS
	2007–2009	2008–2010	2009–2011	2008
Substation	0.067	0.063	0.063	0.075
Bloomfield	0.061	0.060	0.061	0.075
Navajo Lake	0.069	0.066	0.068	0.075

Source: New Mexico Environment Department 2012.
Note: ppm = parts per million.

Table 3 summarizes monitored values for other criteria pollutants in San Juan County.

Table 3. Criteria Pollutant Concentrations Monitored Values in San Juan County

Pollutant	Range of Design Values	Averaging Time	Observation Period	NAAQS	NMAAQS
NO2	7–16 ppb	Annual	2005–2010	53 ppb	50 ppb
NO2	37–50 ppb	1-hour	2005–2010	100 ppb	None
CO	4.6–10.6 ppm	1-hour	1990–2000	35 ppm	13.1 ppm
CO	1.7–5.2 ppm	8-hour	1990–2000	9 ppm	8.7 ppm
PM10	15–116* µg/m3	24-hour	1990–2011	150 µg/m3	150 µg/m3
PM2.5	4.3–6.6 µg/m3	Annual	2000–2010	15 µg/m3	60 µg/m3
PM2.5	10–15 µg/m3	24-hour	2000–2010	35 µg/m3	None
SO2	0.001–0.002 ppm	Annual	2005–2010	None	0.02 ppm
SO2	5–40 ppb	1-hour	2008–2010	75 ppb	None
SO2	0.002–0.004 ppm	24-hour	2005–2010	None	0.01 ppm

Source: BLM 2011.
Note: ppb = parts per billion; ppm = parts per million; PM10 = particulate matter within an aerodynamic diameter equal or less than 10 microns; µg/m3 = micrograms per cubic meter; PM2.5 = particulate matter within an aerodynamic diameter equal or less than 2.5 microns; SO2 = sulfur dioxide.
* These values represent the maximum values.

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 2011). Lead emissions are not an issue in this area and will not be discussed further.

Updates to the NAAQS since the PRMP/FEIS include a change to the ozone standard and the addition of hourly standards for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). The most significant change relevant to this analysis is the NO_2 hourly standard of 100 parts per billion (ppb). The form of the standard is the 3-year average of the annual 98th percentile of the daily 1-hour maximum. The design value is a statistic that describes the air quality status of a given area relative to the NAAQS. The analysis area is in attainment for the NO_2 hourly standard.

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 2011). The 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. The 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 his or her 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. Table 4 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 (°F)	Average Maximum Temperature (°F)	Average Minimum Temperature (°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 2011; data collected at New Mexico State Agricultural Science Center – Farmington.

3.1.2 Impacts from the Proposed Action

Methodology and assumptions for calculating air pollutant and GHG emissions are described in the Air Resources Technical Report (BLM 2011). 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 GHG emissions to be compared to regional and national emissions levels (BLM 2011). Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (BLM 2011).

Direct and Indirect Impacts

Criteria Pollutants

Table 5 shows estimated emissions from one proposed conventional gas well for criteria pollutants, volatile organic compounds (VOCs), and GHGs. For comparison,

Table 6 shows total human-caused emissions for each county in the BLM FFO's jurisdiction and La Plata County, Colorado, based on the EPA's 2008 emissions inventory (EPA 2008b, 2011).

Table 5. Criteria Pollutant and VOC Emissions Estimated for Construction of One Conventional Gas Well

Activity	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2
One-Time Operations (tons)*								
Construction	1.24–1.41	0.37–0.58	0.09–0.16	2.14	0.25	0.03	0.24–0.46	153.54–260.73
Completion	0.1–0.14	0.03–0.04	0–0.01	0.0	0.0	0.0	0.002–0.002	13.85–19.85
Interim reclamation	1.41–2.24	0.43–0.66	0.11–0.18	0.01	0.0	0.01	0.242–0.461	168.1–291.3
Final reclamation	0.07–0.09	0.03–0.04	0.01–0.01	0.01	0.0	0.01	0	7.24–10.80
Ancillary Operations (tons)								
Work-over	0.13	0.04	0.01	0.08	0.02	0.0	0	10.51
Road maintenance	0	0	0	0.01	0	0	0	0.26
Road traffic	0.005	0.008	0.004	0.02	0	0	0	0.475
Annual Operations (tons/year)								
Equipment leaks	0.14	0	0.1	0	0	0	0.01	0.432
Field compression	0.14	0.29	0.1	0.01	0.01	0	0.01	19.3

Source: EPA 2008b.
Note: CO = carbon monoxide; PM_{10} = particulate matter with an aerodynamic diameter equal to or less than 10 microns; $PM_{2.5}$ = particulate matter with an aerodynamic diameter equal to or less than 2.5 microns.
*The range of values in this section represents variability in the time required for completion.

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

County	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2
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***	***23,888.3***	***13,343.3***

Source: EPA 2008b.
Note: CO = carbon monoxide; PM10 = particulate matter with an aerodynamic diameter equal to or less than 10 microns; PM2.5 = particulate matter with an aerodynamic diameter equal to or less than 2.5 microns.

Table 7 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

Emissions	NO_x	CO	VOC	PM_{10}*	$PM_{2.5}$*	SO_2*
Total emissions	57,303.4	147,078.1	160,079.0	218,800.3	23,897.3	13,343.3
Conventional gas well emissions	4.29	1.65	.57	3.47	0.35	0.51
Percent Increase	***0.00007***	***0.00001***	***0.000004***	***0.00002***	***0.00001***	***0.00004***

Note: CO = carbon monoxide; PM10 = particulate matter with an aerodynamic diameter equal to or less than 10 microns; PM2.5 = particulate matter with an aerodynamic diameter equal to or less than 2.5 microns.
* Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.

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 would be equivalent to 10% of VOC emissions. Therefore, the HAP emissions reported here should be considered a very gross estimate. The calculator estimates that a total of 0.051 tons/year of HAPs would be emitted during construction, drilling, and first year of operation of a proposed conventional gas well in the San Juan Basin.

Total Greenhouse Gases

The available statewide GHG summary (New Mexico Environment Department [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_{2eq} emissions of both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO_{2eq} (76.2 million metric tons) (NMED 2010). The estimated CO_{2eq} metric tons emissions from one conventional gas well (312.5) would represent a 0.000004% increase in New Mexico CO_2 emissions.

Cumulative Impacts

The BLM 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 RFD scenarios 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 2011).

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 2011). 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 Action 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 Proposed Action 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 Proposed Action on global or regional climate.

The Air Resources Technical Report (BLM 2011) 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 Soils

3.2.1 Affected Environment

The PPA is in the San Juan Basin, a large depressed drainage basin in northwestern New Mexico and southwestern Colorado. The San Juan Basin is bordered by the Defiance Uplift and Chuska Mountains to the west, the San Juan Dome to the north, the Chaco Slope and Zuni Uplift to the south, and the Nacimiento Uplift to the east. In total, the San Juan Basin covers an area of approximately 4,600 square miles. The soils in the San Juan Basin were formed primarily from two kinds of parent material: alluvial sediment and sedimentary rock. The alluvial sediment is material that was deposited in river valleys and on mesas, plateaus, and ancient river terraces. The material has been mixed and sorted in transport and has a wide range of mineralogy and particle size. Sedimentary parent material consists mainly of sandstone and shale bedrock. These shale and resistant sandstone beds form prominent structural benches, buttes, and mesas bounded by cliffs.

The majority of the soil composition in the PPA is made up of the Fruitland-Persayo-Sheppard complex, hilly. The northeast corner of the PPA is made up of the Doak-Sheppard-Shiprock Association, rolling (Natural Resources Conservation Service 2012). Components of this soil are described below.

The Fruitland-Persayo-Sheppard complex, hilly is found on hills, mesas, plateaus, fans, and breaks with slopes from 5% to 30%. This unit is about 40% Fruitland sandy loam, 30% Persayo clay loam, 25% Sheppard loamy fine sand, and 5% other soil inclusions. The Fruitland soil is deep and well drained and was formed from alluvium derived dominantly from sandstone and shale. Typically, the Fruitland soil has a brown sandy loam surface layer about 4 inches thick, moderately rapid permeability, moderate available water capacity, medium runoff potential, and a moderate water erosion hazard. Persayo soil is shallow and well drained and was formed in residuum derived dominantly from shale. Persayo soil has a surface layer of about 2 inches of brownish gray clay loam, moderately slow permeability, very low water availability, rapid runoff, and a high hazard of water erosion. Sheppard is deep and somewhat excessively drained and was derived from mixed sources. Sheppard soil has a surface layer of about 4 inches of brown loamy fine sand, rapid permeability, low water capacity, slow runoff, and a slight potential for water erosion (Soil Conservation Service [SCS] 1980).

The Doak-Sheppard-Shiprock Association, rolling is found on mesas, plateaus, and terraces with slopes of 0% to 15%. This unit is about 40% Doak loam, 30% Sheppard loamy fine sand, 20% Shiprock fine sandy loam, and 10% other soil inclusions. This soil unit is deep and ranges from well drained to somewhat excessively drained. This soil formed in alluvium derived dominantly from sandstone and shale. The surface layer is typically brown loam to brown loamy fine sand to about three inches deep. The subsoil ranges from light brown silty clay to yellowish brown fine sand. The Doak portion has a moderately slow permeability with very high water capacity; runoff potential is medium and the hazard of water erosion is moderate. The Sheppard portion has rapid permeability with low available water capacity; runoff is slow and the hazard for water erosion is slight. The Shiprock portion has moderately rapid water permeability with moderate available water capacity; runoff is slow and the hazard for water erosion is slight, but potential for soil blowing is severe (SCS 1980).

3.2.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Under the Proposed Action, well pad construction and drilling would have a direct impact to soils through physical disturbances. This would be limited to those areas where vegetation is removed or destroyed. The impacts would be of three types: the physical removal, mixing, or burying of surface soils; and the damage or destruction of soil properties in place. During construction of the proposed well pad,

approximately 3.17 acres of soil would be disturbed. Vegetation would be cleared from the pad location, and surface soils would be removed to a maximum depth of 6 inches and stockpiled for later use during reclamation. The pad location would then be graded and the soil compacted. Loss of vegetation cover would indirectly result in increased erosion and sedimentation of adjacent areas.

Construction of the proposed well pad would indirectly cause an undetermined amount of alluvial erosion, with the loss of surface soils, which would reduce viability for plant regeneration. Impacts from the sedimentation, runoff, and erosion are expected to be relatively low for the life of the project.

Cumulative Impacts

Future oil and gas development activities would contribute to impacts to soils through ground-disturbing activities, as well as natural erosional processes such as stormwater runoff. Soils across the Blanco Canyon watershed could be affected as a result of soil loss, compaction, and disturbance related to development activities, as well as grazing and agriculture. The Proposed Action would result in a total of 1.3 acres of long-term disturbance (see Table 1), out of a total of 836,142 acres of land within a 20-mile radius of the project.

3.3 Water Resources

3.3.1 Affected Environment

The PPA is within the Blanco Canyon watershed, Hydrologic Unit Code (HUC) 14080103, and is part of the larger San Juan River basin. The major river in the region is the San Juan River, which is approximately 12.6 miles north-northwest of the PPA. The San Juan River basin occupies the northwestern corner of the state. Natural surface waters in the area are intermittent streams or ephemeral flow channels located in arroyos, washes, and canyons that feed the San Juan River. The San Juan River drainage includes portions of northern New Mexico, southern Colorado, northeastern Arizona, and southeastern Utah, as well as portions of the Navajo Nation.

Runoff from the PPA would head in a southerly direction, draining into a large southeastern-trending ephemeral drainage, about 700 feet from the proposed pad, into another Blanco Canyon wash, which drains into Canyon Largo, and eventually to the San Juan River. Water quality data for ephemeral runoffs of the San Juan River is limited to only a few observations at sampling stations associated with the U.S. Geological Survey (USGS) coal hydrology program. Ephemeral flows are generally very poor-quality water as a result of the highly erosive and saline nature of the soils. Sparse vegetative cover and rapid runoff conditions are characteristic of the area. Although ephemeral drainages are not assessed for water quality, they are tributaries to the San Juan River, which was designated as impaired for the relevant section in 2004 (assessment unit ID NM-2405_10) (NMED Surface Water Quality Bureau 2005).

The primary Colorado Plateau aquifers that underlie the San Juan Basin are the Uinta-Animas aquifer, which underlies the vast majority of the San Juan Basin, and the Mesaverde aquifer (BLM 2003b:3-29). The quality of groundwater in the San Juan Basin generally ranges from fair to poor. In most places the total dissolved solids content exceeds 1,000 mg/L and can range from 500 to 4,000 mg/L (BLM 2003b:3-30). The Uinta-Animas Basin contains fresh to moderately saline water. Dissolved solids concentrations generally increase along the groundwater flow path in the San Juan Basin. A records search of the New Mexico Office of the State Engineer (NMOSE) database showed an average depth to groundwater near the PPA of 123 feet (NMOSE 2012).The PRMP/FEIS contains a detailed summary of the groundwater conditions in the San Juan Basin (BLM 2003b).

3.3.2 Impacts from the Proposed Action

Direct and Indirect Impacts

No surface waters would be affected by the Proposed Action. Impacts to water quality are expected to be low because the Proposed Action includes design features to reduce the potential for impacts from sedimentation, runoff, and erosion, such as stockpiling the top 6 inches of topsoil on-site for redistribution

during well pad reclamation, installing culverts for proper drainage, installing silt fences, and creating diversion ditches to reroute surface runoff.

Removal of vegetation and soil disturbance for the Proposed Action may result in an increase in sedimentation, runoff, and erosion. The use of best management practices (BMPs) and pollution prevention measures, as required by federal and state regulations, would help minimize impacts to water quality. The increase in the amount of sedimentation would depend on wind and water events in relation to surface disturbance, the timing and success of reclamation, and erosion control measures.

Impacts to groundwater are possible if the well is drilled incorrectly. For instance an incorrectly drilled well could inadvertently cross-connect two aquifers—such as a shallow drinking water aquifer and a deep saline aquifer. If built incorrectly the well could both change water quality in those aquifers, or it could even drain a perched aquifer, and if a spring or stream was connected to the aquifer there could also be impacts to vegetation and/or wildlife. However, technological advances and engineering controls in the drilling of natural gas wells, together with regulatory specifications and operator BMPs make the potential for these kinds of impacts very low. Additionally, lining the reserve pit with a 20-mil impervious liner would prevent seepage into surface or shallow groundwater. Any groundwater used during project development would come from an approved commercial source.

Cumulative Impacts

The Proposed Action, when combined with other surface disturbing actions (cattle grazing, ongoing oil and gas development, and agriculture) that are likely to occur in and near the project area in the future, would increase sedimentation and runoff rates. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in the Blanco Canyon watershed. Increases in degradation would be reduced by Burlington's commitment to minimizing disturbance, using erosion control measures as necessary, and implementing BMPs designed to reduce impacts. Current and future oil and gas development activities could contribute to water quality impacts through potential groundwater contamination from leakage, seepage, or casing failures. BMPs required for development such as strict controls on downhole casing requirements help to minimize the risks to groundwater in the San Juan Basin.

3.4 Upland Vegetation

3.4.1 Affected Environment

According to the EPA's Level III Ecoregions of the United States (EPA 2013), the PPA is located in the Arizona/New Mexico Plateau Ecoregion. This ecoregion is defined below.

Arizona/New Mexico Plateau Ecoregion

The Arizona/New Mexico Plateau occurs primarily in Arizona, Colorado, and New Mexico, with a small portion in Nevada. This ecoregion is approximately 45,870,500 acres, and the elevation ranges from 2,165 to 11,949 feet. The ecoregion's landscapes include low mountains, hills, mesas, foothills, irregular plains, alkaline basins, some sand dunes, and wetlands. This ecoregion is a large transitional region between the semiarid grasslands to the east, the drier shrublands and woodlands to the north, and the lower, hotter, less vegetated areas to the west and south. Vegetation communities include shrublands with big sagebrush (*Artemisia tridentata*), rabbitbrush (*Ericameria/Chrysothamnus* sp.), winterfat (*Krascheninnikovia lanata*), shadscale saltbush (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*), as well as grasslands of blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), and needle and thread (*Hesperostipa comata*). Higher elevations may support twoneedle piñon (*Pinus edulis*) and juniper (*Juniperus* sp.) forests. The ecoregion includes the urban areas of Santa Fe and Albuquerque. Important land uses include irrigated farming, recreation, rangeland, wildlife habitat, and some natural gas production.

Vegetation Cover Types

The vegetation within the PPA is dominated by big sagebrush with surrounding piñon-juniper woodland, especially in the drainages to the east. The understory is sparse and dominated by broom snakeweed (*Gutierrezia sarothrae*), James' galleta (*Pleuraphis jamesii*), and blue grama. There are well-developed cryptobiotic soils throughout the PPA. The canopy is open with approximately 20 immature and mature piñon and juniper, which would be removed during construction.

Three major land vegetation cover types have been mapped by the Southwest Regional Gap Analysis Program (SWReGAP) within and surrounding the PPA: The majority of the PPA is mapped as Inter-Mountain Basins Big Sagebrush Shrubland and Inter-Mountain Basins Semi-Desert Shrub-Steppe. The southeast corner of the PPA is mapped as Colorado Plateau Pinyon-Juniper Woodland. Descriptions of these vegetation cover types have been defined by the SWReGAP and are described in more detail below (USGS 2004).

Inter-Mountain Basins Big Sagebrush Shrubland

This ecological system occurs throughout much of the western United States, typically in broad basins between mountain ranges, plains, and foothills between 4,900 and 7,550 feet in elevation. Soils are typically deep, well drained, and non-saline. These shrublands are dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and/or Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Scattered juniper, greasewood, and saltbush (*Atriplex* sp.) may be present in some stands. Rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), antelope bitterbrush (*Purshia tridentata)*, or mountain snowberry (*Symphoricarpos oreophilus*) may co-dominate disturbed stands. Perennial herbaceous components typically contribute less than 25% vegetative cover. Common graminoid species include Indian ricegrass (*Achnatherum hymenoides*), blue grama, thickspike wheatgrass (*Elymus lanceolatus*), Idaho fescue (*Festuca idahoensis*), needle and thread, basin wildrye (*Leymus cinereus*), James' galleta, western wheatgrass, Sandberg bluegrass (*Poa secunda*), or bluebunch wheatgrass (*Pseudoroegneria spicata*).

Inter-Mountain Basins Semi-Desert Shrub-Steppe

This ecological system occurs throughout the intermountain western United States, typically at lower elevations on alluvial fans and flats with moderate to deep soils. This semiarid shrub-steppe is typically dominated by graminoids (>25% cover) with an open shrub layer. Characteristic grasses include Indian ricegrass, blue grama, saltgrass (*Distichlis spicata*), needle and thread, James' galleta, Sandberg bluegrass, and alkali sacaton (*Sporobolus airoides*). The woody layer is often a mixture of shrubs and dwarf-shrubs. Characteristic species include fourwing saltbush (*Atriplex canescens*), big sagebrush, Greene's rabbitbrush (*Chrysothamnus greenei*), yellow rabbitbrush, rubber rabbitbrush, broom snakeweed, and winterfat. Big sagebrush may be present but does not dominate. The general aspect of occurrences may be either open shrubland with patchy grasses or patchy open herbaceous layer. Disturbance may be important in maintaining the woody component. Microphytic crust is very important in some stands.

Colorado Plateau Pinyon-Juniper Woodland

This ecological system occurs in dry mountains and foothills of the Colorado Plateau region including the Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim and east into the northwestern corner of New Mexico. It is typically found at lower elevations ranging from 4,900 to 8,000 feet above mean sea level. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of piñon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. Twoneedle piñon and/or Utah juniper (*Juniperus osteosperma*) dominate the tree canopy. In the southern portion of the Colorado Plateau in northern Arizona and northwestern New Mexico, oneseed juniper (*Juniperus osteosperma*) and hybrids of juniper species may dominate or co-dominate the tree canopy. Rocky Mountain juniper (*Juniperus scopulorum*) may co-dominate or replace

Utah juniper at higher elevations. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species include greenleaf manzanita (*Arctostaphylos patula*), big sagebrush, littleleaf mountain mahogany (*Cercocarpus intricatus*), alderleaf mountain mahogany (*Cercocarpus montanus*), blackbrush (*Coleogyne ramosissima*), Stansbury cliffrose (*Purshia stansburiana*), antelope bitterbrush (*Purshia tridentata*), Gambel oak (*Quercus gambelii*), blue grama, James' galleta, or muttongrass (*Poa fendleriana*). This system occurs at higher elevations than Great Basin Pinyon-Juniper Woodland and Colorado Plateau shrubland systems where sympatric.

3.4.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Potential impacts on plant communities and habitats from the development of 3.17 acres would include direct impacts from habitat removal, as well as a wide variety of indirect impacts. Impacts would be incurred during initial site preparation and would continue throughout the operational life of the Huerfanito Unit 99N well. Plant communities and habitats affected by direct or indirect impacts from project activities could incur short- or long-term changes in species composition, abundance, and distribution. Some impacts may also continue after the decommissioning of the well. Land areas available for project development support a wide variety of plant communities and habitats.

The PPA is part of the Arizona/New Mexico Plateau, which supports extensive arid and semiarid desert-scrub and shrubland habitats, such as Great Basin sagebrush, saltbush, greasewood, shadscale, or shrublands of big sagebrush and other shrubs, grasslands, and piñon-juniper woodlands and savannas.

In some areas, restoration may potentially include species that are not locally native or plant communities different from local native communities. Although the replanting of disturbed soils may successfully establish vegetation in some locations (i.e., with a biomass and species richness similar to those of local native communities), the resulting plant community may be quite different from native communities in terms of species composition and representation of particular vegetation types, such as shrubs. The community composition of replanted areas would likely be greatly influenced by the species that are initially seeded, and colonization by species from nearby native communities may be slow. In addition, the planting of non-native species may result in the introduction of those species into nearby natural areas. The establishment of mature native plant communities may require decades, and some community types may never fully recover from disturbance. Successful re-establishment of some habitat types, such as some shrubland communities, may be difficult and may require considerably greater periods of time. Restoration of plant communities in areas with arid climates (e.g., averaging less than 9 inches of annual precipitation) would be especially difficult (Monsen et al. 2004).

Indirect impacts on terrestrial and wetland habitats on or off the project site could result from land clearing and exposed soil, soil compaction, and changes in topography, surface drainage, and infiltration characteristics. Indirect impacts could include the degradation of habitat from construction activities occurring in adjacent areas or, in the case of wetlands, activities occurring within the watershed or groundwater recharge area.

In addition to habitat removal, the operation of heavy equipment on the project site or rights-of-way may result in injury or destruction of existing vegetation and biological (microbiological) soil crusts and the compaction and disturbance of soils (Barger et al. 2006). Soil aeration, infiltration rates, and moisture content could be impacted. Biological soil crusts occur in deserts and other sparsely vegetated arid habitats and are important for soil stability, nutrient cycling, and water infiltration; their disturbance may affect the development of plant communities (Fleischner 1994; Belnap et al. 2001; Gelbard and Belnap 2003). All these factors could affect the rate or success of vegetation re-establishment.

Habitats adjacent to the project may become fragmented or isolated as a result of construction. Biodiversity may subsequently be reduced in fragmented or isolated habitats. The fragmentation of large, undisturbed habitats of high quality by construction would be considered a greater impact than construction through previously disturbed or fragmented habitat.

The deposition of fugitive dust (including associated salts) generated during clearing and grading activities and/or during the construction and use of access roads, or deposition that results from wind erosion of exposed soils, could reduce photosynthesis and productivity, increase water loss (Eveling and Bataille 1984) in plants near the PPA, and result in injury to leaves. Considerable amounts of fugitive dust could be generated from the large areas of disturbed soil from road building and well pad construction. Plant community composition could subsequently be altered, resulting in habitat degradation. In addition, pollinator species could be affected by fugitive dust, potentially reducing pollinator populations in the vicinity. Localized impacts on plant populations and communities could occur if seed production in some plant species is reduced.

Direct impacts on plant communities and habitats would be expected to occur along the rights-of-way for access roads and pipelines. Vegetation would be cleared for access road and pipeline construction. Areas along ROWs that would be temporarily impacted by construction activities would be restored in the same manner as other temporarily disturbed project areas. Removal of trees within or along forest or woodland areas would potentially result in an indirect disturbance to forest or woodland interior areas through changes in light and moisture conditions. The plant communities that become established on any area disturbed during construction would depend on the restoration practices that are implemented, including the species selected, the species present in adjacent habitats, the degree of disturbance to vegetation and substrates, and the vegetation management practices selected for implementation.

Cumulative Impacts

Future actions contributing to vegetation modification or loss are the aforementioned planned oil and gas development, as well as livestock grazing of vegetation and other natural processes such as stormwater runoff and use of forage from migrating wildlife. Over time and allowing for average seasonal rainfall and regeneration, these cumulative impacts would be low.

3.5 Noxious Weeds and Invasive Species

3.5.1 Affected Environment

Noxious weeds are officially designated as non-native plant species that are invasive and/or can become monocultures and cause harm to land value, native ecology, agricultural interests, wildlife habitat, livestock forage, riparian resources, and aesthetic and visual values of land. The NMDA has adopted a list of 37 species that are classified as noxious weed species (NMDA 2009).

An SWCA biologist performed a pedestrian survey of the PPA on November 8, 2012, and did not observe any species regulated as noxious by the State of New Mexico (NMDA 2009).

3.5.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Under the Proposed Action, approximately 3.17 acres would be cleared and bladed. Invasive species are generally tolerant of disturbed conditions, and disturbed soils at project sites may provide an opportunity for the introduction and establishment of non-native invasive species. Seeds or other propagules of invasive species may be transported to a project site from infested areas by heavy equipment or other vehicles that are used at the site. Invasive species may also spread from established populations near a project site and colonize soils disturbed by project activities. The longer time periods required for the re-establishment of plant communities in arid regions may create an increased potential for the establishment and spread of invasive species. Invasive plant species typically develop high population densities and tend to exclude most other plant species, thereby reducing species diversity and potentially resulting in long-term effects. The establishment of invasive species may greatly reduce the success of native plant community restoration efforts in project areas and create a source of future colonization and degradation of adjacent undisturbed areas.

The establishment of invasive species, particularly annual grasses, such as cheatgrass (*Bromus tectorum*), which produce large amounts of easily ignitable fuel over large contiguous areas, may also alter fire regimes. This situation may result in an increase in the frequency and intensity of wildfires, and in some areas, such as in some desert-scrub communities, a fire regime may be created where none was present before. In plant communities that are not adapted to frequent or intense fires, native species, particularly shrubs and trees, may be adversely affected, and their populations may be greatly reduced, creating opportunities for greater increases in invasive species populations (Brooks and Pyke 2001). Increases in fire frequency or severity may thus result in a reduction of biodiversity and may promote the conversion of some habitats (such as forest, shrubland, or shrub-steppe) to other types, prolonging or preventing the development of mature native habitats.

Cumulative Impacts

Cumulative impacts from future oil and gas development actions described in the RMP on native vegetation populations and habitats have and would result from ground-disturbing activities that spread invasive species, which in some cases would out-compete native species.

Mitigation Measures

Additional potential mitigation for invasive weeds includes:

- spraying of invasive species and weed-control measures, which would minimize invasion in the short and long term; and
- development of a BLM-approved weed management plan, which would ensure that weed management was done effectively and would effectively eliminate major weed invasions at the site by setting firm success criteria for the site.

3.6 Wildlife

3.6.1 Affected Environment

Migratory Birds

EO 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 that occur in similar ecoregions as the PPA was compiled through a review of existing bird conservation plans, including:

- USFWS Birds of Conservation Concern (USFWS 2008)
- New Mexico Partners in Flight (2007) New Mexico Bird Conservation Plan
- Comprehensive Wildlife Conservation Strategy for New Mexico
- 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 BLM FFO area and may be affected by various types of perturbations. These species and a brief assessment of their habitat are identified in Table 8.

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

Species Name	Habitat Associations	Potential to Occur in the Project 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	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide suitable habitat for the species.
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide suitable habitat for the species.
Brewer's sparrow (*Spizella breweri*)	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide suitable habitat for the species.
Gray vireo (*Vireo vicinior*)	In northern New Mexico, stands of twoneedle piñon and Utah juniper 5,800 to 7,200 feet in elevation, 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.	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide suitable habitat for the species.
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide suitable habitat for the species.
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide suitable habitat for the species.
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.	Sagebrush, piñon-juniper woodland, and sparse understory 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.	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide suitable habitat for the species.
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush.	Sagebrush, piñon-juniper woodland, and sparse understory in the analysis area could provide 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 brushy arroyos, cactus flats, plains, grasslands, or agricultural areas likely limits potential of occurrence.
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.	Lack of grasslands or agricultural areas likely limits potential of occurrence. Nesting habitat also not present.
Vesper sparrow (*Pooecetes gramineus*)	Dry montane meadows, grasslands, prairie, and sagebrush steppe with grass component; nests on ground at base of grass clumps.	Sagebrush and sparse grassy understory in the analysis area could provide suitable habitat for the species.

General Wildlife

The Arizona/New Mexico Plateau ecoregion provides habitat for a variety of wildlife species. The BLM FFO's PRMP/FEIS contains a detailed description of wildlife species that are found within the entire planning area (BLM 2003b:3-40). Priority wildlife management activities conducted by the BLM FFO include big game management and surveys to determine game population size and health. The protection and enhancement of wildlife habitat is accomplished through an aggressive program of habitat improvement projects, designation as an SDA with wildlife-friendly management prescriptions, and the application of mitigation measures on key wildlife lands where oil and gas reserves are being developed.

Within a 2-mile radius of the PPA, there are 94 existing well pads and approximately 50 miles of roads. The Huerfanito Unit 99 N well is proposed in a section containing eight existing well pads and approximately 33 acres of disturbance, including well pads and roads (4.8 miles of roads). An SWCA biologist observed habitat utilization by wildlife species including American black bear (*Ursus americanus*), mule deer, rabbits, burrowing mammals, domestic cattle, and migratory birds, during surveys on November 8, 2012.

3.6.2 Impacts from the Proposed Action

Migratory Birds

Adult migratory birds would not be directly harmed by the Proposed Action because of their mobility and ability to avoid areas of human activity. No nests were observed during surveys on November 8, 2012. Any nests within the area of the PPA at the time of construction, along with eggs and juveniles, may be directly impacted during construction and removal of vegetation. The primary vegetation within the PPA that would be impacted by the Proposed Action would be sagebrush and piñon-juniper. Approximately 20 immature and mature piñon and juniper would be removed during construction. Because of the abundance of similar habitat in the surrounding area, the impact to the bird populations that utilize these habitats would be low.

The increased human presence, traffic, noise levels, and dust dispersion during construction, as well as drilling and reclamation activities, may indirectly disturb or displace adults from nests and foraging habitats within and surrounding the PPA for a short period (possibly 3 months or less). Long-term production operations would result in only a slight increase in human activity in the immediate PPA. In consideration of these factors, there would be minimal short- and long-term effects on migratory birds as a result of the Proposed Action.

General Wildlife

Under the Proposed Action, 3.17 acres of direct habitat loss would occur. Once the well is completed, the areas not needed for operations and maintenance would be revegetated using a BLM-approved seed mixture. Upon final abandonment of the well, the remaining disturbance would be reclaimed as outlined in the COAs.

Impacts to wildlife would result from actions that alter wildlife habitats, including changes to habitat and disturbance. Altering wildlife habitat in ways that would be considered adverse may occur directly (through habitat loss from surface disturbance) or indirectly (through the reduction in habitat quality caused by increased noise levels and increased human activity). Gas development includes both direct and indirect impacts to wildlife associated with ground disturbances caused by drilling, constructing road networks, and installing well pads, pipelines, and other associated infrastructure, as well as disturbance associated with ongoing maintenance.

Large-scale development within the San Juan Basin has caused habitat alteration and fragmentation. Well pad and road density break the available habitat into smaller and smaller pieces, which can lead to displacement and physiological stress in wildlife species. Fragmentation results in indirect habitat loss and degradation. Wildlife species would have to expend an increased amount of energy in order to avoid disturbed areas or when experiencing alarm due to human presence (traffic, noise, interaction). Rost and

Bailey (1979) found an inverse relationship to habitat use by deer and elk (*Cervus elaphus*) with distance to roads.

Watkins et al. (2007) describes quantitative thresholds of fragmentation impact as moderate, high, and extreme, based on the density of well pads per section and cumulative surface disturbance. Moderate impact is defined as one to four wells and less than 20 acres of disturbance per section. High impact is defined as five to 16 wells and 20 to 80 acres of disturbance per section. Extreme impact is defined as more than 16 wells and greater than 80 acres of disturbance per section. The Huerfanito Unit 99N well is proposed in a section containing eight existing well pads and approximately 33 acres of disturbance, including well pads and roads (4.8 miles of roads). Therefore, the fragmentation impact is considered high.

Cumulative Impacts

Oil and gas development throughout the San Juan Basin has the potential to affect wildlife through reductions of, and alterations in, habitat. Wildlife habitat alteration includes modification of the vegetation type on the disturbed areas and, on a larger scale, habitat fragmentation for some species, along with noise and visual intrusion into the area during various phases of the project. Oil and gas development includes adverse direct and indirect impacts to wildlife associated with ground disturbances caused by constructing road networks, drilling, and installing well pads, pipelines, and other associated infrastructure. There are also impacts from ongoing maintenance for approximately 20 to 30 years.

3.7 Special Status Species

3.7.1 Affected Environment

Special Status Plants

The New Mexico Rare Plant Technical Council (NMRPTC) lists 18 species as rare for San Juan County, New Mexico. Of the 18 species listed, nine have no official listing by the USFWS, the State of New Mexico, or the BLM. None of these species were observed by an SWCA biologist during the biological survey on November 8, 2012.

Special Management Species

In accordance with BLM Manual 6840, the BLM 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 ESA, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act of 1976; and Department of the Interior Manual 235.1.1A. FFO SMS are listed below in Table 9.

The PPA provides potential habitat for American peregrine falcon (*Falco peregrinus anatum*), prairie falcon (*Falco mexicanus*), golden eagle (*Aquila chrysaetos*), and ferruginous hawk (*Buteo regalis*). The PPA was visually scanned for raptors, raptor nests, and whitewash. No raptors or their sign were observed during the on-site field survey. The PPA is not within the BLM/FFO designated potential habitat area for Brack's hardwall cactus (*Sclerocactus cloveriae* var. *brackii*) or Aztec gilia (*Aliciella formosa*).

Table 9 provides an evaluation of the potential for SMS to occur in the analysis area. None of these species were observed during the field survey of the PPA, and their potential presence determination is based on evaluation of the PPA habitat and the known habitat requirements of the listed species.

Table 9. Special Management Species with Potential to Occur in the Analysis Area

Species Name	Conservation Status		Habitat Associations	Potential to Occur in Analysis Area
	FFO	State of		

		New Mexico		
Birds				
Golden eagle (*Aquila chrysaetos*)	SMS	–	In the West, mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and trees.	The surrounding action area contains suitable habitat for foraging, but not nesting.
Ferruginous hawk (*Buteo regalis*)	SMS	–	Grasslands and semi-desert shrub; occasionally piñon-juniper edge habitat. Nest on rock spires in northwest New Mexico.	The PPA contains suitable piñon-juniper edge habitat for foraging.
Prairie falcon (*Falco mexicanus*)	SMS	–	Arid, open country, grasslands or desert scrub, rangeland; nests on cliff ledges, trees, power structures.	The surrounding action area contains suitable habitat for foraging.
Mountain plover (*Charadrius montanus*)	SMS	–	Semi desert, grasslands, open arid areas, and bare fields; breeds in open plains or prairie.	The PPA area does not contain flat, open grasslands for suitable habitat.
Yellow-billed cuckoo (*Coccyzus americanus*)	SMS	–	Low to mid-elevation riparian woodlands, deciduous woodlands, and abandoned farms and orchards. Rare in the San Juan River valley.	The PPA area does not contain riparian areas for suitable habitat.
American peregrine falcon (*Falco peregrinus anatum*)	SMS	Threatened	Open country near lakes or rivers with rocky cliffs and canyons. Tall city bridges and buildings also inhabited.	The surrounding action area contains suitable habitat for foraging.
Bald eagle (*Haliaeetus leucocephalus*)	SMS	Threatened	Near lakes, rivers, and cottonwood (Populus sp.) galleries. Nests near surface water in large trees. May forage terrestrially in winter	The PPA does not contain suitable habitat for nesting, foraging opportunities unlikely.
Burrowing owl (*Athene cunicularia*)	SMS	–	Associated with prairie dog (Cynomys sp.) towns. In dry, open, short-grass, treeless plains	The PPA does not contain suitable habitat for foraging and nesting. No associated prairie dog colonies occur in the action area.
Plants				
Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*)	SMS	Endangered	Sandy clay slopes of the Nacimiento Formation in sparse semi desert, piñon-juniper grasslands and open arid areas of badland habitat (5,000–6,000 feet).	The Nacimiento Formation occurs; however, the PPA is above the upper elevational range for this species, and it is outside the boundary of the potential habitat mapped by the BLM FFO.
Aztec gilia (*Aliciella formosa*)	SMS	Endangered	Arid and sparsely vegetated badland/ salt desert scrub communities in soils of the Nacimiento Formation (5,000–6,000 feet).	The Nacimiento formation occurs; however, the PPA is above the upper elevational range for this species, it is outside the boundary of the potential habitat mapped by the BLM FFO, and the vegetation within the PPA does not reflect typical associated habitat for this species.

American Peregrine Falcon (Falco peregrinus anatum)

Peregrine falcons occupy cliff nest sites and range widely during foraging. Peregrines primarily prey on aerial bird species, so their occurrence in the PPA is likely to pertain only to flying over the site. The BLM

database shows a group of historical nest sites east-northeast of the PPA, the closest of which is 6.6 miles from the PPA. No nests or individuals were detected during field survey for the PPA or vicinity.

Ferruginous Hawk (Buteo regalis)

Ferruginous hawks typically nest on the top of trees (20–50 feet above ground), but may nest as low as 6 feet from the ground when suitable nest trees are not present. This species may also nest on cliffs or on the ground. Small- to medium-sized mammals make up the majority of their diet; thus, ferruginous hawks may use the PPA and vicinity for hunting. The BLM database shows a historical nest site 9.1 miles west-northwest of the PPA. No nests or individuals were detected during field survey for the PPA or vicinity.

Golden Eagle (Aquila chrysaetos)

Like peregrine falcons, golden eagles typically nest on cliffs and may range miles during foraging. The BLM database shows multiple historical nest sites mapped within a 5-mile radius of the PPA. The closest nest is approximately 0.9 mile west-northwest of the PPA. No nests or individuals were detected during field survey for the PPA or vicinity.

Prairie Falcon (Falco mexicanus)

Prairie falcons also nest on cliffs and conduct extensive foraging bouts. The species preys on rabbits, as well as other small mammals, and may use the PPA and vicinity for hunting. The closest historical nest site mapped in the BLM database is 13.3 miles southeast of the PPA. No nests or individuals were detected during field survey for the PPA or vicinity.

3.7.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Total habitat disturbance associated with the Proposed Action would be approximately 3.17 acres, which represents a small portion of potential habitat for the four SMS listed above. The canopy is open with approximately 20 immature and mature piñon and juniper, which would be removed during construction. The site-specific surveys conducted by an SWCA biologist did not find any nests or observe any of these species in the PPA. These four species show no special affinity for the PPA, and impacts are anticipated to be low (descriptions of impacts to these four species are listed below). The increased human presence, traffic, noise levels, and dust dispersion during construction, as well as drilling and reclamation activities, may indirectly disturb or displace adults from nests and foraging habitats within and surrounding the PPA for a short period. Long-term production operations would result in only a slight increase in human activity in the immediate PPA. In consideration of these factors, there would be minimal short- and long-term effects on migratory birds as a result of the Proposed Action.

Cumulative Impacts

Future oil and gas development cumulatively impacts species through habitat fragmentation, direct loss of habitat (such as when forested areas are cleared), and the overall increase in human activities. The Proposed Action has a 20- to 30-year lifespan of a typical producing natural gas well; therefore, the effects of other future planned wells would cumulatively add to the impacts from the Proposed Action.

3.8 Cultural Resources

3.8.1 Affected Environment

The proposed project 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. 10,000–5500 B.C.), Archaic (ca. 5500–A.D. 400), Basketmaker II–III and Pueblo I–IV periods (aka Anasazi; A.D. 1–1540), and 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 BLM FFO PRMP/FEIS (BLM 2003b) and will not be reiterated here. Additional information can also be

found in an associated documented, Cultural Resources Technical Report (Science Applications International Corporation 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 SWCA 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 one cultural site within the APE, LA 174638 (SWCA Report 2013-58; 2013(II)024F), which is recommended eligible for nomination to the National Register of Historic Places (SWCA 2013).

3.8.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Direct impacts normally include alterations to the physical integrity of a cultural site. If a cultural site is significant for other than its scientific information, direct impacts may also include the introduction of audible, atmospheric, or visual elements that are out of character for the cultural site. A potential indirect impact from the Proposed Action is the increase in human activity or access to the area with the increased potential of unauthorized removal or other alteration to cultural sites in the area.

Significant cultural sites (e.g., National Register of Historic Places eligible/listed) are being avoided with the implementation of design features such as reduction of the construction buffer zone, erection of a temporary barrier, and site monitoring. These design features are detailed in the Cultural Resource Record of Review, attached to the COA in the APD (BLM 2013). The Proposed Action would have no direct or indirect impact on significant cultural sites.

Cumulative Impacts

There would be no negative cumulative impact on cultural resources as significant cultural sites are being avoided. A positive cumulative effect is the additional scientific information yielded by the consistent archaeological surveys which take place ahead of oil and gas development providing a greater database of information for the cultural record of the area.

3.9 Visual Resources

3.9.1 Affected Environment

The BLM classifies visual resources through a Visual Resource Inventory (VRI). The VRI has three components: scenic quality, sensitivity, and distance zones. Scenic quality is a measure of the visual appeal of a tract of land. In the VRI process, BLM-managed lands are given an A, B, or C rating based on the apparent scenic quality. Scenic quality is determined by using seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Areas with the most visual appeal are rated A, while areas with the least visual appeal are rated C. The project area is within the Bisti Scenic Quality Rating Unit, an area rated C for scenic quality. This area is a vast panoramic landscape with no more than subtle surface variation, very low gentle hills, and a weak drainage pattern. The grays and greens of the low, continuous sagebrush provide some contrast with the beiges of the soils.

Sensitivity is a measure of the public concern for scenic quality. During the sensitivity rating, public lands are assigned high, medium, or low sensitivity by analyzing six indicators of public concern: type of user, amount of use, public interest, adjacent land uses, special areas, and other factors. The project area is within an area rated medium for sensitivity.

The distance zone analysis is conducted to determine the relative visibility from travel points or observation points. The distance zone for this area is foreground/middle ground, meaning the area can be seen from travel routes of observation points within a distance of 3 to 5 miles. This indicates activities and development may be able to be viewed in detail. These three components resulted in the area being assigned a VRI Class IV.

Visual resources are managed by assigning a Visual Resource Management (VRM) Class. The objective for each VRM Class describes how that area should be managed. The project area is within a VRM Class IV. The objective of this class is to provide for activities that require major modification of the landscape. The level of change to the landscape can be high, and management activities may dominate the view and be the major focus of attention (BLM 1986).

3.9.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Under the Proposed Action, there would be short and long-term impacts to visual resources because of surface disturbance and the construction of the well and associated infrastructure. Short-term impacts include . the loss of vegetation on 3.17 acres), and fugitive dust emissions during construction. If the well becomes productive, there would be long-term visual impacts as a result of the construction of other human-made structures associated with natural gas extraction, including the wellhead, dehydrator, tank, and meter run. The Proposed Action would cause visual impacts from contrasts in the landscape created from the smooth texture of the tank surfaces; the height of on-site tanks versus the horizontal plain of the landscape; the removal of vegetation, altering the texture and color of the ground surface; and the simplification of the vegetative community, reducing the roughness and complexity of the surface.

Construction activities would result in additional moderate, short-term impacts to visual resources from dust, increased traffic, increased human presence and activity, and the presence of drilling equipment. After construction and completion, well production equipment (e.g., dehydrator) would remain on-site, resulting in a negligible long-term visual impact. After the successful reclamation of the area outside the teardrop, the overall contrast would minimize over time. The Proposed Action meets VRM Class IV management objectives.

This alternative would include project design features such as use of low-profile aboveground facilities and painting the equipment juniper green to blend with the surrounding environment.

Cumulative Impacts

Future actions contributing to the visual modification of the landscape are the aforementioned planned oil and gas development. Over the 20-year development scenario, individual well pad projects come and go (are built and then plugged, reclaimed, and abandoned), so the visual values in the immediate vicinity of any given project area would fluctuate over time.

3.10 Mineral Resources

3.10.1 Affected Environment

The PPA is located on BLM surface with federal mineral rights. The PPA is in an area known to contain hydrocarbon-bearing formations and has established successful wells. The proposed well would be vertically drilled into the Blanco Mesaverde/Basin Dakota formations. The Basin Dakota gas pool includes the Dakota Sandstone in the Basin Dakota Formation, which is the primary stratigraphic gas reservoir and is closely linked to the Mancos Shale hydrocarbons (Engler et al. 2001). The Basin Dakota pool was created in 1960 by consolidating numerous small Dakota reservoirs, and production has been attributed to reservoir heterogeneity or improved fracture stimulation techniques or a combination of both. In addition, the PPA is located in the northern portion of the Blanco Mesaverde gas pool, separated on the basis of the “Chacra line” (Engler et al. 2001). A range of reservoir characteristics is possible for the Blanco Mesaverde reservoir, depending on location. In the northern portion, the Blanco Mesaverde

reservoir includes the lower part of the Lewis Shale, Menefee Formation, Point Lookout Sandstone, and a portion of Mancos Shale. The Blanco Mesaverde reservoir was discovered in 1927 and is a likely target for commingling or dual completions, thereby reducing the impact of this development.

3.10.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Burlington proposes to extract natural gas from the Blanco Mesaverde/Basin Dakota formations. This would result in a direct, long-term impact as a result of the irretrievable commitment of nonrenewable resources. Production of energy would have a direct, beneficial impact to the nation's need for energy development. Production of energy would have no impact to locatable or salable minerals, including gold, uranium, and gravel, because sources for these resources are not located within the PPA.

Cumulative Impacts

Extraction of fluid minerals is an irretrievable commitment of resources. The past, present, and future drilling of fluid minerals from the Blanco Mesaverde/Basin Dakota formations would all contribute to the overall depletion of the available fluid minerals within the Blanco Mesaverde/Basin Dakota formations.

3.11 Livestock Grazing

3.11.1 Affected Environment

The PPA is located in the Huerfanito Peak Allotment No. 5075. Vegetation in the allotment is in the sagebrush/piñon-juniper community. The Huerfanito Peak Allotment has a grazing authorization that permits 50 cattle with a grazing period from November 1 to May 30 annually. The term grazing authorization permits the utilization of 201 active animal unit months (AUMs) of forage. An AUM is the amount of forage needed to sustain a cow (1,000 lb) or cow/calf pair for one month. The allotment is 3,584.6 acres and consists of 58% BLM-authorized AUMs. The average rangeland carrying capacity for the Huerfanito Peak Allotment is 17.83 acres/AUM for a total of 3,584.6 acres and 201 AUMs.

3.11.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The Huerfanito Unit 99N well, access road, and pipeline tie are proposed to be constructed on the Huerfanito Peak Allotment, No. 5075. The associated disturbance for construction of the well, access road, and pipeline tie would be 3.17 acres. The estimated short-term impact to range carrying capacity would be a loss of 0.18 AUMs (3.17 acres/17.83 acres/AUM). After successful reclamation of the pipeline and construction areas, the long term-loss of AUMs would be 0.06 AUMs (1.0 acre /17.83 acres/AUM).

Additional short-term impacts may include displacement of permitted livestock during construction activities or exposure of livestock to hazards. After construction, livestock should become acclimated to the well and traffic associated with its maintenance. Vehicle traffic associated with this well could pose impacts to livestock considering that the area is open range and livestock may be found on roads in the area.

Direct impacts to livestock occur when holes or ditches are not excluded properly. Any type of hole or ditch is potentially a hazard to livestock while grazing. Cow or calf injuries may occur when they fall into a ditch-type cavity or in process of trying to get out. Cow or calf leg injuries also may occur when any type of small hole is left uncovered. Livestock can step into the hole and break a leg.

Impacts to livestock may occur when containment of livestock is compromised (i.e., fencing cutting). This could result in injury to livestock or individuals in the event of a vehicular accident. Indirect impacts include extra time required by the permittee to locate livestock or potential trespass issues for the respective livestock owner if the livestock cross allotment boundaries.

Cumulative Impacts

Past, present, and future oil and gas development would decrease the available AUMs over the long term. However, with successful revegetation and reclamation efforts, and the seeding of disturbed soils with species favorable to a healthy range, the cumulative impacts to grazing would be low. As the life span of wells come to an end and are plugged and abandoned, and new ones take their place, areas unavailable for grazing would vary over time.

3.12 Socioeconomics

3.12.1 Affected Environment

The PPA is located in San Juan County, New Mexico. According to the 2011 U.S. Census estimate, New Mexico had a population of 2,082,224 with 128,200 persons residing in San Juan County (up from 120,817 persons in 2009) (U.S. Census Bureau 2012). San Juan County, considered rural in character, is approximately 5,514 square miles in area, with an average of 23.6 persons per square mile (based on 2010 Census data). Only 6% of the land in the county is privately owned.

From 2006 to 2010, San Juan County had a median household income of $46,189 and a per capita personal income of $20,725 (in 2010 inflation-adjusted dollars). This 2010 figure was 75.8% of the national average per capita income, which was $27,334, and 90.2% of the average per capita income for New Mexico, which was $22,966 (U.S. Census Bureau 2012).

San Juan County is an integral part of the greater Four Corners region. Each community in this region is economically integrated with its surrounding communities. The nearest town to the PPA with census data is Aztec, New Mexico (approximately 4.9 miles away), which had an estimated population of 6,667 in 2011 (U.S. Census Bureau 2012). According to U.S. Census data, the average per capita income for Aztec from 2007 to 2011 was $22,585 (in 2011 inflation-adjusted dollars).

3.12.2 Impacts from the Proposed Action

Direct and Indirect Impacts

This analysis does not focus on all aspects of economics within the PPA. Only the projected economic effects of the Proposed Action and economic statistics at the state, county, and local levels are considered to describe the economic context of the Proposed Action.

It is expected that approval of the Proposed Action would bring some economic multipliers to the towns en route to the PPA. Construction crews would likely patronize local businesses for supplies such as fuel, food, and refreshments. The Proposed Action would also provide socioeconomic benefits in the form of the production of natural gas used for heating and other energy needs in the greater southwestern United States. Therefore, approval of the Proposed Action would result in beneficial impacts in the short term) and the long term (30 years), as the PPA would be visited once a week (or more often as necessary) for maintenance. Workers might stop in local towns for incidentals. These economic benefit multipliers would be low.

Cumulative Impacts

Other foreseeable actions that would cumulatively and beneficially impact socioeconomics in the area include the construction, operation, and production of natural gas wells, which fuels the local economy by providing employment for the local population, as well as tax revenue for area communities. The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area.

4 SUPPORTING INFORMATION

4.1 List of Preparers

The following agencies, organizations, and individuals contributed to the preparation of this document:

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APPENDIX A. PHOTOGRAPHS OF THE PROPOSED PROJECT AREA

Photograph 1. View of the proposed well pad area and typical vegetation. Taken from the center stake, facing west.

Photograph 2. View of the proposed well pad area and typical vegetation. Taken from the center stake, facing east.

Photograph 3. View of the proposed access road corridor. Facing south towards well pad.

APPENDIX B. PLATS, MAPS, AND DRIVING DIRECTIONS FOR THE PROPOSED ACTION

APPENDIX C. SELECTED LAWS AND REGULATIONS GOVERNING FEDERAL OIL AND GAS DEVELOPMENT

Table C.1. Selected Laws and Regulations Governing Federal Oil and Gas Development

Law/Regulation	Resource Consideration	Authority
American Indian Religious Freedom Act of 1978	Native American religious concerns	All agencies
Bald and Golden Eagle Protection Act of 1940, as amended	Bald and golden eagles	U.S. Fish and Wildlife Service (USFWS)
Bureau of Land Management Instruction Memoranda, national and state	Sensitive species and habitat	Bureau of Land Management (BLM)
Clean Air Act (CAA) of 1970, as amended	Air quality, air emissions	New Mexico Environment Department
Clean Water Act (CWA) of 1977, as amended; Section 401	Discharges from point sources into jurisdictional waters	New Mexico Water Quality Control Commission
Clean Water Act (CWA) of 1977, as amended; Section 402: Stormwater Pollution Prevention Plan (SWPPP)	Discharges from stormwater runoff into jurisdictional waters	U.S. Environmental Protection Agency (EPA)
Clean Water Act (CWA) of 1977, as amended; Section 404	Surface jurisdictional waters of the U.S.	U.S. Army Corps of Engineers
Colorado River Salinity Control Act of 1974, as amended	Colorado River Basin	BLM
Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980, as amended	Use and disposal of listed hazardous materials	EPA
Endangered Species Act (ESA) of 1973, as amended; Section 7	Threatened and endangered plant and animal species	USFWS
Executive Order 11988, as amended	Floodplains	All agencies
Executive Order 12898	Environmental and health conditions in minority and low-income communities	All agencies
Farmland Protection Policy Act of 1994	Prime and unique farmlands	Natural Resource Conservation Service
Federal Land Policy and Management Act (FLPMA) of 1976	Areas of Critical Environmental Concern; Wilderness areas	BLM
Federal Noxious Weed Act of 1974, as amended; Executive Order 13112	Noxious weeds	All agencies
Migratory Bird Treaty Act (MBTA) of 1918, as amended; Executive Order 131186	Migratory birds, nests, and eggs	USFWS
Mineral Leasing Act (MLA) of 1920, as amended; Associated Onshore Orders	Federal oil and gas leases and related transportation pipelines	BLM
National Environmental Policy Act (NEPA) of 1969	Human environment, under federal actions	All agencies
National Historic Preservation Act (NHPA) of 1966, as amended; Section 106	Cultural resources	All agencies
Native American Graves Protection and Repatriation Act (NAGPRA) of 1990	Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony	All agencies
New Mexico Noxious Weed List	Noxious weeds in the state of New Mexico	New Mexico Department of Agriculture

Table C.1. Selected Laws and Regulations Governing Federal Oil and Gas Development

Law/Regulation	Resource Consideration	Authority
Resource Conservation and Recovery Act (RCRA) of 1976	Use of hazardous materials	EPA
Wild and Scenic Rivers Act of 1968, as amended	Wild and scenic rivers	All agencies