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Burlington Resources Oil & Gas Company's
San Juan 29-7 Unit No. 140P
ATS-F010-14-156

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

Burlington Resources Oil & Gas Company LP (BROG) has submitted an Application for Permit to Drill (APD) with the Bureau of Land Management - Farmington Field Office (BLM-FFO) for the San Juan 29-7 Unit No. 140P directional Basin Dakota / Blanco Mesa Verde natural gas well. The proposed project includes the construction of a well pad, access road, and subsurface, well-tie pipeline. The proposed well pad is twinned on an existing well location containing the San Juan 29-7 Unit 520 and San Juan 29-7 Unit 43 wells. BROG would receive an approved APD to develop their lease. The proposed action is the approval of the APD by the BLM-FFO, located in Farmington, New Mexico.

The proposed project is located on public lands managed by the BLM-FFO. BROG would construct a well pad in order to drill and develop federal mineral resources administered by the BLM-FFO. BROG would re-route a portion of the existing resource road to access the proposed well pad area. If the well is successful and proves to be viable, a subsurface pipeline would be constructed to transport produced natural gas to San Juan 29-7 Unit No. 43 pipeline operated by Enterprise Products Company (EPCO).

Surface disturbance associated with the proposed project area would be approximately 3.11 acres, total. Of this, approximately 2 acres would be considered new surface disturbance. This would include approximately 1.92 acres of new well pad and pipeline disturbance, and 0.07 acre of new resource road disturbance. New surface disturbances associated with the well pad would be reclaimed to a BLM-approved working area. Production equipment will be placed on the location in such a manner to allow proper safe access to produce and service the well/facilities while minimizing long-term disturbance and maximizing interim reclamation. As practical, access will be provided by a tear-drop shaped road through the production area. All new surface disturbances associated with the pipeline corridor would be reclaimed during interim reclamation.

Oil and natural gas, vital components of the nation's energy supply, account for approximately 36 and 25 percent of total energy consumed in the U.S., respectively (U.S. Energy Information Administration 2012). Natural gas is used in homes, commercially, in industry, and in the transportation sector. Common uses for natural gas include space heating, water heating, cooling, cooking, waste treatment and incineration, metals preheating, drying and humidification, glass melting, food processing, fueling industrial boilers, vehicle fueling, and electricity generation. Gases such as butane, ethane, and propane can be extracted from natural gas to be used for products such as fertilizers and pharmaceuticals. Natural gas can also be used to create methanol, which is utilized in the production of formaldehyde, acetic acid, fuel cell sources, and additives for cleaner burning gasoline (Natural Gas Supply Association 2010). Most oil goes into fuels, including gasoline, jet fuel, and home-heating oil. Additionally, non-fuel compounds extracted from oil are used to develop lubricants; asphalt for roads; tar for roofing; waxes for food wrapping; solvents for paints; cosmetics and dry-cleaning products; plastics; and foams (U.S. Energy Information Administration 2012).

Most of the oil and natural gas found in North America is concentrated in distinct basins. The BLM-FFO management area is within the San Juan Basin, one of the most prolific gas-producing basins in the country. Currently, the San Juan Basin produced small amounts of oil (BLM 2003a).

Taxes and royalties on oil, natural gas, and carbon dioxide production contribute approximately 25 percent of New Mexico's general fund, and the oil and gas industry is one of the largest private sector employers in the state (New Mexico Bureau of Geology and Mineral Resources 2012). Additionally, the federal government receives royalties, or a share of the production income, for extracted federal minerals. In 2011, federal natural gas royalties totaled over 2 billion dollars (Office of Natural Resources Revenue 2012).

1.2. Purpose and Need for Action

The purpose of the proposed action is to allow BROG reasonable access to BLM managed lands to developeBLM managed lands to develop their mineral lease.

The need for the proposed action is established by the BLM's responsibility under the Mineral Leasing Act of 1920, as amended (30 USC [United States Code] 181 et seq.) to respond to the APD.

1.3. Decision to be Made

Based on the information in this environmental assessment (EA), the BLM-FFO will decide whether or not to issue an APD, and if so, under what terms and conditions. Under the National Environmental Policy Act (NEPA) (Public Law [PL] 91-90, 42 USC 4321 et seq.), the BLM-FFO must determine if there are any significant environmental impacts associated with the proposed action warranting further analysis in an Environmental Impact Statement (EIS). The BLM-FFO Field Manager is the responsible officer who will decide either:

- To approve the APD with design features as submitted;
- To approve the APD with additional mitigations;
- To analyze the effects of the proposal in an EIS; or
- To deny the APD.

1.4. Conformance with Applicable Land Use Plan(s)

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this site-specific EA tiers to and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan/Final Environmental Impact Statement [(PRMP/FEIS) BLM 2003a]. This EA is in conformance with the management goals set forth in the Resource Management Plan (RMP) for the Farmington Field Office (FFO) of the BLM, which was approved by the Record of Decision (ROD) signed September 29, 2003, and updated in December 2003 (BLM 2003b).

Specifically, the proposed actions support the following BLM policy:

> It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable market prices. At the same time, the BLM strives to ensure that mineral development is carried out in a manner that minimizes environmental damage and provides for the rehabilitation of affected lands (2003b, 2-2 – 2-3).

The PRMP/FEIS, RMP, and ROD are available for review at the BLM Farmington Field Office, 6251 College Blvd., Suite A, Farmington, NM, or electronically at: http://www.nm.blm.gov/ffo/ffo_home.html.

1.5. Relationship to Statutes, Regulations or Other Plans

BROG would comply with applicable federal, state, and local laws and regulations. Necessary permits and approvals for the proposed project would be obtained prior to project implementation.

Many requirements regulating specific environmental elements are found in the appropriate elements sections of this EA (Chapter 3). Several permits, licenses, consultations, or other requirements are discussed below.

1.5.1. Clean Water Act

Recognizing the potential for the continued or accelerated degradation of the Nation's waters, the U.S. Congress enacted the Clean Water Act (CWA), formerly known as the Federal Water Pollution Control Act (33 USC 1344). The objective of the CWA is to maintain and restore the chemical, physical, and biological integrity of the waters of the United States.

Under Section 401 of the CWA, an applicant for a federal license or permit to conduct an activity that may result in a discharge into a water of the U.S. must provide the federal agency with a Section 401 certification declaring that the discharge would comply with the CWA. The certification would be granted by the New Mexico Environment Department (NMED).

Under Section 402 of the CWA, the U.S. Environmental Protection Agency (EPA) regulates storm water discharges from industrial and construction activities under the National Pollution Discharge Elimination System (NPDES) program. Permits are required if discharge results in a reportable quantity for which notification is required (pursuant to 40 CFR 117.21, 40 CFR 302.6, or 40 CFR 110.6) or if the discharge contributes to a violation of a water quality standard.

Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the waters of the U.S., including wetlands. The U.S. Army Corps of Engineers (USACE) has jurisdiction over "waters of the U.S." These jurisdictional waters include those that have a "significant nexus" to traditional navigable waters. The BLM-FFO and USACE Durango Regulatory Office have determined that jurisdictional waters may include USGS watercourses (i.e., "blue lines" on USGS 1:24,000 topographic maps).

The proposed action is in conformance with the CWA (33 USC 1251 et seq.).

1.5.2. National Historic Preservation Act

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

1.5.3. Clean Air Act

The Clean Air Act of 1972, as amended (CAA; 42 USC 7401 et seq.), establishes national ambient air quality standards (NAAQS) to control air pollution. In New Mexico, the NMED has adopted most of the CAA into the New Mexico Administrative Code (NMAC). The NMED issues construction and operating permits for air quality and enforces air quality regulations and permit conditions.

1.6. Scoping, Public Involvement, and Issues

1.6.1. Scoping and Public Involvement

The Farmington Field Office (FFO) publishes a NEPA log for public inspection. This log contains a list of proposed and approved actions in the field office. The log is located on the BLM New Mexico website (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html).

An onsite meeting, attended by BROG, BLM-FFO representatives, EPCO, and an environmental consultant (Adkins Consulting, Inc. [ACI]), was held for the proposed project on March 12, 2014.

A public invitation to the on-site meetings was posted online (http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_oil_and_gas/ffo_onsites.html); no private citizens or groups attended the meetings. A BLM-FFO Interdisciplinary Team meeting was held in March 17, 2014 to discuss the proposed action. At the aforementioned meetings, potential issues of concern were identified by the BLM-FFO and ACI.

Based on the size and scale, routine nature, and potential impacts associated with the proposed action, no additional external scoping was conducted. No public comments were received for the proposed action.

1.6.2. Issues

Issues Analyzed

The following issues were identified during internal scoping as potential issues of concern for the proposed action. These issues will be addressed in this EA.

- How would the proposed project impact air resources?
- How would surface-disturbing activities associated with construction of the proposed project impact cultural resources?
- How would vegetation-clearing, proposed project activities, and final reclamation associated with the proposed project impact upland vegetation?
- How would with the proposed project impact water resources?

Issues Considered but not Analyzed

The following issues were identified during scoping as issues of concern that would not be impacted by the proposed action or that have been covered by prior environmental review. These issues will not be analyzed in this EA.

Endangered Species Act Species

The Endangered Species Act (ESA) of 1973 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 will 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 PRMP/FEIS (Consultation No. 2-22-01-I-389) to address cumulative effects of RMP implementation. The consultation is summarized in Appendix M of the PRMP/FEIS. Water used to construct, produce, and maintain the proposed well would be acquired from the Manzanares Water Hole (New Mexico Office of the State Engineer [NMOSE] point of diversion [POD] number SJ-196); no unaccounted-for water depletions within USFWS-listed fish habitat would occur. Therefore, there is no need for additional Section 7 consultation.

Native American Religious Concerns

For the proposed action, identification efforts for Native American Religious Concerns were limited to a review of existing published and unpublished literature (e.g., Van Valkenburgh 1941, 1974; Brugge 1993; Kelly, et al. 2006), development of the site-specific Class III survey report prepared for the proposed action (Western Cultural Resource Management, Inc. [WCRM] Report No. WCRM(F)1315 [Proper and Nathan 2014]), and a review by the BLM's cultural resources program regarding the presence of Traditional Cultural Properties (TCPs) identified through ongoing BLM tribal consultation efforts. There are currently no known remains that fall within the purview of the Native American Graves Protection and

Repatriation Act of 1990 (NAGPRA; 25 USC 3001) or the Archaeological Resources Protection Act (ARPA; 16 USC 470) within the proposed project area. The proposed action would not impact any known TCPs, 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 (AIRFA; 42 USC 1996) or Executive Order (EO) 13007.

Paleontology

The San Juan Basin in northwestern New Mexico is rich in paleontological resources. The BLM used the Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands (Instruction Manual 2008-009) to identify areas with a high potential to produce significant fossil resources (BLM 2008d). Under this system, all lands within the BLM-FFO management area were designated as Class 5 (Very High Potential) for paleontological resources. Class 5 areas require an assessment of paleontological resources at the project level (BLM 2009). If a paleontological site is discovered during the construction phase of the proposed project, the site would be avoided by personnel, personal vehicles, and company equipment. Therefore, no impacts to paleontological resources are anticipated as a result of the proposed project.

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Proposed Action

The proposed action is the BLM-FFO approval of an APD associated with BROG's San Juan 29-7 Unit No. 140P conventional Basin Dakota / Blanco Mesa Verde natural gas well project. The proposed project would include the construction of a well pad in order to directionally drill and develop federal mineral resources administered by the BLM-FFO. BROG would re-route a portion of the existing resource road to access the proposed well pad. If the well is successful and proves to be viable, a subsurface pipeline would be constructed to transport produced natural gas to San Juan 29-7 Unit No. 43 pipeline infrastructure operated by EPCO. The proposed project would commence after the APD is issued.

Construction plats associated with the proposed project are provided in Appendix B. Photographs of the proposed project area are provided in the Surface Reclamation Plan (Appendix C).

2.1.1. Location of Proposed Project area

Maps of the proposed project area plotted on topographic quadrangle and aerial imagery are provided in Appendix A.

The proposed project area is located within the BLM-FFO management area on public lands managed by the BLM within the San Juan Basin of northwest New Mexico. The proposed project area is situated on the north side of Manzanares Mesa approximately 4.3 miles south of Navajo Dam and 12 miles west-northwest of Gobernador.

The proposed project area is located within the northwest quarter of the southwest quarter of Section 8, Township 29 North, Range 7 West, New Mexico Principle Meridian (NMPM).

The general region surrounding the proposed project area is characterized by the northern foothills of Manzanares Mesa and Gobernador Canyon containing an ephemeral/intermittent watercourse, which continues westerly and joins the perennial San Juan River near Archuleta approximately 8.5 miles from the analysis area. The proposed project area generally drains north into an unnamed, ephemeral watercourse that is tributary to Gobernador Canyon. No prominent topographical features are located within the project area. The proposed well pad is located at approximately 6,281 feet above mean sea level (AMSL).

Existing oil and gas lease roads, well pads, and pipeline corridors are in the general vicinity of the proposed project area. In addition, U.S. Highway 64 is located approximately 1.2 road-miles from the project area.

2.1.2. Description of Proposed Project

For a detailed description of design features and construction practices associated with the proposed action, refer to the APD on file at the BLM-FFO. Construction plats associated with the proposed project are provided in Appendix B and provide additional details. Photographs of the proposed project area are provided in the Surface Reclamation Plan (Appendix C).

Design Features and Best Management Practices

BROG would adhere to the stipulations attached to an approved APD from the BLM-FFO. The following general design features and best management practices (BMPs) would occur.

Control of Waste

Liquid and solid wastes would be disposed of at an appropriate waste-disposal site. The proposed project area would be maintained in a sanitary condition. Hazardous substances would be handled and disposed

of according to federal law. Waste resulting from construction activities would be removed from the proposed project area and disposed of in an authorized area, such as an approved landfill.

Protection of Paleontological Resources

If a paleontological site is discovered, the BLM would be notified and the site would be avoided by personnel, personal vehicles, and company equipment. Workers would be informed that it is illegal to collect, damage, or disturb some such resources, and that such activities are punishable by criminal and/or administrative penalties.

Protection of Cultural Resources

All cultural resource stipulations would be followed as indicated in the Cultural Resource Records of Review, attached to the stipulations in an approved APD. These stipulations could include, but would not be limited to, temporary or permanent fencing or other physical barriers, monitoring of earth disturbing construction, reduction of the proposed project areas and/or establishment of specific construction avoidance zones, and employee education.

Employees, contractors, and sub-contractors associated with the proposed project would be informed by BROG that cultural sites are to be avoided by personnel, personal vehicles, and company equipment. These individuals would be informed 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 ARPA.

In the event of a cultural discovery during construction, BROG would 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., eligible for the National Register of Historic Places [NRHP] or protected under NAGPRA or ARPA), it would be protected in place until mitigating measures could be developed and implemented according to guidelines set by the BLM.

Protection of Flora and Fauna, including SSS and Livestock

Should any active raptor nests be observed within one-third mile of the proposed project area or should any additional SSS (listed by the USFWS or BLM) be observed within the proposed project area prior to or during project implementation, construction would cease and the BLM-FFO would be immediately contacted. The BLM-FFO would then ensure evaluation of the resource. Should a discovery be evaluated as significant (protected under the ESA, etc.), it would be protected in place until mitigation could be developed and implemented according to guidelines set by the BLM.

BROG would notify the grazing lease operator(s) at least 10 business days prior to beginning the construction phase of the proposed project in order to ensure that there would be no conflicts between construction activities and livestock grazing operations. The proposed project is located within the Navajo City grazing allotment No. 5092 managed by the BLM-FFO. BROG would not cease or delay construction unless directed by the authorized BLM-FFO officer. If present, any range improvements (e.g., fences, pipelines, and ponds) disturbed by construction activities would be repaired to the condition they were in prior to disturbance. Repairs, if needed, would take place immediately following construction.

The following design features would apply to the proposed project:

- All construction and/or maintenance resulting in surface disturbance would be done in accordance to the BLM Surface Operating Standards and Guidelines for Oil and Gas Development, Fourth Edition-Revised 2007 (The Gold Book).
- Backfilling operations would be performed within a reasonable amount of time to ensure that a pipeline trench is not left open for more than 24 hours. If a trench is left open overnight, it will be fenced with a temporary fence or a night watchman will be utilized.

- If used, all pits would meet State of New Mexico, Oil Conservation Division (NMOCD) pit guidelines and requirements, NMAC 19.15.17.

- Trees to be removed that are 3-inch-diameter and greater would be cut, de-limbed, and stacked for public access within the permitted project area on public lands managed by the BLM-FFO.

Protection of Topsoil

Topsoil, which would be stripped from the surface during the construction phase of the proposed project, would be stored and protected until it is redistributed during reclamation. The topsoil would be stored separately from subsoil or other excavated material within the permitted project area. The topsoil would be free of brush and tree limbs, trunks, and roots. Vehicle/equipment traffic would not be allowed to cross topsoil stockpiles. The topsoil would be protected using wattles or other BMPs so that erosion is minimized. If topsoil is stored for a length of time such that nutrients are depleted from the topsoil, amendments would be added to the topsoil as advised by an appropriate agent/contractor.

Protection of the Public

The hauling of equipment and materials for the proposed project on public roads would comply with Department of Transportation regulations. No toxic substances would be stored or used within the proposed project area. BROG would have inspectors present during construction. Any accidents involving persons or property would immediately be reported to the BLM-FFO. BROG would notify the public of potential hazards by posting signage, as necessary.

Prevention and Control of Weeds

Prior to construction equipment entering the proposed project area, construction equipment would be inspected for noxious weeds and cleaned.

It would be BROG's responsibility to monitor, control, and eradicate all invasive, non-native plant species within the proposed project area throughout the life of the project. BROG's weed-control contractor would contact the BLM-FFO regarding acceptable weed-control methods. If the contractor does not hold a current Pesticide Use Permit, a Pesticide Use Permit would be submitted prior to pesticide application. Only pesticides authorized for use on BLM lands would be used. The use of pesticides would comply with federal and state laws. Pesticides would be used only in accordance with their registered use and limitations. BROG's weed-control contractor would contact the BLM-FFO prior to using these chemicals.

Protection of Air Resources

BMPs for dust suppression would be utilized within the proposed project area to reduce fugitive dust during the construction phase of the proposed project. Fresh waterBLM application, using a rear-spraying truck or other suitable means, would be the primary method of dust suppression within the proposed project area. Any additional dust-suppression practices would include the BLM-standard BMPs found in the Gold Book (BLM and USFS 2007) and the BMPs outlined in the stipulations attached to an approved APD.

Additional Design Features and BMPs

Vehicles would be restricted to proposed disturbance areas and existing areas of surface disturbance, such as existing roads and well pads.

Worker safety incidents would be reported to the BLM-FFO as required under Notice to Lessees (NTL) - 3A (USGS 1979). BROG would adhere to company safety policies, Occupational Safety and Health Administration regulations, and Department of Transportation regulations.

BROG would comply with Onshore Oil and Gas Order No. 2, issued under Onshore Oil and Gas Operations (43 CFR 3160).

Within 90 days of installation, all aboveground structures not subject to safety requirements would be painted Juniper Green to blend with the surrounding landscape and reduce visual resource impacts.

Construction and maintenance activities would cease when soil or road surfaces become saturated to the extent that construction equipment is unable to stay within the proposed project area and/or when activities would cause irreparable harm to roads, soils, or watercourses.

Existing sediment- and/or erosion-control features within the project area would be re-established upon interim reclamation, as necessary. Additional resource protection design features and mitigation associated with construction are listed above, in “Design Features and Best Management Practices”, and would be established upon reclamation following construction and drilling activities. Installation and maintenance of erosion-control features would be done in accordance to BLM Gold Book standards.

Proposed Project Phases

Under the proposed action, the following phases would occur.

Construction Phase

Once the APD is issued, project construction can begin. The BLM-FFO would be notified at least 48 hours prior to the start of construction activities.

Within the proposed project area, all vegetation would be cleared, and the top 6 inches of topsoil would be salvaged and stockpiled for use in reclamation. Vegetation removed during construction, including slash/brush, would be chipped or mulched and incorporated into the topsoil as additional organic matter. Trees greater than 3 inches in diameter will be cut, de-limbed, and stacked for public access. The subsurface portion of any trees (tree stumps) would be placed in adjacent areas needing soil stabilization, or hauled to an approved disposal facility.

A 230-foot by 300-foot level well pad area would be constructed within a total permitted area of 3.03 acres. The proposed well pad is twinned on an active well location, and would result in approximately 1.92 acres of new surface disturbance. The well pad would be constructed from the earthen materials present on-site and gravel brought in from off-site. No concrete or other foreign materials would be brought in for use in construction of the well pad. Construction would involve preparing a level area for the equipment that would drill and complete the well. Following removal of vegetation and stockpiling of viable soil material, the pad would be graded using standard, cut-and-fill techniques of construction using a bulldozer, grader, front-end loader, and/or backhoe. Construction of the well pad would require a maximum cut of 5 feet at corner two, and a maximum fill of 4 feet at corner 5. A reserve pit would be excavated using heavy equipment.

The resource road re-route will be designed and constructed in accordance with BLM Gold Book Standards, BLM 9113-1 (Roads Design Handbook), and BLM 9113-2 (Roads Inventory and Condition Assessment Guidance and Instructions Handbook). Average clearing width for resource road development is 30 feet. Final travel surface width on resource roads is approximately 14 feet.

The well-tie pipeline would be constructed within a single trench. The pipeline would be placed within a granted 40-foot-wide pipeline corridor ROW located on previous well pad construction disturbance. Additional, related appurtenances, such as above ground valve assembly and above and below ground cathodic protection, would be installed within the proposed pipeline corridor as necessary.

Trenching activity would be conducted using a trencher or backhoe. The trench would be 16 inches in width if a trencher is used or 24 inches in width if a backhoe is used. After a pipe has been welded and coated, a side-boom tractor would be used to place the pipe into the trench. The pipeline would be buried to a minimum depth of 3 feet.

After trenching and pipe placement in the trench, the soils excavated from the trench would be returned and compacted to prevent subsidence. The trench would be compacted after approximately two feet of fill is placed within the trench and after the ground surface has been leveled.

Prior to the pipeline being placed in service, the pipe would be pressure tested. Pipeline markers would be installed along the proposed pipeline corridor within the line of sight, without voiding safety measures.

Drilling Operations

A drilling rig would be transported in sections and erected on the well site following construction of the well pad. Additional equipment and materials needed for drilling operations would be trucked into the well site. Drilling is a 24-hour operation taking an average of 9 days to drill a conventional gas well. To protect fresh water zone, surface casing is utilized. A 12 ¼-inch (diameter) hole is drilled to a depth of 500 to 1,000 feet, depending on the depth necessary to penetrate the fresh-water zones. Steel casing is lowered into the hole, and then specially designed cement is pumped down inside the casing out the shoe (at the bottom of the pipe) and up the outer annulus of the pipe to protect aquifers above the top of the casing shoe and to secure the base of the pipe. Surface casing is set to below the depth of the nearest potable water well within ½ mile of the surface location, or as specified by the BLM-FFO. After setting the surface casing, drilling resumes. Depending on well bore conditions, additional strings of casings may be run, using the same cementing practices before the well reaches the objective depth (total depth).

After setting the surface casing, directional drilling would begin with a “kick-off” (kick-off point) at which drilling would “build angle” and begin angle drilling which typically cumulates at an angle of 0-50 degrees to reach the bottom hole location and the target formation. A pipe casing is then installed from the surface of the bore hole through the production zone and cemented in place to prevent interzonal communication between gas bearing zones and water zones.

Most of the water used during the life of a producing well is consumed during drilling operations. A small amount of water is used for dust suppression or equipment installation during other phases of development. Recirculating mud systems are used to reduce the total volume of water needed. Drilling mud can be recycled to the next drilling location. Produced water from wells in the area can be used for most drilling operations except mixing cement. Water used to construct, produce, and maintain the proposed well would be acquired from the Manzanares Mesa Water Hole (POD #SJ-196).

The drilling fluid, called “mud,” is a mixture of water, bentonite, caustic soda, barite, and polymers. Drilling mud cools and lubricates the bit, while lifting the well cuttings caused by the bit to the surface for examination and disposal. The mud in the well bore prevents the hole walls from sloughing off into the hole, keeps underground pressures stable, and seals the sides of the well bore through formation of a thin “mud cake”. Mud properties are carefully supervised, and several measurements of the mud are made by a mud specialist during daily visits to the well site. The drilling mud is mixed on location and stored in steel pits or lined earthen pits. Drill cuttings are separated from the drilling mud and buried in a trench dug on the well location at the end of the drilling operation. The mud can be recycled to another drilling operation. If not recycled, it remains in the pit until the water has evaporated, and then is buried on location.

In the event formation evaluation determines the well would not be economically feasible to complete, then the well would be a dry hole, and would be plugged and abandoned in accordance with BLM procedures.

Completion Operations

A smaller completion rig is used for the final phase of completing the well. Casing is run to the producing zone and cemented in place. To ensure isolation and protection of all zones between the surface and total depth, the BLM requires cement to be circulated from total depth to surface on the production casing, as well as on the surface casing. Remedial measures are taken if cement cannot be circulated to the surface.

If formation pressure can raise oil/gas to the surface, the well would be completed as a flowing well. Several downhole acid or fracture treatments may be necessary to enhance the formation permeability, to make the well flow. Water requirements for these treatments range from 1,800 to 3,000 barrels (42 gallons per barrel). At the end of the treatment, the treatment water flows back to the surface and is captured in temporary tanks on location. This fluid is hauled to injection wells or evaporation ponds for disposal with other produced water.

Acidizing a well requires introducing acid in the well bore across the productive interval, which causes the solution of some of the mineral materials (e.g., calcite, dolomite, etc.) around the pore space. Upon solution and removal of these minerals, porosity and permeability are enhanced.

Hydrofracturing is conducted using fluid pumped down the well through perforations in the casing and into the formation. Pressures are increased to the point that the formation fractures or breaks, and sand is added to the injection fluid to “prop open” the crack, once the pressure is released. The pressure required to fracture a given formation is generally predictable. However, some coals require very high pressures to fracture the formation.

Before a well can begin producing gas for sale, the well bore and surrounding reservoir must be "cleaned up" (e.g., any fluids, sand, coal particles, or drill cuttings within the well bore must be removed). The conventional method for doing this is to pump air down the well bore, which lifts the waste fluids and solids out. The solid and liquid waste materials are then dumped into a pit or tank, and any gas that is removed is flared or vented to the atmosphere. In some flareless or green completions, natural gas, rather than air, is pumped down the well bore to clean it out.

The green completion technique is used on some wells in the San Juan Basin, which eliminates flaring and testing. The gas from flowback is run through a special separator and then placed in the pipeline for gathering. This technique reduces flaring and venting overall. The additional equipment for green completion may include considerably more tankage, special gas-liquid-sand separator traps, and portable gas dehydration. In addition to reducing methane emissions, green completions produce an immediate revenue stream with the produced natural gas and gas liquids, less solid waste and water pollution, and a safer operating practice.

During completion and testing of wells, flaring may be used to safely removed gas from the rig and work area. During the process produced gas is ignited and burned rather than directing that gas to sales. Produced gas is piped away from the well bore into a pit constructed on the well pad, ignited and allowed to burn. A berm is usually constructed around the pit to aid in containing the flame and any materials that might be blown out with the gas.

A free flowing well is closed off with an assemblage of valves, pipes, and fittings to control the flow of oil and gas to other production facilities. If the well is not free flowing, artificial-lift (pump) methods would be used.

Production Facilities

The production equipment and facility layout will be deferred until the well’s production characteristics can be evaluated after completion.

Routine production operations occur throughout the year and require use and maintenance of access roads and well pads on a periodic, as needed basis. Maintenance of the various mechanical components used in production occurs at intervals recommended by manufacturers or as needed, based on site inspections. A pumper would visit the producing well to ensure that equipment is functioning properly. Pumpers may visit the well on a daily basis. A pumper may visit the well site once a week by utilizing off site computer based automation systems. Solar panels are used to power the radio telemetry equipment. When a problem is identified through the system a pumper is dispatched to the location. Control and

monitoring of well production by radio telemetry reduces regular site inspections of the well, and vehicular traffic.

Periodically, a workover on a well is required. A unit similar to a completion rig is used to conduct maintenance procedures for efficient operation. Workover rigs can include repairs to the well bore equipment (casing, tubing, etc.), the well head, or the production formation itself. These repairs occur during daylight hours only and are usually completed in one day. Some situations may require several days to finish a workover. The frequency for this type of work cannot be accurately projected, since workover rigs vary and depend on site specific circumstances.

Interim Reclamation

Following the above mentioned phases of the proposed project, interim reclamation would occur within all new disturbance areas associated with the proposed project. The BLM-FFO would be notified at least 48 hours prior to surface reclamation activities.

During this phase, a bulldozer and a tractor with seeding capabilities would be used for reclamation purposes.

In areas that would be reclaimed, slopes would be re-contoured to pre-construction topographical contours, if possible. Additionally, stockpiled topsoil would be redistributed and the surface would be ripped and seeded.

The well pad would be reclaimed to a BLM-approved working area. Access to the well site would be maintained in accordance with the BLM Gold Book Standards, BLM 9113-1 (Roads Design Handbook), and BLM 9113-2 (Roads Inventory and Condition Assessment Guidance and Instructions Handbook).

During the March 2014 pre-disturbance onsite meeting, it was determined that the Piñon-Juniper Woodland Community best represents the proposed project area. Details of the interim reclamation process (including species included in the seed mixture) are provided in the Surface Reclamation Plan (Appendix C). Reclamation monitoring and reporting are discussed in the Surface Reclamation Plan.

Final Reclamation and Abandonment

Once the well site is no longer necessary and would not be expected to be utilized in the foreseeable future, it would be abandoned. Abandonment of the well would be carried out under current BLM regulations. Aboveground facilities would also be removed.

Final reclamation would occur within any portion of the project area that would be disturbed to bare soil during the abandonment phase of the proposed project, if these areas meet the acreage requirements for reclamation. These acreage requirements are summarized below:

- If final abandonment activities would disturb less than or equal to 0.1 acre to bare soil, the area(s) would be expected to re-vegetate naturally (no reclamation or monitoring activities will be required).
- If final abandonment activities would disturb more than 0.1 acre to bare soil, final abandonment reclamation activities would be the same as described for interim reclamation.

2.1.3. Proposed Surface Disturbance

Surface disturbance associated with the proposed project would encompass approximately 3.11 acres, total. Of this, approximately 2 acres would be considered new surface disturbance.

The well pad area would be 230-feet by 300-feet with a 50-foot construction buffer zone around the perimeter of the pad. New surface disturbance for well pad construction would be approximately 1.92 acres. Production equipment will be placed on the location in such a manner to allow proper safe access to produce and service the well/facilities while minimizing long-term disturbance and maximizing interim

reclamation. As practical, access will be provided by a tear-drop shaped road through the production area.

The proposed resource road re-route is approximately 100 feet in length. New surface disturbance as a result of resource road development would be approximately 0.07 acre.

The well-tie pipeline would be approximately 14 feet long and would be constructed entirely on existing well pad disturbance. New surface disturbance as a result of well-tie pipeline construction would be approximately 0.06 acre. All new surface disturbance associated with pipeline construction would be reclaimed during interim reclamation.

Depictions of the surface-disturbing activity locations are provided in Appendices A (Maps) and B (Plats).

Table 1. Proposed Project Surface Impacts

Surface Disturbance Description (Approximate Stationing)	Existing/Previously Permitted/Proposed Surface Disturbance	New Surface Disturbance (acres)
Well Pad		
230-foot by 300-foot location with 50-foot construction buffer zone	1.11 acres; existing disturbance	1.92 acres; new disturbance
Access Road		
Proposed resource road (0+00 to 0+99.92)	-	100’ long x 30’ wide (0.07 acre; new disturbance)
Well-tie Pipeline		
Overlap well pad (0+00 to 0+13.96)	14’ long x 40’ wide (0.01 acre; existing disturbance)	-
Total Project Surface Disturbance (acres)	**1.12**	**1.99**

2.2. No Action

Under the No Action Alternative, the APD associated with the proposed San Juan 29-7 Unit No. 140P would not be approved. The proposed well pad, access road, and pipeline would not be constructed. Current land and resource uses would continue to occur in the proposed project area.

2.3. Alternatives Considered but Eliminated from Detailed Study

No reasonable alternatives to the proposed project have been developed that would result in significantly fewer impacts or any clear advantages over the proposed action. The proposed well site is twinned on an existing natural gas well location.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Under the No Action alternative, current land and resource issues within the proposed project area would continue; there would be no new impacts from oil and gas development. The No Action alternative will serve as the baseline for comparing the environmental impacts of the analyzed alternatives, and will not be further evaluated in this EA (BLM 2008b).

3.1. Air Resources

3.1.1. Affected Environment

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

Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Resources Technical Report; (U.S. Department of Interior Bureau of Land Management, 2014). This document summarizes the technical information related to air resources and climate change associated with oil and gas development and the methodology and assumptions used for analysis.

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

Air Quality

Criteria Air Pollutants

The Air Resources Technical Report describes the types of data used for description of the existing conditions of criteria pollutants, how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current National and state standards. EPA's Green Book web page (U.S. Environmental Protection Agency, 2013)~~(U.S. Environmental Protection Agency, 2013)~~ reports that all counties in the Farmington Field Office area are in attainment of all National Ambient Air Quality Standards (NAAQS) as defined by the Clean Air Act. The area is also in attainment of all state air

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quality standards (NMAAQS). The current status of criteria pollutant levels in the Farmington Field Office are described below. Total emissions of criteria pollutants from each source sector were calculated by adding together the emissions from the four counties that are located in FFO: San Juan, McKinley, Rio Arriba, and Sandoval.

"Design Concentrations" are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. The 2012 design concentrations of criteria pollutants are listed below in Table 2. There is no monitoring for CO and lead in San Juan County, but because the county is relatively rural, it is likely that these pollutants are not elevated. PM10 design concentrations are not available for San Juan County.

Table 2. 2012 Criteria Pollutant Monitored Values in San Juan County (U.S. Environmental Protection Agency, 2014)

Pollutant	2012 Design Concentration	Averaging Time	NAAQS	NMAAQS
O_3	0.071 ppm	8-hour	0.075 ppm[1]	
NO_2	13 ppb	Annual	53 ppb[2]	50 ppb
NO_2	38 ppb	1-hour	100 ppb[3]	
$PM_{2.5}$	4.7 µg/m^3	Annual	12 µg/m^3[3,4]	60 µg/m^3[3,6]
$PM_{2.5}$	14 µg/m^3	24 hour	35 µg/m^3[3,3]	150 µg/m^3[3,6]
SO_2	19 ppb	1-hour	75 ppb[5]	

[1] Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
[2] Not to be exceeded during the year
[3] 98th percentile, averaged over 3 years
[4] Annual mean, averaged over 3 years
[5] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[6] The NMAAQS is for Total Suspended Particulate (TSP)

In 2005, the EPA estimates that there was less than 0.01 ton per square mile of lead emitted in FFO counties, which is less than 2 tons total (U.S. Environmental Protection Agency, 2012). Lead emissions are not an issue in this area, and will not be discussed further.

Air quality in a given region can be measured by its Air Quality Index value. The air quality index (AQI) is reported according to a 500-point scale for each of the major criteria air pollutants, with the worst denominator determining the ranking. For example, if an area has a CO value of 132 on a given day and all other pollutants are below 50, the AQI for that day would be 132. The AQI scale breaks down into six categories: good (AQI<50), moderate (50-100), unhealthy for sensitive groups (100-150), unhealthy (>150), very unhealthy and hazardous. The AQI is a national index, the air quality rating and the associated level of health concern is the same everywhere in the country. The AQI is an important indicator for populations sensitive to air quality changes.

Mean AQI values for San Juan County were generally in the good range (AQI<50) in 2013 with 80% of the days in that range. The median AQI in 2013 was 42, which indicates "good" air quality. The maximum AQI in 2013 was 156, which is "unhealthy".

Although the AQI in the region has reached the level considered unhealthy for sensitive groups on several days almost every year in the last decade, there are no patterns or trends to the occurrences (Table 3). On 8 days in the past decade, air quality has reached the level of "unhealthy" and on two days, air quality reached the level of "very unhealthy". In 2009 and 2012, there were no days that were "unhealthy for sensitive groups" or worse in air quality. In 2005 and 2013, there was one day that was "unhealthy" during each year. In 2010, there were five "unhealthy" days and two "very unhealthy days".

Table 3. Number of Days classified as "unhealthy for sensitive groups" (AQI 101-150) or worse (U.S. Environmental Protection Agency, 2013a)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Days	3	6	9	18	1	0	12	9	0	1

Hazardous Air Pollutants

The Air Resources 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 (U.S. Department of Interior Bureau of Land Management, 2014). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in the U.S. The purpose of the NATA is to identify areas where HAP emissions result in high health risks and further emissions reduction strategies are necessary. A review of the results of the 2005 NATA shows that cancer, neurological and respiratory risks in San Juan County are generally lower than statewide and national levels as well as those for Bernalillo County where urban sources are concentrated in the Albuquerque area (U.S. Environmental Protection Agency, 2012).

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

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

The Air Resources Technical Report summarizes information about greenhouse gas emissions from oil and gas development and their effects on national and global climate conditions. While it is difficult to determine the spatial and temporal variability and change of climatic conditions; what is known is that increasing concentrations of GHGs are likely to accelerate the rate of climate change.

3.1.2. Impacts from the Proposed Action

Methodology and assumptions for calculating air pollutant and greenhouse gas emissions are described in the Air Resources Technical Report (U.S. Department of Interior Bureau of Land Management, 2014). This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one conventional gas well. The calculators give an approximation of criteria pollutant, HAP, and greenhouse gas (GHG) emissions to be compared to regional and national emissions

levels. Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (U.S. Department of Interior Bureau of Land Management, 2014).

Direct and Indirect Impacts

Criteria Pollutants

Table 5 shows estimated emissions from one proposed conventional gas well for criteria pollutants, volatile organic compounds (VOC) and greenhouse gas (GHG). For comparison, Table 6 shows total human-caused emissions for each of the counties in the FFO and La Plata County, Colorado, based on USEPA's 2011 emissions inventory (U.S. Environmental Protection Agency, 2014)~~(U.S. Environmental Protection Agency, 2014)~~.

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

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

Table 6. Analysis Area Emissions in Tons/Year, 2011

County	NO_X (1)	CO (2)	VOC (3)	PM_{10} (4)	$PM_{2.5}$ (5)	SO_2 (6)
McKinley	11,952.9	17,007.8	3,891.2	70,096.4	7,645.2	1,381.1
Rio Arriba	12,012.3	27,344.6	19,149.8	33,761.2	4,130.6	60.4
San Juan	42,231.5	63,568.9	26,110.8	76,638.3	9,201.0	5,559.3
Sandoval	4,143.8	19,513.9	4,373.1	39,343.0	4,510.8	109.3
Total	**70,340.5**	**127,435.2**	**53,525.0**	**219,838.9**	**25,487.6**	**7,110.0**

(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(6) SO_2 – sulfur dioxide

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

	NO_X[1]	CO[2]	VOC[3]	PM_{10}[4,5]	$PM_{2.5}$[5,6]	SO_2[5,7]
Total Emissions	70,340.5	127,435.2	53,525.0	219,838.9	25,487.6	7,110.0
Conventional Gas Well Emissions	2.44	0.92	0.31	0.93	0.13	0.05
Percent Increase	**.003**	**.0007**	**.0006**	**.0004**	**.0005**	**.0007**

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

Hazardous Air Pollutants

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

Total Greenhouse Gases

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

Cumulative Impacts

The FFO manages Federal hydrocarbon resources in San Juan, Sandoval, Rio Arriba, and McKinley counties. There are approximately 21,150 wells in the San Juan Basin. About 18,483 of the wells in these counties are Federal wells. Analysis of cumulative impacts for reasonable development scenarios and RFDS of oil and gas wells on public lands in the FFO was presented in the 2003 RMP. This included modeling of impacts on air quality. A more detailed discussion of Cumulative Effects can be found in the Air Resources Technical Report (U.S. Department of Interior Bureau of Land Management, 2014).

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 (U.S. Department of Interior Bureau of Land Management, 2014). It includes a summary of emissions on the national and regional scale by industry source. Sources that are considered to have notable contributions to air quality impacts and GHG emissions include electrical generating units, fossil fuel production (nationally and regionally), and transportation.

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

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

The Air Resources Technical Report (U.S. Department of Interior Bureau of Land Management, 2014) 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. Cultural Resources

3.2.1. 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. 10000 B.C. to 5500 B.C.), Archaic (ca. 5500 B.C. to A.D. 400), Basketmaker II-III and Pueblo I-IV periods (aka Anasazi; A.D. 1-1540), and the historic (A.D. 1540 to present), which includes Native American as well as later Hispanic and Euro-American settlers. Detailed descriptions of these various periods are provided in the Bureau of Land Management Farmington Field Office Final Environmental Impact Statement (2003) and will not be reiterated here. Additional information can also be found in an associated documented, Cultural Resources Technical Report (CRTR; SAIC 2002).

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

The entire Area of Potential Effect (APE) for the Proposed Action was archaeologically surveyed by WCRM at a BLM Class III (100 percent) level. The archaeological report, WCRM(F)1315 (Proper and Nathan 2014; BLM 2014(III)071F), 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).

Two previously recorded sites were updated and six isolated occurrences (IOs) were documented during the Class III inventory (Proper and Nathan 2014). The IOs represent insignificant resources. The sites are recommended as being eligible for nomination to the NRHP. No TCPs are known to exist in the APE.

3.2.2. 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 eligible/listed) are being avoided with the implementation of design features such as but not limited to reduction of construction areas, temporary barriers, and site monitoring. These design features are detailed in the Cultural Resource Record of Review, attached to the approved APD. The proposed action is not known to physically threaten any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance

of traditional ceremonies/rituals. The proposed action will have no direct or indirect impact on significant cultural sites.

Cumulative Impacts

There will 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 archaeological survey.

3.3. Upland Vegetation

3.3.1. Affected Environment

The analysis area is located within the United States Environmental Protection Agency (USEPA) designated Colorado Plateaus Level III ecoregion. The Colorado Plateaus ecoregion is located in Arizona, Colorado, and Utah, with a small portion in New Mexico. This ecoregion is approximately 32,581,700 acres (131,854 km^2), and the elevation ranges from 3,284 to 10,204 feet (1,001 to 3,110 meters). This ecoregion is characterized by rugged tableland topography, with large basins, ridges, spectacular canyons, and colorful geological formations. The ecoregion is heavily visited for recreational purposes. The higher elevations support extensive piñon-juniper woodlands. Groundcover in these woodlands is sparse and consists of grama and other grasses, forbs, and shrubs, such as big sagebrush and alderleaf mountain-mahogany. Lower areas contain saltbush-greasewood shrublands, typical of hotter, drier areas. Land uses include livestock, some irrigated farming, recreation, mining, and gas and oil production.

The general region surrounding the proposed project area is characterized by wooded foothills of Manzanares Mesa and sagebrush shrubland valleys. The proposed project area is characterized primarily by previously disturbed area surrounded by open piñon-juniper woodland habitat. Piñon pine (*Pinus edulis*) and Utah juniper (*Sabina osteosperma*) were documented around the perimeter of the proposed well pad within the construction buffer zone. Reclamation of the previously disturbed areas has resulted in the establishment of blue grama (*Bouteloua gracilis*), four-winged saltbush (*Atriplex canescens*), rabbitbrush (*Chrysothamnus* sp.), and Russian thistle (*Salsola australis*). An understory of antelope bitterbrush (*Purshia tridentata*), galleta grass (*Pleuraphis jamesii*), Indian ricegrass (*Achnatherum hymenoides*), mountain-mahogany (*Cercocarpus montanus*), and banana yucca (*Yucca baccata*) was present within the undisturbed woodland habitat. Also found scattered throughout the project area was big sagebrush (*Seriphidium tridentatum*), broom snakeweed (*Gutierrezia sarothrae*), and New Mexican prickly pear cactus (*Opuntia phaeacantha*).

3.3.2. Impacts from the Proposed Action

Direct and Indirect Impacts

During the construction phase of the proposed project, all vegetation within the proposed project area would be cleared. The proposed project would result in the removal of approximately 2 acres of open piñon-juniper woodland habitat. The proposed well pad will be reclaimed to a BLM-approved working area. All new surface disturbance associated with the proposed pipeline corridor will be reclaimed during interim reclamation.

During final reclamation, BROG would fully reclaim any portions of the proposed project that would be disturbed to bare soil as a result of final abandonment earthwork activities (if such areas total greater than 0.1 acre).

During interim and final reclamation, the BLM Piñon-Juniper Woodland Community Seed Mixture would be utilized; the species included in this mixture are included in the Surface Reclamation Plan (Appendix C). Reestablished vegetation would consist of native grass, forb, and shrub species included in the seed

mixture, as well as native species that are not deliberately planted. It is also possible that invasive, nonnative species could become established within the proposed project area, as such species could be transported by project equipment and tend to thrive in disturbed areas. Following the reclamation process, the resulting vegetation communities could differ from the native plant communities surrounding the proposed project area. Within reclaimed areas, it is not expected that the vegetation communities would return to native conditions within 20 years (BLM 2003a, 4-18).

The deposition of fugitive dust generated during vegetation-clearing activities and during wind events could reduce photosynthesis and productivity of the surrounding vegetation (Thompson, et al. 1984; Hirano, et al. 1995), increase water loss in plants near the proposed project area (Eveling and Bataille 1984), and result in injury to leaves of surrounding vegetation.

Cumulative Impacts

The spatial analysis area is the proposed project area and immediately adjacent lands. Within the spatial analysis area, the following vegetative disturbances have occurred or are anticipated to occur in the reasonably foreseeable future:

- The proposed well pad is twinned on an existing well location containing two active wells. The well site has been reclaimed to a BLM-approved working area.
- Resource roads have been developed within the spatial analysis area providing access to various well sites in the vicinity.
- Active wildlife and livestock grazing occurs in the area. The proposed project area is within the Navajo City grazing allotment No. 5092 managed by the BLM-FFO.

Indirectly, fugitive dust or deposition associated with existing roads, well pads, utility corridors, and public use in the immediate area could impact the vegetation within the analysis area, and could continue to do so throughout the life of the proposed project. Aside from those discussed above, no additional impacts to vegetation are expected within the analysis area for the reasonably foreseeable future.

The proposed project would contribute to direct and indirect vegetation disturbance and fugitive dust and/or deposition within the spatial analysis area.

3.4. Water Resources

3.4.1. Affected Environment

Groundwater

The planning area is underlain by sandstone aquifers and unconsolidated sand and gravel aquifers. The Colorado Plateaus Aquifers are sandstone while the Rio Grande Aquifer system is unconsolidated sand and gravel. The primary Colorado Plateaus Aquifers that underlie the planning area are the Unita-Animas Aquifer, which underlies the vast majority of the San Juan Basin, and the Mesaverde aquifer (USGS 2001a).

The Unita-Animas aquifer is composed primarily of Lower Tertiary rocks in the San Juan Basin. It consists of the San Jose Formation, the underlying Animas Formation and its lateral equivalent, the Nacimiento Formation, and the Ojo Alamo Sandstone. The San Jose Formation is the uppermost significant bedrock formation in the San Juan Basin and primarily consists of permeable, coarse, arkosic sandstone interlayered with mudstone. The Animas and Nacimiento Formations and the Ojo Alamo Sandstone consist primarily of permeable conglomerate and medium to very coarse sandstone interlayered with relatively impermeable shale and mudstone. The thickness of the Unita-Animas aquifer generally increases toward the central part of each basin. In the northeastern part of the San Juan Basin, the maximum thickness of the aquifer is about 3,500 feet (USGS 2001a).

Surface Water

As discussed in Section 1.5.1 (Clean Water Act), the BLM-FFO and USACE Durango Regulatory Office have determined that USACE-jurisdictional waters may include USGS watercourses. The project area does not contain a USGS watercourse.

3.4.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Groundwater

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

Hydraulic fracturing is a common process in the San Juan Basin and applied to nearly all wells drilled. The producing zone targeted by the proposed well is well below any underground sources of drinking water. Dakota Sandstone is overlain by the Mancos Shale Formation, which itself is overlain by a continuous confining layer. The geological confining layer is the Lewis Shale Formation that is located above both the Mancos Shale and Mesaverde Group Formations and provides an impermeable layer that isolates the Mancos Shale and Mesaverde Group Formations from both identified sources of drinking water and surface water. Fracturing could possibly extend into the Mancos Shale Formation overlying Dakota Sandstone; however, the Mancos Shale Formation has not been identified as an underground source of drinking water based on its depth and relative high levels of TDS. No impacts to surface water or freshwater-bearing groundwater aquifers are expected to occur from hydraulic fracturing of the proposed well.

Water used to construct, produce, and maintain the proposed well would be acquired from the Manzanares Water Hole (NMOSE POD #SJ-196).

Surface Water

The proposed project would not cross or impede the flow of a USGS watercourse. Construction features will be designed to divert potential surface water away from and around the proposed well pad. Proposed project activities would be designed to avoid discharge into watercourses that are potentially USACE jurisdictional. Impacts to surface water resources from the proposed project would be expected to be negligible.

Cumulative Impacts

The primary cumulative impacts on water quality would result from an increase in the amount of surface disturbance due to increased oil and gas development activity and other earthmoving activities in the Gobernador sub-watershed of the planning area. The proposed surface disturbances and increased sediment yields, along with an increase in roads that would direct sedimentation to stream crossings,

would occur mainly in the high development area. Other vegetation damaging practices, such as OHV use cross-country and in drainageways, livestock grazing, and vegetation management on non-public lands, could contribute to increased sedimentation.

As population increases in the planning area, domestic water consumption would also increase, but no data are available to quantify the amount.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

- Dollie Busse, BROG
- Patsy Clugston, BROG
- Kenny Davis, BROG
- Brent Hottell, BROG
- Sam Jaquez, BROG
- Denise Journey, BROG
- Arleen White, BROG
- Western Cultural Resource Management, Inc.

4.2. List of Preparers

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- Amanda Nisula, Planning and Environmental Coordinator – BLM-FFO
- Dale Wirth, Natural Resource Specialist – BLM-FFO
- Sheila Williams, District Botanist – BLM-FFO
- Matthew Zabka, Environmental Specialist – Adkins Consulting, Inc.

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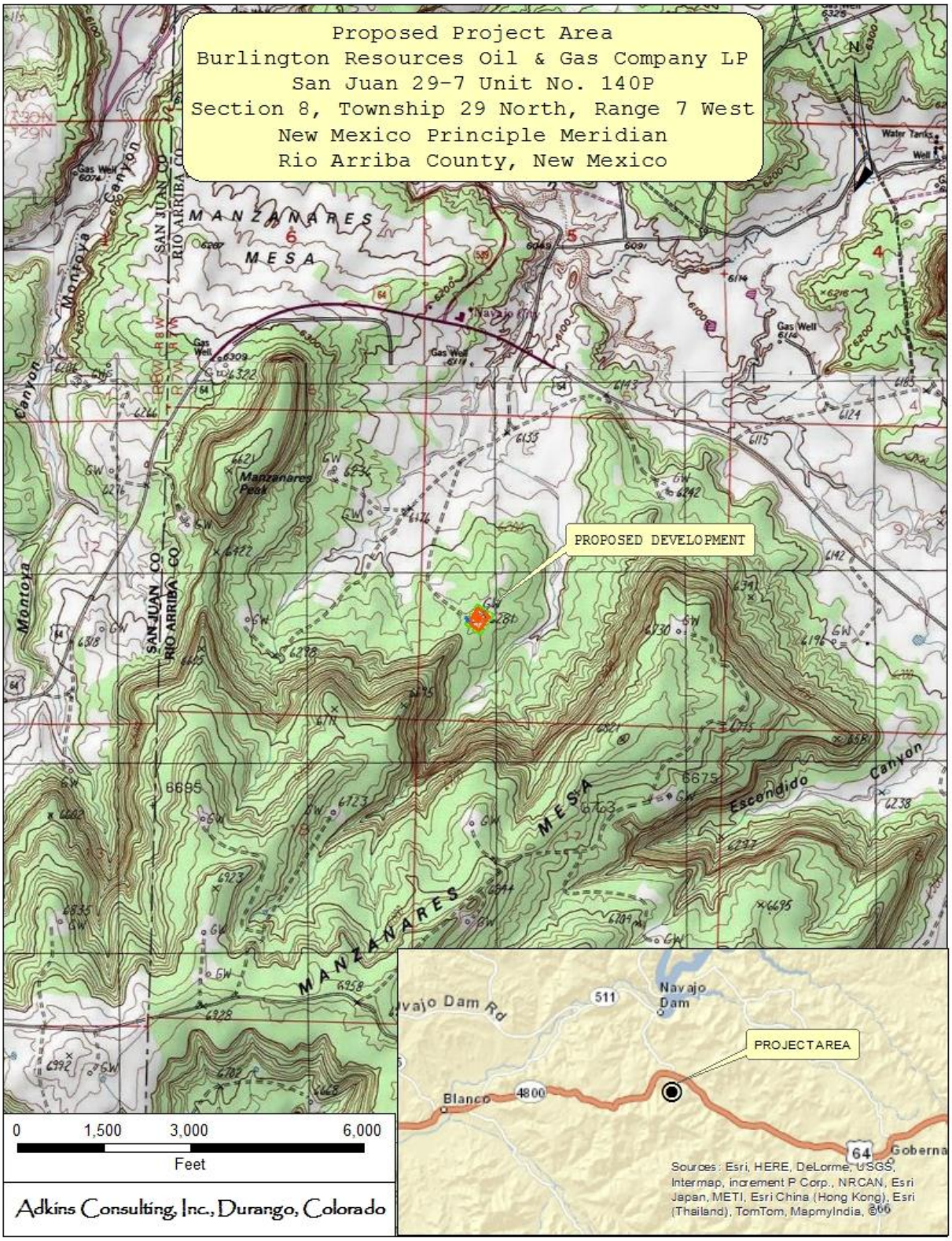
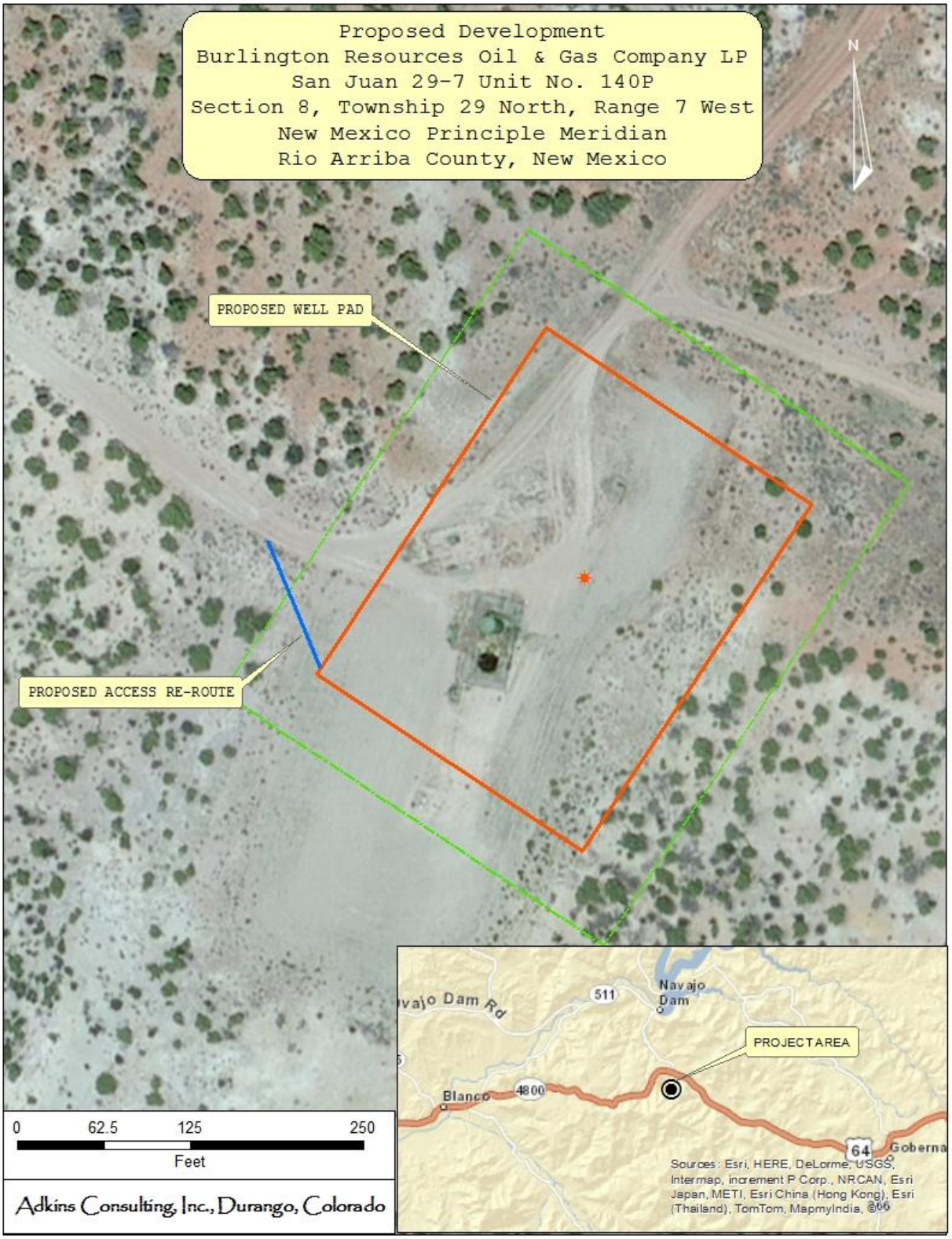
APPENDIX A. MAPS

A.1. Project Area Map



A.2. Proposed Development Map



APPENDIX B. PLATS

APPENDIX C. SURFACE RECLAMATION PLAN