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Logos Operating, LLC
Dragonfly No. 111H & No. 112H
Twinned Horizontal Oil Well Project

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U.S. Department of the Interior
Bureau of Land Management
Farmington District
Farmington Field Office
6251 N. College Blvd., Ste. A
Farmington, NM 87402
Phone: (505) 564-7600
FAX: (505) 564-7608

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

Logos Operating, LLC (Logos) has submitted Applications for Permit to Drill (APD) with the Bureau of Land Management - Farmington Field Office (BLM-FFO) for the twinned Dragonfly No. 111H & No.112H horizontal oil wells and associated access road and pipeline. The proposed project includes the construction of one well pad in order to drill two wells and develop federal mineral resources. Logos would also construct a new resource road to access the proposed well site. Once the wells have been drilled and prove to be viable, Logos would construct a well-tie pipeline within the granted Right of Way (ROW) corridor to transport produced gas to existing William H-21 pipeline infrastructure. Logos would receive the approved APD to develop their lease and a ROW Grant from the BLM-FFO for the authorization to construct, maintain and operate the subsurface, gas well-tie pipeline on public lands. The proposed action is the approval of the APD and ROW by the BLM-FFO, located in Farmington, New Mexico.

The proposed project is located on public lands managed by the BLM-FFO and entirely within the Crow Mesa Wildlife Area, a BLM-FFO Specially Designated Area (SDA). The proposed access road is a previously plugged and abandoned (P&A) well access road and is therefore considered all new disturbance. In addition to constructing a new access road, Logos would upgrade the existing resource road (Road 503) for approximately 1.5-miles to the west. Proposed road construction and upgrades will be designed, constructed and maintained 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).

Surface disturbance associated with the proposed project area would be approximately 13.28 acres, total. Of this, approximately 7.83 acres would be considered new surface disturbance. Proposed new surface disturbances would include 5.45 acres for the construction of a new well pad, 0.96 acres for the construction of an access road, and 1.41 acres for the construction of a well-tie pipeline. The upgrade of existing access road would take place within approximately 5.45 acres existing disturbance. New surface disturbance 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 disturbance associated with the proposed project 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 produces 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 Logos reasonable access to BLM 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 APDs.

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

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 action supports 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 (BLM 2003b, 2-2 – 2-3).

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

1.5. Relationship to Statutes, Regulations or Other Plans

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

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).

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 (2014), 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* (2012), 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 Logos, BLM-FFO representatives, WFC, and an environmental consultant (Adkins Consulting, Inc. [ACI]), was held for the proposed project on February 10th, 2015. A public invitation to the on-site meetings was posted online, no private citizens or groups attended the meeting:

http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_oil_and_gas/ffo_onsites.html

A BLM-FFO Interdisciplinary Team meeting was held on January 23rd, 2015 to discuss the proposed action. At the aforementioned meetings, potential issues of concern (Section 1.6.2) 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 dust, equipment emissions, and consumption of hydrocarbons associated with 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 vegetation-clearing, proposed project activities, and final reclamation associated with the proposed project impact wildlife, including migratory birds?
- How would vegetation-clearing, proposed project activities, and final reclamation associated with the proposed project impact the following BLM Special Status Species (SSS): Bendire's thrasher (*Toxostoma bendirei*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*) and prairie falcon (*Falco mexicanus*)?
- How would vegetation-clearing, proposed project activities, and final reclamation associated with the proposed project impact noxious weeds and invasive species?
- What effects will the proposed action have on public health and safety?
- What effects will the proposed action have on current undeveloped areas in the BLM-FFO Specially Designated Areas (SDA)?

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.

Areas of Critical Environmental Concern (ACECs)

The nearest Area of Critical Environmental Concern to the proposed action is *Superior Mesa ACEC*, approximately 6.5 miles away to the northeast (BLM 2014d).

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 action is well below any underground sources of drinking water. The Mancos Shale formation is also 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 formations and provides an impermeable layer that isolates the Mancos Shale and Mesaverde formations from both identified sources of drinking water and surface water. On average, total depth of the proposed well bore would be about 5,000 feet below the ground surface. Fracturing in the Basin Mancos formation is not expected to occur above depths of 4,000 feet below the ground surface. Fracturing could possibly extend into the Mesaverde formation overlying the Basin Mancos; however, the 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 this proposed well.

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 wells would be acquired from the Blanco Trading Post Water Well (New Mexico Office of the State Engineer [NMOSE] point of diversion [POD] authorization number SJ-2105) no unaccounted-for water depletions within USFWS-listed fish habitat would occur. Therefore, there is no need for additional Section 7 consultation.

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 and ROW Grant associated with Logos' twinned Dragonfly No. 111H & No.112H horizontal oil wells. The proposed action includes the construction of a new 2,085-foot access road and a 400-foot by 400-foot well pad in order to horizontally drill and develop federal mineral resources in the Gallup Dakota Pool. If the well is successful and proves to be viable, a 2,061-foot, subsurface pipeline would be constructed by Logos to transport produced gas to the existing H-21 pipeline infrastructure operated by WFC. In addition, Logos would upgrade approximately 1.5-miles of existing access road to improve access to the proposed well site. The proposed project would commence after the APD and ROW Grant are 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

A map of the proposed project area plotted on USGS topographic quadrangle (Figure A.1) and a drawing of the proposed development, including road upgrades, on aerial imagery (Figures A.2 and A.3) are provided in Appendix A.

The proposed project area is located within the BLM-FFO management area on public lands in San Juan County, New Mexico. The proposed project area is located with Crow Mesa Wildlife Area SDA approximately 32 miles southeast of Bloomfield, 7.2 miles northeast of Nageezi, and 13.2 miles northwest of Counselor. The proposed project is located within the northwest quarter of Section 12, and southwest quarter of Section 1, Township 24 North, Range 8 West, New Mexico Principle Meridian (NMPM).

Table 1. Legal Location of Proposed Well Heads

	Surface Location								
Well Head	UL or Lot No.	Section	Township	Range	Feet from the	North/ South Line	Feet from the	East/West Line	County
111H	**D**	**12**	**24N**	**8W**	**915**	**NORTH**	**823**	**WEST**	**SAN JUAN**
112H	**D**	**12**	**24N**	**8W**	**965**	**NORTH**	**808**	**WEST**	**SAN JUAN**
Bottom Hole Location If Different From Surface									
	UL or Lot No.	Section	Township	Range	Feet from the	North/ South Line	Feet from the	East/West Line	County

111H	**D**	**11**	**24N**	**8W**	**330**	**NORTH**	**250**	**WEST**	**SAN JUAN**
112H	**E**	**11**	**24N**	**8W**	**1650**	**NORTH**	**250**	**WEST**	**SAN JUAN**

The general region surrounding the proposed project area is characterized by ridges and mesas transected by relatively flat lowland valleys. The project area is located within Crow Mesa, just north of Crow Canyon. Ground elevation at the proposed well head is approximately 7,279 feet above mean sea level (AMSL).

2.1.2. Description of Proposed Project

A detailed description of design features and construction practices associated with the proposed action can be found below. Construction plats associated with the proposed projects 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

Logos would adhere to the stipulations attached to the approved APD and ROW Grant 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 Logos 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, Logos 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 SDA

The proposed project is located entirely within Crows Mesa Wildlife Area (Crow Mesa) SDA managed by BLM-FFO. There are a total of 38,252 acres within the boundary of Crow Mesa Wildlife Area, of which 34,189 acres are public land acres (BLM) and 34,264 acres are federal mineral acres. (BLM 2003b). Management goals for Crow Mesa focus on protecting big game and their habitat. Research conducted by Easterly et al. (1991), Rost and Bailey (1979), Ward (1976), Lyon (1983), and others has found that deer and elk tend to avoid the areas within 0.25 to 0.5 miles of adjacent roads. The nature and extent of this avoidance is dependent upon the amount of cover present, the volume of traffic, and whether or not the vehicles stop or continue moving. Research conducted in Wyoming by Easterly et al. (1991) found "that stress from human activities associated with oil and gas development may be additive to environmental stress and increase winter mortality". Therefore timing restrictions on drilling new wells and new construction were identified by BLM-FFO as a means to reduce the amount of vehicle travel and the accompanying human activity.

Seasonal timing limitation on drilling and construction within Crow Mesa SDA are from December 1 through March 31 for new and current oil and gas leases. If circumstances or relative resource values change or if it can be demonstrated that oil and gas operations can be conducted without causing unacceptable impacts, this stipulation may be waived, excepted, or modified by the BLM Authorized Officer, if such action is consistent with the provisions of the Farmington Resource Management Plan, or if not consistent, through a land use plan amendment and associated National Environmental Policy Act analysis document. If the BLM Authorized Officer determines that the waiver, exception, or modification involves an issue of major public concern, the waiver, exception, or modification shall be subject to a 30-day public review period. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes (BLM 2003b).

Additional management goals within the Crow Mesa SDA include managing new oil and gas leases under Controlled Surface Use (CSU) management constraints and allowing ROWs on a case-by-case basis with special management constraints and mitigation.

Protection of Flora and Fauna, including SSS and Livestock

The proposed project area is approximately 0.6-miles northeast of the FFO-designated potential habitat area for Aztec gilia and Brack's hardwall cactus (BLM 2013; Figure A.2 [Appendix A]). Both plants are designated SMS by the BLM-FFO and listed endangered species by the State of New Mexico. Soils derived from the Nacimiento Formation, which provides the appropriate geologic substrate for the two plants, were not present within the action area. During a biological survey by ACI, no Brack's cacti or Aztec gilia were documented within the analysis area.

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.

Under the Migratory Bird Treaty Act – BLM/FFO Interim Management Policy (IM No. NM-F00-2010-001), timing limitations on use authorizations will be enforced for projects during the nesting period of May 15 to July 31 to avoid or minimize the possibility of the unintentional take of migratory birds. These timing limitations will be enforced for projects during the nesting period of May 15 to July 31 under the following conditions:

- For proposed projects 4.0 acres or more of vegetative disturbance, no construction activities from May 15 to July 31 will be permitted without a migratory bird nest survey. These surveys will be conducted by a BLM/FFO approved biologist using a survey protocol provided by a BLM/FFO biologist. If any active nests are located within the proposed project area, projects activities will

not be permitted until written approval by a BLM/FFO biologist. The BLM/FFO will monitor any active nests located from a nest survey.

- The use of prescribed fire and mechanical thinning equipment (i.e. hydromower and tree axe) during this period (5/15-7/31) will be avoided. Exceptions to this policy will be considered where repeated complications due to weather have prevented the attainment of resource objectives through the use of prescribed fire. In these situations a thorough environmental analysis will be prepared assessing the effects of conducting the burn during the restricted period. The decision to proceed or not will be based upon this analysis. It should be noted also that this policy does not apply to natural ignitions in areas that the District Fire Management Plan has designated as a "wildland fire use area" nor does it apply to treatments 4.0 acres or less in size. In addition, should state or national guidance be issued that differs from this policy; the FFO policy will be modified to conform to it.

- Should active nests be observed, the contractor has determined that project activities cannot be avoided until after the birds have fledged (left the nest), and if no practicable or reasonable avoidance alternatives are identified, then the contractor must contact the USFWS's Migratory Bird Permit Office in Albuquerque, NM at (505) 248-7882. The contractor may proceed with work on the affected project activities following receipt of the approved permit from the USFWS.

The proposed action is located within the Rancho Largo grazing allotment No. 05119 managed by the BLM-FFO. Grazing lease operator(s) would be notified 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. Construction would not cease or delay 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, delimbed, stacked and brought up to the main resource road.
- Logos would upgrade the existing resource road for approximately.5-miles. The road would be upgraded and maintained 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).
- Logos would install a lockbar gate at the beginning of the proposed access road.
- Logos would close off / block the previous P&A access road south of the well pad area (see Figure A.3 [Appendix A]).

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. Logos would have inspectors present during construction. Any accidents involving persons or property would immediately be reported to the BLM-FFO. Logos 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 Logos' responsibility to monitor, control, and eradicate all invasive, non-native plant species within the proposed project area throughout the life of the project. Logos' 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. Logos' 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. Water 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). Logos would adhere to company safety policies, Occupational Safety and Health Administration regulations, and Department of Transportation regulations.

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

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.

Erosion-control and water-management features, such as berms, culverts, diversion ditches, and waterbars, would be applied as specified by the BLM-FFO Authorized Officer. Features suggested by the

BLM-FFO representative during the February 10th, 2015 on-site include water turnouts along the access road as needed. Installation and maintenance of erosion-control features would be done in accordance to BLM Gold Book standards. Additional resource protection design features and mitigation associated with construction are listed above, in “Design Features and Best Management Practices”, or would be established upon reclamation following construction and drilling activities.

Proposed Project Phases

Under the proposed action, the following phases would occur.

Construction Phase

Once the APDs and ROW Grants are approved, well site and pipeline construction can begin. The BLM-FFO would be notified at least 48 hours prior to the start of construction.

Within the proposed project area, all vegetation would be cleared, and approximately the top 6 inches of topsoil would be salvaged and stockpiled. Vegetation removed during construction, including slash/brush, would be chipped or mulched and incorporated into the topsoil as additional organic matter. Trees 3-inch-diameter and greater would be cut, delimbed, stacked and brought up to the main resource road. The subsurface portion of any trees (tree stumps) would be placed in adjacent areas needing soil stabilization, or hauled to an approved disposal facility.

Construction would involve preparing a level area for the equipment that would drill and complete the well. A 400-foot by 400-foot well pad area would be constructed within a total permitted area of 5.45 acres. Corner number six would be rounded. The well pad would be constructed from the earthen materials present on-site or imported from a predetermined borrow pit. 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 wells. 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 between 1.1 and 5.9 feet of cut on the west and east side of the well pad, and between 2.7 and 5.8 feet of fill on the southeast (corner six) and northwest (corner three) side of the location.

Logos would construct a new 2,085-foot road to provide access to the well site. In addition, approximately.5 miles of the existing resource road would be upgraded. Proposed road construction and upgrades 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). Clearing width for resource road development would be within a granted 20-feet access road ROW. Final travel surface width on resource roads is approximately 15-feet.

The well-tie pipelines would be constructed within a single trench offset from the proposed access road centerline by approximately 15 feet. The pipelines would parallel the proposed resource road for its entire length of 2,061-feet. The pipelines would be placed within a granted 30-foot-wide pipeline corridor ROW. Additional, related appurtenances, such as above ground valve assembly and above and below ground cathodic protection, would be installed within the proposed pipeline corridors as necessary.

Trenching activities would be conducted using a trencher or backhoe. The trenches 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 a trench. The pipelines 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 pipes would be pressure tested. Pipeline markers would be installed along the proposed pipeline corridors within the line of sight, without voiding safety measures.

Interim Reclamation

Following construction activities, 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 within the proposed project area, 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. All new surface disturbances associated with the pipeline corridor would be reclaimed.

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 February 10th, 2015 pre-disturbance onsite meeting, it was determined that the Piñon-Juniper vegetation community best represents the proposed project area. Details of the interim reclamation process (including species included in the seed mixture) and monitoring and reporting are provided in the Surface Reclamation Plan (Appendix C).

Operation

During the operation phase of the proposed project, Logos personnel would perform routine or emergency maintenance on the proposed well location. One light-duty vehicle would continue to access the area on near daily basis. Heavy-duty vehicles (semi-trucks) would access the well site 1 to 2 times a day for approximately 6 months after which traffic trips would decrease to approximately 1 trip per month.

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 area would be approximately 13.28 acres, total. Of this, approximately 7.83 acres would be considered new surface disturbance. Proposed new surface disturbances would include 5.45 acres for the construction of a new well pad, 0.96 acres for the construction of an access road, and 1.41 acres for the construction of a well-tie pipeline. The upgrade of existing access road would take place within approximately 5.45 acres existing disturbance.

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

Table 2. Proposed Project Surface Impacts

Surface Disturbance Description (Approximate Stationing)	Existing/Previously Permitted/Proposed Surface Disturbance	New Surface Disturbance (acres)
Well Pad		
400-foot by 400-foot location with 50-foot construction buffer zone; rounded corner six	-	5.45 acres
Resource Road		
0+00 to 20+85.34	-	2,085.3' long x 20' wide (0.96 acres)
Existing road upgrade	7920' long x 30' wide (5.45 acres)	
Well-tie Pipeline Corridor		
0+00 to 20+60.85 (parallel to access road disturbance)	-	2,060.9' long x 30' wide (1.41 acres)
Total Project Surface Disturbance	**5.45 acres**	**7.83 acres**

2.2. No Action

Under the No Action Alternative, the APD and ROW Grant associated with the proposed Dragonfly No. 111H & No.112H wells would not be approved. The proposed well pad, resource road, and pipeline corridor would not be constructed, nor would the existing resource road be upgraded. Current land and resource uses would continue to occur in the proposed project area.

2.3. Alternatives Considered but Eliminated from Detailed Study

Alternatives considered for the twinned Dragonfly No. 111H & No.112H include the placement of facilities at end of the proposed access road and alongside the existing resource road, approximately 2,000-feet north of the wellheads. The negatives for alternate placement, determined by Logos, are outlined below:

- Increased land disturbance and well pad construction costs of building a pad for the drilling site and a pad for the remote production facility with an estimated increased cost of $40,000.
- Increased land disturbance and capital expenses for pipeline and construction to deliver the produced fluids to the remote facility. This requires approximately 2000' of additional pipeline material and installation with an estimated cost of $49,000.
- Increased operational complexity of monitoring the well site and production facility at two separate locations.
- Increased operational complexity of treating, pigging, monitoring, and freeze prevention on the long production lines.

The overall review indicates that Logos will gain no operational efficiencies going to the alternative site, but will incur additional land disturbance requirements and an estimated $89,000 of additional expenses.

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 2008a).

3.1. Air Resources

3.1.1. Affected Environment

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

Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Resources Technical Report; (BLM 2014a)). 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 (USEPA 2013a) 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 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 3. 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 3. 2012 Criteria Pollutant Monitored Values in San Juan County

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]	

Source: U.S. Environmental Protection Agency, 2014
[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 (USEPA 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 4). 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 4. Number of Days classified as "unhealthy for sensitive groups" (AQI 101-150) or worse

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

Source: U.S. Environmental Protection Agency, 2013a

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 (BLM 2014a). 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 (USEPA 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 5 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 5. 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

Very recently, pioneering research using space-borne (satellite and aircraft) determination of methane concentrations have indicated anomalously large methane concentrations may occur in the Four Corners region (Kort, Frankenberg, Costigan, Lindenmaier, Dubey, & Wunch, 2014). A subsequent study (Schneising, Burrows, Dickerson, Buchwitz, Reuter, & Bovensmann, 2014) indicated larger anomalies over other oil and gas basins in the U.S. Methane is 34 times more potent at trapping greenhouse gas emissions than CO_2 when considering a time horizon of 100 years (Intergovernmental Panel on Climate Change, 2013). While space-borne studies can determine the pollutant concentration in a column of air, these studies cannot pinpoint the specific sources of air pollution. Further study is required to determine the sources responsible for methane concentrations in the Four Corners region; however, it is known that a significant amount of methane is emitted during oil and gas well completion (Howarth, Santoro, & A.Ingraffea, 2011). Methane is also emitted from process equipment, such as pneumatic controllers and liquids unloading, at oil and gas production sites. Ground-based, direct source monitoring of pneumatic controllers conducted by the Center for Energy and Environmental Resources (Allen, et al., 2014) show that methane emissions from controllers exhibit a wide range of emissions and a small subset of pneumatic controllers emitted more methane than most. Emissions measured in the study varied

significantly by region of the U.S., the application of the controller and whether the controller was continuous or intermittently venting. The Center for Energy and Environmental Resources had similar findings of variability of methane emissions from liquid unloading (Allen, et al., 2014a). In October 2012, USEPA promulgated air quality regulations controlling VOC emissions at gas wells. These rules require air pollution mitigation measures that reduce the emissions of volatile organic compounds. These same mitigation measures have a co-benefit of reducing methane emissions. Future ground-based and space-borne studies planned in the Four Corners region with emerging pollutant measurement technology may help to pinpoint significant, specific sources of methane emissions in the region.

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 (BLM 2014a). This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one horizontal oil 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 (BLM 2014a).

Direct and Indirect Impacts

Criteria Pollutants

Table 7 shows estimated emissions from one proposed horizontal oil 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 (USEPA 2014a).

Table 6. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well; Average 25 Days to Drill and Complete

Activity	NOx	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH4	CO2
One time operations (tons)*								
Construction	5.5	1.5	0.5	2.5	0.25	0.1	0.007	598.85
Completion	0.5	0.1	0.03	0.025	0.025	-	-	55.00
Interim Reclamation	0.006	0.006	0.006	0.001	-	0.003	-	1.24
Final Reclamation	0.006	0.006	0.006	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)								
Oil Haul Truck and Small Truck (100 bbl/day)	0.009	0.006	0.0012	0.0009	0.0008	-	0.0001	3.88
Total	**6.13**	**1.64**	**0.55**	**2.54**	**0.29**	**0.11**	**0.01**	**671.54**

Oil storage tanks on the well location may result in venting of VOC. Oil well production is generally presented as barrels per day produced. The emissions calculator estimated that for every barrel per day produced there may be 0.12 tons of VOC vented per year.

The average horizontal oil well in the planning area produces approximately 100 barrels per day. One hundred barrels per day is estimated to result in 12 tons of VOC emissions per year. Oil storage tanks would be subject to current EPA regulations regarding the capture or flaring of VOC emissions.

Table 7. 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
La Plata	4,838.2	17,116.3	3,740.1	2,330.0	919.6	127.9
Total	**75,187.7**	**144,551.5**	**57,265.1**	**222,168.9**	**26,407.2**	**7,237.9**

(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 8 displays the percent increase in total emissions in the analysis area from the proposed action to construct and operate one horizontal oil well.

Table 8. 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	6.13	1.64	12.55(8)	2.54	0.29	0.11
Percent Increase	**0.009**	**0.001**	**0.02**	**0.001**	**0.001**	**0.002**

(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
(8) Current EPA regulations require operators to reduce VOC emissions by 95% if their oil storage tanks emit over six tons of VOC emissions per year

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 1.25 tons/year should be considered a very gross estimate. Most of the VOC emissions estimated for one horizontal oil well result from venting from oil storage tanks. Current EPA regulations require operators to reduce VOC emissions by 95% if their oil storage tanks emit over 6 tons

of VOC emissions per year. A reduction of 95% of oil storage tank VOC emissions would reduce the estimated HAP emissions to 0.12 tons/year.

Total Greenhouse Gases

The available statewide GHG summary combines GHG emissions from CO_2 and CH_4. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, CO_2e emissions for both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO_2e (76.2 million metric tons; (NMED 2010)). The estimated CO_2e metric tons emissions from one horizontal oil well (609.2 metric tons) would represent a 0.0008 percent increase in New Mexico CO_2 emissions.

Cumulative Impacts

The FFO manages Federal hydrocarbon resources in San Juan, Sandoval, Rio Arriba, and McKinley Counties. There are approximately 21,150 active oil and gas wells in the San Juan Basin. About 14,843 of the wells in these counties are Federal wells. Analysis of cumulative impacts for reasonable development scenarios and RFDS of oil and gas wells on public lands in the FFO was presented in the 2003 RMP. This included modeling of impacts on air quality. A more detailed discussion of Cumulative Effects can be found in the Air Resources Technical Report (BLM 2014a).

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

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

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

The Air Resources Technical Report (BLM 2014a) 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 (BLM 2003a) 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 WCRM at a BLM Class III (100 percent) level. The archaeological 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 for the well, access and pipeline identified seven new recorded sites and 11 isolated occurrences (IOs) within the APE (WCRM(F)1369 [Ayers 2015]; BLM 2015(II)019F). The road upgrade was inventoried by La Plata (LAC (Report 2015-7); BLM 2015(II)019.1F) and identified one new site and one previously recorded site..

For the proposed actions, 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 WCRM(F)1369 [Ayers 2015]), 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.

Portions of the pipeline and resource roads lies within an area referred to as Tazhiike. The Navajo name means Turkey Tracks and appears to be associated with a pair of buttes with same name and may be associated with Nightway origin story. The Navajo Nation Historic Preservation Department was contacted by letter and a face to face meeting (6/10/15). No objections were raised as of 8/19/15.

3.2.2. Impacts from the Proposed Action

Direct and Indirect Impacts

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.

The 11 ISOs represent non-significant resources and no further work is recommended for them. Three of the seven newly recorded sites are not NRHP eligible and three are no longer within the project area, no further work is recommended for these six sites. The remaining site is NRHP eligible and WCRM recommends a combination of fencing and monitoring.

Significant cultural sites (e.g., NRHP 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 an approved APD. With the stipulations set forth by WCRM, 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 (no historic properties effected).

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 Arizona/New Mexico Plateau Level III 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 (185,632 square kilometers), and the elevation ranges from 2,165 to 11,949 feet AMSL. 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, rabbitbrush, winterfat, shadscale saltbush, and greasewood; and grasslands of blue grama, western wheatgrass, green needlegrass, and needle-and-thread grass. Higher elevations may support piñon pine and juniper 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 (Griffith, et al. 2006).

The general region surrounding the proposed project area is characterized by saltbush scrub, sagebrush shrubland valleys, and wooded hills and mesas. The action area contains Piñon-Juniper woodland interspersed with open sagebrush shrubland. The PPA is dominated by Utah juniper (*Sabina osteosperma*), Piñon pine (*Pinus edulis*), big sagebrush (*Seriphidium tridentatum*), mountain mahogany *(Cercocarpus montanus),* blue grama (*Bouteloua gracilis),* sand dropseed *(Sporobolus cryptandrus),* rabbitbrush (*Chrysothamnus* sp.), New Mexican prickly pear cactus (*Opuntia phaeacantha*), narrowleaf yucca (*Yucca angustissima*) and to a lesser degree, James' galleta (*Pleuraphis jamesii*), Cholla cactus (*Cylindropuntia sp.*) and Russian thistle (*Salsola australis*). Approximately 150-200 trees were documented within the proposed project area.

During the February 10th, 2015 onsite field inspection of the proposed project area, no USDA-listed noxious weeds (NRCS 2010), NMDA-listed noxious weeds (NMDA 2010), or BLM-FFO invasive or poisonous weed species (BLM 2003a, 3-34 – 3-35) were identified within the proposed project area.

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 action would result in the removal of approximately 7.83 acres of Piñon-Juniper woodland communities; approximately 150-200 trees would be removed as a result of the proposed action.

Details of the proposed actions during interim reclamation can be found in the Surface Reclamation Plan attached as Appendix C. During final reclamation, Logos would fully reclaim any portions of the proposed project area that would be disturbed to bare soil as a result of final abandonment earthwork activities (if such areas total greater than 0.1 acre).

Within the Crow Mesa SDA, BLM-FFO aims to manage browse species such as antelope bitterbrush, big sagebrush, and mountain mahogany to provide for the fall/winter use of deer and to maintain adequate herbaceous forage for elk use yearlong and spring/summer deer use (BLM 2003a).

During interim and final reclamation, the BLM Piñon-Juniper Community Seed Mixture would be utilized; the species included in this mixture are included in the Surface Reclamation Plan (Appendix C) and include SDA preferred browse species. 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:

- Approximately 13 wells have been drilled within a one mile radius of the proposed well location.
- A resource road (Road 503) has been developed to provide access to numerous wells to the east.
- Active wildlife and livestock grazing occurs in the area. The proposed project area is located within Rancho Largo Community grazing allotment No. 5119 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 as well as within the Crow Mesa SDA 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.

3.4. Wildlife

3.4.1. Affected Environment

Migratory Birds

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

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

The selected species have a known distribution in the 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 9. During the biological survey of the proposed project area, no priority birds of conservation concern were observed or heard.

Table 9. Priority Birds of Conservation Concern with Potential to Occur in the Project Area

Species Name	Habitat Associations	Potential to Occur in the Project Area
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	Suitable habitat documented within the action area for species to occur.
Brewer's sparrow (*Spizella breweri*)	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.	Marginal habitat documented within the action area for species to occur.
Gray vireo (*Vireo vicinior*)	In northern NM, open stands of piñon pine and Utah juniper (5,800 – 7,200 ft) with a shrub component and mostly bare ground; antelope bitterbrush, mountain mahogany, Utah serviceberry and big sagebrush often present. Broad, flat or gently sloped canyons, in areas with rock outcroppings, or near ridge-tops.	Suitable habitat documented within the action area.
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.	Marginal habitat documented within the action area for species to occur. Lack of improved pastures, grasslands, and hayfields likely limiting factors.
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.	Suitable habitat documented within the action area.
Mourning dove (*Zenaida macroura*)	Open country, scattered trees, and woodland edges. Feeds on ground in grasslands and agricultural fields. Roost in woodlands in the winter. Nests in trees or on ground.	Suitable habitat documented within the action area for species to occur. Distance to active agricultural areas likely limiting factor.
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.	Marginal habitat documented within action area for species to occur. Lack of dense sagebrush likely a limiting factor.
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush.	Marginal habitat documented within the action area for species to occur.
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.	Marginal habitat documented within the action area. Lack of grasslands likely a limiting factor.
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.	Marginal habitat documented within the action area for species to occur. Lack of habitat diversity within action area likely a limiting factor.
Vesper sparrow (*Pooecetes gramineus*)	Dry montane meadows, grasslands, prairie, and sagebrush steppe with grass component; nests on ground at base of grass clumps.	Marginal habitat within the action area; lack of grassland areas and suitable nesting habitat likely a limiting factor.

General Wildlife

The Piñon-Juniper vegetation community found within the proposed project area provides habitat for a variety of vertebrate and invertebrate species. The objectives of the BLM wildlife management program are to “ensure optimum populations and a natural abundance and diversity of fish and wildlife values by restoring, maintaining, and enhancing habitat conditions for consumptive and non-consumptive uses” (BLM 2003a, 2-24).

The proposed project is located in the Crow Mesa Wildlife SDA. Management goals for this SDA focus on protecting big game and their habitat.

Wildlife common to the Piñon-Juniper vegetation community includes mule deer (*Odocoileus hemionus*), elk (Cervus elaphus), coyote (*Canis latrans*), fox (*Vulpes* sp.), black-tailed jackrabbit (*Lepus californicus*), cottontail rabbit (*Sylvilagus* sp.), and various reptiles (snakes and lizards) and birds. Wildlife or signs observed in the analysis area included cottontail rabbit, mule deer, common raven (*Corvus corax*) and coyote.

Prior to the biological survey of the proposed project area, no prairie dog colonies had been recorded within or adjacent to the proposed project area (BLM 2012b). No prairie dogs or their signs were observed during the biological survey of the proposed project area.

3.4.2. 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 7.83 acres of Piñon-Juniper. The well pad would be reclaimed to a BLM-approved working area. All new surface disturbances associated with the proposed pipeline corridor would be reclaimed during interim reclamation. The proposed project area would be converted to a reseed community following interim reclamation. The impacts to the native vegetation community are described in Section 3.3 (Upland Vegetation).

There is available, similar habitat in the surrounding area that wildlife could utilize. However, the clearing of vegetation would remove potential habitat. The transformation of the proposed project area to a reseed community could remove potential habitat for numerous wildlife species. The proposed activities would result in new surface disturbances; therefore, habitat fragmentation would increase as a result of the proposed project.

If interim reclamation is successful, Piñon-Juniper vegetation community would become re-established within the proposed project area. However, as discussed in Section 3.3 (Upland Vegetation), the re-establishment of a mature, native plant community could require decades, and it is possible that the plant community could never fully recover from disturbance (BLM 2003a, 4-18).

Audial and visual disturbances associated with the proposed project could temporarily deter wildlife (including migratory birds) from utilizing the proposed project area and immediately adjacent lands.

Migratory Birds

Due to the mobility of adult birds, they would be unlikely to be directly harmed by the proposed project. As discussed in Section 2.1.2 (Description of Proposed Project - Protection of Flora and Fauna, Including SSS and Livestock), if the vegetation-clearing phase of construction is scheduled to occur during migratory bird breeding season, a pre-construction migratory bird nest survey would be conducted within the proposed project area. Therefore, it is unlikely that nests, eggs, or young birds within the proposed

project area would be directly harmed. If proposed project activities occur during migratory bird breeding season, birds nesting outside of but near the proposed project area could abandon existing nests as a result of visual and audial disturbances.

General Wildlife

It is possible that burrowing animals could be killed or injured during the construction phase of the proposed project, as equipment digs into the earth and rolls over the surface of the ground.

During the construction phase of the proposed project, terrestrial wildlife could fall into an open pipeline trench and be injured, stressed, or killed. The presence of an open trench could also disrupt normal wildlife movements to and from water and/or food sources. Wildlife could have to skirt the open-trench portions of the proposed pipeline corridor to access water and/or food; this disruption could stress wildlife and result in the loss of valuable energy resources. As discussed in Section 2.1.2 (Description of Proposed Project – Protection of Flora and Fauna, Including SSS and Livestock), design features and BMPs would be implemented during the construction phase of the proposed project to assist in the prevention of injury, stress, or death of wildlife.

Within the Crow Mesa SDA, CSU stipulates surface disturbance by unitizing existing oil & gas locations, consideration of Directional Drilling, and Best Management Practices will be incorporated in the Surface Use Plan of Operation to minimize wildlife impacts.

Cumulative Impacts

Reasonably foreseeable development within the Blanco sub-watershed may include an estimated additional 677 oil and gas wells and related facilities, and 55 miles of new roads. Surface-disturbing activities that would be associated with these actions may affect an estimated 2,514 acres of wildlife habitat (BLM 2003a, page 4-7 and 4-8). Other reasonably foreseeable actions such as continued livestock grazing, vegetation treatments, and community development would cumulatively impact wildlife, including migratory birds, through direct and effective habitat loss. The proposed action would contribute to the direct loss of approximately 7.83 acres of wildlife habitat. The intensity of indirect effects would be dependent upon the species, its life history, time of year and/or day and the type and level of human and vehicular activity occurring.

Crow Mesa SDA is managed for its wildlife values and as a semi-primitive hunting experience for trophy animals. The area currently has slightly over two miles of road per square mile of land (BLM 2003b). General management prescription in Crow Mesa include minimizing and or reducing habitat fragmentation. The proposed project will follow existing disturbance and therefore will not increase overall habitat fragmentation within the area.

3.5. Special Status Species

3.5.1. Affected Environment

The BLM manages certain species which are 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. BLM SSS include BLM Sensitive Species and BLM-FFO Special Management Species (SMS).

In accordance with BLM Manual 6840, the New Mexico BLM State Directors have developed a list of BLM Sensitive Species for the State of New Mexico (BLM 2011a, BLM 2011b, BLM 2011c, BLM 2012a). In accordance with BLM Manual 6840, the BLM-FFO has prepared a list of BLM-FFO SMS to focus species management efforts toward maintaining habitats under a multiple-use mandate (BLM 2008b, BLM 2008c). BLM-FFO SMS include some BLM Sensitive Species and other species for which the BLM-FFO has determined special management is appropriate (BLM 2008b). The authority for this policy and guidance is established by the ESA; Title II of the Sikes Act, as amended (16 USC 670a-670o, 74 Stat. 1052); FLPMA; and Department of Interior Manual 235.1.1A.

Table 10 provides an evaluation of the potential for BLM Special Status Species to occur in the analysis area. Potential presence determination is based on evaluation of the proposed action area habitat and the known habitat requirements of the species. Species are listed by the BLM New Mexico State Office as Sensitive (SEN) and/or as Special Management Species (SMS) by the BLM-FFO.

Table 10. BLM Special Status Species

Species Name	Conservation Status		Habitat Associations	Potential to Occur in Analysis Area
	BLM	State of NM		
Birds				
American peregrine falcon (*Falco peregrinus anatum*)	SMS	NM-T	Open country near lakes or rivers with rocky cliffs and canyons. Tall city bridges and buildings also inhabited.	Suitable foraging habitat documented within project area.
Ferruginous hawk (*Buteo regalis*)	SMS		Grasslands and semi-desert shrub; occasionally piñon-juniper edge habitat. Nest on rock spires in NW New Mexico.	Suitable foraging habitat documented within project area.
Golden Eagle (*Aquila chrysaetos*)	SMS		In the West, mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and trees.	Suitable foraging habitat documented within project area.
Prairie falcon (*Falco mexicanus*)	SMS		Arid, open country, grasslands or desert scrub, rangeland; nests on cliff ledges, trees, power structures.	Suitable foraging habitat documented within project area.
Flowering Plants				
Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*)	SEN SMS	NM-E	Sandy clay slopes of the Nacimiento Formation in sparse semi desert, piñon-juniper grasslands and open arid areas of badland habitat (5,000-6,400 ft).	Marginal habitat was documented within the vicinity (< 2 miles away) of project area. No specimens found.
Aztec gilia (*Aliciella formosa*)	SEN SMS	NM-E	Arid and sparsely vegetated Badland /Salt desert scrub communities in soils of the Nacimiento Formation (5,000-6,400 ft).	Marginal habitat was documented within the vicinity (< 2 miles away) of project area. No specimens found.

3.5.2. Impacts from the Proposed Action

Direct and Indirect Impacts

There is similar habitat available in the surrounding area that BLM SSS birds could utilize for foraging. However, the proposed project would result in the removal of approximately 7.83 acres of Piñon-Juniper Community habitat, including the removal of approximately 150-200 piñon pine and Utah juniper trees. All new surface disturbance associated with the proposed project would be reclaimed during interim reclamation and converted to a reseed community following interim reclamation. The impacts to the vegetation communities are described in detail in Section 3.3 (Upland Vegetation). Habitat loss likely reduces the carrying capacity for wildlife, although the exact level of reduction cannot be quantified (BLM 2003a, 4-26 – 4-27). The proposed pipeline corridor would parallel existing disturbance; therefore, habitat fragmentation would not increase as a result of the proposed project. If interim reclamation is successful the Piñon-Juniper community would become re-established within the proposed project area. However, as discussed in Section 3.3 (Upland Vegetation), the re-establishment of mature, native plant communities could require decades, and it is possible that plant communities could never fully recover from disturbance (BLM 2003a, 4-18).

Cumulative Impacts

The FFO would continue to manage non-federally listed species according to BLM policies and guidelines, with the goal of contributing to the conservation of these species to reduce the potential for being listed under the ESA of 1973, as amended (BLM 2003a, 4-111). For reasonably foreseeable actions on federal lands, direct impacts to SSS would be avoided through the BLM's siting criteria. Development on federal and private land would result in the removal or modification of potential SSS habitat. These effects would be related to availability of undisturbed habitat in the area and the amount of disturbance that would occur within the area. The PRMP/FEIS determined that cumulatively up to 5.5 percent (128,000 acres) of vegetation in the planning area could be impacted by oil and gas development (BLM 2003a, page 4-125). Other reasonably foreseeable actions within the planning area that could impact SSS would include livestock grazing, agriculture, commercial and residential development, mining, wildfire, and vegetation management.

3.6. Noxious Weeds and Invasive Species

3.6.1. Affected Environment

Management of invasive and non-native plant species is mandated under several pieces of legislation, including the Lacey Act, as amended (16 USC 3371-3378); the Federal Noxious Weed Act of 1974, as amended (7 USC 2801 et seq.); the New Mexico Noxious Weed Management Act of 1998; and EO 13112 regarding Invasive Species. Under EO 13112, Federal agencies are ordered not to authorize or carry out actions that would cause or promote the introduction of invasive species.

In the San Juan Basin, invasive plants are frequently found in areas that have been disturbed by surface activities. A mission of the BLM-FFO is to detect new invasive plant species populations, prevent the spread of these new populations, manage existing populations, and eradicate invasive populations. This is to be accomplished in a timely manner, using the safest environmental methods available. For all actions on BLM-FFO lands that involve surface disturbance or reclamation, reasonable steps are required to prevent the introduction or spread of invasive plants (BLM 2003a, 3-34). A noxious weed plan for monitoring and treatment of any new infestations will be established for the length of this project.

The U.S. Department of Agriculture (USDA) has designated certain plants as federally listed noxious weeds (NRCS 2010). The New Mexico Department of Agriculture (NMDA) has designated certain plants as state-listed noxious weeds (NMDA 2010). A total of 212 invasive and poisonous weed species have been identified on BLM-FFO lands. The PRMP/FEIS lists the invasive, non-native plant species of concern in the BLM-FFO area (BLM 2003a, 3-34 – 3-35).

During the February 10th, 2015 onsite field inspection of the proposed project area, no USDA-listed noxious weeds (NRCS 2010), NMDA-listed noxious weeds (NMDA 2009), or BLM-FFO invasive or poisonous weed species (BLM 2003a, 3-34 – 3-35) were identified within the proposed project area.

3.6.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Noxious weeds and invasive species are generally tolerant of disturbed conditions, and disturbed soils at project sites could provide an opportunity for the introduction and establishment of noxious weeds and invasive species. Seeds or other propagules of noxious/invasive species could be transported to a project site from infested areas by heavy equipment or other vehicles that are used at the site. Noxious weeds and invasive species could also spread from established populations near a project site and colonize soils disturbed by project activities. In arid regions, such as the area in which the proposed project area is located, longer time periods are required for the re-establishment of plant communities; this could create an increased potential for the establishment and spread of noxious/invasive species. Noxious weeds and invasive 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

noxious/invasive species could 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, which produce large amounts of easily ignitable fuel over large contiguous areas, could also alter fire regimes. This situation could 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 could 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, could be adversely affected, and their populations could be greatly reduced, creating opportunities for greater increases in noxious/invasive species populations (Brooks and Pyke 2001). Increases in fire frequency or severity could thus result in a reduction of biodiversity and could 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 (BLM and U.S. Department of Energy 2010).

Cumulative Impacts

The spatial analysis area is the proposed project area and immediately adjacent lands. Within the spatial analysis area, ground-disturbing activities have or are anticipated to occur in the reasonably foreseeable future; these disturbances are described in Section 3.3 (Upland Vegetation). These ground disturbances could encourage the establishment of noxious weeds. In addition, ongoing activities, such as vehicles driving and livestock grazing, have contributed to the potential for weeds to be introduced to the spatial analysis area from other locations. The disturbances and activities have contributed to the establishment of cheatgrass (downy brome) and Russian thistle (tumbleweed), and could contribute to the establishment and spread of other noxious weeds or invasive species. The proposed project would contribute to surface disturbance and ongoing activity, and thus contribute to the potential for the establishment and spread of noxious weeds or invasive plant species within the spatial analysis area.

3.7. Public Health and Safety

3.7.1. Affected Environment

Worker safety is regulated under the Occupational Safety and Health Act of 1970, as amended (29 USC 651). Additional safety regulations found in Pipeline Safety Programs and Rulemaking Procedures (49 CFR 190) and Transportation of Natural and Other Gas by Pipeline: Minimal Federal Safety Standards (40 CFR 192) apply to natural gas pipelines.

The Environmental Protection Agency (EPA) and Department of Transportation (DOT) regulate hazardous materials under the Resource Conservation and Recovery Act (1976). The BLM manages public health and safety by complying with federal and state hazardous materials laws and regulations. The associated management goal of the BLM is to maintain the health of ecosystems through assessment, cleanup, and restoration of contaminated sites (BLM 2003a).

There are no designated recreation areas or commercial areas within 1 miles. The closest residence is approximately 5.8 miles to the southeast. The closest populated area is 7.2 miles to the southwest in Nageezi. The proposed project area is accessible to the public by dirt roads.

The nearest hospital is in Farmington, New Mexico. This hospital is approximately 42 air miles or approximately 53 road miles from the proposed project area.

3.7.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The proposed project would affect transportation. During construction, the proposed project would result in increased traffic on area roads; some vehicles would be hauling heavy equipment. Therefore, there would be an increased potential for traffic accidents.

Dust associated with construction activities or travel on existing and proposed dirt access roads could result in poor visibility in the proposed project area. The increased use of dirt access roads during muddy conditions could worsen the roads' conditions. Following proposed construction, traffic levels would be similar to current levels.

During proposed construction, reclamation, and maintenance activities, the operation of heavy equipment could pose potential safety concerns. Existing facilities (such as oil and gas wells, pipelines, and powerlines) could be damaged or ruptured, which could pose a risk to human safety.

During operation of the proposed pipeline corridor, facility failure (such as pipeline ruptures) could represent a potential danger to the public.

Health and safety BMPs associated with the proposed projects are described in detail in Section 2.1.2 (Description of Proposed Projects).

Cumulative Impacts

The spatial analysis area is the proposed project area and immediately adjacent lands. Within the spatial analysis area, ground-disturbing activities have or are anticipated to occur in the reasonably foreseeable future. This extensive development could contribute to public health and safety concerns in the general proposed project area. Transportation issues are a primary safety concern. Vehicles associated with oil and gas development utilize the developed highway and county road systems in the spatial analysis area. In addition, the oil and gas industry constructs and utilizes dirt access roads in the spatial analysis area. These roads, most of which are accessible by the public, are often hazardous, particularly during and following periods of inclement weather.

Additional safety concerns in the spatial analysis area include wildfire; oil and gas facility leakage or rupture; moving equipment (such as pump jacks); oil and gas explosions; and the handling, storage, and disposal of wastes, chemicals, or condensate. The proposed project would contribute to the cumulative public safety impacts in the spatial analysis area.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

Table 11 contains a list of tribes, individuals, organizations, and agencies invited to attend the on-site for the project.

Table 11. Tribes, Individuals, Organizations, and Agencies Invited to the On-Site

Name	Tribe, Organization, or Agency	Attended On-Site
	Navajo Nation – Nageezi Chapter	No
	Navajo Nation – Counselor Chapter	No
	General Public	No

The BLM fulfills its responsibilities under the National Historic Preservation Act (NHPA) through a number of agreements. The National Programmatic Agreement (NPA; 2012) between the BLM, Advisory Council on Historic Preservation (ACHP), and the National Council of State Historic Preservation Officers (NCSHPO) allows the agency to fulfill its NHPA responsibilities according to the provisions of the NPA in lieu of 36 CFR 800.3 through 800.7 regulations. The NPA, which applies to all BLM activities below specified thresholds, provides among other things, regulatory relief in many instances from the requirement for case-by-case review by State Historic Preservation Officers (SHPOs) and the ACHP, in exchange for managers' maintenance of appropriate staff capability and observance of internal BLM standards as set out in the 8100 Manual series.

4.2. The New Mexico BLM has a two-party protocol with the New Mexico SHPO (2014) specifically encouraged by the NPA. This protocol details how the New Mexico BLM and SHPO will regulate their relationship and consult. Specifically, this document outlines among other things, how and when consultation will be conducted between the BLM, SHPO, Tribes, and the public. The protocol also outlines when case-by-case SHPO consultation is or is not required for specific undertakings and the procedures for evaluating the effects of common types of undertakings and resolving adverse effects to historic properties. These common types of undertakings regularly include the common actions undertaken in the BLM FFO. List of Preparers

- Jim Copeland, Archaeologist – BLM-FFO
- Stan Dykes, Natural Resource Specialist – BLM-FFO
- John Hansen, Wildlife Management Biologist – BLM-FFO
- Roger Herrera, Realty Specialist – BLM-FFO
- John Kendall, Wildlife Management Biologist – BLM-FFO
- Sarah McCloskey, Environmental Specialist – Adkins Consulting, Inc.
- Sarah Scott, Natural Resource Specialist – BLM-FFO
- Jeff Tafoya, Rangeland Management Specialist – BLM-FFO
- Western Cultural Resource Management, Inc.
- Sheila Williams, District Botanist – BLM-FFO

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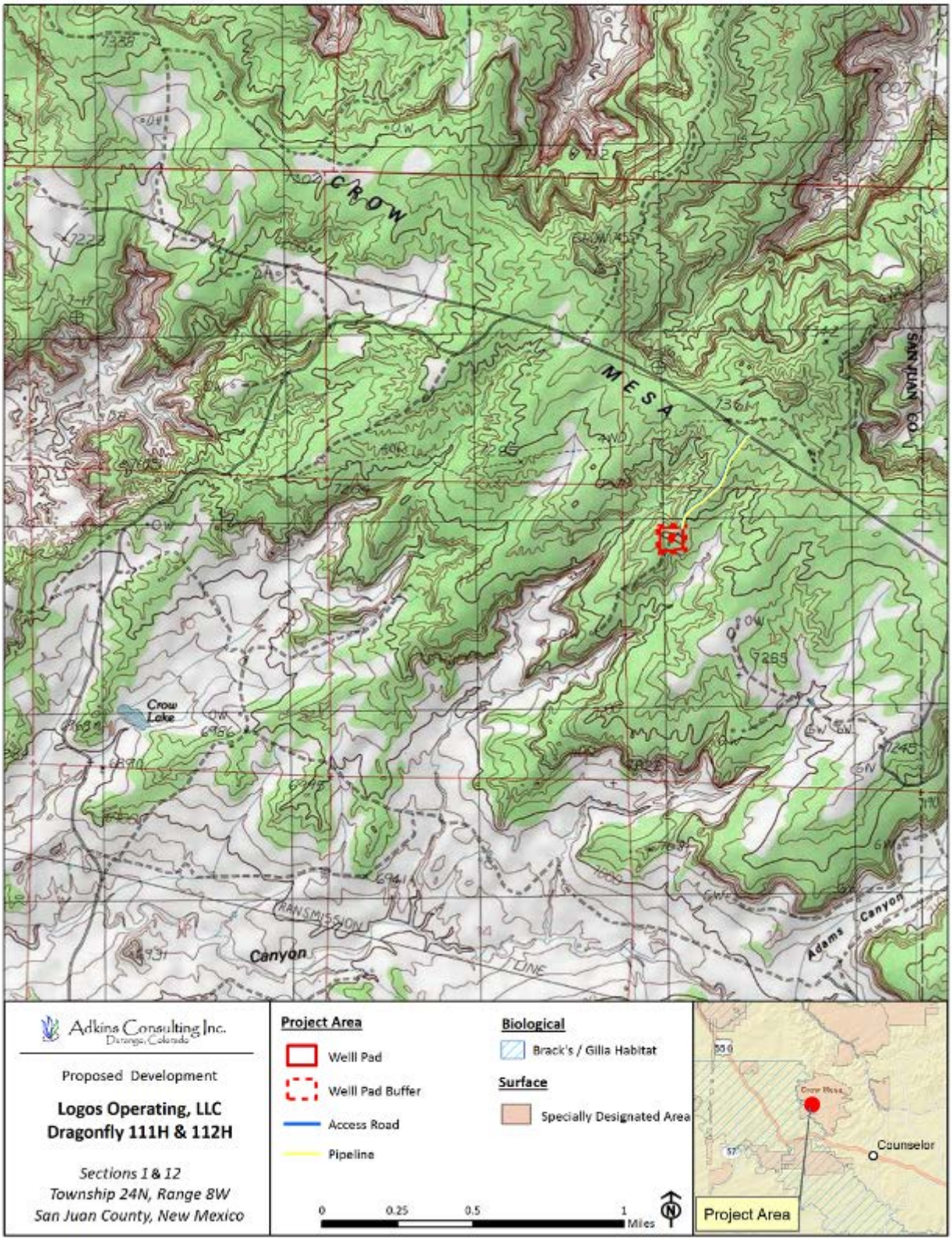
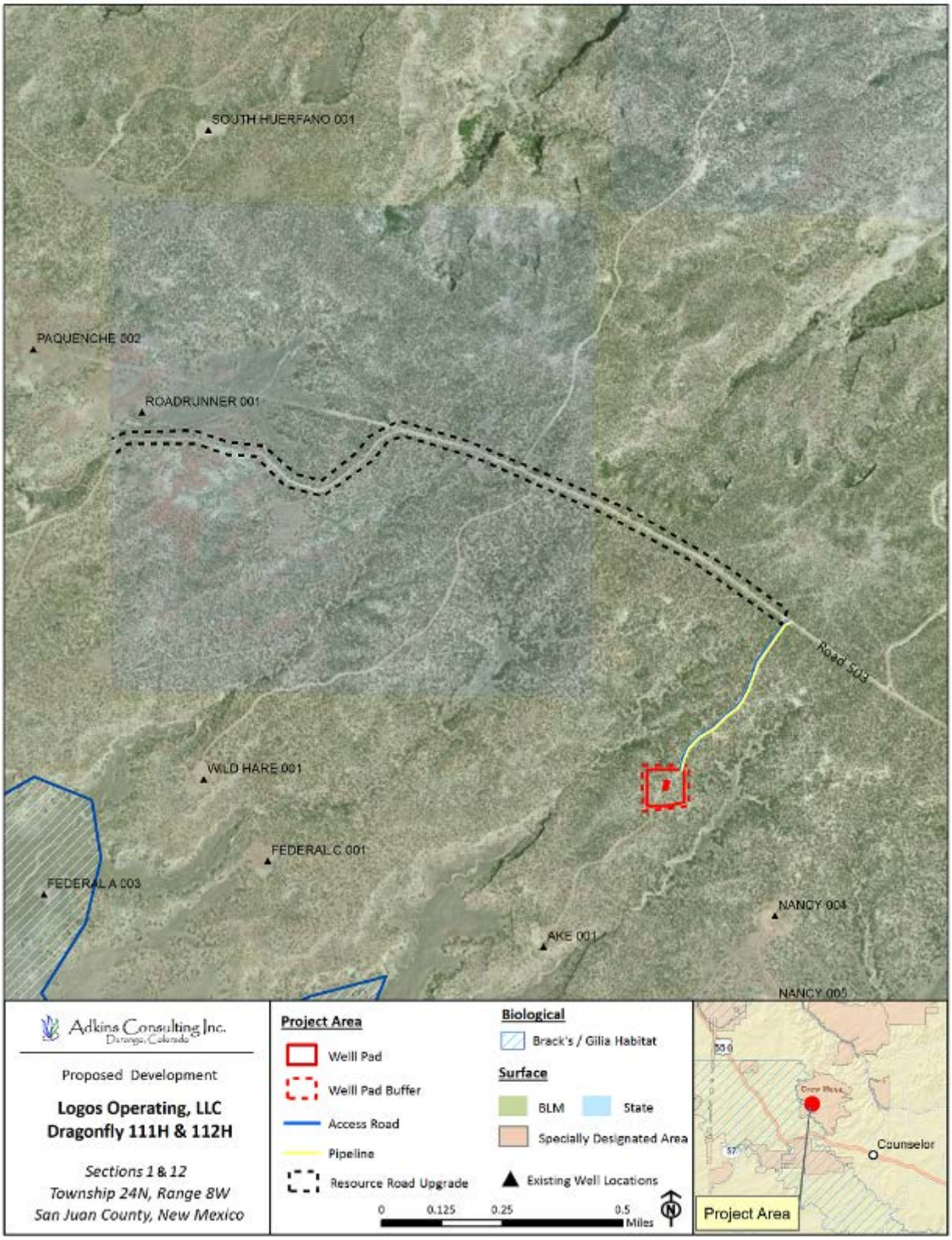
APPENDIX A. MAPS

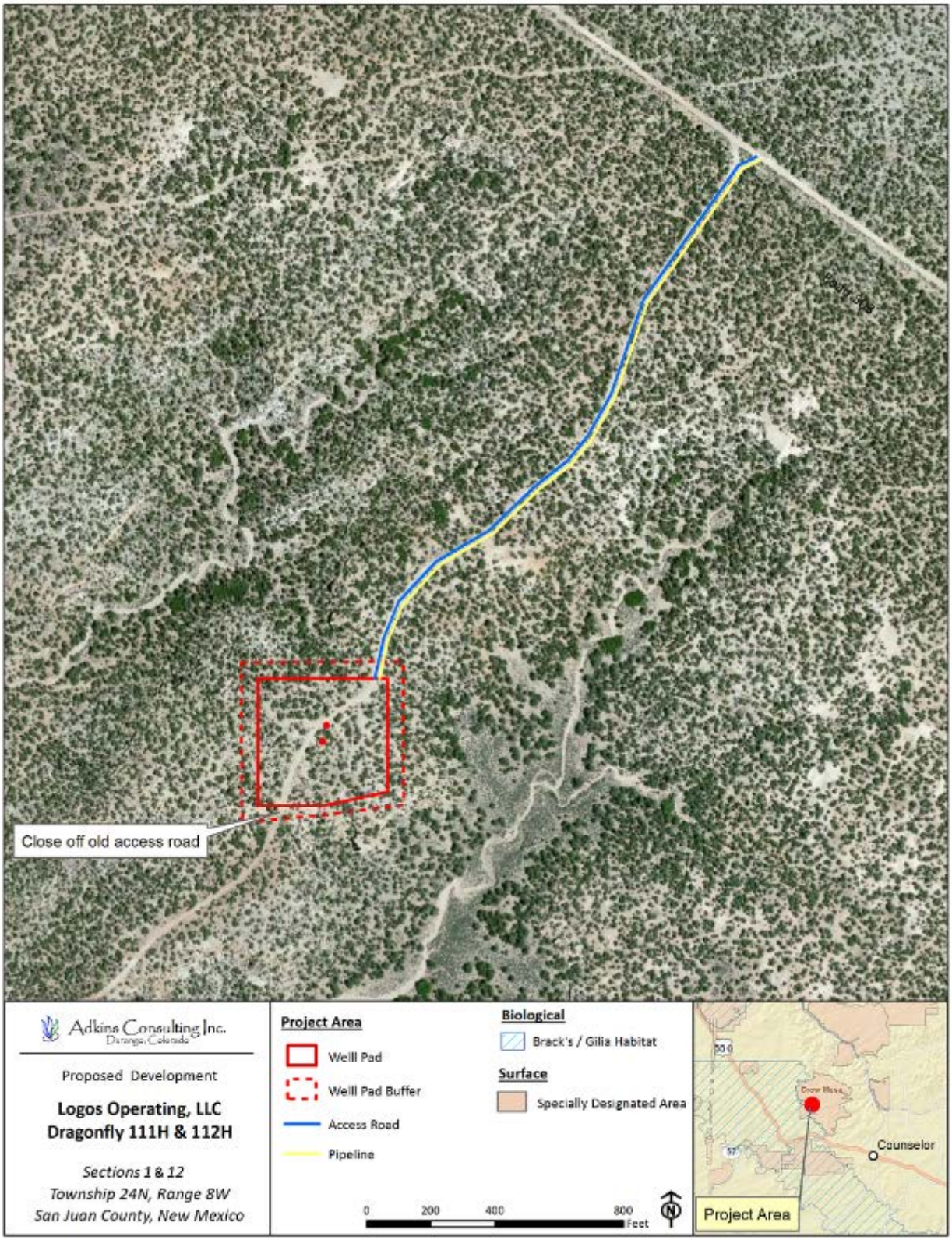
A.1. Project Area Map (Topographic)



A.2. Surface Ownership Map



A.3. Proposed Development Detail Map



APPENDIX B. PLATS

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Fancis Dr.
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
		Dufers Point – Gallup Dakota

Property Code	Property Name	Well Number
	DRAGONFLY	111H

OGRID No.	Operator Name	Elevation
289408	Logos Operating, LLC.	7278.60'

Surface Location

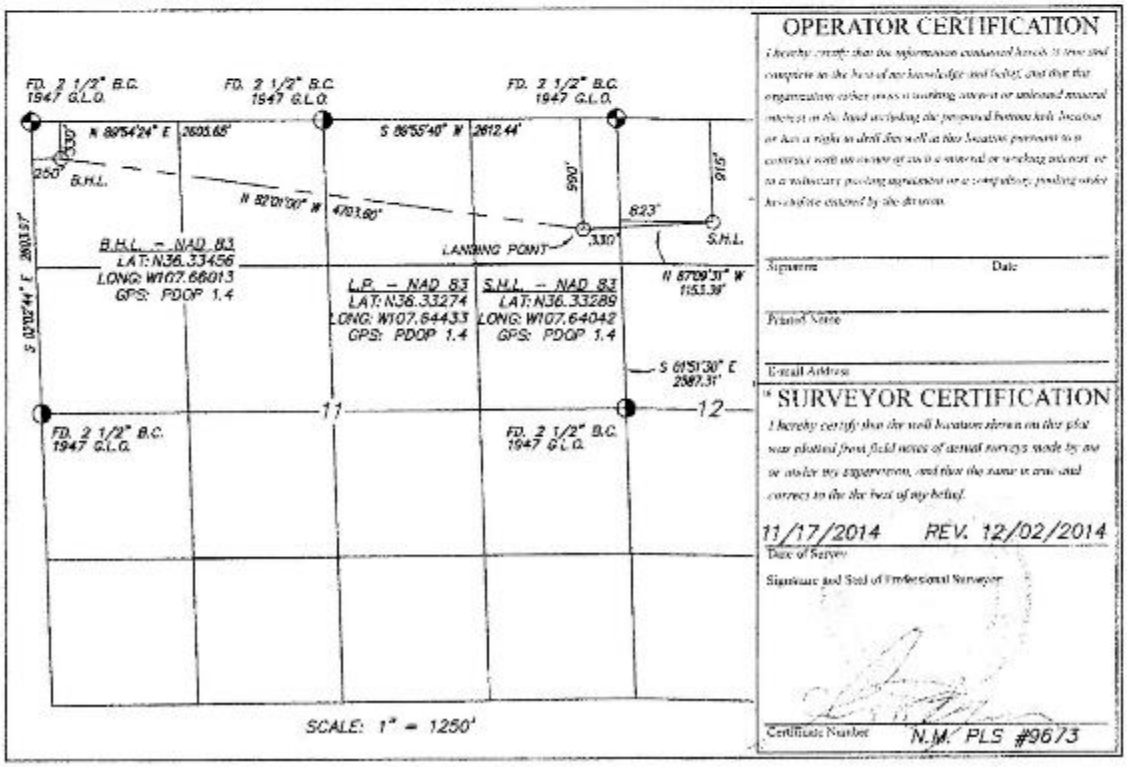
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	12	T24N	R8W		915'	NORTH	823'	WEST	SAN JUAN

Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	11	T24N	R8W		330'	NORTH	250'	WEST	SAN JUAN

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that the organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Date

Printed Name

Email Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the the best of my belief.

11/17/2014 REV. 12/02/2014
Date of Survey

Signature and Seal of Professional Surveyor

Certificate Number N.M. PLS #9673

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
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WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
		Dufers Point – Gallup Dakota

Property Code	Property Name	Well Number
	DRAGONFLY	112H

OGRID No.	Operator Name	Elevation
289408	Logos Operating, LLC.	7278.60'

Surface Location

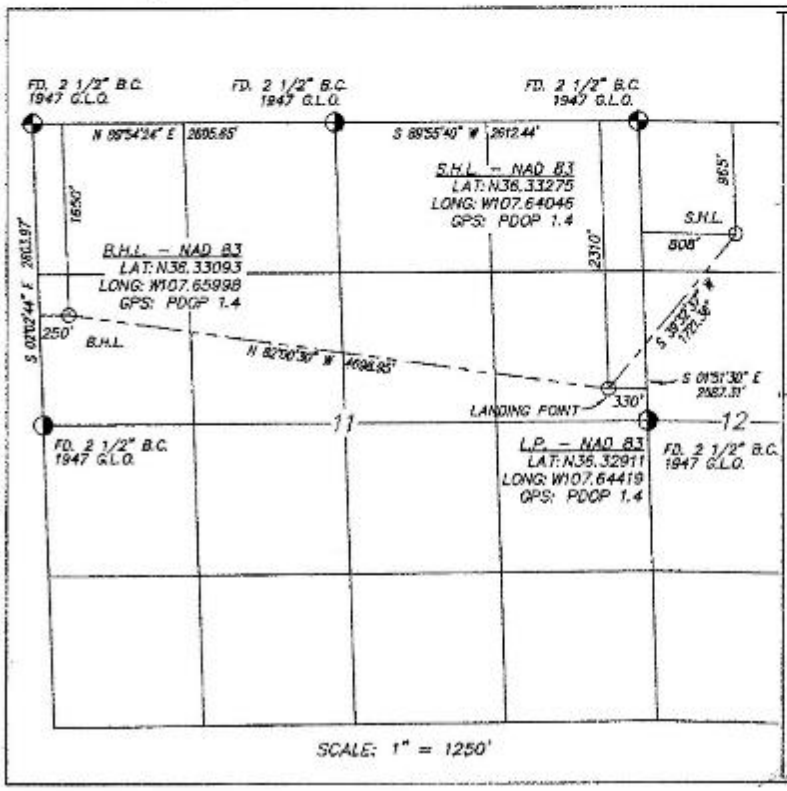
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	12	T24N	R8W		965'	NORTH	808'	WEST	SAN JUAN

Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	11	T24N	R8W		1650'	NORTH	250'	WEST	SAN JUAN

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location, or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Date

Printed Name

E-mail Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the the best of my belief.

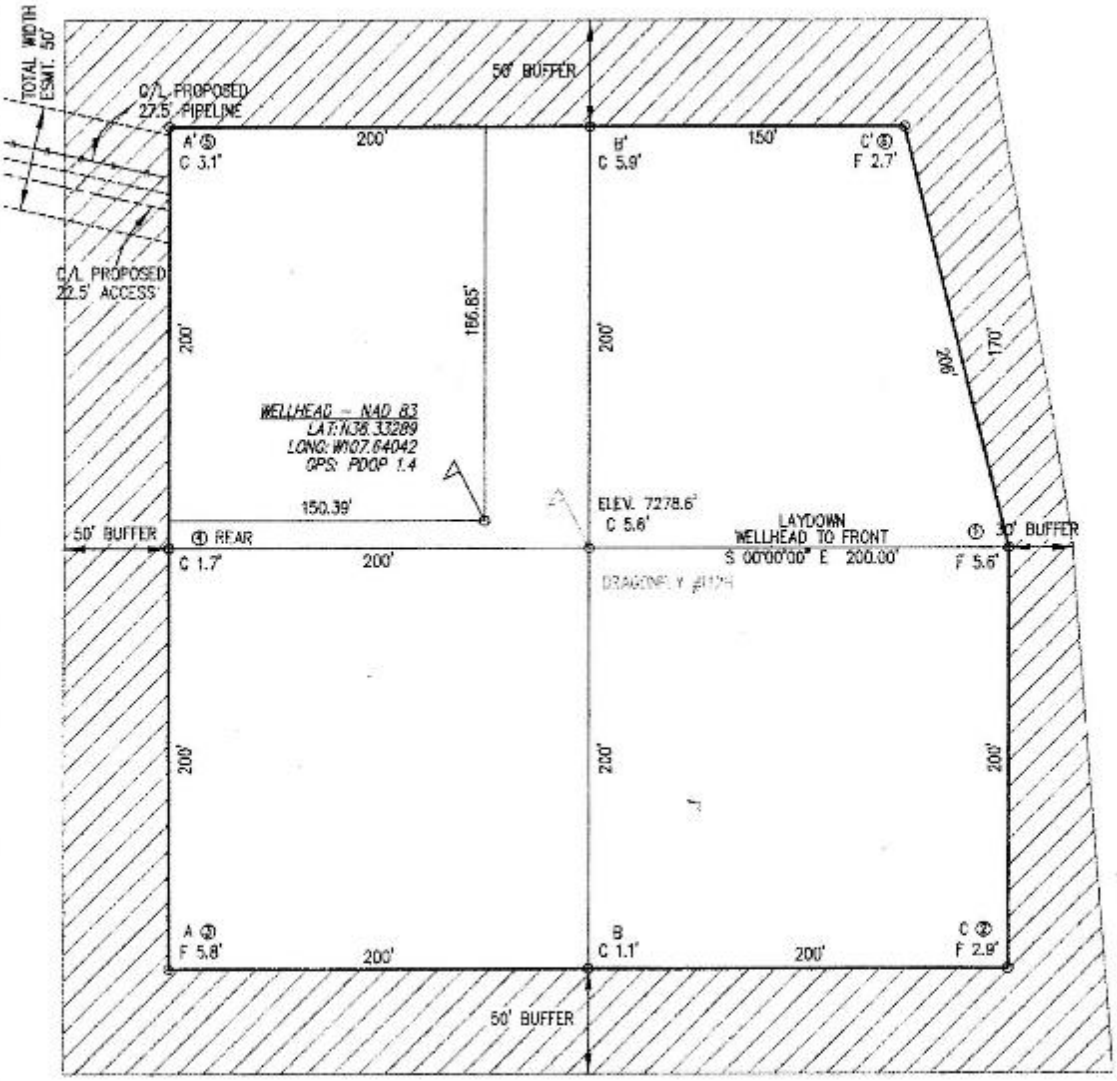
11/17/2014 REV. 12/02/2014
Date of Survey

Signature and Seal of Professional Surveyor

Certificate Number N.M. PLS #9673

LOGOS OPERATING, LLC

DRAGONFLY #111H
915' FNL, 823' FWL
SEC. 12, T-24-N, R-8-W, N.M.P.M.
SAN JUAN COUNTY, NEW MEXICO
ELEVATION: 7278.60'



THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR THE COST OF ANY AND ALL DAMAGES WHICH OCCUR AS A RESULT OF A FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING NEW MEXICO ONE CALL SYSTEM, INC. AT 1-800-321-ALERT THREE (3) DAYS PRIOR TO THE START OF ANY EXCAVATION WORK.

SCALE 1"=70'

DATE:	REVISION	DISTURBANCE AREA	ACRES
11/17/14	MOVED PAD	PAD	3.56
12/22/14	UPDATED DETAIL	BUFFER	1.89
		TOTAL	5.45

DRAWN BY: LB | CAD DWG: DRAGONFLY_111H\PADDIAGRAM.DWG

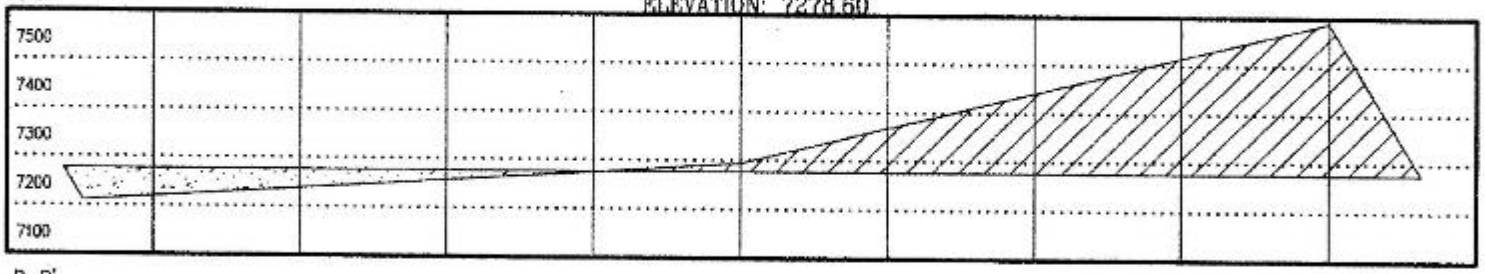
BASIN SURVEYING, INC.
P.O. BOX 6456, FARMINGTON, N.M. 87499
108 LLANO STREET, AZTEC, N.M. 87410
PHONE: (505)334-1500

SCALE: 1"=70' | DATE: 11/17/2014

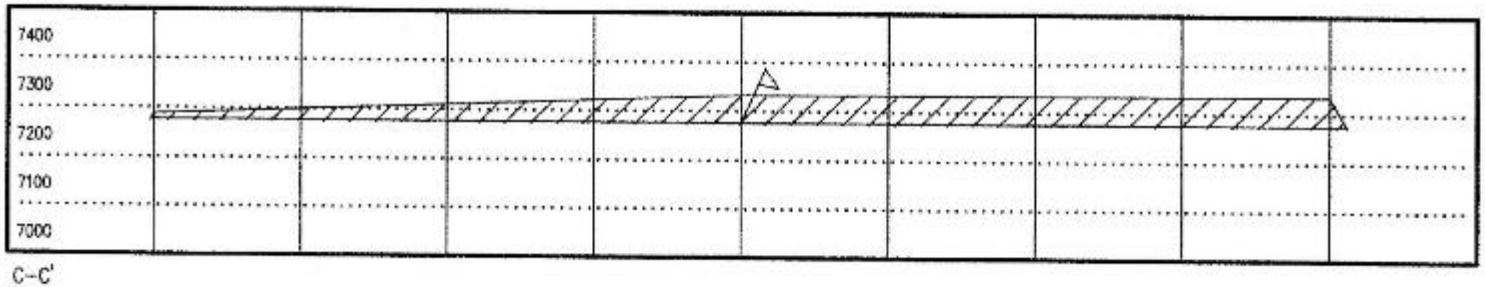
LOGOS OPERATING, LLC

DRAGONFLY #112H
965' FNL, 808' FWL
SEC. 12, T-24-N, R-8-W, N.M.P.M.
SAN JUAN COUNTY, NEW MEXICO
ELEVATION: 7278.60'

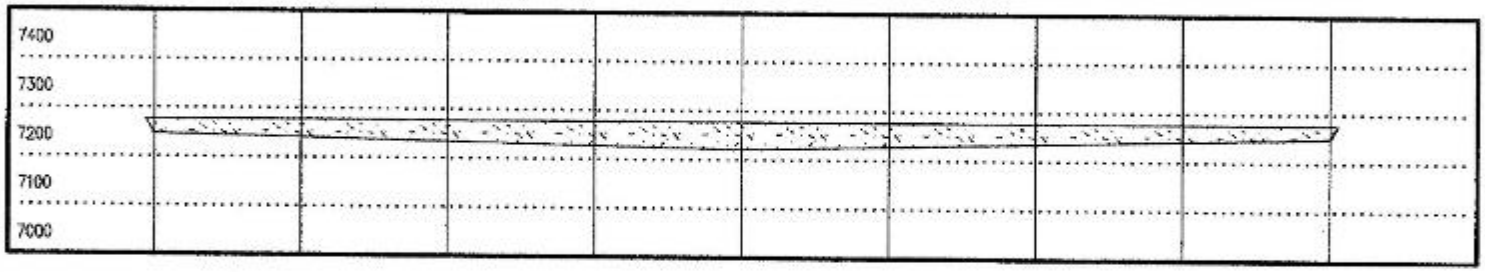
A-A'



B-B'



C-C'



ALL SLOPES 2:1 UNLESS OTHERWISE NOTED
TOTAL VOLUME OF CUT & FILL
CUT: 310755.56 C.F. / 11509.47C.Y.
FILL: 301511.11 C.F. / 11167.08 C.Y.

HORIZONTAL SCALE 1"=50' VERTICAL SCALE 1"=30'

DATE	REVISION
10/17/14	MOVED PAD
12/04/14	UPDATED DETAIL

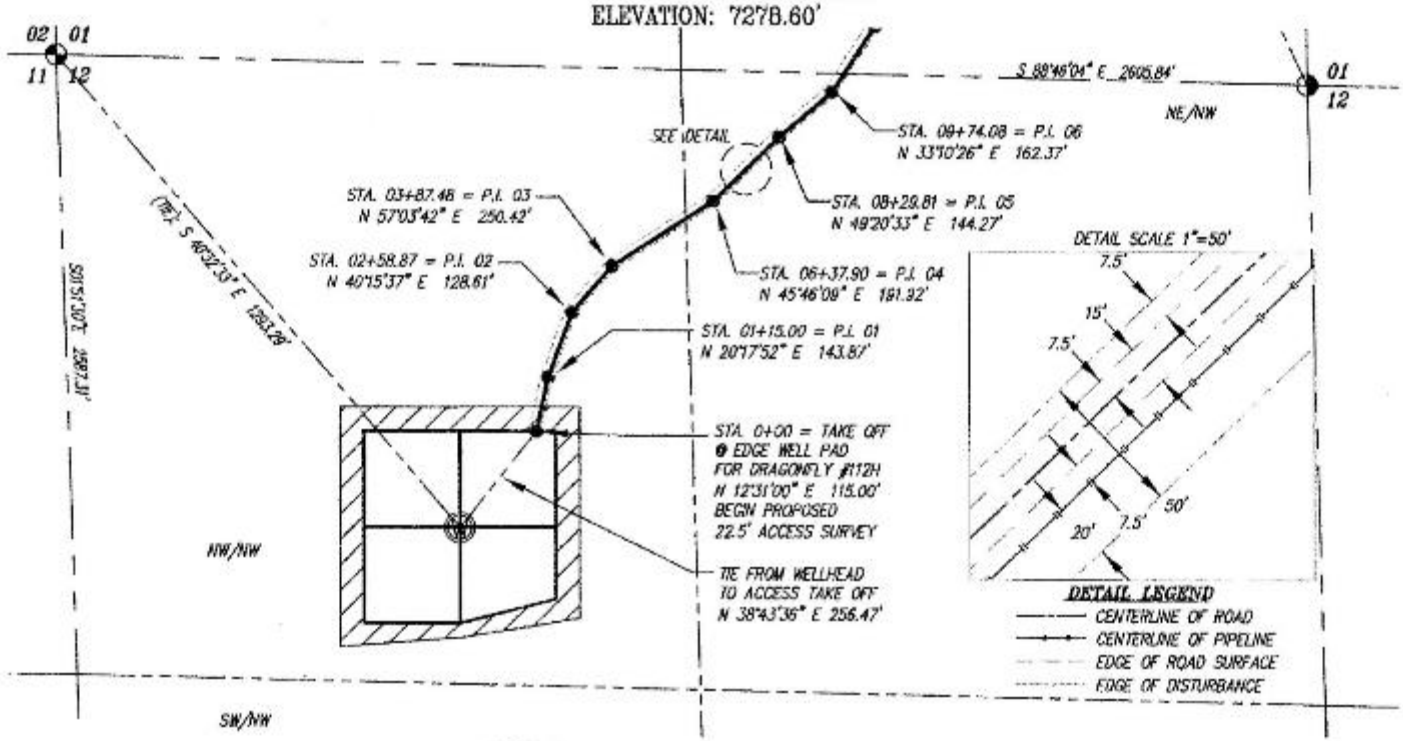
LAT.	N36.33275
LONG.	W107.64046
NAD	83
PDOP	1.4

DRAWN BY: LB CAD DWG: DRAGONFLY_112H\CUTFILL.DWG

BASIN SURVEYING, INC.
P.O. BOX 6456, FARMINGTON, N.M. 87499
108 LLANO STREET, AZTEC, N.M. 87410
PHONE: (505)334-1500

SCALE: 1"=50' DATE: 10/17/2014

LOGOS OPERATING, LLC
DRAGONFLY #112H
PROPOSED ACCESS
965' FNL, 808' FWL
SEC. 12, T-24-N, R-8-W, N.M.P.M.
SAN JUAN COUNTY, NEW MEXICO
ELEVATION: 7278.60'



Some information on this plat is based on information taken from previous surveys, record information, or collateral evidence and may not reflect that which may be disclosed by a complete boundary survey. This plat is not to be relied on for establishment of surface boundaries, fences, buildings or other future improvements.

John D. Wayne
Professional Surveyor
NEW MEXICO Reg. No. 9673

DATE:	REVISION:	WIDTH 22.5'	FEET	LENGTH RODS	MILES	ACRES
11/17/14	MOVED PAD					
2/02/14	UPDATED DETAIL	PG. 1	974.08	59.04	0.18	0.50
		TOTALS	974.08	59.04	0.18	0.50

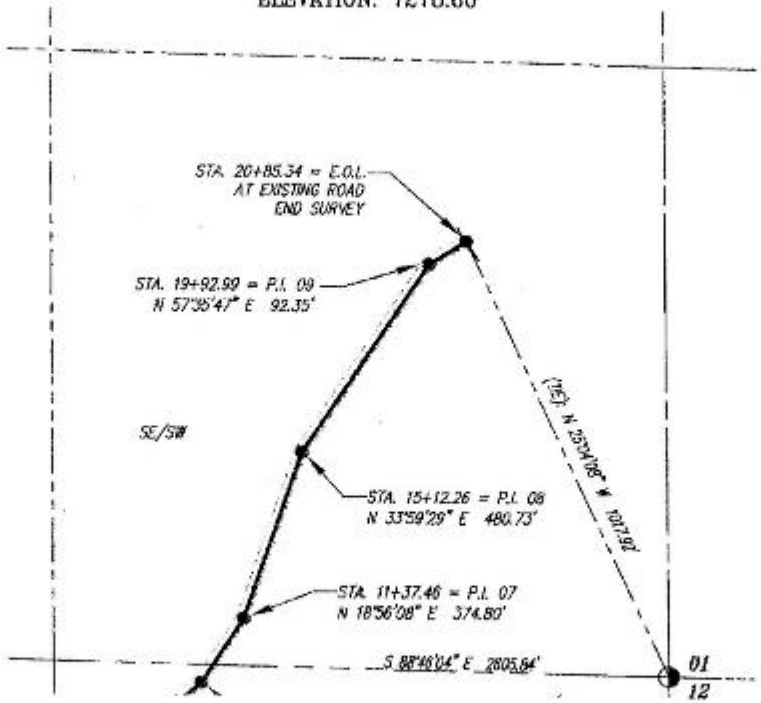
DRAWN BY: LB CAD DWG NO. DRAGONFLY_112H\ACCESS.DWG

BASIN SURVEYING, INC.
P.O. BOX 6456, FARMINGTON, N.M. 87499
108 LLANO STREET, AZTEC, N.M. 87410
PHONE: (505)334-1590

SCALE 1"=300' DATE 11/17/2014

LOGOS OPERATING, LLC

DRAGONFLY #112H
PROPOSED ACCESS
965' FNL, 808' FWL
SEC. 12, T-24-N, R-8-W, N.M.P.M.
SAN JUAN COUNTY, NEW MEXICO
ELEVATION: 7278.60'



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John D. Wayne
Professional Surveyor
NEW MEXICO Reg. No. 9673

300' 150' 0' 300'

SCALE 1"=300'

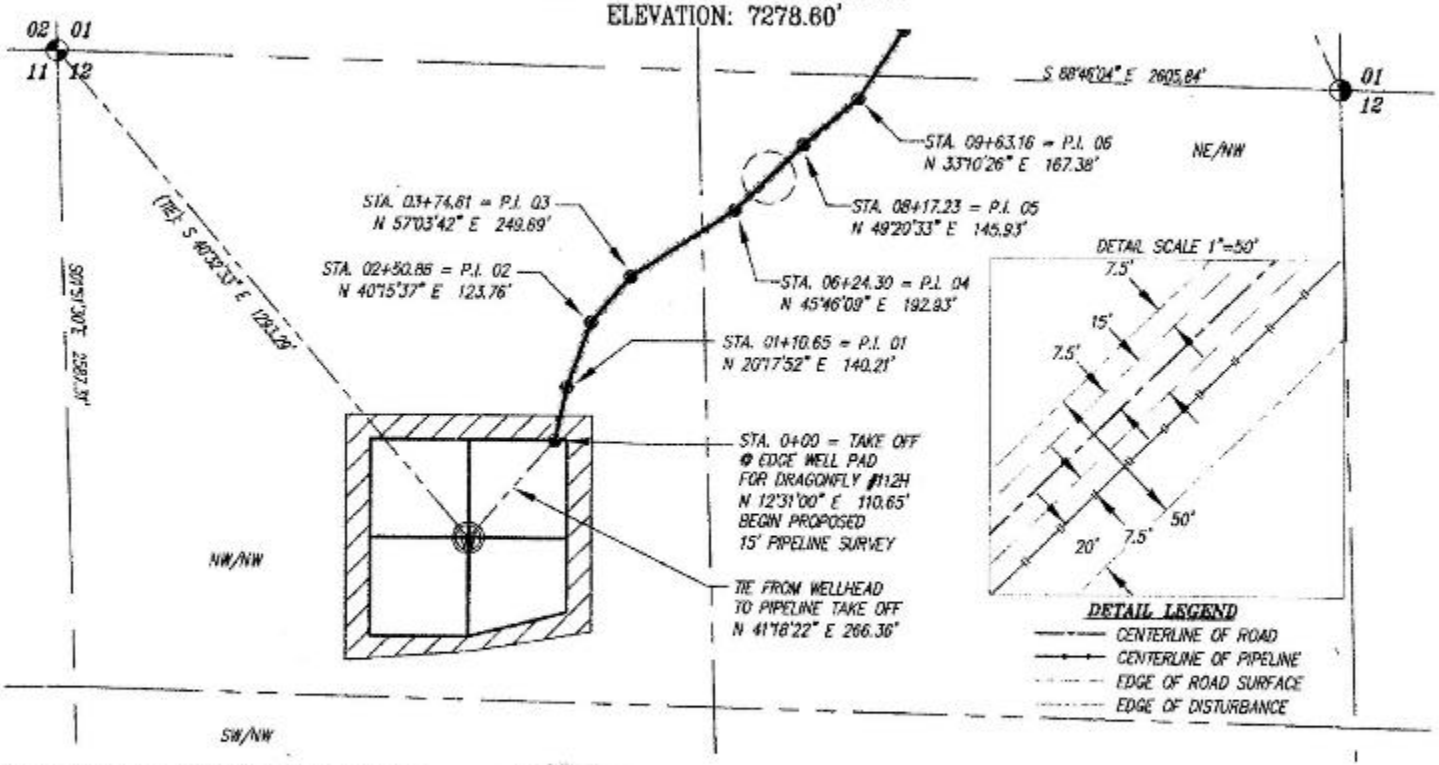
DATE:	REVISION:
11/17/14	MOVED PAD
12/05/14	UPDATED DETAIL

	WIDTH 22.5'	FEET	LENGTH RODS	MILES	ACRES
	PG. 1	974.06	59.04	0.18	0.50
	PG. 2	1111.28	67.39	0.21	0.57
	TOTALS	2085.34	126.38	0.39	1.08

BASIN SURVEYING, INC.
P.O. BOX 5456, FARMINGTON, N.M. 87499
108 LLANO STREET, AZTEC, N.M. 87410
PHONE: (505)334-1300

DRAWN BY: LB CAD DWG NO: DRAGONFLY_112H/ACCESS.DWG SCALE: 1"=300' DATE: 11/17/2014

LOGOS OPERATING, LLC
DRAGONFLY #112H
PROPOSED PIPELINE
965' FNL, 808' FWL
SEC. 12, T-24-N, R-8-W, N.M.P.M.
SAN JUAN COUNTY, NEW MEXICO
ELEVATION: 7278.60'



Some information on this plat is based on information taken from previous surveys, record information, or collateral evidence and may not reflect that which may be disclosed by a complete boundary survey. This plat is not to be relied on for establishment of surface boundaries, fences, buildings or other future improvements.

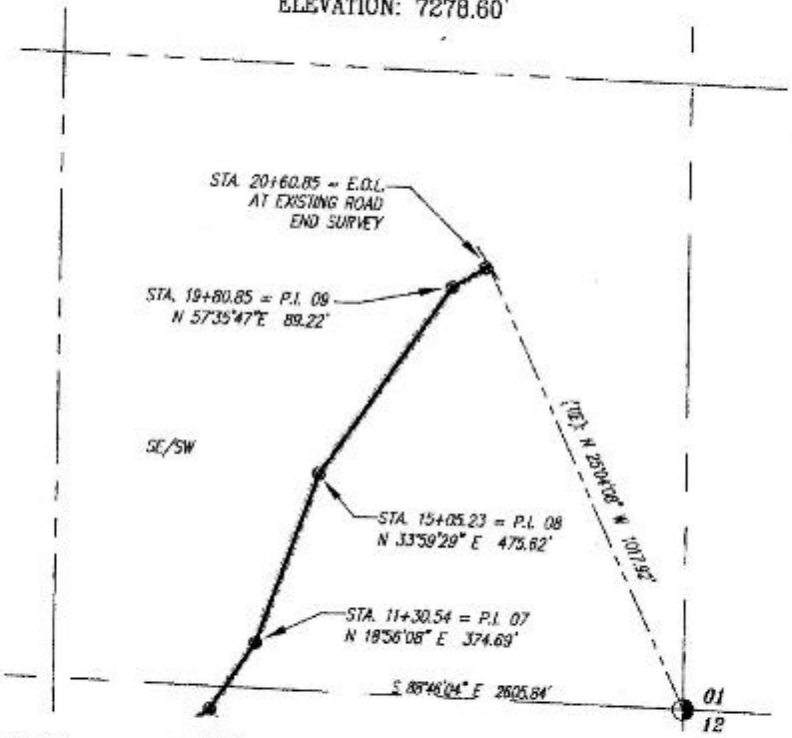
John D. Wayne
Professional Surveyor
NEW MEXICO Reg. No. 9673

DATE:	REVISION:	WIDTH		LENGTH		ACRES
11/17/14	NONE: PAD	27.5'	FEET	RODS	MILES	
2/02/14	UPDATED DETAIL	PG. 1	963.16	58.37	0.18	0.61
		TOTALS	963.16	58.37	0.18	0.61

BASIN SURVEYING, INC.
P.O. BOX 6456, FARMINGTON, N.M. 87499
108 LLANO STREET, AZTEC, N.M. 87410
PHONE: (505)334-1500

DRAWN BY: LB CAD DWG NO: DRAGONFLY_112H\PIPELINE.DWG SCALE: 1"=300' DATE: 11/17/2014

LOGOS OPERATING, LLC
DRAGONFLY #112H
PROPOSED PIPELINE
965' FNL, 808' FWL
SEC. 12, T-24-N, R-8-W, N.M.P.M.
SAN JUAN COUNTY, NEW MEXICO
ELEVATION: 7278.60'



Some information on this plat is based on information taken from previous surveys, record information, or collateral evidence and may not reflect that which may be disclosed by a complete boundary survey. This plat is not to be relied on for establishment of surface boundaries, fences, buildings or other future improvements.

John D. Wayne
Professional Surveyor
NEW MEXICO Reg. No. 9673

300' 150' 0' 300'

SCALE 1"=300'

DATE	REVISION	WIDTH		LENGTH			
11/21/14	MOVED PAD	27.5'	FEET	RODS	MILES	ACRES	
12/02/14	UPDATED DETAIL	PG. 1	963.16	58.37	0.18	0.61	
		PG. 2	1097.69	66.53	0.21	0.69	
		TOTALS	2060.85	124.90	0.39	1.30	

DRAWN BY: LH | CAD DWG NO: DRAGONFLY #12H PIPELINE.DWG

BASIN SURVEYING, INC.
P.O. BOX 8404, FARMINGTON, N.M. 87499
109 ELANO CIRCLE, AZTEC, N.M. 87410
PHONE (505)334-1500

SCALE 1"=300' DATE 12/17/2014

APPENDIX C. SURFACE RECLAMATION PLAN

United States Department of the Interior
Bureau of Land Management

Reclamation Plan

Logos Operating, LLC

Proposed Twinned Dragonfly No. 111H & No. 112H
Well Pad, Access Road, and Pipeline

Prepared for

Logos Operating, LLC

Prepared by

Adkins Consulting, Inc.
Environmental Permitting Services

March 2015

U.S. Department of the Interior
Bureau of Land Management
Farmington District
Farmington Field Office
6251 N. College Blvd., Ste. A
Farmington, NM 87402
Phone: (505) 564-7600
FAX: (505) 564-7608

BLM

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Reclamation Plan (Procedure B)

Applicant	Logos Operating, LLC
Project Type	Oil Well Site, Access Road and Well-tie Pipeline
Well, Oil and Gas Lease, or Right-of-Way (ROW) Name	Twinned Dragonfly No. 111H & No. 112H
Legal Location	915 feet FNL and 823 feet FWL and 965 feet FNL and 808 feet FWL of Section 12, Township 24 North, Range 8 West, New Mexico Principal Meridian, in San Juan County, New Mexico
Lease Number(s)	NM 014580 & NM 47167

Introduction

This reclamation plan has been prepared to meet the requirements and guidelines of the Bureau of Land Management (BLM) Farmington Field Office (FFO) Bare Soil Reclamation Procedures (BLM 2013a) and Onshore Oil and Gas Order No. 1.

The Logos Operating, LLC (Logos) contact person for this reclamation plan is:

Tamra Sessions, Operations Technician
tsessions@logosresourcesllc.com
Cell 505-330-9333, Office 505-436-2606

Vegetation Reclamation Procedure B

Completion of a Vegetation Reclamation Plan in accordance with Procedure B of the BLM/FFO Bare Soil Reclamation Procedures is required for surface disturbing actions, grants, or permits authorized by the BLM/FFO resulting in bare mineral soil **across an area greater than or equal to 1 acre**, not including a BLM/FFO approved working area. Working areas include areas routinely used to operate and maintain facilities or improvements. The FFO makes no distinction between interim and final revegetation processes; revegetation processes and standards are the same for all revegetation activities.

Revision of the Reclamation Plan

Logos may submit a request to the BLM/FFO to revise the Reclamation Plan at any time during the life of the project in accordance to page 44 of the Gold Book (USDI-USDA 2007). Logos will include justification for the revision request.

Project Description

Logos is proposing to construct the twinned Dragonfly No. 111H & No. 112H well pad, access road, and well-tie pipeline. The proposed project is located on public surface with mineral resources administered by the BLM/FFO. The PPA is located within Crow Mesa, just north of Crow Canyon approximately 32 miles southeast of Bloomfield, 7.2 miles northeast of Nageezi, and 13.2 miles northwest of Counselor, NM.

Estimated Total Area of Disturbance

The proposed twinned Dragonfly No. 111H & No. 112H well pad would require constructing a 400-foot by 400-foot location with a 50-foot construction buffer zone around the perimeter of the pad. To access the site, Logos would construct a resource road approximately 2,085-feet in length within a 20-foot ROW and approximately 1.5 miles of the existing resource road would be upgraded to the beginning of the access. A 2,061-foot well-tie pipeline would be constructed within a 30-foot ROW by Logos. The proposed pipeline would parallel the proposed access road for its entire length of 2,061-feet. Surface disturbance

associated with the proposed project area would be approximately 13.28 acres, total. Of this, approximately 7.83 acres would be considered new surface disturbance. Proposed new surface disturbances would include 5.45 acres for the construction of a new well pad, 0.96 acres for the construction of an access road, and 1.41 acres for the construction of a well-tie pipeline. The upgrade of existing access road would take place within approximately 5.45 acres existing disturbance.

Pre-Disturbance Site Visit

The pre-disturbance site visit occurred on February 10th, 2015. The following persons were present at the site visit (Table 1).

Table 1. Pre-disturbance Site Visit Attendees

Name	Affiliation	Contact Info
Duane Bixler	Logos	rbixler@logosresourcesllc.com
Louis Chavez	Williams Four Corners	louis.chavez@williams.com
Roger Herrera	BLM	rherrera@blm.gov
Aaron Martinez	JD Ritter Construction	jdritt@aol.com
Sarah McCloskey	Adkins Consulting, Inc.	sarahm@adkinsenvironmental.com
Wayne Ritter	Logos	writter@logosresourcesllc.com
Danny Ritter	JD Ritter Construction	jdritt@aol.com
Tamra Sessions	Logos	tsessions@logosresourcesllc.com

Vegetation Community

Based on observations made during the pre-disturbance site visit, the BLM/FFO representatives have determined that the vegetation community which best represents the proposed project area is Piñon-Juniper Community. Piñon pine and Utah juniper are the dominant woodland species across most of the FFO management area. These woodlands are associated with a major shrub component, notably big sagebrush, mountain-mahogany, antelope bitterbrush, and various rabbitbrush species.

Proposed Reclamation Seed Mix

Disturbance will be re-contoured and topsoil will be redistributed and prepared for seeding by the construction contractor. Ripping, disking, and seeding of the site will be done by Logos using the BLM-approved seed mix, which is shown in Table 2. The proposed reclamation seed mix takes into account the existing vegetation on the proposed project site.

Table 2. Piñon-Juniper Community Seed Mix

Common Name	Scientific Name	Variety	Season	Form	PLS lbs/acre[1]
Antelope bitterbrush	*Purshia tridentata*	VNS	Cool	Shrub	2.0
Western wheatgrass	Pascopyrum smithii	Arriba	Cool	Sod	2.0
Bottlebrush squirreltail	*Elymus elymoides*	Tusas or VNS	Cool	Bunch	3.0
Blue grama	*Bouteloua gracilis*	Alma or Hachita	Warm	Bunch	2.0
Indian ricegrass	*Achnatherum hymenoides*	Paloma or Rimrock	Warm	Bunch	3.5
Sand dropseed	Sporobolus	VNS	Warm	Bunch	0.5

	cryptandrus				
Scarlet globemallow	Sphaeralcea coccinea	VNS	Warm	Forb	0.25
[1]Based on 60 pure live seeds (PLS) per square foot, drill seeded. Double this rate (120 PLS per square foot) if broadcast or hydroseeded; "lbs" refers to pounds.					

Vegetation Reclamation Standards

Requirements for determining reclamation and if it is successfully completed for the selected vegetation community are determined by the reclamation percent cover standards for the community, as outline in Table 3. These standards must be met during post-disturbance monitoring procedures in order for the BLM/FFO to sign off on the attainment of vegetation reclamation standards.

Table 3. Reclamation Goal for Pinyon-Juniper Community Cover–Persistent (shallow, rocky soil)

Functional Group	Percent (%) Foliar Cover	Common Species
Trees/Shrubs/Grasses/Forbs	≥20	Utah juniper, pinyon pine; Utah serviceberry, alderleaf mountain mahogany, rubber rabbitbrush, cliff fendlerbush, big sagebrush, Antelope bitterbrush, green jointfir, Bigelow sagebrush, broom snakeweed, black sagebrush, Indian ricegrass, blue grama, bottlebrush squirreltail, muttongrass, needle-and-thread grass, sand dropseed, threeawn grass, prairie Junegrass, Arizona fescue, western wheatgrass, Wright's birdbeak, Eriogonum spp., hairy false goldenaster, pingue rubberweed, multi-lobed Senecio, scarlet globemallow, Penstemon spp., Wyoming paint brush, machaeranthera spp.
Invasive/undesirables **10% allowed toward meeting standard of 20%.**	≤10	Plants that have the potential to become a dominant species on a site where its presence is a detriment to revegetation efforts or the native plant community. Examples of invasive species include cheatgrass, Russian thistle, kochia

Pre-Disturbance Weed Survey

During the pre-disturbance site visit, the proposed action area was surveyed for noxious weeds listed on the New Mexico Department of Agriculture's Class A and Class B list. During the survey, no noxious weeds were documented within the proposed action area. The Onsite Noxious Weed Form was completed and signed by a BLM/FFO representative. The form is attached to this Reclamation Plan (Appendix A).

Pre-Disturbance Soil Evaluation

The BLM/FFO representative and Logos representative collaboratively decided at the pre-disturbance site visit that no soil testing is necessary for the proposed project area.

Pre-Disturbance Site Photographs

Photographs were taken of pre-disturbance conditions using a digital camera. The location in North American Datum 83 Latitude/Longitude decimal degrees of each photo point was recorded using Global Positioning System (GPS) device. Each photograph in the Reclamation Plan is notated with the direction the photograph was taken and the GPS coordinates of the photo point. The photograph locations are listed in Table 4.

Table 4. List of Required Pre-Disturbance Site Photographs

Photo Point	Photographs	Location Description
A	1, 2, 3, 4	From each well pad corner, looking toward the center stake
B	5, 6, 7, 8	Four Cardinal directions from the Dragonfly 111H center stake
C	9, 10, 11, 12	Four Cardinal directions from the Dragonfly 112H center stake
D	13	From the start point of the access road at the well pad, towards the end of the access road
E	14, 15, 16, 17, 18, 19	Along the access road towards the pad
F	20	From the end of the access road, towards the beginning of the access road
G	21	From the end of the pipeline, towards the beginning of the access road

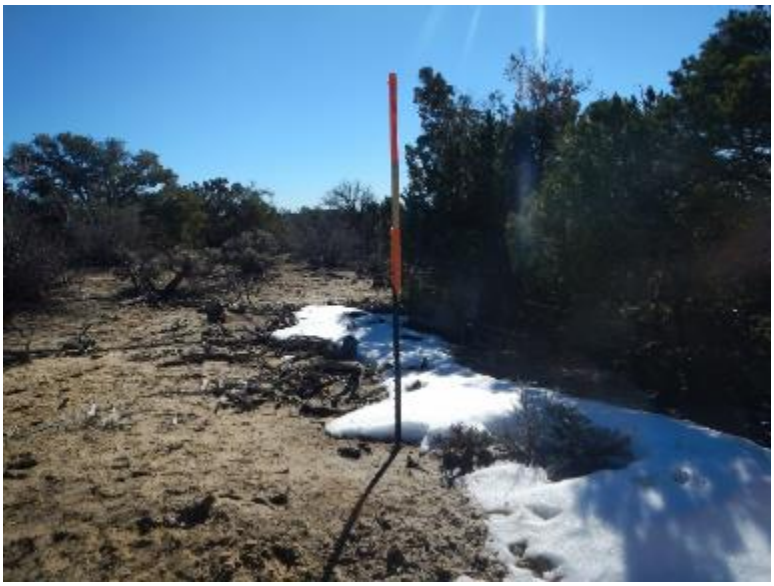
Location:	Dragonfly 111H & 112H (southwest corner 2)			
Photo Point:	A	**Photo Direction:**	Northeast	
Photo Number	1	**GPS Coordinates:**	36.332199	-107.641128

Location:	Dragonfly 111H & 112H (southeast corner 6)			
Photo Point:	A	**Photo Direction:**	Northwest	
Photo Number	2	**GPS Coordinates:**	36.332338	-107.639764

Location:	Dragonfly 111H & 112H (northeast corner 5)			
Photo Point:	A	**Photo Direction:**	Southwest	
Photo Number	3	**GPS Coordinates:**	36.333303	-107.639788

Location:	Dragonfly 111H & 112H (northwest corner 3)			
Photo Point:	A	**Photo Direction:**	Southeast	
Photo Number	4	**GPS Coordinates:**	36.333281	-107.641154

Location:	Dragonfly 111H (center stake)			
Photo Point:	B	**Photo Direction:**	North	
Photo Number	5	**GPS Coordinates:**	36.33289	-107.64042



Location:	Dragonfly 111H (center stake)			
Photo Point:	B	**Photo Direction:**	East	
Photo Number	6	**GPS Coordinates:**	36.33289	-107.64042

Location:	Dragonfly 111H (center stake)			
Photo Point:	B	**Photo Direction:**	South	
Photo Number	7	**GPS Coordinates:**	36.33289	-107.64042

Location:	Dragonfly 111H (center stake)			
Photo Point:	B	**Photo Direction:**	West	
Photo Number	8	**GPS Coordinates:**	36.33289	-107.64042

Location:	Dragonfly 112H (center stake)			
Photo Point:	C	**Photo Direction:**	North	
Photo Number	9	**GPS Coordinates:**	36.33275	-107.64046

Location:	Dragonfly 112H (center stake)			
Photo Point:	C	**Photo Direction:**	East	
Photo Number	10	**GPS Coordinates:**	36.33275	-107.64046

Location:	Dragonfly 112H (center stake)			
Photo Point:	C	**Photo Direction:**	South	
Photo Number	11	**GPS Coordinates:**	36.33275	-107.64046

Location:	Dragonfly 112H (center stake)			
Photo Point:	C	**Photo Direction:**	West	
Photo Number	12	**GPS Coordinates:**	36.33275	-107.64046

Location:	Dragonfly 111H & 112H (from the beginning of the access road at the well pad edge)			
Photo Point:	D	**Photo Direction:**	North	
Photo Number	13	**GPS Coordinates:**	36.333309	-107.639928

Location:	Dragonfly 111H & 112H (access road 3+87.48)			
Photo Point:	E	**Photo Direction:**	Southwest	
Photo Number	14	**GPS Coordinates:**	36.334242	-107.639353

Location:	Dragonfly 111H & 112H (access road 8+29.81)			
Photo Point:	E	**Photo Direction:**	Southwest	
Photo Number	15	**GPS Coordinates:**	36.335001	-107.63823

Location:	Dragonfly 111H & 112H (access road 9+47.08)			
Photo Point:	E	**Photo Direction:**	Southwest	
Photo Number	16	**GPS Coordinates:**	36.335193	-107.637935

Location:	Dragonfly 111H & 112H (access road 11+37.46)			
Photo Point:	E	**Photo Direction:**	Southwest	
Photo Number	17	**GPS Coordinates:**	36.335716	-107.637516

Location:	Dragonfly 111H & 112H (access road 15+12.26)			
Photo Point:	E	**Photo Direction:**	Southwest	
Photo Number	18	**GPS Coordinates:**	36.336585	-107.637138

Location:	Dragonfly 111H & 112H (access road 19+92.99)			
Photo Point:	E	**Photo Direction:**	Southwest	
Photo Number	19	**GPS Coordinates:**	36.337682	-107.636209

Location:	Dragonfly 111H & 112H (from the end of the access road)			
Photo Point:	F	**Photo Direction:**	South	
Photo Number	20	**GPS Coordinates:**	36.337831	-107.635928

Location:	Dragonfly 111H & 112H (from the end of the pipeline 15+12.26)			
Photo Point:	G	**Photo Direction:**	Southwest	
Photo Number	21	**GPS Coordinates:**	36.33778	-107.635942

Reclamation Techniques for Successful Revegetation

Vegetation and Site Clearing

Woody vegetation, such as large shrubs will be cleared from the staked project area and stockpiled for later use as soil mulch, visual mitigation, and/or wildlife shelter. Trees greater than 3 inches in diameter will be cut, de-limbed, stacked and brought up to the main resource road.

Surface rocks (where present and useful for reclamation) will be stockpiled adjacent to the topsoil stockpile. During reclamation activities, the surface rock will be placed within the area of reclamation for erosion control or in a manner that visually blends with the adjacent undisturbed area.

Topsoil Stripping, Storage, and Replacement

If available, the upper 6 inches of topsoil will be stripped, following vegetation and site clearing during construction activities. Logos (or its contractor) will take care not to mix topsoil with the underlying subsoil horizons and will stockpile the topsoil separately from subsoil or other excavated material. Topsoil and sub-surface soils will be replaced in the proper order, prior to final seedbed preparation.

Water Management/Erosion Control Features

The BLM/FFO representative and the Logos representative will work in collaboration to develop site-specific erosion control or water management features and to identify installation locations. Potential erosion control or water management features that may be used include (but are not limited to), waterbars or rolling dips for roads, sediment basins or sediment traps, check dams, silt fencing, outlet protection for culverts, erosion control blankets or geotextiles, and straw wattles.

Logos (or its contractors) will use erosion control blankets, straw bales, or straw wattles as appropriate to limit erosion and sediment transport from any stockpiled soils.

Control features suggested by the BLM/FFO representative during the February 10th, 2015 on-site include water turnouts along the access road as needed. Installation and maintenance of erosion-control features would be done in accordance with BLM Gold Book Standards.

Seedbed Preparation

For cut and fill slopes, initial seedbed preparation will consist of backfilling and re-contouring to achieve a configuration as close to pre-disturbance conditions as possible. Areas to be reclaimed will be re-contoured to blend with the surrounding landscape, emphasizing restoration of existing drainage patterns and landform to pre-construction condition, to the extent practicable.

Seedbed preparation of compacted areas will be ripped to a minimum depth of 12 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping will be conducted in two passes at perpendicular directions. Disking will be conducted if large clumps or clods remain after ripping. Any tilling or disking that occurs along the contour of the slope and seed drills will also be run along the contour to provide terracing and prevent rapid run-off and erosion. If broadcast seeding is used, a dozer or other tracked equipment will track perpendicular to the slope prior to broadcast seeding.

Following final contouring, the backfilled or ripped surfaces will be covered evenly with stockpiled topsoil. Final seedbed preparation will consist or raking or harrowing the spread topsoil prior to seeding to promote a firm (but not compacted) seedbed without surface crusting. Seedbed preparation may not be necessary for topsoil storage piles or other areas of temporary seeding.

Soil Amendments

Based on information gathered at the pre-disturbance onsite inspection, and as a result of any soil testing conducted for the proposed project area, the Logos and BLM/FFO representatives have decided collaboratively that no soil amendments will be used during reclamation of the affected environment.

Seeding

The seed mix chosen for this project is listed in Table 2. Seeding will occur within 90 days of well completion or 120 days from spud date.

A Truax seed drill or modified rangeland drill that allows for seeding species from different seed boxes at different planting depths will be used to seed the disturbed areas of the project area. Logos or its reclamation contractor will ensure that perennial grasses and shrubs are planted at the appropriate depth. Intermediate size seeds (such as wheatgrasses and shrubs) will be planted at a depth of 1 to 2 inches. Small seeds (such as alkali sacaton and sand dropseed) will be planted at a depth of 0.25 inch. In situations where differing planting depths are not practicable using available equipment, the entire seed mix will be planted no deeper than 0.25 inch.

Drill seeding may be used on well-packed and stable soils that occur on gentler slopes and where equipment and drills can safely operate. Where drill seeding is not practicable due to topography, the reclamation contractor will hand-broadcast seed using a “cyclone” hand seeder or similar broadcast seeder. Broadcast application of seed requires a doubling of the drill-seeding rate. The seed will then be raked into the ground so the seed is planted no deeper than 0.25 inch below the surface.

Mulching

Hand seeding with hydro-mulch, excelsior netting, and/or mulch with netting may be required on cut and fill slopes. Mulch should be grass or straw spread at 2,000 to 3,000 pounds per acre, or approximately 1 to 2 inches deep. Mulching will consist of crimping certified weed-free straw or certified weed-free native grass hay into the soil.

Straw or native grass hay mulch can be applied by hand broadcasting or blowing to a relatively uniform depth of 2 to 3 inches, equivalent to a rate of approximately 2 tons per acre (one 74-pound bale per 800 square feet). When applied properly, approximately 20 to 40 percent of the original ground surface will be visible.

Straw or native grass hay mulch will then be anchored using one of the following methods:

- Hand Punching – a spade or shovel is used to punch mulch into the topsoil at 1-foot intervals until all areas have mulch standing perpendicular to the slope and the mulch is embedded at least 4 inches into the soil.
- Roller Punching – a roller is used to spread mulch over an area; the roller is equipped with straight studs not less than 6 inches long, from 4 to 6 inches wide, and approximately 1 inch thick.
- Crimper Punching – similar to roller punching, a crimper is used over the soil. The crimper has serrated disk blades about 4 to 8 inches apart that force the mulch into the soil. Crimping should be done in two directions with the final pass across the slope.

Mulch applications in extremely clayey soils should be evaluated carefully to avoid developing an adobe mixture. In these cases, a soil amendment may be beneficial.

Noxious and Invasive Weed Control

Should noxious or invasive weeds be documented after earthwork and seeding activities, the BLM/FFO weed coordinator will provide Logos with specific requirements and instructions for weed treatments, including the period of treatment, approved herbicides that may be used, required documentation to be submitted to the BLM/FFO after treatment, and any other site-specific instructions that may be applicable.

Monitoring Requirements

Monitoring will be completed according to BLM/FFO Bare Soil Reclamation Procedure B (BLM 2013b). Monitoring activities will be initiated after the project is completed, during the post-disturbance earthwork and seeding inspection process.

Post-Disturbance Monitoring Initiation

During the post-disturbance inspection at the project site, the BLM/FFO representative (in collaboration with Logos) will determine site-specific monitoring locations for photo point monitoring and vegetation line point intercept transects. The BLM/FFO will collect GPS data on the monitoring locations, take the initial monitoring photographs, and complete the initial monitoring report within 60 days of the post-disturbance earthwork and seeding inspection. The initial report will be available from the BLM/FFO.

Post-Disturbance Monitoring Photographs

The minimum photo points necessary to document post-disturbance monitoring (including annual monitoring and long-term monitoring) are described in Table 5. Photographs will be taken with a digital camera without zoom or wide-angle adjustments. GPS coordinates for each photo point will be provided by the BLM/FFO in the initial monitoring report and subsequently included with each photograph in the annual monitoring report.

Table 5. List of Minimum Required Post-Disturbance Monitoring Photographs

Photo Point	Photographs	Location Description

Annual Monitoring

Logos will begin annual monitoring of the photo points and the vegetation line point intercept transects 2 calendar years after the completion and approval of the final earthwork and seeding. Monitoring may occur any time of the year. A completed monitoring report of the permanent photo points will be submitted by Logos to the BLM/FFO by December 31 of the year the site is monitored. Within 60 days after receipt, the BLM/FFO will acknowledge that the report has been received and evaluated.

Vegetation line point intercept transects will be monitored annually until attainment of vegetation reclamation cover standards have been met. Logos will keep a record of the monitoring for future submittal to the BLM/FFO at reclamation attainment.

Attainment of Vegetation Reclamation Standards

When vegetation on a reclaimed site appears to meet the required percent revegetation standard, Logos will submit to the BLM/FFO a written request for concurrence that revegetation standards have been attained. The request will include all annual transect data sheets and a current set of monitoring

photographs. The BLM/FFO will review the request and approve or deny the request within 60 days of receipt. If the request is denied, the BLM/FFO may initiate a site inspection within 60 days of the denial to analyze the site and determine if remedy actions may be appropriate.

Long-Term Monitoring

After the required percent revegetation standard has been attained, Logos will begin long-term monitoring. Every fifth year after attainment, Logos will monitor the site at all established photo points to ensure the site remains productive and stable. A completed monitoring report of the permanent photo points will be submitted to the BLM/FFO by December 31 of the year the site is monitored. The BLM/FFO will acknowledge that the report has been received and evaluated within 60 days after receipt.

Final Abandonment

If 1 or more acre of bare soil results from earthwork required in preparation for final abandonment, Logos will follow Vegetation Reclamation Plan in accordance with Procedure B of the BLM/FFO Bare Soil Reclamation Procedures (BLM 2013a).

If final abandonment or relinquishment earthwork results in less than 1 acre, but more than 0.1 acre of bare soil, Logos will initiate the Vegetation Reclamation Plan in accordance with Procedure A of the BLM/FFO Bare Soil Reclamation Procedures (BLM 2013a).

Revegetation percent cover standards will be attained, documented, and submitted to the BLM/FFO by Logos or an exception granted before the BLM/FFO will approve a final abandonment notice (FAN) or relinquishment.

Cessation of Monitoring

Monitoring requirements will remain in effect as long as the permit, grant, or authorization remains in effect and until all infrastructure or associated facilities are abandoned by established BLM procedure and a FAN or relinquishment is issued by the BLM/FFO. Logos will document that percent cover standards have been attained when submitting a request for a FAN or relinquishment.

References

43 CFR Part 3160, “Onshore Oil and Gas Order No. 1; Onshore Oil and Gas Operations; Federal and Indian Oil and Gas Leases; approval of Operations,” 72 Federal Register 44 (march 2007), pp. 10328-10338.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2013a. Farmington Field Office Bare Soil Reclamation Procedures. Retrieved November 2013 from: http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_planning/surface_use_plan_of.html

BLM. 2013b. Updated Reclamation Goals. Retrieved November 2013 from: http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_planning/surface_use_plan_of/updated_reclamation.html

U.S. Department of the Interior, U.S. Department of Agriculture (USDI, USDA). 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+307/REV 07. Bureau of Land Management, Denver, Colorado. 84 pp.

APPENDIX D. ONSITE NOXIOUS WEED FORM

Onsite Noxious Weed Form

If noxious weeds are found during the onsite, fill out form and submit to FFO weed coordinator
Operator LOGOS Surveyor(s) Adkins Consulting Inc.
Well Name and Number Dragonfly #111H & #112H Date 2/10/15
Location: Township, Range, Section T24N, R8W, Sec 12
Location of Project NAD 83 Decimal Degrees 36.332891 - 107.64042

Class A Noxious Weed – Check Box if Found

	Alfombrilla		Diffuse knapweed		Hydrilla		Purple starthistle		Yellow toadflax
	Black henbane		Dyer's woad		Leafy spurge		Ruvenna grass		
	Camelthorn		Eurasian watermilfoil		Oxeye daise		Scotch thistle		
	Canada thistle		Giant salvinia		Parrotfeather		Spotted knapweed		
	Dalmation toadflax		Hoary cress		Purple loosestrife		Yellow starthistle		

Class B Noxious Weed – Check Box if Found

	African rue		Perennial pepperweed		Russian knapweed		Tree of heaven
	Chicory		Musk thistle		Poison hemlock		
	Halogeton		Malta starthistle		Teasel		

Comments: No Class A or B Noxious Weeds

FFO Representative: [signature]
sign and date
Operator Representative [signature]
sign and date