

Federal 2407 Area

Master Development Plan

LOGOS Operating, LLC
and
Shiprock San Juan, LLC and its affiliate Whiptail Midstream

Version II – February 2019



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1 Introduction

The Federal 2407 Area Master Development Plan (2407-MDP) describes an oil and gas exploration and development program proposed by LOGOS Operating, LLC (LOGOS) and Shiprock San Juan, LLC dba Whiptail Midstream, LLC (Whiptail) for construction over a period of two to five years. The 2407-MDP Area includes federal, New Mexico state, and fee (private) oil and gas leases with federal and state surface ownership/management. LOGOS would develop oil and gas mineral resources by drilling wells and constructing access roads, well pads, and various other related pads and facilities. Whiptail would acquire its own rights of way (ROWs) and then build well-connect pipelines, the Dragonfly Pipeline (“the trunk line”), and related midstream infrastructure necessary to connect and operate those new pipelines.

LOGOS proposes to develop their leases by forming Communitization Areas, constructing well pads with associated access roads, and building other necessary ancillary infrastructure and facilities for the production and operation of approximately 40 oil and natural gas wells. LOGOS has submitted an Application for Permit to Drill (APD) to the BLM for the first well pad in the project area and has staked and onsited three more well pads in anticipation of submitting APDs. Full development could require additional well pads and facilities, so this MDP describes potential impacts from other reasonably foreseeable development assuming LOGOS’s “typical” planning and construction methods.

Whiptail proposes to construct a pipeline system in the 2407-MDP Area to transport natural gas, oil, and other hydrocarbons to markets and to assist with handling associated water. The backbone of Whiptail’s proposed system would be the Dragonfly Pipeline, a 7-mile long arterial corridor containing multiple individual pipelines for natural gas, oil and other hydrocarbon liquids, and water (together “the trunk line”). Whiptail would build well-connect pipelines to connect individual well pads to the trunk line, commingling products for transportation to other pipelines and to markets. The trunk line would be sized to serve LOGOS and other operators in the area.

Whiptail estimates they would develop approximately 10 miles of well-connect and facility-connect pipeline corridors to tie in foreseeable new LOGOS projects and one existing LOGOS well in the 2407-MDP Area. Another 5 miles of pipeline corridor might be developed to gather products from other operators or from other currently unspecified LOGOS projects in and near the 2407-MDP Area. All new well-connect and facility-connect pipelines would be planned with ROWs that parallel and partially overlap access roads where practical in order to reduce new surface disturbance. Additional lines could be added in the same ROWs in the future if needed. Whiptail anticipates constructing a communications tower, a transfer facility for liquids, and a natural gas compressor station as well as necessary aboveground facilities such as pig receivers.

The total development envisioned in the 2407-MDP may result in an approximate total of +/- 236.5 acres of disturbance. During interim reclamation, an estimated +/- 163.7 acres would likely be fully reclaimed and +/- 39.6 acres would be reseeded (but not re-contoured). The remaining +/- 33.1 acres would be stabilized and used as a working surface throughout the life of the wells. The working surfaces and the areas that were only reseeded would be fully reclaimed during final reclamation.

1.1 Schedule/Duration

The development described in this MDP would commence as soon as permits and weather allow. LOGOS plans to submit the first four APDs and associated ROW applications to appropriate regulatory agencies by February 2019. Construction would likely begin shortly after receipt of approved APDs and in consideration of any mitigations required to protect biological resources or other issues limiting access or activity. The Crow Mesa Wildlife Area has winter closure stipulations from December 1 through March 31 each winter.

Access roads and well pads would be constructed in advance of drilling activities, requiring approximately one to two weeks per well pad. Drilling and completion activities would typically continue for two to three months per well pad. Completion activities could be deferred if pipeline connections were not yet completed. Up to fourteen wells could be drilled from four well pads in the first phase of development, comprising approximately half of total development planned for the MDP area.

Similarly, Whiptail plans to submit necessary ROW and New Mexico State Right of Entry applications in January 2019 and to break ground on pipeline development in the spring of 2019 when the necessary documents have been approved and when mitigations and field conditions allow. Whiptail estimates that up to six months would be needed for construction of the Dragonfly Pipeline (“trunk line”). Construction of each well-connect or facility-connect pipeline would be scheduled in coordination with LOGOS’s construction work and would typically require approximately two weeks per well pad or facility. The Escrito well-connect pipelines may require additional time for construction due to the distance involved.

The balance of the construction proposed in this MDP is anticipated to be completed within approximately five years. LOGOS’s development of additional pads and wells would depend on many factors including production results, market factors, and obtaining permits. After the trunk line is completed, Whiptail’s additional construction work – well-connect pipelines, a transfer facility, and possibly a compressor station - would depend on variables including where LOGOS develops wells, the products and volumes produced, and line pressures.

Interim reclamation would commence as soon as practical following completion of construction activities and/or completion of wells in an area. Most Temporary Use Areas (TUAs) would be reclaimed as soon as they are no longer needed. TUA #2 (Appendix C) may be re-permitted and reworked by Whiptail to be a transfer facility. Some of the TUAs necessary for traffic and staging during Whiptail’s pipeline construction would be assumed by LOGOS before reclamation so that LOGOS could use them as staging areas or traffic pullouts during well pad construction, drilling, and completion activities. LOGOS would assume responsibility for reclaiming those TUAs in a timely manner. The trunk line ROW would be fully reclaimed following construction except for necessary above ground appurtenances. Interim reclamation may necessarily extend beyond the initial five years of construction and/or completion activities, and final reclamation is not likely to commence or be completed for many years, as the wells to be drilled are expected to have economic lives well beyond five years.

1.2 Location

The proposed 2407-MDP Area would typically be accessed from Highway 550 approximately 43 miles southeast of the town of Bloomfield, New Mexico, 10 miles east-southeast of Nageezi, New Mexico or 40 miles northwest of Cuba, New Mexico (Figure 1, page 6) Specifically, the proposed 2407-MDP Area includes approximately 5,500 acres of partially contiguous LOGOS lease acreage in Township 24 North,

Range 7 West and Township 24 North, Range 8 West. The leased tracts are supplemented for the MDP with a buffer of approximately one half-mile beyond the lease boundaries to form a contiguous block of acreage considered in this MDP, including a ½ mile-wide arm of acreage in which a well-connect pipeline could be built to one existing LOGOS operated well, the Escrito #1. The buffer takes in any reasonably foreseeable lease or project acreage additions, as well as the surrounding area where off-lease disturbance may occur.

The 2407-MDP Area encompasses approximately 4,500 LOGOS lease acres at this time plus approximately 12,020 buffer acres, more or less, of federal and state lands in San Juan County and Rio Arriba County, New Mexico. The Area includes 14,590 acres of Federal land managed by the U.S. Bureau of Land Management-Farmington Field Office (BLM-FFO) and 1,920 acres of state land managed by the New Mexico State Land Office (NMSLO). The Area includes no fee surface but it does include approximately 120 acres of fee minerals.

Specifically, the 2407-MDP Area would include:

- SE/4 Section 34, S/2 Section 35, and S/2 Section 36 of Township 25 North, Range 8 West
- SW/4 Section 31 of Township 25 North, Range 7 West
- Sections 1 and 2; E/2 Section 3; E/2 Section 10; all of Sections 11, 12, 13, and 14; E/2 Section 15; E2 Section 24; and NE4 Section 25, all in Township 24 North, Range 8 West;
- W/2 Section 6; all of Sections 7 and 8; NW/4 Section 14; NE/4 and W/2 of Section 15 S2 Section 16; all of Sections 17, 18, 19, 20, and 21; W/2 Section 27; all of Sections 28 and 29; N/2 and SE/4 Section 30; NE/4 Section 31; all of Sections 32 and 33; and W/2 Section 34 of Township 24 North, Range 7 West; and
- NW/4 Section 3, N/2 Section 4, and N/2 N/2 and SE/4 NE/4 Section 5, of Township 23 North, Range 7 West,

all New Mexico Principal Meridian (NMPM).

Whiptail would build the trunk line primarily alongside, and partly in, County Road 377. The proposed trunk line corridor, necessary TUAs, and a proposed Compressor Site have been staked, onsited, and surveyed to avoid cultural resources and to minimize new surface disturbance overall (Appendix D). The trunk line predominantly follows and mostly overlaps existing road ROW and in part parallels an existing pipeline ROW corridor. Well-connect and facility-connect pipelines would be individually surveyed, staked and onsited, as has been done for the first four new LOGOS well pads (Appendix C).

1.3 Objective

The objective of the proposed Federal 2407 MDP is to develop hydrocarbon minerals associated with valid existing leases held by LOGOS, related corporate entities, and partners. LOGOS would submit Applications for Permit to Drill (APDs) and Right-of-Way (ROW) Grants as necessary to the BLM-FFO or appropriate surface managing agency for all wells and associated infrastructure to develop the proposed Federal 2407 MDP Area. The proposed wells would access federal, state, and fee minerals administered by the BLM-FFO, New Mexico Oil Conservation Division (NMOCD), and fee mineral owner respectively. TUAs would provide extra space needed for pipeline and road construction, staging of equipment and materials, and as traffic pull outs.

Development planning will be an ongoing process with changes likely as new information is gained from wells drilled within the basin and the MDP Area. LOGOS has submitted two APDs for wells on one well pad and is preparing APDs for three more well pads in the area, but other well and facility plans are still in the preliminary stages and may not be finalized until LOGOS receives data from the first wells drilled in the MDP Area. The locations of proposed laterals may be adjusted due to changes in leasehold, surface issues, and drilling and completion methods. All wells planned will likely utilize similar construction equipment and techniques.

For this MDP, current expectations about specific locations and methods were used as well as other assumptions made in a “best effort” attempt to identify reasonably foreseeable development in this MDP Area. Potential impacts from development were calculated using reasonable assumptions based on recent industry experience and on LOGOS and Whiptail’s own analyses and typical construction methods.

The proposed 2407-MDP includes a total of 40 new well laterals drilled on up to 8 new well pads. This total represents both current plans and speculation about what might be needed for full development of the leases. The number of well laterals proposed considers geologic analysis, desired lateral spacing, drilling logistics, and surface location issues. The total number of wells and pads necessary would be reassessed as completion and production data from the area becomes available and is evaluated. At this time all development being planned is in the Mancos Formation; no Fruitland coal development is currently anticipated.

Each proposed pad’s size would be determined in consideration of surface issues as well as LOGOS’s operational requirements. LOGOS plans to develop at least two wells per well pad wherever practical in order to lower total impacts and is currently planning four to seven wells on most pads. Each well pad would require an access road and connection to a pipeline gathering system.

Assumptions about new disturbance from access roads and pipeline development were based on topography and recent experience. Access road and pipeline development would be highly dependent on well pad placement and proximity to existing infrastructure in the area. The proposed 7-mile trunk line would gather products from wells drilled in the future as well as from the first four new LOGOS well pads and so construction of this trunk line should reduce the length of other new pipelines needed in the future. In addition, the existing LOGOS operated Escrito well in NW/4 Section 14, Township 24 North, Range 7 West may be tied in to the new trunk line and so that is included in this MDP.

A preliminary look at the MDP Area suggests that well pads and remote facility pads would be planned with strong consideration to the cultural resources of the area, natural resources, and naturally occurring topography. Well pad size is unlikely to be severely restricted if appropriate planning occurs, involving archeologists and other resource specialists. Biological resources could also limit where or when construction and operations can occur. Cliffs and steep slopes off the sides of Crow Mesa provide some limits on where pads, road, and pipelines can be physically and economically built, as do washes and drainages, which are generally avoided.

The proposed MDP Area is relatively remote, and water supply, transportation, and disposal will be significant factors in developing the area. LOGOS plans to bring water to the well pads by truck, pipeline, and temporary surface pipeline depending on what would be most practical for each location. Water would be stored on well pads in tanks. Other LOGOS well pads, water containment sites, temporary staging areas, and TUAs could also be used for staging water and other materials as needed. Temporary

surface waterlines to transport water would be placed within existing corridors and would not require new disturbance.

LOGOS is currently considering development of a single new water disposal well to assist in handling the potentially large volumes of produced water that the 2407-MDP Area wells could generate. No disposal well has been sited yet. It is not included in this MDP because it would likely be sited outside of the MDP area.

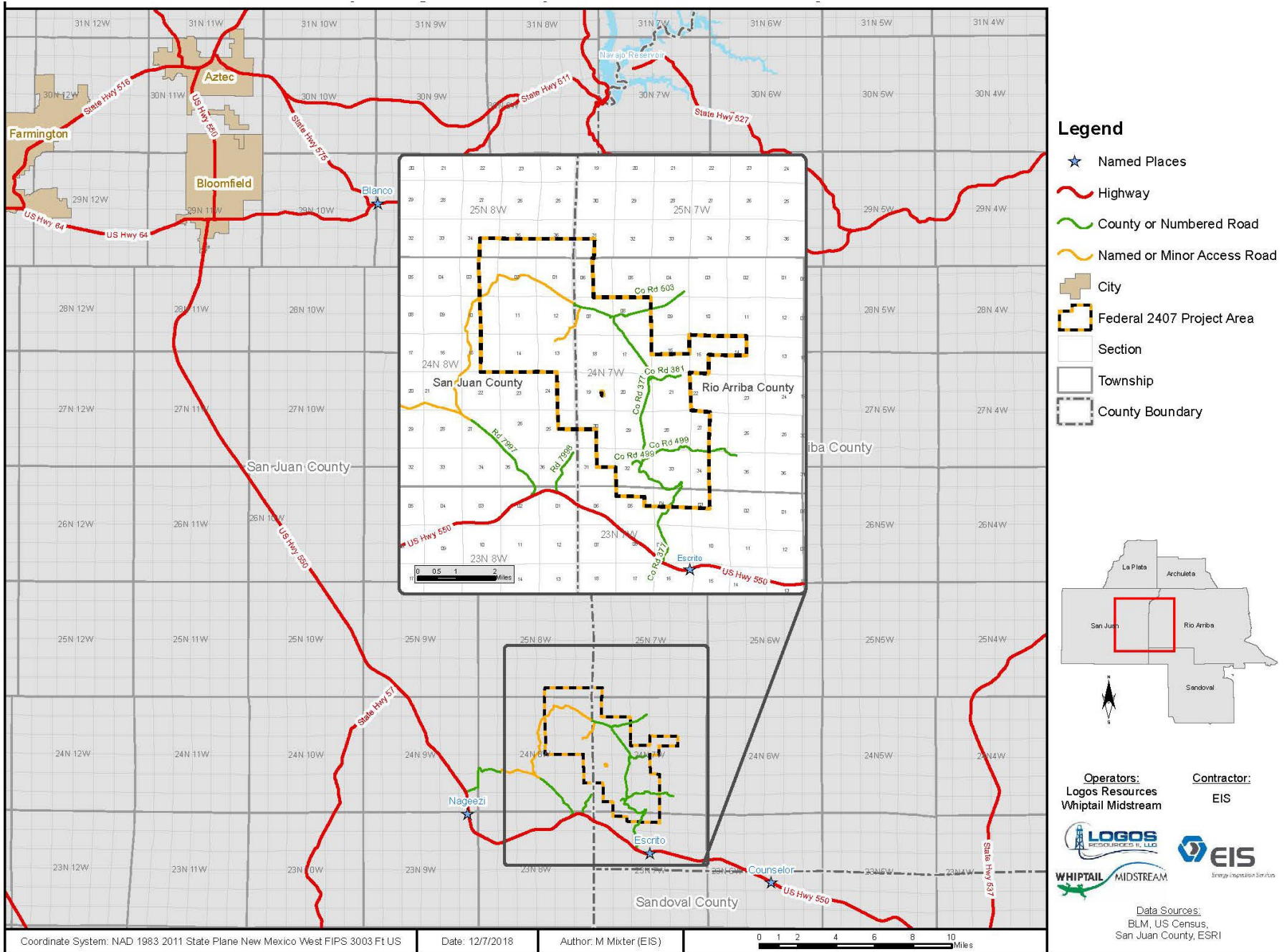


Figure 1. General Location Map of the Federal 2407 MDP Project Area

2 Proposed Development

The New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (NMOCD) regulates access to oil and gas reserves in a particular formation through its spacing and permitting rules and regulations. On Federal lands, the BLM generally abides by NMOCD rules but has the authority to establish its own spacing and well density rules. BLM requires its own well permits and ROWs for development activities on federally managed land. LOGOS plans to form several communization areas in the 2407-MDP Area in order to develop its mineral resources efficiently and will submit permits and abide by the regulations of the appropriate regulatory authorities.

LOGOS would conduct all on-lease surface disturbing activities pursuant to the Oil & Gas Mineral Lease associated and to the approved Applications for Permit to Drill (APDs). The Oil & Gas Mineral Lease Agreements have been agreed upon by the mineral owners, and the owners have been compensated for all activities which are incidental to and/or necessary for the exploration, development, production and sale of resources pursuant to the lease. Off-lease surface disturbing activities would be conducted pursuant to an approved ROW agreement with the surface owner(s) or surface managing agency. Mineral development would occur only within the approved MDP Area abiding by set back and spacing requirements established by appropriate regulatory agencies.

Figure 2 (page 8) illustrates the location of the 2407-MDP Area with respect to various resources. The Area is located in both the Blanco Canyon Watershed and the Outlet Canon Largo Watershed. One BLM-FFO Public Specially Designated Areas (SDA), the Crow Mesa Big Game SDA, overlaps most of the MDP Area. This SDA is likely to require the proposed MDP development activities to abide by numerous mitigations. The MDP Area includes parts of three VRM Class areas, and the project approval process may require Visual Resource Management Evaluation. In addition, a relatively small portion of the MDP Area falls into the BLM designated potential Brack's fishhook cactus habitat. The sensitive BLM-designated potential Brack's fishhook cactus habitat areas would be considered during the site-specific planning and siting process of the proposed infrastructure. No development activity is currently planned in the potential Brack's fishhook cactus habitat. LOGOS and Whiptail would consult with the BLM during project planning to evaluate possible mitigations for potential impacts.

Figure 3 (page 9) illustrates the potential development envisioned in this MDP. The first phase of development would occur primarily in 2019 if permits are approved. This would include construction of four well pads with access roads and well-connect pipelines, the trunk line, two wells from the 2408 13C pad, and twelve wells from three additional pads, the 29E, 28M, and 28O. The 2408 13C pad with two wells, access road, and well-connect pipelines was onsite in early October of 2018, and an APD was submitted in late October 2018. During onsites for the remaining above listed projects, BLM and NMSLO requested various surveys and project modifications, which are being completed and are discussed in Sections 2 and 3 below. APDs and Right of Way grant applications are also being prepared for these projects. Other projects in the MDP would be planned in detail in the future in consideration of all relevant data and business conditions, including early results of drilling and production in the Area.

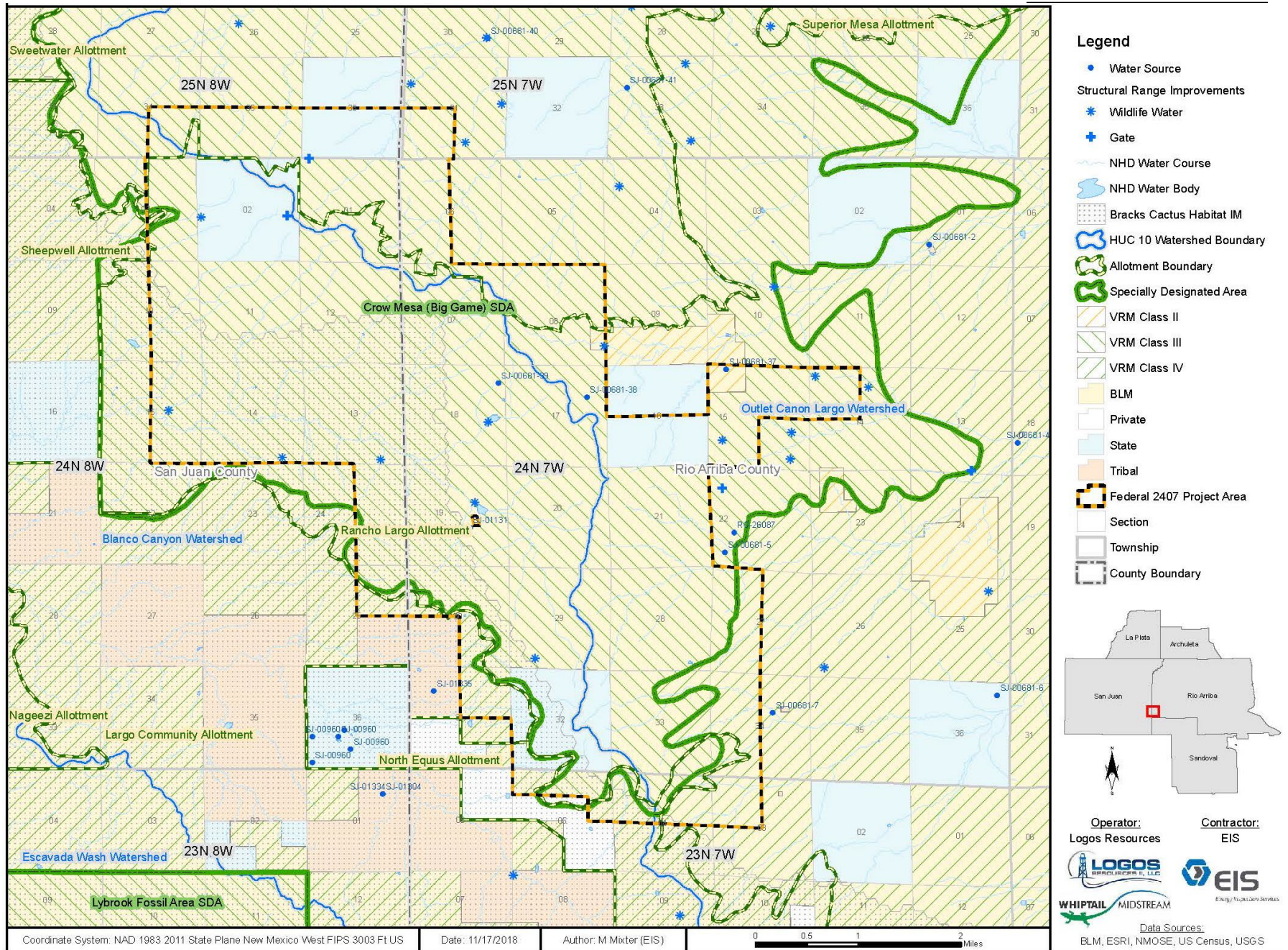


Figure 2. Map of Sensitive Resources within the 2407-MDP Area

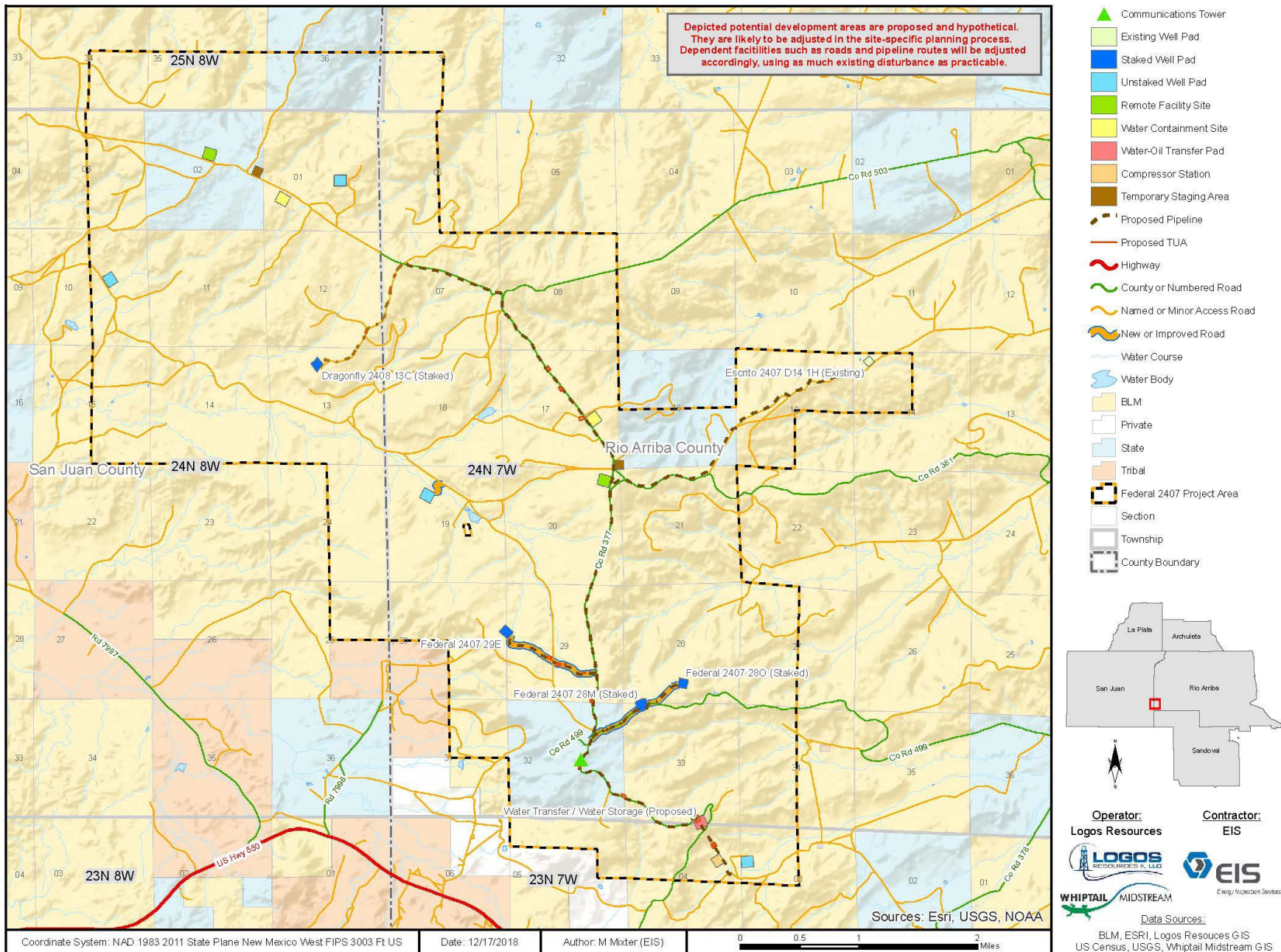


Figure 3. Potential Development Within the Federal 2407 MDP Project Area

2.1 Well Pads and Wells

Each well pad location in the MDP Area would be determined in consideration of numerous factors. For efficient development and extraction of resources, LOGOS endeavors to site laterals carefully in the subsurface. To minimize surface disturbance and other impacts, LOGOS plans to drill multiple wells from each well pad. Thus, in siting well pads, LOGOS must simultaneously consider where laterals need to be located in the subsurface for efficiency and where pads could be sited from which drilling rigs could reach multiple laterals.

Other factors considered in siting well pads include, but are not limited to: operator's lease hold, land ownership, topography, archeological resources, paleontological resources, biological resources (including BLM SSS Habitat), visual resources, drainages and water features, existing disturbance, safety concerns, and proximity to residential areas. Potential well pad sites may be eliminated or altered in shape or size to avoid or to minimize impacts to various resources. The exact size and shape of each well pad could vary depending on many factors. Further details pertaining to well pad locations and rig and equipment configurations can be found in the Master Surface Use Plan of Operations (MSUPO) (Appendix B).

To analyze surface disturbance in this MDP, the typical well pad (Figure 4, page 11) is assumed to be 8.26 acres in size with five wells. Eight typical well pads would create approximately 66.1 acres of new surface disturbance from well pads alone (Table 1, page 36), with additional disturbance from access roads, pipelines, and TUAs. Well pads being planned in detail at this time are the 2408 13C, the 2407 28M, the 2407 28O, and the 2407 29E. All four have been staked, surveyed, and onsited (Appendix D), and all four well pads would be smaller than 8.26 acres, making the "typical" well pad a conservative estimate of area needed. The APD for the 2408 13C pad was submitted to the BLM in October 2018. The other three were adjusted to address agency concerns expressed at the onsites and have been resurveyed as shown in Appendix D. Their APDs are expected to be submitted in January 2019.

As has already been mentioned, pads and laterals could be added, moved or removed from development plans based on a number of technical and economic factors. To include these possibilities, conservative estimates of the maximum number of well pads and laterals have been assumed for the purpose of this document.

LOGOS proposes to develop up to 40 horizontal oil and natural gas wells (40 laterals). The first 14 laterals are currently planned to be located on the first 4 well pads. An additional 21 lateral locations have been tentatively identified for future development. Five more laterals that have not yet been located are included in the total to be evaluated in this document as reasonably foreseeable to take into account possible additions or changes to the MDP Area or lateral configuration. Assuming a conservative average of five wells per well pad, approximately eight well pads would be constructed to develop LOGOS's leases within the MDP Area. However, each pad actually constructed could host fewer or more than five wells.

LOGOS may use water based and/or oil-based mud in its drilling programs, depending on drilling conditions. Agency guidelines would be followed in the use of oil-based mud. Fresh water produced water and nitrogen might all be used in completing the wells. The approximate true vertical depth to the Mancos formation in the MDP Area is 5,500 ft, and the laterals drilled would make the total measured depth of each well approximately 10,000 ft. Hydraulic fracturing techniques would likely be used in completing the Mancos formation. The Fruitland Coal formation, which would be expected to occur at

approximately 2,000 ft true vertical depth, might be developed in the vertical section of some wells or by drilling horizontally but would not be stimulated by hydraulic fracturing.

LOGOS Operating, LLC 2407-MDP Area Well Pad Layout

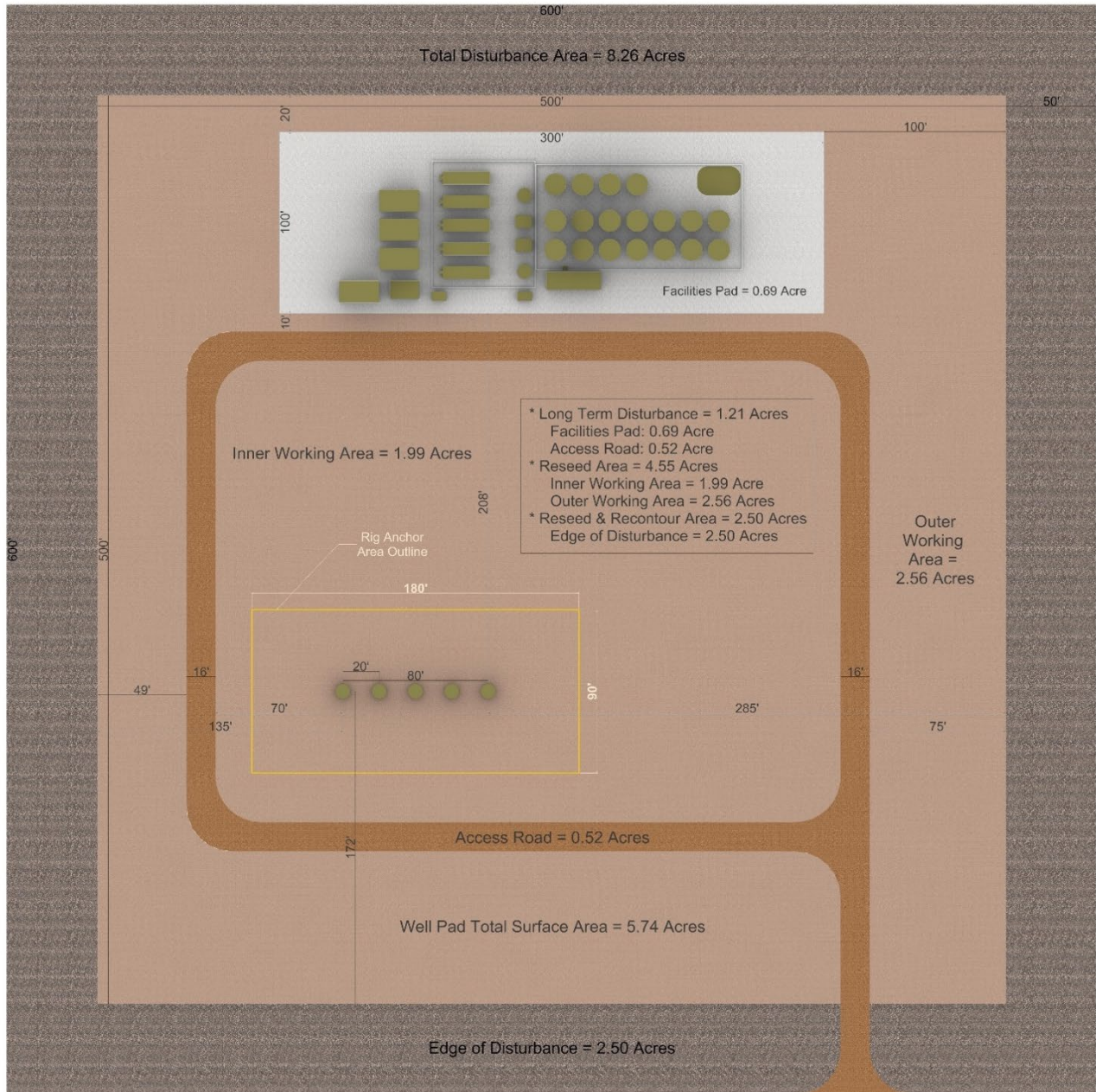


Figure 4. Typical LOGOS Well Pad Layout for the Federal 2407 Area MDP

2.2 Access Roads

Numerous access roads of varying lengths would be needed as part of the MDP Area development. The greatest effort practicable would be made to utilize existing disturbance and to minimize total disturbance through coordinated route and site planning, including the consideration of routing new pipelines adjacent to access roads. It is estimated that approximately 6 miles of new resource roads would be needed to access the eight well pads that would be constructed as part of the 2407-MDP. Access roads would be within a 30-foot wide corridor, anticipated to include a 14-foot wide running surface if resource road designation is affirmed by the BLM.

In addition to the running surface, necessary traffic pullout locations would be constructed generally 500 feet apart along the access roads with slight variations in spacing depending on terrain. The pullout locations would typically be identified in the project plats submitted with the individual APDs. Each pullout would typically be 100 ft x 20 ft adjacent to the proposed access road corridor. In addition, temporary use areas developed along County Road 377 by Whiptail during pipeline construction would likely be assumed by LOGOS for use as traffic pullouts during drilling and completions operations.

LOGOS expects to be responsible for road maintenance associated with the proposed wells and facilities in the MDP Area under the site-specific APDs and/or ROW Grants. Roads would be maintained according to the 9113-Roads Manual, 9113-1 Roads Design Handbook, H-9113-2 Roads Inventory and Condition Assessment Guidance & Instructions standards. This responsibility would continue until LOGOS transfers the permits or abandons the project. Abandonment would require reclaiming disturbances as per permits and agreements and obtaining a Final Abandonment Notice (FAN) or relinquishment from the BLM-FFO.

Conditions of Approval (COAs) attached to the approved APDs or stipulations in the ROW Grants would specify any site-specific requirements or upgrades to existing roads. If it is necessary to upgrade roads, identified roads would be upgraded to the BLM's 9113-Roads Manual, 9113-1 Roads Design Handbook, and H-9113-2 Roads Inventory and Condition Assessment Guidance & Instructions standards. For existing County Roads or roads that are considered collector roads, LOGOS would defer to the county or to the Roads Committee, when formed, for maintenance determinations.

2.3 Well-Connect Pipelines, Facility-Connect Pipelines, and Trunk line

Well-connect pipelines and the Dragonfly Pipeline (the "trunk line") would be constructed in the MDP Area to connect wells to existing third party pipeline infrastructure and efficiently transport products to sales. Facility-connect pipelines would also likely be installed to move fluids efficiently and reduce truck traffic. The trunk line would efficiently gather fluids from multiple sites and possibly from multiple operators. Whiptail envisions constructing a total of approximately 21.72 miles of new pipeline corridor as part of the 2407-MDP. This estimate includes 2.6 miles for the Escrito well-connect, 6.0 miles for well-connect pipelines to the 8 new well pads, 7.14 miles for the trunk line including the bored section, 0.95 miles for facility connecting pipelines, and 5 miles for other as yet unidentified but reasonably foreseeable pipelines.

Multiple pipes for different fluids would typically be installed in the same pipeline corridor during construction. In the trunk line, Whiptail plans to install two steel natural gas lines up to 16" in diameter, two steel oil lines up to 8" in diameter, and two poly pipelines, typically HDPE "Flexline", up to 6" in diameter, for water. The same sizes and types of lines would be installed as well-connect pipeline to the Dragonfly 2408 13C well pad. This would eliminate the need for a valve set at the connection of the two

lines, reducing new surface disturbance at that location, which was a concern of the Federal Indian Minerals Office (FIMO) representative at the onsite. Other well-connect pipelines would likely be constructed with smaller diameter pipe of the same compositions and for the same types of fluids. Facility-connect pipelines would be selected to meet the design parameters of each facility.

Pipeline construction would utilize existing disturbance in the area and would parallel new access roads whenever practicable. In some instances, it may not be practicable for the pipeline route to follow existing disturbance or to parallel the access road due to: avoidance of archeological or natural resources, existing gathering line infrastructure and desired tie-in points, significant route distances, and constructability based on terrain. All proposed well-connect pipeline disturbance would be temporary and would be fully reclaimed post installation except for above ground appurtenances and areas which are part of other permitted long-term surface use.

Pipeline corridors constructed on NMSLO-managed lands would be constructed within a 50-foot wide corridor containing a permitted 30-foot ROW. This would allow for a maximum width of 50 feet during construction but a reduced 30-foot width for future repairs and/or maintenance. Pipeline corridors constructed on BLM lands would be constructed within a permitted 40-foot wide corridor. Whiptail would likely maintain a 40-foot wide construction corridor along the entire well-connect pipeline length where possible and over differing property ownerships but would have the option to expand the width by the additional 10-foot construction width on NMSLO lands if needed. The trunk line corridor may be constrained to less than 40 feet in some areas by cultural resources.

Where parallel to proposed access roads on BLM-managed lands, the well-connect pipeline corridors would utilize and overlap 20 feet of the proposed access road corridor during construction and installation. This would result in a 50-foot wide access road/well-connect pipeline corridor. Disturbance calculations assume that all well-connect pipelines will be able to share the access road right of way. Depending on how LOGOS and Whiptail decide to connect their equipment at each pad, the well-connect pipeline corridor would typically either overlap and utilize part of each proposed well pad or facility pad or have the connection located at the edge of the pad.

2.4 Temporary Use Areas

Temporary use areas (TUAs) are areas where ground disturbance would take place because additional area outside the proposed permitted corridor is needed to accommodate one or more tasks. TUAs may be cleared of vegetation, and excavated material could be stockpiled or placed to establish appropriate slopes needed to stabilize the surface and reduce erosion. TUAs are typically utilized along drainages and utility line crossings, in steep terrain, and in other areas where additional space is needed for temporary activity such as dirt work or equipment storage and staging. TUAs are fully reclaimed during interim reclamation. Reclamation may include re-contouring and reseeding or only reseeding as necessary to preserve industry standard safe cut slopes.

TUAs would be essential for construction in the MDP Area due to the density of cultural resources and other surface issues. Each TUA would be separately identified, staked, and permitted as needed with the appropriate surface managing agencies by LOGOS and/or Whiptail. LOGOS expects to develop approximately 2.89 acres of TUAs for use in various well pad, facility, and access road projects. Whiptail might share some of these TUAs when constructing well and facility connect pipelines. Whiptail has identified, staked and surveyed ten TUA locations for use during trunk line construction (Appendix C.) LOGOS might assume some of these ten TUAs before reclamation by Whiptail for use during well drilling and completion. LOGOS would then become responsible for final reclamation of these TUAs. Whiptail

estimates that 4 TUAs totaling approximately 3.79 acres could be needed during construction of the Escrito well-connect. Whiptail also plans to evaluate using the proposed Dragonfly TUA site as a compressor station in the future.

Whiptail has staked two TUAs for use by equipment that would construct a section of the trunk line by boring to avoid more substantial impacts from alternative construction methods. The boring activity would primarily occur from near the base of a cliff in Section 4 of Township 23 North, Range 7 West (TUA #1, the lower boring location). The bore hole would emerge at a location at the top of the cliff in Section 33 of Township 24 North, Range 7 West (TUA #2, the upper boring location), and equipment would be deployed at the upper boring location to pull pipe up through the borehole. The TUA #2 location has been sited to overlap and utilize existing disturbance from a P&A well pad. The entire boring is not likely to be cased as one hole due to the high cost of buying and working with large diameter casing. However, the poly water pipe may be cased to prevent damage to it when it is pulled through the bore.

TUA #1, the lower boring location, would be fully reclaimed after construction of the pipeline. A small area within the pipeline ROW a short distance past the point where the boring joins the horizontal pipe would be developed with a leak detection system (Figure 5, page 15). This would consist of a length of horizontal PVC pipe set in clean gravel below the new oil, natural gas, and water pipelines. The PVC pipe would be perforated to allow fluids to enter and would have a sock over it to prevent gravel from clogging the perforations. The PVC pipe would have a capped riser extending to the surface which could be periodically checked with a gas monitor to detect hydrocarbons and provide early detection of a possible pipeline leak.

In the future, Whiptail plans to request a ROW for use of the upper boring location, TUA #2, as a transfer facility location (Figure 6, page 16). Primarily, this upper location would house tanks for short term storage of water and oil. A preliminary plan for the layout is shown in Figure 6 below. The timing for development of this facilities location is not yet established.

Finally, Whiptail has identified and staked a 4.1-acre site in Section 4, Township 23 North, Range 7 West for use as a TUA with potential future utility as a compressor station site (Figure 7, page 17). In the short term, it would be used as a TUA for staging and storage of materials and equipment for use in the MDP area. This site is well positioned with respect to Highway 550 and other pipeline system components. The possible compressor station would require additional permitting before construction could begin.

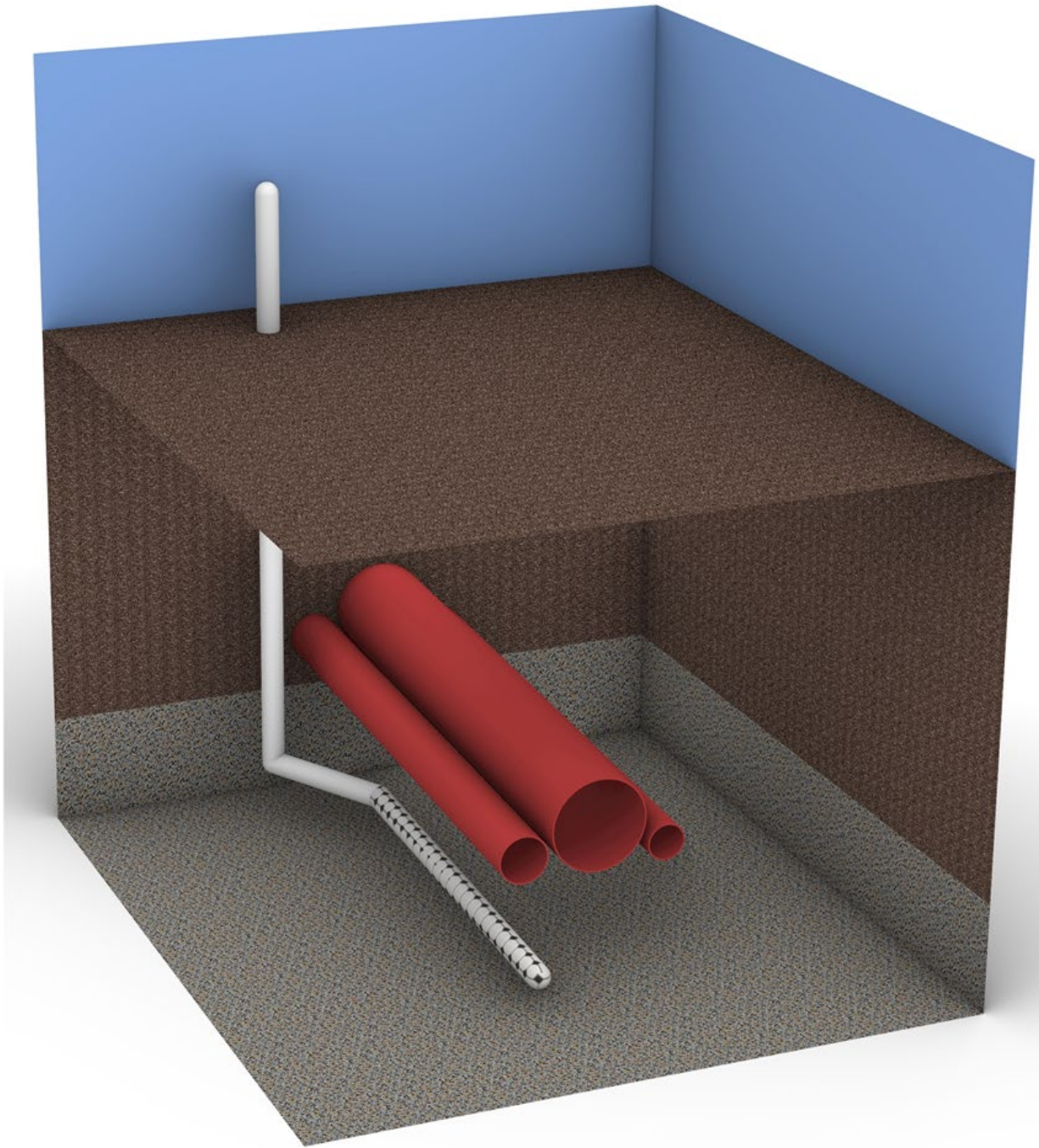


Figure 5. Proposed Leak Detection System at TUA #1, the Lower Boring Location: Red pipelines are buried commodity lines; white pipe is leak detection line installed and perforated under the commodity lines and extending to just above ground surface for monitoring.

Whiptail Midstream Proposed Transfer Facility

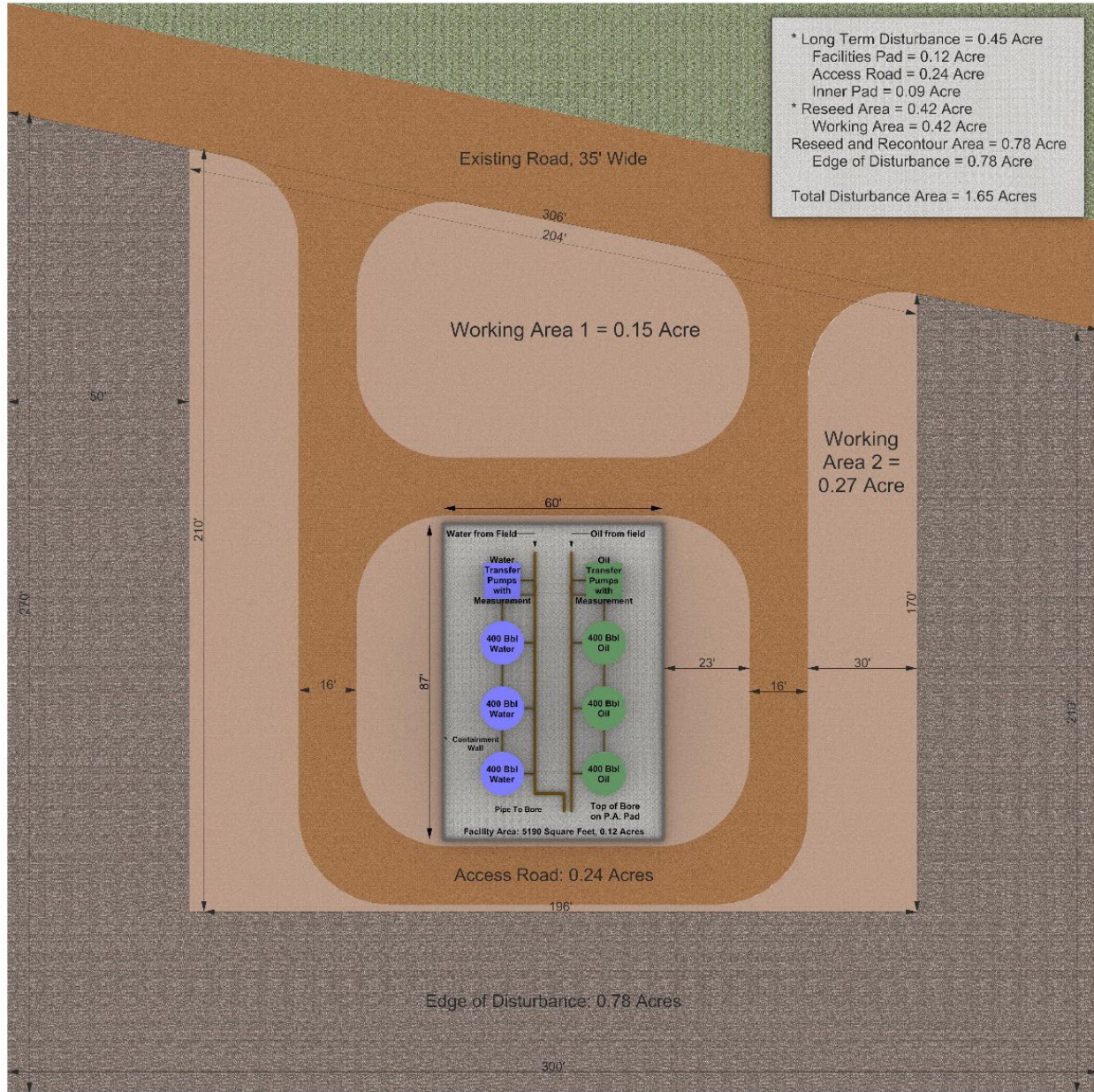


Figure 6. Preliminary Layout for Whiptail Transfer Facility

Whiptail Midstream Dragonfly Compressor Detail

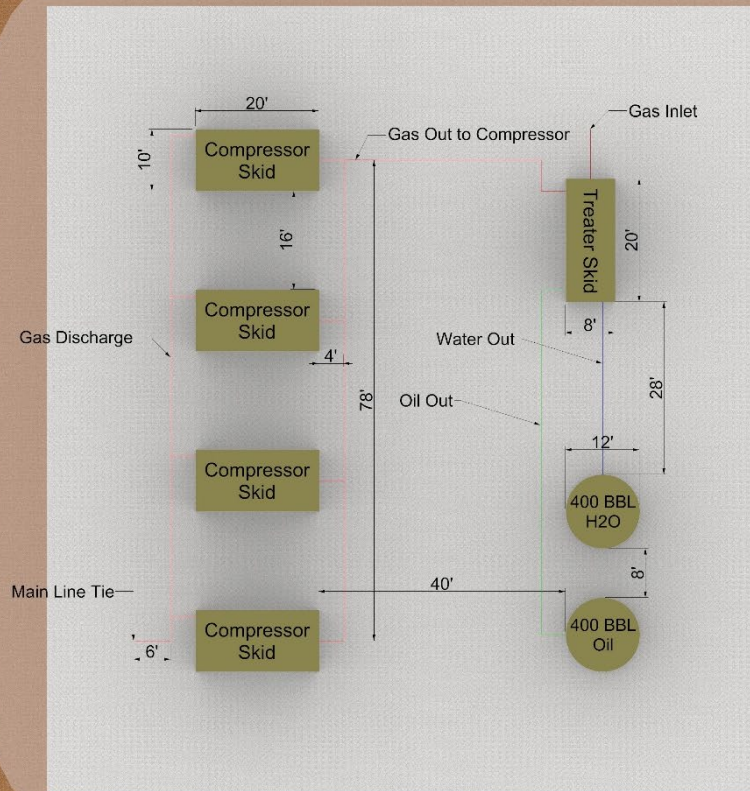


Figure 7. Whiptail's Dragonfly Compressor Layout

2.5 Remote Facility Pads

LOGOS may construct remote facility pads that would house production facilities for two or more nearby well locations. Although LOGOS would prefer to co-locate production equipment with wells on well pads, some well pads may be restricted in size and/or be in close proximity to a sensitive area. In such instances, production facilities might need to be sited on a remote facility pad. If a remote facility pad is used, the proposed well location served might only have well heads and possibly gas lift and electrical buildings on location.

Remote facility pads may be permitted on lease under a Sundry Notice if located on lease. Two potential remote facility pads have been planned by LOGOS as part of this 2407-MDP although they may not be needed once specific well pads are sited and therefore may not be constructed. These remote facility pads are assumed to be 500 ft x 500 ft (5.74 acres) in size, including a 50-foot construction buffer zone along all sides (Figure 8, page 19.) Each remote facility would have an access road approximately 1,500 ft long and 30 ft wide. If pipelines were installed to service the remote facility, Whiptail would typically install them adjacent to the access road so as to overlap and utilize part of the access road for pipeline construction, requiring then only an additional 20 ft of ROW width for the pipeline. The access road would have traffic pullouts installed approximately every 500 ft if possible. Each pullout would typically be 100 ft long and 20 ft wide.

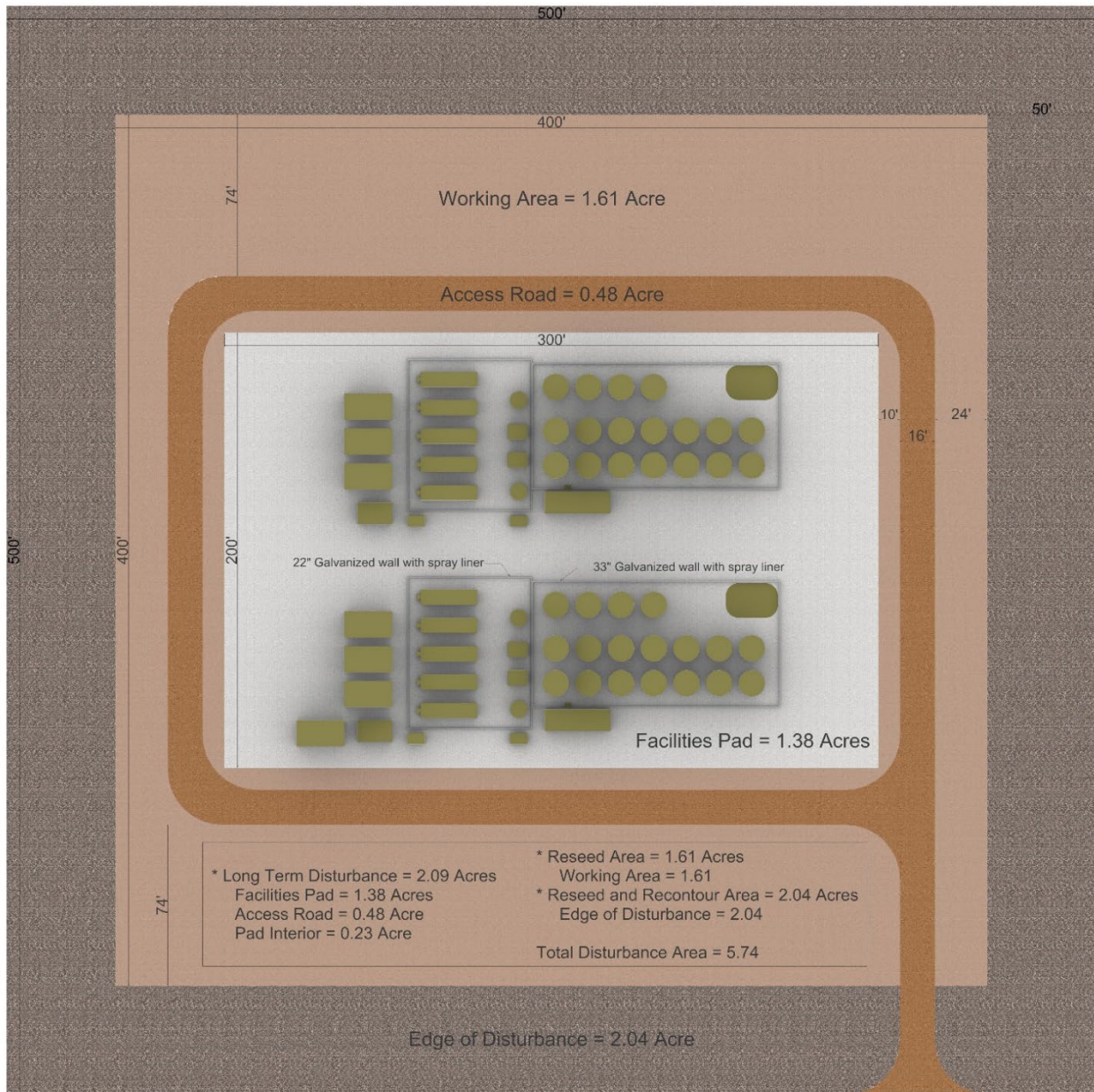


Figure 8. Standard LOGOS Remote Facility Diagram

2.6 Water Containment Pads

Significant volumes of water would be needed for drilling and completions. Water would also likely be produced with hydrocarbons from wells once they are completed. LOGOS plans to install storage tanks for water treatment and storage at well pads, at temporary staging areas, at remote facilities, and at new water containment pads. Inground ponds might also be constructed as an alternative to tanks. These choices would centralize and consolidate water management and reduce truck traffic but would also be carefully planned with consideration of useable space, operational scheduling, and other factors. If located on BLM surface on-lease, water containment pads would be permitted under a Sundry Notice.

Two new water containment pads have been assumed in this MDP. Each is planned as 500 ft x 500 ft (5.74 acres) in size including a 50 ft wide construction buffer on all four sides. LOGOS would most likely utilize enclosed laydown tanks to store water on the water containment pads (Figure 9, page 21) but other options are being considered (Figure 10, page 22 and Figure 11, page 23). Each pad would require an access road, estimated at 30 ft wide and up to 500 ft long (0.344 acre), and temporary surface lines might be laid to reduce truck traffic associated with water hauling. The equipment and facilities needed for water handling, treatment, and storage may include, but would not be limited to, pumps and pump houses, treatment/filtration systems, tank batteries, and water transfer lines. A site-specific layout would be submitted at the time a location is proposed for development as a water containment pad.

Centralizing water handling and storage at a water containment site would allow LOGOS to use water more efficiently and greatly reduce truck traffic, thereby increasing safety and reducing traffic impacts during the construction, drilling, and completion phases of well projects. Recycling produced water in drilling and completions would greatly reduce the amount of fresh water that would need to be brought into the area, reducing both fresh water use and truck transportation. The containment site area could be located to minimize the distance to the new well pads being developed, thus further reducing traffic within the 2407-MDP Area.

Centralizing water handling and storage would also increase safety on existing well pads. LOGOS plans to capture, treat, and transfer for reuse some produced water at existing well pads for use in drilling and completions. However, consolidation of these activities at a different site would reduce potential risks from increased activity within close proximity to well heads and production equipment at individual well sites. Adding temporary surface lines where buried lines are not available would further decrease the truck traffic needed to transport water.

Water containment pads could be used to provide water for multiple well pads and be used as long as wells are being drilled and completed in the MDP Area. Once all wells within the MDP Area have been completed, the containment site could be fully reclaimed unless further surface agreements necessary to continue use were completed. If necessary, LOGOS would register the facility through the NMOCD as a Produced Water Recycling Facility or Containment (NMOCD Form C-147). The application would be submitted to NMOCD after adequate NEPA analysis is completed.

LOGOS does not currently plan to drill any water supply wells within the MDP Area for drilling and completion activities. Although some fresh water may need to be trucked into the area, water will be recycled as much as practicable during the development of the MDP Area. Produced water may be used for drilling and completions.

LOGOS also does not intend to construct any water disposal wells within the MDP area for disposal of flowback and produced water generated from drilling, completion and long-term production of wells. LOGOS would prefer to recycle water and only dispose of water for which there is no immediate possible reuse.

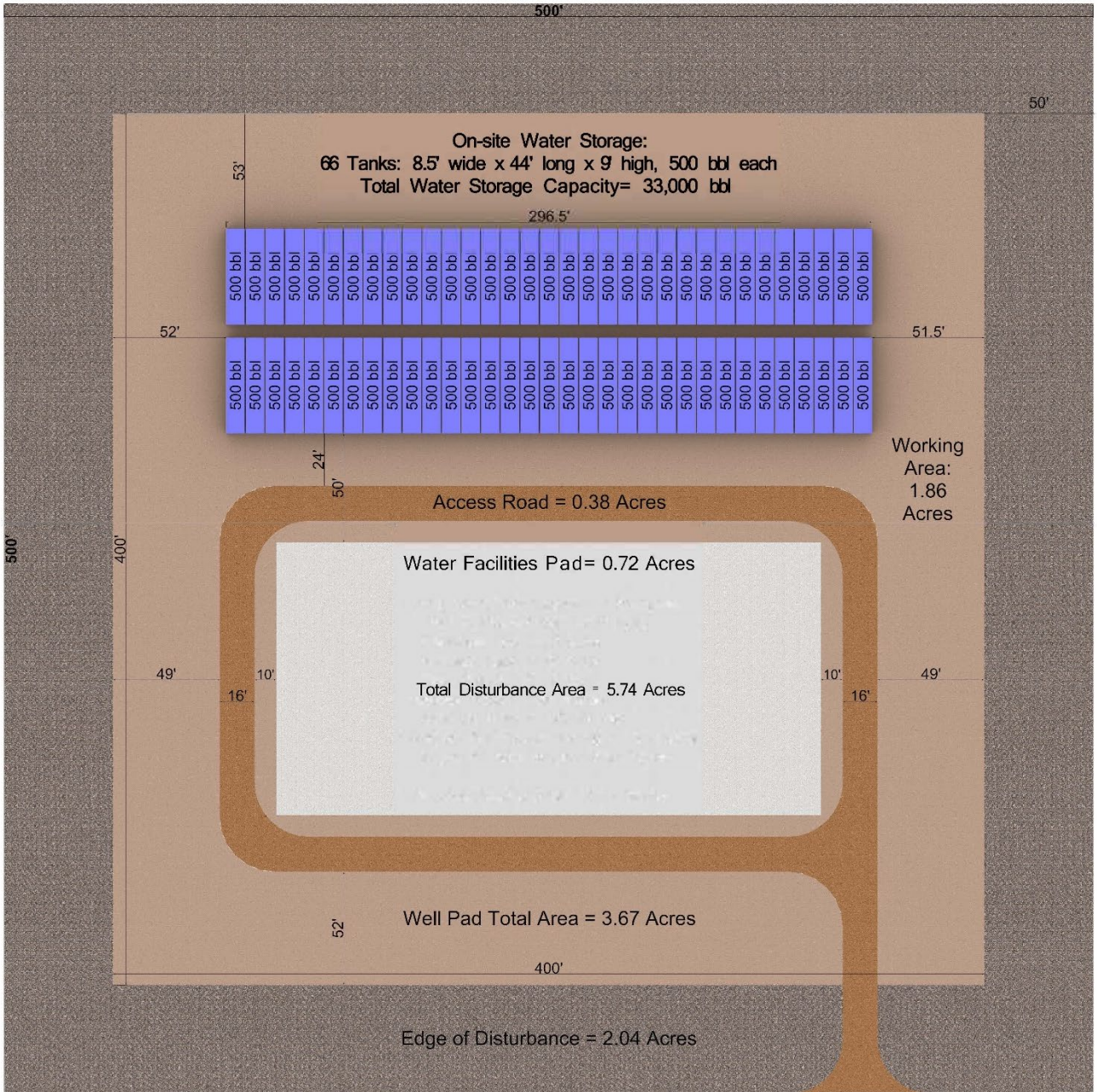


Figure 9. Typical LOGOS Water Containment Layout with Horizontal Tanks

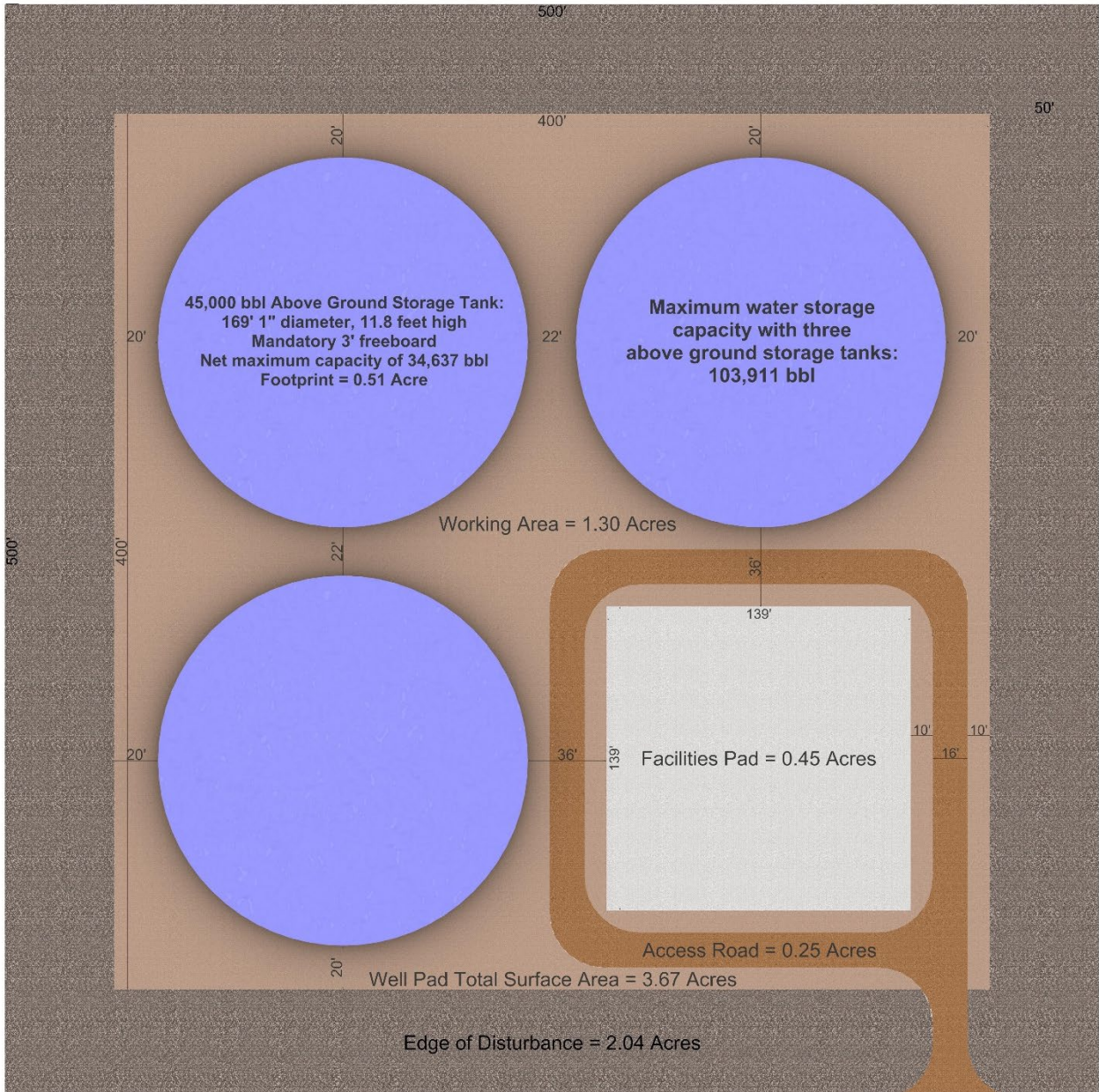


Figure 10. Typical LOGOS Water Containment Layout with Above ground, Open-topped Tanks

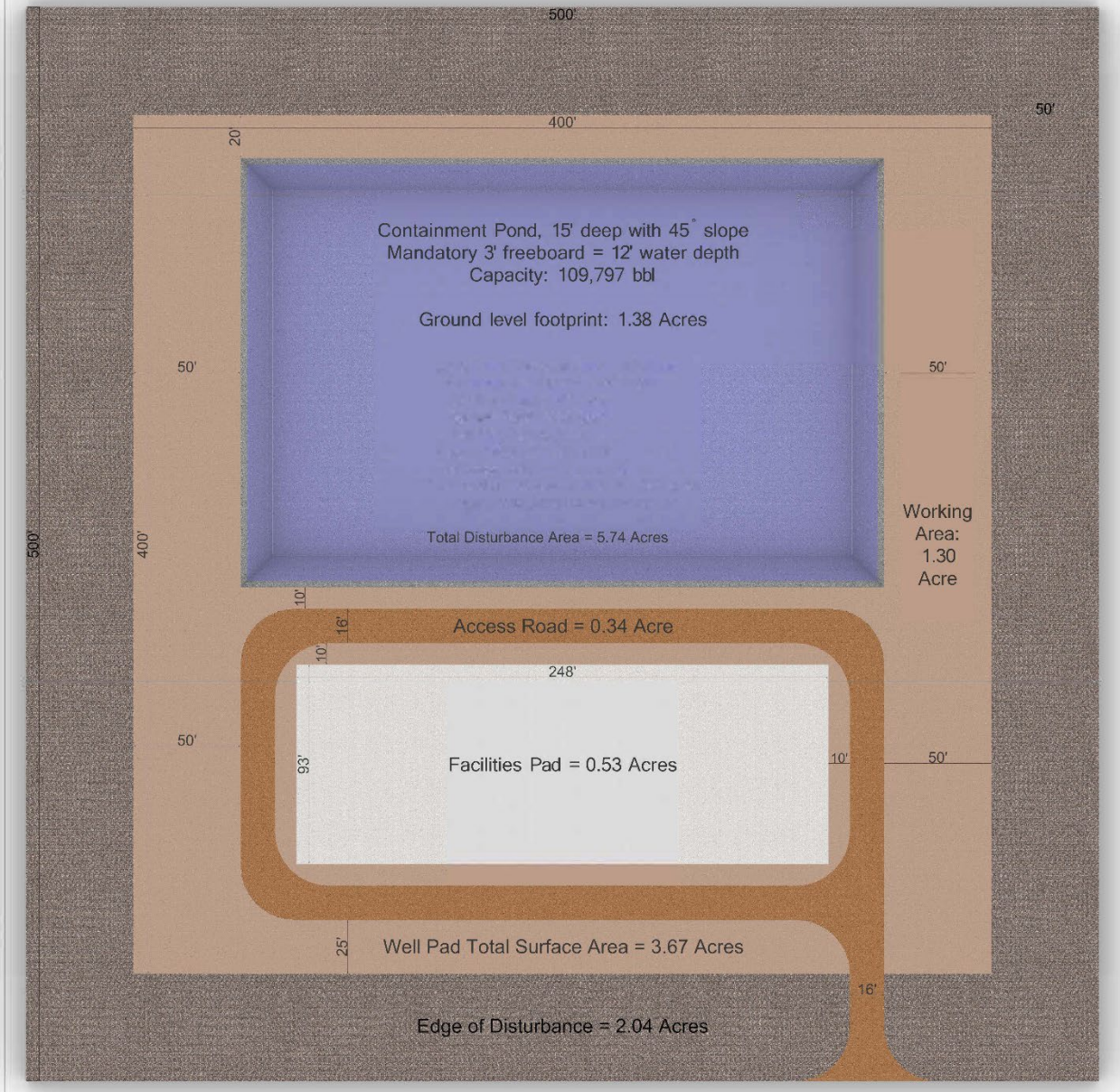


Figure 11. Typical LOGOS Water Containment with Inground Pond

2.7 Temporary Staging Areas and Surface Pipelines

LOGOS may use any of its existing or new well locations as a staging area for equipment and material or may develop new temporary staging areas. Similar to the water containment pads, a temporary staging area could host above ground water tanks or an inground pond that would store and treat produced water for staging before disposal or for recycling in drilling and completion operations. No drilling or production operations would occur at the temporary staging sites. For purpose of this MDP, two new temporary staging areas were assumed. Each would typically be 400 ft x 400 ft (3.67 acres) and have an access road that was 500 ft long and 30 ft wide (0.34 acre) as shown in Figure 12 (page 25).

Water would typically be transported into and out of the temporary staging areas by truck or aboveground temporary surface pipelines. Temporary aboveground pipelines would be utilized within the Temporary Staging Area pad and along existing disturbance corridors to transfer water between wells and storage within the staging area. Supplemental fresh water (water from an approved source or water supply well) may be brought in by trucks or by temporary surface lines and added to the water supply.

2.8 Communication Towers

Aside from communication equipment contained within the well pad locations, two communication towers are planned by LOGOS for installation within the MDP Area. The communication towers would assist in the remote monitoring and operation of wells and greatly reduce the number of site visits needed to operate wells. The towers would be installed within a 5 ft x 5 ft area within an existing pipeline corridor. These would be freestanding aluminum towers approximately 20 feet in height. No additional surface disturbance would be required for these towers; they would be placed on existing disturbance. These communication towers would be permitted with a Sundry Notice to the BLM if on lease within the MDP Area or permitted with the State Land Office if on state land.

Whiptail is also planning to install a communications tower within the MDP area. Whiptail is currently planning a single tower that would be constructed within a 50 ft x 50 ft area probably on NMSLO managed land in TUA #3B. This use might delay final reclamation in that area, depending on the construction of the tower.

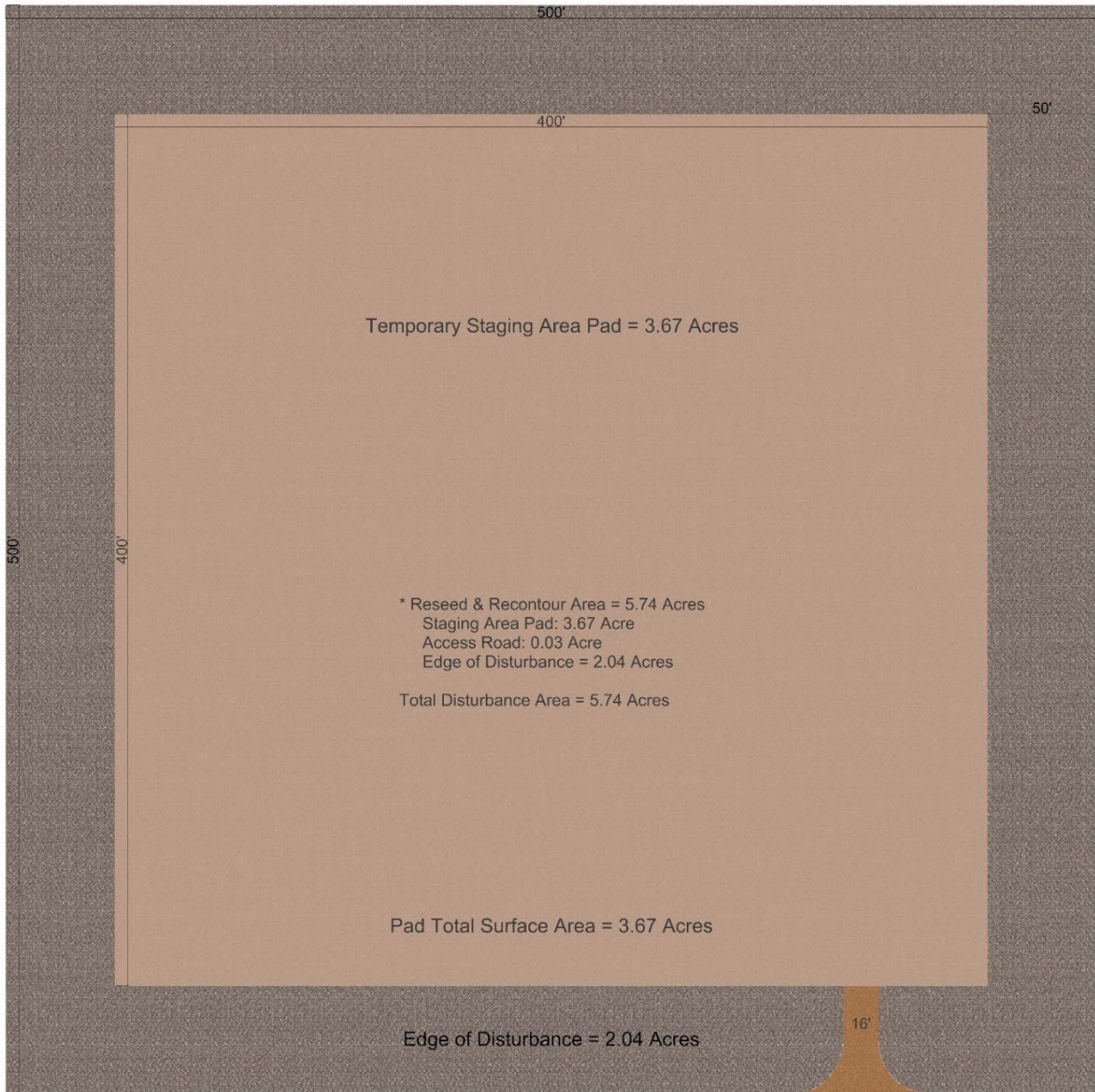


Figure 12. Typical LOGOS Temporary Staging Area

3 Proposed Development Phases

3.1 Construction

3.1.1 Well Pads, Remote Facility Pads, Water Containment Pads, and Temporary Staging Areas

LOGOS and Whiptail, or their contractors, would construct the proposed well pads, access roads, pipelines, and other necessary ancillary facilities upon receipt of the approved APDs and/or ROW Grants. All activities associated with the construction, use/operation, maintenance, and abandonment or termination of the 2407-MDP would be limited to areas approved in the APDs and ROW Grants. The BLM-FFO would be notified by phone call at (505)-564-7600 at least 48 hours prior to the start of construction or reclamation.

LOGOS's typical well pad layout is designed using a 500 ft x 500 ft (5.74 acres) area (Figure 13, page 28). However, because various strategic issues have increased the size of well pads staked in the MDP Area to date, the average well pad size used in calculating new disturbance in this MDP has been increased to 600 ft x 600 ft (8.26 acres) including a 50 ft wide construction buffer on all four sides. This is a conservative size estimation: three of the four well pads LOGOS has staked to date in the MDP Area are smaller than 8 acres (Appendix D). All pads actually developed are likely to vary slightly in size and shape based on number of wells planned per pad and other pad siting criteria.

The typical remote facility pad, water containment pad, and temporary staging area pad is estimated at 500 ft x 500 ft (5.74 acres) including a 50-foot wide construction zone on all sides of the pad. These dimensions and the typical layouts planned are shown in Figure 8 (page 19), Figure 9 (page 21), Figure 10 (page 2222), Figure 11 (page 23), and Figure 12 (page 25). For purpose of reclamation area calculations, it is assumed in this MDP that these types of pads have no interim reclamation or reseeding but are fully reclaimed after the construction and operations work that they are supporting is completed.

During construction of any well pad or other type of pad, the area would be cleared to provide adequate space and a level working surface for vehicles and equipment. Trees that measure less than 3 inches in diameter (at ground level) and slash/brush along the proposed access roads would be chipped or mulched and incorporated into topsoil as additional organic matter. Trees 3 inches in diameter or greater (at ground level) within the pad area and along the proposed access roads would be cut at ground level and de-limbed. There is limited firewood collection allowed in the Crow Mesa SDA. As such, BLM has asked the operators to deliver the tree trunks (left whole) and cut limbs to the nearby Navajo Chapter Houses. The subsurface portion of trees (tree stumps) would be disposed of appropriately. Any topsoil would be stripped and stored as a berm along the outer edge of the proposed pad area. Excavated materials from cuts would be used in fill portions of the pad to level the surface. The approximate cuts, fills, and pad orientations would be shown on the construction plats in the individual APD permit packages or Sundry Notices.

No construction or routine maintenance activities would be performed during periods when the soil is too wet to adequately support construction equipment. If equipment creates ruts deeper than 6 inches, the soil would be deemed too wet for construction or maintenance.

The permitted area would all be utilized during construction, setting of production equipment, drilling, and completion phases. After drilling and completion of the wells currently planned on a single well pad, interim reclamation would be completed at each pad. Within each well pad area, a 16-foot-wide driving surface looping around the wellheads and servicing the edge of the facilities pad area would remain unreclaimed for the life of the wells (Figure 4, page 11). A working area including the center of the loop of road and a level surface surrounding the well heads would not be re-contoured; however, the working area would be reseeded. The remainder of the well pad and construction buffer zone would have topsoil replaced and be re-contoured and reseeded. Stormwater BMPS would be adjusted. Seeding operations during interim reclamation would use the BLM-approved and designated seed mix based on the plant community identified during the site-specific onsite.

The typical expected rig orientation and location of drilling equipment, layout of the completions equipment, and interim reclamation/long-term disturbance layout of the well pads would be similar to those illustrated in Figure 13 (page 28), Figure 14 (page 29), and Figure 4 (page 11). If drilling is delayed after a well pad has been constructed, LOGOS would follow BLM requirements to address a site-stabilization plan.

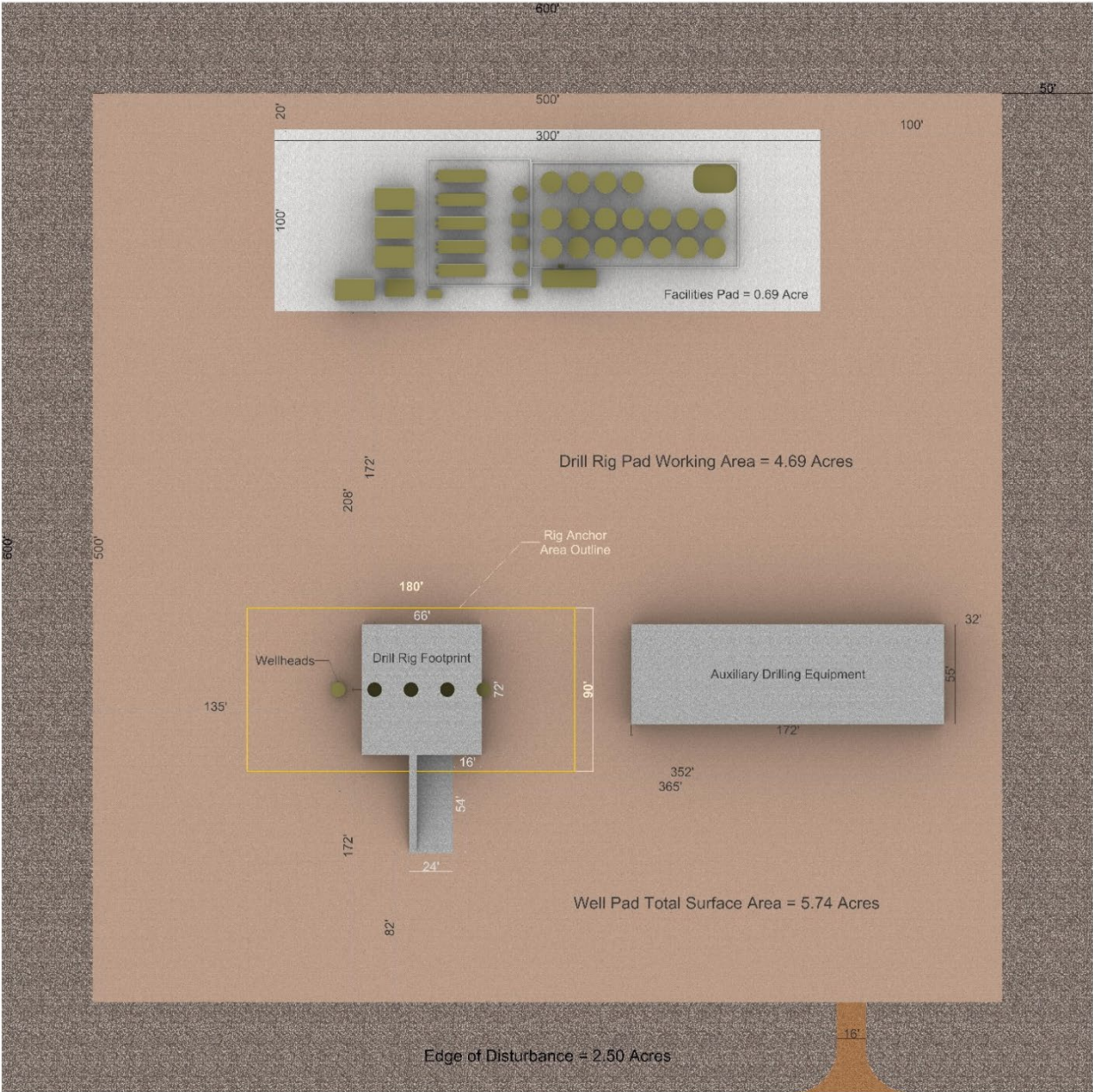


Figure 13. Typical LOGOS Drilling Rig Layout

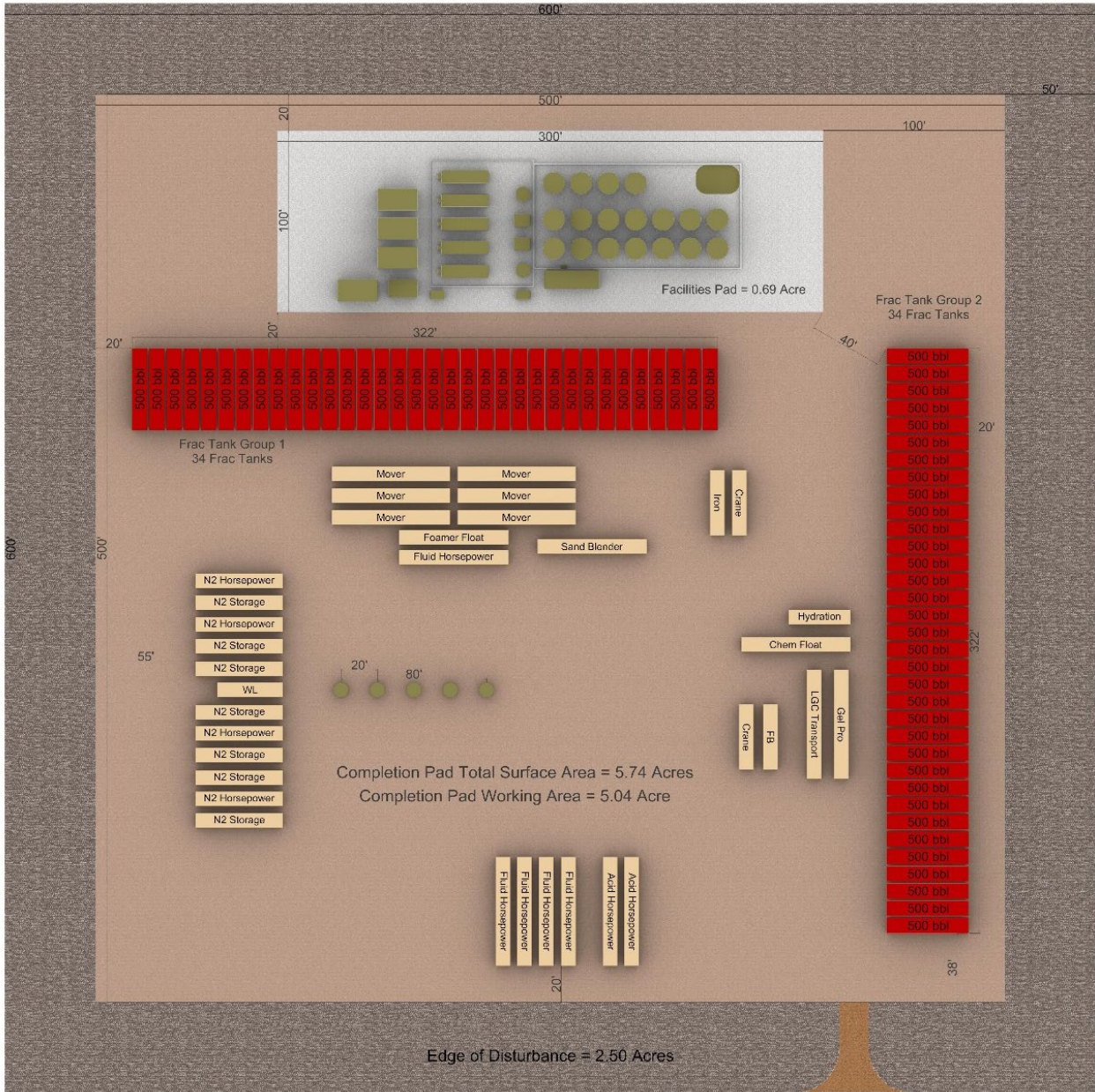


Figure 14. Typical LOGOS Completion Layout: Tanks on location

3.1.2 Access Roads

The proposed access roads for the well, remote facility, water containment, and temporary staging area pads would be designed, constructed, and maintained in accordance with The Gold Book standards and BLM Manual 9113, Sections 1 and 2, and to meet the standards for anticipated traffic flow and all-weather requirements. The road type designation would be identified during the site-specific on-site visits and would most likely be designated Resource Roads. Construction activities and road features including clearing, cut-and-fill slopes, and drainage ditches would all take place within the 30-foot wide access road corridor or designated temporary use areas.

The roads would typically be leveled with bulldozers, scrapers, and graders to provide space and a stable traveling surface for vehicles and equipment. Excavated materials from cuts would be used as fill to establish a balanced travel surface utilizing native soil and materials available onsite or from a nearby pad. Construction materials for access road improvements would consist of native borrow and subsoil accumulated on site. If additional fill or surfacing material is required, it would be imported from a predetermined borrow pit. Imported material would be weed-free and authorized.

The maximum road grade would be no greater than eight (8) percent, unless specified by the BLM or appropriate surface managing agency.

The proposed road would be crowned and ditched or sloped and dipped, and water turnouts installed as necessary to provide proper drainage. Relief culverts would be placed in the topographic low spots where water may converge and transverse grade encourages flow across the road. All culvert locations would be identified on the site-specific construction plats in the individual APD permit packages. Any additional need for water-control features such as diversions and/or silt traps would be determined during construction and/or interim reclamation. For example, at the late October 2018 onsite for the 2407 29E well pad, access road, and pipeline, the BLM-FFO directed LOGOS and Whiptail to rework storm water drainage significantly in one section encountered along the route of the access road and well-connect pipeline.

Upon interim reclamation, the typical newly constructed road would be reduced in size to a 14-foot wide running surface (if resource road designation is given) with barrow ditches on both sides and appropriately placed traffic pull out(s). All remaining disturbed areas within the 30-foot access road corridor would be fully reclaimed and reseeded in efforts to reduce erosion. If other road designations are given per anticipated size and quantity of traffic, the roads would be constructed and interim reclaimed per the Gold Book standards for its designation. At final abandonment, the access roads would be reclaimed as described in their individual Surface Reclamation Plans, submitted with the individual APD packages.

In clearing vegetation, trees that measure less than 3 inches in diameter (at ground level) and slash/brush along the proposed access roads would be chipped or mulched and incorporated into topsoil as additional organic matter. Trees 3 inches in diameter or greater (at ground level) within the pad area and along the proposed access roads would be cut at ground level and de-limbed. Tree trunks (left whole) and cut limbs would be delivered to nearby Navajo Chapter Houses. The subsurface portion of trees (tree stumps) would be disposed of appropriately. Topsoil removal, storage, and protection would be described in further detail in the individual Surface Reclamation Plans.

No construction or routine maintenance activities would be performed during periods when the soil is too wet to adequately support construction equipment. If equipment creates ruts deeper than 6 inches,

the soil would be deemed too wet for construction or maintenance. BMPs for dust abatement and erosion control would be utilized along the roads to reduce fugitive dust for the life of the project. The access road would be maintained as outlined in the Road Maintenance Plan included in the Master Surface Use Plan of Operations (Appendix B). Water application using a rear-spraying truck or other suitable means, would be the primary method of dust suppression along the roads. Any additional erosion-control practices, such as the application of magnesium chloride, organic-based compounds, or polymer compounds to the road, would be included in the COAs attached to the approved APDs and or stipulations in the ROW Grants. At final abandonment, the access roads would be reclaimed as described in the individual Surface Reclamation Plans. All LOGOS approved locations may be utilized as staging areas for equipment and vehicles during construction of the pads, access roads, or well-connect pipelines.

3.1.3 Well-Connect Pipelines

Well-connect pipelines would typically be constructed according to Whiptail's standard practices for the area, namely construction of one trench approximately four feet deep and four feet wide and installation of three separate pipelines approximately one foot apart from each other. These pipelines would be a steel natural gas pipeline up to 16 inches in diameter, a steel oil pipeline up to 10 inches in diameter, and a flexible poly water pipeline up to 6 inches in diameter. Trenches could be narrower than four feet wide if construction space is constricted by surface obstacles such as cultural sites. All surface disturbance would be reclaimed except as needed for ancillary facilities, and standard industry pipeline markers would be installed following construction.

Whiptail would be responsible for ensuring that well-connect pipeline construction follows the permitted corridor. Prior to construction, Whiptail would mark the exterior boundaries of the proposed pipeline corridors with stakes and/or lath at 100 to 200-foot intervals. The stakes and/or laths would be flagged in a distinctive color. The survey station numbers would be marked on the boundary stakes and/or laths at the entrance to and the exit from BLM lands. Whiptail would maintain all boundary stakes and/or laths in place until final cleanup and restoration is completed and approved by the Authorized Officer (AO).

Whiptail recommends being allowed to close Road 377 in sections of approximately 1 mile in length at a time to keep unrelated traffic away from the pipeline construction zone and to give construction workers and equipment sufficient room to construct the pipeline safely and efficiently.

The proposed well-connect pipeline corridors would be cleared of vegetation in the same manner as that described for the well pads. Topsoil would be stripped and stored as a windrow along one side of the trench with subsoil horizons piled separately on the opposite side. Either type of soil might be stored elsewhere if space is not available immediately alongside the trench due to surface obstacles. Whiptail would excavate a trench within the permitted pipeline corridor, off-setting any other pipeline by 5 feet if possible, using a trencher, excavator, or backhoe. The bottom of the trenches would be dug to a depth of 4 feet with a minimum trench width of 36 inches. Pipe would be strung alongside the trenches on stands adjacent to the trench. Pipe would be bent for horizontal or vertical angles in the alignment, and pipe segments would be welded together. After welding, the pipe and welds would be inspected and the joints coated. Then the pipe would be lowered into the trench using a side-boom tractor or excavator with pipe handling attachment.

At this time, Whiptail plans to install three lines in the trunk line trench: two welded steel lines for natural gas and hydrocarbon liquids and third for water made of continuous roll poly pipe. A cathodic

protection line, and possibly fiber optic or electric power lines would also be placed in the trench. Soft plugs would be placed within the trenches every ¼ mile. The time required to construct a section of pipe would depend largely on the time required for digging the trench. If the trench encounters durable bedrock, trenching alone could be the limiting factor on the completion of pipeline construction.

Fine soil would be sifted from the excavated subsoil to provide rock-free padding and bedding for pipelines in the trenches. Material would be brought in from an approved site if necessary, to supplement local rock excavated from the trench. Backfilling of soils would begin after a section of pipe has been successfully placed in the trench and final inspection has been completed. Backfilling operations would be performed within a reasonable amount of time to ensure that the trenches are not left open for more than 24 hours. If a trench were to be left open overnight, it would be temporarily fenced or a night watchman would be utilized. The excavated soils would be returned to the trenches, atop the pipe, and compacted to prevent subsidence. The trenches would be compacted after approximately 2 feet of fill is placed over the pipe and again after the ground surface has been leveled. Once the pipelines are installed, the pipeline corridor would be reclaimed to pre-construction contours, topsoil would be replaced, and the area would be reseeded. Prior to the pipelines being placed in service, the pipes would be pressure tested using fresh water.

Special construction methods would be used where the pipeline is installed in the road and wash crossings. First, pipeline trenches may be deeper than the standard four feet to ensure safety and protection of the pipelines. Where the pipeline is installed in a road, Whiptail would backfill in one-foot thick layers rather than every two feet, compacting each layer separately before adding the next so as to develop a stable road surface and prevent a low trench from forming as backfill material settles over time.

Sediment- and/or erosion-control features would be installed in the construction areas as necessary. Additional resource protection design features and mitigation associated with construction are listed in Section 13 of the Master Surface Use Plan of Operations (Appendix B). COAs attached to the approved APDs and/or ROW Grant stipulations would specify any site-specific requirements. Where appropriate and applicable, earthen berms would be constructed at the intersection of pipeline corridors with existing roads. The berms would be a minimum of 4 feet high with a 1-foot cut at the base facing away from the corridors (towards the direction of potential traffic).

Following construction, pipeline markers would be installed along the well-connect pipeline corridors within the line of sight. These markers would not create safety hazards. Within 90 days of installation, aboveground structures not subject to safety hazard identification would be painted the BLM designated color (determined at the on-site for each location) to blend with the natural color of the landscape and reduce visual resource impacts. At onsites held in October 2018 for the staked projects included in this MDP (Appendix C), BLM-FFO specified Juniper Green paint for facilities. Where necessary, contrasting safety paint would be used to highlight areas that may be potentially hazardous.

Prior to the well-connect pipelines being placed in service, cathodic protection would be installed. Cathodic protection is an integral part of maintaining the integrity of pipelines, wellbores, and other sub-grade metallic structures. It is accomplished by installing anode beds in the pipeline corridor to take on corrosion which otherwise might attack the subgrade metallic structures. Anode beds consist of a sacrificial metal (anode), a rectifier, and cabling. The sacrificial metal is more easily corroded than the metal in the pipelines. The rectifier and cabling provide electrical current to structure the electric field in the subsurface so that corrosion occurs at the more easily corroded anode beds rather than in the

pipelines, which become cathodes in the system. Cathodic protection facilities would remain in place for the life of the proposed pipelines and wells. Upon final reclamation of the pipelines and wells, the decommissioning of the anode bed would be completed in accordance with all State, Federal and local regulatory requirements.

3.2 Drilling and Completion

Production results from the initial wells would be used to plan future drilling programs. Fewer wells may be drilled than are proposed because of geologic and market uncertainties or changes in drilling and completion methods.

Drilling operations would be conducted in compliance with Federal Oil and Gas Onshore Orders and all applicable NMOCD rules and regulations. A mobile drilling rig (“rig”) and other equipment would be transported to the location, where components would be assembled and the rig derrick erected. Other facilities and equipment that would be on the drilling site include: pipe racks, catwalk, hopper, rig personnel camper trailers, closed loop mud system, and personnel vehicles.

Drilling would begin, continuing through any fresh water bearing formations, then halt. A “shoe” (i.e. a seal) would be landed at the bottom of the hole, a surface pipe (“surface casing”) would be installed from the surface down to the shoe. Cement would be circulated between the rough wall of the well bore and the casing pipe (“annulus”). The casing would be pressure-tested to ensure that a seal has been created. After the cement is sufficiently cured, drilling would resume and continue until reaching the production zone or other identified “target” formation. An intermediate casing would be installed and cemented in place through most or all of the open hole section just drilled in order to seal off any zones that may present problems in drilling deeper portions of the well and to maintain the integrity of the hole. Drilling would resume, entering and continuing horizontally through the target formation to the bottom hole location. A production casing or “production liner” (shortened string of casing that suspends from the intermediate casing) would typically then be landed and cemented in place. Casings prevent interzonal interaction between fluids from different geologic strata, particularly oil and gas bearing zones and usable water zones, and help to maintain the integrity of the bore. Drilling operations would continue 24-hours a day until complete. Drill cuttings would be hauled from the location and disposed of at an approved facility.

Following drilling, the drilling rig is typically moved off the location, and a smaller completion rig is moved onto the location. Perforations would be shot through the production string across the zone of the target formation to provide entry points for the hydraulic fracturing fluids. If hydraulic fracturing is planned, then appropriate materials, tanks, and pumps would be moved to the location. The completion rig would connect to the perforated casing and begin fracturing the target formations through the perforations using pressurized water, nitrogen, other fluid additives, and sand or other solid proppant.

After completion, the fluids (water and fracturing fluids) would be removed from the well bore and a well head would be installed. Completion fluids would be allowed to flow back to the on-site tanks or staging area. Water recovered from the well after fracturing would be confined to storage tanks and transported to the temporary staging areas for storage and treatment so that it could be recycled by reuse in another well. These staging areas could include any LOGOS well location or the proposed Federal 2407 MDP Area Temporary Staging Areas.

Completion rigs would typically operate 24-hours a day. Drilling and completion activities may take approximately 30 days per well depending on the well and site-specific circumstances.

3.3 Production – Operation and Maintenance

Production facilities would be placed on the individual well locations or on a remote facility pad nearby. Facilities that may be employed may include, but are not limited to, production separators, fuel gas separators, sand traps per separator, free water knockouts, vapor recovery towers, vapor recovery units, slug catchers, JT fuel gas skids, chemical skids, pumps (recirc, charge, etc.), electric/automation buildings and equipment, capstone buildings and equipment, compressors, gas lift skids, cathodic protection equipment, 500 bbl oil tanks, 500 bbl produced water tanks, 750 bbl flash tanks, 120 bbl above grade pits, 40 bbl below grade pits, LACT equipment, gas measurement equipment, pipeline risers, and pipe manifolds. Various types of artificial lift equipment may be installed and utilized if necessary throughout the life of the wells. Any of the above listed pieces of production equipment could be installed and maintained throughout the life of the wells to assist in production and measurement of the product.

Telemetry equipment would be used to remotely monitor wells wherever topographically feasible. The use of telemetry would minimize traffic to and from the well locations in order to minimize impacts. A pumper truck would still be required to visit the well pads daily. The frequency of additional visits would be based upon information from the telemetry equipment.

Reportable spills or releases of oil, gas, or any other potentially hazardous substance would be reported immediately to the BLM and other responsible parties. Spills would be mitigated immediately; appropriate measures for cleanup would be implemented and spilled substances and clean up related materials would be removed for disposal at approved disposal sites.

Periodically, the workover or recompletion of a well may be required to ensure that efficient production is maintained. Workovers can include repairs to the well bore equipment (casing, tubing, rods, or pump), the wellhead, or the production facilities. These repairs would usually be completed during daylight hours. The frequency of this type of work cannot be accurately projected because workovers vary from well to well.

Operation facilities for the water supply and disposal wells would be contained within the permitted location for those wells. Facilities on location may include, but are not limited to, water storage tanks, water pumps, water piping and fittings, and filter stations. Some level of operations at the site would occur continuously as long as wells within the MDP Area are being drilled and completed. These locations would remain long-term during the life of the wells within this MDP Area so that they could be used during production operations or future drilling and completion operations, if permitted.

3.4 Reclamation

Reclamation plans would be prepared to meet the requirements and guidelines of the BLM-FFO Bare Soil Reclamation Procedures and Onshore Oil and Gas Order No. 1. A site-specific Reclamation Plan would be provided for each proposed project during the APD and or ROW Grant submittal.

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

Reclamation would commence as soon as practical after construction. This would include monitoring to ensure revegetation is effective in accordance with the BLM-FFO Bare Soil Reclamation Procedures

Table 1 lists the development areas considered in this MDP and shows how much of the surface disturbance is assumed to have interim reclamation, reseeding, or long-term use.

3.4.1 Interim Reclamation

If the proposed wells prove to be productive, interim reclamation will be completed to reduce the area of long-term disturbance. During interim reclamation, some portions of the proposed areas would be fully reclaimed (re-contoured and reseeded) and some portions would only be reseeded. The driving and working areas needed for production operations would remain disturbed throughout the life of the proposed wells on each pad.

After completion of wells, a standard 16-foot-wide driving surface looping around the well heads and providing access to the facilities area (~0.52 acres) and the facilities area itself (~0.69 acres) would remain un-reclaimed on each well pad for the life of the wells (~1.21 acres). A working area including the center of the loop of road and a level surface surrounding the well heads (~1.99 acres) would not be re-contoured; however, these working areas would be reseeded. The remainder of the well pad and construction buffer zone (~5.06 acres) would be re-contoured and reseeded. The reclamation estimates presented here are based on LOGOS's typical five-well well pad without taking into account any cut or fill estimates. Individual well pads would likely vary from these standard assumed estimates.

During interim reclamation, approximately 15 feet of the 30-foot wide access road disturbance corridors would be fully reclaimed assuming Resource Road designation is given A 14-foot wide running surface and the bottoms of the bar ditches along either side would remain unreclaimed for the life of the project and only be fully reclaimed at the end of the project.

Interim reclamation would be initiated according to BLM requirements and consultations. If drilling is delayed after a well pad has been constructed, LOGOS would follow BLM requirements to address a site-stabilization plan. The BLM-FFO would be notified at least 48 hours prior to the start of interim reclamation activities. Interim reclamation could occur simultaneously with production. Details of the interim reclamation process (including the seed mixture) would be provided in the individual Surface Reclamation Plans. During this phase, a bulldozer and a tractor with seeding capabilities would be used. Approximately four personnel would be required.

In areas that would be fully reclaimed, slopes would be re-contoured to pre-construction topographical contours, if possible. LOGOS would diminish the evidence of cuts, fills, and flat well pad surfaces. In areas that are to be fully reclaimed or reseeded, stockpiled topsoil would be redistributed and the surface would be ripped and seeded. Sediment and erosion control features (including water diversions, silt traps, and culverts) would be installed, as necessary. The BLM-FFO designated seed mixture would be used.

If bare ground vegetation treatment (trim-out) is desired around facility structures, LOGOS would submit a bare ground/trim-out design. The design would address vegetation safety concerns of LOGOS and BLM while minimizing impacts to interim reclamation efforts. The design must include structures to be treated and buffer distances of trim-out. Pesticide use for vegetation control around anchor structures would not occur. If pesticides are used for bare ground trim-out, the trim-out would not exceed 3 feet from the edge of any eligible permanent structure (i.e. well heads, fences, tanks). Additional distance/areas may be requested and must be approved by the FFO AO. Monitoring and reporting of reclamation success would be discussed in the individual Surface Reclamation Plans.

Table 1. Estimated Surface Disturbance from Well Pads, Access Roads, Well-Connect Pipelines, and Ancillary Facilities

Facility	Length	Width	Disturbed Acreage	Description of Acreage Following Post Construction Reclamation		
				Fully Reclaimed	Reseed Only	Long-term Disturbance
New Well Pads and Associated Facilities						
8 Foreseeable Well Pads	600 ft	600 ft	66.12 acres	20 acres	36.4 acres	9.68 acres
8 Foreseeable Access Road/Well-connect Pipelines	3960 ft (31,680 ft /6.0 mi)	50 ft	36.36 acres	25.45 acres	0 acres	10.91 acres
24 Foreseeable Access Road Pullouts (3 per Access)	100 ft each	20 ft	1.10 acres	0 acres	0 acres	1.10 acres
24 Foreseeable Temporary Use Areas (3 TUAs per pipeline/road)	150 ft each	35 ft	2.89 acres	2.89 acres	0 acres	0 acres
Sub Total	N/A	N/A	106.47 acres	48.35 acres	36.40 acres	21.69 acres
Whiptail's Potential Pipeline and Associated Facilities						
Dragonfly Trunk line (without bore length)	36456 ft	40 ft	33.48 acres	33.48 acres	0 acres	0 acres
Dragonfly Trunk line Boring TUAs 1 and 2, Including Transfer Station development			2.35 acres	0.78 acre	0 acres	1.57 acres
Trunkline TUAs 3-10			4.00 acres	4.00 acres	0 acres	0 acres
Dragonfly TUA (Potential Compressor Site)			4.13 acres	4.13 acres	0 acres	0 acres
Escrito Well-connect Pipeline Corridor (to an existing pad)	13,900 ft (13,900 ft /2.6 mi)	40 ft	12.76 acres	12.76 acres	0 acres	0 acres
4 Foreseeable Escrito well-connect TUAs	825 ft	50 ft	3.79 acres	3.79 acres	0 acres	0 acres
Foreseeable well-connect pipelines	26,400 ft	40 ft	24.24 acres	24.24 acres	0 acres	0 acres

Facility	Length	Width	Disturbed Acreage	Description of Acreage Following Post Construction Reclamation		
				Fully Reclaimed	Reseed Only	Long-term Disturbance
(for other operators in 2407-MDP Area)						
Foreseeable well-connect pipeline TUAs	850 ft	25 ft	2.44 acres	2.44 acres	0 acres	0 acres
Sub Total			87.19 acres	81.49 acres	0 acres	5.70 acres
Water Containment Pads, modeled with tanks, and Associated Facilities						
2 Foreseeable Pad	500 ft	500 ft	11.48 acres	11.48 acres	0 acres	0 acres
2 Foreseeable Access/Pipeline Corridor	500 ft (1,000 ft /0.19 mi)	50 ft	1.15 acres	.80 acre	0 acres	0.34 acre
Foreseeable Temporary Use Area – all Facilities	5280 ft (1 mi)	20 ft	2.42 acre	2.42 acre	0 acres	0 acres
Sub Total			15.05 acres	14.70 acres	0 acres	0.34 acres
Remote Facility Pads and Associated Facilities						
2 Foreseeable Pads	500 ft	500 ft	11.48 acres	4.08 acres	3.22 acres	4.18 acres
2 Foreseeable Access/Pipeline Corridors	1,500 ft (3,000 ft /0.57 mi)	50 ft	3.44 acres	2.41 acres	0 acres	1.03 acre
4 Foreseeable Access Pullouts (2 per Access)	100 ft	20 ft	0.18 acre	0 acres	0 acres	0.18 acre
Sub Total			15.11 acres	6.49 acres	3.22 acres	5.40 acres
Temporary Staging Areas and Associated Facilities						
2 Foreseeable Pads	500 ft	500 ft	11.48 acres	11.48 acres	0 acres	0 acres
2 Foreseeable Access Roads	500 ft (1,000 ft/ 0.19 mi)	30 ft	0.69 acre	0.69 acre	0 acres	0 acres
Sub Total			12.17 acres	12.17 acres	0 acres	0 acres
Project Total	6.95 mi Access		236.99 acres	163.20 acres	39.62 acres	33.14 acres

Facility	Length	Width	Disturbed Acreage	Description of Acreage Following Post Construction Reclamation		
				Fully Reclaimed	Reseed Only	Long-term Disturbance
	18.85 mi Pipeline					

Disturbance Calculations are based on the following assumptions:

- The average well pad should be 600 ft x 600 ft
- The average remote facility, and water containment pads are 500 x 500 (5.74 acres).
- There will not be a water supply well or disposal well in the MDP area.
- The average new well-connect pipeline for each foreseeable well pad is .75 mile in length, ALL paired with access road.
- The Escrito well-connect is an exception: it would be 13,900 ft in length and be 40' wide since the road is already constructed.
- The average pipeline paired with access road for each foreseeable water containment facility or temp staging area is 500' long, for remote facility is 1500' long.
- Three 100 ft x 20 ft Access Road Pullouts are assumed for each of the foreseeable well pads.
- One 100 ft x 20 ft Access Road Pullout is assumed for each of foreseeable remote facility.
- A total of 5280' of 20' wide TUAs is assumed as necessary for all the facilities.
- Plat measurements for TUAs were used for the trunk line, compressor station, and boring TUAs.
- Plat measurements were used for the 13C, 29E, 28M, and 28O well-connect pipelines.

Table 2. Existing Disturbance Utilized for Ancillary Facilities

Facility	Length	Width	Disturbed Acreage	Description of Acreage Following Post Construction Reclamation		
				Fully Reclaimed	Reseed Only	Long-term Disturbance
Communication Towers						
2 LOGOS Towers on Existing Disturbance	5 ft.	5 ft.	50 sq. ft. consolidated (0.001 acres)	0.001 acres	0 acres	0 acres
1 Whiptail Tower on Existing Disturbance	50 ft	50 ft	0.057 acre	0 acres	0.057 acre	0 acres
Project Total			0.058 acres	0.001 acres	0.057 acre	0 acres

Facility	Length	Width	Disturbed Acreage	Description of Acreage Following Post Construction Reclamation		
				Fully Reclaimed	Reseed Only	Long-term Disturbance
Disturbance Calculations are based on the following assumptions:						
<ul style="list-style-type: none"> The average LOGOS communication tower would be 5 ft. x 5 ft. (0.0005 acres) Whiptail wants a 50' x 50' space for their communication tower 						

3.4.2 Final Reclamation

The final reclamation phase would vary depending on the area but is estimated to take approximately two to three weeks per well pad or facility area. LOGOS and Whiptail would provide the managing agency with technical and environmental aspects of the final abandonment and reclamation procedures in advance of beginning these activities in accordance with agency regulations in effect at the time.

If one of the proposed wells proves to be unproductive, or when each of the proposed wells is no longer commercially viable, it would be plugged and abandoned. Downhole well abandonment would be carried out under then-current BLM-FFO and State regulations. Current plugging and abandonment regulations include placing cement plugs in the bore holes, removing the production facilities, and placing an aboveground marker over the plugged holes. The markers would contain individual well identification information. Final reclamation of the surface would be completed for areas no longer needed for production operations.

Details of the final reclamation process (including seed mixtures) would be provided in the site-specific Surface Reclamation Plans. The goal of final reclamation would be to return disturbed areas associated with the proposed project that are no longer needed to as close to pre-construction conditions as possible, by re-contouring and re-seeding to blend with the surrounding terrain. Portions of the proposed Area that were not fully reclaimed during interim reclamation would be cleared (if vegetated), re-contoured, covered with salvaged topsoil, and seeded. Sediment- and erosion-control measures would be implemented as necessary.

Any portion of the proposed pipeline corridors that would be disturbed to bare soil during the abandonment phase, such as the site of aboveground structures, would be fully reclaimed. If final abandonment activities disturb less than or equal to 0.1 acre to bare soil, the area(s) would be expected to revegetate naturally (no reclamation or monitoring activities would be required). If final abandonment activities disturb more than 0.1 acre to bare soil, final abandonment reclamation activities would be the same as described for interim reclamation. Monitoring and reporting would be discussed in the Surface Reclamation Plans.

3.5 Workforce and Traffic

The construction workforce is estimated to include up to 15 workers for well pad, access road, well-connect pipeline, and staging area construction; 16 workers during drilling; and up to 35 workers during well completion. Once the wells are drilled and completed, the operational workforce required to service the well pad would include one lease operator visiting each site daily, 7-days a week. A single lease operator can typically visit 40-45 well pads per day. In addition, one contract crew performing a variety of maintenance work would visit each site periodically throughout the year depending on

maintenance needed. Therefore, following completion of the last well on the final pad, the operational workforce during long-term production and maintenance is not expected to exceed 2-5 workers on a regular basis. LOGOS expects that approximately 50% of the construction, drilling and completion workforce would be local and all the operational workforce would be local.

Table 3 below illustrates the estimated truck traffic for each of the stages associated with oil and gas well operations. The proposed development would result in short-term increases in the volume of both heavy and light traffic during the construction, drilling and completion phases of the wells. The 2407-MDP area is rural, but travelers of the area specifically along County Roads 7997 and 377 could be impacted in the short-term by the construction of access roads and pads, drill-rig moves, and pipeline construction. These impacts would be reduced after well completion. It is anticipated that one to two pick-up trucks would visit each of the proposed well pads daily during the normal work week.

Table 3. Traffic Estimate for Construction, Drilling, Completion, and Production Operations

	Light-Duty Trucks/ Day	Heavy-Duty Trucks/ Day	Duration of Time
Construction			
Pad & Access Road	5	6	14 Days
Pipelines	8	1	60 Days
Staging Area	5	6	30 Days
Drilling			
One Well/Pad	12	3	10 Days
Five Wells/Pad	12	3	60 Days
Completions			
One Well/Pad	30	40	5 Days
Staging Area (Assumes One Well/Pad)	8	60	5 Days
Five Wells/Pad	30	50	17 Days
Staging Area (Assumes Five Wells/Pad)	8	100	17 Days
Production Operations			
Five Wells/Pad	1	0	Life of the Well
Total Maximum at one time:	38	150	

Appendix A. Glossary of Terms

Authorized Officer: The decision maker who has the delegated authority to for that decision.

Best Management Practices: A suite of techniques that guide, or may be applied to, management actions to aid in achieving desired outcomes.

Conditions of Approval: Conditions or requirements under which a decision is made.

Environmental Assessment: A concise public document that analyzes the environmental impacts of a proposed action and provides sufficient evidence to determine the level of significance of the impacts.

Impact: A modification of the existing environment caused by an action (such as construction or operation of facilities).

Minimize: To reduce the adverse impact of an operation to the lowest practical level.

Mitigation: Steps taken to: 1) avoid an impact; 2) minimize an impact; 3) rectify an impact; 4) reduce or eliminate an impact over time; or, 5) compensate for an impact.

Monitoring: The process of collecting and assessing data/information necessary to evaluate the effectiveness of a decision or its conditions of approval.

Permit: A revocable authorization to use public land for a specified purpose for a specified period of time.

Area: The area of land potentially affected by a proposed project.

Revegetation: Re-establishing desirable plants on areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation).

Utilization: The proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects).

A.1. List of Acronyms

The below table contains a list of acronyms and their meanings that are frequently used by the BLM and which may have been used in the writing of this document.

Table 8: Acronyms

Acronym	Meaning
AO	Authorized Officer
APD	Application for Permit to Drill

Acronym	Meaning
BLM	Bureau of Land Management
BMP	Best Management Practice
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
COA	Condition of Approval
FFO	Farmington Field Office
NMOCD	New Mexico Oil Conservation Division
NMSLO	New Mexico State Land Office
Onsite	Onsite Inspections per Onshore Order #1
2407-MDP	Federal 2407 MDP Area Master Development Plan
ROW	Right of way
SDA	Specially Designated Area
SUPO	Surface Use Plan of Operations

Appendix B. Master Surface Use Plan of Operations

The Master Surface Use Development Plan includes the following sections:

1. Existing Road
2. New or Reconstructed Roads
3. Wells within One Mile Radius Map
4. Existing and Proposed Production Facilities
5. Water
6. Construction Materials
7. Waste
8. Ancillary Facilities
9. Well Site
10. Plans for Surface Reclamation
11. Surface Ownership
12. Other Information
13. Site Specific Surveys and Special Design Features
 - Attachment A: Existing Wells Within 1-Mile Radius
 - Attachment B: Road Maintenance Plan

Appendix C: Plats for Whiptail

This Appendix includes the following plats:

- A) Plats for the Dragonfly Pipeline (Trunk line), from south to north
- B) Plats for the Dragonfly Compressor Site and 9 Temporary Use Areas
- C) Plats for the 2407-28M Well-connect pipeline route
- D) Plats for the 2407-28O Well-connect pipeline route
- E) Plats for the 2407-29E Well-connect pipeline route
- F) Plats for the 2408 13C Well-connect pipeline route

Appendix D: Plats for LOGOS Operation, LLC

- A) Plats for the 2407-28M Well Pad and Access Road
- B) Plats for the 2407-28O Well Pad and Access Road
- C) Plats for the 2407-29E Well Pad and Access Road
- D) Plats for the 2408 13C Well Pad and Access Road

Appendix E: Transportation Safety Management Plan

The transportation plan below outlines practices which LOGOS and Whiptail would employ to promote traffic safety for construction workers, wildlife, and the general public during construction in the MDP project area, particularly in 2019, when the first phase of development will result in large volumes of construction traffic accessing the MDP project area simultaneously.