CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

2.0 ALTERNATIVE DEVELOPMENT PROCESS

Warren is proposing to drill 120 shallow gas wells for both technical and economic reasons. Of the 120 wells, 108 would be located on public lands managed by the BLM, 8 would be located on private lands, and 4 would be located on State of Wyoming lands. The 120 wells were determined by Warren to be the minimum number necessary to implement this project and to provide: (1) adequate surface area and geological coverage, (2) flexibility in the exploration program due to uncertainty in reservoir characteristics, and (3) an appropriate number of wells to evaluate project viability in a timely fashion. The proposed well count permits an examination of reservoir and geological properties, as well as characteristics that allow for production from a depth range of 1,000 feet to 6,500 feet. Additionally, 120 wells provides flexibility in repositioning a pod or group of wells in the event that the exploratory drilling attempts encounter poor quality reservoirs or indicate a need to drill future wells on denser spacing. The 120-well proposal also provides a sufficient number of wells to effectively dewater the target reservoirs.

The proposed gas development is based on a 160-acre well spacing pattern. In addition to well sites, other reasonable and necessary facilities (such as access roads, gas gathering and water disposal pipelines, electrical utilities, and compressors) would be developed to facilitate natural gas production in the Pacific Rim Shallow Gas Project Area (PRPA). The project would be developed over a 2- to 4-year period. The projected life-of-project is estimated to be between 10 and 20 years.

Based on the planning information provided by Warren, this EA addresses Warren's Proposed Action and the No Action Alternative.

2.1 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Horizontal or directional drilling might allow the clustering of surface facilities; however, this alternative has not been given further consideration for the following reasons:

- Economics. Horizontally drilled wells are estimated to cost 1.5 to 10 times as much as similar vertically drilled wells with no commensurate increase in production. This is due to the requirement of drilling as many laterals to develop the gas resource in a formation as there are coal seams. In addition, horizontal laterals would not be economical in thin coal seams because the cost of each lateral would exceed the return on ultimate gas recovery. In conventional drilling, thin coal seams will contribute to overall production; therefore maximizing recovery of the gas resource.

- Reservoir Issues. The science of coalbed methane gas wells does not warrant drilling horizontal wells for the purpose of intersecting naturally occurring vertical fractures. The coal seams of the Almond Coal formation contain several seams ranging in thickness from 1 to 10 feet. Some Almond coal seams may correlate between wells over long distances, but there are a high number of seams or riders that do not correlate from well to well. Thin or discontinuous target zones are poor prospects for horizontal drilling. In

addition, horizontal drilling technology requires precise control of target locations in three dimensions. Even the thickest coal seams in the project area are below the vertical resolution of current seismic technology and yield no target control for lateral drilling. Thus, without the knowledge of coal seams locations, directional or horizontal drilling will not produce the desired results.

2.2 PROPOSED ACTION

The Warren E & P, Inc. (Warren) Proposed Action consists of exploratory drilling with potential drilling, completing, and operating a maximum of 120 shallow gas wells and related production and water disposal facilities in the PRPA (Figure 2-1). This analysis assumes that all wells would be drilled and produced; although it is possible a lesser number of wells could actually be drilled and produced. If initial drilling attempts are unsuccessful or uneconomical, the possibility exists that Warren would abandon the proposal

2.2.1 Preconstruction Planning and Site Layout

- Warren would follow the procedures outlined below to obtain approval for proposed activities on BLM administered lands within the PRPA. Additional site-specific environmental analyses and resource information will be contained in the individual well Applications for Permit to Drill (APD) and/or Right-of-Way (ROW) applications when submitted to the BLM. Development activities proposed on private or State of Wyoming surface would be submitted to and approved by the Wyoming Oil and Gas Conservation Commission (WOGCC). The WOGCC permitting procedures require filing an APD with the WOGCC and obtaining a ROW from the surface owner. Warren bases this proposed activity on preliminary development plans previously submitted to the BLM in 2003.

  Prior to the start of construction activities, Warren would submit a Notice of Staking (NOS), APD, or ROW Application to the BLM with a map showing the specific location of the proposed activities, such as individual drill sites, pipeline corridors, access roads, or other facilities. The application would include site-specific plans where necessary to describe the proposed development (i.e., drilling plans with casing/cementing program; surface use plans with road and drill pad construction details; and site specific reclamation plans, etc.). Approval of all planned operations would be obtained in accordance with the authority prescribed in Onshore Oil and Gas Order No. 1 (Approval of Operations on Onshore Federal and Indian Oil and Gas Leases).

- The proposed facility would be staked by Warren and inspected by an interdisciplinary team and/or an official from the BLM to ensure consistency with the approved Green River Resource Management Plan (GRRMP), approved mitigation measures incorporated into the PRPA (FONSI/Decision Record), and plans provided by Warren in the APD or ROW Application. If or when required by the BLM for the proposed development, more detailed construction plans would be submitted by Warren. Such plans would address concerns that may exist regarding construction standards, required mitigation, or related matters. Negotiation of these plans between Warren and the BLM,

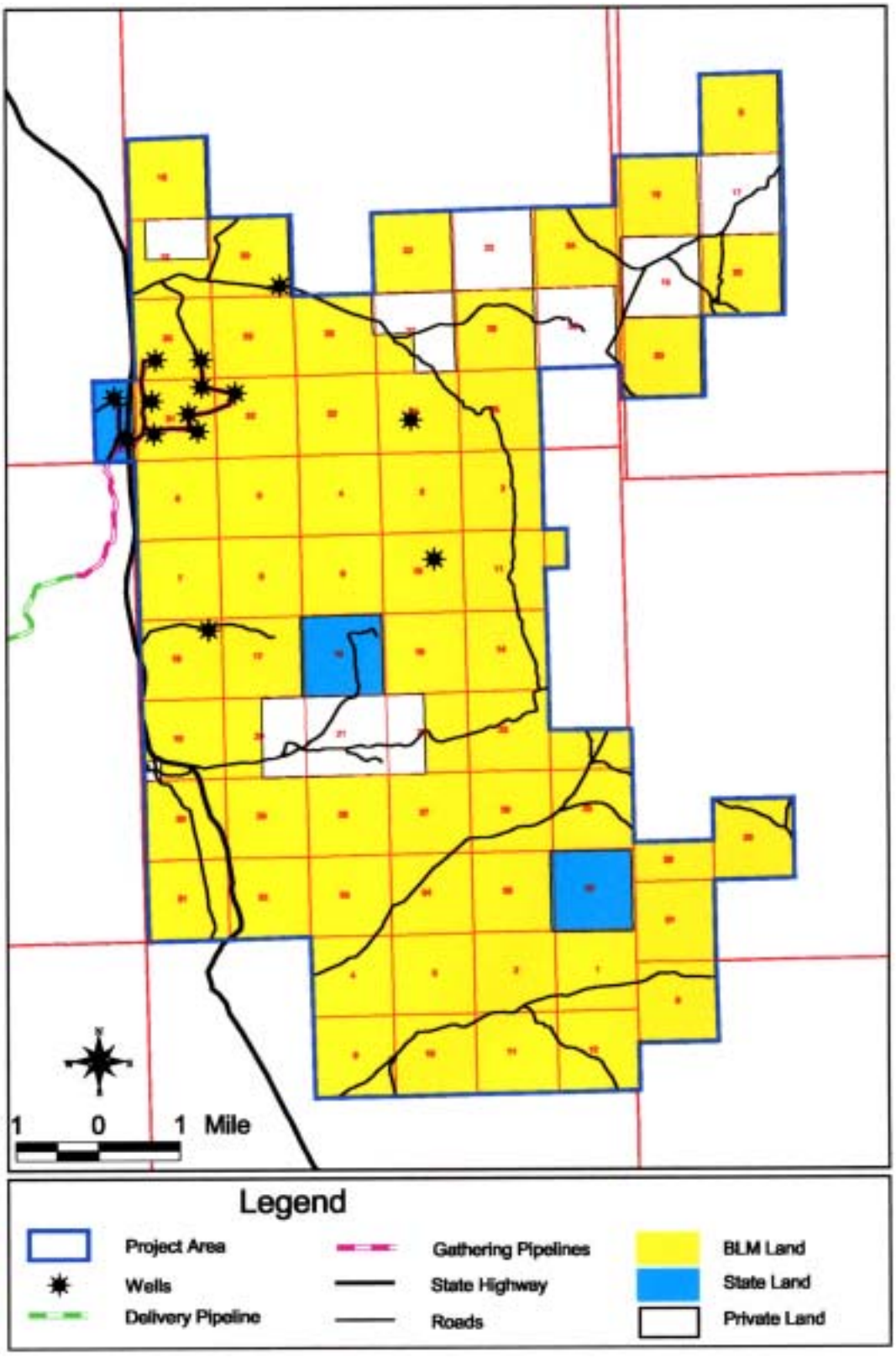


Figure 2-1. Pacific Rim Project Area Showing Surface Ownership.

if necessary to resolve differences, would be based on field inspection findings resulting from BLM on-site inspections.

- Warren and/or its contractors would make any necessary revisions to the APD or ROW Application based on negotiations with the BLM. The BLM would complete a project-specific environmental analysis that incorporates agreed upon construction and mitigation standards. The BLM would then approve the specific proposal and attach the Conditions of Approval to the permit. Warren would then commence the proposed activity within one year after the BLM's approval date.

A general discussion of proposed construction techniques to be used by Warren is set forth below. These construction techniques would apply to drill site, pipeline, and access road proposals within the PRPA, and may vary between the well sites.

2.2.2 Construction and Drilling Phase

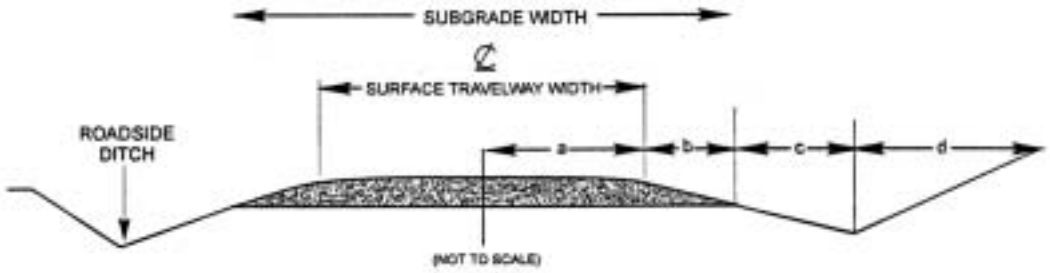
2.2.2.1 Road Construction

The primary roads utilized by Warren to access the PRPA would be Wyoming State Highway (WYO) 430, Sweetwater County Road (SCR) 19, SCR 24 and SCR 76. These existing improved roads represent approximately 40 percent of the access road network proposed for the PRPA. There would be no authorized use of unimproved roads to access wells. Where possible, existing 2-track trails intersecting or parallel to new access roads would be reclaimed in order to minimize or reduce surface disturbance. All roads leading to producing wells will be graveled.

Where required, Warren proposes to construct new access roads across public lands in accordance with Wyoming State Office (WSO) BLM Manual 9113 Supplement (see Figure 2-2). All roads leading to producing wells would be graveled. As stated in WSO BLM Manual 9113 Supplement, "Flat-bladed roads will not be authorized in Wyoming. In most cases, flat-bladed roads develop into canals and are a hazard to users as well as creating environmental resource damage, especially on sensitive soils." Roads would be located to minimize disturbances and maximize transportation efficiency, and would be closed and reclaimed by Warren when they are no longer required for production operations, unless otherwise directed by the BLM. Roads would be designed to minimize disturbance and would be built and maintained to provide safe operating conditions for the specific purpose of natural gas field development. Surface disturbance would be contained within the road right-of-way (ROW). Roads located on private lands would be constructed in accordance with standards imposed by the private landowner.

Development of the 120 wells would require the construction or reconstruction of approximately 35.64 miles of access roads and approximately 35.64 miles of gas and produced water gathering lines (facilities corridors). It is estimated that 32.1 miles of new roads would be built on federal land and 3.5 miles of roads or facilities corridors would be built on private and state land.

Well pad and access road construction would require a maximum of four workers for a period of approximately 4 days per location. These workers would include both heavy equipment operators engaged in road and well pad construction and truck drivers hauling heavy equipment to and from locations. Construction workers would likely be hired locally and contracted by Warren or its agents.



	Minimum Subgrade Width (ft.)	Minimum Surfaced Travelway Width (ft)	a (ft)	b (ft)	c (ft)	d (ft)	Approximate Disturbance Width (ft)	Total ROW Width (ft)	Design Speed (mph)
Resource Road	16	14	7	2	4	8	40	50	15-30
Local Road	24	20	10	2	4	8	48	55	20-50
Collector Road	28	24	12	2	4	8	52	60	30-50

DIAGRAM OF TYPICAL TURNOUTS ON RESOURCE ROADS (PLAN VIEW)

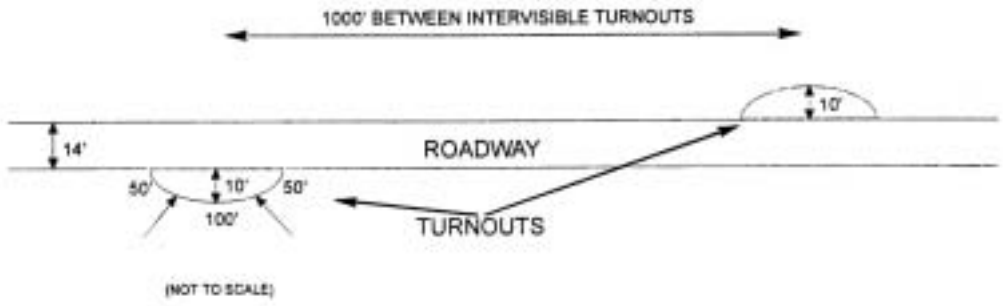


Figure 2-2. Typical Roadway Cross-Section with Width Specifications.

Topsoil on new road ROWs would be salvaged, spread on the backslope of the borrow ditch within road ROWs, and seeded to prevent erosion as necessary. Windrows of topsoil will not be left above the borrow ditch. Available topsoil (up to 12 inches) would be: (1) stripped from all road corridors prior to commencement of construction activities, (2) stockpiled, and (3) redistributed and reseed using authorized seedmix by BLM on backslope areas of the borrow ditch after completion of road construction activities. Borrow ditches would be reseeded in the first appropriate season after initial disturbance. If a well were determined to be unproductive, the entire road ROW would be recontoured and reclaimed within one (1) year of well plugging using stockpiled topsoil and appropriate seeding techniques. Any rocks that were encountered on the ROW prior to construction would be scattered over the ROW after reseeding. Disturbance areas associated with the Proposed Action and Alternatives are summarized in Table 2-1.

Table 2-1. Types and Approximate Acreage of Surface Disturbance on Federal Land – Proposed Action.

Proposed Action									
	Estimated Life-of-Project (LOP) Disturbance Area (acres)					Estimated Initial Disturbance Area (acres)			
Type of Disturbance	Federal	Private	State	Total		Federal	Private	State	Total
Number of Gas Wells	108	8	4	120		108	8	4	120
Number of disposal wells	10	0	0	10		10	0	0	10
Gas Well Pads[1]	21.6	1.6	.8	24		118.8	8.8	4.4	132
Disposal Well Pads[2]	9.2	0	0	9.2		12.4	0	0	12.4
Roads[3]	103.7	7.7	3.9	115.3		129.6	9.6	4.8	144
Compressors(5)	4.5	0	0	4.5		4.5	0	0	4.5
Gathering Pipelines [4]	0	0	0	0		129.6	9.6	4.8	144
Delivery Pipelines[5]	0	0	0	0		60.6	0	0	60.6
Total	**138.1**	**9.3**	**4.7**	**153.0**		**455.5**	**28**	**14**	**497.5**

[1]Assumes initial disturbance of approximately 1.1 acres for each well pad and LOP disturbance of 0.2 acre per well pad.
[2]Assumes initial disturbance of approximately 1.2 acres per well pad and LOP disturbance of 0.9 acres per well pad.
[3]Assumes an average of 0.33 mi of new roads with a 30-ft average disturbance width for each well. All disturbance except for the estimated 14-ft wide road travelway and adjacent ditches would be reclaimed for the LOP.
[4]Assumes an average of 0.33 mi of new gas gathering and water discharge lines with a 30-ft average disturbance width for each well. All disturbance will be reclaimed for the LOP.
[5]Assumes an average disturbance width of 50 ft. All disturbance will be reclaimed for the LOP.

2.2.2.2 Well Pad Design and Construction

The majority of the proposed gas wells would be drilled on lands administered by the BLM. A graded well pad would be constructed at each well site, and drilling operations should not disturb an area greater than approximately 180 feet by 270 feet at each well site.

Cut and fill construction techniques would be used within the well site area to level and clear the well pad of vegetation. (See Figure 2-3 for a typical CBM drill site layout).

A temporary reserve pit 55 feet wide, 10 feet deep, and 75 feet long would be excavated at each well and reclaimed after completion of operations. The reserve pits would be lined with an impermeable liner. Topsoil would be removed and stockpiled prior to excavating the pit as required by BLM. Warren estimates that reserve pits would be open for a period of approximately 2 to 8 weeks to allow for evaporation of pit fluids. During this time, the pits would be fenced on all sides to prohibit wildlife and livestock from falling into the pits.

In the event drilling is non-productive, all disturbed areas, including the well site and access road, would be reclaimed to the approximate land form that existed prior to construction. Reclamation would take place within one (1) year of plugging. Reclamation and site stabilization techniques would be applied as specified in the APD Surface Use Plan or the Right-of-Way Plan of Development (POD).

If drilling is productive, all access roads to the well site would remain in place for well servicing activities (i.e., maintenance, improvements, etc.). Partial reclamation would be completed on those segments of the well pad and access road that are no longer needed.

2.2.2.3 Drilling and Completion Operations

Following construction of the well pad and access road for a given well, a rotary drilling rig would be transported via truck to the well pad and erected on-site. Wells would be drilled to sandstone reservoirs and coal seams within the Almond Formation at depths of approximately 1,000 feet to 6,500 feet. The Almond Formation is presently proposed for initial exploration, but other sandstone and coal reservoirs may be explored. Gas produced would be from both coal seams (coalbed methane (CBM)) and adjacent sands. The CBM wells would be drilled through the Lance, Lewis Shale, Almond, and Ericson Formations, stopping at the top of the Rock Springs Formation. The Ft. Union may appear in the southern portion of the project area. Water for use in drilling the wells would be obtained from properly permitted sources near the project area, from wells previously drilled in the project area, or from a commercial source in Rock Springs, Wyoming. Water used to drill one well may also be reused for drilling subsequent wells. Approximately 4,500 barrels of water would be needed for drilling and completing each well; however, actual water volumes would be dependent upon the depth of the well and any losses that might occur during drilling and completion operations.

Well control systems would be designed to meet the conditions likely to be encountered in the hole and would be in conformance with Federal Onshore Order No. 2 and State of Wyoming requirements. A completed shallow gas well bore is shown on Figure 2-4.

Drilling and completion operations for a gas well normally require approximately 10 to 15 people at a time, including personnel for logging and cementing activities. Each well would be drilled,

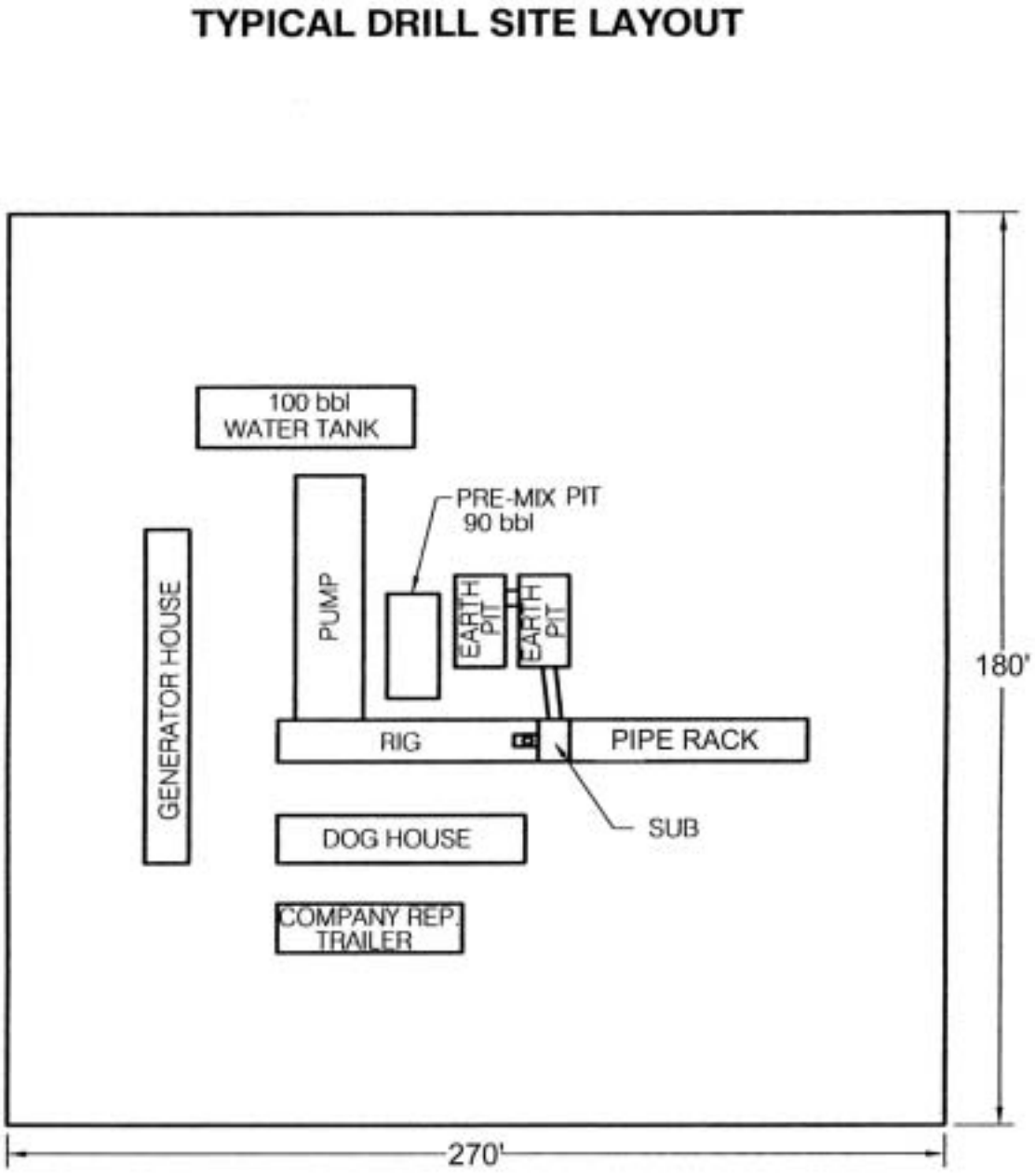


Figure 2-3. Typical CBM Drill Site Layout

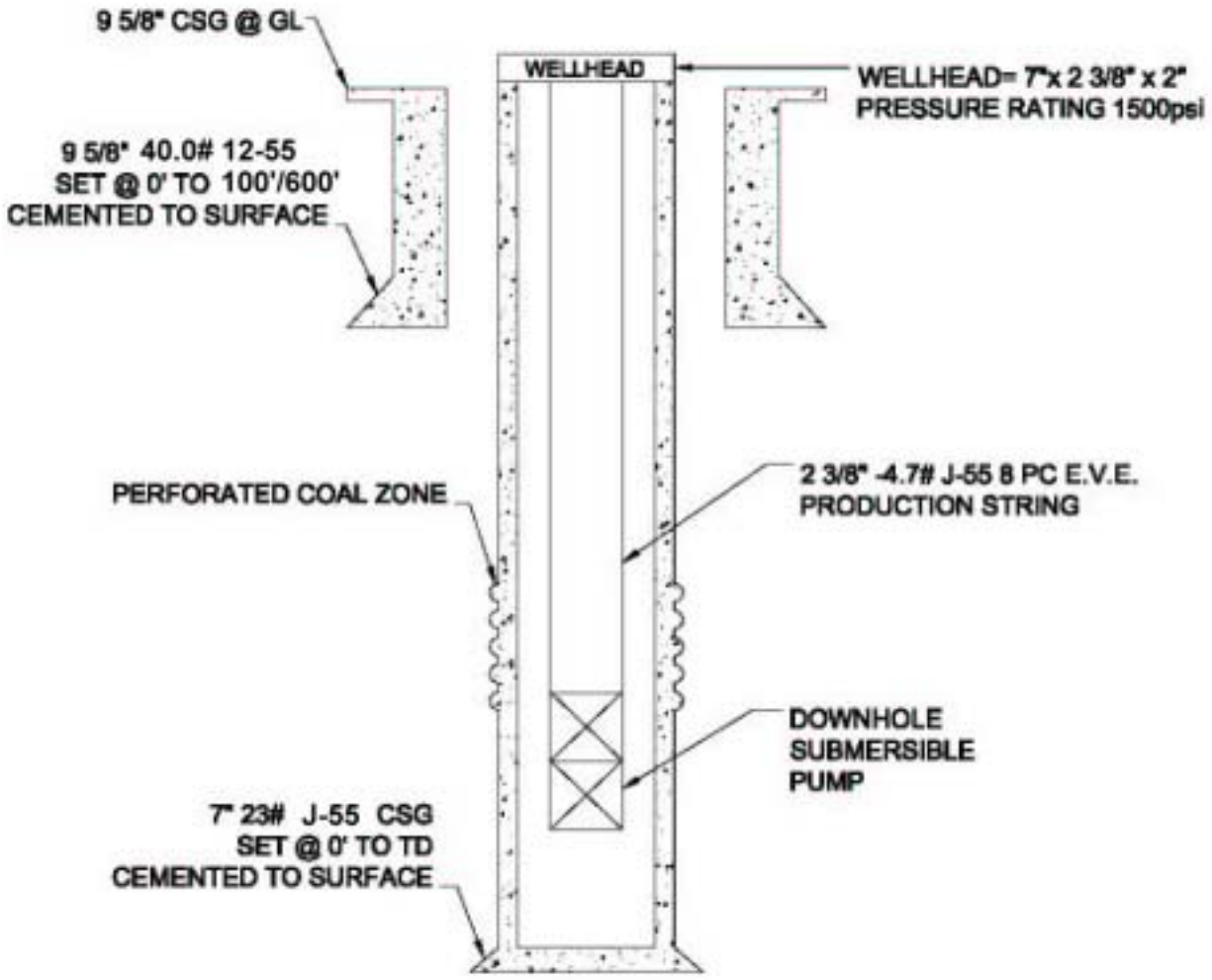


Figure 2-4. Typical Completed Shallow Gas Well Bore.

logged and cased within a period of 5 to 10 days. A well completion program may be initiated to stimulate production of gas and to determine gas and water production characteristics. Gas may be vented for a short period of time during testing to determine if a well is capable of production. Produced water will not be discharged onto surface areas within the project. Productive wells will be shut-in until pipelines and other production facilities can be constructed.

No abnormal temperatures, pressures, or hydrogen sulfide levels are anticipated to be encountered during drilling. Any shallow water zones encountered would be reported and adequately protected.

Drilling of disposal wells would be accomplished with the equipment and personnel used to drill the gas wells. Depths of the disposal wells are expected to range from 3,000 feet to 7,500 feet. Drilling and completion of a disposal well is expected to take approximately 12 to 15 days, and installation of surface equipment, holding tanks and pumping equipment would include an additional 14 days. A schematic of a typical injection well is shown on Figure 2-5.

Fresh-water aquifers would be protected by running casing into the open borehole and cementing the casing into place. Cementing would also isolate all other formations in the hole and will effectively eliminate the possibility of contamination between hydrocarbon zones, water aquifers and other mineral resources.

During drilling and subsequent operations, all equipment and vehicles will be confined to access roads, well locations and other areas specified in the approved APD's, except in emergency situations.

2.2.3 Well Production Facilities

Wellhead facilities would be installed if the gas wells are productive, and a weatherproof covering would be placed over the wellhead facilities. At this time, no additional facilities would be constructed at the well site for the separation of gas and water. A downhole pump would be utilized to produce water from the cased hole or perforated interval. Gas would flow to the surface using the space between the production casing and the water tubing. The long-term surface disturbance (10 to 20 years) at each productive well location would encompass approximately 0.2 acres. Well site production facilities will be fenced or otherwise removed from existing uses.

Pipeline trenches for well gathering lines are expected to temporarily disturb portions of a 30-foot wide corridor and would be reclaimed as soon as practical after construction is completed.

Trenches will be constructed along the access roads wherever feasible. Gathering lines would be buried in the trenches and will transport gas to compression facilities and produced water to disposal facilities.

At the conclusion of the project, roads, culverts, cattleguards, pipelines, stock watering facilities, or other structures may be left in place for any beneficial use designated by the BLM or surface owner. Water wells and produced water would be available for use by the BLM, so long as appropriations, diversions, and storage rights are properly filed with the Wyoming State Engineer's Office. All federally-owned surfaces that contain disturbed areas or facilities that are no longer needed would be reclaimed.

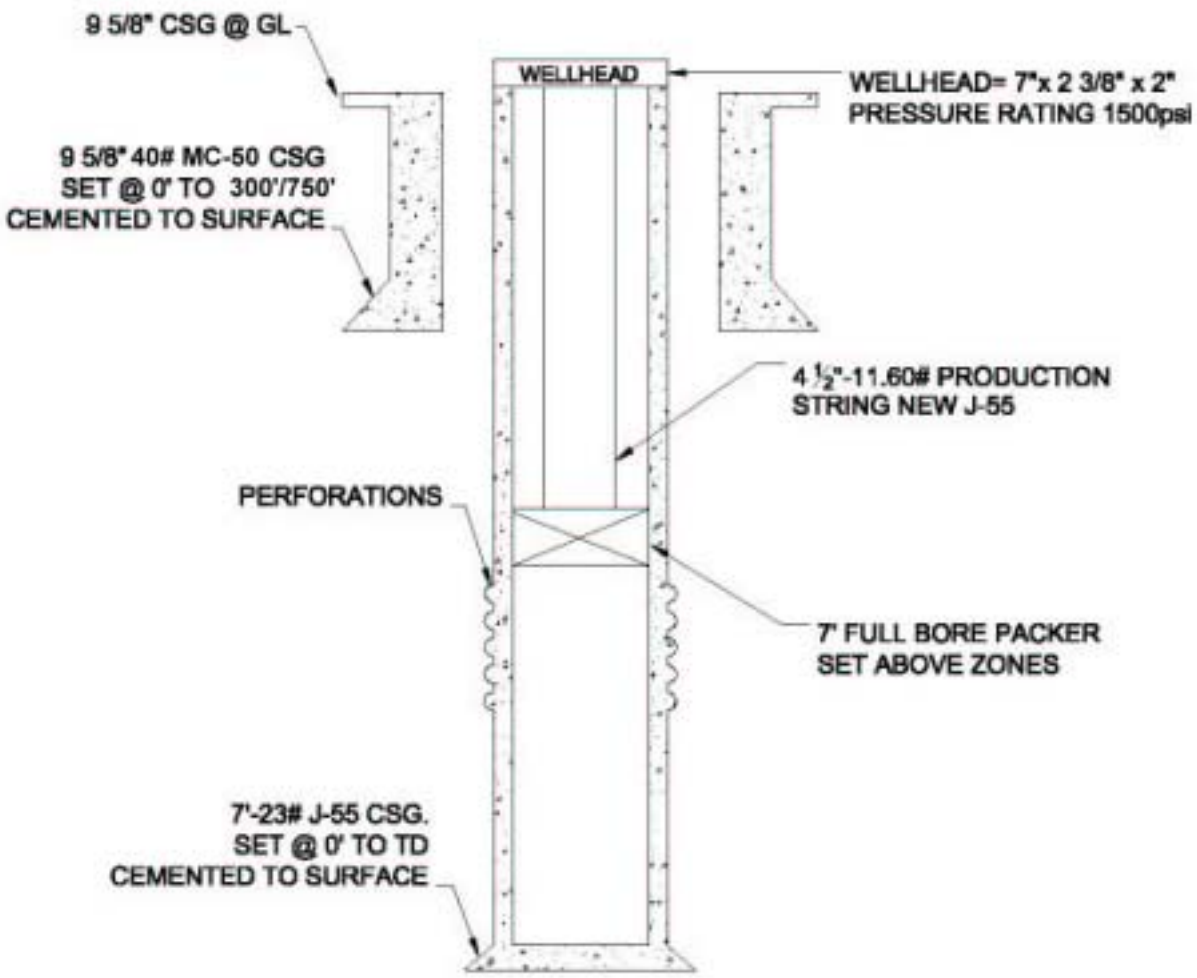


Figure 2-5. Typical Water Injection Well Bore

2.2.4 Electric Power Construction

Electricity would be used to power pumps during well development and to initiate and maintain production. Natural gas-fired generators would be used until electrical distribution lines are constructed. Temporary generators would be located on well sites or within compressor stations to minimize surface disturbance.

Permanent electricity would be supplied from an electric utility substation or high voltage line into the PRPA. The 15kV power line would be constructed overhead using standard overhead power line construction techniques in conformance with the National Electric Safety Code (NESC), the American National Standards Institute, and *Mitigation Collisions with Power Lines: The State of the Art in 1996* (Avian Power Line Interaction Committee 1996) or any future updated versions.

Removal of vegetation would be minimized for setting of poles. Prior to construction, all resource protocols would be satisfied. Holes for pole placement would be drilled by truck mounted auger. No water is necessary for drilling. Poles would be set using a truck mounted crane or other appropriate equipment. The footings of each pole would be backfilled with drill cuttings and tamped into place to prevent structure movement or settling. Final structure assembly and hardware placement would be completed using man-lift trucks. Guy wires may be installed on specific power poles and would be located within the approved ROW. Guy wires would be screwed into the ground in accordance with standard construction practices.

Following the assembly and erection of all power pole structures, conductor and ground wires would be installed. Wire installation would involve pulling a nylon rope (leader line) and then the conductor or ground wire through temporary pulleys installed on each insulator or ground wire bracket. An all-terrain vehicle (ATV) or light truck would be used to pull the leader line from pole to pole, and a winch would be used to pull the wires. Each reel would hold 2,000 feet to 3,000 feet of wire, and all wires would be spliced where required. Once each wire is correctly positioned, the final mounting hardware would be installed, and temporary installation pulleys would be removed. Man-lift trucks, hydraulic tension machines, and reel trailers would be used to suspend and mount the conductors and ground wires.

2.2.5 Pipeline Construction

Three types of pipelines, as described below, would be constructed as part of the proposed project:

1. Gas-gathering pipeline systems (low pressure, from wellhead through trunk line to compressor station).

2. Produced water-gathering pipeline systems (low pressure, from wellhead through trunk line to disposal facility).

3. Gas-delivery pipelines (high pressure, from compressor station to existing or newly constructed transmission pipelines).

Reclamation of pipeline corridors will occur as soon as possible after pipeline construction is completed.

2.2.5.1 Gas-Gathering Pipeline Systems

As part of the transportation system, gas-gathering pipelines and produced water-gathering pipelines would be constructed, placed together in the same trench or ditch (where practical), and buried below the frost line. Construction and installation of pipelines would occur immediately after the well is determined to be productive. Pipeline rights-of-way would typically follow the access road, except in a limited number of cases where topography dictates, or as required by the BLM. Gathering lines would transport gas to production facilities and produced water to disposal wells.

Gas-gathering lines are expected to disturb portions of 30-foot wide corridors and would transport gas from each well to a trunk line and then to a compressor station. Reclamation of the pipeline corridor will occur as soon as practical after pipeline construction is completed.

Gas-delivery pipelines would convey gas from the compressor station to an existing or newly constructed transmission pipeline. Gas-delivery pipelines would be co-located with existing roads where feasible. Disturbance related to the delivery lines is expected to be confined to areas not wider than 50 feet. Production must be established before potential gas-delivery pipeline rights-of-way can be identified for site-specific environmental analysis.

Development would be constrained by the gas production from the sandstone and coal reservoirs within the Almond Formation and by the pipeline capacity available to transport compressed gas to markets.

2.2.5.2 Gas-Delivery Pipelines and Compression

Produced natural gas under wellhead pressure would move through the low pressure gas gathering system to a compressor station. Typical gathering system line pressure is less than 50 pounds per square inch (psi). Gas arriving at the compressor station would be compressed to a greater line pressure in order to facilitate the transportation and introduction of the gas into an existing transmission pipeline.

Compression of the gas at a field compressor station would increase the pressure to an estimated 400 to 1,450 psi. Warren would evaluate compression needs as wells are drilled and completed and the project develops. A compressor station would have a pad size of approximately 200 feet by 200 feet and would occupy approximately 0.9 acres of surface area. Compressors would be housed within structures and muffled to minimize noise. A typical compressor station and meter facility is shown on Figure 2-6. Warren currently estimates that five (5) compressor stations would be necessary to transport field gas to interstate pipelines: each having a maximum of 2,300 horsepower(hp) of natural-gas fired engines driving the compressors. Thus, the total maximum horsepower for the proposed development would be 11,500 hp.

2.2.6 Water Production

Long-term water production data within the project area is currently not available. Short-term tests on recently drilled gas wells indicate that discharge rates will be highly variable due to the difference in depths of the producing zones and coal thicknesses. Until long-term testing can be conducted, an average life-of-project (LOP) discharge rate of 5 gallons per minute per well has

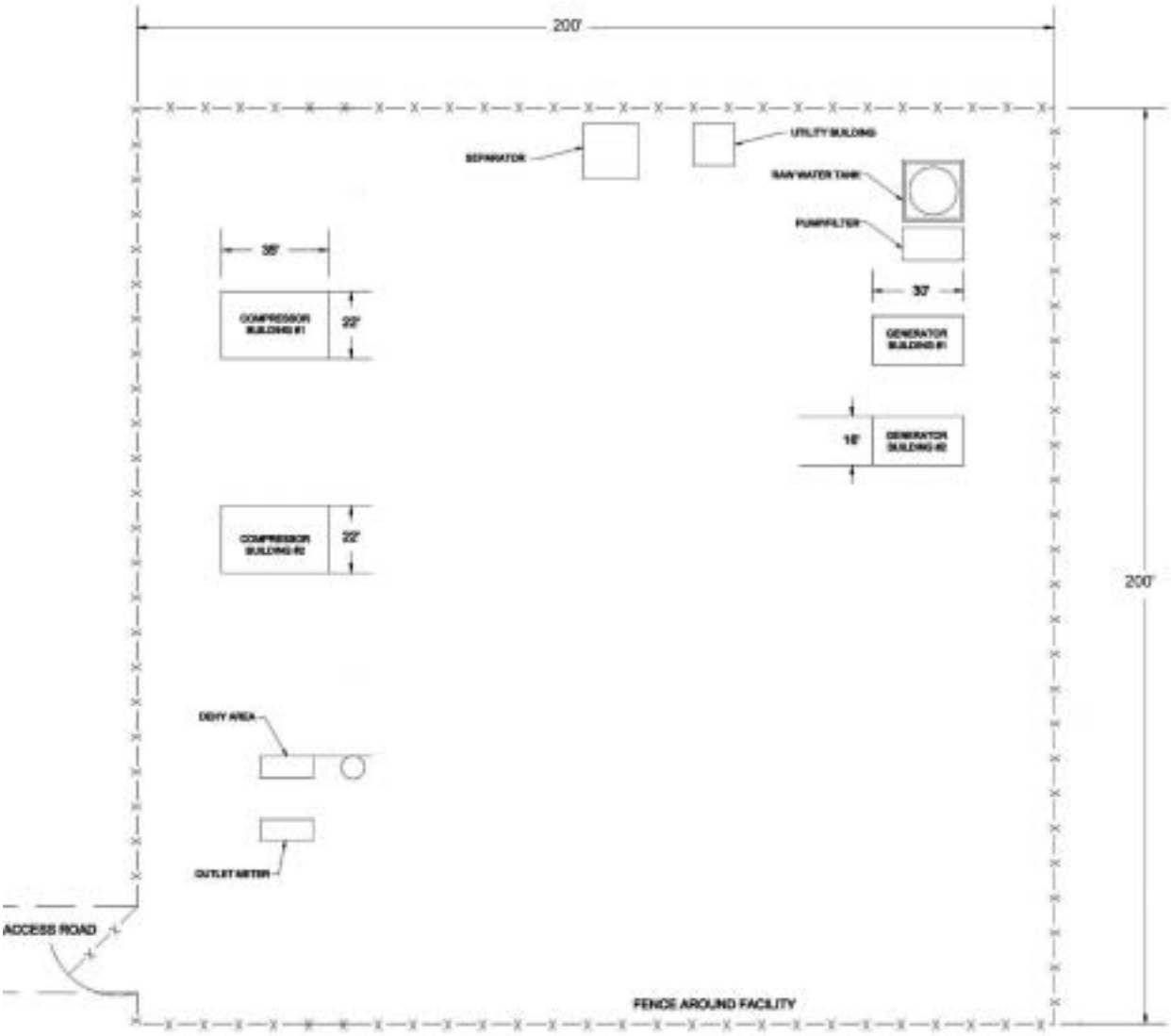


Figure 2-6. Typical Compressor Station and Meter Facility.

been assumed for this analysis. This discharge rate may vary within the project area and throughout the life of a well. Long-term average production through the life of the well is expected to be less, but in order to present a conservative analysis, the maximum rate was used for the life of the project. This rate is likely to vary from well to well; however, the maximum discharge rate should occur at the onset of production and then decline through the life of the well. Long-term average water production should not exceed an estimated 171 barrels of water per day per well.

2.2.6.1 Produced Water-Gathering System and Injection Facilities

Produced water from individual wells would be collected and re-injected in WDEQ/WQD approved and permitted disposal wells located in the project area. The water disposal wells would be drilled through the Lance, Lewis shale, Almond, Ericson, and Rock Springs Formations, stopping at the top of the Blair Formation. Water disposal would be via re-injection into the Rock Springs Formation. The water disposal formation may change if Warren does not get favorable results. All water disposal facilities would be new. The number of disposal wells would be dependent upon the ability of the designated injection zone to accept water and the amount of water produced by each gas well. Gathering lines for produced water would be constructed along the well access roads wherever feasible, and would run from the wellhead to disposal well locations. The water lines would be placed together and buried in the same trench or ditch used for gas gathering lines wherever practical in order to reduce surface disturbance. A typical water disposal facility is shown on Figure 2-7.

Transfer pumping stations would be utilized during production operations to transfer produced water from the gas well(s) to the disposal well. Transfer pumping stations would be needed in those areas where elevation differences require supplemental pumping to transfer the produced water. The location of the transfer pumping stations would be identified on the plan overview for each well. A typical transfer station would consist of two 400-barrel water tanks and a small centrifugal water pump. Each transfer station would be confined to a 125-foot by 125-foot area. A berm, approximately 3 feet tall, would be constructed around the perimeter of the transfer station area to contain any potential spills, and a small pump house would be constructed immediately outside the bermed area to house the centrifugal pump. A typical water transfer facility is shown on Figure 2-8.

As previously explained, no produced water will be discharged onto surface drainage areas within the project. The injection well method of water disposal eliminates the need for a federal water management plan, as is required in the Powder River Basin where surface discharge is the typical method of water disposal.

2.2.7 Ancillary Facilities

The Proposed Action would utilize any existing ancillary facility infrastructure within the PRPA where feasible, including access roads, water disposal facilities and gas gathering pipelines. Where existing facilities are not available, Warren would construct new ancillary facilities, which may include, but not be limited to (1) produced water disposal equipment, (2) individual well site compression, (3) individual well site liquids recovery units, (4) electrical power lines, (5) gas metering stations, (6) pipeline pigging facilities, (7) field storage buildings, and (8) cathodic protection facilities. The exact number and location of such ancillary facilities is unknown at this time.

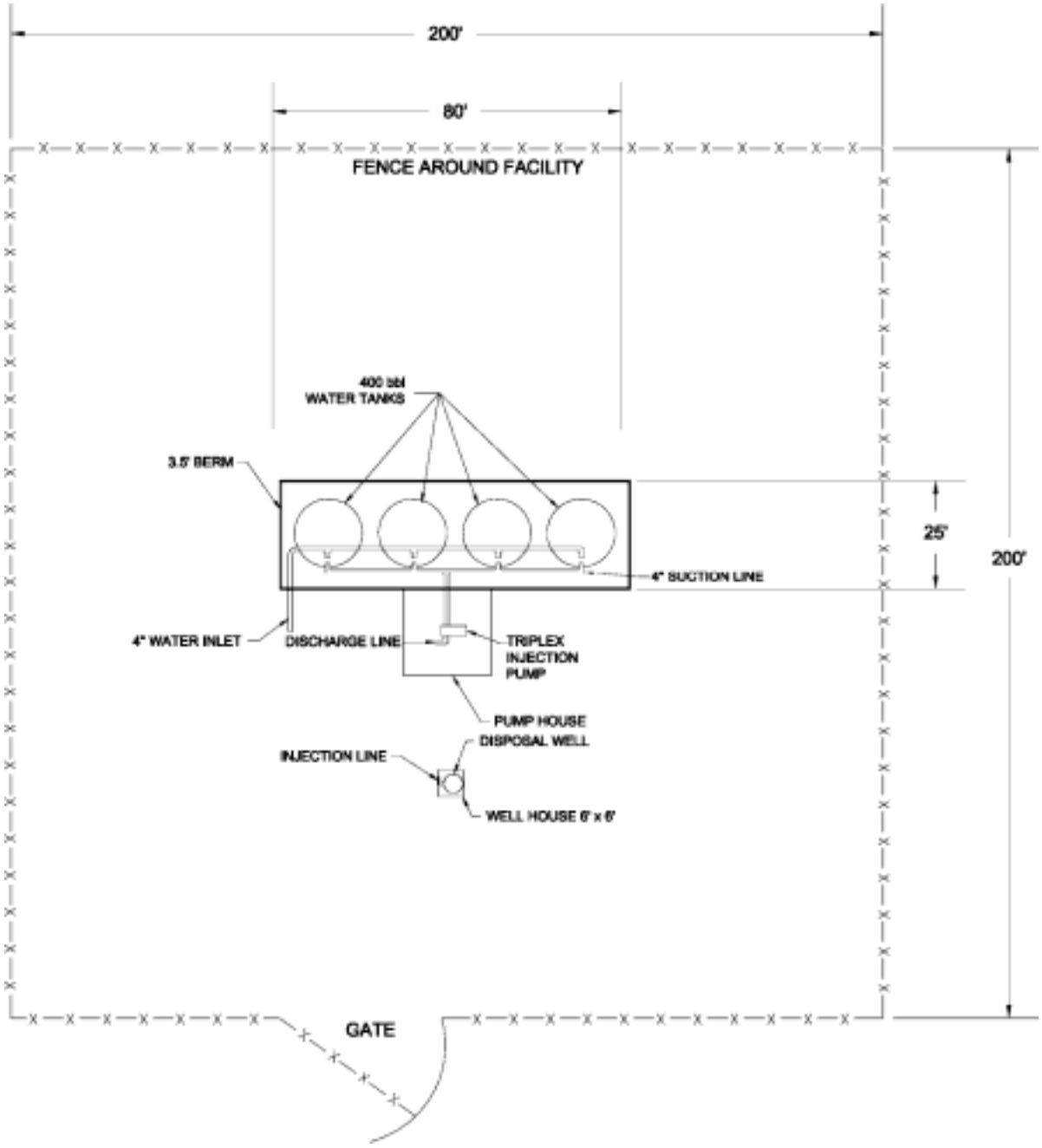


Figure 2-7. Typical Water Disposal Facility.

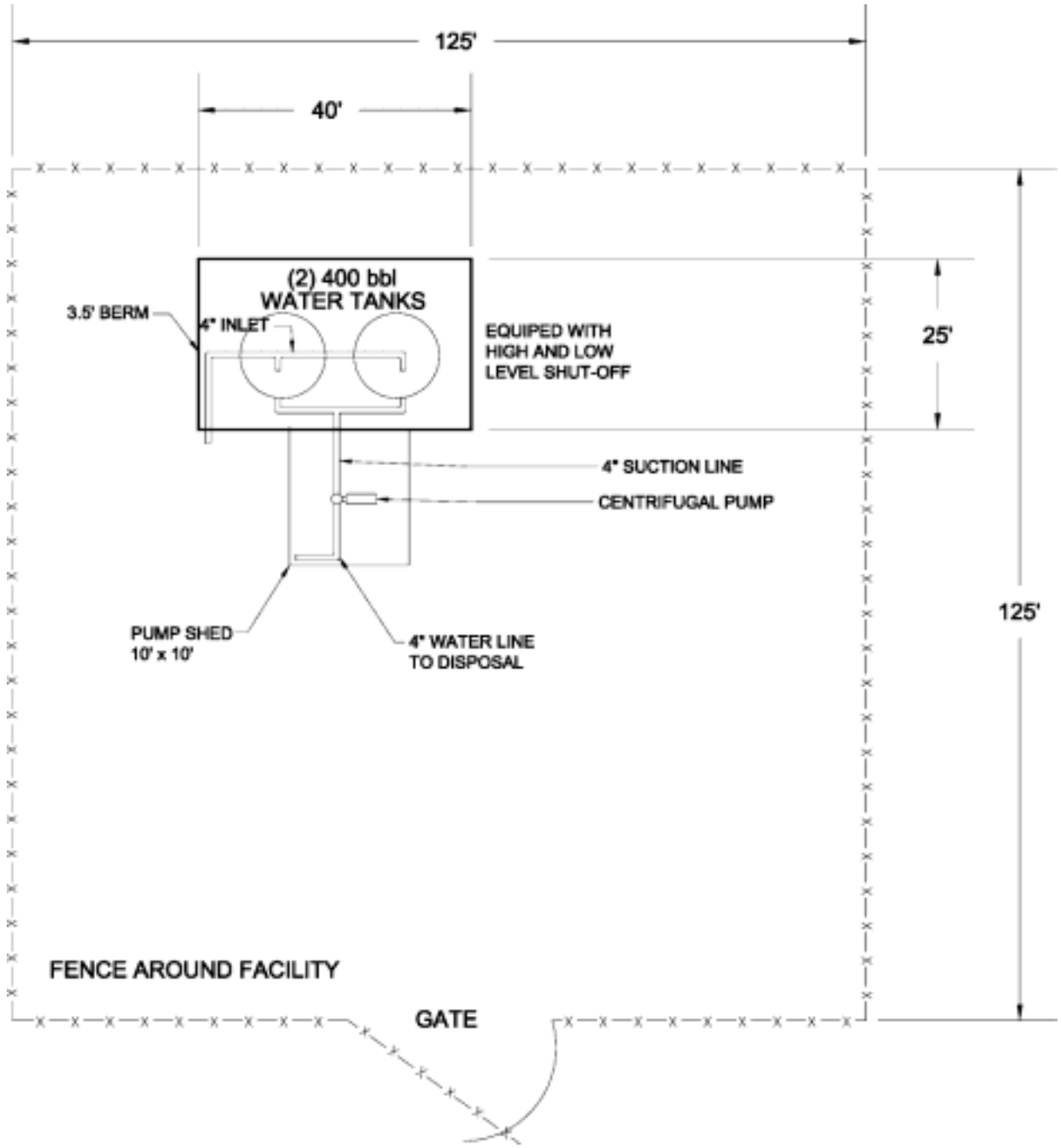


Figure 2-8. Typical Water Transfer Facility.

All wells, pipelines, and associated ancillary production facilities would be operated in a safe manner by Warren and in accordance with standard industry operating procedures. Routine maintenance of producing wells would be necessary to maximize performance and detect potential difficulties with gas production operations. Each well location would be monitored daily to ensure operations are proceeding in an efficient and safe manner, including, but not limited to: checking gauges, valves, fittings and other facilities. Routine equipment maintenance would be performed as necessary, and all roads and well locations would be regularly inspected and maintained to minimize erosion and assure safe operating conditions.

2.2.8 Geophysical Operations

No additional geophysical operations are currently planned in the project area by Warren.

2.2.9 Traffic Estimates and Work Force Loading Schedule

Estimated traffic requirements for drilling, completion, and field development operations are shown in Table 2-2. The TRIP TYPE column lists the various service and supply vehicles that would travel to and from well sites and production facilities. The ROUND TRIP FREQUENCY column lists the number of external trips (to and from the project area), and internal trips (within the project area). The figures provided in Table 2-2 should be considered general estimates. Drilling and production activity levels may vary over time due to weather and other factors.

2.2.10 Site Restoration and Abandonment

Reclamation would be conducted on all disturbed public lands in compliance with the BLM Wyoming Policy on Reclamation (USDI-BLM 1990). The short-term goal of the reclamation program is to stabilize disturbed areas as soon as possible after disturbance in order to protect sites and adjacent undisturbed areas from degradation. The long-term goal is to return the land to conditions approximating those that existed prior to disturbance.

Reclamation would occur during two phases of the proposed project. Initially, well pads and facilities corridors would be partially reclaimed after well testing and production and ancillary facilities are installed. This initial reclamation would reduce the amount of disturbed area to only that necessary for production operations. Final reclamation at the end of the LOP would involve reclamation of all remaining disturbed areas. In addition, all unproductive well sites and the ROWS to these sites would be reclaimed as soon as practical during the LOP.

2.2.10.1 Initial Reclamation

After installation of production equipment, the well pad needed for a producing well would be reduced from approximately 1.1 acres to approximately 0.2 acre. Drilling and other fluids contained in reserve pits would be evaporated and covered in place, as authorized by the BLM and/or WOGCC. If necessary, the material would be removed from pits and disposed of at an authorized location outside of the PRPA (e.g., existing lined evaporation ponds or injector wells). The unused portion of the pad would be recontoured and reseeded within 1 year.

The following procedures are proposed by Warren to assure that all disturbed areas are stabilized and that revegetation efforts are enhanced so that adverse impacts do not occur (USDI-BLM 1997, USDI-BLM 1999).

Table 2-2. Traffic Estimates per well

TRIP TYPE	ROUND TRIP FREQUENCY
Drilling	
Rig supervisor	1/day
Rig crews	2/day
Engineers(a)	1/week
Mechanics	3/week
Supply delivery(b)	1/week/project area
Water truck	1/day
Fuel trucks	1 every other day
Mud trucks(c)	1/week/project area
Rig move(d)	6 trucks
Drill bit/tool delivery	1/week
Completion	
Completion crew	1/day
Cement crew	2 trips/well
Consultant	1/day
Well loggers	3 trips/well
Gathering systems	2/day
Power systems	2/day
Compressor stations	2/day
Other field development	2/day
Testing and operations	2/day

Notes:

a. Engineers travel to project weekly and stay in a trailer during the week.
b. Current plans are to establish a central supply area and deliver supplies on a weekly basis.
c. Current plans are to establish a central mud location and deliver mud on a weekly basis.
d. Trucks are required to move each rig. Upon completion of drilling a well, each rig would move to the next well.

Scarification. Prior to reseeding, all compacted areas would be scarified by ripping or chiseling to loosen compacted soils. Scarification promotes water infiltration, better soil aeration and root penetration. Scarification would be done when soils are dry in order to promote shattering of compacted soil layers.

Seed Mixtures. Seed mixtures would be specified on a site-specific basis and their selection would be justified in terms of local vegetation and soil conditions. Livestock palatability and wildlife habitat needs would be given consideration in seed mix formulation. The recommended general seed mixtures shown in Table 2-3 were developed from observation of successful

revegetation projects in the Green River Basin region and observation of dominant species in the project area.

Table 2-3. Bureau of Land Management Recommended Seed Mixes for Disturbed Surface Land Areas in the RSFO Management Area.

Plant Species	Variety (if applicable)	Recommended Drill Seeding Rate (lbs/ac PLS)[A]
SALINE/SODIC SOILS		
Western wheatgrass	'Rosanna'	4.0
Sandberg bluegrass		2.0
Indian ricegrass		3.0
Bottlebrush squirreltail		1.0
Slender wheatgrass		3.0-4.0
Scarlet globemallow		1.0
Gardner saltbush		2.0
TOTAL		**17.0**
WETLAND/HIGH WATER SOILS		
Tufted hairgrass		2.0
Basin wildrye		5.0
Slough grass		6.0
Bluejoint reedgrass		3.0
Alkali sacaton		1.0
TOTAL		**17.0**
UPLAND SOILS		
Thickspike wheatgrass	'Critana'	4.0
Western wheatgrass	'Rosanna'	4.0
Indian ricegrass		4.0
Shadscale		1.0
Scarlet globemallow		1.0
Winterfat		2.0
Gardner saltbush		1.0
Sandberg bluegrass		2.0
Slender wheatgrass		3.0-4.0
TOTAL		**22.0-23.0**

[A] Pounds/acre Pure Live Seed. **(Source: USDI-PFO 1999 and Glennon 2003)**

Seedbed Preparation. Appropriate seed bed preparation is critical for seed establishment. Seedbed preparation would be conducted immediately prior to seeding to prepare a firm seedbed conducive to proper seed placement and moisture retention. Seedbed preparation would also be performed to break up surface crusts and to eliminate weeds that may have developed between final grading and seeding. In most cases, chiseling is sufficient because it leaves a surface smooth enough to accommodate a tractor-drawn drill seeder and rough enough to catch broadcast seed, as well as trap moisture and runoff. In low to moderate saline

soils, a firm, weed-free seedbed is recommended. With high salinity levels, particularly when a high water table is involved, a fallow condition may not provide the best seedbed. If existing vegetation and weeds are chemically eradicated, the remaining dessicated roots and stems improve moisture infiltration and percolation, reduce evaporation from the soil surface, and protect emerging seedlings (Majerus 1996).

BLM guidance for native seed use is BLM Manual 1745 (Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants). The Wyoming Game and Fish Department (WGFD) recommends that BLM consider shrub, forb, and grass species in seed mixtures. BLM would coordinate with the WGFD to insure that the correct shrub, forb, and grass species are incorporated into seed mixtures on public lands. Native species to be considered include bluebunch wheatgrass, streambank wheatgrass, bottlebrush squirreltail, needle-and-thread grass and Wyoming big sagebrush.

Fall seeding would occur from about September 15 until ground freeze or snow pack prevents critical seed soil coverage. The optimum time to seed a forage or cover crop in saline-alkaline soils is late fall (mid-October to December), or during a snow-free period during the winter (Majerus 1996). Ideally, in saline-alkaline soils, the seed should be in the ground before the spring season so that it can take advantage of the diluting effects of early spring moisture. Spring seeding would be completed by May 30 or as directed by the BLM. Seed would be used within 12 months of testing.

Seeding Method. Drill seeding would be used where the terrain is accessible by equipment. The planting depth for most forage species is 1/4 to 1/2 inch (5-10 mm). A double disk drill equipped with depth bands would ensure optimum seed placement. The seed would be separated by boxes to prevent seed from separating due to size and weight. Rice hulls or other appropriate material would be added to the seed as necessary to prevent separation. The drill would be properly calibrated so that seed is distributed according to the rates specified for each seed mix.

Although not anticipated to be common in the project area, broadcast seeding may also be used, especially in areas too steep for drill seeding, or where approved by the BLM. Broadcasted seed should occur onto a rough seedbed and then should be lightly harrowed, chained or raked to cover the seed. The seeding rate should be doubled for the recommended mixtures because the mixtures were developed for drill seeding. The method used to cover the seed should be carefully selected so that the seed is lightly covered and the surface is maintained in rough condition. The broadcast seeder should be properly calibrated or the seeding should occur over a calculated known area so that the proper seeding rate is applied.

Mulching. Where mulching is deemed necessary, a certified weed-free, straw or hay mulch would be crimped into the soil at an application rate of two to four tons per acre. Mulches would be applied by blowers, spreaders or by hand. The mulch would not be finely shredded during application, and mulch strand lengths would be long enough to be anchored by crimping. The mulch would be spread uniformly over the area so that 75 percent or more of the ground surface is covered. Mulch would be crimped to a depth of two to three inches.

2.2.10.2 Final Reclamation/Abandonment

During final reclamation and abandonment, Warren would obtain necessary authorizations from the BLM or private landowners to abandon facilities. Wells would be permanently or temporarily

plugged or shut-in until decisions are reached regarding future production options. Pipelines would be purged of all combustible products and retired in place or removed, based on authorizing agency or landowner specifications. All above ground facilities would be removed, and all unsalvageable materials would be disposed of at authorized sites. Roads would be reclaimed or left in place based on authorizing agency or landowner preference. Reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time the area is reclaimed. Regrading, topsoiling, and revegetation of disturbed lands would be completed. Abandoned ROWs would revert to the private landowner or appropriate agency control. Compacted areas would be thoroughly ripped to a depth of 12-18 inches before topsoil is replaced. A seed mix approved by the BLM or private landowner would be broadcast or drill seeded on these affected lands. The types and approximate acreage of surface disturbance on federal land for the Proposed Action are summarized in Table 2-1.

2.2.11 Applicant-committed Practices

2.2.11.1 Project-Wide Mitigation Measures and Procedures

Warren proposes to implement the following mitigation measures, procedures, and management requirements on public lands administered by the BLM to avoid land use impacts. On privately owned lands, the landowner would determine which measures would be applied, to what degree, and where. Warren would coordinate with the State of Wyoming concerning mitigation on state-owned lands. An exception to a mitigation measure and/or design feature may be approved on public land on a case-by-case basis when deemed appropriate by the BLM. An exception would be approved only after a thorough, site-specific analysis determined that the resource or land use for which the measure was put in place is not present or would not be significantly impacted.

2.2.11.1.1 Preconstruction Planning and Design Measures

- Warren and the BLM would make on-site interdisciplinary team inspections of each proposed and staked facility site (e.g., well sites), new access road, access road reconstruction area, and pipeline alignment projects so that site-specific recommendations and mitigation measures can be developed.

- New road construction and maintenance of existing roads in the PRPA would be accomplished in accordance with WSO BLM Manual 9113 Supplement, unless private landowners or the State of Wyoming specify otherwise.

- Warren would prepare and submit an APD for each drill site on federal leases to the BLM for approval prior to initiation of construction, and would be subject to additional environmental review. Prior to construction, Warren or its contractors would also submit Sundry Notices and/or ROW applications for pipelines and access road segments on federal leases. The APD would include a Surface Use Plan that would show the layout of the drill pad over the existing topography, dimensions of the pad, volumes and cross sections of cut and fill (when required), location and dimensions of reserve pit(s), and access road egress and ingress. The APD, Sundry Notice, and/or ROW application plan would also itemize project administration, time frame, and responsible parties.

- Construction activities would be slope–staked when required by the BLM for steep and/or unstable slopes and BLM approval would be received prior to start of construction.

2.2.11.2 Resource-Specific Requirements

Warren proposes to implement the following resource-specific mitigation measures, procedures, and management requirements on public lands managed by the BLM.

2.2.11.2.1 Range Resources/Other Land Uses/Invasive/Noxious Weed Monitoring and Management

Mitigation requirements listed under Soils, Vegetation and Wetlands, and Wildlife also apply to Range Resources and Other Land Uses.

- Warren would coordinate with the affected livestock operators to ensure that livestock control structures remain functional during drilling and production operations.

- The best known weed prevention measures, as outlined in Appendix 4 of Partners *Against Weeds: An Action Plan for the Bureau of Land Management,* would be incorporated in the mitigation requirements.

- Invasive/noxious weed management strategies would be incorporated into the preconstruction planning and design process for all surface disturbance activities, including road, pipeline, well pad and ancillary facility construction.

- Warren would inventory and remove existing invasive/noxious weed and/or seed sources that could be transported into relatively weed-free areas by passing vehicles.

- Muddy off-road equipment would be cleaned before moving into relatively weed-free areas.

- Warren would minimize removal of native vegetation during construction of roads, pipelines, well pads and ancillary facilities.

- Disturbed areas would be stabilized and vegetation reestablished on all bare ground using mixtures and treatment guidelines prescribed in the approved APD/ROW as soon as practical to minimize weed spread.

- Gravel, top soil and fill would be stored in relatively weed-free areas.

- Where possible, Warren would limit access to all disturbed sites that are not yet re-vegetated.

- Disturbed and re-vegetated sites would be monitored to ensure that desired species are thriving and invasive/noxious weeds are not present, and treated, reseeded and fertilized as necessary.

- Roads and other disturbed areas would be monitored throughout the life of the project

and for three years after reclamation to insure that invasive/noxious weeds are identified and eradicated.

- Warren would ensure that all invasive/noxious weed control measures adhere to standards in the Decision Record for the Rock Springs District Noxious Weed Control EA or applicable updated guidance.

- Warren would cooperate with the Sweetwater County Weed and Pest District to identify appropriate methods of weed control.

- Before treatment of invasive/noxious weeds, Warren would submit a Pesticide Use Proposal (PUP) to the BLM for approval, and ensure that all pesticides intended for use are on the BLM's approved label list for use on public lands (the label list is updated each year). The PUP(s) must be approved prior to any spraying. PUP's can be approved for up to a three year period.

- Warren would ensure that pesticide applicators are certified with an up to date Pesticide Applicator's License before performing spraying work.

- Pesticide Application Records would be submitted to the BLM RSFO each year. Treatments would comply with all federal and state regulations regarding use of pesticides, including those outlined in the following:

    - BLM Information Bulletin No. WY-98-106, *Weed Management Guidance*;
    - Instruction Memorandum No. WY-99-29, *Executive Order #13112 : Invasive Species*;
    - Washington Information Bulletin No. 99-110; *Submission of Pesticide Use Report*;
    - Information Bulletin No. WY-2000-25: *Annual Pesticide Use Report.*

2.2.11.2.2 Air Quality

- All BLM conducted or authorized activities (including natural gas development alternatives) must comply with applicable local, state, tribal and Federal air quality regulations and standards. Warren would adhere to all applicable ambient air quality standards, permit requirements (including preconstruction, testing, and operating permits), motorized equipment and other regulations, as required by the State of Wyoming, Department of Environmental Quality, Air Quality Division (WDEQ-AQD).

- Warren would not allow burning garbage or refuse at well locations or other facilities. Any other open burning would be conducted under the permitting provisions of Chapter 10, Section 2 of the Wyoming Air Quality Standards and Regulations.

- On Federal land, Warren would initiate immediate abatement of fugitive dust (by application of water, chemical dust suppressants, or other measures) when air quality, soil loss, or safety concerns are identified by the BLM or the WDEQ-AQD. These concerns include, but are not limited to, potential exceedances of applicable air quality standards. The BLM would approve the control measure, location, and application rates. If watering is the approved control measure, the operator must obtain the water from state-approved source(s).

- Warren would obtain the appropriate permits and/or follow state protocol for approval of all on-site temporary or permanent equipment used in association with this project from the WDEQ-AQD.

2.2.11.2.3 Transportation

- Existing and local roads would be used as collectors whenever possible. Standards for road design would be consistent with WSO BLM Manual 9113 Supplement. Newly constructed *Resource Roads*, spur roads that provide point access and connect to local or collector roads, would be crowned and ditched with a 14-foot wide travelway and a design speed of 30 mph.

- On Federal land, Warren would initiate immediate abatement of fugitive dust (by application of water, chemical dust suppressants, or other measures) when air quality, soil loss, or safety concerns are identified by the BLM or the WDEQ-AQD. The BLM would approve the control measure, location, and application rates. If watering is the approved control measure, the operator must obtain the water from state-approved source(s).

- Roads not required for routine operation and maintenance of producing wells and ancillary facilities would be permanently blocked, reclaimed, and revegetated.

- Areas with important resource values, steep slopes and fragile soils would be avoided where possible in planning for new roads.

2.2.11.2.4 Minerals/Paleontology

Mitigation measures presented in the Soils and Water Resources sections would avoid or minimize many of the potential impacts to the surface and mineral resources. Protection of subsurface mineral resources from adverse impacts would be provided by the BLM casing and cementing policy contained in Onshore Order No. 2.

Impacts to fossil resources can be reduced by the implementation of paleontologic resource mitigation measures. These measures include the following:

Field Survey. Detailed preconstruction field surveys should be conducted within the PRPA in areas where construction would disturb surface exposures or subsurface bedrock of the Green River, Wasatch, and Fort Union Formations. Field surveys would involve a visual examination of the formation by a BLM-approved paleontologist in areas of exposure, and would recommend additional mitigation, if necessary. A report of findings, including recommendations for further mitigation, or negative findings must be filed by the BLM-approved paleontologist and approved by the BLM before work can be authorized. After review of the paleontologist's report, the BLM will determine the need for any additional mitigation measures. These could include collection of specimens and monitoring of excavation.

Worker Instruction. Construction personnel would be instructed about the types of fossils they could encounter and the steps to take if they uncover fossils during construction. Workers would be informed that destruction, collection or excavation of vertebrate, scientifically-significant invertebrate or plant fossil materials from federal land without a federal permit is illegal, and that they and their company could face charges if they knowingly destroy or remove

fossils.

Discovery Contingency. Should fossil resources be uncovered during surface disturbance associated with the Proposed Action, authorized personnel should immediately notify the BLM and work should cease immediately in the area of the discovery until authorized by the BLM Authorized Officer (AO). A BLM-approved paleontologist may be needed to evaluate the fossil material. If fossil remains of significance are identified, then additional mitigation measures may be required. Additional mitigation could include avoidance, collection, identification, or monitoring, and may delay resumption of work.

If field surveys do not reveal significant fossils, no additional work for paleontology may be recommended in the areas surveyed.

2.2.11.2.5 Soils

Other mitigation measures listed herein would also apply to Soils. The primary mitigation activities concerning Soils are as follows:

- Reduce the area of disturbance to the absolute minimum necessary for construction and production operations, while providing for the safety of the operation.
- Where feasible, locate pipelines immediately adjacent to roads in order to avoid creating separate areas of disturbance and reduce the total area of disturbance.
- Avoid using frozen or saturated soils as construction material.
- ”Limiting disturbance on slopes greater than 25%.” (USDI-BLM, 1997, p. 159)
- Design cutslopes in a manner that would allow retention of topsoil, surface treatment such as mulch, and subsequent revegetation.
- Selectively strip and salvage topsoil or the best suitable medium for plant growth from all disturbed areas to a minimum depth of 6 inches on all well pads.
- Where possible, minimize disturbance to vegetated cuts and fills on existing roads that are improved.
- Install runoff and erosion control measures such as water bars, berms, and interceptor ditches if needed.
- Install culverts for ephemeral and intermittent drainage crossings. Design all drainage crossing structures to carry the 25- to 50-year discharge event, or as otherwise directed by the BLM.
- Implement minor routing variations during access road layout to avoid steep slopes adjacent to ephemeral or intermittent drainage channels. Disturbance would not encroach within 500 feet of perennial surface water and/or riparian areas and 100 feet of the thalweg in ephemeral channels. (See item 3 in Section 2.1.11.2.6 below).

- Include adequate drainage control devices and measures in the road design (e.g., road berms and drainage ditches, diversion ditches, cross drains, culverts, out-sloping, and energy dissipators) at sufficient intervals and intensities to adequately control and direct surface runoff above, below, and within the road environment to avoid erosive concentrated flows. In conjunction with surface runoff or drainage control measures, use erosion control devices and measures such as temporary barriers, ditch blocks, erosion stops, mattes, mulches, and vegetative covers. Implement a revegetation program as soon as possible to re-establish the soil protection afforded by a vegetal cover.

- Upon completion of construction activities, restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites; replace up to 6 inches of topsoil or suitable plant growth material over all disturbed surfaces; apply fertilizer as required; seed; and mulch.

2.2.11.2.6 Water Resources

Other mitigation measures listed in the Soils, and Vegetation and Wetlands sections would also apply to Water Resources. The primary mitigation activities concerning Water Resources are as follows:

- Limit construction of drainage crossings to no-flow periods or low-flow periods.

- Minimize the area of disturbance within perennial, ephemeral and intermittent drainage channel environments.

- Surface disturbing activities would avoid the area within 500 feet of or on 100-year floodplains, wetlands, riparian areas, or perennial streams and within 100 feet of the edge of the inner gorge of intermittent and large ephemeral drainages. Proposals for linear crossings in these areas would be considered on a case-by-case basis.

- Design channel crossings to minimize changes in channel geometry and subsequent changes in flow hydraulics.

- Maintain vegetation barriers occurring between construction activities and perennial, ephemeral and intermittent flows or channels, with the exception of approved right angle linear feature crossings, which, with the exception of the active travel path of a roadway, should be reclaimed.

- Design and construct interception ditches, sediment traps/silt fences, water bars, silt fences and revegetation and soil stabilization measures if needed.

- Construct channel crossings by pipelines such that the pipe is buried a minimum of four feet below the channel bottom.

- Regrade disturbed channel beds to the original geometric configuration and replace the same or very similar bed material.

- Case wells during drilling, and case and cement all wells in accordance with Onshore Order No. 2 to protect all high quality water aquifers. High quality water aquifers are

aquifers with known water quality of 10,000 total dissolved solids or less. Include well casing and welding of sufficient integrity to contain all fluids under high pressure during drilling and well completion. Further, wells would adhere to the appropriate BLM cementing policy.

- Construct the reserve pits in cut rather than fill materials, or compact and stabilize fill. Inspect the subsoil material of the pit to be constructed in order to assess soil stability and permeability, and determine whether reinforcement and/or lining are required. If lining is required, as specified in the GRRMP (50 feet or less to ground water and permeability greater than 10^{-7} cm/hour), line the reserve pit with a reinforced synthetic liner at least 12 mils in thickness with a bursting strength of 175 x 175 pounds per inch. Reserve Pit lining requirements will be handled on a case-by-case basis during the APD process taking into consideration water quality, soil permeability, and depth to groundwater.

- Maintain two feet of freeboard on all reserve pits to ensure the reserve pits are not in danger of overflowing. Shut down drilling operations until the problem is corrected if leakage is found outside the pit.

- Extract hydrostatic test water used in conjunction with pipeline testing and all water used during construction activities from sources with sufficient quantities and through appropriation permits approved by the State of Wyoming.

- Discharge hydrostatic test water in a controlled manner onto an energy dissipator. The water is to be discharged onto undisturbed land that has vegetative cover, if possible, or into an established drainage channel. Prior to discharge, treat or filter the water to reduce pollutant levels or to settle out suspended particles if necessary. If discharged into an established drainage channel, the rate of discharge would not exceed the capacity of the channel to safely convey the increased flow, and the hydrostatic test water quality would be equal to or better than the receiving waters. Coordinate all discharge of test water with the Wyoming State Engineer's Office, the Wyoming Department of Environmental Quality, Water Quality Division (WDEQ-WQD), and the BLM.

- Discharge all concentrated water flows within access road ROWs onto or through an energy dissipator structure (e.g., riprapped aprons and discharge points) and into undisturbed vegetation.

- Develop and implement a pollution prevention plan for storm water runoff at drill sites, as required per WDEQ-WQD storm water National Pollution Discharge Elimination System permit requirements. The WDEQ-WQD requires operators to obtain a field permit for fields of 20 wells or more.

- Exercise stringent precautions against pipeline breaks and other potential accidental discharges of toxic chemicals into adjacent streams. If liquid petroleum products are stored on-site in sufficient quantities (per criteria contained in 40 CFR 112), a Spill Prevention Control and Countermeasures plan would be developed in accordance with 40 CFR 112, dated December 1973.

- Coordinate all crossings or encroachments of waters of the U.S. with the Army Corps of Engineers (COE).

- Discharge all water produced from the gas bearing formation(s) into tanks, pumps, pipelines, and existing injection wells to preclude contamination of surface waters with high mineral content formation water.

2.2.11.2.7 Fisheries

- No fisheries mitigation is needed beyond that indicated under Water Resources and Special Status Species Fish.

2.2.11.2.8 Vegetation and Wetlands

Other mitigation measures under Soils and Water Resources would also apply to Vegetation and Wetlands. The primary mitigation activities concerning Vegetation and Wetlands are as follows:

- File noxious weed monitoring forms with the BLM and implement, if necessary, a weed control and eradication program.

- Evaluate all project facility sites for occurrence and distribution of waters of the U.S., special aquatic sites, and jurisdictional wetlands. All project facilities would be located outside of these sensitive areas. If complete avoidance is not possible, minimize impacts through modification and minor relocations. Coordinate activities that involve dredge or fill into wetlands with the COE.

2.2.11.2.9 Wildlife

The primary mitigation activities concerning Wildlife are as follows:

- During reclamation, establish a variety of forage species that are useful to resident herbivores.

- Prohibit unnecessary off-site activities of operational personnel in the vicinity of the drill sites. Inform all project employees of applicable wildlife laws and penalties associated with unlawful take and harassment.

- Limit construction activities according to BLM authorizations within big game crucial winter range from November 15 to April 30.

- Complete a raptor survey of the PRPA prior to construction to ensure that well sites are located away from potential conflict areas.

- Survey and clear well sites within one mile of raptor nests identified in the raptor survey prior to the commencement of drilling and construction during the raptor nesting period (February 1 through July 31).

- When an `active' raptor nest is within one mile (Ferruginous Hawk) or ½ mile (all other raptors) of a proposed well site, restrict construction during the critical nesting season for that species.

- Do not perform construction activities within 0.25 mile of existing sage grouse leks at any time except as authorized in writing by exception, including documented supporting analysis, by the Authorizing Official. All surface disturbances would abide by sage-grouse stipulations as detailed in the GRRMP ROD and supporting documents.

- Provide for sage grouse lek protection during the breeding, egg-laying and incubation period (March 1 - June 30) by restricting construction activities within a two-mile radius of active sage grouse leks. Exceptions may be granted if the activity would occur in unsuitable nesting habitat.

2.2.11.2.10 Special Status Species

The primary mitigation activities concerning Special Status Species are as follows:

Special Status Plants

- Employ site-specific recommendations developed by the BLM IDT for staked facilities.

- Minimize impacts due to clearing and soil handling.

- Monitor and control noxious weeds.

- Comply with Section 404(b)(1) guidelines of the federal Clean Water Act.

- Perform clearance surveys for plant species of concern.

Special Status Animals

- Implement measures discussed in Chapter 4 (Section 4.8) in compliance with the Endangered Species Act.

2.2.11.2.11 Visual Resources

The primary mitigation activities concerning Visual Resources are as follows:

- Utilize existing topography, vegetation, and color that mimic the existing environment to screen roads, pipeline corridors, drill rigs, well heads, and production facilities from view.

- Paint well and central facilities site structures with flat colors (e.g., Carlsbad Canyon or Desert Brown) that blend with the adjacent surrounding undisturbed terrain, except for structures that require safety coloration in accordance with Occupational Safety and Health Administration (OSHA) requirements.

2.2.11.2.12 Noise

Mitigation concerning Noise is as follows:

- Muffle and maintain all motorized equipment according to manufacturers' specifications.

2.2.11.2.13 Recreation

Measures under Wildlife, Transportation, Soils, Health and Safety, and Water Resources could apply to Recreation. The primary mitigation activities concerning Recreation are as follows:

- Minimize conflicts between project vehicles and equipment, and recreation traffic by posting appropriate warning signs, implementing operator safety training, and requiring project vehicles to adhere to low speed limits.

- Monitor recreational use of roads, especially during hunting seasons.

2.2.11.2.14 Socioeconomics

The primary mitigation activities concerning Socioeconomics are as follows:

- Implement hiring policies that would encourage the use of local or regional workers who would not have to relocate to the area.

- Coordinate project activities with ranching operations to minimize conflicts involving livestock movement or other ranch operations. This would include scheduling of project activities to minimize potential disturbance of large-scale livestock movements. Establish effective and frequent communication with affected ranchers to monitor and correct problems and coordinate scheduling.

- Warren and its subcontractors would obtain Sweetwater County sales and use tax licenses for purchases made in conjunction with the project so that project-related sales and use tax revenues would be distributed to Sweetwater County.

2.2.11.2.15 Cultural Resources

The primary mitigation activities concerning Cultural Resources are as follows:

- Conduct a Class Ill inventory prior to any ground disturbing activities and identify sites considered eligible for or already on the National Register of Historic Places (NRHP).

- If a site is considered eligible for or is already on the NRHP, avoidance is the preferred method for mitigating adverse effects to that property.

- Mitigation of adverse effects to cultural/historical properties that cannot be avoided would be accomplished by the preparation of a cultural resources mitigation plan.

- If unanticipated or previously unknown cultural resources are discovered at any time during construction, all construction activities would halt and the BLM AO would be

immediately notified. Work would not resume until a Notice to Proceed is issued by the BLM AO.

2.2.11.2.16 Health and Safety

Measures listed under Air Quality and Water Quality would also apply to Health and Safety. The primary mitigation activities concerning Health and Safety are as follows:

- Sanitation facilities installed on the drill sites and any resident camp site locations would be approved by the WDEQ-WQD.

- To minimize undue exposure to hazardous situations, require measures that would preclude the public from entering hazardous areas and place warning signs alerting the public of truck traffic.

- Haul all garbage and rubbish from the drill site to a State-approved sanitary landfill for disposal. Collect and store any garbage or refuse materials on location prior to transport in containers approved by the BLM.

- Spill Prevention Control and Countermeasure Plans would be written and implemented as necessary in accordance with 40 CFR 112 to prevent discharge into navigable waters of the United States.

- Any hazardous wastes, as defined by the Resource Conservation and Recovery Act (RCRA), would be transported and/or disposed of in accordance with all applicable federal, state, and local regulations.

- During construction and upon commencement of production operations, Warren would have a chemical or hazardous substance inventory for all such items that may be at the site. Warren would institute a Hazard Communication Program for its employees and would require subcontractor programs in accordance with the Occupational Safety and Health Administration, 29 CFR 1910.1200. These programs are designed to educate and protect the employees and subcontractors with respect to any chemicals or hazardous substances that may be present in the work place. It would be required that as every chemical or hazardous material is brought on location, a Material Safety Data Sheet would accompany that material and would become part of the file kept at the field office, as required by 29 CFR 1910.1200. All employees would receive the proper training in storage, handling, and disposal of hazardous substances.

- Chemical and hazardous materials would be inventoried and reported in accordance with the Superfund Amendments and Reauthorization Act Title III, 40 CFR 335, if quantities exceeding 10,000 pounds or the threshold planning quantity are to be produced or stored in association with the Proposed Action. The appropriate Section 311 and 312 forms would be submitted at the required times to the State and County Emergency Management Coordinators and the local fire departments.

- Warren plans to design operations to severely limit or eliminate the need for Extremely Hazardous substances. Warren also plans to avoid the creation of hazardous wastes, as defined by RCRA, wherever possible.

2.3 NO ACTION ALTERNATIVE

Section 1502.14(d) of the National Environmental Policy Act (NEPA) requires that the alternatives analysis in the environmental assessment (EA) "include the alternative of no action". "No Action" implies that on-going natural gas production activities would be allowed by the BLM to continue in the PRPA, but the proposed field development program (Proposed Action) would be disallowed. Additional APDs and ROW actions would be considered by the BLM for federal land on a case-by-case basis consistent with the scope of existing environmental analysis. Transportation of natural gas products would be allowed from those wells within the PRPA that are currently productive. Additional gas development could occur on private and state lands within the project area under APDs approved by the WOGCC.

Table 2-4 details approximate disturbance acreages on federal, private, and state held surface under the No Action Alternative.

Table 2-4. Types and Approximate Acreage of Surface Disturbance on Federal Land – No Action Alternative.

No Action Alternative									
	Estimated Life-of-Project (LOP) Disturbance Area (acres)					Estimated Initial Disturbance Area (acres)			
Type of Disturbance	Federal	Private	State	Total		Federal	Private	State	Total
Number of Gas Wells	0	8	4	12		0	8	4	12
Number of disposal wells	0	1	0	1		0	1	0	1
Gas Well Pads[1]	0	1.6	.8	2.4		0	8.8	4.4	13.2
Disposal Well Pads[2]	0	0.9	0	0.9		0	1.3	0	1.3
Roads[3]	10.4	7.7	3.9	22.0		10.4	9.6	4.8	24.8
Compressors(5)	0	0.5	0	0.5		0	0.5	0	0.5
Gathering Pipelines [4]	0	0	0	0		13.0	9.6	4.8	27.4
Delivery Pipelines[5]	0	0	0	0		6.1	0	0	6.1
Total	**10.4**	**10.7**	**4.7**	**25.8**		**29.5**	**29.8**	**14**	**73.3**

[1]Assumes initial disturbance of approximately 1.1 acres for each well pad and LOP disturbance of 0.2 acre per well pad.
[2]Assumes initial disturbance of approximately 1.2 acres per well pad and LOP disturbance of 0.9 acres per well pad.
[3]Assumes an average of 0.33 mi of new roads with a 30-ft average disturbance width for each well. All disturbance except for the estimated 14-ft wide road travelway and adjacent ditches would be reclaimed for the LOP.
[4]Assumes an average of 0.33 mi of new gas gathering and water discharge lines with a 30-ft average disturbance width for each well. All disturbance will be reclaimed for the LOP.
[5]Assumes an average disturbance width of 50 ft. All disturbance will be reclaimed for the LOP.

The rationale behind these acreages is as follows:

- Since the decision would be to not allow drilling on federal acreage, the 108 wells

proposed for federal surface would not be approved. Therefore, no acreage would be disturbed on federal surface by well sites.

- Only private and State of Wyoming surface would be utilized for well pads, but federal surface would be disturbed for roads and pipelines. Since only 12 wells or 10 percent of the proposed number of wells (120) would be drilled, disturbances due to common support facilities (roads and pipelines) were assumed to be 10 percent of the Proposed Action disturbances on federal surface.
- None of the 10 injection wells proposed for federal surface would be drilled, but 10 percent, or one injection well would be drilled on private surface.

2.4 COMPARISON OF ENVIRONMENTAL IMPACTS OF FIELD DEVELOPMENT ALTERNATIVES

A summary of impacts for the Proposed Action and the No Action Alternative, analyzed in this EA is provided in Table 2-5. A detailed analysis of project impacts and mitigation measures is presented in Chapter 4.

Table 2-5. Comparative Impact Summary.

RESOURCE ELEMENT	PROPOSED ACTION	NO ACTION ALTERNATIVE
General		
Proposed Disturbance (acres)		
Ancillary Facilities	4.5	0.5
Well Sites	144.4	14.5
Pipelines	204.6	33.5
New & Upgraded Roads	144	24.8
Disturbance - Project Area (acres)		
before reclamation	497.5	73.3
after reclamation	153.0	25.8
Range Resources	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP	YES	YES
AUM's Lost Following Reclamation	14.6	2.5
Air Quality	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP's and FLPMA	Yes	Yes
Compliance with State and National Ambient Air Quality Standards	Yes	Yes
Hazardous Air Pollutant Concentrations	NSI	NSI
Direct Visibility Impacts to Sensitive Areas (0.5 delta-deciview threshold)	NSI	UAD
Transportation	**NSI**	**NSI**
Compliance with RMP	YES	YES

RESOURCE ELEMENT	PROPOSED ACTION	NO ACTION ALTERNATIVE
Traffic Volume (ADT relative to 2002 data) WYO 430	Increase of ADT: 30%	Lower than Proposed Action
Minerals/Paleontology	**NSI w mitigation**	**NSI w/mitigation**
Compliance with RMP's	YES	YES
Disturbance to Fossil Resources	UNKI	UNKI
Soils	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP's	YES	YES
Total Surface Disturbance within the Project Area within the CIA Area	1.0 percent 1.6 percent	0.15 percent UAD
Erosion w/ Effective Erosion Control	NSI w/mitigation	UAD
Additional Erosion: Year 5 (tons/year) w/ Effective Erosion Control	NSI w/mitigation	UAD
Compliance with EO 11987 (reclamation)	YES	YES
Water Resources	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP's	YES	YES
Compliance with CWA and State Water Quality Standards	YES	YES
Groundwater Quality Degradation Potential	Improbable	Improbable
Fisheries	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP	YES	YES
Vegetation & Wetlands	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP	YES	YES
Compliance with Section 404 of the CWA, EO' 11990 (wetlands), 11988 (floodplains)	YES	YES
Special Status Plants	**NSI w/ mitigation**	**NSI w/ mitigation**
Wildlife	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP's, FWS, and WGFD objectives and stipulations	YES	YES
Big Game Crucial Winter Range	**NSI w/ mitigation**	**NSI w/ mitigation**
Greater Sage Grouse Leks, Nesting & Severe Winter Relief Habitats	**NSI w/ mitigation**	**NSI w/ mitigation**
Raptor Nesting Habitat	**NSI w/ mitigation**	**NSI w/ mitigation**

RESOURCE ELEMENT	PROPOSED ACTION	NO ACTION ALTERNATIVE
Special Status Wildlife & Fish		
Compliance with RMP's and FWS: Animals and Fish	YES	YES
Potential Disturbance to FWS Listed & Proposed Wildlife Species		
Black-Footed Ferret	NSI w/ mitigation	NSI w/ mitigation
Yellow Billed Cuckoo	NWI w/ mitigation	NSI w/ mitigation
Bald Eagle	NSI w/ mitigation	NSI w/ mitigation
Potential Disturbance to Special Status Fish	NSI w/ mitigation	NSI w/ mitigation
Visual Resources	**Moderate, Short Term**	**Low**
Compliance with RMP's	YES	YES
Compliance with BLM VRM Class	NSI in Class IV VRM areas	NSI in Class IV VRM areas
Noise	**NSI**	**NSI**
Compliance with RMP	No standards specified	No standards specified
Construction and Traffic Noise	Minimal and Short Term	Lower than Proposed Action
Recreation/Wilderness	NSI w/ mitigation	NSI w/ mitigation
Compliance with RMP's	YES	YES
Quality of Recreation / Wilderness Experience	NSI w/ mitigation	NSI w/ mitigation
Displacement of Recreation/Wilderness Values	NSI w/ mitigation	NSI w/ mitigation
Socioeconomics	**NSI, Positive**	**NSI**
Compliance with RMP	No standards specified	No standards specified
Employment Rate	Increase	Lower than Proposed Action
Tax & Royalty Revenue over 40 years (Ad valorem, federal mineral royalty, WY severance tax, and sales & use tax)	$116,000,000	$6,570,000
Cultural Resources	**NSI w/ mitigation**	**NSI w/ mitigation**
Compliance with RMP's	YES	YES
Compliance with the NRHP[2] guidelines	YES	YES
Sites Eligible for the NRHP in the WRPA	30	Same as Proposed Action
Impacts to Known or Anticipated Cultural Resources	NSI if avoided	Lower than Proposed Action
Health & Safety	**NSI**	**NSI**
Compliance with RMP's	YES	YES
Risk to the Public	Slight Increase	Lower than Proposed Action

CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

Abbreviations:

ADT	- Average daily traffic
AUM	- Animal Unit Month
CIA	- Cumulative Impacts Analysis
CWA	- Clean Water Act
EO	- Executive Order
ESA	- Endangered Species Act
FWS	- Fish and Wildlife Service
NSI	- No significant impacts
RMP	- Resource Management Plan
SI	- Significant impacts
UAD	- Unquantified additional development
UNKI	- Unknown impact until site-specific location is proposed and surveys are completed
VRM	- Visual Resource Management
WGFD	- Wyoming Game and Fish Department
w/	- with
w/o	- without