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Bureau of Land Management  
Glenwood Springs Field Office  
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## **ENVIRONMENTAL ASSESSMENT**

**NUMBER:** CO-140-05-009 EA

**CASEFILE NUMBER:** Lease COC- 66576, 66578, 66579, 66580

**PROJECT NAME:** Castle Springs Geographic Area Plan (GAP)

**LEGAL DESCRIPTION:** T6S and T7S, R91W.

**APPLICANT:** Windsor Energy Group LLC

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## **PURPOSE AND NEED FOR PROPOSED ACTION**

The purpose and need is to authorize the Application for Permits to Drill (APD) to provide for federal lease development that will in turn provide natural gas for commercial marketing to the public.

## **PROPOSED ACTION**

### **Introduction**

The Castle Springs Geographic Area Plan (CSGAP) is a comprehensive and detailed plan that describes the Windsor Energy Group LLC (Windsor) proposed plan of development to drill and operate up to 98 natural gas wells in the Castle Springs Geographic Area (CSGA) approximately 5 miles southeast of Silt, Colorado in Garfield County. The CSGAP encompasses portions or all of 11 sections of surface land (approximately 4,087 acres) in Township 7 South, Range 91 West. All of the land is under the jurisdiction of the Bureau of Land Management (BLM), Glenwood Springs Field Office. Efforts have been performed to ensure figures are as accurate as possible based on the available data. However, variances may exist throughout the CSGA.

Windsor proposes to use directional drilling technology to drill most of the 98 wells from only 18 locations rather than develop a new pad for each well. As a result, this plan would result in more than 60 percent less surface disturbance. The exact number of wells drilled in any given year would depend on technical results and market performance. Windsor proposes a 3- to 4-year phased drilling scenario as follows:

- up to 12 wells in 2005 using one drill rig;
- up to 35 wells in 2006 using up to 3 drill rigs; and
- the remaining wells in 2007 and/or 2008 using up to 5 drill rigs.

Over a 3- to 4-year period, Windsor would:

- develop 15 new well pads;
- expand the 3 existing pads;
- drill and operate up to 98 wells – one vertical (non-directional) well and up to 7 directional wells at each pad;
- install gas and water pipelines along the access road right-of-way (ROW);
- extend trunk road system by 1.71 miles by widening existing narrow roads and two-tracks;
- upgrade 1.88 miles of existing roads and two-tracks to access the well pads;

- construct 3.30 miles of new access roads to well pads;
- construct a new central station (compression, separation, dehydration, and tanks); and
- construct a transmission pipeline to transport gas off-site to an existing sales pipeline.

### **Existing Surface Disturbance**

Three wildcat wells have been drilled, completed, and shut-in on Pads T, U, and V. In addition to the wells on the three pads, 4.37 miles of access roads have been widened and graveled by Windsor's predecessor, KLT. There are also 11.68 miles of narrow, semi-improved, and two-track roads. Of the 16.05 miles of existing roads, Windsor would only use 10.61 miles for its operations. The existing pads and roads are shown on Figure 1. Existing surface disturbance is estimated as follows:

- Existing Well Pads - 3.38 acres
- Existing Roads - 41 acres

### **GAP EA Process and Intent**

The GAP Environmental Assessment (EA) Process is intended to provide a 3- to 4-year look at an overall development scenario instead of a case-by-case submittal of APDs. The intent of the GAP process is to address site-specific and cumulative environmental impacts associated with oil and gas development within a defined geographic area. In addition, the GAP process was created to propose mitigation for potential impacts to environmental resources, such as wildlife habitat and visual aesthetics that may occur within discrete ecosystems.

The result of the GAP is a reasonable foreseeable development (RFD) scenario proposed by the operator given the current market conditions and demand for natural gas, other constraints of the company, and by environmental constraints imposed by the BLM. If fully developed, this proposal would result in up to 98 bottom-hole locations drilled at 18 surface locations (15 new locations and 3 expanded pads). Windsor expects to drill up to 12 wells in 2005, up to 35 in 2006, and the remaining in 2007 and possibly 2008. The proposed location of surface facilities and bottom-hole locations is shown on Figure 1. The total number of wells drilled would depend largely on factors out of Windsor's control such as geologic success, engineering technology, economic factors, availability of commodity markets and lease and unit stipulations and restrictions. Additional wells are expected after 2007 to 2008, but will be addressed at a later date.

The major elements of the GAP are presented below under Development (Construction/Drilling/Completion), Production (Operation and Maintenance), and Abandonment and Reclamation. The proposed elements contain a standard Surface Use Plan (SUP) for gas well development. With BLM's approval, all measures discussed in the SUP would be implemented as part of Windsor's Proposed Action. Any deviations from the standard practices below are identified in site-specific conditions of approval.

## **Development**

### **Year 1 – 2005**

The plan of development for 2005 would include the following tasks but not necessarily in the order listed below:

- 1) Upgrade 0.94 miles of trunk road, from pad D to the fork in the road west of proposed pad I;
- 2) Upgrade 1.95 miles of existing access roads to Pads E, G and W;
- 3) Construct 1.45 miles of new access roads to Pads A, B, C, F, Q and the central station;
- 4) Construct eight new well pads (A, B, C, D, E, F, G, and Q);
- 5) Enlarge Pad T, U and V and improve abandoned well pad W;
- 6) Drill and complete new vertical and/or directional wells on Pads A, B, C, D, E, F, G, Q, T, U, V and W;
- 7) One drill rig and one to three completion rigs would be used during the first year;
- 8) Install tanks and production facilities on pads;
- 9) Construct new central station;
- 10) Evaluate feasibility of reentering the plugged and abandoned oil well on Pad W as a water disposal injection well (dependent upon completion test of the well);
- 11) If well on Pad W is capable of economic gas production, drill new water injection well on Pad W;
- 12) Construct gas (4 to 6 inch diameter) and water pipelines (2 to 4 inch diameter) along access road rights-of-way from Pads A, B, C, D, E, F, G, Q, T, U, V to Pad W; and
- 13) Construct a 1.57 mile, 6-inch diameter pipeline from the central station that would connect to the Canyon sales pipeline along County Road 313.

**Year 2 - 2006**

The plan of development for 2006 would include the following tasks but not necessarily in the order listed below:

- 1) Upgrade 0.77 miles of two-tracks to a trunk road extending from the fork in the road west of proposed pad I to Pad S;
- 2) Construct 1.84 miles of new access roads to Pads H, I, J, K, R, and S;
- 3) Construct six new well pads (H, I, J, K, R, and S);
- 4) Drill and complete new wells on Pads H, I, J, K, R, and S (or pads without wells);
- 5) Install tanks and production facilities on new pads;
- 6) Drill and complete 14 to 29 directional wells from developed locations on a schedule of events to be determined;
- 7) Up to three drill rigs would be used simultaneously to complete the drilling schedule;
- 8) Construct gas and water pipelines, or connect to existing infrastructure as applicable, from Pads H, I, J, K, R, and S to Pad W.

**Year 3 and 4 – 2007 and 2008**

The remaining directional wells would be drilled and completed from developed locations on a schedule of events to be determined. Up to five drill rigs would be used simultaneously to complete the drilling schedule.

**Facility Construction**

During the first year of development in 2005, numerous construction activities would be completed. All of these activities could occur simultaneously.

**Trunk Road Network**

The trunk road network would be extended along existing small roads and two-track roads from proposed Pad D to the fork in the road west of the proposed Pad I as shown on Figure 1. Roads would be constructed with appropriate drainage and erosion control features and structures to include cut-and-fill slope and drainage stabilization, relief and drainage culverts, water bars and wind ditches similar to those described in the BLM/USFS Surface Operating Standards for Oil and Gas Development, the “Gold Book” (BLM and USFS 1989). Roads would be constructed using standard equipment and techniques. Bulldozers and/or road graders would first clear vegetation and topsoil from the ROW. The trunk roads would be constructed to an 18-foot wide

running surface with variable construction ROWs based on topography. With the exception of pinyon pine, vegetation may be placed on well pad fills to help visually screen the pads. Pinyon pine would be mulched or disposed of to prevent spread of the ips beetle. Vegetation not needed for visual screening would be hauled away for disposal. After the top soil would be cleared and stockpiled at the nearest pad location, the road surface would be graded to slopes no more than 10 percent. Roads would be crowned and ditched to the “Gold Book” construction standards for BLM resource roads. Minimum horizontal curve radii would be 100 feet. Where terrain would not allow 100-foot curve radii, curve widening would be employed. All portions of the new trunk road would then be graveled.

### **Well Pads and Access Roads**

12-foot wide access roads from the trunk road system to the proposed well pad sites would be constructed. These roads would vary in length from 117 to 4,590 feet. The access road to Pad C may have to be wider at certain locations based on topography. The access roads to well pads would be constructed to the same “Gold Book” standards as the trunk roads.

The well pad would be constructed from the native soil and rock materials present and leveled by standard cut-and-fill techniques using a bulldozer, grader, front-end loader, or backhoe. The pad would be constructed by first clearing vegetation, next stripping and stockpiling topsoil, and finally leveling the pad area considering earth balancing techniques for cuts and fills. As shown on Table 1 below, preliminary design calculations indicate that cuts and fills would be as high as 33 feet in some locations. In areas of deep cuts, the side slopes may vary from the standard 2:1 slope ratio to accommodate local topographic conditions. The tops of the cut banks may be rounded to improve the visual appearance.

**Table 1. Castle Springs Well Pad Description**

Pad	Dimensions (feet)	Cuts and Fills at Corners (feet)				Design Elevation (feet)
		NW Corner	NE Corner	SE Corner	SW Corner	
A	360 x 200	F 17.5	F 7.5	C 14.5	F 4.0	7038
B	375 x 200	F 11.3	F 22.4	C 12.6	C 19.3	6922
C	375 x 200	C 10.1	C 21.1	C 28.5	F 24.7	6418
D	375 x 200	F 4.2	F 11.1	F 0.9	C 26.5	7038
E	375 x 200	F 19.6	F 21.4	C 16.5	C 18.5	6782
F	375 x 200	F 9.6	F 18.4	C 18.3	C 11.1	7209
G	345 x 200	F 6.9	C 14.6	C 17.6	F 8.7	7112
H	375 x 200	C 1.5	C 23.9	C 12.7	F 20.6	7211
I	Polygon	F 9.5	F 12.2	F 24.3	F 12.7	7527
J	Polygon	C 23.2	C 22.3	F 12.9	F 12.8	7250
K	Polygon	F 17.1	F 6.9	C 11.9	C 12.4	6295
Q	345 x 200	C 15.3	F 6.4	F 25.6	C 19.6	7291
R	375 x 200	C 9.0	F 32.0	F 10.5	C 25.2	7681
S	Polygon	F 20.4	F 27.5	C 32.6	C 31.5	7695
T	Polygon	F 10.0	F 5.5	F 15.0	F 15.0	6450
U	Polygon	F 5.8	C 0.0	C 0.0	C 9.1	6837
V	360 x 200	F 11.5	C 6.5	C 18.1	F 1.2	6954
W	Polygon	F 9.0	C 13.6	F 6.6	F 15.8	7064
Central Station	Polygon	F 9.1	F 14.2	C 9.2	C 11.7	7021

C = Cuts needed

F = Fill needed

Initially, the size of the pads would range from 2.09 to 4.42 acres. After the pad would be finished, a locking gate would be placed on the access road near the entrance to the pad. Table 2 shows the size of the pads during drilling and completion activities and then after interim reclamation. When all drilling, completion and production facilities construction would be completed, interim reclamation activities would begin. Generally, cuts would be revegetated and fills would be recontoured to blend in with adjacent natural slopes. These interim reclamation techniques that would result in a 45 percent reclamation success of well pads developed for drilling and completion activities.

**Table 2. Castle Springs Well Pads**

<b>Pad</b>	<b>Initial Size (acres)</b>	<b>Total Reclaimed (acres)</b>	<b>Long-Term Disturbance (acres)</b>	<b>% Reclaimed</b>	<b>Design Elevation (feet)</b>
A	2.26	0.75	1.51	33.2%	7038
B	2.51	0.97	1.54	38.6%	6922
C	3.33	1.75	1.58	52.6%	6418
D	2.65	1.04	1.61	39.2%	7038
E	3.41	1.78	1.63	52.2%	6782
F	3.27	1.67	1.6	51.1%	7209
G	2.63	1.15	1.48	43.7%	7112
H	3.19	1.55	1.64	48.6%	7211
I	3.7	2.03	1.67	54.9%	7527
J	4.42	2.44	1.98	55.2%	7250
K	2.47	0.96	1.51	38.9%	6295
Q	2.74	1.28	1.46	46.7%	7291
R	3.67	2.01	1.66	54.8%	7681
S	3.71	2.17	1.54	58.5%	7695
T	2.32	0.39	1.93	16.8%	6450
U	2.88	0.89	1.99	30.9%	6837
V	2.05	0.49	1.56	23.9%	6954
W	2.09	1.21	0.88	57.9%	7064
Central Station	1.43	None	None	None	7021
Total	54.73	24.53	30.20	44.8%	

Reserve pits would be needed to contain drilling fluids. Generally, these pits would be 40 feet x 120 feet with a depth to 12 feet to allow for a minimum of two feet of free board between the maximum fluid level and the top of the berm for the containment of cuttings, drilling fluids, and chemicals. Pits would be designed to exclude all surface runoff. A fence would be constructed around the perimeter of the reserve pit to prevent wildlife from entering the pit. The fence would remain until all wells have been drilled and completed. After each well would be drilled, the fluids would be allowed to evaporate unless an alternative method of disposal is approved. Because multiple wells would be drilled at each pad, the pit would not be reclaimed until all wells have been drilled on each respective pad.

When all drilling would be complete at a pad, the reserve pit would be backfilled after allowing for evaporation of fluids. The backfilling of the reserve would be done in such a manner that the mud and associated solids would be confined to the pit and not squeezed out and incorporated into the surface materials. There would be a minimum of three feet of cover (overburden) in the pit. When work is complete, the pit area would support heavy equipment without sinking.

## **Gathering Gas and Water Pipelines**

A gas gathering and produced water pipeline network would be needed to deliver gas to the central station and water to the underground injection well. Both pipelines would be buried in the same trench in the outer edge of ROW of the roads. Generally, the trench would be dug on the uphill side of a road. Construction of pipelines would proceed in a planned sequence of operations. All vehicles and trenching equipment would use the road as a construction ROW. Therefore, no extra temporary disturbance would occur during construction. The path would first be cleared of vegetation if any would still exist after road construction. The pipeline trench would be excavated mechanically to a depth that would allow approximately 4 to 5 feet of earth to be placed on the top of the pipeline. Pipe segments would then be welded together and tested, lowered into the trench, and covered with excavated material. Then, each pipeline would be pressure tested with fresh water and/or nitrogen gas to locate any leaks. Fresh water or nitrogen used for testing would be obtained off-site and transported on-site. After testing, the water would be disposed of at the water injection facility or discharged into drainages if approved by the BLM. The nitrogen would be released to the atmosphere. Generally, a mile of pipeline would be constructed in four to six days.

## **Central Station**

A central station would be required to process the natural gas and boost the line pressure from about 200 pounds per square inch gage (psig) at the wellhead to about 1,000 psig for delivery to the downstream pipeline. Upon arrival of the gas at the central station at wellhead pressure, the gas would first flow through a central separator to remove produced water and condensates and then flow through a central dehydration unit to further remove water in the flow prior to compression.

The central station would be 1.43 acres in size. The compressor engines would be enclosed in a building and would be sized to initially process 25 million cubic feet of gas per day (mmcf). The separator and dehydration units would also be sized for 25 mmcf. Two condensate tanks and two water tanks would also be placed on the facility. These tanks would be sized to accommodate 300 to 400 barrels of liquid. A chain link fence at least six feet high with a locking gate would be installed around the perimeter of the central station for security and safety reasons.

## **Transmission Pipeline**

A 6-inch pipeline would be constructed from the central station to a connection with the downstream sales pipeline along the north side of County Road 313 in the NE/4 NW/4 of Section 20. The pipeline would be buried to a depth of four to five feet for a distance of approximately 0.37 miles paralleling an existing two-track road. Then, the pipeline would be laid on the surface for a distance of approximately 0.96 miles until it would be buried near the connection point to the sales pipeline. The total 1.36-mile length of the pipeline would be on BLM-administered land.

Construction of the buried portion of the pipeline would proceed in a planned sequence of operations. A variable width ROW shall be required during construction to install the pipeline through difficult terrain areas. Generally, construction activities shall be performed within a 50 foot wide ROW. If a wider ROW would be needed in specific areas along the pipeline corridor, prior approval from the BLM Authorized Officer will be required. First, a 50-foot wide ROW would be cleared of all vegetation. After construction, a 25-foot ROW would be needed for maintenance purposes. The pipeline trench would be excavated mechanically to a depth of 4 to 5 feet. Pipe segments would then be welded together and tested, lowered into the trench, and covered with excavated material. Then, each pipeline would be pressure tested with fresh water and/or nitrogen gas to locate any leaks. Fresh water and/or nitrogen gas used for testing would be obtained off-site and transported on-site. After testing, the water would be disposed of at the water injection facility or discharged into drainages if approved by the BLM. The nitrogen would be released to the atmosphere. After the pipeline would be laid and tested, the trench would be backfilled with the excavated dirt. The ROW would be graded with a slight rise over the ROW to allow for settling. Reclamation (reseeding) would begin after construction would be complete. It is estimated that the time required to complete this pipeline segment would be about three to five weeks.

Construction of the surface portion of the pipeline would consist of laying the pipe on the surface. The pipeline ROW would have minor deviations to avoid large rock areas. The pipeline segments would then be welded and tested as the buried segments. While vegetation clearing would be minimized, a 30-foot ROW would be reserved for the surface pipelines. Generally, a mile of surface pipeline would take less than a day to construct.

**Total Surface Disturbance**

After all facilities would be constructed, the total new surface disturbance would be 113.74 acres. Table 3 shows the contribution of each type of facility/road to the overall short- and long-term disturbance.

**Table 3. New Surface Disturbance Proposed under the Castle Springs GAP**

<b>GAP Action</b>	<b>Short-term Disturbance</b>	<b>Long-term Disturbance</b>
Well Pads	53.30 Acres	28.77 Acres
Trunk Roads	12.19 Acres	12.19 Acres
Access Roads to Pads	37.80 Acres	37.80 Acres
Gas/Water Pipeline ROW	Contained within roadways	Contained within roadways
Gas Pipeline ROW	9.49 Acres	4.74 Acres
Central Station	1.43 Acres	1.43 Acres
Total Acreage	114.21	84.93
Percent of Castle Springs Geographic Area (4087 acres)	2.8%	2.1%

## Drilling and Completion

Windsor's drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, and all applicable rules and regulations. New wells would be drilled to an average depth of 6,500 feet. A natural gas well in this GAP would require about 14-21 days to drill and approximately 45 days to complete. Multiple wells may ultimately be drilled from all pads. A vertical non-directional well would first be drilled usually followed by up to 7 directional wells at each pad. Construction, drilling and completion activities would not be permitted from December 1 through April 30 because of the big game winter range timing limitation described in Windsor's oil and gas lease agreements. By imposing the winter timing limitation on BLM leases, the Castle Springs project is effectively closed to construction and drilling activities during the 5-month winter period. Wording in the leases indicates that exceptions may be granted, in consultation with the BLM and the Colorado Division of Wildlife, for the last 60 days of the closure if mild winter conditions are present.

The drilling operation would be conducted in two phases. The first phase may use a small drilling rig to drill to a depth of approximately 600 –1000 feet or 50 feet below the base of any freshwater aquifers encountered. This surface hole would be cased with steel casing and cemented in place entirely from about 600 – 1000 feet up to ground level. This surface casing would serve the purposes of providing protection for freshwater aquifers present and to contain pressure that may be encountered while drilling deeper. The BLM would be notified in advance of running surface casing and cement in order to witness these operations if so desired. This part of the drilling operation would normally take 2 to 3 days to complete.

Prior to drilling below the surface casing, a Blowout Preventer (BOP) would be installed on the surface casing and both the BOP and surface casing would be tested for pressure integrity. The BOP and related equipment would meet the minimum requirements of Onshore Oil and Gas Order No. 2, and the BLM would be notified in advance of all pressure tests in order to witness these tests if so desired. Following the use of the surface-hole rig if used, a larger drilling rig would be used to drill to a depth of about 6,500 to 8,500 feet. A downhole mud motor may be used to increase penetration rate. The rig would pump drilling fluids to drive the mud motor, cool the drill bit, and remove cuttings from the wellbore. In order to achieve borehole stability, minimize possible damage to the formations, provide adequate viscosity to carry the drill cuttings out of the wellbore, and to reduce downhole fluid losses, various chemicals and certain materials may need to be added to the mud system.

The directional wells would be drilled with a measurement well drilling (MWD) system. The actual bottom hole locations would be horizontally separated from the surface pad positions up to approximately 3,000 feet. Downhole operations would be done with tools to facilitate proper direction and path of the well. The main benefit of directional drilling is to reduce the surface directional drilling is a benefit to the land that significantly minimizes the use of surface area.

The well pads would have a reserve pit to retrieve the drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals) and to contain drilling fluids carried over with the cuttings. No hazardous substances would be placed in this pit.

After drilling the hole to the total depth, logging tools would be run in the well to evaluate the potential hydrocarbon resource. If the evaluation indicates adequate hydrocarbon resources are present and recoverable, steel production casing would be run and cemented in place in accordance with the well design, as approved by the BLM and any applicable COA's. The casing and cementing program would be designed to isolate and protect the various formations encountered in the wellbore and to prohibit pressure communication or fluid migration between zones.

After production casing has been cemented in place, the drilling rig would be removed and a completion rig would be moved in. The well completion consists of running a Cement Bond log to evaluate the cement integrity and to correlate (on depth) the cased hole logs to the open hole logs, perforating the casing across the hydrocarbon producing zones, and then stimulating the formation to enhance the production of oil and gas. The typical stimulation in the area is a hydraulic fracture treatment of the reservoir, in which sand with fluid is pumped into the producing formation with sufficient hydraulic horsepower to fracture the rock formation. The sand serves as a proppant to keep the created fracture open, thereby allowing reservoir fluids to move more efficiently into the wellbore.

Part of Windsor's storm water management policy may include additional engineering measures which would be implemented to construct drainage systems and culverts in order to divert water flow away from the surface location, prevent erosion, and prevent sediment loading in waterways due to pad and/or road construction as needed.

## **Production**

Well locations would consist of wellheads, separation and/or dehydration units and aboveground condensate and produced water tanks with 300- to 400-barrel capacity. Dehydration may not be required at the pads higher than the compressor elevation because the water would gravity flow from higher elevations. A separation unit would be sized to handle the flow from all the wells on the pad. A test separator may be used at various times to measure the volume from each individual well. All production equipment would be painted to match the surrounding terrain and located to reasonably minimize visual impact. BLM would select the color for all facilities, including containment rings, at each site. Telemetry equipment could be utilized to remotely monitor well conditions after a reasonable level of development and to minimize traffic to and from well locations. Automated tank gauging could be employed to minimize the risk of spills.

Produced water may be confined to the reserve pit for a period of 90 days after initial production. The tanks would be installed next to the production facilities to contain produced water and condensate during the operation period of the well. Produced water at well pads would be transported by pipeline to either the central station or the well on Pad W for underground injection disposal. It is expected that each well would produce about 6 to 7 barrels per day of condensate. Condensate would be transported to market on a 2 to 3 week schedule.

## **Interim Reclamation**

### **Well Pads**

At the end of the construction season in which a new well pad has been developed, the operator will seed the fill slopes with a short-lived, sterile hybrid grass such as QuickGuard™ to reduce soil erosion and surface runoff."

After all completion activities on a well pad, Windsor would reduce the size of the well pad to the minimum surface area needed for production facilities and future operations, while providing for reshaping and stabilization of cut and fill slopes to match the original topography. All disturbed areas not necessary for drilling and production operations would undergo the following reclamation standards after completing dirt work and operations.

Some locations would require special reclamation practices such as hydromulching, straw mat application on steeper slopes, fertilizing, and soil analysis to determine the need for fertilizer, seed-bed preparation, contour furrowing, watering, terracing, water barring, and the replacement of topsoil. All reclamation efforts would employ seed mixes as directed by the BLM. Pads would be fenced for the first two growing seasons or until the seeded species have established to prevent livestock/wildlife grazing pressure. Noxious weeds that may be introduced due to soil disturbance and reclamation would be treated by methods to be approved by the BLM.

### **Road Maintenance**

The trunk and access roads would be inspected by BLM and, if necessary, maintained on a quarterly basis at a minimum to include such items as:

- Road surface grading and graveling;
- Relief ditch, culvert and cattle guard cleaning;
- Erosion control measures for cut and fill slopes and all other disturbed areas;
- Road closures in periods of excessive soil moisture to prevent rutting caused by vehicular traffic.
- Road and slope stabilization measures as required until final abandonment and rehabilitation;
- Weed control; and
- Dust abatement (as often as determined necessary by BLM and Windsor).

### **Workovers / Recompletion**

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 and may last several days per well. The frequency for this type

of work cannot be accurately projected because workovers vary well by well; however, an average may be one workover per well per year for a period of seven days. In the case of multi-well pads, space for equipment would usually be limited to the “in-use” (i.e., disturbed) area of the surface location, although it is possible that interim reclamation could be delayed. In the case of a well recompletion, a reserve pit may have to be constructed.

### **Abandonment and Reclamation**

Upon abandonment, each borehole would be plugged, capped, and its related surface equipment would be removed. Subsurface pipelines would be plugged at specific intervals and site contouring would be accomplished using appropriate heavy equipment. All surface soil disturbances would be reseeded with native vegetation, the mix to be determined by the typical vegetation surrounding the specific well site. Well site reclamation would be performed and monitored in accordance with the 1998 GSRA Reclamation Policy, including control of noxious weeds. Further information on reclamation standards is available in Appendix I of the 1999 Oil and Gas Leasing and Development EIS. One of the basic goals of the policy is to “establish desirable (seeded and native) vegetation to set the stage for the natural process to restore the site”. Consequently, one of the goals of the Proposed Action is to accomplish as much reclamation on each well pad during the life of the well as possible, even on those pads with a large final reclamation or “in use” area. Unreclaimed areas or reclaimed areas that do not meet the objective of three-to-four years of sustained reclamation (known as “operator complete”) would undergo the reclamation re-treatment measures described in the Surface Use Plan (Appendix A). Windsor would also meet the BLM bonding requirements. Additional bonding would be provided for sites with extremely difficult reclamation conditions if repeated reclamation attempts have been unsuccessful, or final reclamation cannot be completed with standard reclamation measures.

A Sundry Notice would be submitted by the operator to the BLM that describes the engineering, technical, or environmental aspects of final plugging and abandonment. It would describe final reclamation procedures and any mitigation measures associated with the final reclamation performed by the operator. The BLM’s standards for plugging would be followed. A configuration diagram, a summary of plugging procedures, and a job summary with techniques used to plug the well bore (e.g., cementation) would be included in the Sundry notice.

### **NO ACTION**

The Proposed Action affects federal subsurface minerals that are encumbered with federal oil and gas leases granting the lessee a right to explore and develop the oil and gas leases in the CSGA. The No Action alternative constitutes denial of the Proposed Action. Absent a non-discretionary statutory prohibition against drilling, BLM cannot deny the right to drill and develop the leasehold. Only Congress can completely prohibit development activities (Western Colorado Congress, 130 IBLA 244, 248, citing *Union Oil Co. of California v. Morton*, 512 F.2d 743, 750-51. Overall, the No Action alternative has been considered but eliminated from detailed analysis due to the existing lease rights involved.

**ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD**

The original GAP proposal included one pad and two wells in Section 10, two pads and 10 wells in Section 4, and two pads and 12 wells in Section 3. These locations were withdrawn from the proposal for two reasons. Access could not be constructed to these locations from the existing and planned road network within the CSGA because of topography. Furthermore, access from the north across private property could not be obtained.

The original proposal included large extensions of the existing Pads T, U and V. Based on coordination with BLM, Windsor redesigned these three well pad extensions to minimize new disturbance.

The pipeline to transport natural gas to a sales pipeline was originally designed as a southern route from Pad J along an existing two-track road to the downstream pipeline along the north side of County Road 313. This route was eventually abandoned because it would be a longer length than the pipeline route finally proposed. Additionally, this route would cross some private lands and would have involved more access issues.

The final proposed pipeline design underwent various changes. Because an access road was originally planned along the pipeline ROW, the route was redesigned to avoid the steepest terrain. Adjustments were made to achieve the best grade for an access road. BLM then decided an access road along the pipeline ROW would not be required. Furthermore, BLM agreed with Windsor that a portion of the pipeline could be laid on the surface to minimize environmental effects in the steep and rocky terrain.

The location of Pad C and the associated access road was rerouted several times to avoid known cultural resources. As a result of redesigning the well pad, the access road extending on to Pad K also needed to be realigned.

Visual impacts were considered in the original designs for Pads G and I. Changes were made in coordination with BLM four times to achieve the least visible footprint for these pads.

**PLAN CONFORMANCE REVIEW:** The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

- Glenwood Springs Resource Management Plan – approved January 1984;  
Decision Number/Page: page 14 & Map 4  
Decision Language: Continue to allow mineral exploration and development on lands not withdrawn for other uses or restricted to mineral activity.
- Oil and Gas Leasing and Development – amended in November 1991;
- Colorado Standards and Guidelines; amended in November 1996;
- Castle Peak Travel Management Plan; amended in August 1997;
- Oil and Gas Leasing and Development Final Environmental Impact Statement – amended in March 1999;
- Red Hill Plan Amendment - amended in November 1999; and

- Fire Management Plan for Wildland Fire Management and Prescriptive Vegetation Treatment Guidance – amended in September 2002.

**Standards for Public Land Health:** In January 1997, Colorado BLM approved the Standards for Public Land Health. The Glenwood Springs Field Office is in the process of completing Land Health Assessments. These assessments are done on a landscape basis. At this time, the landscape addressed in this EA has not had a formal Land Health Assessment completed. As such, no formal determination on conformance with the Standards would be made until a formal Land Health Assessment and Determination Document is completed.

These Standards cover upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. Because a Standard exists for these five categories, the impact analysis must address whether the Proposed Action or any alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions for that specific parameter. These analyses are located in specific elements listed below:

**AFFECTED ENVIRONMENT / ENVIRONMENTAL CONSEQUENCES / MITIGATION MEASURES**

Approving individual APDs is contemplated by the FSEIS, which addressed the environmental impacts of oil and gas development. Implementing the Proposed Action is consistent with the Preferred Alternative described in the FSEIS. The environmental impacts of the Preferred Alternative are described in the FSEIS and will not be repeated in this EA. Rather, discussion of the environmental impacts in this EA will be limited to site-specific information not included in the FSEIS. An analysis of adherence to the stipulations of the four leases COC66576, COC66578, COC66579, and COC66580 is included in the environmental consequences section. In some cases, the conclusions of the FSEIS will be summarized if necessary to address issues raised in scoping or to provide information necessary to the decision maker. In addition, the discussion of environmental impacts will be limited to those remaining after reviewing the APDs, the application and conformance of mitigation from the FSEIS, and any changes or additions to the proposal resulting from the on-site investigations. The APDs and subsequent review and adjustments result in on-the-ground requirements and development of site-specific Standard Conditions of Approval to provide the best location of the proposal to minimize impacts and accomplish the objectives of the Glenwood Springs Reclamation Policy.

**CRITICAL ELEMENTS**

**AIR QUALITY**

**Lease Stipulations:** None.

**Affected Environment:** National and Colorado Ambient Air Quality Standards (NAAQS and CAAQS) have been established for the purpose of protecting human health and welfare with an adequate margin of safety. For the pollutants associated with oil and gas operations (nitrogen

dioxide (NO<sub>2</sub>), carbon monoxide (CO), particulate matter less than 10 microns in effective diameter (PM<sub>10</sub>), and particulate matter less than 2.5 microns in effective diameter (PM<sub>2.5</sub>), the NAAQS and CAAQS are identical. If the ambient concentrations of pollutants are less than the CAAQS, then existing air quality in the region is acceptable based on standards set for the protection of human health. Garfield County is designated as an attainment area, meaning that the concentration of criteria pollutants in the ambient air is less than the CAAQS. Representative monitoring of air quality in the general area indicates that the existing air quality is well within acceptable standards. Table 4 provides a summary of representative air quality data for the CSGA and a comparison to the CAAQS.

**Table 4. Existing Air Quality Summary for the CSGA**

Pollutant	Averaging Period	Ambient Concentration (µg/m <sup>3</sup> )	CAAQS (µg/m <sup>3</sup> )	Monitoring Station Location Description
PM <sub>10</sub>	24-hour	54	150	Rifle, Garfield County. (1998-2000 data collected by CDPHE) <sup>a</sup>
	Annual	24	50	
PM <sub>2.5</sub>	24-hour	7	65	Rifle, Garfield County. (1998-2000 data collected by CDPHE) <sup>a</sup>
	Annual	19	15	
NO <sub>2</sub>	Annual	34	100	Provided by CDPHE <sup>a</sup>
CO	1-hour	8,000	40,000	Grand Junction, Mesa County. (Average of 1999-2001) <sup>a</sup>
	8-hour	4,444	10,000	
Ozone	1-hour	145	235	Provided by CDPHE <sup>b</sup>
	8-hour	145	157	

µg/m<sup>3</sup>: micrograms of pollutant per cubic meter of ambient air

<sup>a</sup> Background concentrations recommended by CDPHE

<sup>b</sup> (personal communication with Nancy Chick) as composite averages of ozone monitoring locations in western Colorado and Eastern Utah

**Environmental Consequences:** Emission sources would include those resulting from well development, well production, and gas processing. This includes increased vehicle traffic and drilling activity during the development phase of the Proposed Action, followed by continuous well site and central station emissions. Air pollutant emissions from these sources would include oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), particulate matter less than 10 and 2.5 microns in effective diameter (PM<sub>10</sub>, PM<sub>2.5</sub>) and volatile organic compounds (VOCs). Results indicate that benzene, toluene, ethylbenzene and xylenes (BTEX) compounds and n-hexane would be the primary hazardous air pollutants (HAP) emitted from the Proposed Action sources.

Total estimated emissions for the Proposed Action are summarized in Table 5. The development related emission calculations, which include well pad and resource road construction, well drilling, and well completion, represent the maximum activity within the 3 to 4 year development phase. At full development, it is estimated that a total of 98 gas wells would produce 25 million standard cubic feet per day (MMscf/day) of natural gas and approximately 600 barrels of condensate per day at full production.

Emissions resulting from well development activities can be categorized into three distinct phases: well pad and access road construction, well drilling, and well completion. During well development, vehicle tailpipe and fugitive dust emissions would increase within the CSGA.

Vehicle emissions, NO<sub>x</sub> and CO, would result from vehicles transporting workers to and from the work site and from the transportation and operation of construction equipment. Fugitive dust concentrations would increase with vehicle traffic on unpaved roads and from wind erosion in areas of soil disturbance. Drill rig operations would result mainly in an increase of NO<sub>x</sub> and CO emissions. Emission rates were calculated using applicable EPA emission factors and anticipated level of operational activities, such as estimated vehicle trips, load factors, and hours of operation.

After the construction phase is complete, the operation of the CSGA wells would primarily produce NO<sub>x</sub>, CO, PM<sub>10</sub>, VOC, and HAP emissions from the following sources:

- separator heaters and condensate storage tanks located at well pads;
- glycol dehydrator reboilers and still vents located at some of the well pads and at the central station;
- vehicle tailpipe sources;
- compressor engine at the central station; and
- road dust from vehicles.

**Table 5. Proposed Action Emission Summary**

Pollutant	Construction and Well Development (tons/year)	Operations <sup>1</sup> (tons/year)			
		Compressor Engine	Well Pad Production	Dehydration	Total
NO <sub>x</sub>	170.8	53.11	6.4	0.2	59.6
CO	77.1	79.66	2.6	0.0	82.3
VOC	13.8	26.55	1,253.9	1.8	1,282.2
SO <sub>2</sub>	2.9	1.87	0.0	0.0	1.9
PM <sub>10</sub>	178.0	1.87	0.5	0.0	2.4
PM <sub>2.5</sub>	30.8	0.00	0.5	0.0	0.5
Benzene	0.0	0.15	6.3	0.2	6.6
Toluene	0.0	0.05	0.4	0.4	0.8
Ethylbenzene	0.0	0.00	0.0	0.0	0.1
Xylene	0.0	0.02	0.2	0.2	0.4
n-Hexane	0.0	0.00	17.7	0.1	17.8
Formaldehyde	0.1	2.66	0.0	0.0	2.7

<sup>1</sup> Emissions associated with full-field development

No substantial adverse impacts to air quality are predicted as a result of the Proposed Action. Ambient air concentrations were predicted using the Industrial Source Complex (ISC) computer dispersion model along with four years of representative meteorological data measured near Grand Junction, Colorado. Localized increases in NO<sub>2</sub>, CO, and PM<sub>10</sub> concentrations would occur near the central station and well pads. However, as summarized on Table 6, these predicted ambient air impacts would be well below all applicable federal and State of Colorado ambient air quality standards.

Any comparisons with Prevention of Significant Deterioration (PSD) increments are intended only to evaluate potential significance, and do not represent a regulatory PSD increment consumption analysis. PSD Increment consumption analyses are typically applied to large industrial sources during the permitting process, and are solely the responsibility of the State of Colorado and the Environmental Protection Agency.

**Table 6. Predicted Castle Springs Air Quality Impacts**

Pollutant	Averaging Period	Predicted Concentration ( $\mu\text{g}/\text{m}^3$ )	CAAQS ( $\mu\text{g}/\text{m}^3$ )	% of NAAQS	PSD Allowable Increment ( $\mu\text{g}/\text{m}^3$ )	% of PSD Increment
NO <sub>2</sub>	Annual	4.8	100	4.8%	25	19.2%
CO	1-hour	172.1	40,000	0.4%	None	NA
CO	8-hour	64.4	10,000	0.6%	None	NA
PM <sub>10</sub>	24-hour	3.2	150	2.1%	30	10.7%
PM <sub>10</sub>	Annual	0.5	50	1.0%	17	2.9%

Two Class I airsheds, the Flat Tops Wilderness Area to the northeast and the and the Maroon Bells Wildernes Area to the southeast, are within 35 miles of the CSGA. The potential effect on Air Quality Related Values (visibility and acid deposition) in Class I areas are considered in a NEPA analysis. The BLM recently published the Roan Plateau draft Environmental Impact Statement. The DEIS included a cumulative analysis of oil and gas development in the Glenwood Springs Resource Area that included approximately the effects from about 3,500 new wells in the future. The analysis concluded that this level of development, along with other reasonably foreseeable pollutant sources, would have no adverse effect on Air Quality Related Values at either Flat Tops or Maroon Bells. Therefore, it can be concluded that the much smaller level of development of the CSGAP would not have an effect on these Class I areas.

**Mitigation:** Air quality impacts would be minimized through the permitting process of all regulated air pollution sources through the Colorado Department of Public Health and Environment, Air Pollution Control Division. The construction and operating permitting processes, where applicable (compressor engines and large glycol dehydration units) typically require the use of emissions controls to reduce air pollution emissions and impacts to air quality. For smaller, minor sources of air pollution (small dehydrators, condensate tanks), impacts are generally insignificant and further air pollution control is generally not warranted.

To reduce the emission of fugitive dust from vehicle traffic on roads in the CSGA, gravel would be placed on all roads.

**AREAS OF CRITICAL ENVIRONMENTAL CONCERN**

**Lease Stipulations:** None.

**Affected Environment:** There are no ACECs within the CSGA.

**Environmental Consequences/Mitigation:** N/A.

**CULTURAL RESOURCES**

**Lease Stipulation: Lease Notice** – “Class III cultural resource inventories shall be conducted by an accredited archeologist approved by the AO prior to surface disturbing activities. The inventory would be used to prepare mitigating measures and to reduce the impacts of surface disturbances on the affected cultural properties. These mitigating measures may include, but are not limited to, relocation of roads, well pads and other facilities, evaluation testing, data recovery, and/or fencing.”

**Affected Environment:** The CSGA covering a total of 4,087 acres has been the subject of 24 different cultural resource investigations for a variety of projects listed below in Table xx.

**Table 7. Cultural Resource Inventories within the CSGA**

<b>Glenwood Springs Field Office No.</b>	<b>Document Name</b>	<b>Author</b>	<b>Date</b>
251	Electrical Transmission Line	John Crouch, BLM	08/01/1977
400	Road Closure Construction and Easement	John Crouch, BLM	09/25/1978
520	David M. Munson-Rifle Boulton #1 Pipeline Route and Associated Wells	M. Burney & C. Wheeler, Western Cultural Resource	05/1979
575	Survey of Rifle-Boulton #1	Robert K. Hefouder, Grand River Institute	10/1979
591	Class II Cultural Resource Inventory for GSRA	Nickens etal, Nickens and Associates	12/1980
716	Arkla Exploration Federal 1-10	B. Heau, Powers Elevation	07/01/1980
747	Firewood Sale	Paul R. Williams, BLM	05/04/1981
762	Well Pad and Access Road	James J. Hester, Grand River Institute	08/24/1981
765	Gibson Gulch Firewood Sale	Paul R. Williams, BLM	08/14/1981
794	Gibson Gulch Firewood Sale	Paul R. Williams, BLM	04/26/1982
918	Gibson Gulch Burn #2	Mike Kinser, BLM	03/19/1985
1037	Construction of 0.4 Miles of Barbed Wire Fence	Michael M. Blantin, BLM	11/09/1988
1092	Northern Geophysical Seismic Exploration near Battlement Mesa	Bret Overturf, Metcalf Archaeological	10/1989
1163	Two Planned Torch Operating Well Pads and Access	Alan D. Reed, Alpine Archaeological Consultants	05/1991

Glenwood Springs Field Office No.	Document Name	Author	Date
15403-10	KTL Fed. Well # 24-07-07-91, Garfield County	McDonald, Kae	7/8/03
15403-4	KTL Castle Sps. Fed. 44-06-07-91	McDonald	5/7/03
15403-5	KTL Fed. Castle Sps. 22-07-07-91	McDonald, Kae	5/5/03
15403-6	KTL Fed. Castle Sps. 12-08-07-91	McDonald, Kae	5/6/03
15403-7	KTL Castle Sps. Fed. 33-09-07-91	McDonald, Kae	5/12/03
15403-8	KTL Fed. Well # 14-09-07-91, Garfield County	McDonald, Kae	7/8/03
15403-9A	KTL Gas Castle Springs Fed. Well 24-07-07-91 Access Road	McDonald, Kae	7/22/03
15404-1	KLT Castle Springs 2004/2005 GAP Garfield	McDonald, Kae	12/31/03
15405-3	KLT Gas Castle Spgs 04/05 Geographic Area Plan proposed Pipeline realignment	McDonald, Kae	11/22/04
940B	Grant-NORPAC, Inc Divide Creek and Southern Minturn Prospects	George R. Burns, Pronghorn Anthropological Association	02/1986

These inventories have resulted in the identification of 33 cultural resources which include 7 sites (5GF441, 5GF1510, 5GF3207, 5GF3208, 5GF3209, 5GF3210, and 5GF3233). Six of these sites are considered Historic Properties potentially eligible (Need Data) for listing on the National Register for Historic Places (NRHP). One site could not be relocated and may have been destroyed. This site and all of the Isolated Finds are considered not eligible for listing on the NRHP.

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take in to account the affects their actions will have on cultural resources. As a general policy, an agency must consider affects to cultural resources for any undertaking that involves federal monies, federal permitting/authorization, or federal lands.

**Environmental Consequences:** The Proposed Action has the potential to adversely affect historic properties. “Adverse affect” to an historic property occurs when a Proposed Action “may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.” (36 CFR §800.5[a][1]). Which part or parts of the Proposed Action may cause such an affect depends on the nature of the historic property, the criterion or criteria under which it is considered significant and eligible for the NRHP (36 CFR §60.4), which aspects of integrity are considered critical to that significance, and the location and nature of the specific proposed development with respect to the historic property.

## Direct Impacts

Direct physical impacts are the greatest single source of potential adverse effect to the majority of historic properties known and expected in the CSGA. For archaeological sites (sites manifested by artifacts and features found on or below the ground surface) these impacts come primarily from disturbance of surface and subsurface sediments through topsoil stripping, excavation, and pipeline trenching. Many of these historic properties are considered eligible under National Register Criterion “d”. Criterion “d” recognizes the information potential inherent in the materials on these sites. A site’s potential is dependent on the integrity of materials, location, and association, all which are damaged by disturbance to the matrix of the site. This loss of integrity negates the significance of the site. Such impacts are generally concentrated during the development phase of the Proposed Action, though they can result any time undisturbed ground is subject to alteration.

Direct physical impacts are considered to have an “adverse effect” when they damage or destroy protohistoric structures that contribute to a site’s eligibility under National Register criterion “c.” These sites are considered eligible because they preserve rarely found examples of historic and protohistoric Native American structures. These sites also usually have an archaeological component associated with the structures and this component may also cause the site to be eligible under criterion “d.”

## Indirect Impacts

Generally, activities that do not directly physically damage or destroy an historic property are not considered “adverse effect”. However, there are certain Native American sites that can be adversely affected by impacts that alter their surroundings. These culturally sensitive sites are usually ones that convey a significant association to the surrounding terrain or vegetation or specific topographic features. Assessing this effect is often one of consideration of the magnitude of the effect, the degree to which the significant qualities of the surrounding landscape are already affected, and how much weight these surroundings carry in the overall significance of the historic property. Evaluating this effect also relies on consultation with interested Native American tribes because sites may be significant within the context of their surroundings for reasons that are of religious or cultural importance to tribes.

Additionally, indirect long-term cumulative impacts 1) could occur from increased public access and personnel involved in the GAP development; 2) could result in a range of impacts to known and undiscovered cultural resources from illegal collection and excavation to vandalism; or 3) if environmental degradation is allowed to occur which could potentially exposed cultural material which was once buried.

**Mitigation:** Based upon the inventories, pad and road relocations have been made to avoid the historic properties. As such, there should be “No Effect” to any historic or potentially eligible historic properties. Therefore, formal consultation with the Colorado State Historic Preservation Office (SHPO) was not initiated in accordance with the Colorado BLM/SHPO Protocol (1998) and National Protocol (1997) for this GAP.

However, the following Condition of Approval (COA) that must be adhered to within the scope of this permit.

- All ground disturbance for roads or facilities in the N½SE/SE/NW; NE/SE/NW; S½SE/NE/NW, W½NW/SW/NE; SW/SW/NW/NE Section 17, Township 7 South, Range 91West will require an archaeological monitor during all phases of construction. Monitoring will be done by a qualified archaeologist, who will mitigate/salvage any and all cultural features discovered during these activities.
- An Archaeological monitor will be required during construction of Pad C and access road. Monitoring will be done by a qualified archaeologist, who will mitigate/salvage any and all cultural features discovered during these activities.
- Class III cultural resource inventories will be required on any and all new wells, access roads, pipelines and other ground disturbing activities that require a federal permit or authorization to conduct the action that have not been previously inventoried with an acceptable report. Additional action specific mitigation may be required – including but not limited to: moving the location, archaeological testing, and/or data recovery.

The importance of the Education/Discovery Stipulation needs to be stressed to Windsor and all of their subcontractors. To that end the following standard Education/Discovery Condition of Approval for Cultural Resource protection will be added to the permit.

“The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the BLM Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act.”

Lease Stipulation Adherence: Cultural Resource inventories have been completed for all proposed surface disturbing activities within the CSGA. Further inventories will be required and further approval will be required from the AO if surface disturbance activities would occur outside of the inventoried areas.

## **ENVIRONMENTAL JUSTICE**

**Lease Stipulation:** None.

**Affected Environment:** Review of 2001 data from US Census Bureau indicates the median annual income of Garfield County averages \$43,560, and is neither an impoverished nor a

wealthy county. U.S. Census Bureau data from July 2002 shows the minority population of Garfield County comprises less than 3 % of the total population (U.S. Census Bureau 2003).

**Environmental Consequences/Mitigation:** The Proposed Action is not expected to create a disproportionately high and adverse human health impact or environmental effect on minority or low-income populations within the area.

#### **FARMLANDS, PRIME AND UNIQUE**

**Lease Stipulation:** None.

**Affected Environment:** The Proposed Action does not involve any prime or unique farmlands.

**Environmental Consequences/Mitigation:** N/A

#### **FLOODPLAINS, WETLANDS & RIPARIAN ZONES**

**Lease Stipulation:**

**Controlled Surface Use:** “Activities within 500 feet of riparian or wetland vegetation, including roads, pipelines, and well pads, may require special design, construction and implementation measures, including relocation beyond 200 meters, in order to protect the all uses and functions of riparian and wetland zones. Such measures will be based on the nature, extent, and value of riparian vegetation that are most important to the riparian zone and will be avoided.”

**No Surface Occupancy:** “To maintain the proper function of riparian zones, activities associated with oil and gas exploration and development, including roads, transmission lines and storage facilities, are restricted to an area beyond the outer edge of the riparian zone. Within the riparian vegetation, an exception is permitted for stream crossings, if an area analysis indicates that no suitable alternative is available.”

**Affected Environment:** Floodplain habitat occurs along the intermittent drainage of Gibson Gulch, an intermittent drainage that flows west-northwest in the northern portion of the CSGA.

**Environmental Consequences:** Indirect and cumulative impacts (e.g., sedimentation) to floodplains are discussed under the Water Quality (Surface and Ground Water) section of this EA. No well pads would be located within the riparian corridors or wetlands. However, access roads to Pads C and W would cross the drainage.

**Mitigation:** N/A

**Lease Stipulation:** (see soils section)

## GEOLOGY AND MINERALS

**Affected Environment:** There are three major topographic divisions in the State of Colorado, which loosely correspond to three major geologic zones. The topographic divisions include the eastern plains, Rocky Mountains, and the Colorado Plateau. The Colorado Plateau region falls within the western part of the state and consists of a succession of plateaus and mesas that decline gradually toward the west away from the mountains or step down in a series of horizontal plateaus. The Colorado Plateau is classified as a sedimentary zone. Igneous and metamorphic areas occur within the plateau, but these areas are small in comparison to the extent of sedimentary rock.

The CSGA is located east of East Divide Creek, within the southern portion of the Piceance Basin. The Piceance Basin is a broad, asymmetric, southeast-northwest trending structural basin that contains sedimentary rocks up to 20,000 feet thick and lies between the White River uplift to the northeast, the Gunnison uplift to the south, and the Uncompahgre swell to the west (George 1927; Weiner and Haun 1960). The Piceance Basin contains stratified sediments ranging in age from Cambrian through middle Tertiary. The northern half of the basin is deepest and has the thickest stratigraphic sequence.

The entire CSGA is underlain by the Wasatch and Ohio Creek Formations (undivided). The Wasatch Formation consists of variegated siltstone, claystone, and sandstones and ranges from 1,000-2,500 feet thick. The Ohio Creek Formation consists of sandstones and is sometimes considered to be the uppermost unit of the Mesaverde Group.

The Wasatch Formation is underlain unconformably by the Mesaverde Group. The Mesaverde Group includes various rock formations that have sometimes been given individual formation names, such as the Iles Formation and Williams Fork Formation. The Mesaverde Group has also sometimes been referred to as the Mesaverde Formation on some maps, with the various rock units considered to be members of the formation. The Mesaverde Group is composed of mudstones and sandstones with interlayered coal beds and ranges in thickness from about 3,000 to over 7,000 feet. The proposed natural gas drilling project would target various horizons within the Mesaverde Group. There are several known hydrocarbon-producing marine sands at or near the base of the Mesaverde Group, including the Cameo, Cozette, Corcoran, and Rollins Sandstones. Above these units lies the “barren member”, named because of the lack of coal in this interval, which consists of numerous unconnected sandstones, shales, and mudstones with low permeability (Glover et al 1998).

Alluvial deposits of Quaternary age are present within the valley of East Divide Creek, west of the CSGA, and in the northern reaches of Gibson Gulch within the CSGA. These deposits consist of unconsolidated sand, gravel, and clay and may locally produce groundwater to wells. In addition, a large landslide deposit is located just south of the CSGA.

Over one-half of the project area is mantled by landslide deposits (Madole et al. 2003), as shown on Figure 2. These deposits are most extensive on north-facing slopes within the area, but are also common on northwest- and west-facing slopes. These landslides were produced by three

mechanisms: transitional earth slides, complex rotational earth slides – debris flows, and complex rotational earth slides – earth flows (Cruden and Varnes 1996). The transitional landslides are shallow features with failure surfaces originating between 3 and 15 feet below ground surface. These landslides originate on steep slopes and involve sliding of regolith, colluvium, and decomposed bedrock along the interface between the regolith and underlying competent bedrock. Rotational slope failures in the area are typically large and their failure surfaces deeper than for transitional landslides. These rotational landslides involve unconsolidated surface materials, decomposed bedrock, and weakly cemented beds of the Wasatch Formation.

**Environmental Consequences:** The construction of well pads would result in changes to the local topography, including into bedrock surfaces. Some of these cuts may be up to 35 feet high in some locations. These changes to the topographic character of the CSGA would be minor, but long-term. The potential for increased landslides in the CSGA is negligible because none of the rock units exposed in the area have a high potential for mass movements. Some small slumps may occur in the cuts created for the new access roads and well pads.

If the proposed CSGA unit wells would become productive, implementation of the Proposed Action would result in natural gas and associated water being produced from the hydrocarbon-producing sands within the Mesaverde Formation. The amount of natural gas that may be potentially produced from the maximum 98 proposed wells cannot be estimated. However, if the wells become productive, initial production rates would be expected to be highest during the first few years of production, then steadily decline during the remainder of the wells' economic lives. Natural gas production from the proposed wells would contribute to the draining of hydrocarbon-bearing reservoirs within the Mesaverde Formation in this area, an action that would be consistent with Forest Plan objectives for mineral production.

The proposed access roads would have a gravel surface. Construction materials (sand and gravel) may be indirectly affected in that they are likely to be used from local sources for surfacing materials for the access roads. Known accumulations of local materials may become depleted and additional sources would need to be identified and used.

Injection of drilling fluids and hydraulic fracturing of the wells would have the potential to induce earthquakes in nearby faults. Injection of waste liquids has historically caused earthquakes at some locations in the United States, notably near Denver, Colorado. Earthquake-induced ground shaking could result in damage to above-ground structures within the CSGA. However, the likelihood of fluid-induced earthquakes is considered to be very low, as indicated by the absence of recorded historic earthquake epicenters in the region. Accordingly, the Proposed Action would have a negligible impact on the risk of fault-generated earthquakes.

Much of the project area is mantled by landslide deposits that are thought to be from one hundred to several thousand years old (Madole et al. 2003) or older. Many of these landslides probably occurred during the Pleistocene (“the Ice Ages”), a time of greater precipitation and colder temperatures, and are stable under current conditions (Madole et al. 2003). Most of the proposed well pads and access roads would be constructed in areas that are vulnerable to mass-wasting processes, including landslides. Given the stable nature of the majority of the existing

landslide deposits in the area, the potential for the occurrence of landslides from the Proposed Action is considered to be minor. Any landslides that might occur would be expected to be small and shallow-seated. Since the area is undeveloped, there are no structures that would be at risk from these small landslides.

**Mitigation Measures:** In order to isolate the Mesa Verde -Wasatch contact, production casing on Federal wells would be set from total depth through at least 200 feet above the uppermost productive interval. The estimated total depth is approximately 8,500'. The estimated top of cement is approximately 5,000.

## INVASIVE, NON-NATIVE SPECIES

**Lease Stipulation:** None.

**Affected Environment:** There are currently few infestations of invasive or non-native plants in the CSGA. Invasive and non-native plants that occur within the present habitat types include Russian knapweed (*Acroptilon repens*), houndstongue (*Cynoglossum officinale* L.), and musk thistle (*Cardus nuttans*). Infestations primarily occur along roads but a concentrated band, approximately 650 feet wide and .75 mile long, of houndstongue and milk thistle running in a north/south direction in Sections 9 and 16, Township 7S, Range 91W has been documented. Further identification of invasive and non-native weed species will be completed during plant surveys in May 2005.

**Environmental Consequences:** The spread of invasive, non-native weeds is a concern for areas proposed for surface development activities. Weeds are plants that are designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property. A noxious weed is commonly defined as a plant that grows out of place and is competitive, persistent and pernicious (James et al. 1991). Specific negative effects of noxious and invasive weeds can include 1) reduction in the overall visual character of an area; 2) competition with, or complete over-running of, native plants resulting in the loss of species diversity and ecosystem functions; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion. Construction activities, increased soil disturbance, and higher traffic volumes could potentially introduce and spread undesirable weed species within the CSGA. However, implementation of mitigation would minimize the potential for their invasion or expansion in the CSGA.

**Mitigation:** A weed detection and control plan would begin the first growing season after surface disturbance occurs and continue through the life of the wells. Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan approved by the Authorized Officer. Weed monitoring and reclamation measures would be continued on an annual basis (or as frequently as the Authorized Officer determines) throughout the life of the wells.

## MIGRATORY BIRDS

### **Lease Stipulation:**

Lease Notice – “A biological survey will be required for raptor nests or significant natural plant communities prior to approval of operations. Mitigation measures such as relocation and fencing of habitat may be required.”

Timing Limitation - No surface use is allowed from February 1 to August 15 within a ¼ mile buffer zone around nest sites for golden eagles and all accipiters: falcons, except the kestrel; all buteos; and owls. During years when a nest site is unoccupied by May 15, the seasonal limitation may be suspended. It may also be suspended once the young have fledged and dispersed from the nest.

**Affected Environment:** The Migratory Bird Treaty Act of 1918 (MBTA) as amended, was implemented for the protection of migratory birds. Unless permitted by regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of Federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds.

The CSGA provides habitat and/or potential habitat for numerous migratory bird species. Table 7 addresses migratory birds that may inhabit the CSGA, including those species listed by Partners in Flight as declining and in need of conservation. Partners in Flight is an international bird conservation organization that is working with Federal, State, and local agencies to study and conserve landbirds. None of the birds that have potential habitat in the CSGA are federally listed under the Endangered Species Act of 1973.

**Table 8. Migratory Birds Potentially Occurring in the CSGA**

Habitat Type	Avian Species Commonly Associated with Habitat
<b>Mountain Shrub Community</b>	Dusky Flycatcher
	Green-tailed Towhee*
	Common Poorwill*
	Band-tailed Pigeon
	Lewis’s Woodpecker
	Stellar’s Jay
	Western Scrub Jay
<b>Pinyon-Juniper Woodland</b>	Pinyon Jay*
	Black-throated Gray Warbler
	Black-chinned Hummingbird*
	Gray Flycatcher
	Juniper Titmouse*
<b>Scrub Oak</b>	Virginia’s Warbler*

(\*) Partners in Flight High-Priority species are denoted by an asterisk. Priority ratings reflect species in decline (according to status indicators such as population trends, threats to breeding, and habitat stability/availability) that are not currently protected by initiatives.

Additionally, the United States Fish and Wildlife Service (USFWS) published a list of more than 100 Birds of Conservation Concern, which are species that deserve prompt conservation attention to stabilize or increase populations or to secure threatened habitats. Of the bird species potentially found in the CSGA, the following three are listed as Birds of Species Conservation Concern in USFWS Region 6 (USFWS 2002):

- Bewick’s wren,
- Brewer’s sparrow, and
- Virginia’s warbler.

A raptor survey was performed by Buys & Associates (Buys & Associates 2005) biologist in March 21-24, 2005. The survey included all potential raptor nest habitat (tall Rocky Mountain juniper, pinyon pine, rock outcrops, and cliffs. The survey area included all lands within ¼ miles of proposed roads and well pads in potential habitat. Nine inactive nests were observed on rock outcrops or large boulders in and around Gibson Gulch. No raptor nests were discovered within pinyon juniper woodlands or oak brush that dominates the CSGA. Five nests were determined to be red-tailed hawks, one was a golden eagle, and three were undetermined species. Five of these nests were observed at location within ¼ mile of a proposed well pad or road.

**Environmental Consequences:** Direct impacts to migratory birds from the Proposed Action include the loss of approximately 114 acres of foraging/hunting and nesting habitat. Removal of mature pinyon pine and juniper trees, sagebrush and mixed mountain shrub species would result in a loss of existing and potential nesting sites. Loss of habitat and impacts on populations would be more severe for High-Priority species or Birds of Conservation Concern. Reclamation activities resulting in the growth of herbaceous species would increase habitat for small rodents,

and therefore, increase prey species for raptors. While habitat loss may affect individual birds, it is not expected to adversely effect the species as a whole.

Construction, drilling or completion activities occurring during the spring and summer would result in visual and noise disturbance near active nests and could cause nest failure or nest abandonment and subsequently, a reduction in productivity. Construction activity during the nesting season could also result in the destruction of clutches and/or mortality of nestlings/fledglings.

**Mitigation:** In order to protect nesting raptors, prior to any new construction, drilling or completion between February 1 and August 15, the known locations of raptor nests would be re-surveyed no more than 10 days prior to initiation of the surface activity. If an active raptor nest(s) is documented within 1/4 miles of proposed construction, drilling or completion, the activity could be delayed by a 60-day timing limitation. The nest of concern would then be monitored during the 60-day timing limitation by the BLM or a BLM-approved contractor. If the 60-day timing limitation concludes before the nesting season ends, the nest of concern would be monitored on a weekly or bi-weekly basis to document any effects of the construction, drilling or completion activity on the nesting birds.

This mitigation provides adherence to the raptor nest timing limitation.

## NATIVE AMERICAN RELIGIOUS CONCERNS

**Lease Stipulation:** Lease Notice – “Class III cultural resource inventories shall be conducted by an accredited archeologist approved by the AO prior to surface disturbing activities. The inventory would be used to prepare mitigating measures and to reduce the impacts of surface disturbances on the affected cultural properties. These mitigating measures may include, but are not limited to, relocation of roads, well pads and other facilities, evaluation testing, data recovery, and/or fencing.”

**Affected Environment:** At present, no Native American concerns are known by the GSFO within the project area. On January 13, 2005 the Southern Ute Tribe, the Ute Tribe of the Uintah and Ouray Bands, and the Mountain Ute tribe were notified of the proposed GAP and potential Ute sites. They were given till March 10, 2005 to respond if they had concerns. The Southern Ute Tribe responded via a letter dated February 14, 2005; that they did not have any concerns or objections, but would appreciate immediate notification in the event of inadvertent discovers of Native American cultural sites, artifacts, or human remains. No response was received from the other two tribes. The Ute Tribes continued to claim this area as part of their ancestral homeland. If new data is disclosed, new terms and conditions may have to be negotiated to accommodate their concerns.

**Environmental Consequences/Mitigation:** Environmental consequences and mitigation would be the same as the Cultural Resources section. The importance of the Education/Discovery Stipulation needs to be stressed to Windsor and all of their subcontractors. A standard Education/Discovery Condition of Approval for Cultural Resource protection will be attached to the permit.

## **THREATENED, ENDANGERED, AND SENSITIVE SPECIES**

**Lease Stipulation:** Endangered Species Act Section 7 Consultation – “The lease area may contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened and endangered species or result in the destruction or adverse modification of a designed or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 *et seq.*, including completion of any required procedure for conference or consultation.”

**Affected Environment:** According to the latest species list from the U. S. Fish and Wildlife Service, the following federally listed and candidate species may reside or be impacted by actions occurring in Garfield County: bald eagle, Canada lynx, Mexican spotted owl, black-footed ferret, Uinta Basin hookless cactus, Parachute beardtongue, DeBeque phacelia, boreal toad, yellow-billed cuckoo, razorback sucker, Colorado pikeminnow, bonytail chub, and humpback chub.

Specific to the project location, the Colorado pikeminnow and razorback sucker have Designated Critical Habitat identified from the town of Rifle downstream. The BLM sensitive plant species *Penstemon Harringtonii* is known to occur in the project area. These species are discussed in greater detail below.

No other federal or state listed species or federal proposed or candidate species or BLM sensitive species or their habitats are found in the project vicinity. As such, the proposed action should have “No Effect” to any other listed species.

### **Colorado River Endangered Fishes (Colorado Pikeminnow, Razorback Sucker, Bonytail Chub, Humpback Chub)**

The Colorado pikeminnow and razorback sucker occur within the Colorado River downstream of the CSGA. The bonytail and humpback chubs are both found farther downstream near the Utah state line. These fishes require a diversity of habitats within the Colorado River, particularly during certain life stages. Low velocity side channels, backwaters, oxbows, sloughs, and flooded bottom lands are all important habitats for both young and adult fish. The Colorado River and its 100-year floodplain from the town of Rifle downstream is designated critical habitat for the razorback sucker and Colorado pikeminnow. Critical habitat for the bonytail and humpback chub is located in the Blackrocks area of the Colorado River near the Colorado-Utah state line.

The Proposed Action of constructing 15 new well pad locations and associated roads and pipelines would increase the potential for more erosion and increased sediment to Gibson Gulch

(See Soils analysis for WEPP calculations). However, given the distance to occupied habitat and the size of the CSGA, the amount of sediment reaching the Colorado River would be largely undetectable given the volume of water and sediment already carried by the river. Furthermore, these fish all evolved with the large amounts of sediment that the Colorado River has traditionally carried. Based on this information, the Proposed Action should have “No Effect” on any of the Colorado River Endangered fishes, or their habitat. For the same rationale, the Proposed Action would have no significant effect on the other game and non-game fish of the Colorado River. Given the amount of surface disturbing activity occurring in the area and within the Colorado River Basin as a whole, cumulative effects regarding sediment should be negligible.

### **Harrington Beardtongue**

Portions of the CSGA support potential habitat for the BLM Sensitive species, Harrington beardtongue. Habitat for Harrington beardtongue (*P. harringtonii*) usually occurs between 6,300 and 9,200 feet in open sagebrush habitat or sagebrush habitat with encroaching pinyon-juniper woodland trees. Associated soils are typically rocky loams and rocky clay loams derived from coarse calcareous parent materials.

Specific locations that provide habitat that could potentially support populations of Harrington beardtongue were identified during multiple field assessments and on-site investigations involving BLM, Windsor Energy, and Buys & Associates. Because Harrington beardtongue is not flowering in November (and therefore the exact species cannot be determined), the preliminary survey determined if penstemon existed in the area. The rosettes of several penstemon species were visible and easily identifiable, but the exact species could not be determined at the time.

### **Environmental Consequences:**

The areas identified as having suitable habitat by B&A biologists and BLM biologist Carla Scheck were proposed well pads A, F, G, J, K, U, and V and the proposed central station. Preliminary surveys indicated that no penstemon rosettes existed at Pads F, G, J, K and the central station. Three separate populations of penstemon were identified, although only two of these populations were within the 10-acre survey buffer surrounding the well pads. The three populations were found at or near the following proposed well pad locations:

- Pad U (SE<sup>1</sup>/<sub>4</sub> Sec. 7, T7S R91W),
- Pad A (SW<sup>1</sup>/<sub>4</sub> Sec. 7, T7S R91W), and
- Pad V (SE<sup>1</sup>/<sub>4</sub> Sec. 7, T7S R91W).

The exact species of penstemon was determined at these locations during a June 2, 2005 follow-up survey during the flowering period (Buys & Associates 2005a). No Harrington’s penstemon plants were found.

**Mitigation:** None.

The description of preliminary surveys listed above provides the adherence to the lease stipulation.

## **WASTES, HAZARDOUS OR SOLID**

**Lease Stipulation:** None.

**Affected Environment:** N/A

**Environmental Consequences:** Fuel and lubricants would be temporarily stored in transportable containment trailers or tanks on the proposed well pad to minimize potential for accidental releases/spills. No other hazardous or potentially hazardous materials would be brought into the CSGA.

**Mitigation:** If any spills of oil, gas, salt water, or other fluids were to occur during the construction, drilling or operational phase of the project, Windsor would immediately contact the BLM and any other regulatory agencies necessary. Strict cleanup efforts, based on a spill plan approved by the BLM would be initiated immediately. This mitigation would be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

## **WATER QUALITY, SURFACE AND GROUND WATER**

**Lease Stipulation:** None.

**Affected Environment:**

### **Surface Water**

The CSGA is located in the Divide Creek watershed. Most of the CSGA is drained by Gibson Gulch, which flows to the northwest into East Divide Creek approximately 4 miles north-northwest of the boundary of the CSGA. A portion of the CSGA is drained by Tar Gulch, which flows to the southwest into East Divide Creek. East and West Divide creeks are perennial drainages that are tributaries to Divide Creek and the Colorado River.

Stream flows in the drainages within the CSGA are ephemeral and dependent on seasonal storm and snowmelt runoff. The majority of the runoff is during the spring and early summer and is generated by melting of the winter snow pack. With the exception of West and East Divide Creeks, the existing stream channels are dry for most of the year and a single rainstorm event can account for a large percentage of the total annual runoff in these areas.

There are no USGS gauging stations (current or historic) within the CSGA. The closest station is located on East Divide Creek to the west of the CSGA.. Streamflow data is available for the period October 1959 to October 1965 for this station. The average monthly mean discharge at this station for the period of record ranged from 0.32 cubic feet per second (cfs) in January to 68.4 cfs in May. The monthly mean discharge ranged from 0.0 to 127 cfs during this period.

### **Water Quality and Beneficial Uses**

The Colorado Department of Public Health and Environment (CDPHE) uses a set of use criteria to classify surface waters for the purpose of assigning water quality standards in compliance with the national water quality improvement objectives of the Clean Water Act. The state water quality standards are separated into numeric and narrative standards. Numeric standards are typical for concentrations of metals or other constituents with known toxicity levels to aquatic organisms. Narrative standards are written to insure that management actions protect the designated uses in the water body. The primary (and most stringent) use is for cold water aquatic life. The Forest Plan requires that management activities maintain and protect these beneficial uses (FSH 2509.25, Ch. 20). All surface waters in the CSGA have been assigned the following beneficial uses:

- Aquatic Life Cold Water Class 1: These waters currently support or are capable of supporting cold-water biota with no impairment to the abundance and diversity of species.
- Recreation Class 2: Waters are suitable for recreation use on or about the water, where primary contact is not intended.
- Agriculture: Waters are suitable for irrigation of crops or livestock use.
- Domestic Water Supply: These surface waters are suitable for potable water supplies following standard treatment.

Water quality in East and West Divide Creeks is generally good, although it is influenced by grazing activity in the watershed, existing roads, recreational use, and natural erosion. Recent water quality data for these streams are virtually non-existent. There are no known chemical water quality issues in the CSGA. No stream segments associated with the CSGA are contained on the State of Colorado 303(d) list, which suggests that the designated uses are currently being supported.

### **Groundwater**

The CSGA lies within the south province of the Piceance Basin. Groundwater resources in the CSGA include shallow alluvial groundwater associated with alluvium along creeks in the area and alluvial deposits that mantle hillside slopes, and deeper aquifers located within sandstone beds of the Wasatch Formation and the Mesaverde Group. Little information is available for the Mesaverde aquifer in this region. Glover et al (1998) reports that the depth to the Mesaverde aquifer beneath the CSGA is about 2,000 feet below ground surface, which is generally too deep

for water wells. The saturated thickness is reported to be about 2,000 feet and the hydraulic conductivity ranges from about 0.001 to 0.01 feet/day.

No water wells have been developed within the CSGA. However, numerous water wells have been developed near the CSGA (CDWR 2005). Most of these wells have been drilled in the alluvial beds of the East and West Divide Creeks. The listing of these wells is shown on Table 8 and the locations within one mile of the CSGA are shown on Figure 2. For the wells where information is available, the total depths range from 16 to 205 feet, water levels range from 7 to 110 feet, and average yields range from 2.5 to 100 gallons per minute. Although water quality is not available, the primary use of these wells is domestic. Therefore, it can be assumed that water quality is very good as it is fit for human consumption.

**Table 9. Water Wells Within and Near CSGA**

Active Date	Permit Status	Use 1	Use 2	Well Yield	Well Depth	Well Level	UTM easting	UTM northing
4/6/1981	Issued	Domestic		0	0	0	282549	4372144
6/8/1981	Issued	Domestic		0	0	0	282140	4371741
7/28/2000	Issued	Domestic	Irrigation	0	0	0	284105	4371961
8/14/1981	Expired	Domestic		0	0	0	282483	4371388
3/20/1981	Issued	Domestic		0	0	0	282922	4370917
7/27/1981	Issued	Domestic		0	0	0	283723	4370908
3/31/1981	Issued	Domestic		0	0	0	282911	4370508
4/6/1981	Expired, Extended	Domestic		0	0	0	283711	4370499
9/29/1981	Expired, Extended	Domestic		0	0	0	283700	4370091
9/11/1998	Issued	Domestic		15	170	35	283517	4369028
5/29/1990	Expired	Domestic	Stock	0	0	0	284900	4368535
5/14/1981	Expired	Domestic		0	0	0	284593	4368313
6/13/1986	Issued	Domestic		0	0	0	284053	4368455
2/22/2001	Issued	Domestic		4.5	140	64	284242	4368251
1/4/1980	Issued	Domestic		0	0	0	284440	4368044
7/24/1989	Expired, Extended	Domestic		3	140	55	284143	4367544
4/20/2001	Expired, Extended	Domestic		5	205	110	284542	4367052
5/26/1992	Issued	Domestic		7	155	80	284340	4366905
4/21/1980	Expired	Domestic		0	0	0	284479	4366687
4/21/1980	Issued	Domestic		0	0	0	284395	4366388
1/13/2004	Issued	Domestic	Stock	15	80	14	284736	4365650
6/6/2000	Issued	Domestic		10	62	22	283737	4367881
10/23/1995	Issued	Domestic	Stock	21	44	16	283607	4367990
8/17/1995	Issued	Domestic		0	0	0	283221	4368108
2/15/1985	Issued	Domestic		0	0	0	282030	4368077
4/21/1980	Issued	Domestic		0	0	0	282043	4368484
4/21/1980	Expired	Domestic		0	0	0	281938	4368446
12/5/2000	Issued	Domestic	Irrigation	0	60	13	280646	4367885
8/31/1999	Issued	Domestic		0	0	0	279483	4367575
8/25/1989	Expired	Domestic		0	0	0	278587	4367976
8/30/1984	Issued	Domestic		0	0	0	278417	4368171
8/30/1984	Issued	Domestic		0	0	0	278417	4368171
Unknown	Unknown	Domestic		2.5	130	75	278715	4368555
1/12/1989	Issued	Domestic	Stock	0	0	0	276957	4368527
1/12/1989	Issued	Domestic	Stock	15	20	0	275802	4369542
6/2/2003	Issued	Domestic		10	160	50	276160	4369732
9/4/2004	Issued	Domestic		10	16	7	275317	4370601
7/29/2002	Issued	Domestic		6	140	22	275308	4370960
7/29/2002	Issued	Domestic		5	120	35	275320	4371058
Unknown	Unknown	Domestic		100	149	59	275226	4371489
7/31/2002	Issued	Domestic		10	140	0	275671	4372576

**Environmental Consequences:**

**Surface Water**

Potential direct or indirect impacts to surface water resources that could occur as a result of the Proposed Action include increased sedimentation and turbidity of surface water as a result of ground disturbance and erosion into surface waters via runoff; changes in stream flow regimes of

surface waters in the CSGA and depletion of water flow in the Upper Colorado River System due to project-related water consumption, and potential contamination of surface water resources with drilling fluids, fuels, or other wastes generated by natural gas drilling and production activities.

Minor increased sedimentation of Gibson Gulch, Tar Gulch, and other minor streams within the CSGA would occur, especially during the construction of the project facilities. The WEPP modeling described in section 4.5.1 indicates that about 4.41 tons of additional erosion per year would be expected from the project facilities. Increased sedimentation from these surfaces could lead to a short-term increase in turbidity in the creek and an increase in the deposition of fine sediment within the channel. Both of these effects could have negative impacts on aquatic habitat within affected streams. However, as discussed above, the disturbed areas would generally be well-buffered from the streams by vegetation. Therefore, the amount of eroded sediment reaching the streams would be less than the total additional erosion, and have a negligible impact on the receiving streams.

Direct impacts to surface water quality could also result from construction-related activities within connected disturbed areas, including road and pipeline crossings of the ephemeral tributaries. Potential impacts could include erosion of the banks of channels of ephemeral drainages and deposition of sediment from nearby disturbed surfaces into these channels. Since surface water quality impacts are likely to directly result from disturbance within and adjacent to stream channels, the operator would need to implement the mitigation measures identified below to minimize impacts to water quality in affected streams.

Since water would be obtained from an offsite source and hauled to the CSGA for drilling and completion, there would be no diversions or alterations of the flow regime of any creeks in the area. Therefore, adverse effects to stream health from changes in stream flow regime should not occur in the CSGA.

The Proposed Action would result in a minor depletion of water flow in the Upper Colorado River system. Under the Proposed Action, approximately 0.25 acre-feet of water would be needed to drill each well, for a total depletion of approximately 24.5 acre-feet, assuming that no water used for drilling returns to the Colorado River. Based on average annual flow rate of 2,820,000 acre-feet per year for the Colorado River in this reach, this project-related depletion would be insignificant from a hydrologic standpoint.

Contamination of surface water by spills of fuels, produced water, or petroleum products could potentially occur. The contamination could occur from two mechanisms: direct spills of materials into a creek, and indirect contamination of surface water due to migration of petroleum from areas of soil contamination adjacent to surface water courses. The potential for contamination of surface water from these events is considered to be minor.

## **Groundwater**

Potential impacts to groundwater resources from the Proposed Action include contamination of groundwater from drilling fluids or petroleum constituents. Recently, benzene was discovered in

Divide Creek north of the project area. The benzene was apparently released to the surface water through fractures that extend from a gas well in the area. This well was likely not completed properly and allowed benzene from producing horizons lower in the well to invade the shallow groundwater adjacent to the upper part of the well bore. This appears to be the first reported occurrence of this type in the Piceance Basin. Therefore, the potential for a release of benzene or other petroleum constituents from a proposed well into shallow groundwater within the project area is considered to be minor.

**Mitigation:** Windsor would implement reclamation and re-vegetation of disturbed areas not needed for operational activities. These measures would help prevent erosion and sedimentation to drainages. In addition Windsor would implement multiple BMPs including the following:

- New access roads would be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.
- Relief ditches or corrugated metal pipes would be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.
- Ditches would be allowed to vegetate and/or would include large rocks or stones to slow the velocity of drainage and allow sediment to settle out.
- Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.
- Windsor's road construction plans would identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.
- Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these zones reported to the BLM and COGCC. All usable water zones encountered (those with TDS less than 10,000 mg/L) must be isolated and protected, whether they are shallow or deep. Isolation of shallow zones would be accomplished by setting surface casing from the ground surface to below the water zone. Deeper zone would be cemented off as required.
- After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.
- BLM would conduct surface casing inspections on every federal well in the CSGA.

- Windsor will consult with the Army Corps of Engineers (for 404 permits) and from the State of Colorado Water Quality Control Division (for stormwater permits) prior to commencing construction activities related with said permits within the proposed action area. Written documentation to the Authorized Officer is required to indicate that appropriate permits have been obtained or are not required by the permitting agencies.

In addition, the following site-specific mitigation measures would be implemented:

Culverts would be placed at the toe of proposed roads that cross the Gibson Gulch. The hydrologic studies indicate one 60-inch culvert should be placed under the access road that would lead to Pad W. Two 60-inch culverts should be installed under the proposed access road that leads to Pad C.

Erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, placement of surface rock, straw bales, and/or matting would be used along the proposed road reaches to Pad W and C.

#### **WILD AND SCENIC RIVERS**

**Lease Stipulation:** None.

**Affected Environment:** There are no un-studied rivers, or rivers found to be eligible or designated Wild and Scenic Rivers within the CSGA.

**Environmental Consequences/Mitigation:** N/A

**Lease Stipulation:** None.

#### **WILDERNESS**

**Affected Environment:** There are no designated Wilderness Areas, Wilderness Study Areas, or citizen's wilderness proposal areas within the CSGA.

**Environmental Consequences/Mitigation:** N/A

#### **NON-CRITICAL ELEMENTS**

#### **HYDROLOGY AND WATER RIGHTS**

**Affected Environment:** See Water Quality, Surface and Groundwater section.

**Environmental Consequences:** Since water would be obtained from an offsite source and hauled to the new well pad locations for drilling and completion, there would be no diversions or alterations of the flow regimes of Gibson Gulch. No effects to stream health from changes in stream flow regime should occur in the CSGA as a result of the Proposed Action.

Development of additional gas wells would result in the use of approximately 0.25 acre-feet of water to drill each well, for a total of approximately 28.5 acre-feet. Based on the average annual flow rate of 2,820,000 acre-feet per year for the Colorado River in this reach (based on flow data from the USGS gauging station at Cameo), this project-related depletion would be insignificant from a hydrologic standpoint.

**Mitigation:** N/A

## NOISE

**Lease Stipulation:** Lease Notice – “The lessee is required to consider the impact of operations on nearby communities and residences and will be expected to reasonably adjust operating procedures to accommodate local residential concerns. For example, the operator will be expected to try to work out reasonable compromises on issues such as noise, dust, and traffic. The operator will be expected to address such issues when raised during public comment periods associated with the preparation of environmental assessments or when complaints are reported to the operator, BLM, or the Colorado Oil & gas Conservation Commission.”

**Affected Environment:** The BLM has not established noise standards. A 55-dBA threshold for noise established (EPA 1974) is not a regulatory requirement. Rather, the 55-dBA threshold for noise should be recognized as a level below which there is no reason to suspect that the public health and welfare of the general population would be at risk from any of the identified effects of noise.

The Colorado Oil and Gas Conservation Commission (COGCC 2004) has established regulatory noise limits for oil and gas facilities on state and private lands as follows:

“Oil and gas operations, including gas facility operations, shall comply with the following maximum permissible noise levels for the predominant land use existing in the zone in which the operation occurs. Any operation involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation is subject to the maximum permissible noise levels for industrial zones. In the hours between 7:00 a.m. and the next 7:00 p.m. the noise levels permitted below may be increased ten (10) db(A) for a period not to exceed fifteen (15) minutes in any one (1) hour period”.

Current noise in and near the CSGA is typical of a rural area with occasional traffic noise along the western and southern boundaries. Therefore, estimated noise levels are about 35 dBA.

Noise has been measured at typical compressor units (USGS 1981). A noise level of 90 dBA from one large compressor engine can be expected at 10 feet from the source. A compressor

building enclosing compressor engines would afford further noise attenuation of about 15 dBA.

**Environmental Consequences:** Noise above existing levels would occur during construction, drilling, completion, and operation of natural gas facilities as a result of the Proposed Action. Elevated noise from construction of well pads and roads, drilling, and completion activities would occur for 10 to 45 days at any given location. After construction activities, noise increases from natural gas extraction activities would occur for the life of the project near production facilities such as gas processing stations, well pads, and along access roads.

Noise from an individual source is the greatest in the immediate vicinity. Noise decreases with increasing distance from a source. Noise levels at a given distance from a source can be estimated using the Inverse Square Law of Noise Propagation (Harris 1991). Essentially, this law states that noise decreases by 6 dBA with every doubling of distance from a source. For example, if the noise at 50 feet from an industrial engine is 70 dBA, the noise at 100 feet will be 64 dBA, and 58 dBA at 200 feet.

Construction noise levels would be moderate but short-term at any given location. Based on an average construction site noise level of 85 dBA at 50 feet from the site, the construction noise could be above 55 dBA within 1,500 feet of the site. Additionally, elevated noise levels would occur along access roads as vehicles and heavy equipment travel to each site. Elevated noise levels would occur for a short duration at any given location and would occur only during daytime because construction would generally cease between sunset and sunrise.

Noise impacts from drilling and completion activities would be moderate and would last approximately 60 days at any one location. Based on a measured noise level of 50 dBA at ¼ mile (1,320 feet) from a drill rig, the noise would be above 55 dBA within 800 feet of a drill rig. Drilling noise would occur continuously for 24 hours per day during the approximate 16 to 21-day drilling period for each well. Completion flaring activities would also contribute to elevated noise levels for a short duration at any one site.

Additionally, traffic noise levels would be elevated along access roads during the drilling and completion sequences. However, the majority of traffic would occur during the morning and evening hours as workers arrive at and leave from the drilling sites. Vehicle traffic would be negligible during evening hours provided suggested mitigation is implemented.

### **Operational Noise Impacts**

Noise impacts related to production work would be minor along access roads due to infrequent operations traffic and provided suggested mitigation is implemented. Additional noise sources would include periodic maintenance and workovers at well sites. Since no additional compression is planned for the Proposed Action, compression noise would remain unchanged from existing compression facility levels.

Since noise impacts during both the short-term and long-term timeframes would affect locations within close proximity to noise sources, no cumulative noise impacts (i.e., cumulative increases in noise throughout the CSGA) are expected. Ongoing projects in the region are only expected to affect their own site-specific locations.

**Mitigation:**

During drilling and completion, Windsor would angle the exhaust muffler stacks on the power units or generators away from private homes.

The operator would encourage commuting construction and drilling crews to reduce speeds especially early in the morning hours to reduce traffic related noise at residences along CR 311.

This mitigation provides adherence to the lease stipulation regarding traffic noise.

**PALEONTOLOGY**

**Lease Stipulation:** Lease Notice – “An inventory shall be conducted by an accredited paleontologist approved by the Authorized Officer prior to surface-disturbing activities in Class I and II Paleontological Areas.”

**Affected Environment/Environmental Consequences:** A paleontological survey of the CSGA was conducted in May 2005 (Paleontological Investigations (PI) 2005). Prior to the ground reconnaissance survey, locality searches within and near the CSGA (Gibson Gulch 7.5 minute Quadrangle) of the recovered fossil collection were conducted at the University of Colorado Museum, the Denver Museum of Natural History, and the Museum of Western Colorado. No fossil locations have been recorded. Previously in 2003, PI had conducted a survey and delineated areas of potential significant fossil localities as well as exposed Wasatch Formations.

The survey of areas of potential surface disturbance revealed four general localities with scientifically significant resources. These areas include portions of Sections 9, 16, 17 and 20. The individual localities are restricted to a constrained stratigraphic level of the Wasatch Formation. Exposed formation both above and below were generally barren. Multiple taxa were present at two of the recorded sites. The site with only one taxon recorded is was an individual molar tooth with a jaw fragment. Small but common fossil bone fragments were observed throughout a relative flat area extending for about five acres. A fourth occurrence was fragments associated with channel sandstone. The fossil fragments showed breakage and abrasion before final burial. While none of the fossil fragments observed warranted recovery, any proposed disturbance would require detailed survey and monitoring.

The 2005 PI survey looked at areas where the 2005 field development plan would be carried out. Specifically, PI investigated the roads and pad extensions for Pads U and V, the expansion of Pad T, the roads to Pads E and W, the construction of Pad E, and the construction of the transmission pipeline from the central station to the sales pipeline. Based on the pedestrian survey, the following mitigation was recommended:

- Brief monitoring of construction for the Pad T extension should take place.

- Although Pad W has exposed Wasatch Formation, disturbance would be confined to the existing disturbance of the previous Pad W and the road. Therefore, no construction monitoring would be needed.
- The pedestrian survey for the road to Pad E revealed small isolated bone fragments. However, these fragments may have been transported by tire treads. Monitoring would be required but may be cancelled by the on-site paleontologist if the initial disturbance would not warrant continued monitoring.
- The pipeline ROW would potentially disturb known fossil localities in Sections 17 and 20. These sites are rated highly sensitive until a complete evaluation could be completed. However, acceptable levels of impact would be realized with the following specific mitigation:
  - 1) Construction would be monitored throughout the ROW;
  - 2) A detailed “nose to ground” survey would be completed in the highly sensitive areas
  - 3) Realignments must be completely surveyed before construction.

Before any ground disturbing activities, a paleontology survey must be conducted by a BLM-permitted paleontologist. The BLM will be contacted at least 48 hours before commencement of the survey. A general survey would first be conducted to determine if the ground disturbance would have the potential to affect paleontological resources. If a potential exists, a certified paleontologist must on site during construction to monitor the construction activities to ensure that significant paleontological resources would be avoided.

## RANGE MANAGMENT

**Lease Stipulation:** None.

**Affected Environment:** The BLM permits livestock grazing on public land on two allotments in the CSGA: Scott # 08106 and East Divide # 08105 which has three permittees. These allotments are permitted for cattle grazing. Although the total acreage of the East Divide allotment is equally distributed between the three permittees, only 9.2 percent of the entire allotment lies within the CSGA. Table 9 shows the percentage of acreage within the GAP and the resultant percentage of Animal Unit Month (AUM) within the CSGA. An AUM is the amount of forage needed by an "animal unit" (AU) grazing for one month. The animal unit in turn is defined as one mature 1,000 pound cow and her suckling calf.

**Table 10. Grazing Allotments in Castle Springs CSGA**

Allotment	Permittee	Acreage in Allotment	Acreage in CSGA	% in CSGA	Active Grazing Preference (AUMs)	Active Grazing Preference in CSGA (AUMs)
Scott #08106	Ray and Ruth Miller	978	225	23%	103	24
East Divide # 08105	Frank and Shelia Daley	13,779	1,267	9.2%	259	24
	Gary and Karen Hill	13,779	1,267	9.2%	555	51
	Record Ranch c/o Don Fulton	13,779	1,267	9.2%	215	20

**Environmental Consequences:** The Proposed Action would have negative and positive impacts on livestock grazing. The Scott Allotment would only have one new well pad and a short 400-foot road segment. All of the rest of the proposed well pads and roads would fall within the East Divide allotment.

Surface disturbing activities such as construction and use of roads, pipelines, well pads, etc. would initially remove forage. On areas that are disturbed and rehabilitated, herbaceous vegetation and herbaceous forage production typically recovers to the level before disturbance in 3 years. Rehabilitated sites often produce more livestock forage than native rangeland. There would be some loss of vegetation on well pads and roads that remain in use for the life of the project. This long-term projected loss of vegetation and forage on each allotment is expected to be relatively minor with a projected loss of about 112 acres. This would amount to an estimated loss of no more than 1 AUM of forage on each allotment. Development and maintenance of oil and gas facilities would increase human activity, which would disturb grazing livestock. Construction of roads and pipelines may improve access into remote areas of allotments that livestock have difficulty reaching.

**Mitigation:** It is not anticipated that the level of impacts expected from implementation of the Proposed Action would require adjustment of stocking rates. The level of forage utilization will be monitored on affected allotments and if necessary, adjustments in livestock use would be made to protect land health based on this monitoring.

Windsor will fence reclaimed well pads to inhibit livestock and big game grazing pressure on seeded sites.

Range improvements (fences, gates, reservoirs, pipelines, etc.) will be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for fixing or replacing the damaged range improvement.

**RECREATION**

**Lease Stipulation:** None.

**Affected Environment:** The primary recreation use in the Castle Springs area is hunting. Hunting is licensed by the Colorado Division of Wildlife (CDOW 2005) from the end of August through the early part of November. Primary hunting is elk, mule deer and bear. Bow hunting is permitted early in the season. The BLM parcels are part of the Glenwood Springs extensive recreation management area (ERMA) where management is for dispersed/undirected recreation activities. The RMP does not have any specific, measurable or targeted recreation management objectives for ERMAs. However, the RMP provides a general overview of appropriate experience and activity opportunities that occur by adopted Recreation Opportunity Spectrum (ROS) class. For the Castle Springs area, the RMP direction is to generally maintain a roaded-natural setting for the physical, social and administrative setting characteristics for a variety of experience and activity opportunities.

**Environmental Consequences:** During the 3 to 4-year development period, hunting opportunities within the CSGA would likely be affected. The traffic and level of activity associated with the construction of well pads and roads, and drilling and completion activities would shift some portions from roaded-natural to industrial for short times. The human activity would tend to displace the animals. Furthermore, a potential safety issue could occur if hunters fire their arms too close to construction activities. After the construction period, hunting opportunities would return to near pre-development levels. Pumper vehicles and trucks picking up condensate would be on access roads, but the level of activity would be much less.

During times rather than hunting season, the construction of new graveled roads would result in a slight increase in recreational use within the CSGA. Areas would be open to “sedan-type” visitations rather than strictly trucks and four-wheel drive vehicles.

The Proposed Actions would not necessarily change the variety of experience and activity opportunities that occur or that are appropriate on public lands. However, the Proposed Action would shift the physical ROS setting from a roaded natural towards a rural ROS setting because landscape modifications and use would be obvious (also see Transportation, Travel and Access section). Social settings would also move towards a rural ROS setting because the sights and sounds and evidence of development would be evident. There would be an administrative ROS shift due to the presence of access restrictions/signs and possibly more field presence.

## SOILS

### Lease Stipulation:

Controlled Surface Use – “For the purpose of protecting soils and slopes greater than 30 percent, special design, construction and reclamation procedures will be required to limit the amount of surface disturbance, to reduce erosion potential, to maintain site stability and productivity, and to insure successful reclamation in identified areas of highly erosive soils and slopes greater than 30 percent. Highly erosive soils are soils in the “severe” and “very severe” erosion classes based on NRCS Erosion Condition mapping. Areas identified in the RMP as Erosion Hazard Areas and Water Management Areas are also included in this stipulation. Implementation may include relocation of operations beyond 200 meters.

The surface use plan of the APD submitted for wells on erosive soils or slopes greater than 30 percent must include specific measures to comply with the GSRA Reclamation Policy, such as stabilizing the site to prevent settling, land sliding, slumping, and highwall degradation, and controlling erosion to protect the site and adjacent areas from accelerated erosion and siltation of nearby water sources.

Specific performance objectives for the plan include:

- Limitation of total disturbance of 3.0 acres for the wellpad;
- Limitation of the interim “in use” area to 0.5 acres; and
- Maximizing the area of interim reclamation that is shaped to a grade of 3:1 or less; any planned highwall must be demonstrated to be safe and stable and include enhanced reclamation and erosion prevention measures as needed.

The operator must also provide an evaluation of the site’s reclamation potential based on problematic characteristics of the site (slope, aspect, depth of soils, soil salinity, and alkali content) and a comparison of the site with sites already constructed. When the proposed site is comparable to sites where reclamation has not been successful, the operator will be required to make adjustments to reclamation techniques. Special measures might include: Locating production facilities off-site; building roads to higher standards, including surfacing; constructing sediment catchments; reclaiming the reserve pit immediately after use; and applying fertilizers, mulches, soil additives and geotextile fabrics. The Authorized Officer will evaluate plans submitted by the operator and approve a design and any special measures that best accomplish the performance objectives, achieving a reasonable balance of site stability and re-vegetation potential and minimizing overall disturbance.

Any changes to this stipulation will be made in accordance with the land use plan/or the regulatory provisions for such changes. (For guidance on the use with this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).”

**Affected Environment:** Elevations within the CSGA range from approximately 6,200 feet along Gibson Gulch to 7,800 feet near the southeastern corner of the area. Annual precipitation within the CSGA ranges from 15 to 20 inches. Soils surrounding the CSGA are distributed according to the major soil forming factors including climate (effective moisture and temperature), parent material, topographic position, and slope.

Eleven soil associations are found within the CSGA, as shown on Figure 32 (SCS 1985). Table 10 provides a summary of the soil types found within the CSGA. Of these soils, the Bucklon-Inchau loams, Potts loam, and Vale silt loam are considered to be fragile soils with a severe erosion hazard on cut slopes.

**Table 11. Soil Units in the CSGA**

<b>Soil Association Name</b>	<b>Soil Description</b>	<b>Runoff Potential</b>	<b>Erosion Potential</b>	<b>Slope</b>
Bucklon-Inchau loams	Moderate to steeply-sloping, shallow, well-drained loam formed from sandstone and shale residuum found on ridges and mountainsides.	Moderate	Severe	25-50%
Potts loam	Moderately-sloping, deep, well-drained loam and clay loam formed from reworked alluvium found on mesas, benches, and the sides of valleys	Moderate	Severe	3-6%
Potts loam	Moderately-sloping to rolling, deep, well-drained loam and clay loam formed from reworked alluvium found on mesas, benches, and the sides of valleys	Moderate	Severe	6-12%
Vale silt loam	Moderately-sloping to rolling, deep, well-drained silt loam and silty clay loam formed from calcareous eolian materials found on mesas, mesa sides, and alluvial fans.	Moderate	Severe	6-12%
Morval loam	Gently-sloping to rolling, deep, well-drained loam formed from reworked alluvium found on mesas and the sides of valleys	Slow	Moderate	3-12%
Morval-Tridell complex	Moderately-sloping to hilly, deep, well-drained loam formed from reworked alluvium found on alluvial fans and the sides of mesas	Moderate	Moderate	6-25%
Olney loam	Moderately-sloping to rolling, deep, well-drained loam and sandy clay loam formed from reworked alluvium found on alluvial fans and the sides of valleys	Moderate	Moderate	6-12%
Villa Grove-Zoltay loams	Moderately-sloping to hilly, deep, well-drained loam and clay loam formed on alluvium found on mountainsides and alluvial fans.	Slow	Slight	15-30%
Torrifluents, nearly level	Deep, well-drained to poorly-drained loam, sandy loam, silty loam, and clay loam stratified with sand, gravel, and cobbles formed on alluvium. Found on floodplains. Subject to spring flooding.	NA	NA	0-6%
Torriorthents-Camborthids-Rock outcrop complex	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony loams.	NA	NA	15-70%
Torriorthents-Rock outcrop complex, steep	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony loams.	NA	NA	15-70%

**Environmental Consequences:** Potential impacts to soils in the CSGA from the Proposed Action include removal of vegetation and increased susceptibility of the soils to water erosion, and contamination of soils with petroleum products.

Excavation of well pads could potentially result in increased erosion of these soils in the short-term. The increased erosion of soils could potentially lead to increased sedimentation in watercourses, siltation of ponds, and loss of vegetative cover on the side slopes of the ridges. However, environmental impacts to soils in the Glenwood Springs Resources Area from existing oil and gas development is considered to be minimal (BLM 1999). The BLM attributed these minimal impacts to soils to well established mitigation and reclamation practices. In addition, field observations of recently-completed pipeline corridors in the Piceance Basin (the TransColorado Pipeline, completed in 1998, and the American Soda pipeline, completed in 2000) show that vegetation has been reestablished on these corridors in only a few years and erosion is minimal.

Implementation of the Proposed Action would initially disturb up to 114 acres of surface soils, or approximately 2.8% of the total CSGA of approximately 4,087 acres. These disturbed areas would consist of areas where vegetation is removed during the construction of 18 new well pads, 3.3 miles of new access roads, 3.59 miles of upgraded roads, a new central compressor station, and gas and water gathering pipelines. In addition, the three existing well pads within the area would be expanded. Each well pad is anticipated to cover between 0.92 and 2.25 acres.

Of the total of 92.5 acres of disturbance, approximately 10 acres would be reclaimed and re-vegetated upon the completion of drilling. The remaining 82.5 acres would remain disturbed for the long-term 20 to 30 year life of the project.

The primary effect of long-term surface disturbances on soil resources is increased erosion and the resulting increase in sediment yield to nearby drainages and streams. In order to estimate potential erosion and sediment yield increases from the long-term surface disturbance, the Water Erosion Prediction Project model (WEPP) developed by the U.S. Forest Service was used (USFS 2005).

Baseline WEPP modeling of the forested areas in the CSGA shows that the existing erosion rate from these surfaces is less than 0.01 tons per acre per year (tons/acre/yr). Erosion from the three existing well pads is about 0.022 tons/acre/yr. These are low erosion rates.

For the Proposed Action, certain access roads and well pads are located in areas where sediment eroded from them could potentially enter Gibson Gulch or Tar Gulch. Table 11 shows the WEPP model inputs and predicted erosion from each of the sensitive proposed access roads. All roads were assumed to be outsloped and unrutted, have a width of 18 feet, a graveled surface, and low traffic volume. The custom climate used for the WEPP modeling has annual precipitation of 15.67 inches at an elevation of 6,300 feet.

**Table 12. WEPP Erosion Modeling of Access Roads**

Access Road ID <sup>1</sup>	Segment <sup>2</sup>	Length (feet)	% slope	Soil type and surface	Erosion (tons/road segment/yr) <sup>3</sup>
D-W Road	1	4,620	7.4	Loam w/ 20% rock content	
	2	5,775	5.95	Loam w/ 20% rock content	1.14
C-K Road	1	125	0	Stony loam w/ 50% rock content	
	2	228	24.6	Stony loam w/ 50% rock content	
	3	413	9.6	Stony loam w/ 50% rock content	
	4	1,795	7.2	Stony loam w/ 50% rock content	
	5	409	3.2	Stony loam w/ 50% rock content	0.28
Q Road	1	1,600	8.0	Loam w/ 20% rock content	
	2	165	10.0	Loam w/ 20% rock content	
	3	198	21.7	Loam w/ 20% rock content	0.35
J Road	1	1,445	1.6	Stony loam w/ 35% rock content	
	2	3,090	9.3	Stony loam w/ 35% rock content	0.51
D-E Road	1	1,980	11.7	Loam w/ 20% rock content	
	2	485	0	Loam w/ 20% rock content	0.41
C-T Road	1	990	7.3	Stony loam w/ 50% rock content	
	2	2,475	6.5	Stony loam w/ 50% rock content	
	3	528	0	Stony loam w/ 50% rock content	0.35
B-D Road	1	2,575	5	Loam w/ 20% rock content	
	2	1,890	1.2	Loam w/ 20% rock content	0.37
<b>TOTAL = 3.41 tons</b>					

<sup>1</sup>Roads named using the proposed well pad designations

<sup>2</sup>Road segments represent lengths of road with similar slope

<sup>3</sup>Total erosion for the combined road segments

Approximately 3.41 tons per year of sediment would be eroded from the access roads located in sensitive areas under the Proposed Action. The majority of this erosion would occur in the Gibson Gulch watershed. Sediment from the J road would eventually reach the Tar Gulch.

Erosion from new well pads was also estimated with WEPP. Because these pads would be constructed to be level, the additional erosion from all new well pads would be only about 1 ton per year. Therefore, the total increased erosion for the Proposed Action is about 4.41 tons per year. Because all pads would generally be well buffered (at least 100 feet) from the creeks, and Best Management Practices (BMPs) for road construction would be utilized, very little of this additional eroded material is expected to reach the ephemeral creeks within the CSGA in the short- or long-term from the disturbed surfaces. Accordingly, the expected increase of sedimentation to Gibson Gulch and Tar Gulch from the Proposed Action would be negligible. It is also expected that following re-vegetation and two to four growing seasons, the erosion rate and potential sediment yield would drop to near baseline conditions from pads but would remain at estimated levels on roads.

Contamination of surface and subsurface soils near oil and gas facilities can occur in oil and gas fields. Sources of potential contamination include leaks from wellheads, conveyance pipelines, compressor stations, produced water sumps, condensate storage tanks, and fuel spills from vehicles. Petroleum released to surface soils infiltrates the soil and, under the right circumstances, can migrate vertically until the water table is encountered. The potential for spills of this type from the Proposed Action is slight.

**Mitigation:** Twelve of the 18 proposed well pads in the CSGA have Controlled Surface Use stipulations (CSUs) associated with their corresponding lease agreements that protect fragile soils. The CSU stipulations state, “*Special design, construction, and operation and reclamation measures will be required to reduce erosion potential, to maintain site stability and productivity, and to insure successful reclamation in identified areas of highly erosive soils and slopes greater than 30 percent*”. *Specific performance objectives are:*

- 1. Limitation of total disturbance to 3.0 acres for the wellpad.*
- 2. Limitation of the interim “in use” area to 0.5 acres.*
- 3. Maximizing the interim reclamation that is shaped to a grade of 3:1 or less; any planned highwall must be demonstrated to be safe and stable and include enhanced reclamation and erosion prevention measures as needed.*

*Performance Standards:*

- 1. All sediments generated from the surface-disturbing activity will be retained on site.*
- 2. Vehicle use would be limited to existing roads and trails.*
- 3. All new permanent roads would be built to meet primary road standards (BLM standards) and their location approved by the Authorized Officer. Furthermore, the final road design would be reviewed and approved by a certified Geotechnical Engineer. For oil and gas purposes, permanent roads are those used for production.*

4. *All sediment control structures, reserve pits, or disposal pits would be designed to contain a 100-year, 6-hour storm event. Storage volumes within these structures would have a design life of 25 years.*
5. *Before reserve pits and production pits would be reclaimed, all residue would be removed and tucked off-site to an approved disposal site.*
6. *Reclamation of distributed surfaces would be initiated before November 1 each year.*
7. *All reclamation plans would be approved by the Authorized Officer in advance and might require an increase in the bond.*

In addition, the following measures would be implemented to help prevent erosion and subsequent sedimentation:

- Erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, placement of surface rock, straw bales, and/or matting would be used along the approaches to Gibson Gulch on the roads to Pad C and Pad W.
- New access roads would be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.
- Initial gravel application will be a minimum of 4 inches. Graveling of roads will be periodically re-graveled as directed by the Authorized Officer. If rutting within the roadway exceeds 6 inches, then additional gravel will be applied.
- Relief ditches or corrugated metal pipes would be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.
- Ditches would be allowed to vegetate and/or would include large rocks or stones to slow the velocity of drainage and allow sediment to settle out.
- Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.
- Straw cover would be placed on excess material piles to help limit heavy dust emissions into the air during weather-created wind events.
- Windsor's road construction plans would identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

Windsor's compliance with the performance standards the mitigation listed above, and the the provisions listed in the attached Erosion Control and Reclamation Plan provide adherence to the lease stipulations.

## **TRAVEL/ACCESS AND TRANSPORTATION**

**Lease Stipulation:** Lease Notice – “The lessee is required to consider the impact of operations on nearby communities and residences and will be expected to reasonably adjust operating procedures to accommodate local residential concerns. For example, the operator will be expected to try to work out reasonable compromises on issues such as noise, dust, and traffic. The operator will be expected to address such issues when raised during public comment periods associated with the preparation of environmental assessments or when complaints are reported to the operator, BLM, or the Colorado Oil & gas Conservation Commission.”

**Affected Environment:** Traffic to the CSGA would be originate from Silt, Colorado and then proceed southerly along County Road (CR) 311. The only point of entry into the CSGA would be on the BLM road at the northwest corner of the CSGA approximately five miles southeast of Silt. As shown on Figure 1, the main road throughout the CSGA extends from the entry point to the fork in the road at the proposed location of Pad B. The main road then extends west to existing pads U and V. The road also extends east to the location of the proposed pad D. All of these roads are improved, widened, and have a gravel surface. Other roads within the CSGA range from semi-improved to two-tracks. The road system currently is open for public use.

**Environmental Consequences:** Under the Proposed Action, approximately 6 miles of new road would be constructed in order to access the proposed wells. Short-term increases in the volume of both heavy and light traffic would occur during the construction, well drilling, and completion phases of the project, proposed for 2005 and 2006. To construct, drill and complete each well, an average of approximately 16 light truck trips and 8 heavy truck trips per day would be expected on local area roads. Project-related traffic during the 20 to 30 year operational phase of the project would be as follows. A Windsor employee would visit the CSGA wells approximately once per day to inspect well site facilities, read meters, and perform other routine facility maintenance activities. Tanker trucks would remove condensate from the storage tanks on the well pad about three times per week. On average, there would be one workover or recompletion per well per year. Increased traffic associated with a workover or recompletion would consist of three to five truck trips per day for a period of seven days.

All traffic in and out of the CSGA would be along CR 311. Potential impacts to travel and access of other land users during the construction/drilling phase and recompletion/workover activities would include temporary conflicts with existing traffic (including a potential for delays and increased vehicle collision rates), degradation of County roads due to heavy equipment use, fugitive dust, and traffic-related noise at residences near CR 311. After all drilling and completion would be finished, traffic levels would reduce significantly.

**Mitigation:** The operator would encourage car pooling for commuting construction and drilling crews to reduce the number of vehicle trips on local area roads and associated wear and tear.

The operator would encourage commuting construction and drilling crews reduce speeds especially early in the morning hours to reduce traffic related noise at residences along CR 311. These mitigation measures listed above provide methodology for adherence with the lease stipulations.

## VEGETATION

**Lease Stipulation:** None.

**Affected Environment:** Vegetation in the CSGA consists of woodland hillsides dominated by Piñon pine (*Pinus edulis*) and Utah Juniper (*Juniperus osteosperma*) (more than half of the CSGA is covered by Piñon/Juniper, Piñon/Juniper Shrub Mix, or Piñon/Juniper Sagebrush Mix vegetation types) as well as flatter more open areas dominated by big sagebrush (*Artemisia tridentata*). Figure 4 shows the vegetation distribution throughout the CSGA. Other vegetation types include Snowberry/Shrub Mix, Sagebrush Mixes, and Douglas Fir/Douglas Fir Mixes. Dense groves of scrub oak or Gambel's oak (*Quercus gambelii*) can be found in the eastern portion of the CSGA. Additionally, small pockets of serviceberry (*Amelanchier alnifolia*) occur sporadically throughout the CSGA.

Various grasses, forbs and succulent species are also commonly found in the CSGA. In addition to these native species, several undesirable weed species are also found in the area. Some of these include Russian knapweed and houndstongue. Few areas within the CSGA have been infested by weed species (See Invasive, Non-Native Weeds).

Like many areas in Colorado, a few pinyon pines in the CSGA have suffered from engraver beetle (*Ips confuses*) infestation. *Ips* beetles are bark beetles that specifically damage pinyon pine trees by boring under the bark and producing egg galleries that have a girdling effect on the tree's cambium layer. This girdling creates loss of nutrient flow in the tree resulting in mortality. (Colorado State 2004).

**Environmental Consequences:** The Proposed Action would result in a short-term loss of herbaceous and shrubby vegetation and a long-term loss of mature pinyon-juniper woodland vegetation on those portions of the pads, roads and pipelines that will be revegetated following completion of drilling activities. In addition, there would be a long term loss of all vegetation on the access roads and the portions of the pads needed for ongoing production activities. Indirect effects may include the short-term and long-term increased potential for noxious weed invasion; exposure of soils to accelerated erosion; shifts in species composition and/or changes in plant density; reduction of wildlife habitat; and changes in visual aesthetics. These potential effects are discussed in more detail within the following paragraphs and under Invasive, Non-Native Weeds.

Implementation of the Proposed Action would initially disturb up to 114 acres during the construction of the well pads, roads and pipelines. Approximately 29 acres would be reclaimed and re-vegetated upon the completion of drilling on each pad. Herbaceous ground cover would likely re-establish within 1 to 2 years following seeding using native plant species. Given, the arid precipitation zone of the CSGA, it would take at least 7 to 8 years for shrub species to

successfully re-vegetate the CSGA and 20+ years for pinyon pine and Utah juniper to become established. Because multiple wells would be drilled on each pad, the interim reclamation may not begin on a pad until Year 4 of the development phase of the project. The remaining 85 acres would remain disturbed for the long-term life of the wells. This disturbance would occur until the abandoned pads and road corridors would be reclaimed. With implementation of reclamation practices identified in the COAs, desirable vegetative establishment on temporary disturbed areas can be expected. Monitoring of the reclamation would occur as identified in the COAs.

**Mitigation:** Where road, pipeline or pad construction requires the removal of pinyon pine trees, the trees would be disposed of in the following manner to avoid attracting pinyon *Ips* beetles into live standing trees and mitigate effects of ongoing *Ips* beetle infestation in the local area: (1) broken down with earthmoving equipment and buried in excess material pile or at toe of fillslopes; (2) cut down, sectioned and chipped with Hydroaxe-type equipment capable of chipping large pinyon trees; or (3) cut and removed trees from BLM land and hauled to Colorado State Forest Service-approved disposal site.

Reseeded pads will be fenced to exclude livestock grazing until seeded species are established and well-rooted, and 55 percent of seeded species are reproducing. The fencing will be for a minimum of two growing seasons, but a longer period may be required depending on climatic conditions.

## VISUAL RESOURCES

**Lease Stipulation:** Lease Notice – “Special design and construction measures may be required to minimize the visual impacts of drilling activities within five miles of all communities and population centers, major BLM or county roads, and state and federal highways. The overall goal of these measures would be to blend in the disturbance with the natural landscape as much as possible. At a minimum, operations should be designed to insure that the disturbance does not dominate the natural landscape character (VRM Class III objective).”

**Affected Environment:** The CSGA is within areas classified as Visual Resource Management (VRM) Classes III and IV, as identified in the 1984 Glenwood Springs Resource Management Plan. As shown on Figure 5, the northwest portion of the CSGA falls within VRM Class III. The construction of Pads C, K, T, and V as well as the access roads to Pads C and K would be within VRM Class III lands. The remainder of the CSGA is within VRM Class IV. Objectives for each of these VRM classes, as defined in the BLM’s Manual H-8410-1 - Visual Resource Inventory (BLM 1986), are described below:

- The objective of VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- The objective of VRM Class IV is to provide for management activities that require major modifications of existing character of the landscape. The level of change within VRM Class IV areas can be high. Management actions within VRM Class IV may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of activities in areas through careful location, minimal surface disturbance, and repeating the basic landscape elements.

Landscape is currently characteristic of hilly terrain, pinyon juniper woodlands, and open sagebrush communities.

## **View shed Analysis**

In addition to analyzing the potential visual impacts of the proposed project immediately within the CSGA, a view shed analysis was conducted to determine the effects of the project from Key Observation Points (KOP) or in this case, visibility corridors within and near the CSGA. The view shed analysis does not constitute a visual impact analysis. Rather, it is designed as linear KOPs from which potential visual impacts would be observed by the general public.

The view shed analysis was conducted using GIS by calculating uninterrupted lines-of-sight from a regular spacing of points along a chosen observation corridor. Three observation corridors were chosen for view shed analysis: the I-70 corridor from Newcastle to Silt, County Road 311 from I-70 to the southwest corner of the CSGA, and the main road through the CSGA from northwest to southeast near the proposed Pad S. The analysis only considered the visibility of facilities within the CSGA. Areas outside the CSGA were totally ignored.

The roads were digitized as lines, and each point represented a location that was integrated with other viewpoints to construct the view shed. Each point was spaced approximately 400 feet apart, depending on curvature. High curvature contains more points per linear distance; therefore, there were more points per linear distance for analysis. The I-70 corridor contained 350 points, County Road 311 contained 546 points, and the main access road through the CSGA contained 333 points. Obstructions such as structures and tall vegetation are not modeled in the DEM, and were not factored into the view shed analyses. The view shed analysis for all three roads was conducted at a height of two meters above the ground surface, as calculated from a 30-meter DEM (Digital Elevation Model, 30-meter grid sample spacing).

Four visibility categories were calculated for each visibility corridor. The “not visible” category was defined as not being visible from less than 1% of the points. “Low visibility” was defined as being visible from less than 25% of the points. “Moderate visibility” was visible from 25% to 50% of the points. “Highly visible” was defined as being visible from over 50% of the points within an observation corridor.

The visibility of each proposed pad and associated roads and pipelines was analyzed from each visibility corridor, and were analyzed in comparison to the VRM class within which they fall. While some pads may be “highly visible” from some specific locations along the corridor, the visibility category results were based on calculations derived from the entire length of the corridor. The results of the view shed analysis for each visibility corridor are discussed in the following sections. Results are illustrated in Figures 6, 7, and 86.

### **Castle Springs Observation Corridor Results (See Figure 6)**

The Castle Springs access road, which runs through the middle of the CSGA from the northwest to southeast, shows the greatest amount of highly visible terrain, mostly along the higher terrain in the northern and the north-central portion of the CSGA, on the top of Castle Springs, and in the southwestern portion of the CSGA, on the east-facing slopes of Flatiron Mesa. Approximately 75 percent of the CSGA is visible from the main access road. However, only Pad

B would be visible for more than 25 percent of the time along this main access road. All other pads would fall in the less than 25% visibility from this corridor.

### **County Road 311 Observation Corridor Results (See Figure 7)**

County Road 311 passes along the western edge of the CSGA (see Figure 1) from Silt, Colorado approximately five miles to the north. Very little of the CSGA would be visible from this observation corridor. However, Pads U, G, H, I and R would be in areas of low visibility (less than 25 percent) from CR 319. Only Pad U would be within lands with a VRM Class III designation. The other visible pads would be in conformance with VRM Class IV management objectives.

### **I-70 Observation Corridor Results (See Figure 8)**

The CSGA would have low visibility from the I-70 corridor from New Castle to Silt. A viewer on the I-70 corridor would see a facility less than 25 percent of the time if the viewer would be looking south the entire time. Although most of the proposed pads “could be viewed” from I-70, the distance of five miles would make the intermittent viewing of pads literally unnoticeable.

**Environmental Consequences:**

This visual impact analysis responds to the CSGA Lease Notice “The lessee is hereby notified that special design and construction measures may be required in order to minimize the visual impacts of drilling activities within five miles of all communities or population centers throughout the Glenwood Springs Resource Area, major BLM or country roads, and state and federal highways.

Short-term visual impacts due to construction, drilling and completion activities would occur on all new pads, and on existing pads where new wells are proposed. The existing landscape would be changed by introduction of new elements within the landscape in the form of new lines, colors, forms, and textures. New well pad facilities, roads and pipelines would increase oil and gas visual elements (e.g., dozers, drilling rigs, truck traffic, heavy equipment, dust, flaring, lights, etc.) within the CSGA landscape. Construction would take place over a 3- to 4-year period. Drilling activity would occur 24 hours per day. Therefore, the lights from the drill rigs would be visible from the CR 311 corridor at Pads U, G, H, I and R for the 15 to 21 day duration of drilling on these pads.

Long-term impacts of the project consist of reduced visual character within portions of the landscape due to new contrasts from well pad facilities, pipelines and roads.

The protection of VRM classes, landscape character and scenic quality on private and public lands and split estate is discussed on pages 3-41 through 3-45 of the 1999 FSEIS. The impacts of development are discussed on pages 4-49 through 4-54 of the 1999 FSEIS.

Alternative sites, alternative access routes and directional drilling off adjacent pads were considered to mitigate visual impacts. However, due to other resource issues or concerns that included sensitive plants, archaeological resources, topographic limitations, erosive soils, geologic targets, etc. they were not feasible.

**Conformance with VRM Classes**

The design of the CSGAP decreases visual impacts through the directionally drilling of multiple wells from existing and new pads, rather than vertically drilling all 98 new wells on 98 well pads with their associated access roads. However, the introduction of new production facilities on both new and existing pads would still contribute to long-term visual impacts within the landscape on a site-specific basis. The impacts would be most noticeable in the foreground-middleground views. Cumulatively, the addition of new well pads, new production facilities, pipelines, and access roads would change the setting of the CSGA as a whole to more of an industrialized landscape character overall. However, with the proposed mitigation measures and interim reclamation, overall the changes in the landscape would meet VRM Class III objectives.

Within VRM Class III lands, two new well pads (Pads C and K) would be constructed along with about 1 mile of new access roads. Pads T and U would be enlarged. During construction, drilling and completion, the operator’s vehicles, rigs and equipment on the proposed pads would dominate the landscape when viewed from the pad, access road, and from adjacent lands. However, activities on Pads K, C and T would not dominate the landscape from the KOP

corridors. Activities on Pad U may dominate the landscape from the CR 311 corridor and the corridor within the CSGA. As such, the Proposed Action would not meet VRM Class III objectives during the short-term (i.e., construction, drilling and completion phases) at these locations. After interim reclamation and during operations, the well site facilities would be a moderate change in the landscape that may attract attention of the viewer but would not dominate the landscape. As a result, the long-term VRM Class III objectives would be met.

The remainder of the project would be within VRM Class IV lands. During construction, drilling and completion activities, the operator's vehicles, rigs, and equipment on the proposed pads would dominate the landscape in the short term when viewed from the pad, access road, and from adjacent lands. However, activities on all the pads except Pad B would not dominate the landscape from any of the identified KOP corridors. Pad B would dominate the landscape and have short-and long-term visual impacts from the CSGA corridor. However, as level of change within VRM Class IV can be high, objectives of VRM Class IV would continue to be met.

### **Summary of Long-term Visual Impacts**

Potential long-term impacts would be reduced through the directionally drilling of multiple wells from existing and new pads, rather than vertically drilling all 98 new wells and constructing 98 new well pads and access roads. However, the introduction of new production facilities on both new and existing pads would still contribute to long-term visual impacts within the landscape on a site-specific basis. The impacts would be most noticeable in the foreground-middleground views. Cumulatively, the addition of new well pads, new production facilities, pipelines, and access roads would change the setting of the CSGA as a whole to more of an industrialized landscape character overall. Mitigation measures can reduce some impacts to visual resources on a site-specific basis. As a result, the changes in the landscape would meet VRM Class III and Class IV objectives.

### **Mitigation:**

While there are no stipulations attached to the CSGA leases for VRM Class III and IV, the following site specific mitigation and design features will be incorporated into the project to minimize visual impacts.

To help mitigate the contrast of bare, re-contoured slopes, reclamation will include measures to feather cleared lines of vegetation, and to save and re-distribute cleared trees, debris, and rock over re-shaped cut and fill slopes.

All facilities will be painted juniper green (BLM color classification C-34130) to blend in with the vegetation background.

To reduce the visibility of production facilities from visibility corridors, facilities will not be placed in visually exposed locations. Rather, facilities will be placed against backdrops or cut sides of pads and will be placed to allow the maximum re-shaping of cut and fill slopes.

Trees and vegetation will be left along the edges of the pads whenever feasible.

The listed mitigation measures that minimize the visual impacts of drilling activities within five miles of all communities and population centers, major BLM or county roads, and state and federal highways provide adherence to the lease stipulations..

## **WILDLIFE, AQUATIC**

**Lease Stipulation:** None.

**Affected Environment:** Aquatic habitat is nonexistent in the CSGA given the intermittent nature of CSGA streams.

**Environmental Consequences:** As aquatic habitats do not occur within the CSGA, the Proposed Action would not have any direct impact on aquatic wildlife. Potential indirect effects to threatened and endangered fish in the Colorado River are discussed under Threatened, Endangered and Sensitive species.

**Mitigation:** N/A

## **WILDLIFE, TERRESTRIAL**

**Lease Stipulation:** Timing Limitation - No surface use is allowed from December 1 to April 30 in big game winter habitat (mule deer and elk) which includes severe big game winter range and other high value winter habitat as mapped by the Colorado Division of Wildlife. This stipulation does not apply to operation and maintenance of production facilities. Under mild winter conditions, the last 60 days of the seasonal limitation may be suspended after consultation with the CDOW. Severity of the winter will be determined on the basis of snow depth, snow crusting, daily mean temperature, and whether animals were concentrated during the winter months. The limitation may apply to work requiring a Sundry Notice pending environmental analysis of any operational or production aspects.

**Affected Environment:** Habitat for variety of terrestrial wildlife species occurs in the CSGA. Common mammals likely to occur in the CSGA include elk, mule deer, black bear, mountain lion, bobcat, coyote, raccoon, badger, porcupine, Nuttall's cottontail, white-tailed jackrabbit, red fox, ringtail, striped skunk, and various species of shrews, rodents and bats. Bird species include numerous migratory and upland game birds, and raptors. Herptiles potentially found in the Castle Springs geographic area include the plateau lizard, sagebrush lizard, smooth green snake, Great Plains rat snake, western terrestrial garter snake, and western rattlesnake (Hammerson 1999).

Information on elk and mule deer seasonal activity areas were researched and downloaded from the CDOW's Wildlife Resource Inventory System (WRIS) for several types of habitats: summer range, winter range, summer concentration areas, winter concentration areas, severe winter range, production areas, and migration corridors (CDOW 2003). Definitions of these types of habitat, as defined by the CDOW, are shown in Table 12.

**Table 13. CDOW Seasonal Big Game Range Definitions**

<b>Seasonal Range</b>	<b>Definition</b>
<b>Summer Range</b>	That part of the range of a species where 90 percent of the individuals are located between spring green-up and the first heavy snowfall, or during a site specific period of summer as defined for each data analysis unit (DAU). Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.
<b>Winter Range</b>	That part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.
<b>Summer Concentration Area</b>	Those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high-energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.
<b>Winter Concentration Area</b>	That part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.
<b>Severe Winter Range</b>	That part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten
<b>Production Area</b>	That part of the overall range of elk occupied by the females from May 15 to June 15 for calving. Only known production areas have been mapped by the CDOW, additional production areas in each DAU may exist.
<b>Migration Corridors</b>	A specific identifiable corridor through which large numbers of animals migrate and loss of which would change migration routes.

Elk seasonal use areas in the CSGA and the proposed locations that occur in each type of seasonal use area) include the following:

- Summer range – occurs along the eastern border and northeast corner of the CSGA. A very small portion of summer range is found within the southeast and northeast corners of the CSGA. Pad S located in elk summer concentration range.
- Winter range – can be found throughout the majority of the CSGA. All pads, with the exception of S, are located within elk winter range.
- Elk winter concentration – is found only in the southeast corner of the CSGA but lies less than a quarter mile north of the northern CSGA boundary. No pads are located within elk winter concentration areas.
- Severe winter range – occurs in approximately a quarter (the northwest section) of the CSGA and along the western boundary. Pads C, K, T, and U are found in elk severe winter range.

Mule deer seasonal use areas in the CSGA and the proposed locations that occur in each type of seasonal use area) include the following:

- Summer range - occurs along the western boundary and in the southeast corner of CSGA. Pads R and S are located within summer range and pads Q and I are within .25 mile of the summer range.
- Winter concentration area – can be found in the northwest portion of the CSGA. Pads K, T, and U are located within mule deer winter concentration areas and Pad C is sited within .25 mile.
- Severe winter range – overlaps the majority of the winter concentration area in the northwest portion of the CSGA and runs along the western boundary. Pads K, T, and U are located within this range.

All of the proposed well pads in the CSGA have Timing Limitation stipulations (TLs) associated with their corresponding lease agreements that limit surface use in crucial big game winter habitat during the winter months. Therefore, no construction, drilling, or completion work is allowed from December 1 through April 30 in the CSGA. A waiver can be considered for the last 60 days of the period if mild winter conditions exist.

Timing limitations help protect big game by limiting surface use during peak big game activity in winter habitats. Windsor would abide by these lease stipulations as a part of their standard operating procedure.

**Environmental Consequences:** The Proposed Action would result in the initial loss and fragmentation of 114 acres of wildlife habitat. While vegetation in the area provides important habitat for many wildlife species, the vegetation communities found in the CSGA are widespread throughout Glenwood Springs Field Office area. As such, the loss of 114 acres of forage would not adversely impact viability of most wildlife species in the CSGA. Following partial reclamation of new well pads and roads, long-term forage disturbance would be reduced to approximately 87 acres. Interim reclamation activities would benefit some wildlife species by increasing herbaceous forage. In areas where shrubs and trees would be disturbed, impacts to wildlife from loss of thermal and/or hiding cover would be long-term, lasting the 20 to 30+ years following reclamation that it would take for these woody species to re-establish.

The primary concern for terrestrial wildlife is the potential effect of the project on big game, particularly impacts to big game wintering activities. The CSGA contains critical winter range for mule deer and elk. Activity within these habitats during the winter has the potential to displace mule deer and elk from these important habitats. Construction activities, soil disturbance, and traffic could potentially spur the introduction and spread of weed species within the CSGA. Weed invasion and establishment has become an increasingly important concern associated with surface disturbing activities in the west. Weeds often out-compete native plant species, rendering an area less productive as a source of forage for wildlife. However, implementation of the suggested mitigation measures in the Invasive, Non-Native Weeds section of this EA would minimize the potential for invasion and establishment of the CSGA by undesirable plants.

Construction and drilling operations would likely result in the temporary displacement of wildlife species from the CSGA into surrounding habitats. Depending on the suitability of adjacent habitats, displacement from habitats can result in high animal mortality rates and reduced breeding success. The increased network of roads and associated traffic would increase mortality and injury from big game collisions with vehicles, illegal hunting, and harassment from people and their dogs. Vehicle traffic and soil excavation could result in the direct mortality of nesting birds, small mammals, amphibians and reptiles occurring in the CSGA. If construction were to occur during the spring, the Proposed Action could also result in the direct mortality of eggs and/or nestlings within the CSGA.

The extent to which human activity disturbs big game varies by species and other factors such as timing of disturbance, topography, vegetative screening, habituation to disturbance, and frequency and intensity of disturbance. The amount of habitat lost due to displacement is termed “effective habitat loss”. In some areas, research has shown big game reduce their habitat use within a 1/8-mile buffer on either side of roads. This “effective habitat loss” displacement factor was used to analyze indirect impacts to big game species in the 1999 FEIS, and the same methodology is used to evaluate impacts to big game in the CSGA. Based on the total disturbance (existing and new roads and pads), the Proposed Action would indirectly in decreased habitat use and available forage in approximately 2,237 acres within 1/8 mile of existing and proposed facilities.

Elk and mule deer forage on a variety of vegetation and diet composition is largely dependant upon the season and amount of available forage. In spring and summer mule deer feed on green leaves, herbs, weeds and grasses more than on browse species. The reverse is true in fall and winter. Elk on the other hand are predominantly grazers, and commonly only consume browse during winter months. As a wide variety of vegetation occurs within the 1/8-mile buffer around all proposed and existing facilities and roads, these areas are commonly used by big game as foraging habitats. Table 13 shows the distribution of vegetation types within the 2,237 acre buffer. Although big game do typically avoid areas of human disturbance, habitat avoidance is typically short-term in nature (i.e., during construction and when human activity occurs). As such, the presence of roads, well pads, and associated human activity in the CSGA may temporarily alter big game behavior however these activities would not make the adjacent area unsuitable for big game foraging.

**Table 14. Vegetation Within 1/8-Mile Buffer Surrounding CSGAP Facilities and Roads**

<b>Vegetation Type</b>	<b>Area Within 1/8-Mile Buffer (acres)</b>	<b>Percentage Within Total Buffer</b>
Aspen	0.3	0.0%
Conifer Riparian	6.8	0.3%
Cottonwood	2.8	0.1%
Willow	44.4	2.0%
Water	2.7	0.1%
Talus Slopes & Rock Outcrops	7.9	0.3%
Sparse PJ/Shrub/Rock Mix	7.2	0.3%
Shrub Riparian	12.7	0.6%
Sagebrush/Mesic Mountain Shrub Mix	46.7	2.1%

Sagebrush/Grass Mix	30.5	1.3%
Sagebrush Community	118.7	5.2%
Pinon-Juniper	601.8	26.5%
PJ-Sagebrush Mix	178.4	7.8%
PJ-Oak Mix	233.8	10.3%
PJ-Mountain Shrub Mix	375	16.5%
Mesic Mountain Shrub Mix	51.6	2.3%
Gambel Oak	524.8	23.1%
Douglas Fir	27.1	0.0%

**Mitigation:** As required by lease stipulations, Windsor shall avoid all well pads, central station, and pipeline related construction, drilling, and completion activities within critical deer and elk winter range between December 1 and April 30. After consultation with the CDOW, exceptions to these lease stipulations may be granted for federal surface locations during the last 60 days of the respective timing limitation under mild winter conditions. Severity of winter conditions will be determined on the basis of snow depth, snow crusting, daily mean temperatures, and whether big game were concentrated on winter range within the area during the winter months.

Standard measures are incorporated into the APD along with other measures (i.e., automatic well reporting, and reclamation) to conform to the FSEIS that will help to mitigate wildlife impacts.

**Threshold Analysis for Wildlife and Wildlife Habitat Mitigation:** In addition to the mitigation measures proposed above, the FSEIS Record of Decision (March 1999) on page 14 it states that: *“Within high value or crucial big game winter range, the operator is required to implement specific measures to reduce impacts of oil and gas operations on wildlife and wildlife habitat...Measures to reduce impacts would generally be considered when well density exceeds four wells per 640 acres, or when road density exceeds three miles of road per 640 acres.”* Furthermore, Lease Notice GS-LN-05 states: *“Within high value or crucial big game winter range, the operator is required to implement specific measures to reduce impacts of oil and gas operations on wildlife and wildlife habitat.”*

The road and well density threshold analysis was completed for the 15 new surface locations and associated access roads, and the 3 existing pads located within the CSGA boundary. The maximum well pad density is 3 per 640 acres. The road density would be 13.75 miles of road attributed to oil and gas development distributed over 4,087 acres. The resultant road density would be 2.2 miles/640 acres. Thus, the threshold for surface locations would not be exceeded. However, if future activity within the CSGAP exceeds the proposed level of activity and would exceed the threshold values, mitigation would be sought by BLM.

**OTHER NON-CRITICAL ELEMENTS:** For the following elements, those brought forward for analysis would be formatted as shown above.

**Table 15. Other Non-Critical Elements**

<b>Non-Critical Element</b>	<b>NA or not Present</b>	<b>Applicable or Present, No Impact</b>	<b>Applicable and present and Brought Forward for Analysis</b>
Travel/Access			X
Cadastral Survey	X		
Fire/Fuels Management	X		
Forest Management	X		
Geology and Minerals			X
Hydrology/Water Rights			X
Law Enforcement	X		
Paleontology			X
Noise			X
Range Management			X
Realty Authorizations		X	
Recreation		X	
Socio-Economics		X	
Transportation			X
Visual Resources			X

**ADDITIONAL ISSUES**

None.

**CUMULATIVE IMPACTS SUMMARY**

The 2004 Draft Roan Plateau Resource Management Plan & Environmental Impact Statement released in November, 2004 (BLM 2004) analyzed five alternatives for oil and gas development in the Roan Plateau planning area. These alternatives assessed impacts, including cumulative impacts, for oil and gas scenarios ranging from 855 to 1,582 new gas wells on public lands. The drilling of the wells addressed in this Environmental Assessment is well below the low range of development analyzed in the DEIS.

Since the completion of the 1999 Oil and Gas Leasing and Development FEIS, the number of wells analyzed in subsequent NEPA documents has exceeded the 230 federal wells forecast in the RFD for lands outside the NOSR Production Area. However, drilling technology advancements have drastically reduced the expected surface disturbance of 3.4 acres per well or 1,020 acres from federal wells analyzed in the 1999 FSEIS. The FSEIS analysis was based on a reasonably foreseeable development scenario, including the number of wells. Well spacing, required equipment, and assumed pollutant emission rates. Since completion of the FSEIS, the majority of new wells have been drilled directionally and, in many instances, are being drilled from existing well pads thereby reducing the overall anticipated surface impact addressed in the 1999 FSEIS.

The air quality analysis conducted in the 2004 DEIS does assess the impacts to the airshed from oil and gas development within and around the Roan Plateau Planning Area. The Proposed Action addressed in this document, which include well pad and road construction, well drilling and well completion work typical for oil and gas development, would not represent an increase in emissions beyond that anticipated in the 2004 DEIS.

## **PERSONS / AGENCIES CONSULTED**

### **PUBLIC INVOLVEMENT**

The Council on Environmental Quality (CEQ) regulations require an “early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a Proposed Action” (40 CFR 1501.7). In order to satisfy this CEQ requirement, the BLM requested input from the public to determine their concerns and issues with Windsor’s proposal, to develop alternatives to the proposal that respond to those issues, to analyze the environmental effects of the Proposed Action and to prepare the environmental document for the CSGAP.

The legal notice addressing the CSGAP Proposed Action was published in the Citizen Telegram, a newspaper in Glenwood Springs that has a circulation in Garfield County. The Proposed Action notice was published on January 20, January 27, and February 3. Additionally, a copy was mailed directly to multiple state and federal agencies, adjacent landowners, the Garfield County oil and gas auditor, the City of Rifle, and the Colorado Department of Wildlife. The 30-day comment period ended on February 20, 2005.

One comment letter was received. The respondent objected to the well drilling overtaking Garfield County and the effects on the environment and welfare of all its residents.

### **Key Issues**

Key issues were defined as issues that 1) drive the analysis of environmental effects; 2) prescribe or necessitate the development of mitigation measures; 3) drive the development of additional project alternatives. These key issues are summarized as follows:

- Soil Erosion
- Construction and operational methods to prevent erosion.
- Interim reclamation methods
- Visual effects

### **Non-Key Issues**

Non-key issues were identified as those: 1) outside the scope of the Proposed Action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific or factual evidence; or 5) are

general opinions or position statements of a general nature; 5) public issues/requests/concerns that cannot be enforced by BLM. The CEQ NEPA regulations require this delineation in Sec. 1501.7; "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)". These non-key issues (and a brief rationale as to why they are categorized as non-key issues) are summarized as follows:

In addition to the public "scoping" period, BLM has initiated formal consultation with the Southern Ute, Ute Mountain Ute, and Northern Ute Tribes. BLM has also coordinated with the Colorado Division of Wildlife.

The EA was prepared by an interdisciplinary team of resource specialists from Buys & Associates Environmental Consultants (a third-party contractor) with direction from and independent review by BLM employees in the Glenwood Springs Field Office. The following tables list the BLM staff members who provided review for the EA and the people from Buys & Associates who prepared the EA.

**Table 16. List of Buys & Associates Preparers**

<b>Resource Parameter/Area of Responsibility</b>	<b>Responsible B&amp;A Member</b>
Project Management, Air Quality, Noise, Visuals, Transportation, Recreation	Don Douglas
Biological Resources, Land Use, Socioeconomics	Kirby Carroll, Stephanie Stewart
Geology, Hydrology, Soils	Dave Nicholson
GIS	Roger Melick
NEPA Review, Technical Editor	Dawn Martin

**Table 17. List of BLM Interdisciplinary Reviewers**

<b>Resource Parameter/Area of Responsibility</b>	<b>Responsible IDT Member</b>
Air Quality	Mark Wimmer
Areas of Critical Environmental Concern	Kay Hopkins
Cultural Resources	Cheryl Harrison
Environmental Justice	Bill Barter
Farmlands, Prime and Unique	Bill Barter
Floodplains	Mark Wimmer
Invasive, Non-Native Species	Carla Scheck
Migratory Birds	Tom Fresques
Native American Religious Concerns	Cheryl Harrison
Threatened, Endangered and Sensitive Species	Tom Fresques (wildlife), Carla Scheck (plants)
Wastes, Hazardous or Solid	Bill Barter
Water Quality, Surface and Ground (including 404 permit issues)	Mark Wimmer, Jim Scheidt
Wetlands and Riparian Zones	Mike Kinser
Soils	Mark Wimmer
Vegetation	Carla Scheck
Wildlife, Aquatic	Tom Fresques
Wildlife, Terrestrial	Tom Fresques
Travel/Access	Brian Hopkins Dorothy Morgan
Geology and Minerals (Adverse Energy Impact Statement)	Jim Wilkinson Bruce Fowler
Hydrology/Water Rights	Mark Wimmer Jim Scheidt Bruce Fowler
Paleontology	Jim Wilkinson
Range Management	Mike McGuire
Realty Authorizations	Vaughn Hackett
Recreation	Kay Hopkins
Socio-economics	Brian Hopkins
Visual Resources	Kay Hopkins

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**FINDING OF NO SIGNIFICANT IMPACT (FONSI)**

**CO-140-05-009 EA**

The environmental assessment analyzing the environmental effects of the Proposed Action has been reviewed. The Proposed Action with any approved mitigation measures result in a Finding of No Significant Impact on the human environment. Therefore, an environmental impact statement is not necessary to further analyze the environmental effects of the Proposed Action.

**DECISION RECORD**

DECISION AND RATIONALE: It is my decision implement the proposed action as described herein and approve the Applications for Permit (APD) for all wells identified in Figure 1 of the Proposed Action.

This decision does not modify any lease terms and stipulations attached to the specific leases involved. Updates and amendments to the Geographic Area Plan may be made over the course of the term of the drilling program. Depending on the magnitude of the changes in future, additional NEPA compliance documentation may be necessary if determined to be outside the scope of the analysis.

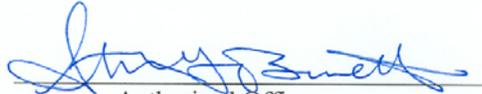
The rationale for selecting the Proposed Action:

1. Approval of the Proposed Action is validating the rights granted with the federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.
2. The environmental impacts have been mitigated with measures included in the Surface Use Plan and attached Conditions of Approval.

MITIGATION MEASURES: Mitigation Measures for the Proposed Action are listed in the environmental assessment. Standard and site-specific mitigation measures are outlined in the environmental assessment and will be included and/or referenced in individual APDs.

NAME OF PREPARER: Don Douglas, Project Manager/Senior Scientists.  
Buys & Associates, Environmental Consultants.

SIGNATURE OF AUTHORIZED OFFICIAL:

  
Authorized Officer

DATE SIGNED:

June 22, 2005

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APPENDICES:

ATTACHMENTS:

Castle Springs GAP Surface Use Plan

Castle Springs GAP Standard Conditions of Approval

Castle Springs GAP Site-Specific Conditions of Approval

Castle Springs GAP Erosion Control and Reclamation Plan

## **Figures 1 through 8**

Figure 1 – Castle Springs GAP Proposed Action

Figure 2 – Landslide Areas and Adjacent Water Wells

Figure 3 – CSGAP Soils

Figure 4 – CSGAP Vegetation

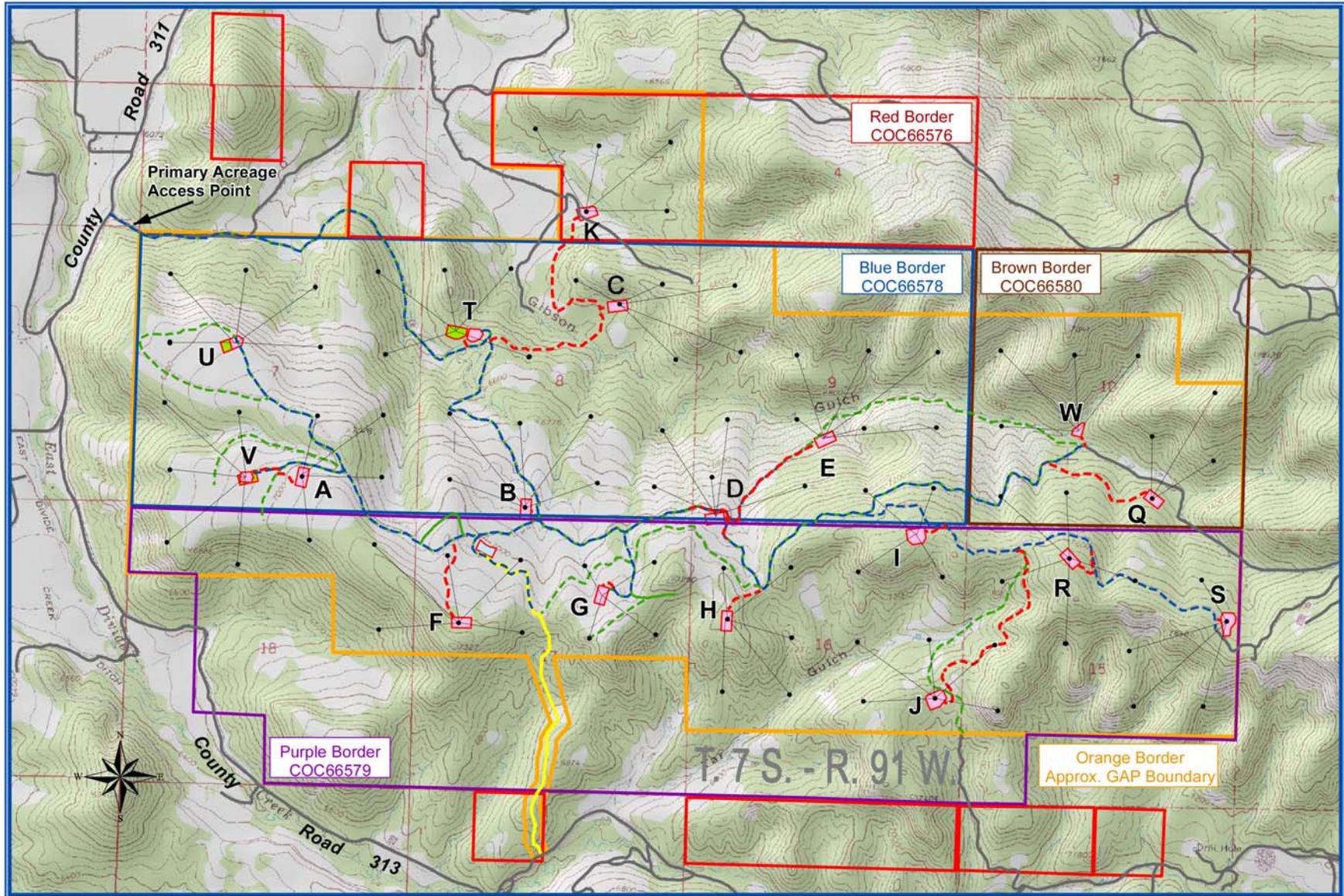
Figure 5 – Visual Resource Management Units in and Near the CSGAP

Figure 6 – Viewshed Analysis within CSGAP

Figure 7 - Viewshed Analysis from County Road 311

Figure 8 – Viewshed Analysis from I-70

# Windsor Energy Group LLC - Castle Springs GAP



- |                               |                             |                            |                                 |
|-------------------------------|-----------------------------|----------------------------|---------------------------------|
| Existing Roads - county, etc. | Windsor used BLM roads      | Proposed central station   | Proposed and existing well pads |
| Existing BLM Roads            | Proposed new access roads   | Proposed pads extension    | Proposed pipeline               |
|                               | CS GAP Proposed Wells (BHL) | Wellbore Deviation Pathway |                                 |

Figure 1

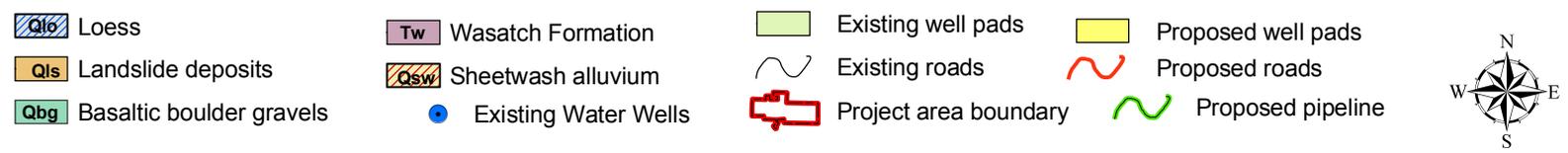
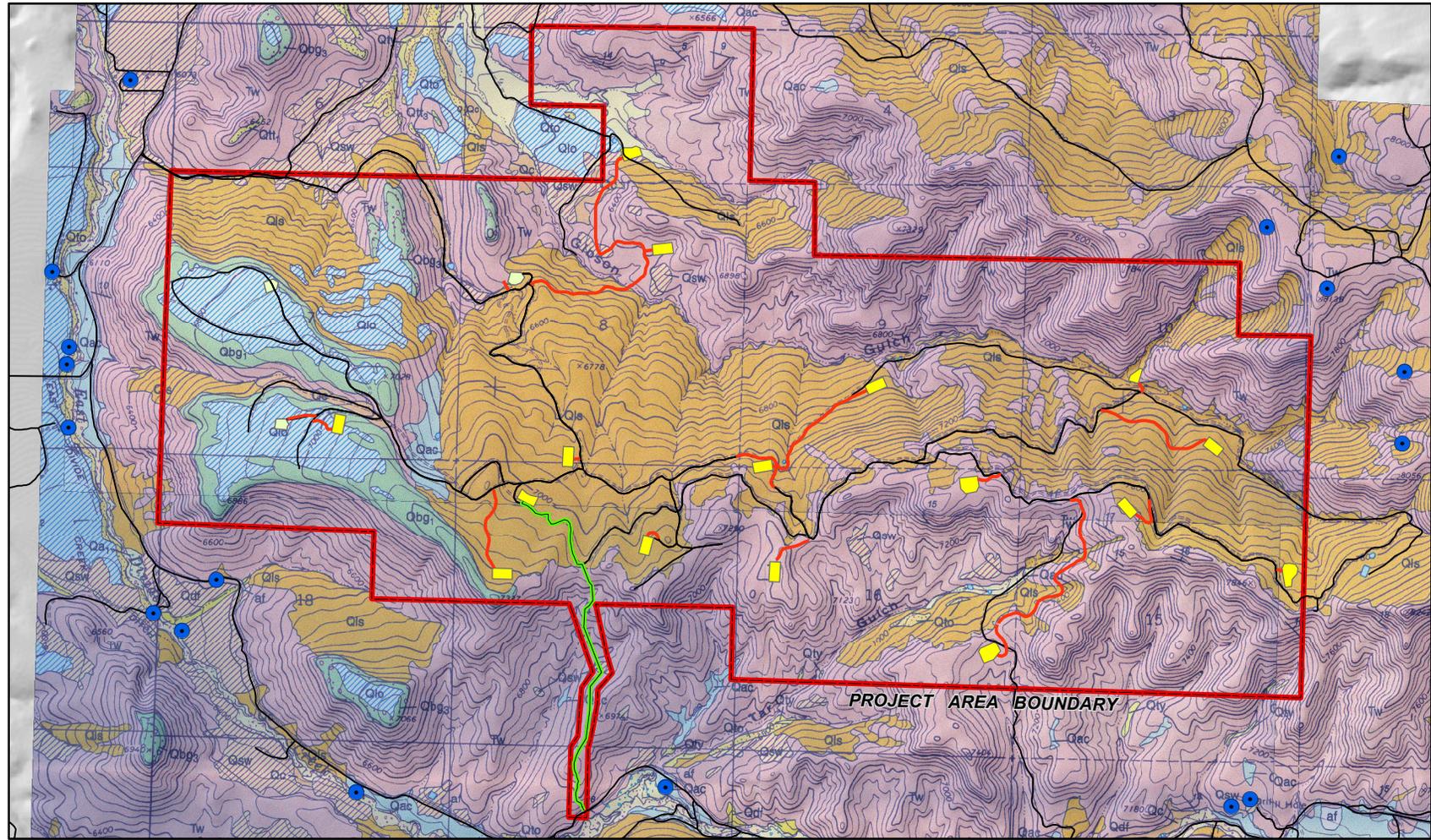
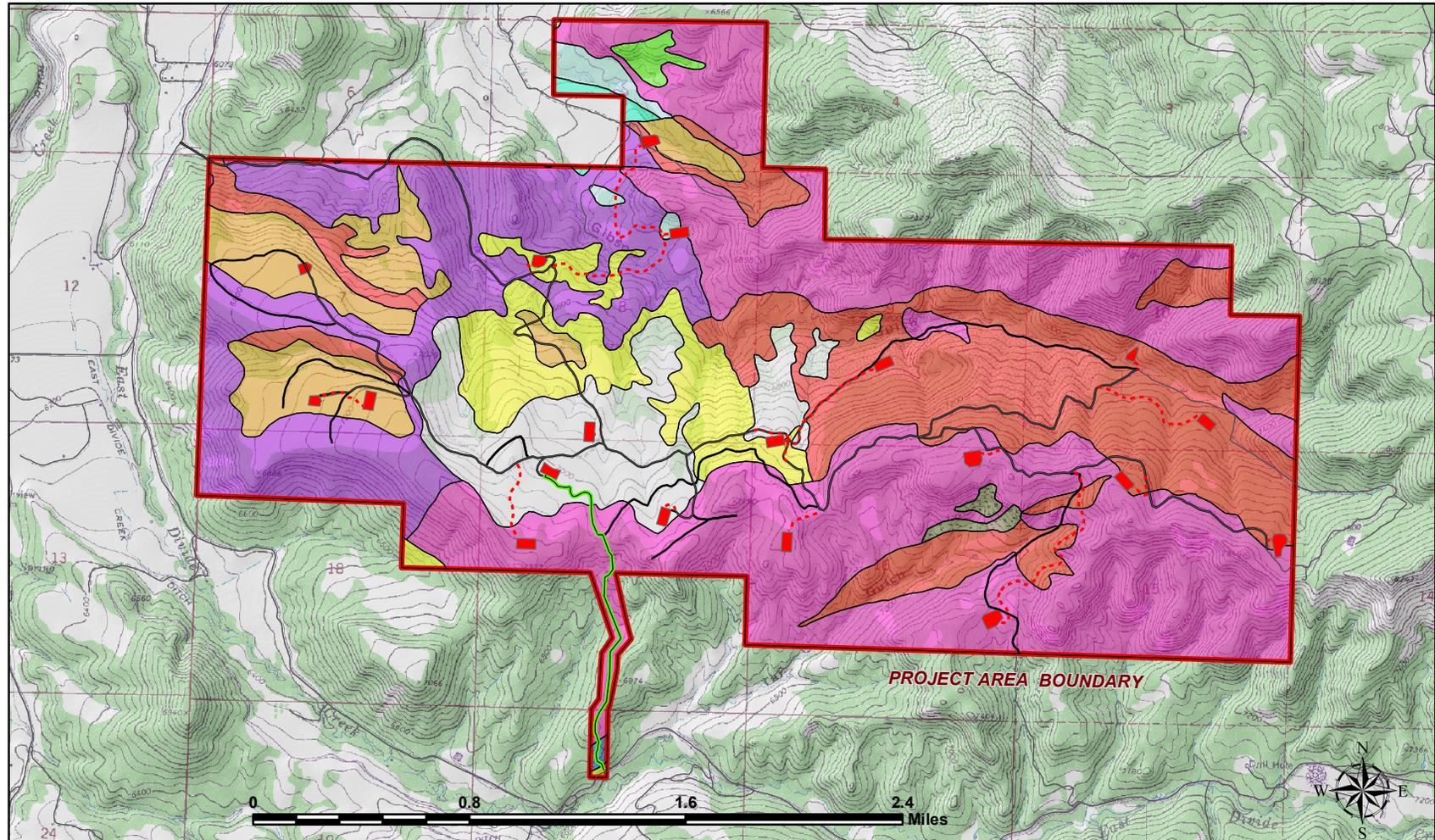
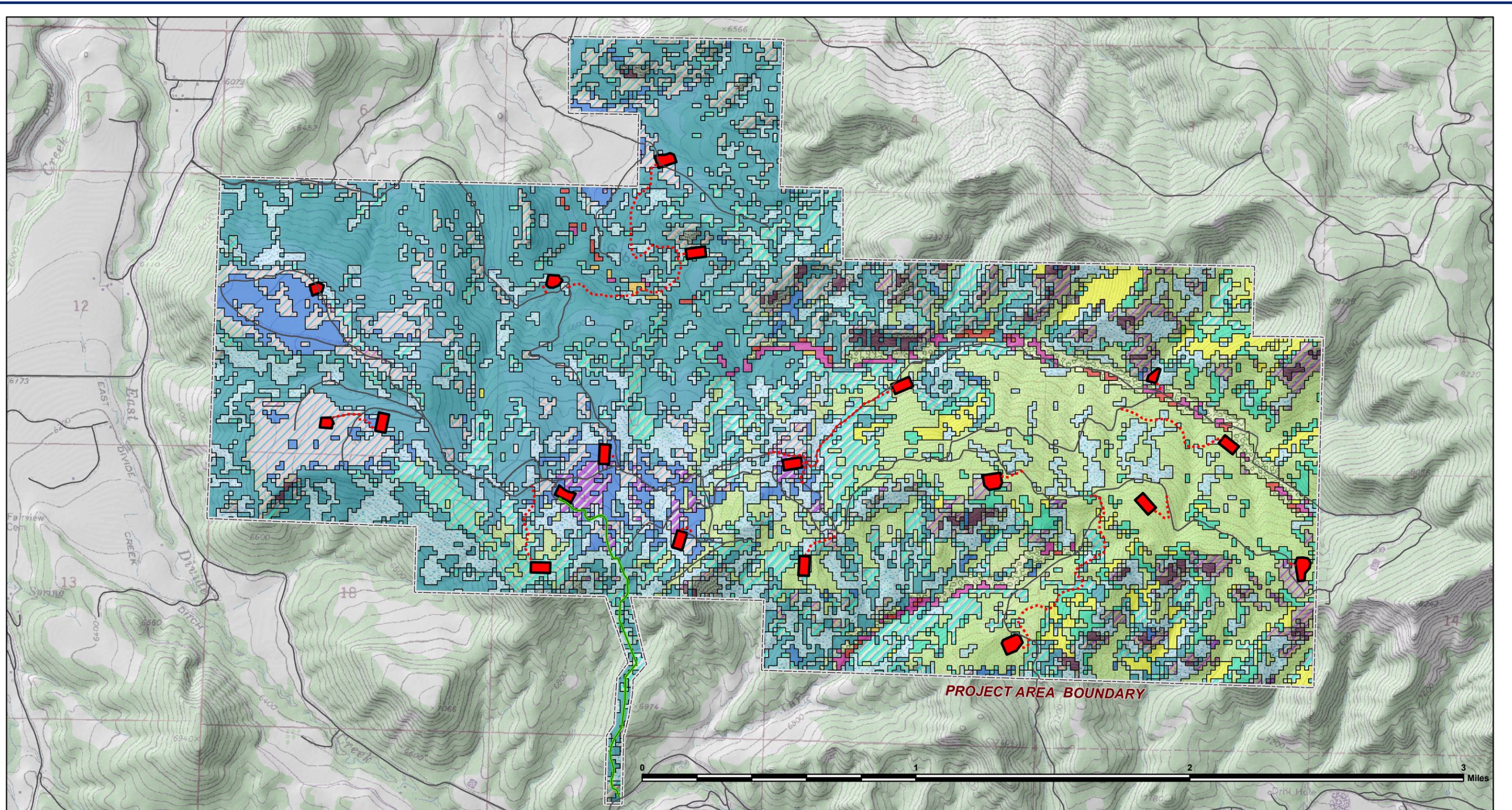


Figure 2. Landslide Areas (Modified from Madole and Streufert, 2003) and adjacent Water Wells



- |  |   |  |
|--|---|--|
| Bucklon-Inchau loams, 25 to 50 percent slopes  | Olney loam, 6 to 12 percent slopes                | Torriorthents-Camborthids-Rock outcrop complex |
| Morval loam, 3 to 12 percent slopes            | Potts loam, 3 to 6 percent slopes                 | Torriorthents-Rock outcrop complex, steep      |
| Morval-Tridell complex, 6 to 25 percent slopes | Potts loam, 6 to 12 percent slopes                | Vail silt loam, 6 to 12 percent slopes         |
| Torrifluvents, nearly level                    | Villa Grove-Zoltay loams, 15 to 30 percent slopes | Well Pads                                      |
|  |   | Proposed Roads                                 |
|  |   | Proposed Pipeline                              |

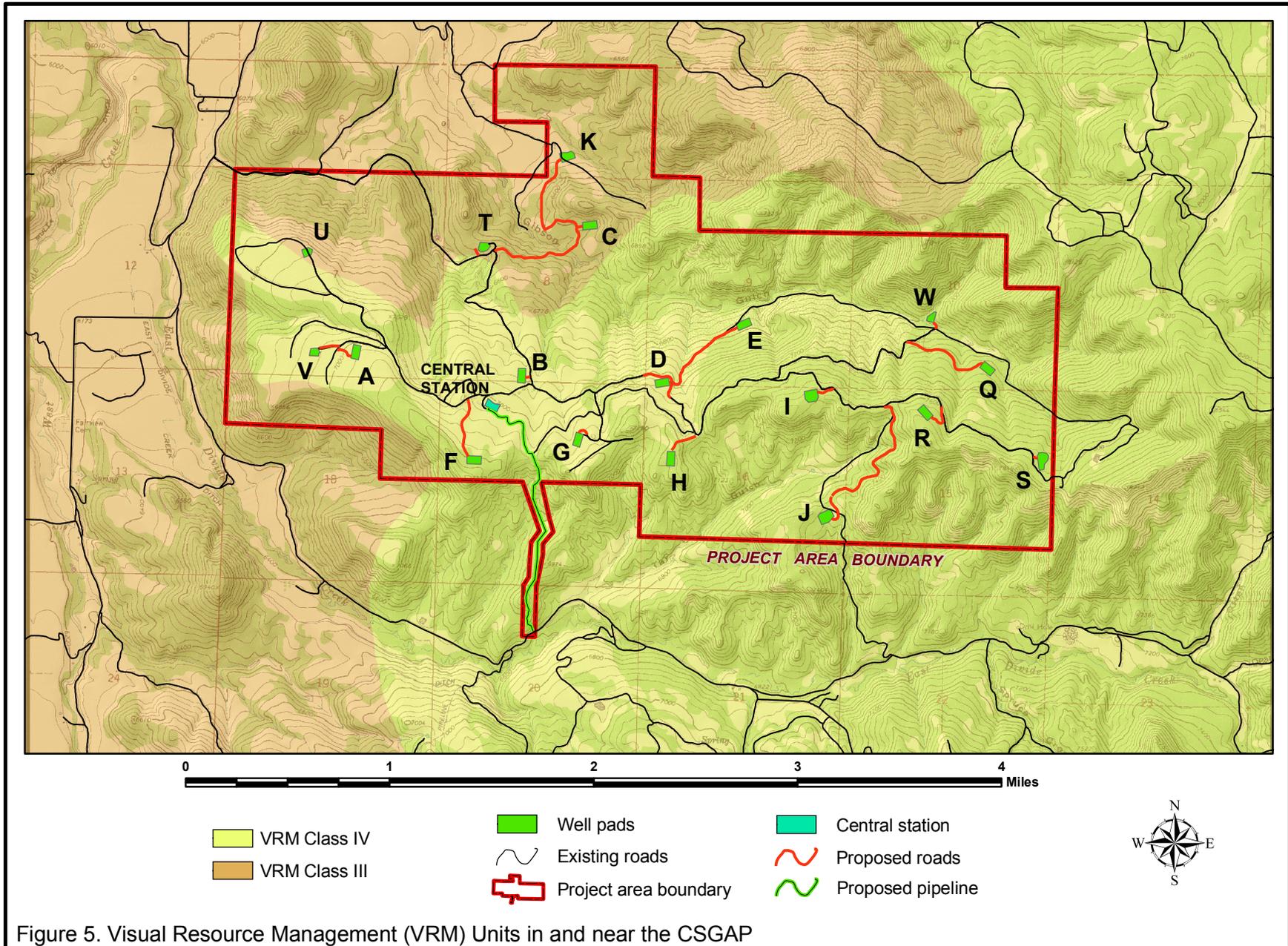
Figure 3. CSGAP Soils (From the Soil Conservation Survey, 1985)



- |                                |                       |                          |                               |                              |
|--------------------------------|-----------------------|--------------------------|-------------------------------|------------------------------|
| Willow                         | Cottonwood            | Mesic Mountain Shrub Mix | Pinon-Juniper                 | Shrub Riparian               |
| Aspen                          | Douglas Fir           | PJ-Mtn Shrub Mix         | Sagebrush Community           | Snowberry/Shrub Mix          |
| Aspen/Mesic Mountain Shrub Mix | Douglas Fir/Aspen Mix | PJ-Oak Mix               | Sagebrush/Grass Mix           | Sparse PJ/Shrub/Rock Mix     |
| Conifer Riparian               | Gambel Oak            | PJ-Sagebrush Mix         | Sagebrush/Mesic Mtn Shrub Mix | Talus Slopes & Rock Outcrops |
|                                | Proposed Roads        | Well Pads                | Proposed Pipelines            |                              |



**Figure 4. CSGAP vegetation.**



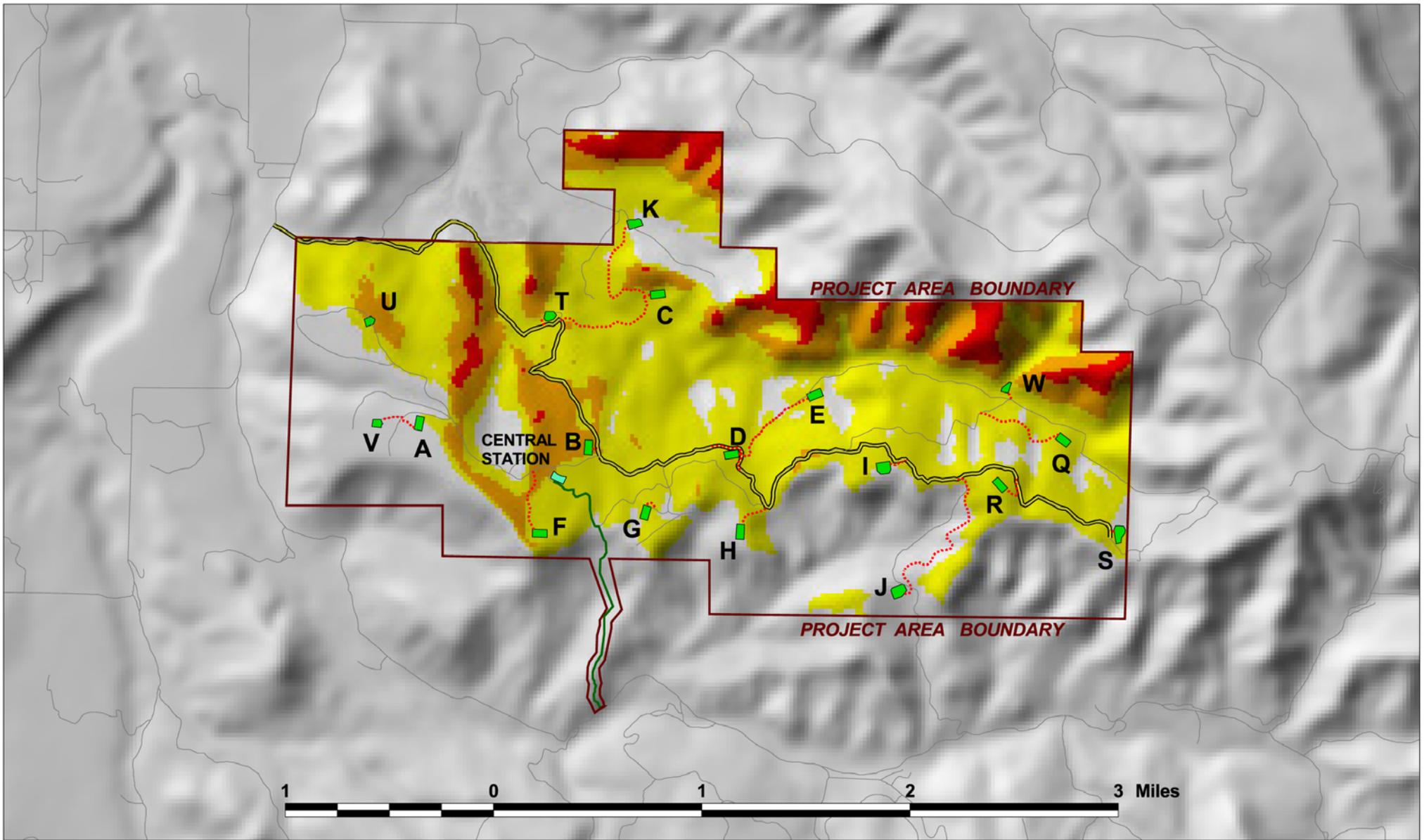
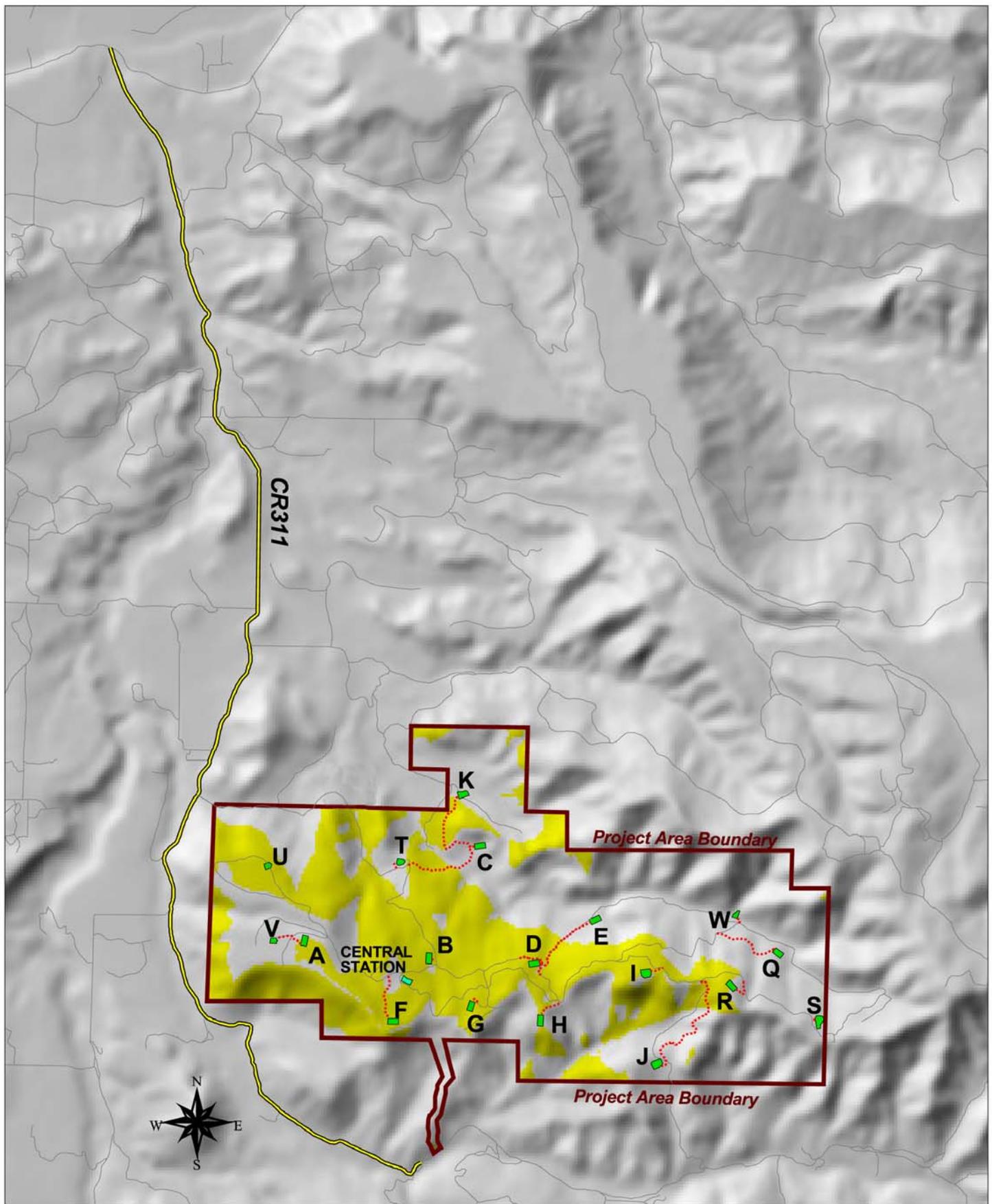


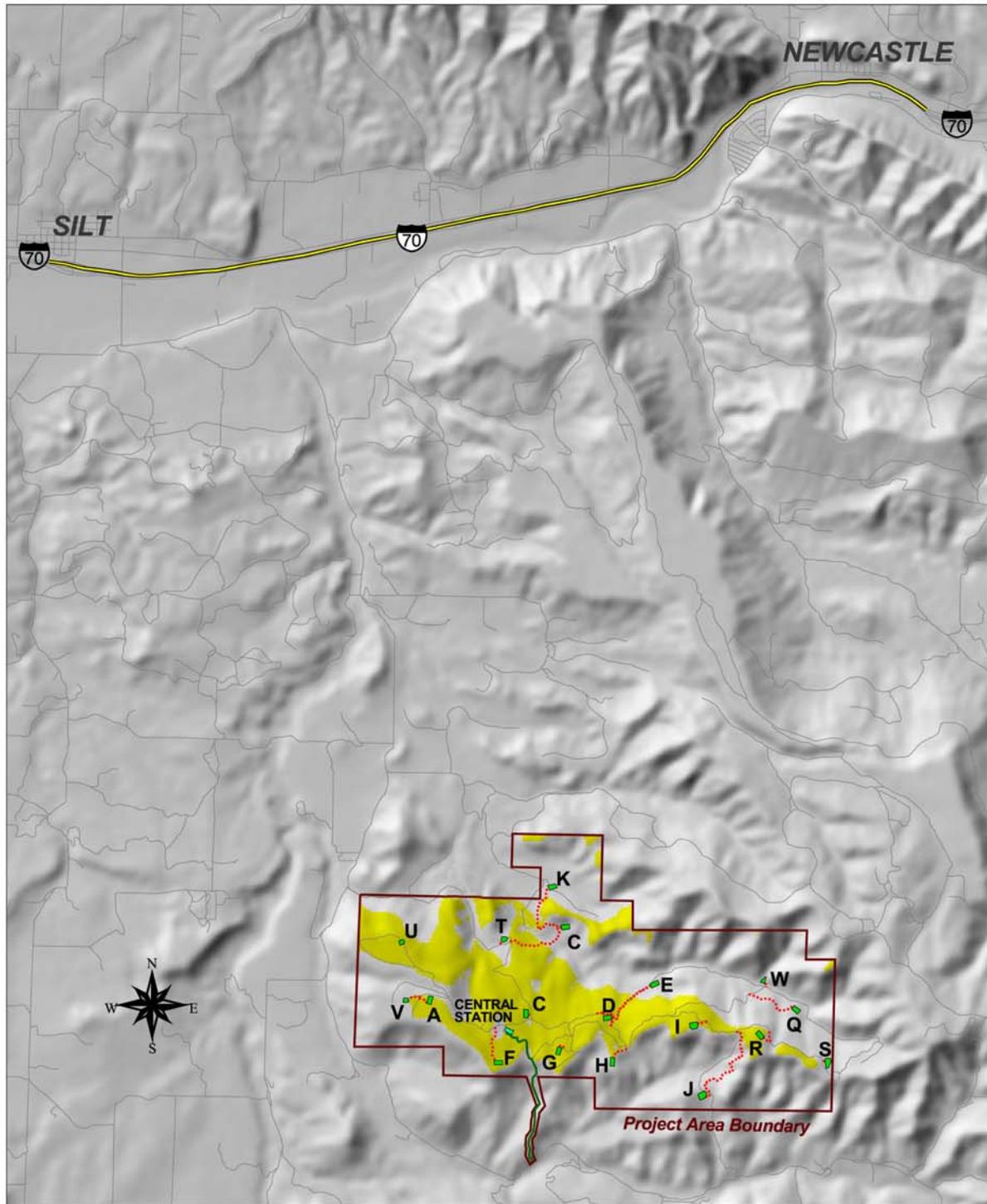
Figure 6. Viewshed Analysis within CSGAP.



2 0 2 Miles

- Low visibility
- Moderate visibility
- High visibility
- No visibility (areas outside of project area not analysed)
- Well Pads
- Visibility corridor
- Proposed Roads
- Proposed Pipeline

Figure 7. Viewshed Analysis from County Road 311.



- Low visibility
- Moderate visibility
- High visibility
- No visibility (areas outside of project area not analysed)
- Well Pads
- Visibility corridor
- Proposed Roads
- Proposed pipeline

Figure 8. Viewshed Analysis from I-70.

## Surface Use Plan

### Castle Springs GAP

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#### 1. EXISTING ROADS

- A. The attached Figure 1 shows the existing roads and well pads.
- B. The existing roads will be maintained in the same or better condition as existed prior to the commencement of operations and maintenance will continue until final abandonment and reclamation of the well location. Excessive rutting or other surface disturbance will be avoided. Operations may be suspended temporarily during adverse weather conditions if excessive rutting is occurring when access routes are wet, soft, or partially frozen and an acceptable detour route cannot be established.

#### 2. PLANNED ACCESS ROAD

All proposed access roads are shown on Figure 1.

- A. Right-of-Way Width – The construction right-of-way width shall vary with the terrain. All trunk roads shall be constructed with an 18-foot wide running surface, crowned and ditched as appropriate for surface drainage. All access roads connecting the well pad to the trunk roads shall be constructed with a 12-foot wide running surfaces. An exception may be the road to Pad C which may have to be constructed to an 18-foot running surface in certain locations. Similar to the trunk roads, the construction right-of-way width shall vary with the terrain.
- B. Construction standard – all new roads will be constructed in accordance with the “Gold Book” standards to meet the anticipated traffic flow and weather requirements. Construction will include ditching, crowning, or sloping the roadbed as necessary to provide adequate drainage.

Prior to construction/upgrading, the roadway shall be cleared of any snow cover and allowed to dry completely.

All travel will be confined to road right-of-ways.

Road drainage crossings shall be of the typical dry creek drainage crossing type. Crossings shall be designed so they will not cause siltation or the accumulation of debris in the drainage crossing. Additionally, the road bed shall not block the runoff. Diverting water off at frequent intervals by means of cutouts shall prevent erosion of the drainage ditches by runoff water.

Upgrading shall not be allowed during muddy conditions. Should mud holes develop, they will be filled in and detours would be provided around the mud holes.

- C. Maximum grade – the average road grade will be 10% or less, wherever possible. The 10% grade will only be exceeded in accordance with provisions in the Gold Book or with approval of the Authorized Officer.
- D. Drainage design – the access road will be crowned and ditched or sloped and dipped as necessary to provide proper drainage along all roads.
- E. Turnouts will be constructed along the access route as required to allow for the safe passage of traffic.
- F. Culverts for access across Gibson Gulch to Pads C and W shall be designed to handle a 25-year flow.
- G. Surface materials – surfacing materials will consist of a base of native soil. A 4-inch deep layer of gravel shall then be applied on all roads within the GAP. If any additional surfacing materials are required they will be purchased from a local contractor having a permitted source of materials in the area.
- H. Gates, cattle guards or fence cuts – none required unless specified during the onsite inspection.
- I. Road maintenance – during the drilling and production phase of operations, the road surface and shoulders will be maintained in accordance with the original construction standards. The access road right-of-way will be kept free of trash generated by operations.
- J. All proposed access roads have been centerline flagged.
- K. The operator is responsible for applying dust abatement measures as needed or directed by the Authorized Officer to reduce fugitive dust emissions from access roads. The level and type of treatment (watering or application of various dust agents, surfactants and road surfacing material) may be changed in frequency, intensity, etc., and must be approved by the Authorized Officer. Dust control is needed to prevent heavy plumes of dust from road use that create safety problems and disperses heavy amounts of particulate matter on adjacent vegetation.

### **3. LOCATION OF EXISTING WELLS WITHIN A ONE MILE RADIUS**

There are no existing wells with a one-mile radius.

### **4. LOCATION OF EXISTING AND/OR PROPOSED FACILITIES**

- A. At each pad, surface disturbance will be kept to a minimum. Each pad will be leveled using cut and fill construction techniques as noted in the attached surveys. Drilling will occur on cuts rather than fills.
- B. Construction shall adhere to the following standards:
1. All proposed gas and water lines will be placed within existing or proposed roadway disturbance areas.
  2. Pipelines will be buried to a minimum depth of 3 feet, except at road crossings where they will be buried to a minimum depth of 4 feet.
  3. Construction width of the gas transmission pipeline right-of-way shall be variable in width, based on the terrain.
  4. Pipeline location warning signs shall be installed within 90 days after construction is completed.
  5. Windsor shall reclaim pipeline right-of-ways in a manner to preclude vehicular travel upon the rights-of-way, except for access to pipeline drips and valves.
  6. A pipeline right-of-way will be requested on the APD. ROW request is for variable width for construction of working surface during construction. After construction is complete, the entire right-of-way will be rehabilitated.
  7. The area used to contain the proposed production facilities will be built using native materials. If these materials are not acceptable, arrangements will be made to acquire appropriate materials from private sources.
  8. An earthen dike will be constructed or corrugated metal rings will be installed completely around any production facilities which contain hydrocarbon fluids (i.e. production tanks or fuel containers). These dikes will be constructed of compacted subsoil, be impervious, hold 110% of the capacity of the largest tank, and be independent of the back cut.
  9. All permanent (onsite for six months or longer) above-the-ground facilities constructed will be painted a flat non-reflective, earth tone color to match one of the standard environmental colors as determined by the five State Rocky Mountain Interagency committee. All production facilities will be painted juniper green (BLM color classification C-34130) within six months of installation. Facilities required complying with Occupation Health and Safety Act Rules and Regulations will be excluded from this painting requirement.

10. If different production facilities are required, a sundry notice will be submitted.
- C. Windsor shall protect all survey monuments, witness corners, reference monuments and bearing trees in the affected areas against disturbance during construction, operation, maintenance and termination of the facilities authorized herein.
- Windsor shall immediately notify the authorized officer in the event that any corners, monuments or markers are disturbed or are anticipated to be disturbed. If any monuments, corner or accessories are destroyed, obliterated or damaged during construction, operation or maintenance, Windsor shall secure the services of a Registered Land Surveyor to restore the disturbed monuments, corner or accessories, at the same location, using surveying procedures found in the Manual of surveying Instructions for the Survey of the Public Lands of the United States, latest edition. Windsor shall ensure that the Registered Land Surveyor properly records the survey in compliance with the Colorado Revised Statutes 38-53-101 through 38-53-112 (1973) and shall send a copy to the authorized officer.
- D. During drilling and subsequent operations, all equipment and vehicles will be confined to the access road right-of-way and any additional areas as specified in the approved Application for Permit to Drill.
- E. Disturbed areas no longer needed for operation will be reclaimed by grading, leveling, and seeding as proposed in the Erosion Control and Interim Reclamation Plan.
- F. Windsor will be responsible for road maintenance from the beginning to completion of operations.

## **5. LOCATION AND TYPE OF WATER SUPPLY**

Water to be used for the drilling of these wells will be hauled by truck over the roads described in item #1 and item #2, from a water supply. Water volume used in drilling operation is dependent upon the depth of the well and any losses that might occur during drilling.

## **6. SOURCE OF CONSTRUCTION MATERIALS**

- A. Access roads within the GAP are on Federal land. Construction material for these location sites and access roads shall be borrowed material accumulated during the construction of the location sites and access roads. Additional gravel or other material will be obtained from private sources.
- B. All trees on the locations, access road, and proposed pipeline routes shall be disposed of by the following method. Pinyon Pine trees would be mulched on-site to reduce the spread of insects. Juniper trees may be dozed off-site and

used for slope reclamation or cut, stacked and hauled off-site to a licensed landfill. Trees may also be dozed on the transmission pipeline right-of-way and then pulled back onto right-of-way as part of final reclamation.

C. Rootballs can be buried or placed off location, access road, or pipeline route to be scattered back over the disturbed area as part of the final reclamation.

## **7. METHODS OF HANDLING WASTE MATERIALS**

- A. Cuttings will be deposited in the reserve pit.
- B. Following the last well to be drilled on a pad, reserve pit fluids will be back filled by the end of the succeeding summer to allow for evaporation of fluids unless an alternative method of disposal is approved. The back filling of the reserve pit will be done in such a manner that the mud and associated solids will be confined to the pit and not be squeezed out and incorporated in the surface materials. There will be a minimum of three feet of cover (overburden) on the pit. When work is complete, the pit area will support heavy equipment without sinking.

In the event that adverse weather conditions prevent removal of the fluids from the reserve pit within this time period, an extension may be granted by the Authorized Officer upon receipt of a written request from Windsor. The reserve pit will be constructed so as not to leak, break or allow discharge.

- C. Produced fluids – liquid hydrocarbons produced during completion operations will be placed in test tanks on the location. Produced waste water will be confined to a reserve pit or storage tank for a period not to exceed 90 days after initial production. During this period, a permanent disposal method and location, along with the required water analysis shall be submitted for the Authorized Officer's approval.
- D. Sewage- self-contained, chemical toilets will be provided for human waste disposal. Upon completion of operations, or as needed, the toilet holding tanks will be pumped and the contents thereof disposed of in the nearest, approved, sewage disposal facility.
- E. Garbage and other waste material – garbage, trash and other waste materials will be collected in a portable, self-contained and fully – enclosed trash container during drilling and completion operations. Upon completion of operations (or as needed) the accumulated trash will be disposed of at an authorized sanitary landfill. No trash will be burned on location or placed in the reserve pit.
- F. Immediately after removal of the drilling rig, all debris and other waste materials not contained in the trash container will be cleaned up and removed from the well location. No adverse materials will be left on the location. Any open pits will be maintained until such time as the pits are backfilled.

- G. The reserve and/or production pit will be constructed on the existing location and will not be located in natural drainages where a flood hazard exists or surface runoff will destroy or damage the pit walls. All pits will be constructed so as not to leak, break, or allow the discharge of liquids from the pit.
- H. Spills of oil, gas, produced water or other potentially hazardous substances will be reported immediately to the BLM and will be mitigated as soon as possible.

## **8. ANCILLARY FACILITIES**

Self-contained travel-type trailers may be used on site during drilling operations. Standard drilling operation equipment to be on location will include: drilling rig with associated equipment; living facilities for company representative, tool pusher, mud logger, directional driller, toilet facilities and trash containers.

Facilities other than those described in this surface use plan to support drilling operations will be submitted to the Authorized Officer via a sundry notice (form 3160-5) for approval prior to commencing operations.

### **WELLSITE LAYOUT**

The location plats shown in the Erosion Control and Interim Reclamation Plan specify the drill site layouts as staked and the proposed production equipment. Cross sections have been drafted to visualize the planned cuts and fills across the location. An average minimum of six (6) inches of topsoil will be stripped from the location (including the areas of cut, fill and/or subsoil storage) and stockpiled for future reclamation of the well site.

- A. The reserve pit will be constructed as a combination pit with a minimum 2-foot freeboard.
- B. Prior to the commencement of drilling operations, the reserve pit will be fenced on 3 sides using 3 strands of barbed wire according to the following minimum standards:
  - 1. Corner posts shall be braced in such a manner to keep the fence tight at all times.
  - 2. Standard steel, wood, or pipe posts shall be used between the corner braces. The maximum distance between any two (2) posts shall be no greater than sixteen (16) feet.
  - 3. All wire shall be stretched by using a stretching device before it is attached to the corner posts.

4. The fourth side of the reserve pit will be fenced immediately upon removal of the drilling rig and the fencing will be maintained until the pit is backfilled. When a subsequent well is drilled on the pad, the fourth side of the fence will be removed until prior to drilling.
- C. Any hydrocarbons on the pit will be removed from the pit as soon as possible after drilling operations are completed.
- D. Operator will notify the Authorized Officer at least 3 working days prior to construction of the well pad and/or related facilities and within 2 working days after completion of the well pad.

## **9. PLANS FOR RECLAMATION OF THE SURFACE:**

The BLM will be contacted prior to commencement of any reclamation operations.

### **A. RECLAMATION**

1. Immediately upon well completion, the well location and surrounding areas(s) will be cleared of all debris, materials, trash and junk not required for production.
2. Immediately upon well completion, any hydrocarbons in the pit shall be removed in accordance with 43CFR 3162.7-1.
3. Before any dirt work to restore the location takes place, the reserve pit will be completely dry and all cans, barrels, pipe, etc. will be removed. Other waste and spoil materials will be disposed of immediately upon completion of drilling, completing and workover activities.
4. If the well is a producer, Windsor will upgrade and maintain access roads as necessary to prevent soil erosion, and accommodate year round traffic. Areas unnecessary to operations will be contoured to blend with the natural adjacent slopes. Topsoil will be redistributed in an even layer and disked. All areas outside the work area will be re-seeded according to the Bureau of Land Management recommendations for seed mixture.
5. During reclamation of the site, fill material will be pushed into cuts and up to the backslope. No depressions will be left that will trap water or form ponds. Prior to reseeding, all disturbed surfaces will be scarified and left with a rough surface. Topsoil will be distributed evenly over the location and seeded according to the recommended seed mixture. The access road and location shall be ripped or disked prior to seeding. Perennial vegetation will be established. Additional work shall be required in case of seeding failures, etc.

The seedbed will be prepared by contour cultivating 4 to 6 inches deep. Drill seed ½ to 1 inch deep. In areas that may not be drilled, broadcast seed at 1½ times the application rate and harrowed into soil.

Fall seeding will be completed after August 15, and prior to prolonged ground frost. Spring seeding will be completed after the frost has left the ground and prior to May 15.

#### **B. DRY HOLE/ABANDONED LOCATIONS**

1. Abandoned well sites, roads or other disturbed areas will be restored to near their original contour. This procedure will include ensuring revegetation of the disturbed areas to the specification of the BLM at the time of abandonment.
2. All disturbed surfaces will be recontoured to the approximate natural contours and re-seeded according to BLM specifications. Reclamation of the well pad and access road will be performed as soon as practical after final abandonment and reseeded operations will be performed in the fall or spring following completion of reclamation operations.

#### **10. SURFACE OWNERSHIP**

Surface ownership is Federal.

#### **11. OTHER INFORMATION**

- A. A Class III Cultural Resource Inventory has been conducted for the proposed drill sites, access roads and other facilities on federal lands and a report is on file with the Glenwood Springs BLM office.
- B. If archaeological, historical or vertebrate fossil materials are discovered during the course of any construction activities, Windsor will suspend all operations that further disturb such materials and immediately contact the appropriate BLM office. Operations in the area of discovery will not resume until written authorization to proceed has been issued by the BLM Authorized Officer (AO).

#### **12. REPRESENTATIVES AND CERTIFICATION**

- A. Representative:  
Jeffery Dahlberg  
Windsor Energy Group, LLC  
14313 N. May Avenue, Suite 100  
Oklahoma City, OK 73134  
Phone: (405) 848-8807 extension # 121

All lease and/or unit operations will be conducted in such a manner that full compliance is made with all applicable laws, regulations, Onshore Oil and Gas Orders, the approved Plan of Operations, and any applicable Notice to Lessees.

The Operator will be fully responsible for the actions of its subcontractors. A copy of these conditions and the approved APD will be furnished to the field representatives to ensure compliance.

B. Representative Certification:

I hereby certify that I, or persons under my supervision, have inspected the proposed drill site and access route, and I am familiar with the conditions that currently exist; that the statements made in this plan are, to the best of my knowledge, true and correct and the work associated with the operations proposed herein will be performed by the Operator, its contractors, and subcontractors conformity with this plan and the terms and conditions under which is approved.

---

Jeffery Dahlberg  
Windsor Energy Group, LLC  
(405) 848-8807

---

Date

**STANDARD CONDITIONS OF APPROVAL  
For Castle Springs GAP**

**Air Quality**

The operator is responsible for applying dust abatement measures as needed or directed by the Authorized Officer to reduce the emissions of fugitive dust from access roads.

The level and type of treatment (watering or application of various dust agents, surfactants and road surfacing material) may be changed in intensity and must be approved by the Authorized Officer.

Gravel will be applied as needed to roads used for natural gas operations to help reduce fugitive dust from traffic on these roads.

**Noise**

Compressor engines at the Central Station will be equipped with mufflers.

Commuting construction and drilling crews will be encouraged to reduce speeds especially early in the morning hours to reduce traffic related noise at residences along CR 311.

**Invasive Non-Native Species**

Noxious weeds, which may be introduced due to soil disturbance associated with the proposed lease operations, will be treated by methods to be approved by the Authorized Officer. A Pesticide Use Plan (PUP) will be submitted annually and approved by the Authorized Officer, prior to use of any pesticide.

**Raptors**

In order to protect nesting raptors, prior to any new construction, drilling or completion, all pinyon-juniper woodlands and cliff faces within 0.25 miles of the proposed disturbance will be surveyed for the presence of active raptor nests. The inventory would be completed no more than 10 days prior to the initial surface activity. If an active raptor nest(s) is documented within 0.25-miles of proposed construction, drilling or completion, the activity would be delayed. The nest of concern would then be monitored by the BLM or a BLM-approved contractor and a 60-day timing limitation should be applied to a 0.25 mile buffer around the nest site to minimize disturbance during a portion of the critical nesting period.

**Wastes, Hazardous or Solid**

If spills of oil, gas, salt water, or other fluids occur during the construction, drilling or operational phase of the project, Windsor will contact the BLM authorized officer. Spill mitigation and cleanup efforts shall be commenced as soon as practical and in accordance with

approved industry standards. This mitigation will be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

### **Water Quality Surface and Ground**

Windsor will implement appropriate reclamation and re-vegetation of disturbed areas not needed for operational activities after the last multiple directional well has been drilled on a pad. In addition, Windsor will implement Best Management Practices (BMP) including the following:

All roads used for natural gas operations will be covered with a layer of gravel to a depth specified by Gold Book Standards and BLM AO. This includes all access roads from the trunk road network to the edge of the well pad.

New access roads will be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity

Relief ditches will be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.

Ditches will be allowed to vegetate and/or will include large rocks or stones to slow the velocity of drainage and allow sediment to settle out.

Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes will be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.

Windsor's road construction plans will identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

### **Wetlands and Riparian Zone Protection**

Erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, and placement of surface rock will be used along proposed road reaches within 100-feet of stream channels. Within areas less than 100 feet from the creeks, an adequate vegetative buffer or filter strip will be maintained between the road and Gibson Gulch to filter runoff from the road before it reaches the creek, wherever possible. Sediment traps or basins will be installed in problem locations where insufficient vegetative buffering is available to filter runoff prior to Gibson Gulch.

### **Vegetation**

Where road, pipeline or pad construction requires the removal of pinyon pine trees, the trees will be disposed of in the following manner to avoid attracting pinyon *Ips* beetles into live standing trees and mitigate effects of ongoing *Ips* beetle infestation in the local area: (1) broken down with earthmoving equipment and buried in excess material pile or at toe of fillslopes; (2) cut

down, sectioned and chipped with Hydroaxe-type equipment capable of chipping large pinyon trees; or (3) cut and removed trees from BLM land and hauled to Colorado State Forest Service-approved disposal site.

To help identify and avoid surface disturbance to surveyed Penstemon plant species and/or other resource values (i.e., cultural or paleontological), flagging, silt fencing or orange plastic barrier fencing will be installed around the perimeter of area possessing resource values prior to and during any construction or reclamation activities.

### **Terrestrial Wildlife**

As required by lease stipulation, Windsor will not conduct construction or drilling activities from December 1 to April 30 in order to minimize impacts to wintering big game animals. Exceptions to this lease stipulation may be granted during the last 60 days (i.e., March 1 – April 30) of the timing limitation under mild winter conditions. Severity of winter conditions will be determined on the basis of snow depth, snow crusting, daily mean temperatures, and whether big game are concentrated on winter range within the area during the winter months. Decisions concerning timing exceptions will be made by BLM in coordination with CDOW.

### **Visual Resources**

All surface facilities, including any metal containment rings surrounding tanks, will be painted juniper green (BLM color classification C-34130).

To help mitigate the contrast of bare, re-contoured slopes, reclamation will include measures to feather cleared lines of vegetation, and to save and re-distribute debris and rock over re-shaped cut and fill slopes.

Windsor may utilize vegetative mats on cuts and fills where visual effects may be noticeable.

To reduce the visibility of production facilities, facilities will be located against backdrops at the back of the cut side of the pad and will be placed to allow the maximum re-shaping of cut and fill slopes.

### **Cultural Resource Education/Discovery**

All Windsor employees, contractors and employees of contractors, who are associated with the Castle Springs project, will be notified if anyone is found disturbing historic, archaeological, or scientific resources, including collecting artifacts, the person or persons will be subject to prosecution.

Pursuant to 43CFR10.4(g), the BLM authorized officer must be notified, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43CFR10.4 (c) and (d), activities must stop in the vicinity of the discovery and the discovery must be protected for no more than 30 days or until notified to proceed by the authorized officer.

If Windsor or its contractors, subcontractors, or the employees of any of them, discovers, encounters or becomes aware of any objects or sites of cultural or paleontological value or scientific interest such as historic or prehistoric ruins, graves or grave markers, fossils, or artifacts, the proponent shall immediately suspend all operations in the vicinity of the cultural or paleontological resource and shall notify the BLM authorized officer of the findings (16 U.S.C. 470h-3, 36CFR800.112). Operations may resume at the discovery site upon receipt of written instructions and authorization by the authorized officer. Approval to proceed will be based upon evaluation of the resource. Evaluation shall be by a qualified professional selected by the authorized officer from a federal agency insofar as practicable. When not practicable, the holder shall bear the cost of the services of a non-federal professional.

Within five working days the authorized officer will inform the holder as to:

- whether the materials appear eligible for the National Register of Historic Places;
- the mitigation measures the holder will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and,
- a time frame for the authorized officer to complete an expedited review under 36 CFR 800.11, or any agreements in lieu thereof, to confirm through the State Historic Preservation Officer that the findings of the authorized officer are correct and the mitigation is appropriate.

Windsor may relocate activities to avoid the expense of mitigation and/or the delays associated with this process, as long as the new area has been appropriately cleared of resources and the exposed materials are recorded and stabilized. Otherwise, Windsor will be responsible for mitigation costs. The authorized officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the authorized officer that the required mitigation has been completed, Windsor will then be allowed to resume construction.

Antiquities, historic, prehistoric ruins, or objects of scientific interest that are outside of the authorization boundaries but directly associated with the impacted resource will also be included in this evaluation and/or mitigation.

Antiquities, historic, prehistoric ruins, or objects of scientific interest, identified or unidentified, that are outside of the authorization and not associated with the resource within the authorization will also be protected. Impacts that occur to such resources, which are related to the authorizations activities, will be mitigated at Windsor's cost, including Native American consultation cost.

In situations where federal action is required for wells directionally drilled into federal minerals from fee surface overlying fee minerals, BLM's responsibilities under Section 106 of the National Historic Preservation Act [(NHPA) 16 U.S.C. 470] as amended and Section 36 CFR 800.4 will be followed.

### **Additional Cultural Resource Requirement**

Class III cultural resource inventories will be required on all new wells, access roads, pipelines and other ground disturbing activities not already inventoried under the Castle Springs GAP. Additional action specific mitigation may be required – including but not limited to moving the location, archeological monitoring, testing, or data recovery.

### **Paleontological Resource Education/Discovery**

Before any ground disturbing activities, a paleontology survey must be conducted by a BLM-permitted paleontologist. The BLM will be contacted at least 48 hours before commencement of the survey. A general survey would first be conducted to determine if the ground disturbance would have the potential to affect paleontological resources. If a potential exists, a permitted paleontologist must on site during construction to monitor the construction activities to ensure that significant paleontological resources would be avoided.

All persons associated with operations under this authorization must be informed that any objects or sites of paleontological or scientific value, such as vertebrate or scientifically important invertebrate fossils, shall not be damaged, destroyed, moved or disturbed. If in connection with operations under this authorization any of the above resources are encountered the proponent shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM authorized officer of the findings. The discovery must be protected until notified to proceed by the authorized officer.

The proponent shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM authorized officer of any finds. The BLM authorized officer will, as soon as feasible, have a BLM-permitted paleontologist evaluate the find and record and collect it if warranted.

### **Reclamation Plan**

Refer to Appendix I. Surface Reclamation of the 6/98 GSFO's Draft Supplemental EIS for Oil & Gas Leasing Development (pages I-1 through I-8) for specific reclamation goals, objectives, timelines, measures and monitoring methods. These guidelines will be followed in completing the reclamation of disturbed surfaces on well pads, access roads and pipelines

Some effective practices that will be implemented during planning, construction, and reclamation include, but are not limited to:

- proper siting of the well pad to minimize impacts;
- seeding of disturbed areas after drilling and production facilities are complete on each pad;
- proper storage and redistribution of topsoil;

- reshaping cut and fill slopes;
- seeding with specified seed mix within the first available growing season after disturbance;
- deep ripping (>18 inches on 2 foot centers) of abandoned road sections from Pad E to wildlife stock pond and the existing Road to Pad J in the year said pads are built;
- fencing reclaimed areas to protect from livestock use for the first two growing seasons; and
- use of riprap, slash or other erosion control structures to help control sediment loss.

The 4 Reclamation Categories defined on Page I-8 of Appendix I (6/98 GSFO’s Draft Supplemental EIS for Oil & Gas Leasing Development) will be used in gauging the progress of reclamation monitoring.

Seed Mix Application Practices

A specified seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mixture of shrub, grass and forb species shall be applied. Depending on the site, one of the following two seed mixes and rates will be used on all disturbed surfaces, including pipelines unless otherwise noted in the specific APD.

**Sagebrush/Pinyon-juniper sites (Pads A, B, C, D, F, H, J, K, T, U, V, W and pipeline to E Divide Creek)**

<u>Species of Seed</u>	<u>Variety</u>	<u>Application Rate (PLS lbs/acre)</u>
4-wing saltbush	Rincon	2.0
Wyoming big sagebrush		0.5
Thickspike wheatgrass	Critana	2.5
Western wheatgrass	Arriba	3.0
Bluebunch wheatgrass	P-7	3.0
Scarlet globemallow		0.5
Rocky Mountain penstemon		0.5
		<b>12.0 lbs PLS/acre Total</b>

**Oakbrush/Mixed Mountain Shrub (Pads E, G, I, Q, R, S)**

<u>Species of Seed</u>	<u>Variety</u>	<u>Application Rate (PLS lbs/acre)</u>
Winterfat		1.0
Mountain brome	Garnet	3.0
Slender wheatgrass	San Luis	3.0
Big bluegrass	Sherman	3.0
Arrowleaf balsamroot		1.5
Sulfur buckwheat		1.0
		<b>12.0 lbs PLS/acre Total</b>

The above rate of application is listed in pounds of pure live seed (PLS)/acre. The seed will be certified and there will be no primary or secondary noxious weeds in the seed mixture. The operator shall notify the Authorized Officer 24 hours prior to seeding and shall provide seed tags and evidence of certification of the seed mix to the Authorized Officer within 30 days of completion of the seed application.

Upon completion of backfilling, leveling, ripping to minimum 18 inch depth on 2 foot centers, and recontouring, the stockpiled topsoil will be evenly spread over the reclaimed areas(s). Prior to reseeding, all disturbed surfaces will be scarified and left with a rough surface. No depressions will be left that would trap water and form ponds.

The prepared seedbed will be seeded within 24 hours after completing dirt work unless a change is requested by the operator and approved by the Authorized Officer. Prepare the seedbed by contour cultivating 4-6 inches deep. Drill seed  $\frac{1}{4}$  to  $\frac{1}{2}$  inch deep following the contour. In areas that cannot be drilled, broadcast seed at double the application rate and cover  $\frac{1}{4}$  to  $\frac{1}{2}$  deep with a harrow or drag bar. All seeding will be conducted between September 1 and May 1. If the seeding is unsuccessful, operator will be required to make subsequent seedings until the reclamation objectives identified in Appendix I. Surface Reclamation of the 6/98 GSFO's Draft Supplemental EIS for Oil & Gas Leasing Development are met.

#### Erosion Control Practices

The cut and fill slopes will be protected against rilling and erosion with measures such as water bars, lateral furrows, or other measures approved by the Authorized Officer. Weed free straw bales, straw "wattles", straw matting or a well-anchored fabric silt fence will be used on cuts and fill slopes to protect against soil erosion.

#### Topsoil Practices

During well pad, road and/or pipeline construction, topsoil will be stripped to a minimum depth of 6 inches and segregated from other subsurface material piles. If topsoil is less than 6 inches, the top 6 inches of surface material will be stripped and piled.

#### Site Protection Practices

Reclaimed areas will be fenced to exclude livestock until seeded species have established. The Authorized Officer will approve the type of fencing. Fencing shall be to BLM standards

Windsor will submit an annual reclamation report by December 31 to the Authorized Officer. The report will document compliance with all aspects of the reclamation objectives. The report will specify if the reclamation objectives are likely to be achieved and actions needed to meet these objectives.

## Ground Water / Soils

Windsor will implement appropriate reclamation and re-vegetation of disturbed areas not needed for operational activities. These measures will help prevent erosion and sedimentation to drainages. Windsor will implement the BMPs including the following:

- New access roads will be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.
- Relief ditches or corrugated metal pipes will be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.
- Ditches will be allowed to vegetate and/or will include large rocks or stones to slow the velocity of drainage and allow sediment to settle out.
- Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes will be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.
- Windsor's road construction plans will identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.
- Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these zones reported to the BLM and COGCC.
- All potentially productive hydrocarbon zones would be cemented off as detailed in the GAP.
- After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.
- BLM will be notified in advance to allow surface casing inspections on every well in the Castle Springs project area.
- Wells will be cemented off 200 feet above the Williams Fork or top of gas. This measure is required to isolate the Mesa Verde Formation from the Wasatch Formation.
- In addition, the following site-specific mitigation measures will be implemented:

Erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, placement of surface rock, straw bales,

and/or matting will be used along proposed road reaches within 100-feet of Gibson Gulch (i.e., roads to Pads C and W).

Within areas less than 100 feet from the creeks, an adequate vegetative buffer, artificial buffers (e.g., straw bales, matting, etc.), or filter strip will be maintained between the road and Gibson Gulch to filter runoff from the road (i.e., roads to Pads C and W) before it reaches the creek, wherever possible.

**SITE-SPECIFIC CONDITIONS OF APPROVAL  
Castle Springs GAP**

**Pad A – 1 vertical and 4 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

All pinyon-juniper trees will be kept in place to north of pad as a visual screen.

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad B – 1 vertical and 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad C – 1 vertical and 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A geotechnical engineer will be consulted prior to construction of the access road.

Access road across Gibson Gulch will have two 60-inch culverts.

Monitoring/salvaging of cultural material/features during construction of the well pad and access road. Monitoring will be done by qualified archaeologists, who will mitigate/salvage any and all cultural features discovered during ground disturbing activities. Monitoring will occur through the construction period and will be completed prior to mobilizing any drilling equipment, machinery or associated facilities onto the pad.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

#### **Pad D – 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

Special visual screening (vegetation mats) may be utilized on northern fills and southwestern cuts if revegetation is not started immediately after construction is finished.

The front corners of the pad will be rounded and revegetation will begin immediately.

The existing road will be ripped and reclaimed where it would not be needed.

Plantings in addition to reseeding may be utilized on the cuts at the back of the pad.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

#### **Pad E – 6 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

That portion of the existing, unimproved road, to the stock pond, approximately 600 feet Northeast of the proposed Pad E, shall be abandoned, ripped and reclaimed.

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad F – 1 vertical well, 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad G – 4 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

Revegetation will begin on north toe as soon as after construction is complete.

If revegetation can not begin immediately, special visual screening (vegetation mats) may be utilized on northern fills and eastern cuts.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad H – 1 vertical well, 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

#### **Pad I – 4 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

Pad I was designed to mitigate the potential of a negative visual impact by lowering the pad design elevation so as not to be “ridge-lining” this location. All excess material generated by this design will be distributed in the valley to the southeast of the pad where it is obscured from view.

All fill material shall be placed with feathered, irregular edges, contoured to blend with the adjacent natural slopes.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

#### **Pad J – 1 vertical well, 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A geotechnical engineer will be consulted during construction of the access road.  
A raptor survey is required.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad K – 1 vertical well, 4 directional wells**

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

All facilities will be painted juniper green (BLM color classification C-34130).

A geotechnical engineer will be consulted during construction of the access road.

Monitoring/salvaging of cultural material/features during construction of the well pad and access road. Monitoring will be done by qualified archaeologists, who will mitigate/salvage any and all cultural features discovered during ground disturbing activities. Monitoring will occur through the construction period and will be completed prior to mobilizing any drilling equipment, machinery or associated facilities onto the pad.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad Q – 1 vertical well, 3 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A geotechnical engineer will be consulted during construction of the access road.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad R – 1 vertical well, 4 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A geotechnical engineer will be consulted during construction of Pad R. All cut and fill slopes shall be designed to minimize new surface disturbance. Pad corners shall be rounded to blend with the adjacent natural slopes.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad S – 1 vertical well, 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad T – 1 existing vertical well, drill 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad U – 1 existing vertical well, drill 5 directional wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad V – 1 existing vertical well, drill 5 vertical wells**

All facilities will be painted juniper green (BLM color classification C-34130).

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**Pad W – 4 directional wells, 1 water disposal well**

All facilities will be painted juniper green (BLM color classification C-34130).

A raptor survey is required to determine if any changes have occurred since the 2005 survey.

A geotechnical engineer will be consulted during construction of the access road to Pad W across Gibson Gulch.

Access road across Gibson Gulch will have one 60-inch culvert.

A seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mix of shrub, grass and forb species shall be used. One of two seed mixes and rates will be on all disturbed surfaces, including pipelines, unless otherwise noted in the specific APD. The recommended seed mix, rate, and application procedures are described in Standard Conditions for Approval for the Castle Springs GAP document.

**EROSION CONTROL AND RECLAMATION PLAN**

**for the**

**CASTLE SPRINGS  
GEOGRAPHICAL AREA PLAN**

**Prepared for:**

**Bureau of Land Management  
Glenwood Springs Field Office**

**and**

**Windsor Energy Group LLC**

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## **Introduction**

Design plans for all well pads and roads are available for review at the Glenwood Springs Field Office in Glenwood Springs, Colorado. These plans include specific pad and road designs, representative cross-sections for each pad and access road, and construction techniques for roads and culverts. Once constructed, the roads will remain for the life of the project. However, well pads will be partially reclaimed after all well drilling and completion activities are completed on a pad. The interim reclamation plan for each well pad is shown in the attached exhibits.

Portions of many well pads within the Castle Springs GAP will be constructed on slopes greater than 30 percent and/or soils exhibiting severe erosion potential. The erosion prevention and reclamation plan listed here summarizes the construction and reclamation techniques that will be used in the GAP.

A Registered Professional Geotechnical Engineer shall be consulted during the construction of the drilling pads. Road soil testing and field monitoring will be conducted by a Registered Professional Geotechnical Engineer.

## **Well Pads**

Well pads would be constructed from the native soil and rock materials present and leveled by standard cut-and-fill techniques using a bulldozer, grader, front-end loader, or backhoe. The pad would be constructed by first clearing vegetation, next stripping and stockpiling topsoil, and finally leveling the pad area considering earth balancing techniques for cuts and fills. When applicable, well pads will be constructed to balance cuts and fills.

Design calculations indicate that cuts and fills would be as high as 35 feet in some locations. In areas of deep cuts, the side slopes may vary from the standard 2:1 slope ratio to accommodate local topographic conditions. The tops of the cut banks may be rounded to improve the visual appearance. The size of the pads would range from 0.9 to 2.25 acres.

Windsor will implement appropriate reclamation and re-vegetation of disturbed areas not needed for operational activities after the last multiple directional well has been drilled on a pad and all wells have been completed and all production facilities have been installed. Generally, cuts would be revegetated and fills would be contoured to blend in with adjacent natural slopes. Table 1 summarizes shows the initial disturbance needed for well drilling and completion, the expected acreage to be reclaimed by recontouring edges of slopes or revegetation, and the resultant long-term disturbance. Overall, the interim reclamation techniques would reduce long-term well pad disturbance by 45 percent over the life of the project.

**Table 1. Proposed Interim Reclamation**

<b>Pad</b>	<b>Initial Disturbance (acres)</b>	<b>Reclaimed Slopes (acres)</b>	<b>Revegetated Slopes (acres)</b>	<b>Total Reclaimed (acres)</b>	<b>Long-term Disturbance (acres)</b>	<b>% Reclaimed</b>
A	2.26	0.45	0.30	0.75	1.51	33.2%
B	2.51	0.56	0.41	0.97	1.54	38.6%
C	3.33	0.43	1.32	1.75	1.58	52.6%
D	2.65	0.35	0.69	1.04	1.61	39.2%
E	3.41	0.91	0.87	1.78	1.63	52.2%
F	3.27	0.85	0.82	1.67	1.6	51.1%
G	2.63	0.77	0.38	1.15	1.48	43.7%
H	3.19	1.03	0.52	1.55	1.64	48.6%
I	3.7	2.03	0.00	2.03	1.67	54.9%
J	4.42	1.36	1.08	2.44	1.98	55.2%
K	2.47	0.59	0.37	0.96	1.51	38.9%
Q	2.74	0.64	0.64	1.28	1.46	46.7%
R	3.67	1.03	0.98	2.01	1.66	54.8%
S	3.71	1.51	0.66	2.17	1.54	58.5%
T	2.32	0.39	None	0.39	1.93	16.8%
U	2.88	0.58	0.31	0.89	1.99	30.9%
V	2.05	0.14	0.35	0.49	1.56	23.9%
W	2.09	0.22	0.99	1.21	0.88	57.9%
Total	53.3			24.53		46.0%

**Access Roads**

Road construction will involve the widening of existing roads to develop the trunk road network and the construction of access roads from the trunk road network to the well pad. The trunk road would be constructed using a variable width ROW to construct an 18-foot wide running surface. Access roads connecting well pads to the trunk road network will be constructed with a variable width ROW and 12-foot wide running surfaces. A possible exception may be the access road to Pad C where the running surface may be extended to 18 feet in some locations.

Roads will be constructed using standard equipment and techniques. Bulldozers and/or road graders will first clear vegetation and topsoil from the ROW. The top soil will be cleared and stockpiled by the nearest pad location. With the exception of pinyon pine, vegetation may be placed on well pad fills to help visually screen the pads. Vegetation not needed for visual screening would be hauled away for disposal. Cuts would be constructed at some locations to enable the widening to more than 18 feet for traffic turnouts and curve widenings.

After the clearance of vegetation, the road surface will be graded to slopes no more than 10 percent where topography permits. Exceptions would be along the access roads listed in Table 2.

Roads will be crowned and ditched to the Gold Book construction standards to allow water to flow off the road surface to reduce volume and velocity. Minimum horizontal curve radii would be 100 feet. Where terrain would not allow 100-foot curve radii, curve widening would be employed.

Roads will be constructed with appropriate drainage and erosion control features and structures to include cut-and-fill slope and drainage stabilization, relief and drainage culverts, water bars and wind ditches similar to those described in the Gold Book. Relief ditches will be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface. Ditches will be allowed to vegetate and/or will include large rocks or stones to slow the velocity of drainage and allow sediment to settle out. Corrugated metal pipe (CMP) culverts will be constructed especially along steep roads. Larger CMPs will be constructed at the two locations where roads will cross Gibson Gulch. The number and size of the CMPs are also shown in Table 2.

Erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, and placement of surface rock will be used along proposed road reaches within 100-feet of Gibson Gulch. Within areas less than 100 feet from the creeks, an adequate vegetative buffer or filter strip will be maintained between the road and Gibson Gulch to filter runoff from the road before it reaches the creek, wherever possible. Sediment traps or basins will be installed in problem locations where insufficient vegetative buffering is available to filter runoff prior to Gibson Gulch.

Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes will be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.

Erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, placement of surface rock, straw bales, and/or matting will be used along proposed road reaches within 100-feet of Gibson Gulch (i.e., roads to Pads C and W).

Finally, all roads used for natural gas operations will be covered with a layer of gravel to a depth specified by BLM. This includes all access roads from the trunk road network to the edge of the well pad.

**Table 2. Road Segments >10% Slope and CMP Installation**

Access Road to Pad	Approximate Length of Road (feet)	Road Segment >10% (feet)	Approximate Length of Steep Slope (feet)	# of 18-inch CMPs	Larger CMPs	Comments
A	410	Yes	100	None	None	
B	100	No	NA	None	None	
C	2345	No	NA	4	1	60-inch CMP across Gibson Gulch. 20 x 40 feet riprap; 1.5 feet thick.
D	1310	No	NA	3		
E	2450	Yes	1,300	6		
F	1185	Yes	200	4		
G	1935	Yes	350	None		
H	835	No	NA	2		
I	460	Yes	100	None		
J	4565	Yes	400	9		
C to K	885	No	NA	3		
Q	2375	No	NA	5	1	30-inch CMP. 20 x 40 feet riprap; 1.5 feet thick.
R	1390	No	NA	None		
S	90	No	NA	None		
T	160	No	NA	None		36-inch CMP; outlet protection riprap.
U	Existing	No	NA	None		
V	Existing	No	NA	None		
W	205	No	NA	None		60-inch CMP across Gibson Gulch. 20 x 20 feet riprap; 1.5 feet thick.

**ATTACHMENTS**

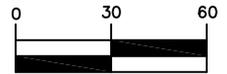
**WELL PAD INTERIM RECLAMATION  
AND EQUIPMENT LAYOUT**

# Pad A

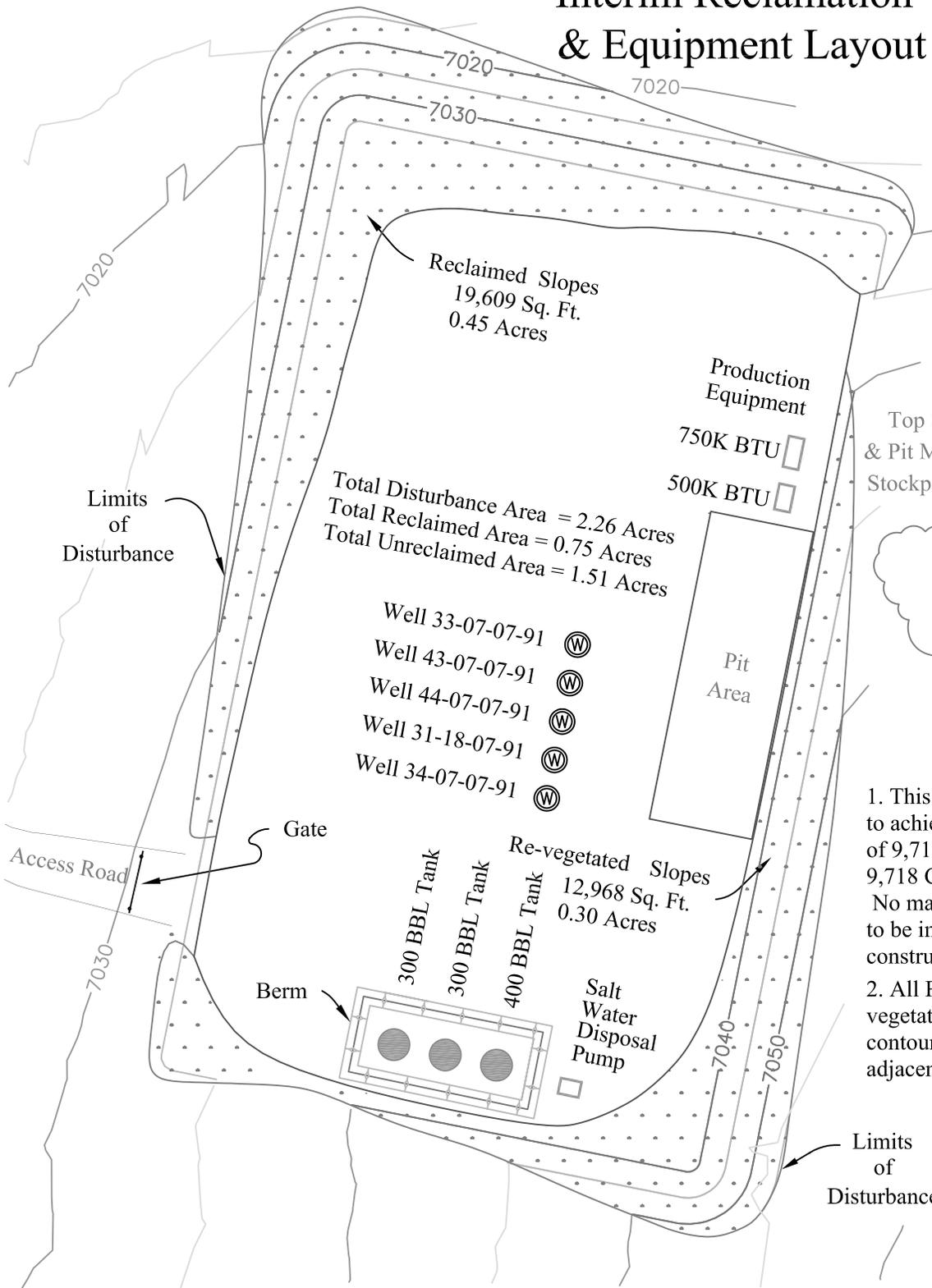
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 60 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 9,718 Cu. Yds. of Cut and 9,718 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



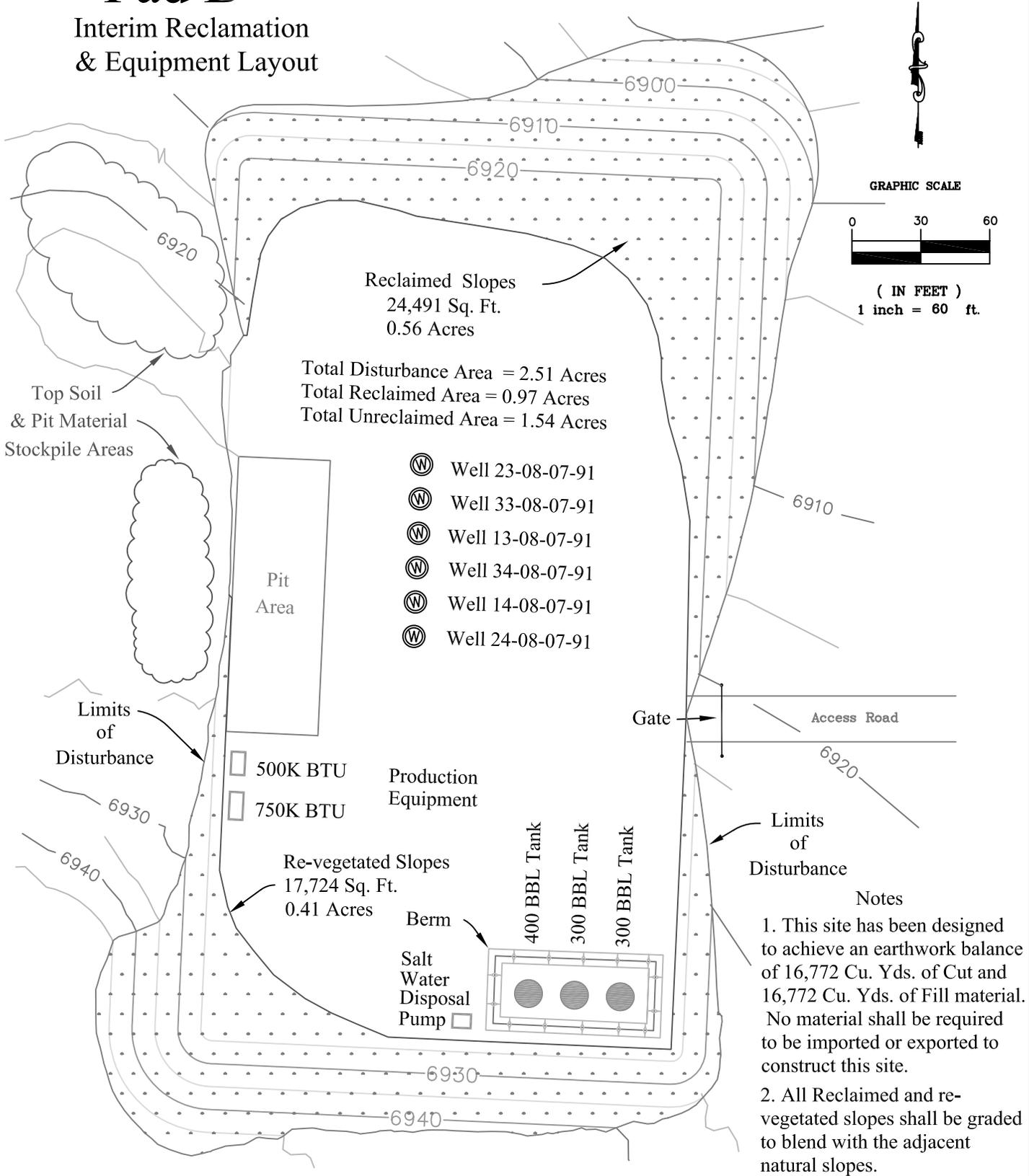
Prepared By:  
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Prepared For:  
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Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad A-5 Reclamation  
Drawing Date: 2/12/05  
Date Surveyed: 10/02/04

# Pad B

## Interim Reclamation & Equipment Layout



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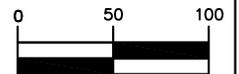
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad B-5 Reclamation  
Drawing Date: 2/12/05  
Date Surveyed: 10/02/04

# Pad C

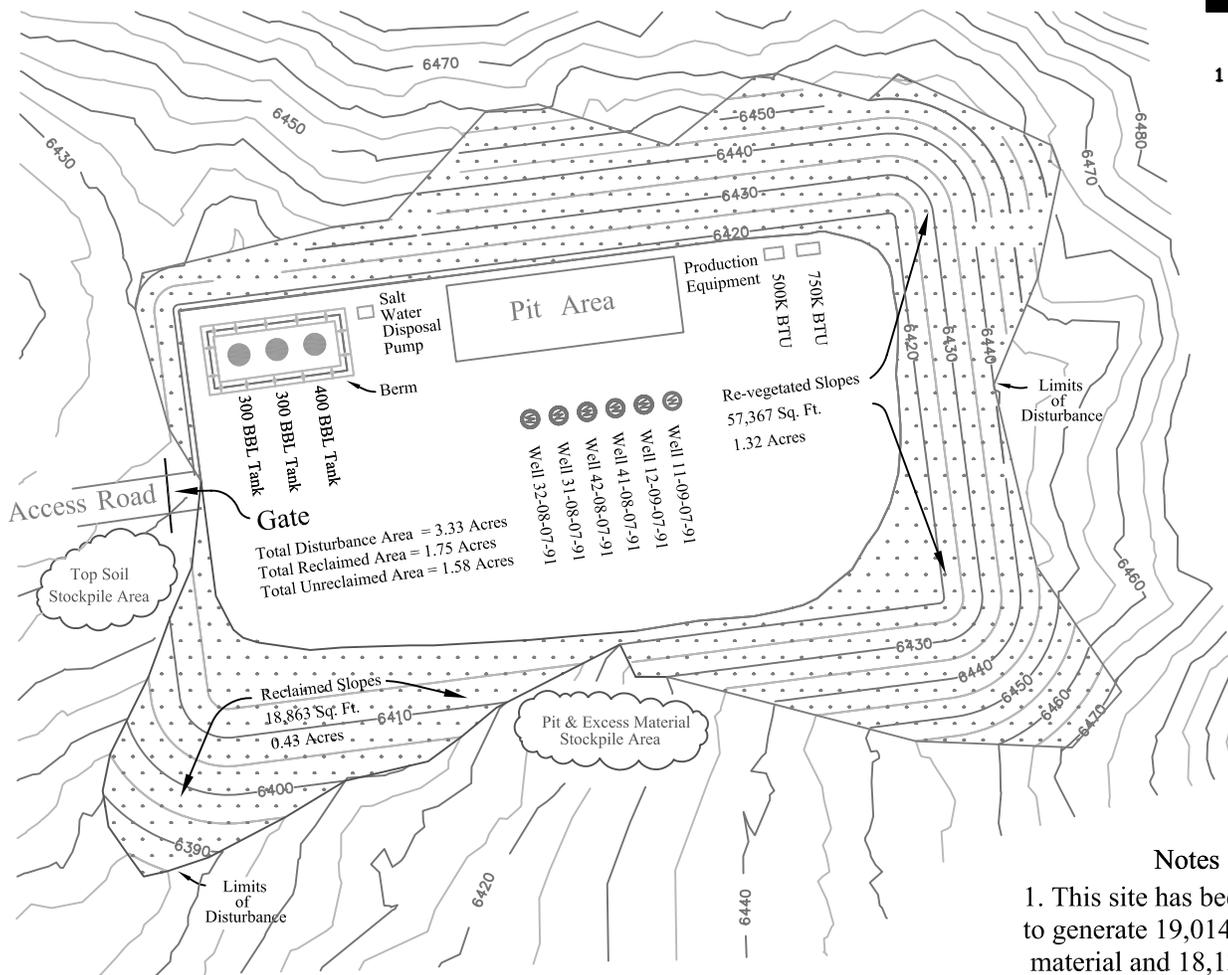
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to generate 19,014 Cu. Yds. of Cut material and 18,130 Cu. Yds. of Fill material. All excess material shall be stockpiled onsite and be used for site reclamation.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad C-6 Reclamation  
Drawing Date: 2/14/05  
Date Surveyed: 11/18/04

# Pad D

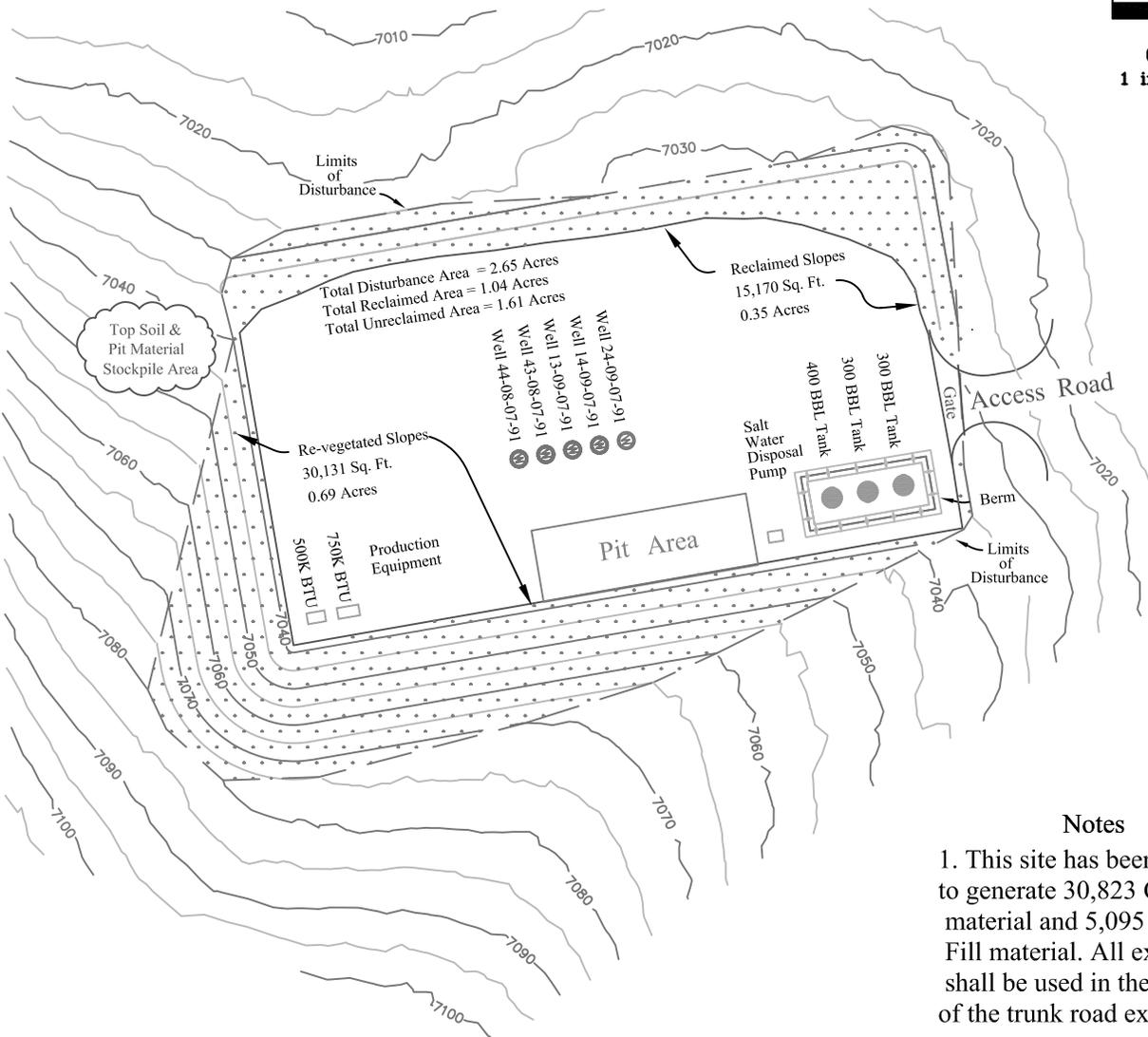
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to generate 30,823 Cu. Yds. of Cut material and 5,095 Cu. Yds. of Fill material. All excess material shall be used in the construction of the trunk road extension.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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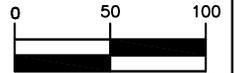
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Project Number: FC04200  
Drawing Name: Pad D-5 Reclamation  
Drawing Date: 2/15/05  
Date Surveyed: 11/22/04

# Pad E

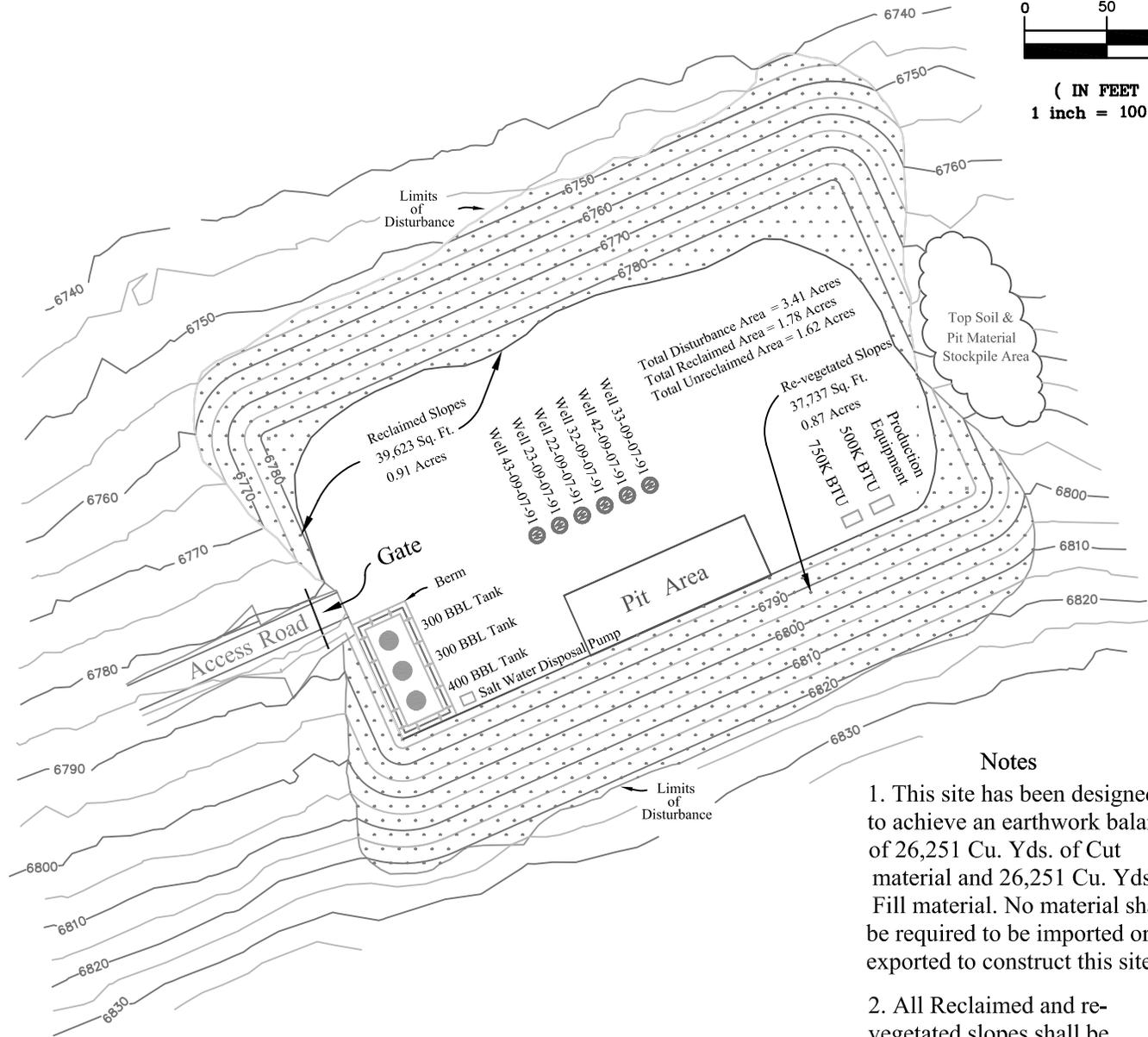
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 26,251 Cu. Yds. of Cut material and 26,251 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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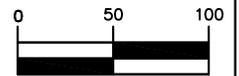
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad E-5 Reclamation  
Drawing Date: 2/16/05  
Date Surveyed: 11/22/04

# Pad F

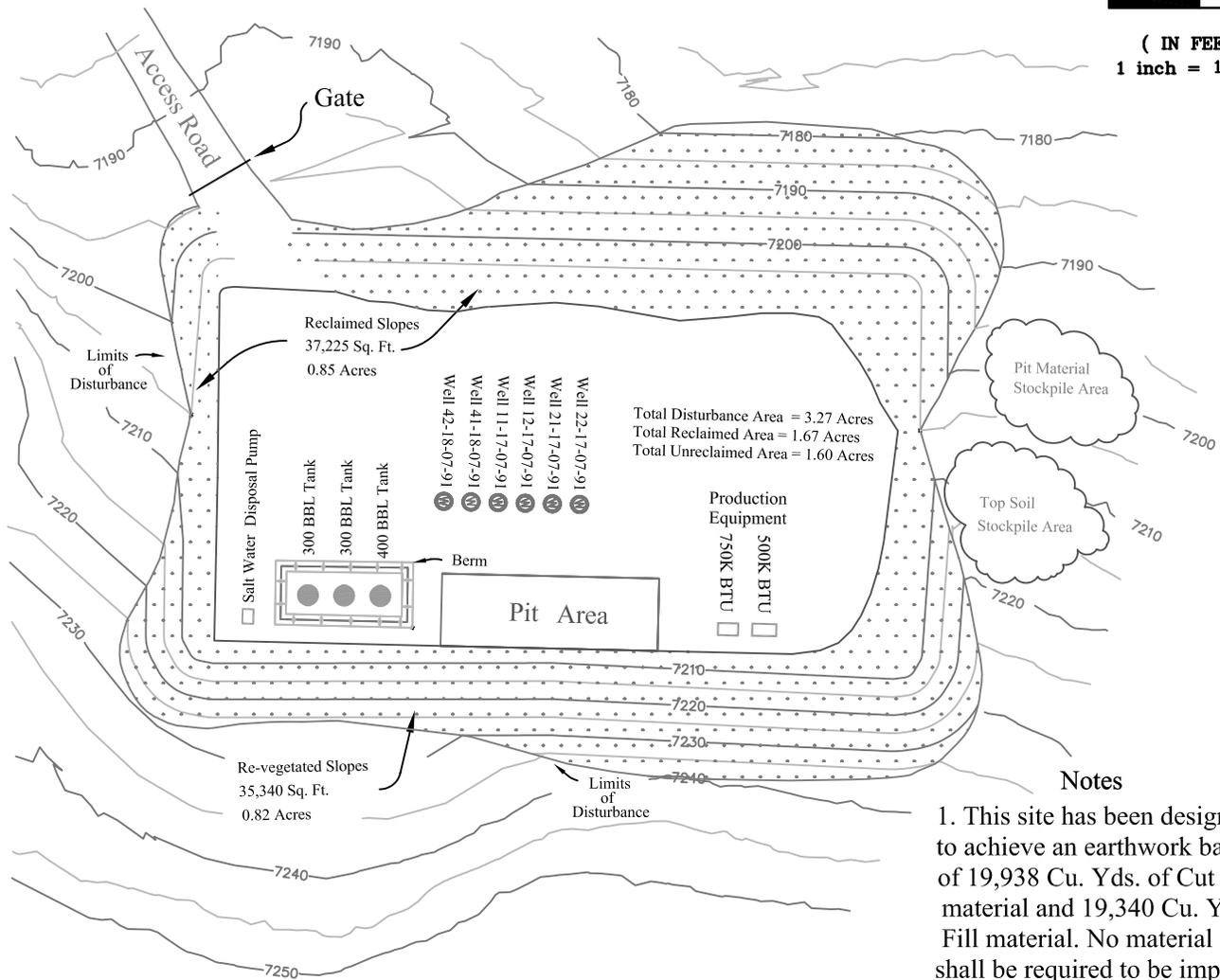
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 19,938 Cu. Yds. of Cut material and 19,340 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



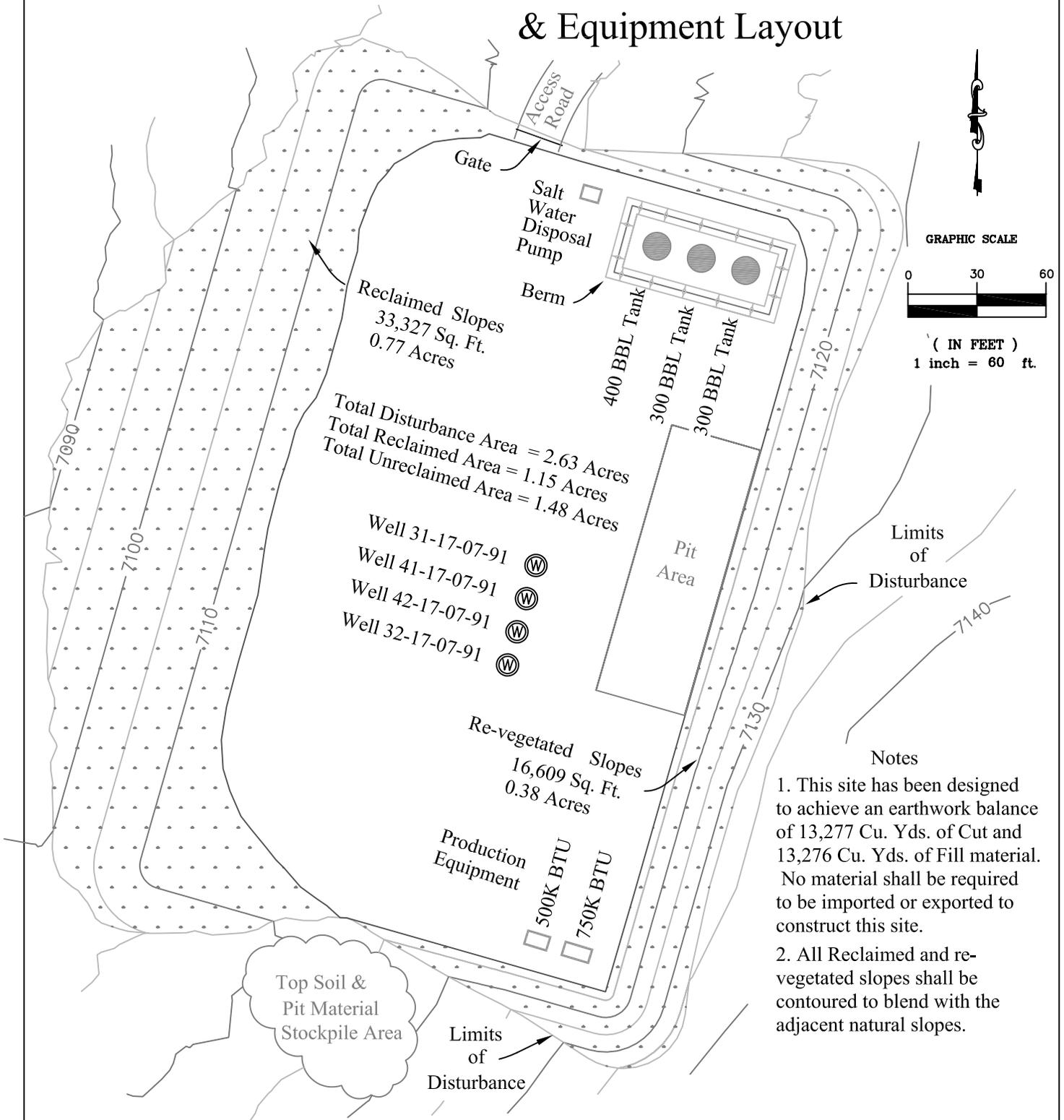
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Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad F-5 Reclamation  
Drawing Date: 2/17/05  
Date Surveyed: 10/02/04

# Pad G

## Interim Reclamation & Equipment Layout



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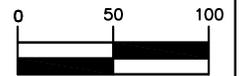
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Project Number: FC04200  
Drawing Name: Pad G-5 Reclamation  
Drawing Date: 2/18/05  
Date Surveyed: 10/02/04

# Pad H

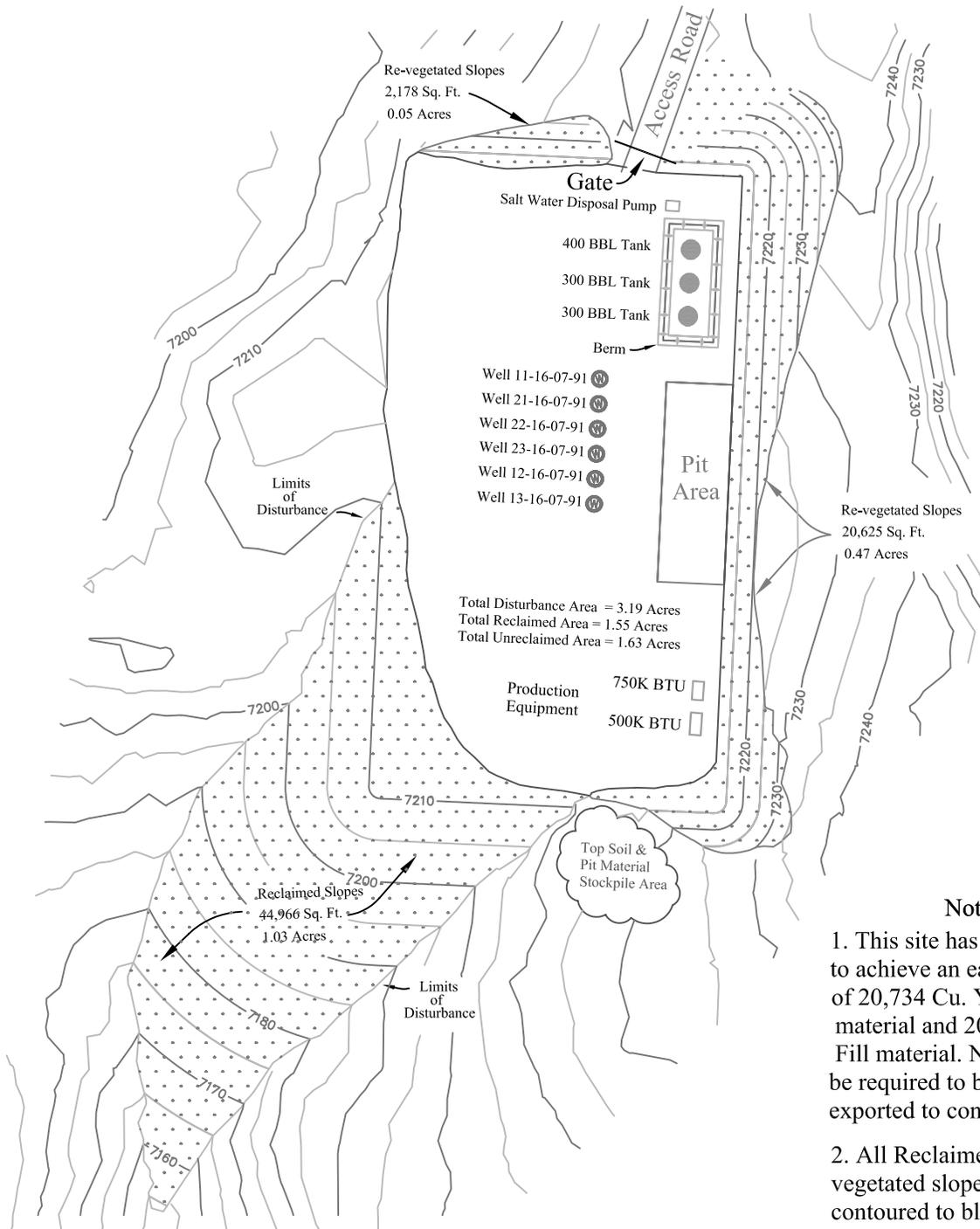
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



Total Disturbance Area = 3.19 Acres  
Total Reclaimed Area = 1.55 Acres  
Total Unreclaimed Area = 1.63 Acres

### Notes

1. This site has been designed to achieve an earthwork balance of 20,734 Cu. Yds. of Cut material and 20,730 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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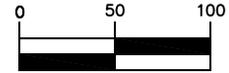
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Project Number: FC04200  
Drawing Name: Pad H-5 Reclamation  
Drawing Date: 2/19/05  
Date Surveyed: 10/03/04

# Pad I

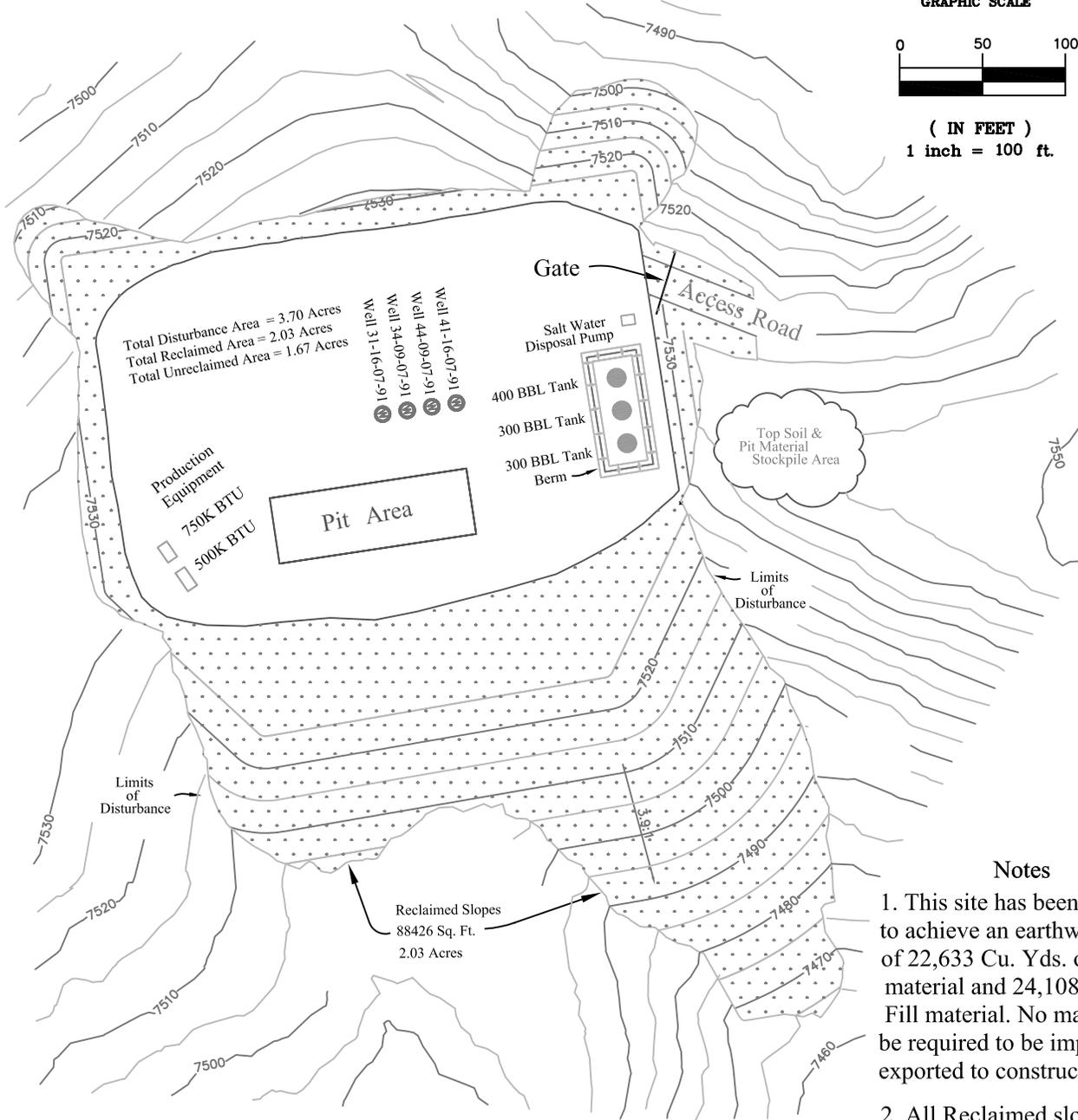
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 22,633 Cu. Yds. of Cut material and 24,108 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed slopes shall be contoured to blend with the adjacent natural slopes.



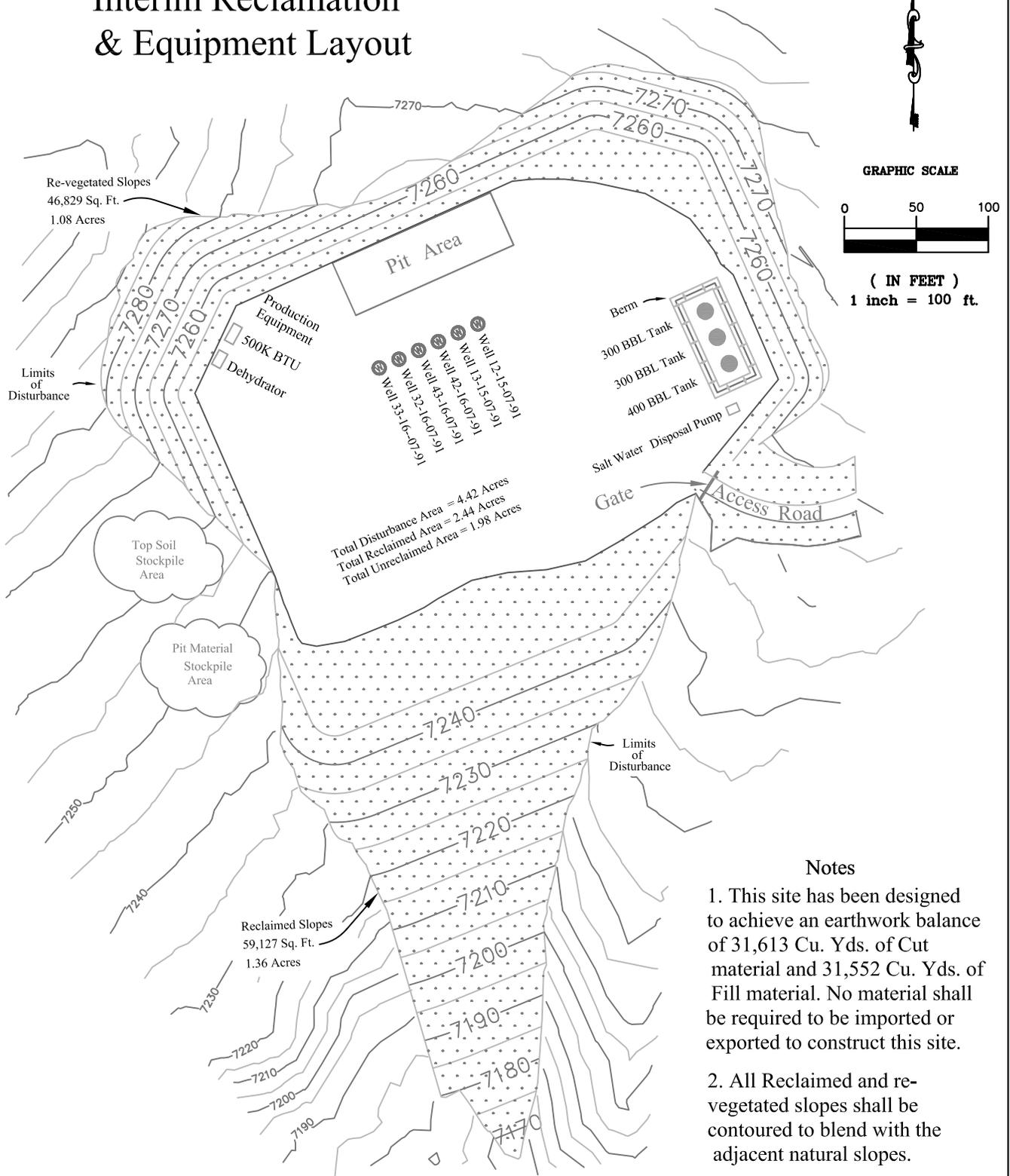
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Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad I-5 Reclamation  
Drawing Date: 2/20/05  
Date Surveyed: 10/04/04

# Pad J

## Interim Reclamation & Equipment Layout



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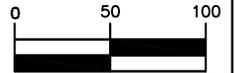
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Project Number: FC04200  
Drawing Name: Pad J-5 Reclamation  
Drawing Date: 2/21/05  
Date Surveyed: 10/04/04

# Pad K

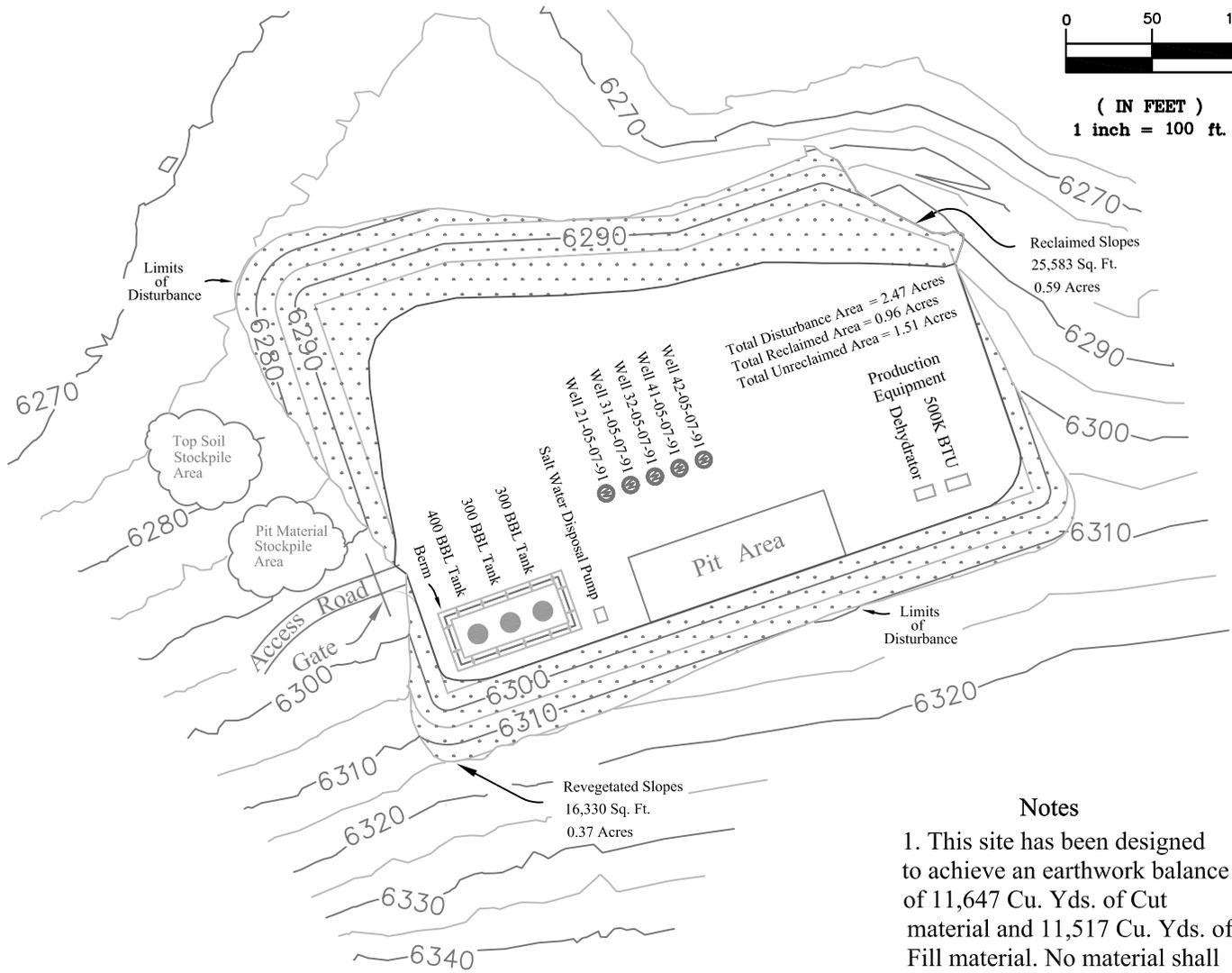
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 11,647 Cu. Yds. of Cut material and 11,517 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and revegetated slopes shall be contoured to blend with the adjacent natural slopes.



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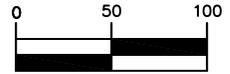
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad K-5 Reclamation  
Drawing Date: 2/22/05  
Date Surveyed: 11/18/04

# Pad Q

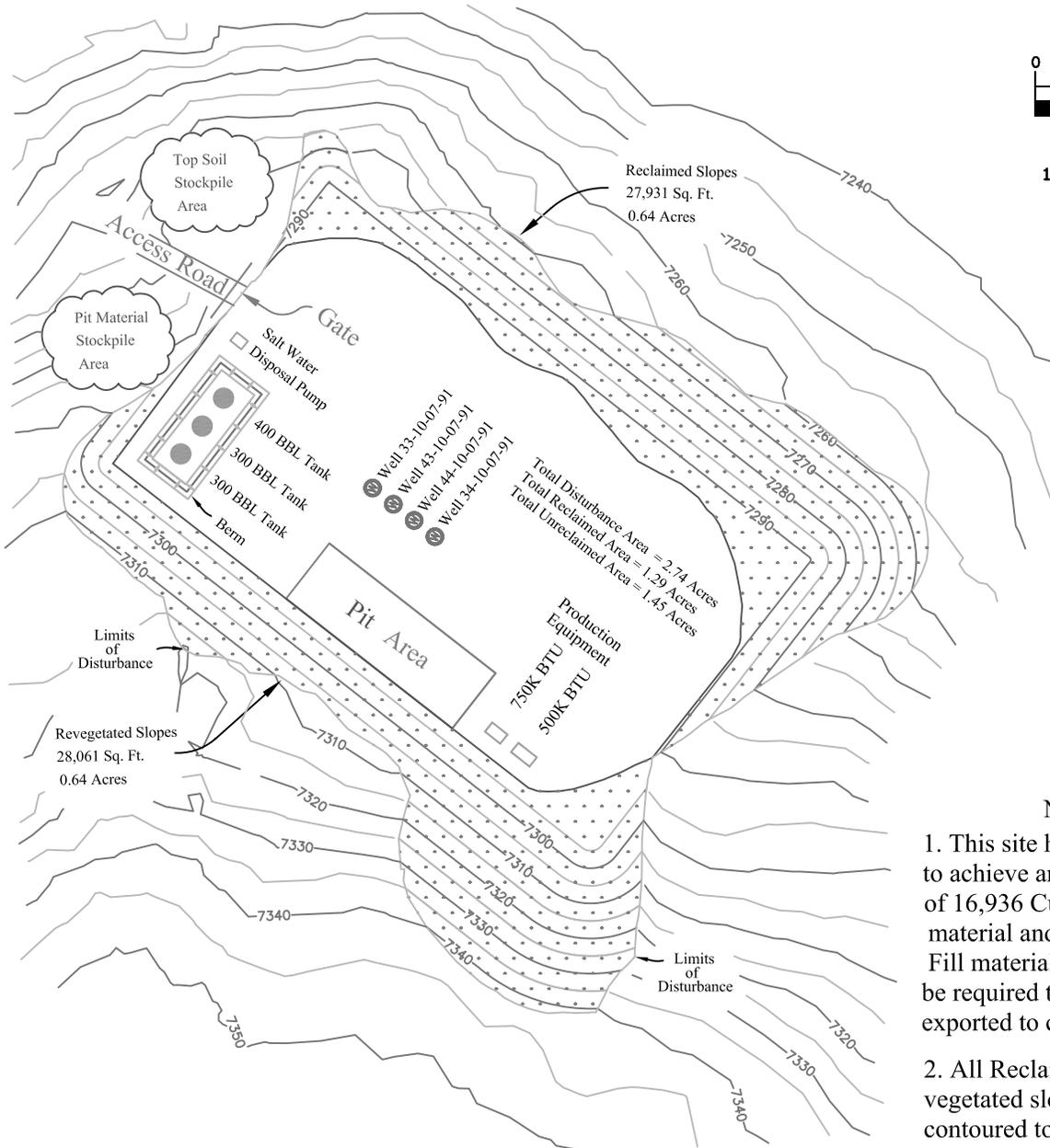
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 16,936 Cu. Yds. of Cut material and 16,936 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and revegetated slopes shall be contoured to blend with the adjacent natural slopes.



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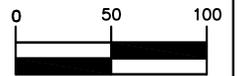
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad Q-5 Reclamation  
Drawing Date: 2/22/05  
Date Surveyed: 10/05/04

# Pad R

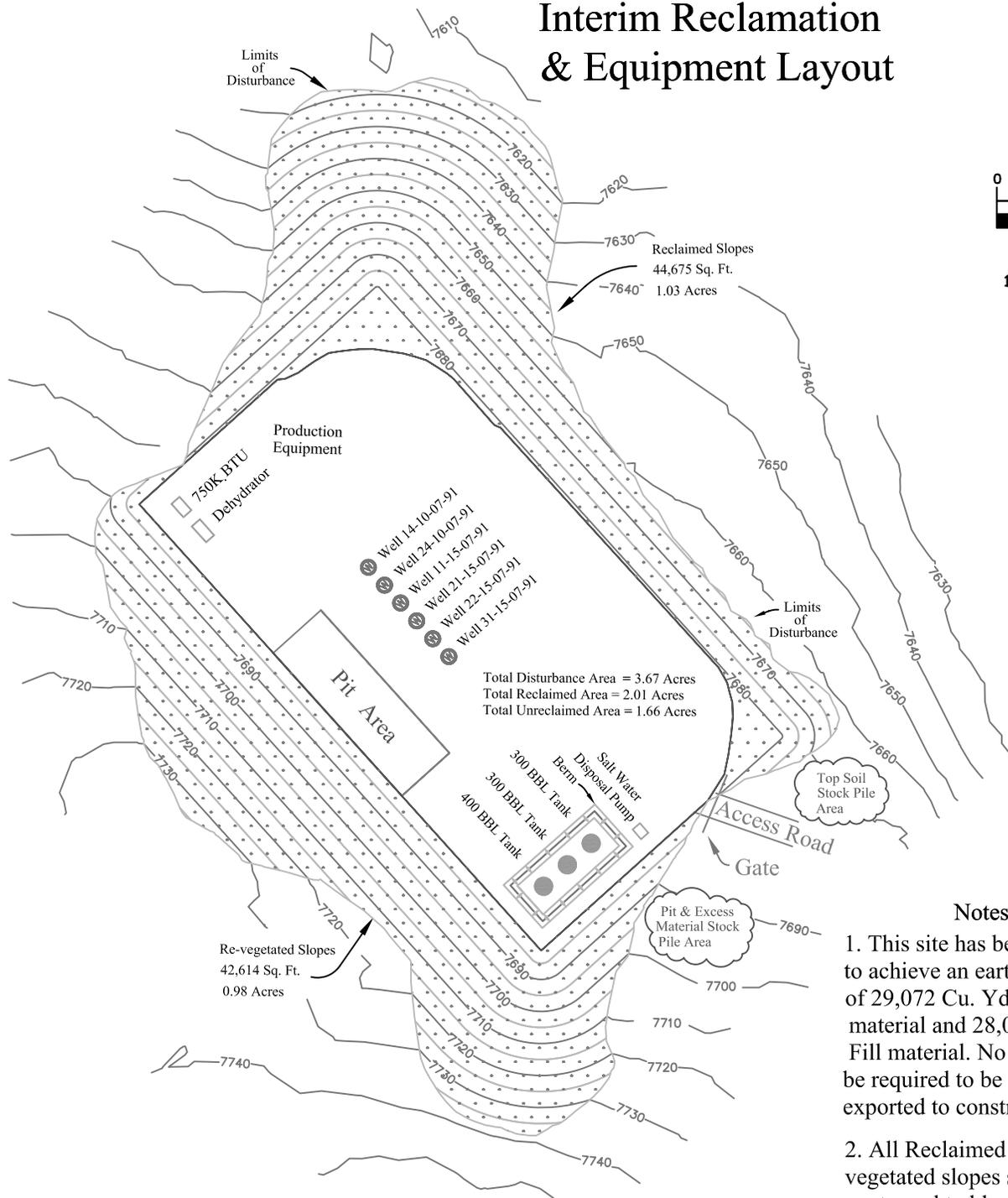
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 29,072 Cu. Yds. of Cut material and 28,000 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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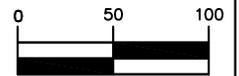
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad R-5 Reclamation  
Drawing Date: 2/22/05  
Date Surveyed: 10/16/04

# Pad S

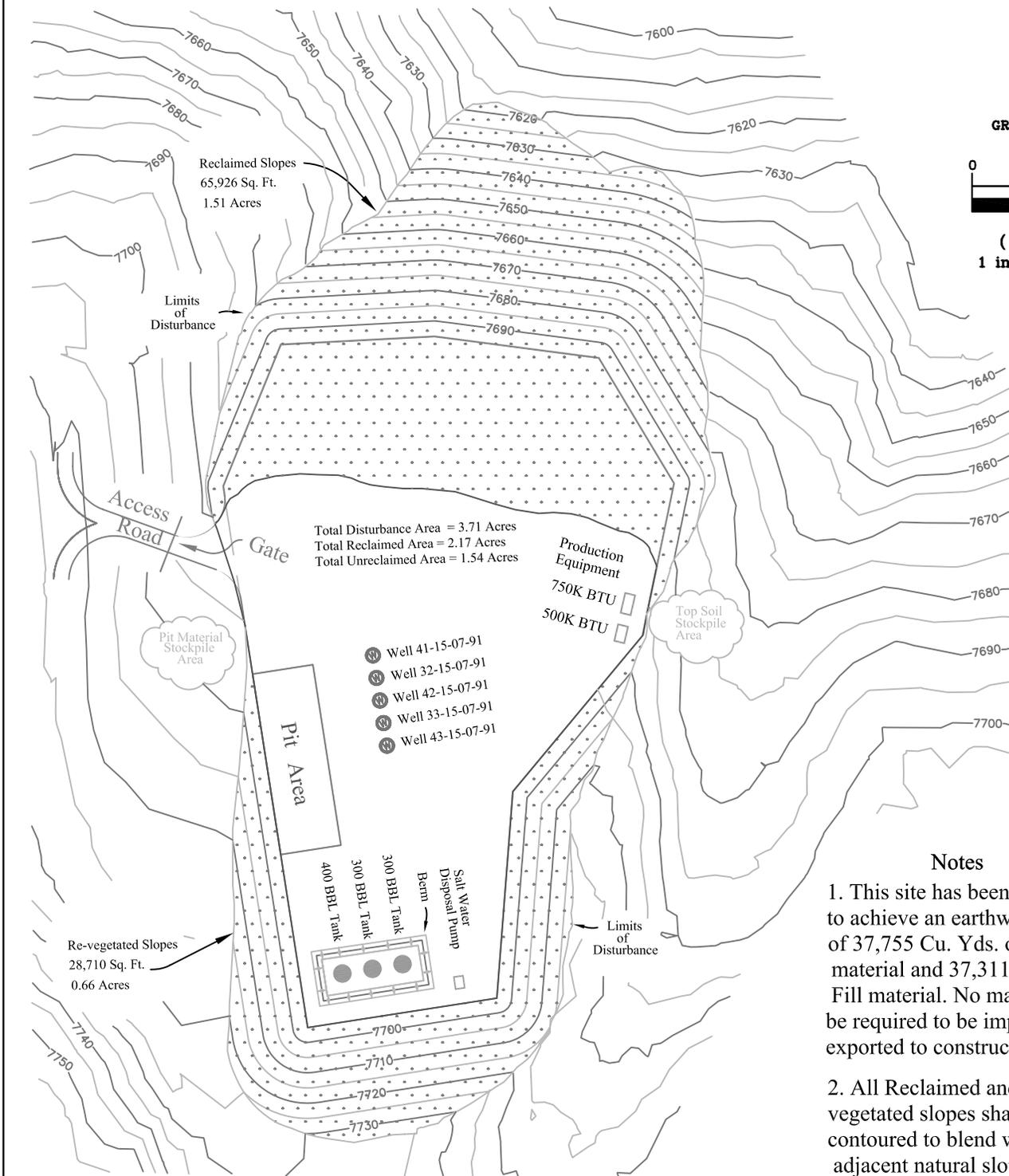
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



Total Disturbance Area = 3.71 Acres  
Total Reclaimed Area = 2.17 Acres  
Total Unreclaimed Area = 1.54 Acres

### Notes

1. This site has been designed to achieve an earthwork balance of 37,755 Cu. Yds. of Cut material and 37,311 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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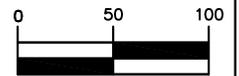
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad S-5 Reclamation  
Drawing Date: 2/23/05  
Date Surveyed: 10/07/04

# Pad T Extension

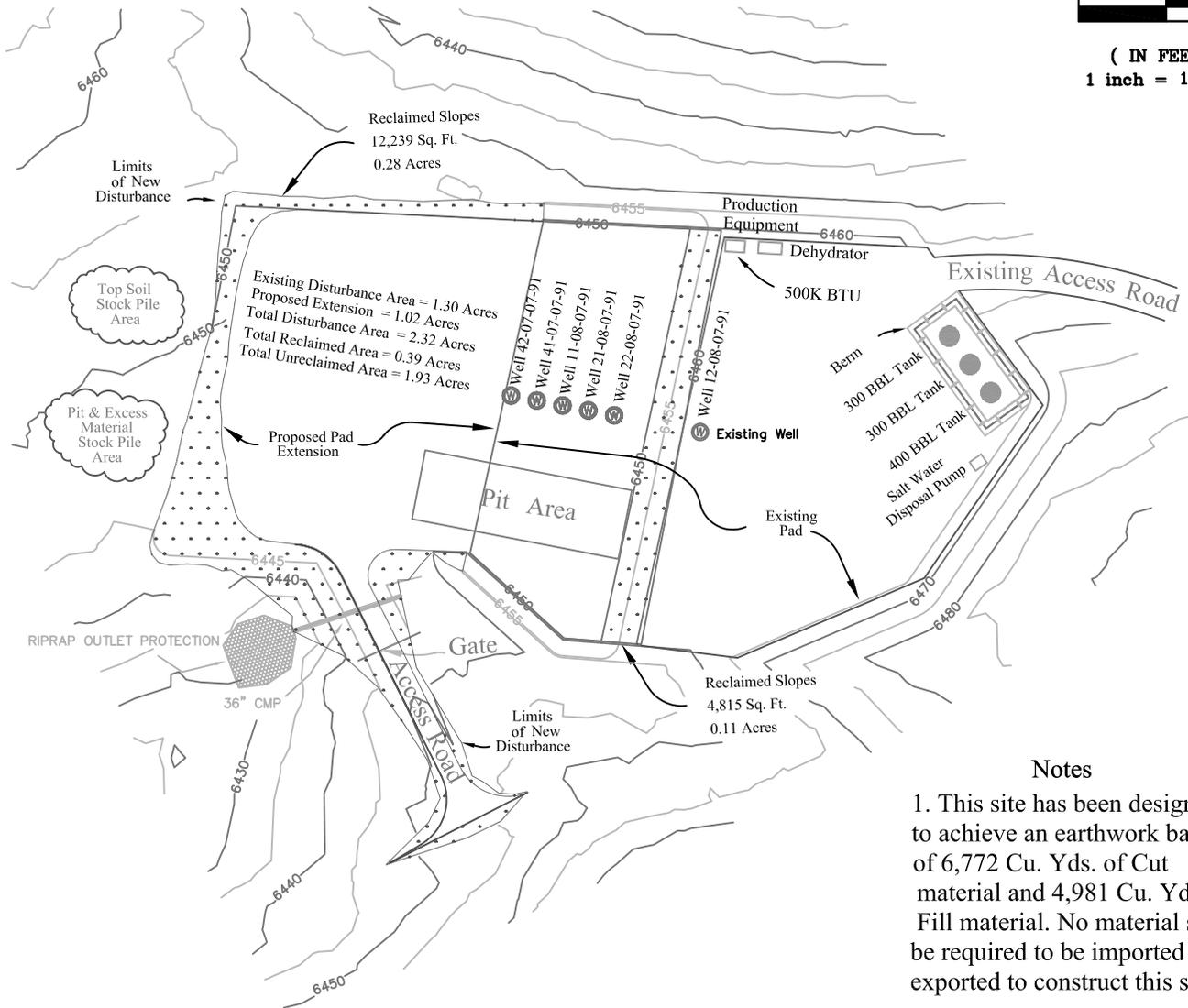
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 6,772 Cu. Yds. of Cut material and 4,981 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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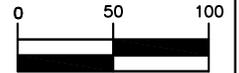
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad-T6 Reclamation  
Drawing Date: 2/25/05  
Date Surveyed: 10/07/04

# Pad U

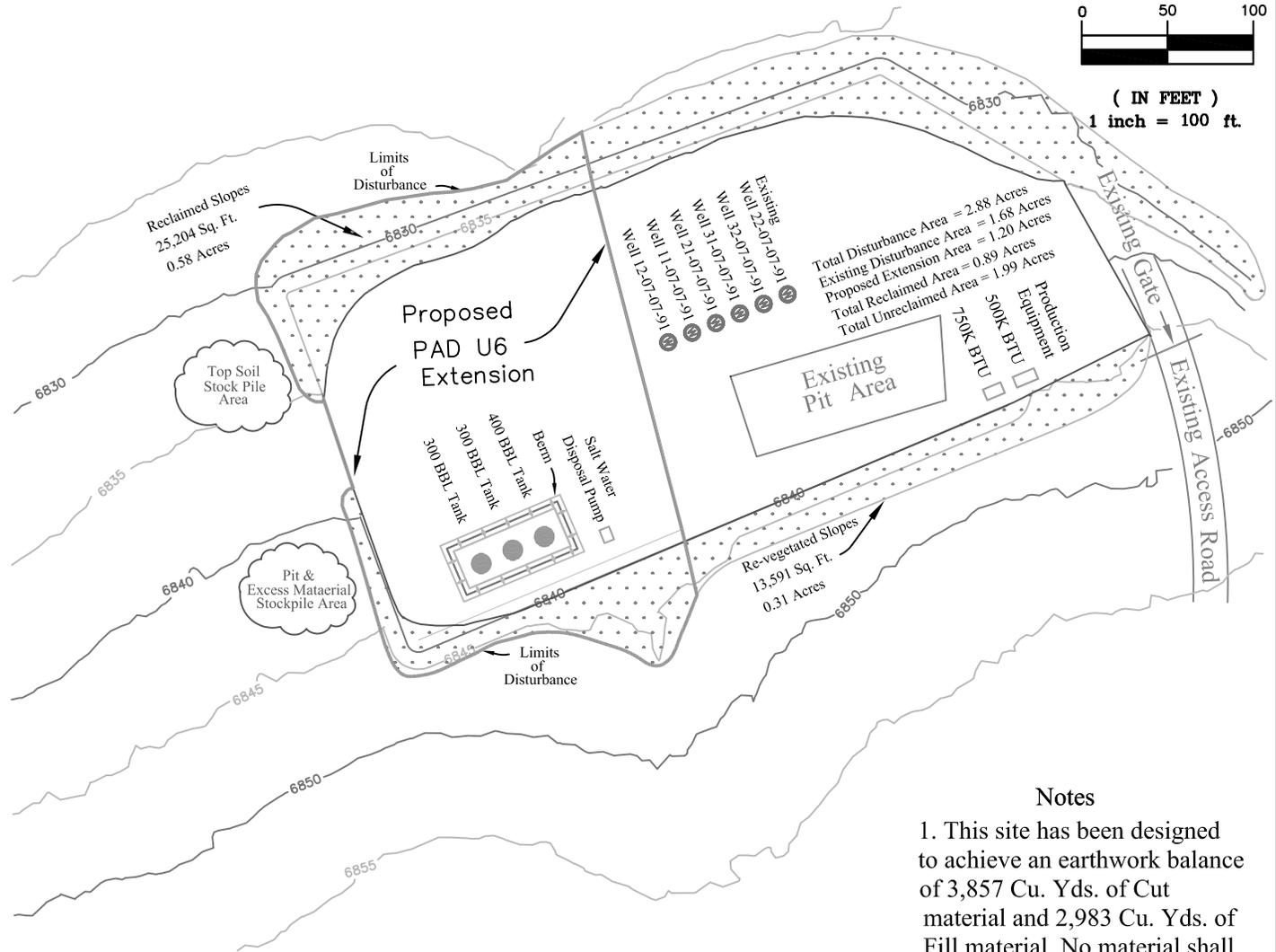
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 3,857 Cu. Yds. of Cut material and 2,983 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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Prepared For:  
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14313 N. May Avenue  
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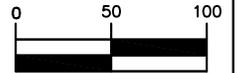
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad U-6 Reclamation  
Drawing Date: 2/23/05  
Date Surveyed: 11/03/04

# Pad V

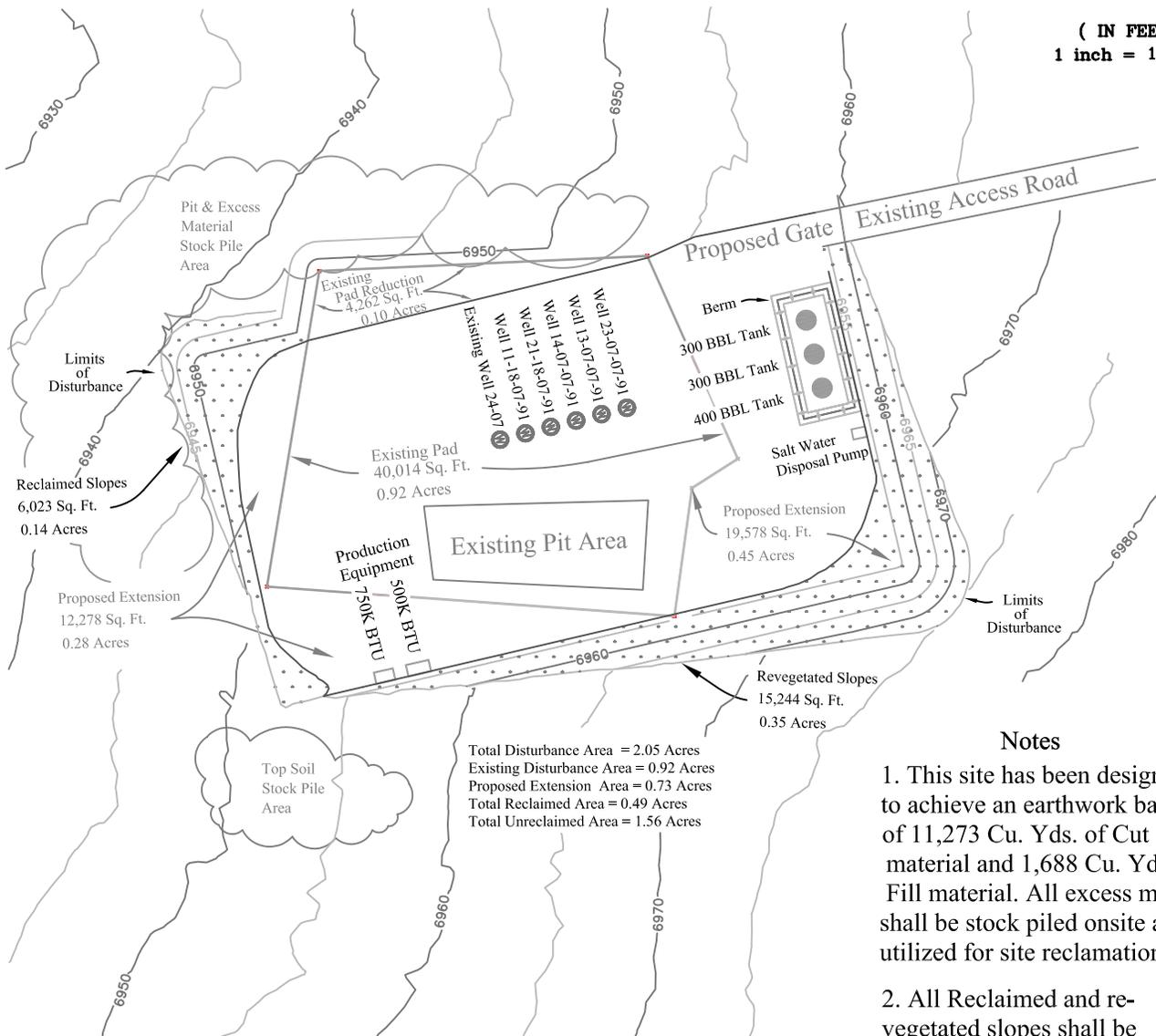
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GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



Total Disturbance Area = 2.05 Acres  
Existing Disturbance Area = 0.92 Acres  
Proposed Extension Area = 0.73 Acres  
Total Reclaimed Area = 0.49 Acres  
Total Unreclaimed Area = 1.56 Acres

### Notes

1. This site has been designed to achieve an earthwork balance of 11,273 Cu. Yds. of Cut material and 1,688 Cu. Yds. of Fill material. All excess material shall be stock piled onsite and be utilized for site reclamation.
2. All Reclaimed and revegetated slopes shall be contoured to blend with the adjacent natural slopes.



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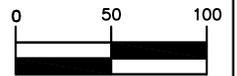
Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad V-6 Reclamation  
Drawing Date: 2/27/05  
Date Surveyed: 10/12/04

# Pad W

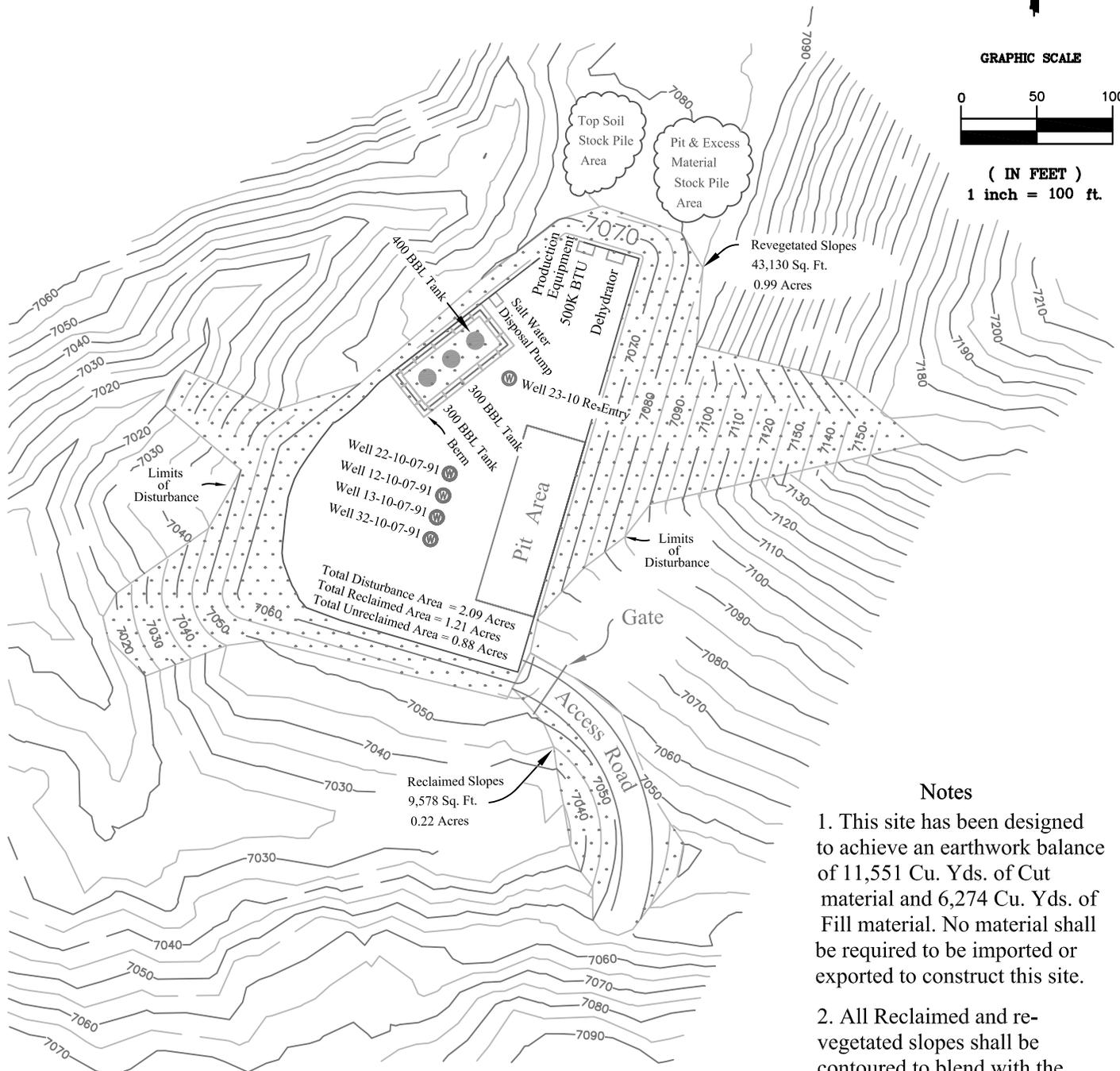
## Interim Reclamation & Equipment Layout



GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.



### Notes

1. This site has been designed to achieve an earthwork balance of 11,551 Cu. Yds. of Cut material and 6,274 Cu. Yds. of Fill material. No material shall be required to be imported or exported to construct this site.
2. All Reclaimed and re-vegetated slopes shall be contoured to blend with the adjacent natural slopes.



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Project Name: Castle Springs GAP  
Project Number: FC04200  
Drawing Name: Pad W-5 Reclamation  
Drawing Date: 2/24/05  
Date Surveyed: 10/26/04