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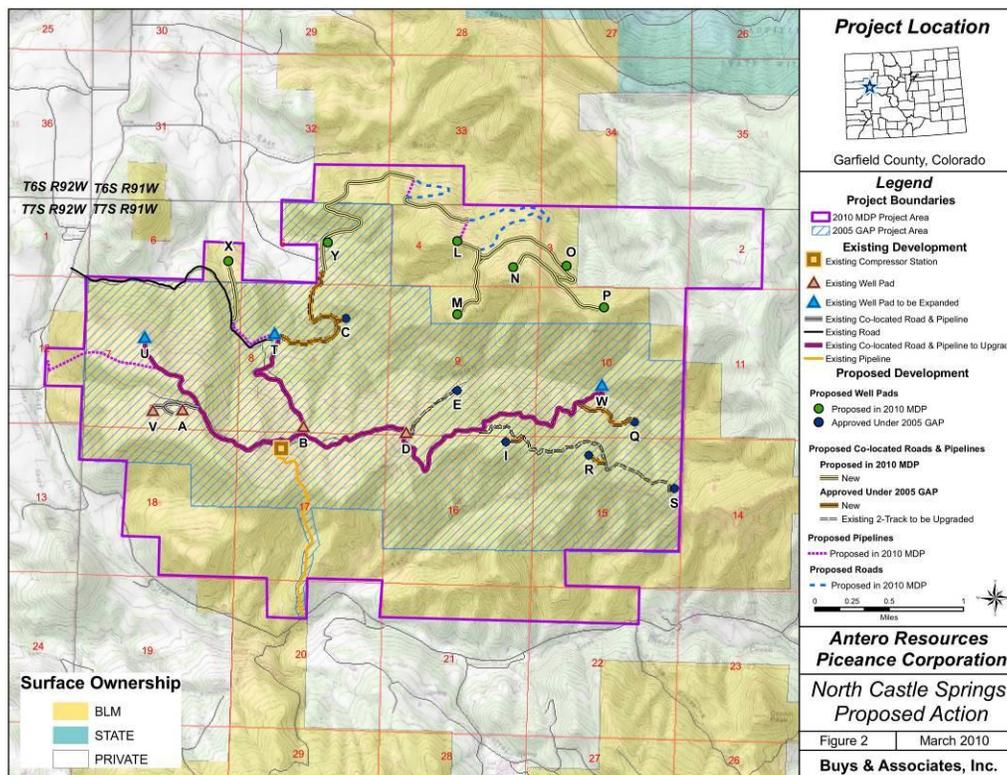
Colorado River Valley Field Office

April 2010



## Proposed Action North Castle Springs Master Development Plan for Natural Gas Exploration and Development

Antero Resources Piceance Corporation



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for

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## 1.0 INTRODUCTION

In 2005, the Bureau of Land Management (BLM), Glenwood Springs Field Office (now the Colorado River Valley Field Office, CRVFO) approved the Castle Springs Geographic Area Plan (CSGAP) (CO-140-05-009 EA) proposed by Windsor Energy Group, Limited Liability Company (LLC) (Windsor). Land included in the CSGAP Project Area included four Federal mineral leases (COC66576, COC66578, COC66579, and COC66580) that covered all or portions of the following legal locations: Sections 7-10 and 15-18, Township 7 South, Range 91 West (T7S, R91W) of the Sixth Principal Meridian. The CSGAP included the proposed construction, drilling, completion, and operation of 98 natural gas wells that would be drilled from 18 well pads over a 3- to 4-year period. Proposed construction also included development of access roads, pipelines, and a 1.5-acre compressor station site. Total surface disturbance associated with the development was approximately 114.2 acres.

Between 2005 and 2008, Windsor constructed seven well pads and drilled 21 wells. Additional construction also included associated access roads, pipeline rights-of-way (ROWs), and a compressor station. This development originally disturbed approximately 40.6 acres. In 2008, the CSGAP Project Area was acquired by Antero Resources Piceance Corporation (Antero); since that acquisition, Antero has drilled two additional wells. In total, 23 wells have been drilled in the CSGAP area: 20 producing, one plugged and abandoned, one dry, and one used for water injection (disposal of produced water).

Following acquisition and additional drilling in the CSGAP area, Antero determined that production in the area would support additional drilling. In addition, Antero currently holds rights to one additional lease (COC66577) immediately north of the CSGAP area. As a result, Antero is proposing a development program for additional natural gas exploration and development in the CSGAP area as well as on the additional lease COC66577. The new proposal is referred to as the North Castle Springs Master Development Plan (NCSMDP) (Figure 1).

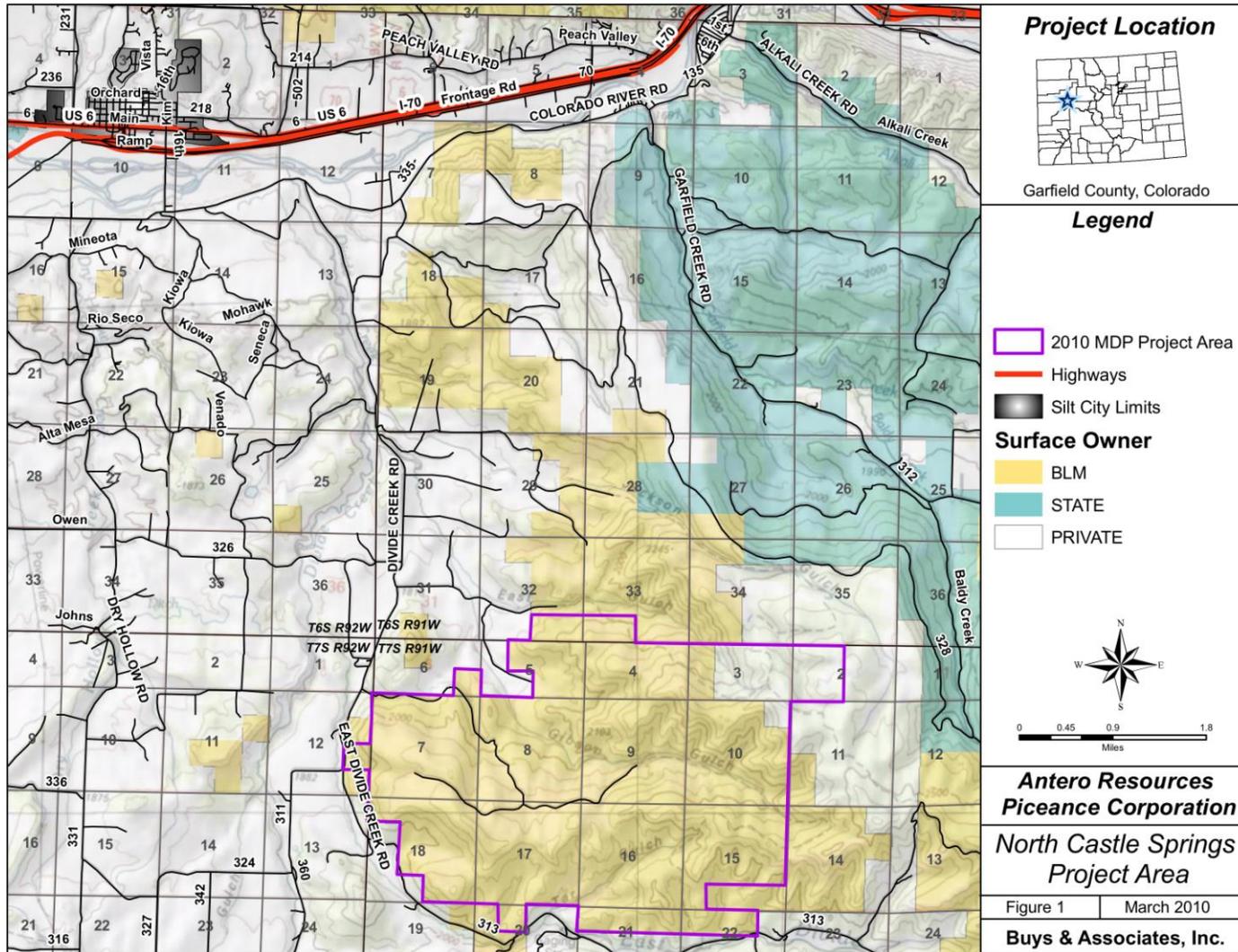
The Project Area for the NCSMDP includes approximately 6,524 acres. This comprises 6,311 acres currently leased by Antero as well as 213 acres of off-lease lands that would be used for roads and pipeline. Of the 6,524-NCS Project Area, 93% (6,060 acres) are Federal lands administered by the CRVFO, and the remaining 7% (464 acres) are privately owned (Figure 2). Table 1 outlines the distribution of surface ownership across the NCS Project Area.

Specifically, Antero is proposing a 4- to 5-year drilling program that would utilize a maximum of four drilling rigs. Target reservoirs in the NCSMDP would include the Williams Fork and Iles Formations of the Mesaverde Group (total depths ranging between 6,000 and 8,000 feet) as well as the Mancos Group (total depths ranging between 12,500 and 14,500 feet). At a maximum development rate using four drilling rigs, approximately 284 wells would be drilled within the 4- to 5-year drilling period. However, due to the exploratory nature of the deeper target reservoirs and the associated increase in drilling days required to reach these depths, the total number of wells to be drilled may be less than the aforementioned well count. All wells would access Federal minerals.

Surface disturbance associated with the proposed NCSMDP would include the development of new well pads and associated road and pipeline ROWs, along with the expansion and upgrade of existing infrastructure. In total, 13 new well pads would be constructed and three existing well pads would be expanded. Of the 13 proposed well pads, six have been previously analyzed and approved under the CSGAP. All surface disturbance would occur on Federal lands (Figure 2).

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Figure 1. North Castle Springs Project Area



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**Table 1. Legal Locations of the North Castle Springs Project Area**

| Location        |   | Surface Ownership |
|-----------------|---|-------------------|
| Township, Range | Section                                     |                   |
| T6S, R91W       | SESE and SWSE Section 32                    | BLM (Off-lease)   |
| T6S, R91W       | SWSW and SESW Section 33                    | BLM (Off-lease)   |
| T7S, R91W       | SW Section 2                                | Private           |
| T7S, R91W       | SWSW and NWSW Section 3                     | BLM               |
| T7S, R91W       | SESW, NESW, and SE Section 3                | Private           |
| T7S, R91W       | All Section 4                               | BLM               |
| T7S, R91W       | NESW and SE Section 5                       | BLM               |
| T7S, R91W       | SESE Section 6                              | BLM               |
| T7S, R91W       | All Section 7                               | BLM               |
| T7S, R91W       | All Section 8                               | BLM               |
| T7S, R91W       | All Section 9                               | BLM               |
| T7S, R91W       | NENE Section 10                             | Private           |
| T7S, R91W       | NW, SW, NE, NWNE, SWNE, and SENE Section 10 | BLM               |
| T7S, R91W       | NW, NE, N½S½, and SWSW Section 15           | BLM               |
| T7S, R91W       | All Section 16                              | BLM               |
| T7S, R91W       | All Section 17                              | BLM               |
| T7S, R91W       | NE, SE, NWNW, NENW, SENW, NESW Section 18   | BLM               |
| T7S, R91W       | NENW Section 20                             | BLM               |
| T7S, R91W       | N½N½ Section 21                             | BLM               |
| T7S, R91W       | NWNW, NENW, NWNE Section 22                 | BLM               |
| T7S, R92W       | NESE Section 12                             | BLM               |

**2.0 PURPOSE AND NEED**

The purpose of this proposal is to develop natural gas resources on Federal leases COC66576, COC66577, COC66578, COC66579, and COC66580, consistent with existing Federal lease rights. The action is needed to increase the development of natural gas resources for commercial marketing to the public.

Instead of structuring the development of individual leases as a series of individual actions, the current CRVFO land use plan (BLM 1984, revised 1988), amendments to that plan for oil and gas exploration and development (BLM 1991, 1999a), and BLM regulations specify the use of multi-well development plans to more effectively manage Federal lease development.

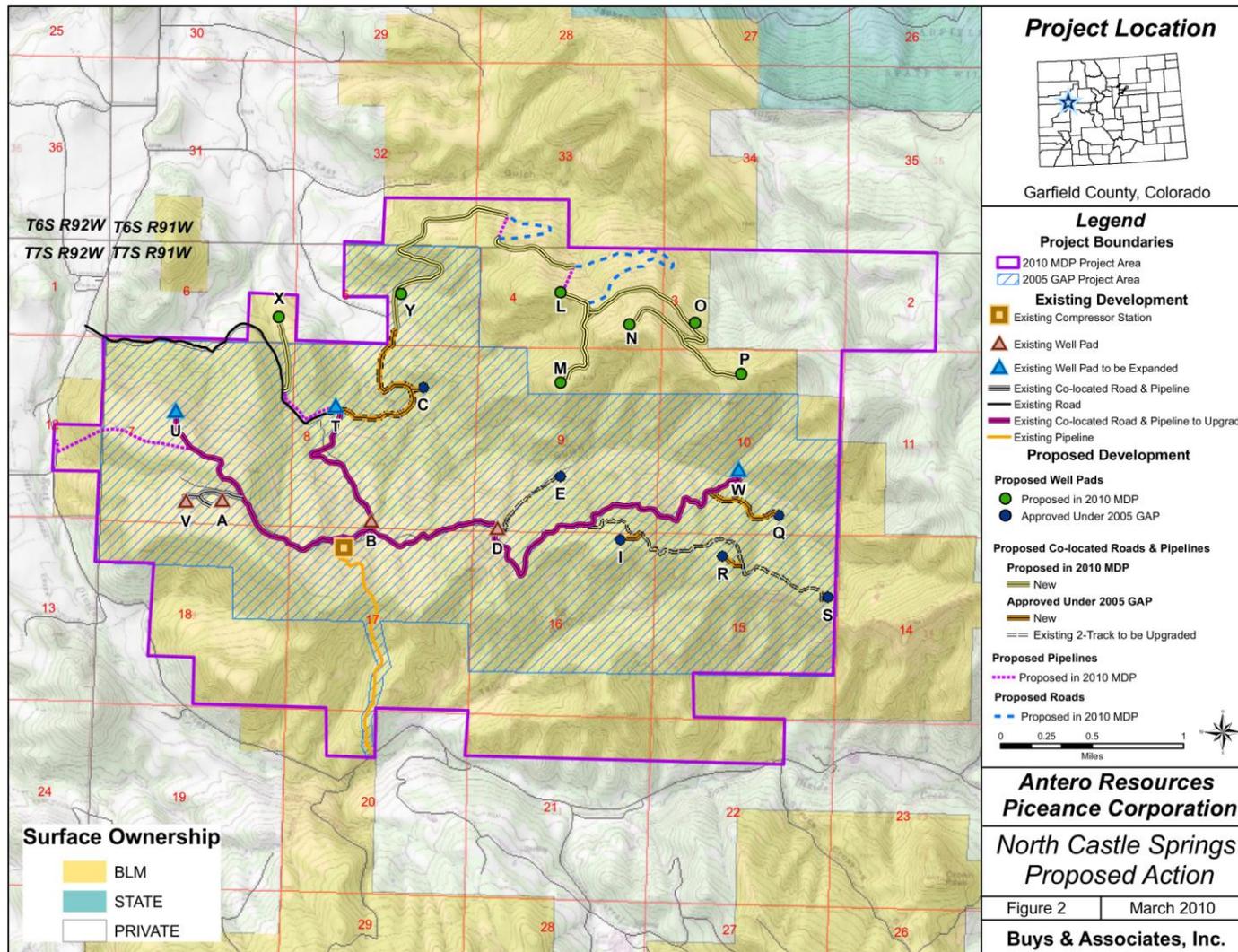
**3.0 PROPOSED ACTION**

Antero’s proposed 4- to 5-year NCSMDP would include both the development of the Williams Fork and Iles Formations of the Mesaverde Group at 10-acre downhole well density (previously approved by the Colorado Oil and Gas Conservation Commission (COGCC) and BLM), as well as drilling of the Mancos Group. Specifically, Antero’s Proposed Action includes the following primary components:

- Construction of 13 new well pads and expansion of three existing well pads
- Construction of 6.6 miles (34,569 feet) of new collocated road and pipeline ROW
- Upgrade of 2.2 miles (11,540 feet) of existing two track road that would be reconstructed to include a collocated road and pipeline ROW
- Replacement or twinning of 5.3 miles (28,309 feet) of existing pipeline

- Construction of 1.8 miles (9,240 feet) of new road ROW
- Construction of 2.2 miles (7,729 feet) of new pipeline ROW
- Installation of up to 2,680-horsepower (hp) of compression at the existing compressor location
- Drilling of one water injection well
- Use of four drilling rigs per year for 4 to 5 years
- All surface disturbance associated with the components described above would occur on Federal lands, and all wells would be drilled into Federal Leases COC66576, COC66577, COC66578, COC66579, and COC66580. Table 2 displays the lease stipulations that are variously attached to the individual leases. The effective date of all leases in this table is March 1, 2003. Figure 3 displays the distribution of each lease in the NCS Project Area.

Figure 2. North Castle Springs Proposed Action



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**Table 2. Summary of Lease Stipulations within the Project Area**

| Lease  | Well Pads   | Stipulation   |
|--|---|---|
| <b>General</b>   |   |   |
| COC66576<br>COC66577<br>COC66578<br>COC66579<br>COC66580 | All Pads  | <b>Endangered Species Act Section 7 Consultation (CO-34):</b> The lease area may contain threatened, endangered, or other special status plant or animal species or their habitats. Therefore, BLM may recommend modifications to exploration and development proposals in order to avoid activities that: 1) would contribute to a need to list such species or their habitat(s), 2) jeopardize the continued existence of a proposed or listed threatened or endangered species, or 3) result in the destruction or adverse modification of a designated or proposed critical habitat. BLM would not approve any surface-disturbing activities until it completes its obligations under the Endangered Species Act (ESA) as amended, 16 U.S.C. § 1531 et seq., including completion of any required conference or consultation. |
| <b>Controlled Surface Use (CSU)</b>                      |   |   |
| COC66576<br>COC66578                                     | T and Y   | <b>CSU Stipulation for Riparian and Wetland Zones (GS-CSU-02):</b> Surface occupancy or use is subject to special operating constraints within 500 feet of the outer edge of riparian or wetland vegetation. Activities associated with oil and gas exploration and development may require special design, construction, and implementation measures, including relocation of operations beyond 200 meters, in order to protect the values and functions of riparian and wetland zones.  |
| COC66576<br>COC66577<br>COC66578<br>COC66579<br>COC66580 | A, C, D, E, I, L, M, N, O, P, Q, R, S, T, U, V, W, X, and Y | <b>CSU Stipulation for Erosive Soils and Slopes Greater than 30% (GS-CSU-04):</b> Surface occupancy or use is subject to special operating constraints on erosive soils and slopes greater than 30%. Special design, construction, and operation and reclamation measures would be required in these areas. Implementation may include relocation of operations beyond 200 meters. The surface use plan of the Application for Permit to Drill (APD) submitted for wells in these areas must include specific measures (that comply with Glenwood Springs Resource Area Reclamation Policy) and specific performance objectives. Operators must also provide an evaluation of the site's reclamation potential and a comparison of the site with previously constructed sites.  |
| <b>No Surface Occupancy (NSO)</b>                        |   |   |
| COC66576   | L   | <b>NSO Stipulation for Raptors (GS-NSO-07):</b> No surface occupancy or use is allowed within a 0.125-mile radius of a raptor nest site. Species protected by this stipulation include the golden eagle and osprey; all accipiters; falcons, except the kestrel; all buteos and owls.<br><i>Exception Criteria:</i><br>a) The NSO area may be altered depending on the active status of the nest site or the geographical relationship of the nest site to topographic barriers and vegetative screening.   |
| COC66576<br>COC66577<br>COC66580                         | L, N, O, and P  | <b>NSO Stipulation for Wildlife Seclusion Areas (GS-NSO-11):</b> No surface occupancy or use is allowed in the 14 wildlife seclusion areas that provide high wildlife value: the Roan Cliffs, Cottonwood Gulch, and Webster Hill/Yellowslide Gulch (all in the Naval Oil Shale Reserves (NOSR) Production Area); Hayes Gulch; Riley and Starkey Gulch; Riley Gulch; Crawford Gulch; Magpie Gulch; Paradise Creek; Coal Ridge; Lower Garfield; Jackson Gulch; Bald Mountain; and Battlement Mesa.<br><i>Exception Criteria:</i><br>a) Exceptions may be granted by the BLM, based on approval of a mitigation plan that suitably addresses the wildlife seclusion values at risk.  |
| COC66576<br>COC66578<br>COC66579<br>COC66580             | C, E, I, L, M, N, P, R, S, W, and Y                         | <b>NSO Stipulation for Steep Slopes (GS-NSO-15):</b> No surface occupancy or use is allowed on steep slopes (i.e., those greater than 50%), so as to maintain site stability and site productivity. This NSO does not apply to pipelines.<br><i>Exception Criteria:</i><br>a) Exceptions may be granted by the BLM, if the lessee demonstrates that operations can be conducted without causing unacceptable impacts and that less restrictive measures would protect the public interest. A request for an exception must include an engineering and reclamation plan consistent with the objectives of the Glenwood Springs Resource Area Reclamation Policy. In addition, all elements of GS-CSU-04 would apply (see above).   |

| Lease  | Well Pads   | Stipulation   |
|--|---|---|
| <b>Timing Limitation (TL)</b>                            |   |   |
| COC66576<br>COC66577<br>COC66578<br>COC66579<br>COC66580 | A, B, C, D,<br>E, I, L, M, N,<br>O, Q, R, S, T,<br>U, V, W, X,<br>and Y | <p><b>TL Stipulation for Big Game (GS-TL-01):</b> No surface use is allowed from December 1 to April 30 in severe big game winter ranges and other high value winter habitat, as mapped by the Colorado Division of Wildlife (CDOW). Big game species protected by the stipulation include mule deer, elk, pronghorn antelope, and bighorn sheep. This stipulation does not apply to operation and maintenance of production facilities.</p> <p><i>Exception Criteria:</i></p> <p>a) Under mild winter conditions, the last 60 days of the seasonal limitation period may be suspended after consultation with the CDOW. Severity of the winter would be determined based on snow depth, snow crusting, daily mean temperatures, and whether animals are concentrated on the winter range during the winter months. This limitation may apply to work requiring a Sundry Notice, pending environmental analysis of any operational or production aspects.</p> |
| COC66576<br>COC66578                                     | E, L, and M   | <p><b>TL Stipulation for Raptors (GS-TL-06):</b> No surface use is allowed from February 1 to August 15 within 0.25 mile of raptor nesting and fledgling habitat. Species protected by this stipulation include the golden eagle and all accipiters; falcons, except the kestrel; all buteos and owls.</p> <p><i>Exception Criteria:</i></p> <p>a) The seasonal limitation may be suspended in years when a nest is unoccupied by May 15. It may also be suspended once the young have fledged and dispersed from the nest.</p>   |

### 3.1 CONSTRUCTION

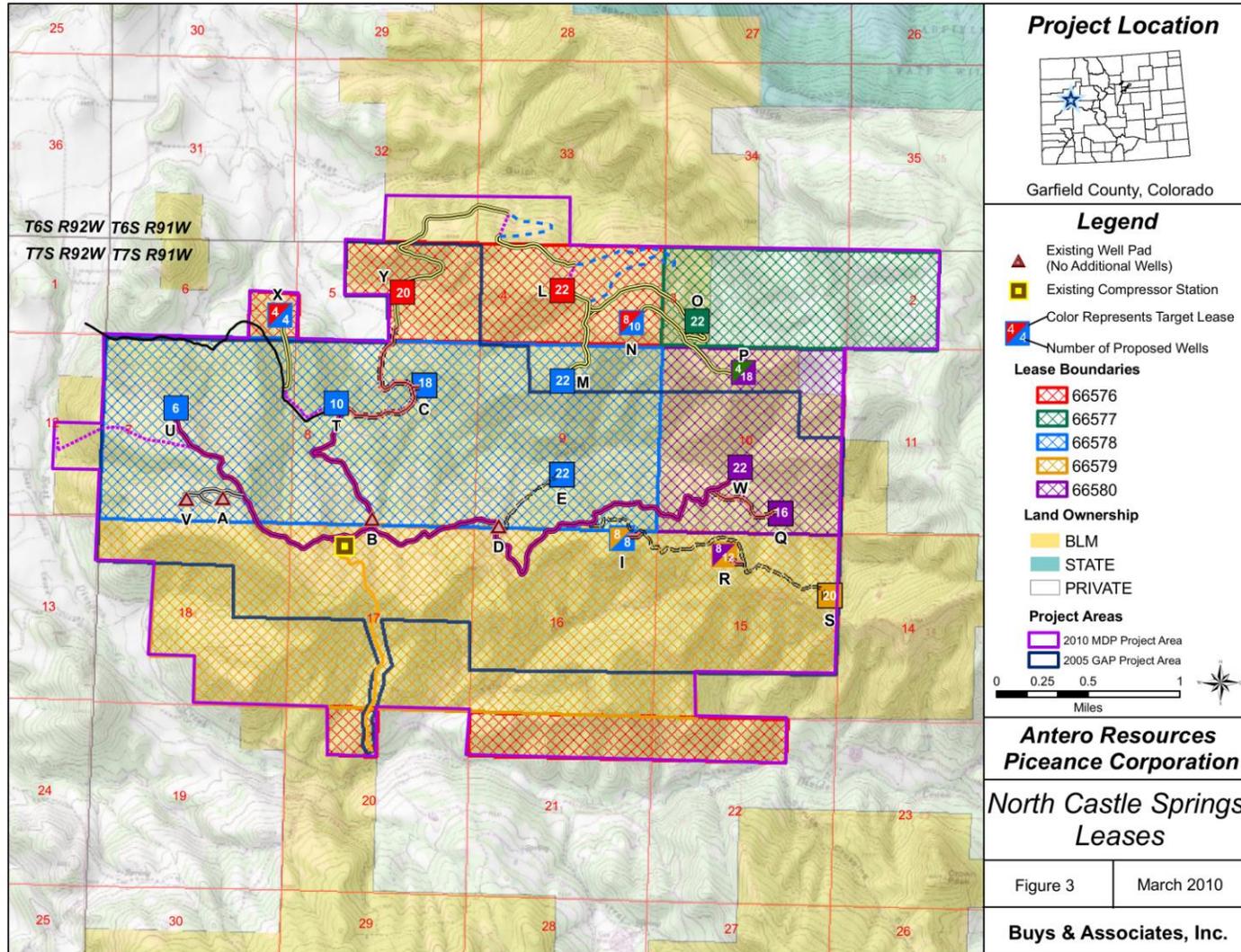
#### 3.1.1 Proposed Well Pads

As mentioned previously, Antero plans to construct 13 new well pads and to expand three existing well pads. All pad construction and expansion would occur on Federal lands and would be conducted using guidelines described in the “Gold Book” (BLM and USFS 2007), as appropriate. Construction or expansion of a typical well pad would involve the use of heavy equipment; equipment would vary depending on site conditions. Surface-disturbing activities would be supervised by a qualified company representative who is familiar with the terms and conditions in the approved Master Development Plan (MDP) and site-specific permits.

To prepare surfaces for well pad construction or expansion, the existing topsoil and brush would be cleared and topsoil would be windrowed around the pad perimeter to create a berm that would limit and redirect stormwater runoff. All cut and fill slopes needed would be constructed so that stability would be maintained for the life of the project (LOP). Environmental protection measures (i.e., energy dissipaters such as straw bales and staked soil retention baskets) would be implemented for well pads where the possibility of erosional downcutting exists. These structures would be installed prior to earth-disturbing activities and would remain in place and maintained until adjacent slopes have been revegetated and stabilized.

On average, each newly constructed or expanded well pad would be approximately 4 acres in size. Additional acreage on existing pads is needed to accommodate drilling equipment and additional wellheads and production facilities. Construction of 13 well pads and the expansion of three existing well pads would initially disturb approximately 55.7 acres. Following drilling of the last well, the rig would be dismantled and mobilized to another location, and interim reclamation would occur within 180 days of final well completion. Topsoil previously windrowed along the edges of each well pad would be re-spread across the disturbed areas, and each of these areas would then be seeded with a seed mixture prescribed by the BLM. If a well is unproductive, all areas not required for production of existing wells would be reclaimed following well plugging and abandonment. Due to wells being drilled utilizing a closed-loop system, the well pads would not require reserve pits.

Figure 3. Antero Leases in the North Castle Springs Project Area



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### **3.1.2 Proposed Access Roads**

The primary access route to the NCS Project Area would be from Interstate 70 (I-70) exiting at Silt, Colorado (Exit 97). Directions to the NCS Project Area are as follows: After exiting I-70, proceed to the frontage road (River Frontage Road) at the south end of the Silt/I-70 interchange; proceed in a general easterly direction along this frontage road 0.4 miles to the intersection with County Road 311 (CR 311); turn right and follow CR 311 in a general southerly direction crossing the Colorado River and continue 0.6 miles to the intersection with CR 331; turn left and follow CR 311 in a general easterly direction for 1.4 miles to the intersection with CR 335. Turn right at the intersection of CR 311 and CR 335, and follow CR 311 in a general southeasterly direction along Divide Creek approximately 5.5 miles to the intersection with a gravel road that enters the NCS Project Area on the left (Figure 1).

Existing roads would be used to minimize new surface disturbance and upgrades to those roads would occur on an as-needed basis to facilitate access to each drilling location. Utilized roads would be maintained in good repair during all drilling, completion, and production operations. Overall, approximately 6.1 miles (32,235 feet) of existing roads occur in the NCS Project Area. Existing surface disturbance associated with these roads is approximately 37 acres.

In addition to the existing road network in the NCS Project Area, approximately 10.6 miles (55,349 feet) of new access road would be required to access the 13 proposed well pad locations. Of this development, approximately 88% (48,758 feet) would occur on lease, while the remaining 12% (6,591 feet) would occur off-lease (L Pad Vicinity). A separate ROW application would be submitted to the BLM for all off-lease ROWs.

New roads would be constructed within a 50-foot-wide ROW that would be used for road construction and pipeline installation. Of the 10.6 miles of new access road, approximately 2.2 miles (11,540 feet) would consist of upgrading existing two-tracks in the NCS Project Area. Although a 50-foot ROW would also be required for these activities, approximately 12-foot of this ROW has already been disturbed by previous two-track development. In areas where road construction would occur independent of pipeline installation (L Pad vicinity), only a 30-foot ROW would be needed. No roads would be constructed through the middle of well pads.

Vegetation removed during construction would be windrowed or scattered over adjacent disturbance to reduce erosion. New access roads would be crowned (2 to 3 percent), ditched, and constructed to meet the anticipated traffic flow and all weather requirements to provide a well-constructed and safe road. Surface materials would consist of native soil whenever possible. If additional surfacing materials are required, they would be purchased from a local contractor having a permitted source of materials. Prior to construction, the ground would be allowed to dry completely, and no road construction would take place when soils are frozen. For analysis purposes, it is assumed that the entire 50-foot wide construction ROW would be used for collocated road and pipeline and the entire 30-foot wide construction ROW would be used for independent roads. Therefore, total surface disturbance from upgrading approximately 2.2 miles (11,540 feet) of existing two-track, the construction of approximately 6.6 miles (34,569 feet) of new collocated road and pipeline and 1.8 miles (9,240 feet) of independent road within the NCS Project Area would be approximately 58.4 acres. All disturbance would occur on Federal lands. Timing of new road construction would depend on the drilling schedule, topographic constraints, and weather conditions.

### **3.1.3 Natural Gas Pipelines**

Natural gas produced from existing wells is currently transported via 5.7 miles (30,091 feet) of 6- to 12-inch-diameter pipelines buried adjacent to existing roads throughout the NCS Project Area. To accommodate additional gas production, several new gas-gathering pipelines would be added to the

existing pipeline network. Pipeline diameters would range from 6 to 20 inches and would be dependent upon site-specific production rates. In most cases, the new pipelines would be buried adjacent to proposed access roads; however a minimal amount of cross-country pipeline (i.e., 9,129 feet) has been proposed (L Pad and Western Gathering Pipeline). In addition to new pipeline, approximately 2.2 miles (7,729 feet) of existing pipeline would either be twinned or replaced with larger diameter pipeline.

Construction corridors for new collocated road and pipeline and cross country pipeline (L Pad and Western Gathering Pipeline) would be 50 feet, while pipeline upgrades/replacements (U, T, D, and W Pads) and the independent pipeline installation for the X Pad (SWNW Section 8, T7S, R91W) would be installed within a 30-foot wide ROW. Surface disturbance calculations associated with all collocated road and pipeline have been previously discussed above (Section 3.1.2). Total surface disturbance associated with new pipeline installation and the twinning or replacement of existing pipeline would equal approximately 27.5 acres. Of this, approximately 2.8 acres would occur off-lease. Following pipeline installation, all disturbed areas would be fully reclaimed.

Construction of the pipelines would immediately follow construction of the new roads in a planned sequence. All vehicles and trenching equipment would use the road as part of the construction corridor. The pipeline alignment would first be cleared of vegetation remaining after road construction. The pipeline trench would be excavated mechanically to a depth that would allow approximately four to five feet of earth to be placed on top of the pipeline. Pipe segments would then be welded together and tested, lowered into the trench, and covered with excavated material.

After construction, pipeline would be pressure tested with fresh water or nitrogen gas to test pipeline integrity. Fresh water or nitrogen would be obtained off site. After testing, the water would be transported to either the W Pad or the Y Pad for injection. If nitrogen is used it would be released to the atmosphere. Generally speaking, about one mile of pipeline would be constructed in approximately 15 to 30 days.

### **3.1.4 Water Pipeline**

Currently, water produced from existing wells in the NCS Project Area is transported via water pipeline to an existing water injection well located at the W Pad. Facilities used to operate the injection well, including the power generator, are currently enclosed to assist with winterization and noise reduction. The generator is also equipped with a muffler system adequate to meet the standards of the BLM and COGCC.

As additional wells come online in the NCS Project Area, the amount of water produced from downhole formations would increase. To accommodate this additional water volume, it is anticipated that one additional water injection well would be drilled from the Y Pad. Mufflers, housing, and any other necessary noise attenuation measures would be implemented at the Y Pad to meet the COGCC standards (Rule 802). To decrease the amount of truck traffic that would be needed to transport and dispose of water, Antero proposes to install produced water pipelines from proposed well pads to water injection wells located at the W Pad and the Y Pad. Water pipeline would consist of 6- to 12-inch polyethylene or internally poly-lined steel pipe, which would be buried adjacent to the proposed gas pipelines. No additional ROWs would be necessary for installation of water pipeline and no additional surface disturbance would occur as a result of this installation.

## **3.2 DRILLING OPERATIONS**

Once construction or expansion of an individual well pad is completed, drilling equipment would be mobilized onto the well pad. Antero is proposing a 4- to 5-year drilling program that would utilize a

maximum of four drilling rigs. Target reservoirs in the NCSMDP would include the Williams Fork and Iles Formations of the Mesaverde Group (6,000 to 8,000 feet) and the Mancos Group (12,500 to 14,500 feet). At a maximum development rate using four drilling rigs, approximately 284 wells would be drilled within the 4- to 5-year drilling period. All wells drilled under the NCSMDP would access Federal minerals. Up to 22 wells could be drilled per location and well densities at individual well pads would be limited primarily by the relation of pad locations to lease boundaries, directional reach capabilities (anticipated max. of 3,000 feet), and the area of each well pad.

As drilling rigs could remain at a given location until all proposed wells are drilled and completed, the total length of time that a rig would be on any particular location would vary but would not exceed annual operation seasons unless a variance was granted. Production results for wells drilled during the first 2 years of development would be used to plan and design/refine the drilling program for subsequent years.

For analysis purposes, Table 3 presents the estimated drilling schedule for the NCSMDP, based upon maximum rig utilization. Although this schedule is being presented, several factors, including well production results, gas prices, rig availability, and several other economic variables, may decrease rig utilization and therefore lower the annual number of wells drilled.

**Table 3. Estimated Drilling Schedule for the NCSMDP**

| Year         | Maximum Number of Wells <sup>1</sup> | Number of Rigs        |
|--------------|--------------------------------------|-----------------------|
| 2010         | 12                                   | 1                     |
| 2011         | 68                                   | 4                     |
| 2012         | 68                                   | 4                     |
| 2013         | 68                                   | 4                     |
| 2014         | 68                                   | 4                     |
| <b>Total</b> | <b>284</b>                           | <b>Does Not Apply</b> |

<sup>1</sup>All wells would access Federal minerals.

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 to 1,000 feet or 10% of the total well depth 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 to 1,000 feet up to ground level. This surface casing would provide protection for freshwater aquifers and 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. Water used for drilling purposes would be obtained from private landowners or would be recycled from existing wells in the NCS Project Area. Water would be transported to individual well pads by pipeline or by licensed haulers, and water permits would be filed by the licensed haulers.

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. Following the use of the surface-hole rig if used, a larger drilling rig would be used to drill to the total depth (TD). A downhole mud motor may be used to increase penetration rate and directional well control. The rig would pump drilling fluids to drive the mud motor, cool the drill bit, and remove cuttings from the wellbore. Various non-toxic chemicals and additional materials may need to be added to the mud system to maintain borehole stability, minimize possible damage to the formations, provide adequate carrying viscosity to carry the drill cuttings out of the wellbore, and reduce downhole fluid losses. All drilling fluids used for each well would be recycled

using a closed-loop drilling system, and no reserve pits would be constructed or used. The directional wells would be drilled with a measurement while drilling system. The actual bottomhole locations would be horizontally separated from the surface pad positions up to approximately 3,000 feet.

### **3.3 WELL COMPLETION AND PRODUCTION**

If drilled wells indicate economic potential, completion operations would commence. Completion operations would involve setting production casing to the total drilled depth and perforating the casing in target production zones, followed by hydraulically fracturing (fracking) the productive formation under high pressure. The fracking material would likely contain sand or other proppant material to keep the fractures open, thereby allowing hydrocarbons to flow more freely from the rock formation into the casing or well bore. The next phase would be to flow and test the well to determine rates of production. Completion and testing would take approximately 7 to 10 days.

As pipeline ratings/specifications permit, water to be used during fracking operations would be transported to the appropriate well pads via buried water pipelines as discussed in Section 3.1.4. It is anticipated that all fracking water obtained off-lease would be stored at a temporary central water storage area located at the T Pad. Where necessary, temporary booster pumps would be installed at various well pad locations to aid in transporting water from the central water storage area to the well pads where the fracking is taking place. If these pumps are not adequate, additional booster pumps would be installed adjacent to the existing roads within the construction easement of the pipeline ROW.

Surface facilities at each well pad location would consist of wellheads, separation units, gas metering units, tank vapor combustors, chemical storage containers less than 500 gallons in capacity, and above-ground, low-profile condensate and produced water tanks. Telemetry equipment would also be installed at each pad location to remotely monitor well conditions and reduce traffic to and from well pad locations. Where well pads would be used for development of a single lease, Antero would commingle gas and existing or proposed facilities would be used to the greatest extent possible. Antero would also collaborate with the BLM to define the potential to commingle fluids on pad locations that have wells that drill into two or more leases. All permanent (onsite for 6 months or longer) structures constructed or installed would be painted a flat, non-reflective, earth tone color using one of the standard environmental colors, as determined by the BLM. All facilities would be painted within six months of installation and all production equipment would be fenced to prevent contact with wildlife/livestock.

Condensate and water produced from the wells would be initially stored in tanks located on the site. Tanks would be placed within secondary containment to prevent the offsite migration of accidentally spilled condensate or produced water. Water from storage tanks would be transported to the W Pad via water pipeline where the existing injection well would be used. It is expected that an additional injection well would be drilled from the Y Pad to accommodate the produced water from the northern pads. It is estimated that each well would initially produce about 6 to 7 barrels of condensate per day. Condensate would be trucked to market on a 2 to 3 week schedule.

Periodically, a workover or recompletion on 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 in 7 days per well, during daylight hours. The frequency for this type of work cannot be accurately projected because workovers vary by well; however, an average work time may be one workover per well per year after about 5 years of production. In the case of a recompletion, where the wellbore casing is worked on or valves and fittings are replaced to stimulate or improve production, all byproducts would be stored in tanks and hauled from the location. For workover operations, it may be necessary to rework the surface

location to accommodate equipment. At the completion of the work, the surface location would be re-graded to the pre-work contours and reclaimed.

### **3.4 COMPRESSION**

Antero currently operates one Caterpillar G3508TALE/Aerial JGE2 compressor package, which is rated at 633 hp. This compressor package is located within an insulated metal building to reduce noise impacts.

If the proposed wells are productive, natural gas would be transported from each wellhead via gas gathering lines to the existing compressor station. To support the proposed development, additional compression may need to be added to the existing compressor location. This upgrade would add additional horsepower sufficient enough to maximize daily flow rates through the existing pipeline that delivers natural gas to the gathering line in the NENW Section (Sec.) 20, T7S, R91W. All additions and/or upgrades to existing compressors would occur on previously disturbed areas that currently house existing compressor facilities. When and if daily production rates within the NCS Project Area are projected to reach/exceed the maximum feasible flow rates through the current pipeline infrastructure, which travels south from the compressor location to the gathering line, an alternate gas transport/sales line would be pursued. This alternate route is outlined on Figure 2 (Sec. 7, T7S, R91W and Sec. 12, T7S, R92W). In total, compression upgrades in the NCS Project Area would not exceed 2,680 hp.

### **3.5 DISTURBANCE SUMMARY**

Table 4 summarizes initial and long-term surface disturbance estimates for the Proposed Action. In order to adequately consider all possible impacts of the Proposed Action, this MDP assumes that that all 13 new well pads and their associated access roads and pipelines would be constructed and that three existing well pads would be expanded. Existing disturbance associated with the three existing well pads is estimated to be approximately 4.8 acres. New surface disturbances associated with construction of the remaining project components under the Proposed Action would result in an additional 139.3 acres of disturbance, for a total of approximately 144.1 acres. Of this total, approximately 58% (83 acres) would be reclaimed during interim reclamation. As such, long-term disturbance associated with the Proposed Action would equal approximately 61.1 acres. Long-term is defined as lasting the approximate 40-year LOP, and until reclamation efforts result in revegetation of disturbed areas. To ensure surface reclamation would occur at the end of the productive LOP, Antero would secure a reclamation bond with the BLM, which covers both well plugging and abandonment and surface reclamation. That bond would not be released until reclamation is deemed successful, as determined by the BLM. Well pads would be monitored annually to document the success of interim reclamation and reports summarizing the results of monitoring would be annually submitted to the BLM.

**Table 4. Location and Estimated Disturbance Acreage of Proposed Project Components**

| Proposed New Well Pads <sup>1</sup>                         |                               |       |                           |  |  |   |                                |
|---|-------------------------------|-------|---------------------------|--|--|---|--------------------------------|
| Pad   | Surface Location<br>T7S, R91W | Lease | Maximum # of<br>New Wells | Initial Disturbance<br>(acres)               | Long-term<br>Disturbance<br>(acres)                        | Interim<br>Reclamation<br>(acres)             |                                |
| C*  | NWNE Sec. 8                   | 66578 | 18                        | 3.3  | 1.6  | 1.7   |                                |
| E*  | NESW Sec. 9                   | 66578 | 22                        | 3.4  | 1.6  | 1.8   |                                |
| I*  | NENE Sec. 16                  | 66578 | 8                         | 3.7  | 1.7  | 2.0   |                                |
|   |                               | 66579 | 8                         |  |  |   |                                |
| L   | NESW Sec. 4                   | 66576 | 22                        | 4.0  | 1.5  | 2.5   |                                |
| M   | NENW Sec. 9                   | 66578 | 22                        | 4.0  | 1.5  | 2.5   |                                |
| N   | SESE Sec. 4                   | 66576 | 8                         | 4.0  | 1.5  | 2.5   |                                |
|   |                               | 66578 | 10                        |  |  |   |                                |
| O   | SWSW Sec. 3                   | 66577 | 22                        | 4.0  | 1.5  | 2.5   |                                |
| P   | NENW Sec. 10                  | 66577 | 22                        | 4.0  | 1.5  | 2.5   |                                |
| Q*  | SWSE Sec. 10                  | 66580 | 16                        | 2.7  | 1.5  | 1.2   |                                |
| R*  | NENW Sec. 15                  | 66579 | 12                        | 3.7  | 1.7  | 2.0   |                                |
|   |                               | 66580 | 8                         |  |  |   |                                |
| S*  | SENE Sec. 15                  | 66579 | 20                        | 3.7  | 1.5  | 2.2   |                                |
| X   | SESE Sec. 6                   | 66576 | 4                         | 4.0  | 1.5  | 2.5   |                                |
|   |                               | 66578 | 4                         |  |  |   |                                |
| Y   | NESE Sec. 5                   | 66576 | 20                        | 4.0  | 1.5  | 2.5   |                                |
| <b>Subtotal New Well Pads</b>                               |                               |       | <b>246</b>                | <b>48.5</b>                                  | <b>20.1</b>  | <b>28.4</b>                                   |                                |
| Expansion of Existing Well Pads                             |                               |       |                           |  |  |   |                                |
| Pad   | Surface Location              | Lease | Proposed Wells            | Existing Disturbance<br>(acres) <sup>2</sup> | Disturbance to Expand Existing<br>Pad (acres) <sup>3</sup> | Long-term Disturbance<br>(acres) <sup>4</sup> | Interim Reclamation<br>(acres) |
| T   | SENE Sec. 8                   | 66578 | 10                        | 1.9  | 2.1  | 1.5   | 2.5                            |
| U   | SENE Sec. 7                   | 66578 | 6                         | 1.9  | 2.1  | 1.5   | 2.5                            |
| W   | NESW Sec. 10                  | 66580 | 22                        | 1.0  | 3.0  | 1.5   | 2.5                            |
| <b>Subtotal Existing Well Pads</b>                          |                               |       | <b>38</b>                 | <b>4.8</b>                                   | <b>7.2</b>   | <b>4.5</b>                                    | <b>7.5</b>                     |
| <b>TOTAL PADS</b>   |                               |       |                           |  | <b>55.7</b>  | <b>24.6</b>                                   | <b>35.9</b>                    |
| Proposed Collocated Roads and Pipelines <sup>1, 5, 10</sup> |                               |       |                           |  |  |   |                                |
| Well Pad Accessed   | Length                        |       | Construction Width (feet) | Initial Disturbance (acres)                  | Long-term Disturbance (acres)                              | Interim Reclamation (acres)                   |                                |
|   | Miles                         | Feet  |                           |  |  |   |                                |
| C*  | 0.6                           | 2,935 | 50                        | 3.4  | 2.0  | 1.4   |                                |
| I*  | 0.1                           | 411   | 50                        | 0.5  | 0.3  | 0.2   |                                |
| L   | 1.8                           | 9,412 | 50                        | 10.9   | 6.5  | 4.4   |                                |
| M   | 0.5                           | 2,569 | 50                        | 2.9  | 1.8  | 1.1   |                                |
| N   | 0.3                           | 1,584 | 50                        | 1.8  | 1.1  | 0.7   |                                |
| O   | 0.9                           | 4,919 | 50                        | 5.6  | 3.4  | 2.2   |                                |
| P   | 0.7                           | 3,861 | 50                        | 4.4  | 2.7  | 1.7   |                                |
| Q*  | 0.4                           | 2,301 | 50                        | 2.7  | 1.6  | 1.1   |                                |
| R*  | 0.1                           | 477   | 50                        | 0.5  | 0.3  | 0.2   |                                |
| X   | 0.4                           | 2,053 | 50                        | 2.4  | 1.4  | 1.0   |                                |
| Y   | 0.8                           | 4,047 | 50                        | 4.6  | 2.8  | 1.8   |                                |
| <b>TOTAL NEW COLLOCATED ROAD AND PIPELINE</b>               |                               |       |                           | <b>39.7</b>                                  | <b>23.9</b>  | <b>15.8</b>                                   |                                |

NORTH CASTLE SPRINGS MASTER DEVELOPMENT PLAN – PROPOSED ACTION

| <b>Proposed Upgrade of Existing Two-tracks to Collocated Road and Pipeline</b> <sup>1, 6, 10</sup> |               |             |  |                                    |                                      |                                    |
|--|---------------|-------------|--|------------------------------------|--------------------------------------|------------------------------------|
| <b>Well Pad Accessed</b>   | <b>Length</b> |             | <b>Construction ROW Width (feet)<sup>6</sup></b> | <b>Initial Disturbance (acres)</b> | <b>Long-term Disturbance (acres)</b> | <b>Interim Reclamation (acres)</b> |
|  | <b>Miles</b>  | <b>Feet</b> |  |                                    |                                      |                                    |
| E  | 0.5           | 2,516       | 38   | 2.2                                | 1.7                                  | 0.5                                |
| I*   | 0.4           | 1,967       | 38   | 1.7                                | 1.4                                  | 0.3                                |
| R*   | 0.7           | 3,945       | 38   | 3.4                                | 2.7                                  | 0.7                                |
| S*   | 0.6           | 3,112       | 38   | 2.7                                | 2.1                                  | 0.6                                |
| <b>TOTAL UPGRADE OF EXISTING TWO-TRACKS</b>  |               |             |  | <b>10.0</b>                        | <b>7.9</b>                           | <b>2.1</b>                         |
| <b>Proposed Upgrade of Existing Collocated Road and Pipeline</b> <sup>1, 7, 9</sup>                |               |             |  |                                    |                                      |                                    |
| <b>Well Pad Accessed</b>   | <b>Length</b> |             | <b>Construction ROW Width (feet)</b>             | <b>Initial Disturbance (acres)</b> | <b>Long-term Disturbance (acres)</b> | <b>Interim Reclamation (acres)</b> |
|  | <b>Miles</b>  | <b>Feet</b> |  |                                    |                                      |                                    |
| U*   | 1.3           | 7,110       | 30   | 4.9                                | 0.0                                  | 4.9                                |
| T*   | 1.2           | 6,337       | 30   | 4.4                                | 0.0                                  | 4.4                                |
| D*   | 0.8           | 4,201       | 30   | 2.9                                | 0.0                                  | 2.9                                |
| W*   | 2.0           | 10,660      | 30   | 7.3                                | 0.0                                  | 7.3                                |
| <b>TOTAL UPGRADE OF EXISTING COLLOCATED ROAD AND PIPELINE</b>                                      |               |             |  | <b>19.5</b>                        | <b>0.0</b>                           | <b>19.5</b>                        |
| <b>Proposed New Pipelines</b> <sup>7, 9, 10</sup>  |               |             |  |                                    |                                      |                                    |
| <b>Well Pad Served</b>   | <b>Length</b> |             | <b>Construction ROW Width (feet)</b>             | <b>Initial Disturbance (acres)</b> | <b>Long-term Disturbance (acres)</b> | <b>Interim Reclamation (acres)</b> |
|  | <b>Miles</b>  | <b>Feet</b> |  |                                    |                                      |                                    |
| L  | 0.3           | 1,400       | 50   | 1.6                                | 0.0                                  | 1.6                                |
| X  | 0.4           | 1,892       | 30   | 1.3                                | 0.0                                  | 1.3                                |
| Western Gathering Line   | 0.8           | 4,437       | 50   | 5.1                                | 0.0                                  | 5.1                                |
| <b>TOTAL NEW PIPELINES</b>   |               |             |  | <b>8.0</b>                         | <b>0.0</b>                           | <b>8.0</b>                         |
| <b>Proposed New Road</b> <sup>8, 10</sup>  |               |             |  |                                    |                                      |                                    |
| <b>Well Pad Served</b>   | <b>Length</b> |             | <b>Construction ROW Width (feet)</b>             | <b>Initial Disturbance (acres)</b> | <b>Long-term Disturbance (acres)</b> | <b>Interim Reclamation (acres)</b> |
|  | <b>Miles</b>  | <b>Feet</b> |  |                                    |                                      |                                    |
| L  | 1.8           | 9,240       | 30   | 6.4                                | 4.7                                  | 1.7                                |
| <b>TOTAL NEW ROADS</b>   |               |             |  | <b>6.4</b>                         | <b>4.7</b>                           | <b>1.7</b>                         |
| <b>GRAND TOTAL PADS + ROADS + PIPELINES</b>  |               |             | <b>Existing Disturbance (acres)</b>              | <b>Initial Disturbance (acres)</b> | <b>Long-term Disturbance (acres)</b> | <b>Interim Reclamation (acres)</b> |
|  |               |             | <b>4.8</b>                                       | <b>139.3</b>                       | <b>61.1</b>                          | <b>83.0</b>                        |

Notes:

- (1) Well pads denoted by an asterisk (\*) were previously analyzed in the Castle Springs GAP (BLM 2005). Initial pad size, long-term disturbance, and interim reclamation acres were derived from Table 2 in the 2005 GAP.
- (2) Existing disturbance was derived from Table 2 in the 2009 weed inventory and reclamation report (B&A 2009).
- (3) Assumes existing well pad would be expanded from existing disturbance to 4.0 acres.
- (4) Long-term disturbance is based on a 4.0-acre well pad (i.e., not initial disturbance to expand the existing well pad).
- (5) Collocated road and pipeline disturbance is estimated at an average of 50 feet from the toe of fill to top of cut. Long-term disturbance is estimated at 30 feet (22-foot running surface and 8 feet for the pipeline).
- (6) Existing two-tracks occupy a 12-foot wide ROW. Therefore, initial disturbance for a 50-foot ROW would equal 38 feet.
- (7) Upgrade of existing pipeline and installation of cross-country pipeline would require a 30-ft initial disturbance and would be fully reclaimed.
- (8) Proposed road corridors would require a 30-foot initial disturbance and 22-foot long-term disturbance.
- (9) To avoid double calculation, pipeline disturbance is represented under the associated collocated road and pipeline disturbance estimate because of pipeline/road collocation (indicated in table by \*\*). Only the portion attributable to replacement or twinning of existing pipeline and installation of cross-country pipelines is listed separately.
- (10) Disturbance calculations for all ROWs are based on the following well pad construction schedule: U, X, T, C, Y, Q, L, E, I, R, S, O, P, N, M, W.

### 3.5.1 Interim Reclamation

After all well completion activities on a given well pad are finalized, Antero 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. Interim reclamation would be accomplished by grading, leveling, and seeding, as required by the BLM. Interim reclamation would reduce the disturbed area at each pad to approximately 1.5 acres or less. Following installation of new or replacement pipeline, all surface disturbances within the pipeline corridor would be fully reclaimed. Therefore, no long-term disturbance would occur following successful interim reclamation. The following is a summary of interim reclamation activities Antero would implement after all wells have been completed on a location:

- The well location and surrounding areas would be cleared of all materials not required for production. Waste materials would be disposed of at an approved facility.
- All pits, cellars, rat holes, and other boreholes at drilling locations unnecessary for further lease operations would be backfilled to conform to surrounding terrain.
- All drill cuttings would be hauled offsite to an approved facility.
- Areas not necessary for production and future operation would be reshaped to resemble the original landscape contour. Windrowed topsoil would be redistributed and disked on the area to be reclaimed and reseeded using a BLM-prescribed mix.

Interim reclamation for each well pad and access road not needed for production facilities/operations would be completed within 6 months following completion of the last well planned for the pad. Pipeline ROWs would be reclaimed within 6 months of pipeline installation. Reclamation, including seeding of temporarily disturbed areas along roads and pipelines, would be completed within 30 days following completion of construction.

Some locations would require the use of special reclamation practices. These practices could include hydromulching, straw mat application on steeper slopes, fertilizing, seedbed preparation, contour furrowing, watering, terracing, water barring, and the replacement of topsoil. All reclamation efforts would employ seed mixes as approved by the BLM. To prevent livestock/wildlife grazing pressure, pads would be fenced for the first two growing seasons or until the seeded species are established.

### 3.5.2 Final Abandonment and Reclamation

#### Well and Pipeline Plugging and Abandonment

Upon abandonment, each well would be plugged with cement 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 disturbed surface soil would be reseeded with native species. The seed mix used would conform to the typical vegetation surrounding the specific well site and would be approved by the BLM.

A Sundry Notice would be submitted by Antero to the BLM describing the technical or environmental aspects of final plugging and abandonment. This notice would describe final reclamation procedures and any mitigation measures associated with the final reclamation performed by the operator. The BLM and COGCC 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.

### Final Reclamation

All areas of surface disturbance would be recontoured and revegetated according to an approved reclamation plan. Final well site reclamation would be performed and monitored in accordance with the GSRA reclamation policy in the 1998 DSEIS (BLM 1998), including control of noxious weeds, or consistent with new standards and protocols in effect at the time of final reclamation. Further information on reclamation standards is available in Appendix I of the 1999 FSEIS (BLM 1999b). 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 in this proposal is to accomplish as much reclamation on each well pad during the life of the wells as possible, even on those pads with a large interim reclamation or “in-use” area.

Unreclaimed areas or reclaimed areas that do not meet the objective of 3 to 4 years of sustained progress toward reclamation success (known as “operator complete”) would undergo the reclamation retreatment measures described in the Surface Use Plan of Operations, submitted as part of the NCSMDP, and referenced with each APD. Antero 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.

Antero would restore the well pad locations, access roads, and pipeline ROWs to approximately their original contours. During reclamation of these sites, fill material would be pushed into cuts and up over the back slope. No depressions would be left that would trap water or form ponds. Upon completion of backfilling, leveling, and recontouring, the windrowed topsoil would be evenly spread over the reclaimed areas. All disturbed surfaces on BLM land would be reseeded with a seed mixture prescribed by the BLM. The seedbed would then be prepared by disking and roller packing following the natural contours. Seed would be drilled on contours at a depth no greater than 0.5 inch. In areas that cannot be drilled, seed would be broadcast at double the seeding rate and harrowed into the soil. Seeding should occur within 24 hours following completion of final seedbed preparation to reduce the potential for establishment of weeds and before crusting of the soil, which can impede germination. If the seeding is unsuccessful, Antero would be required to make subsequent seedings.

Reclamation would be considered successful when the objectives described in the 1998 GSRA reclamation policy (BLM 1998) or other standards and protocols in effect at the time of initiation of final reclamation are achieved. Revegetation would be considered successful if it meets the objectives set forth in the 1998 DSEIS (BLM 1998). To summarize the objectives in Appendix E of the DSEIS, revegetation would be considered successful when the following objectives are met:

- Immediate short term: Establishment of desirable perennial vegetation by the end of the second growing season, capable of renewing itself.
- Acceptable establishment: Acceptable level of desirable vegetation by the end of the fifth growing season.
- Long-term establishment: Level of revegetation approximates the original predisturbance condition, in terms of canopy cover and species composition.

### **3.5.3 Road Maintenance**

The access roads would be inspected by the BLM and, if necessary, maintained by Antero in conjunction with other operators utilizing the NCS Project Area roads, and the appropriate road management authorities. Road maintenance would 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 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 reclamation
- Weed control
- Dust abatement methods and frequency to be determined in consultation with BLM

#### **4.0 LAND USE PLAN CONFORMANCE REVIEW**

The Proposed Action and No Action Alternative are subject to, and have been reviewed for, conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

Name of the Plan: The current land use plan is the *Glenwood Springs Resource Management Plan* (RMP), approved in 1984 and revised in 1988 (BLM 1984). Relevant amendments to the Plan include the *Oil and Gas Plan Amendment to the Glenwood Springs Resource Management Plan* (BLM 1991) and the *Oil & Gas Leasing & Development Record of Decision and Resource Management Plan Amendment* (BLM 1999a).

Decision Language: The 1991 Oil and Gas Plan Amendment (BLM 1991) included the following decision language: “697,720 acres of BLM-administered mineral estate within the Glenwood Springs Resource Area are open to oil and gas leasing and development, subject to lease terms and (as applicable) lease stipulations” (BLM 1991, page 3).

“In areas being actively developed, the operator must submit a Geographic Area Proposal (GAP) [currently referred to as a MDP] that describes a minimum of two to three years activity for operator controlled leases within a reasonable geographic area” (BLM 1999a).

Discussion: The Proposed Action is in conformance with the 1991 and 1999 RMP amendments cited above because the Federal mineral estate proposed for development is open to oil and gas leasing and development. In addition, the Proposed Action describes a multi-year development plan over a large geographic area and, as such, is in conformance with decision to require operators to submit MDPs, referred to at that time as GAPs.

#### **STANDARDS FOR PUBLIC LAND HEALTH**

In January 1997, Colorado BLM approved the Standards for Public Health. The five 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. The environmental analysis must address whether the Proposed Action or alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions relative to these resources.

#### **5.0 MITIGATION MEASURES PROPOSED BY ANTERO**

In addition to the environmental protection measures required by applicable regulatory authorities, the following applicant-committed environmental mitigation measures would be applied to all activities on

Federal lands within the NCS Project Area. Implementation of these measures would be incorporated as Conditions of Approval, which authorizes the BLM to enforce these measures to help avoid or minimize impacts to the environment.

#### AIR QUALITY

- All internal combustion equipment would be kept in good working order.
- All internal combustion engines will be equipped with emission controls in compliance with Colorado Department of Public Health and Environment (CDPHE) and Environmental Protection Agency (EPA) emission control standards for natural gas fired reciprocating internal combustion engines.
- Antero would apply water or other BLM-approved dust suppression at construction sites and on roads, as necessary, to abate fugitive dust.
- Antero would not allow any open burning of garbage or refuse at well sites or other facilities.

#### CULTURAL RESOURCES

- Antero would inform their employees, contractors, and subcontractors about relevant Federal regulations intended to protect archaeological and cultural resources. All personnel would be informed that collecting artifacts is a violation of Federal law and that employees engaged in this activity would be subject to disciplinary action.
- If cultural resources are uncovered during surface-disturbing activities, Antero would suspend operations at the site and immediately contact the BLM, who would arrange for a determination of eligibility in consultation with the State Historic Preservation Office (SHPO), and, if necessary, recommend a recovery or avoidance plan.

#### VEGETATION INCLUDING SPECIAL-STATUS SPECIES AND WEEDS

- Removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g., using previously disturbed areas and existing easements where feasible, placing pipelines adjacent to roads, limiting well pad expansion, etc.). In addition, all areas not utilized for the operational phase of the project would be reseeded.
- In an effort to ensure that project activities do not increase the existence of invasive or noxious weeds in the NCS Project Area, Antero would continue updating the existing annual *Antero Resources Piceance Corporation Castle Springs Area Weed Inventory and Reclamation Monitoring* report.

#### FISH AND WILDLIFE INCLUDING SPECIAL-STATUS SPECIES

- To minimize wildlife mortality due to vehicle collisions, Antero would advise project personnel regarding appropriate speed limits in the NCS Project Area. The CDOW would be contacted regarding the presence of carrion within or along roadways.
- Prior to any surface-disturbing activities between February 1 and August 31, a BLM approved contractor would survey all areas within 0.5 mile of proposed surface disturbance for the presence

of raptor nests. If active raptor nests are found, construction would not occur during the nesting season for that species within the species-specific buffer.

#### LIVESTOCK GRAZING

- Antero would repair or replace any fences, cattleguards, gates, drift fences, and natural barriers that are damaged as a result of the Proposed Action. Cattleguards or gates would be installed for livestock control on road ROWs when fences are crossed and these structures would be maintained by Antero for the LOP.

#### PALEONTOLOGICAL RESOURCES

- If fossils are encountered during excavation, construction would be suspended, and the BLM would be notified. Construction would not resume until the fossils are assessed by the BLM, and appropriate mitigation measures are developed and implemented.

#### SOIL RESOURCES

- Areas used for soil storage would be stripped of topsoil before soil placement.
- Appropriate erosion control and revegetation measures would be employed. In areas with unstable soils where seeding alone may not adequately control erosion, grading would be used to minimize slopes and water bars would be installed on disturbed slopes. Erosion control efforts would be monitored by Antero and, if necessary modifications would be made to control erosion.
- Rock check dams would be installed on portions of access roads where steep grades are encountered.

#### WATER RESOURCES

- Antero would inform their employees, contractors and subcontractors of the potential impacts that can result from accidental spills, as well as the appropriate actions to take if a spill did occur.
- Newly constructed gas and water pipelines would be pressure tested to evaluate structural soundness and reduce the potential for leaks.
- Gas and water pipelines would be bored to avoid impacts to U.S. Army Corps of Engineers jurisdictional drainages.

#### VISUAL RESOURCES

- To reduce visual impacts to individuals utilizing the surrounding lands, low profile tanks would be used at all well pads.
- Tanks, separators, wellheads, and other associated pad facilities would be painted a non-reflective, earth tone color as determined by the BLM. Wherever possible, these facilities would be positioned on the pad against cut slopes or in accordance with other visual resource management (VRM) practices.
- All objects visible from surrounding private properties shall be painted a natural color selected by the BLM to minimize contrast with adjacent vegetation or rock outcrops.

- Collocated access roads and pipeline, cross-country pipelines, and well pads have been designed to minimize surface disturbance and visual resources concerns.
- Access roads were designed to follow contouring and wherever possible were positioned behind larger stands of pinyon-juniper and/or oakbrush to reduce the visual impacts from key observation points (KOP) along County Road 311.
- The two cross-country sections of pipeline in the vicinity of the L pad were oriented slightly to the northeast to camouflage the pipeline ROW from County Road 311. If the alternate gas transport line is pursued, the section of pipeline that travels through the NESE Sec. 12, T7S, R92W would be constructed to meet all VRM standards.
- Pad locations were positioned with long axes parallel to existing contouring wherever possible to minimize cut and fill. The use of existing vegetation and Wasatch outcroppings were considered as well when designing the position of certain pads in the northern portion of the NCS Project Area in an attempt to blend the pad sites into the existing terrain.

#### PAD-SPECIFIC MITIGATION MEASURES

- Y Pad – Mufflers, housings, and any other necessary noise attenuation measures would be installed for the proposed water injection well to meet the COGCC noise standards (COGCC Rule 802). All objects visible from surrounding private properties shall be painted a natural color selected by the BLM to minimize contrast with adjacent vegetation or rock outcrops.

### 6.0 STANDARD SURFACE USE COAS APPLICABLE TO ALL ACTIVITIES

The following standard surface use COAs are in addition to all stipulations attached to the respective Federal leases and to any site-specific COAs for individual well pads. In cases of discrepancies, the following COAs supersede earlier versions.

1. Administrative Notification. The operator shall notify the BLM representative at least 48 hours prior to initiation of construction.
2. Road Construction and Maintenance. Roads shall be crowned, ditched, surfaced, drained with culverts and/or water dips, and constructed to BLM Gold Book standards. Initial gravel application shall be a minimum of 6 inches. The operator shall provide timely year-round road maintenance and cleanup on the access roads. A regular schedule for maintenance shall include, but not be limited to, blading, ditch and culvert cleaning, road surface replacement, and dust abatement. When rutting within the traveled way becomes greater than 6 inches, blading and/or gravelling shall be conducted as approved by the BLM.
3. Dust Abatement. The operator shall implement dust abatement measures as needed to prevent fugitive dust from vehicular traffic, equipment operations, or wind events. The BLM may direct the operator to change the level and type of treatment (watering or application of various dust agents, surfactants, and road surfacing material) if dust abatement measures are observed to be insufficient to prevent fugitive dust.

4. Drainage Crossings and Culverts. Construction activities at perennial, intermittent, and ephemeral drainage crossings (e.g. burying pipelines, installing culverts) shall be timed to avoid high flow conditions. Construction that disturbs any flowing stream shall utilize either a piped stream diversion or a cofferdam and pump to divert flow around the disturbed area.

Culverts at drainage crossings shall be designed and installed to pass a 25-year or greater storm event. On perennial and intermittent streams, culverts shall be designed to allow for passage of aquatic biota. The minimum culvert diameter in any installation for a drainage crossing or road drainage shall be 24 inches. Crossings of drainages deemed to be jurisdictional waters of the U.S. pursuant to Section 404 of the Clean Water Act may require additional culvert design capacity. Due to the flashy nature of area drainages and anticipated culvert maintenance, the U.S. Army Corps of Engineers (USACE) recommends designing drainage crossings for the 100-year event. Contact the USACE Western Colorado Regulatory Branch at 970-243-1199.

Pipelines installed beneath stream crossings shall be buried at a minimum depth of 4 feet below the channel substrate to avoid exposure by channel scour and degradation. Following burial, the channel grade and substrate composition shall be returned to pre-construction conditions.

5. Jurisdictional Waters of the U.S. The operator shall obtain appropriate permits from the U.S. Army Corps of Engineers (USACE) prior to discharging fill material into waters of the U.S. in accordance with Section 404 of the Clean Water Act. Waters of the U.S. are defined in 33 CFR Section 328.3 and may include wetlands as well as perennial, intermittent, and ephemeral streams. Permanent impacts to waters of the U.S. may require mitigation. Contact the USACE Western Colorado Regulatory Branch at 970-243-1199. Copies of any printed or emailed approved USACE permits or verification letters shall be forwarded to the BLM.
6. Wetlands and Riparian Zones. The operator shall restore temporarily disturbed wetlands or riparian areas. The operator shall consult with the BLM Glenwood Springs Field Office to determine appropriate mitigation, including verification of native plant species to be used in restoration.
7. Reclamation. The goals, objectives, timelines, measures, and monitoring methods for final reclamation of oil and gas disturbances are described in Appendix I (Surface Reclamation) of the 1998 Draft Supplemental EIS (DSEIS). Specific measures to follow during interim and temporary (pre-interim) reclamation are described below.
  - a. Reclamation Plans. In areas that have low reclamation potential or are especially challenging to restore, reclamation plans will be required prior to APD approval. The plan shall contain the following components: detailed reclamation plans, which include contours and indicate irregular rather than smooth contours as appropriate for visual and ecological benefit; timeline for drilling completion, interim reclamation earthwork, and seeding; soil test results and/or a soil profile description; amendments to be used; soil treatment techniques such as roughening, pocking, and terracing; erosion control techniques such as hydromulch, blankets/matting, and wattles; and visual mitigations if in a sensitive VRM area.

- b. Deadline for Interim Reclamation Earthwork and Seeding. Interim reclamation to reduce a well pad to the maximum size needed for production, including earthwork and seeding of the interim reclaimed areas, shall be completed within 6 months following completion of the last well planned for the pad. Reclamation, including seeding, of temporarily disturbed areas along roads, pipelines, and topsoil piles and berms, shall be completed within 30 days following completion of construction.

If requested by the project lead NRS for a specific pad or group of pads, the operator shall contact the NRS by telephone or email approximately 72 hours before reclamation and reseeding begin. This will allow the NRS to schedule a pre-reclamation field visit if needed to ensure that all parties are in agreement and provide time for adjustments to the plan before work is initiated.

The deadlines for seeding described above are subject to extension upon approval of the BLM based on season, timing limitations, or other constraints on a case-by-case basis. If the BLM approves an extension for seeding, the operator may be required to stabilize the reclaimed surfaces using hydromulch, erosion matting, or other method until seeding is implemented.

- c. Topsoil Stripping, Storage, and Replacement. All topsoil shall be stripped following removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. In areas of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. The BLM best management practice (BMP) for the Windrowing of Topsoil (COA number 19) shall be implemented for well pad construction whenever topography allows.
- d. Seedbed Preparation. For cut-and-fill slopes, initial seedbed preparation shall consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. For compacted areas, initial seedbed preparation shall include ripping to a minimum depth of 18 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping shall be conducted in two passes at perpendicular directions. Following final contouring, the backfilled or ripped surfaces shall be covered evenly with topsoil.

Final seedbed preparation shall consist of scarifying (raking or harrowing) the spread topsoil prior to seeding. If more than one season has elapsed between final seedbed preparation and seeding, and if the area is to be broadcast-seeded or hydroseeded, this step shall be repeated no more than 1 day prior to seeding to break up any crust that has formed.

Seedbed preparation is not required for topsoil storage piles or other areas of temporary seeding.

Requests for use of soil amendments, including basic product information, shall be submitted to the BLM for approval.

- e. Seed Mixes. A seed mix consistent with BLM standards in terms of species and seeding rate for the specific habitat type shall be used on all BLM lands affected by the project (see Attachments 1 and 2 of the letter provided to operators dated May 1, 2008). Note that temporary seeding no longer allows the use of sterile hybrid non-native species.

For private surfaces, the menu-based seed mixes are recommended, but the surface landowner has ultimate authority over the seed mix to be used in reclamation. The seed shall contain no noxious, prohibited, or restricted weed seeds and shall contain no more than 0.5 percent by weight of other weed seeds. Seed may contain up to 2.0 percent of “other crop” seed by weight, including the seed of other agronomic crops and native plants; however, a lower percentage of other crop seed is recommended. Seed tags or other official documentation shall be submitted to BLM at least 14 days before the date of proposed seeding for acceptance. Seed that does not meet the above criteria shall not be applied to public lands.

- f. Seeding Procedures. Seeding shall be conducted no more than 24 hours following completion of final seedbed preparation.

Where practicable, seed shall be installed by drill-seeding to a depth of 0.25 to 0.5 inch. Where drill-seeding is impracticable, seed may be installed by broadcast-seeding at twice the drill-seeding rate, followed by raking or harrowing to provide 0.25 to 0.5 inch of soil cover or by hydroseeding and hydromulching. Hydroseeding and hydromulching shall be conducted in two separate applications to ensure adequate contact of seeds with the soil.

If interim revegetation is unsuccessful, the operator shall implement subsequent reseeding until interim reclamation standards are met.

- g. Mulch. Mulch shall be applied within 24 hours following completion of seeding. Mulch may consist of either hydromulch or of certified weed-free straw or certified weed-free native grass hay crimped into the soil.

NOTE: Mulch is not required in areas where erosion potential mandates use of a biodegradable erosion-control blanket (straw matting).

- h. Erosion Control. Cut-and-fill slopes shall be protected against erosion with the use of water bars, lateral furrows, or other measures approved by the BLM. Cut-and-fill slopes along drainages or in areas with high erosion potential shall also be protected from erosion using hydromulch designed specifically for erosion control or biodegradable blankets/matting, bales, or wattles of weed-free straw or weed-free native grass hay. A well-anchored fabric silt fence shall also be placed at the toe of cut-and-fill slopes along drainages or to protect other sensitive areas from deposition of soils eroded off the slopes. Additional BMPs shall be employed as necessary to reduce soil erosion and offsite transport of sediments.
- i. Site Protection. The pad shall be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species are firmly established, whichever comes later. The seeded species will be considered firmly established when at least 50 percent of the new plants are producing seed. The BLM will approve the type of fencing.
- j. Monitoring. The operator shall conduct annual monitoring surveys of all sites categorized as “operator reclamation in progress” and shall submit an annual monitoring report of these sites to the BLM by **December 31** of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator

shall be responsible for implementing the corrective actions or other measures specified by the BLM.

8. Weed Control. The operator shall regularly monitor and promptly control noxious weeds or other undesirable plant species as set forth in the Glenwood Springs Field Office *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, dated March 2007. A Pesticide Use Proposal (PUP) must be approved by the BLM prior to the use of herbicides. Annual weed monitoring reports shall be submitted to BLM by **December 1**.
  
9. Big Game Winter Range Timing Limitation. To minimize impacts to wintering big game, no construction, drilling or completion activities shall occur during a Timing Limitation (TL) period from **December 1 to April 1 annually**.
  
10. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to “take” of either eagle species. Under the Eagle Act, “take” includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 miles from a nest that may disturb eagles, should be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative in the BLM Field Office (970-876-9051).
  
11. Raptor Nesting. Raptor nest surveys conducted for the Castle Springs GAP (2005) (**U, T, C, B, D, E, W, Q, I, R, S, V, and A Pads**) resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility (**E and W Well Pads**). Raptor nest surveys for the NCS MDP (2009) (**L, M, N, O, P, X, and Y**) did not result in location of raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility associated with this project.

To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to construction, drilling, or completion activities within the buffer widths specified above, if the activities would be initiated during the nesting period of February 1 to June 15. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied during the normal nesting period for that species, (c) the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied but the nestlings have fledged and dispersed from the nest. In the case of a dilapidated nest or one that was destroyed due to natural causes, the TL shall apply to any alternate or replacement nest within the buffer widths specified above, unless an exception is granted for the alternate or replacement nest for one of the reasons listed.

Although BLM considers surveys conducted for a NEPA Environmental Assessment to be valid for 5 years, new nests may be built and occupied between the initial surveys and project implementation. To ensure compliance with the Migratory Bird Treaty Act, the operator should schedule construction or drilling activities to begin outside the raptor nesting season (February 1 to August 15) if practicable. If initiation of construction, drilling, or completion activities during these dates cannot be avoided, the operator is responsible for complying with the Migratory Bird Treaty Act, which prohibits the “take” of birds or active nests (those containing eggs or young), including nest failure caused by noise and human activity.

12. Migratory Birds. It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act (MBTA) with respect to “take” of migratory bird species. Under the MBTA, “take” means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The operator shall prevent use by migratory birds of any pit containing fluids associated with oil or gas operations, including but not limited to reserve pits, produced water pits, frac-water pits, cuttings trenches (if covered by water/fluid), and evaporation pits. Fluids in these pits may pose a risk to migratory birds (e.g., waterfowl, shorebirds, wading birds, songbirds, and raptors) as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation. Regardless of the method used, it shall be in place within 24 hours following the placement of fluids into a pit. Because of high toxicity to birds, oil slicks and oil sheens should immediately be skimmed off the surface of any pit that is not netted. The most effective way to eliminate risk to migratory birds is prompt drainage, closure, and reclamation of pits, which is strongly encouraged. All mortality or injury to species protected by the MBTA shall be reported immediately to the BLM project lead and to the USFWS representative in the BLM Field Office at 970-876-9051 and visit <http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm>.
13. Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all surface-disturbing activities are prohibited from May 15 to July 15 to reduce impacts to Birds of Conservation Concern (BCC). An exception to this COA will be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no BCC species are nesting or otherwise present within 10 meters of the area to be disturbed. Nesting surveys shall include an aural survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying a BCC species. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 15 and continue into the 60-day period at the same location.
14. Range Management. Range improvements (fences, gates, reservoirs, pipelines, etc) shall 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 repairing or replacing the damaged range improvements. If a new or improved access road bisects an existing livestock fence, steel frame gate(s) or a cattleguard with associated bypass gate shall be installed across the roadway to control grazing livestock.
15. Ips Beetle. To avoid mortality of pinyon pines due to infestations of the *Ips* beetle, any pinyon trees damaged during road, pad, or pipeline construction shall be chipped after being severed from the

stump or grubbed from the ground, buried in the toe of fill slopes (if feasible), or cut and removed from the site within 24 hours to a location approved by the Colorado State Forest Service.

16. Paleontological Resources. All persons associated with operations under this authorization shall 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, removed, moved, or disturbed. If in connection with operations under this authorization any of the above resources are encountered the operator shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM of the findings. The discovery must be protected until notified to proceed by the BLM.

Where feasible, the operator shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM of any finds. The BLM will, as soon as feasible, have a BLM-permitted paleontologist check out the find and record and collect it if warranted. If ground-disturbing activities cannot be immediately suspended, the operator shall work around or set the discovery aside in a safe place to be accessed by the BLM-permitted paleontologist.

17. Cultural Education/Discovery. All persons in the area who are associated with this project shall be informed that if anyone is found disturbing historic, archaeological, or scientific resources, including collecting artifacts, the person or persons will be subject to prosecution.

Pursuant to 43 CFR 10.4(g), the BLM shall 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 43 CFR 10.4 (c) and (d), activities shall stop in the vicinity of the discovery, and the discovery shall be protected for 30 days or until notified by the BLM to proceed.

If in connection with operations under this contract, the operator, its contractors, their subcontractors, or the employees of any of them discovers, encounters, or becomes aware of any objects or sites of cultural value or scientific interest such as historic ruins or prehistoric ruins, graves or grave markers, fossils, or artifacts, the operator shall immediately suspend all operations in the vicinity of the cultural resource and shall notify the BLM of the findings (16 USC 470h-3, 36 CFR 800.112). Operations may resume at the discovery site upon receipt of written instructions and authorization by the BLM. Approval to proceed will be based upon evaluation of the resource. Evaluation shall be by a qualified professional selected by the BLM from a Federal agency insofar as practicable. When not practicable, the operator shall bear the cost of the services of a non-Federal professional.

Within five working days, the BLM will inform the operator as to:

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

The operator may relocate activities to avoid the expense of mitigation and 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, the operator shall be responsible for mitigation costs. The BLM will provide technical and procedural guidelines for relocation and/or to conduct mitigation. Upon verification from the BLM that the required mitigation has been completed, the operator will be allowed to resume construction.

Antiquities, historic ruins, prehistoric ruins, and other cultural or paleontological objects of scientific interest that are outside the authorization boundaries but potentially affected, either directly or indirectly, by the proposed action shall also be included in this evaluation or mitigation. Impacts that occur to such resources as a result of the authorized activities shall be mitigated at the operator's cost, including the cost of consultation with Native American groups.

Any person who, without a permit, injures, destroys, excavates, appropriates or removes any historic or prehistoric ruin, artifact, object of antiquity, Native American remains, Native American cultural item, or archaeological resources on public lands is subject to arrest and penalty of law (16 USC 433, 16 USC 470, 18 USC 641, 18 USC 1170, and 18 USC 1361).

18. Visual Resources. All applications for permit to drill (APDs) shall include a detailed, site-specific description outlining how the proposed action will meet the VRM Class of the area where the action is proposed. The specific location of the proposed action, including pads, roads, and pipelines, shall be shown on a map and shall include associated cut-and-fill data (location, horizontal and vertical extent, slope length, and steepness).

Production facilities shall be placed to avoid or minimize visibility from travel corridors, residential areas, and other sensitive observation points—unless directed otherwise by the BLM due to other resource concerns—and shall be placed to maximize reshaping of cut-and-fill slopes and interim reclamation of the pad.

To the extent practicable, existing vegetation shall be preserved when clearing and grading for pads, roads, and pipelines. The BLM may direct that cleared trees and rocks be salvaged and redistributed over reshaped cut-and-fill slopes or along linear features.

Above-ground facilities shall be painted a natural color selected to minimize contrast with adjacent vegetation or rock outcrops. The color shall be specified by the BLM and attached as a COA to individual APDs.

19. Windrowing of Topsoil. Topsoil shall be windrowed around the pad perimeter to create a berm that limits and redirects stormwater runoff and extends the viability of the topsoil per BLM Topsoil Best Management Practices (BLM 2009 PowerPoint presentation available upon request from Glenwood Springs Field Office). Topsoil shall also be windrowed, segregated, and stored along pipelines and roads for later spreading across the disturbed corridor during final reclamation. Topsoil berms shall be promptly seeded to maintain soil microbial activity, reduce erosion, and minimize weed establishment.

20. Reserve Pit. A minimum of 2 feet of freeboard shall be maintained in the reserve pit. Freeboard is measured from the highest level of drilling fluids and cuttings in the reserve pit to the lowest surface elevation of ground at the reserve pit perimeter.
21. Soils. Cuts and fills shall be minimized when working on erosive soils and slopes in excess of 30 percent. Cut-and-fill slopes shall be stabilized through revegetation practices with an approved seed mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with well-anchored silt fences, straw wattles, or other acceptable BMPs designed to minimize the potential for sediment transport. On slopes greater than 50 percent, BLM personnel may request a professional geotechnical analysis prior to construction.

**SITE-SPECIFIC COAS APPLICABLE TO THE NCS MDP**

The following site-specific surface use COAs are in addition to the standard COAs applicable to all wells within the NCS MDP and all stipulations attached to the respective Federal leases.

1. Generator Noise. The generator(s) and pump(s) serving the injection well shall be installed and operated at the site in a manner that, at a minimum, meets the Colorado Oil and Gas Conservation Commission's Noise Abatement regulation (No. 802) for Residential/Agricultural/Rural Zone. In summary, this regulation requires that the noise level not exceed 50 db(A) between 7:00 p.m. and 7:00 a.m. at a distance of 350 feet from the noise source.

## 7.0 REFERENCES

- Bureau of Land Management (BLM). 1984. Glenwood Springs Resource Area Resource Management Plan. Revised 1988. U.S. Department of Interior. Grand Junction District Office, Colorado.
- \_\_\_\_\_. 1991. Oil and Gas Plan Amendment to the Glenwood Springs Resource Management Plan. U.S. Department of the Interior. Grand Junction District Office, Colorado.
- \_\_\_\_\_. 1998. Glenwood Springs Resource Area Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement, June 1998.
- \_\_\_\_\_. 1999a. Glenwood Springs Resource Area Oil & Gas Leasing & Development Record of Decision and Resource Management Plan. Glenwood Springs Field Office, Colorado. March.
- \_\_\_\_\_. 1999b. Glenwood Springs Resource Area Oil & Gas Leasing & Development Final Supplemental Environmental Impact Statement. Glenwood Springs Field Office, Colorado. June.
- \_\_\_\_\_. 2005. Castle Springs Geographic Area Plan Environmental Assessment (CO 140-05-009 EA). Glenwood Springs Field Office.
- Bureau of Land Management and U.S. Forest Service (BLM and USFS). 2007. The Gold Book - Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, 4<sup>th</sup> Edition. BLM/WO/ST-06/021+3071/REV07. BLM. Denver, CO. 84pp.
- Buys & Associates, Inc. (B&A). 2009. Antero Resources Piceance Corporation Castle Springs Project Area 2009 Weed Inventory and Reclamation Report. December 2009.