

Cumulative Impacts Plan

Red Rocks Oil and Gas Development Plan Amendment 2

This Cumulative Impacts Plan has been prepared by Desert Eagle Operating, LLC (DEO) for Red Rocks Oil and Gas Development Plan – Amendment 2 in Las Animas County, Colorado. Amendment 2 consists of five proposed conventional vertical helium gas wells. The Plan addresses the Colorado Energy & Carbon Management Commission (ECMC) requirement at Rule 304.c.(19) to prepare a Cumulative Impacts Plan. The five proposed locations are listed in Table 1. Previously approved locations under the Red Rocks OGD (ID 483775) are listed in Table 2.

Table 1. Proposed Locations

Location	Qtr Qtr	Section/Township/Range	Lat/Lon
Red Rocks 1-09	SE¼NE¼	Section 1, T30S R55W	37.460372, -103.517227
Red Rocks 1-15	NW¼NE¼	Section 1, T30S R55W	37.465009, -103.522500
Red Rocks 35-01	SE¼SE¼	Section 35, T29S R55W	37.467959, -103.537764
Red Rocks 35-08A	NE¼SE¼	Section 35, T29S R55W	37.473477, -103.536136
Red Rocks 35-10	SW¼NE¼	Section 35, T29S R55W	37.475925, -103.541431

Table 2. Previously Approved Locations

Location	ID
Original OGD	
Red Rocks 1-13	481115
Red Rocks 35-15	481116
OGD – Amendment 1	
Red Rocks 1-14	484357
Red Rocks 1-16	484358
Red Rocks 35-08	484359
Red Rocks 35-11	484360

DEO proposes to develop helium gas using one conventional vertical helium gas well at each location. The wells will be drilled with air using a water well-sized drill rig. Wells will be approximately 1,900 feet deep. There will be no drilling mud, hydraulic fracturing, stimulation, or flowback. The wells are not expected to produce hydrocarbons or water, based on results from DEO wells already drilled in the area. There will be no fluid storage on site during production.

The locations are on fee surface leased from a private landowner. The locations will produce fee minerals.

The environmental setting is remote and arid rangeland, which is sparsely vegetated. The area is historically disturbed from ranching, dirt roads, and oil and gas well development. Estimated disturbance acreages for proposed Oil and Gas Locations are listed in Table 3.

Table 3. Location Disturbance

Disturbance	Disturbance (ac)
Oil and Gas Location	1.10
Working Pad Surface	1.00
Production Pad	0.20
Interim Reclamation	0.90

The wells will be accessed from County Road (CR) 177.9 using existing and new private dirt access roads. Roads will be approximately 15 feet wide.

Each well will be drilled with air. Freshwater will be used for cementing and dust suppression. Estimated durations for each phase of development are listed in Table 4.

Table 4. Phases of Development

Phase	Days
Construction	2
Drilling	5
Completion	5
Interim Reclamation	10
Production	10 years (est.)

If the wells are developed for production, each location will contain only a helium gas wellhead inside of livestock fencing. Helium gas will be piped underground from the wellhead to DEO's off-location helium processing unit using a buried 8-inch polyethylene off-location flowline tie in to DEO's existing gathering system. At the helium processing unit, helium gas is processed, compressed, and loaded into a tube trailer for transport by truck.

This Plan addresses cumulative impacts to resources identified in Rule 303.a.(5). They are:

- Air Resources
- Public Health
- Water Resources
- Terrestrial and Aquatic Wildlife Resources & Ecosystems
- Soil Resources
- Public Welfare, including:
 - Noise
 - Light
 - Odor
 - Dust
 - Recreation and Scenic Values

Pursuant to Rule 304.c.(19), the resources listed in Rule 303.a.(5) are addressed in this Plan according to:

- A. A description of resources to which cumulative adverse impacts are expected to increase;
- B. A description of measures taken to avoid or minimize the extent to which cumulative impacts are increased;
- C. A description of measures taken to mitigate or offset cumulative impacts; and
- D. Additional information determined to be reasonable and necessary to the evaluation of cumulative impacts.

1.0 Air Resources

A. Cumulative Impacts

Development will occur in Las Animas County. The area is designated attainment for National Ambient Air Quality Standards established by the U.S. Environmental Protection Agency.

Pre-production operations increase the following from non-road internal combustion engines: nitrogen oxides, carbon monoxide, volatile organic compounds, and carbon dioxide.

There will be no anticipated production emissions. Helium gas will be piped underground directly from the wellhead to DEO's existing off-location helium processing unit. There will be no tanks or liquid storage on site.

Emissions from diesel vehicle road miles are shown in Table 5 by location for each phase of development.

Table 5. Diesel Vehicle Road Miles

Location	Construction	Drilling	Completion	Interim Reclamation	Production ¹
Red Rocks 1-09	318	954	477	318	1591
Red Rocks 1-15	316	948	474	316	1580
Red Rocks 35-01	312	937	469	312	1562
Red Rocks 35-08A	314	942	471	314	1570
Red Rocks 35-10	314	941	471	314	1568
TOTAL	1574	4722	2361	1574	7870

¹Life of production

Increased air emissions are quantified on the Form 2Bs. Adverse cumulative impacts are not anticipated because of the short duration for construction, well development without drilling fluid, and tie-in to a gas gathering system during production.

B. Measures to Avoid or Minimize Cumulative Impacts

To avoid or minimize air impacts, DEO will:

- Commit to connecting to a gas gathering system by the commencement of production operations.
- Schedule well pad construction to avoid high-wind warnings issued for Las Animas County.
- Develop conventional vertical wells without hydraulic fracturing and proppant.
- Water the well pad when indicated by loose soils to stabilize the soil and form a crust.
- Minimize vegetation removal and soil disturbance to the area sufficient to site and level equipment.
- Mound the soil stockpile with a slope of approximately 3:1 to prevent loose soils.

C. Measures to Mitigate or Offset Cumulative Impacts

To mitigate or offset air impacts, DEO will:

- Reclaim the areas not needed to support production during the first growing season and within 6 months on non-cropland.
- Place aggregate as needed at the apron where the access road ties into the public road.

D. Additional Information

See detailed information in the Dust Mitigation and Topsoil Protection plans submitted with the Form 2As.

2.0 Public Health

A. Cumulative Impacts

Helium is an inert, non-toxic, non-combustible gas. The locations are greater than 1 mile from the nearest residence. On each location, the single conventional vertical well will be drilled with air over a short duration of approximately 5 days for well drilling and 5 days for completion. There will be no hydraulic fracturing, stimulation, flowback, or any anticipated produced water.

During pre-production, freshwater will be used for dust suppression. Freshwater will be stored in a 100-bbl water tank on a water truck. Fuel for the drill rig will be stored in a 300-gallon double-walled fuel tank.

During production, the location will contain only a wellhead. There will be no other equipment, liquids, or storage on site. The Larkin-type natural gas wellhead will flow to a buried 8-inch polyethylene off-location flowline.

Increased air emissions are quantified on the Form 2Bs. Adverse cumulative impacts are not anticipated because of the minimal use of off-road engines during well development, the distance to receptors, and the lack of tank storage during production.

Estimated truck trips are shown in Table 6 by location for each phase of development.

Table 6. Truck Trips

Location	Construction	Drilling	Completion	Interim Reclamation	Production Mo/Yr
Red Rocks 1-09	10	30	30	34	16/192
Red Rocks 1-15	10	30	30	34	16/192
Red Rocks 35-01	10	30	30	34	16/192
Red Rocks 35-08A	10	30	30	34	16/192
Red Rocks 35-10	10	30	30	34	16/192
TOTAL	50	150	150	170	80/960

B. Measures to Avoid or Minimize Cumulative Impacts

To avoid or minimize public health impacts, DEO will:

- Commit to connecting to a gas gathering system by the commencement of production operations.
- Maintain and periodically test wellhead and flowline valves.
- Perform well development over a short duration of approximately 5 days for well drilling and 5 days for completion at each location.

C. Measures to Mitigate or Offset Cumulative Impacts

To mitigate or offset air impacts, DEO will:

- Site wells to the extent practicable to maximize the distance to the nearest receptor.

D. Additional Information

See detailed illustration of the surrounding area on the Cultural Features Maps submitted with the Form 2As.

3.0 Water Resources

A. Cumulative Impacts

The locations are not immediately upgradient of surface water or riparian areas. The nearest mapped features are a field verified swale and gully lacking an ordinary high water mark and ephemeral features.

There are no water wells within 0.5 mile of the locations. The estimated depth to groundwater is 1,800 feet, based on DEO wells drilled in the area. The locations are not within a Sensitive Area for water resources.

Groundwater will be used for cementing and dust suppression during well development. Water will be sourced from a private groundwater well via a stock tank and trucked to the locations using a 100-bbl water tank. Water use for well development will be an estimated 250 bbl per well. Total water use is an estimated 1,250 bbl.

Adverse cumulative impacts are not anticipated because of the distances to water wells and surface water, the depth to groundwater, well development without use of pits or ponds, no liquids storage during production, and minimal use of freshwater for cementing and dust suppression.

B. Measures to Avoid or Minimize Cumulative Impacts

To avoid or minimize water impacts, DEO will:

- Avoid downgradient surface water, as demonstrated on the Hydrology Maps submitted with the Form 2As.
- Develop conventional vertical wells without hydraulic fracturing.
- Provide for drilling equipment with a synthetic liner under the motor to capture drips or leaks and a double-walled fuel tank.
- Use on-site soil, if necessary, to berm and prevent downgradient runoff if a potential catastrophic loss of freshwater occurs at the water truck.
- Place wattles to prevent stormwater and sediment runoff from the locations.

C. Measures to Mitigate or Offset Cumulative Impacts

To mitigate or offset water impacts, DEO will:

- Drill wells with air.
- Source minimal groundwater for cementing and dust suppression from a permitted groundwater well.
- Perform interim reclamation during the first growing season and within 6 months for non-cropland to stabilize disturbed soil and minimize stormwater runoff.

D. Additional Information

See detailed information in the Fluid Leak Detection, Stormwater Management, and Interim Reclamation plans, and on the Hydrology Maps submitted with the Form 2As.

4.0 Terrestrial and Aquatic Wildlife Resources & Ecosystems

A. Cumulative Impacts

The locations are not within High Priority Habitat (HPH) or mapped habitat for species of concern. The locations are zoned Agricultural by Las Animas County. The area is rangeland. It is historically disturbed from ranching, dirt roads, and oil and gas well development. The area supports mapped black bear habitat.

Colorado is part of a broad Central Flyway for migratory birds, one of four North America flyways. There is no mapping specific to migratory bird pathways near the locations, according to data provided by the U.S. Fish and Wildlife Service, Colorado Parks and Wildlife, and National Audubon Society. The locations have no nearby ponds or wetlands to attract migratory birds.

Area vegetative cover is predominantly shrub and disturbed grassland. Species consist of tree cholla, one-seed juniper, Great Plains yucca, sideoats grama, blue grama, and gambel oak.

Oil and Gas Location construction will disturb approximately 1.10 acres at each location, or approximately 5.50 acres total, for helium well development.

New access will disturb approximately 0.49 acres.

Off-location flowlines will disturb approximately 1.53 acres.

The total combined disturbance will be approximately 7.52 acres.

During interim reclamation, approximately 0.90 acres will be reclaimed at each Oil and Gas Locations, or 4.50 acres of reclamation. Off-location flowline corridors will be reclaimed. The total area to be reclaimed is approximately 6.03 acres.

The cumulative loss of foraging habitat for birds and general wildlife will be approximately 1.49 acres for production pads and new access roads.

Adverse cumulative impacts are not anticipated because cover and foraging habitat for birds and wildlife is limited to approximately 7.52 acres during well development and will be downsized to approximately 1.49 acres during production for pads and access roads.

B. Measures to Avoid or Minimize Cumulative Impacts

To avoid or minimize terrestrial and aquatic wildlife resources and ecosystem impacts, DEO will:

- Develop wells outside of HPH.
- Not have open water or open liquids storage on the locations during pre-production or production.
- Keep locations unlit during production.
- Ensure that trenches left open for more than 5 consecutive days during construction of flowlines regulated under the 1100 Series Rules have wildlife escape ramps at a minimum of one ramp per ¼ mile of trench.
- Either conduct all vegetation removal necessary for oil and gas operations outside of the nesting season for migratory birds (April 1 to August 31) or conduct a pre-construction nesting migratory bird survey within the approved disturbance areas prior to any vegetation removal during the nesting season.
- Use bear-proof dumpsters and trash receptacles for food related trash.

C. Measures to Mitigate or Offset Cumulative Impacts

To mitigate or offset terrestrial and aquatic wildlife resources and ecosystem impacts, DEO will:

- Downsize each location during interim reclamation to a 0.20-acre production pad.
- Reclaim the remaining 0.90 acres at each location to pre-construction habitat.
- Reclaim the flowline corridors to return them to pre-construction habitat.
- Till the reclaimed area to re-establish a seedbed. In cooperation with the surface owner, DEO will identify appropriate soil amendments to promote vegetative growth.
- Use the appropriate revegetation seed mix identified in the Interim Reclamation Plan.

D. Additional Information

See detailed information in the Wildlife Protection and Interim Reclamation plans and on the Wildlife Habitat Maps submitted with the Form 2As.

5.0 Soil Resources

A. Cumulative Impacts

Soils at the Oil and Gas Locations, access roads, and flowline corridors are:

DaE: Dalerose-Rock Outcrop complex, 3 to 25 percent slopes

Red Rocks 1-09 location, access, and flowline

Red Rocks 1-15 location and access

Red Rocks 35-01 location

Red Rocks 35-10 location

VT: Villedry-Travessilla complex, 1 to 8 percent slopes

Red Rocks 1-09 access and flowline
 Red Rocks 1-15 access
 Red Rocks 35-08 location, access, and flowline
 Red Rocks 35-10 location, access, and flowline

WC: Plughat-Villegreen complex, 1 to 4 percent slopes

Red Rocks 1-09 access
 Red Rocks 1-15 access
 Red Rocks 35-01 location and access

The A horizon for these soil types is gravelly fine sandy loam, silt loam, and loam. The soils are well drained.

The locations will disturb the combined acreages shown in Table 7.

Table 7. Soil Disturbance Area

Location	O&G Location (ac)	New Access (ac)	Off-location Flowline (ac)	Total Disturbance (ac)	Total Reclamation (ac)
Red Rocks 1-09	1.10	0.31	0.94	2.35	1.84
Red Rocks 1-15	1.10	0.02	0	1.12	0.90
Red Rocks 35-01	1.10	0.05	0	1.15	0.90
Red Rocks 35-08A	1.10	0.04	0.58	1.72	1.48
Red Rocks 35-10	1.10	0.07	0.01	1.18	0.91
TOTAL	5.50	0.49	1.53	7.52	6.03

Adverse cumulative impacts are not anticipated because the total disturbance after interim reclamation is an estimated 1.49 acres and is equivalent to between 0.22 and 0.51 acres of disturbance per pad. Final reclamation will be conducted in accordance with ECMC requirements by plugging and abandoning wells, removing equipment and surfacing material, and restoring the locations to specifications from ECMC and the landowner.

B. Measures to Avoid or Minimize Cumulative Impacts

To avoid or minimize soil impacts, DEO will:

- Bury the flowlines in trenches approximately 2 feet wide to minimize soil disturbance.
- Protect topsoil from contamination by stockpiling it in a location free from drilling, fuel storage, and parking.
- Segregate soil removed during flowline trenching based on changes in physical characteristics. The soil layers will be windrowed adjacent to the trench.
- Protect soil from compaction by designating it with surveyor staking as topsoil for reclamation.
- Protect the topsoil stockpile from wind degradation by mounding at an approximately 3:1 steepness to prevent loose soils while promoting continued microbial activity.
- Protect the topsoil stockpile from erosion by ensuring that stormwater controls and diversions are installed, where needed, to divert stormwater away from the stockpile.
- Allow vegetation to establish on the topsoil stockpile to stabilize it, outcompete weeds, and promote soil microbial activity.
- Install erosion controls to prevent stormwater run on and runoff.

C. Measures to Mitigate or Offset Cumulative Impacts

To mitigate or offset soil impacts, DEO will:

- Salvage and segregate location topsoil based on the results of soil test pits for texture, color, structure, consistency, and organic matter.
- Replace soils from the flowline trench promptly in the order in which they were removed.
- Conduct interim reclamation during the first growing season and within 6 months for non-cropland.

D. Additional Information

See detailed information in the Topsoil Protection, Stormwater Management, and Interim Reclamation plans submitted with the Form 2As.

6.0 Public Welfare**A. Cumulative Impacts****Noise**

Construction will be approximately 2 days at each location. Well drilling will be approximately 5 days and completion approximately 5 days at each location. The nearest residence is greater than 1 mile away from each location. The areas do not support HPH or habitat mapped for species of concern. The locations are historically disturbed from ranching, dirt roads, and oil and gas well development. During production, each location will contain only a wellhead inside of livestock fencing. Routine inspection and maintenance visits will be conducted using a light-duty pickup truck, approximately twice weekly. No processing will occur on the locations. Adverse cumulative impacts are not anticipated because of the short durations for construction and well development, limited truck trips during production, distance to receptors, and lack of HPH or species of concern.

Light

Well drilling and completion will occur during daylight hours. The locations will be unlit during production. Adverse cumulative impacts are not anticipated because lighting will not be used.

Odor

The wells will be drilled with air. During production, there will be no produced water or liquids storage. Adverse cumulative impacts are not anticipated because no volatile organics will be used during drilling or stored during production.

Dust

Each location will disturb approximately 1.10 acres of land, plus an additional approximately 0.49 acres for new access and 1.53 acres for buried flowlines. Each Working Pad Surface will be reduced to approximately 0.20 acres after interim reclamation. The reclaimed areas and flowline corridors will be revegetated. The wells will be drilled with air. There will be no hydraulic fracturing and no proppant. Adverse cumulative impacts from dust will be controlled using the best management practices (BMPs) listed below and in the operator's Dust, Topsoil, and Interim Reclamation plans. The BMPs address limiting disturbance areas, controlling vehicle speeds, road maintenance, topsoil stockpile stabilization, and reclamation.

Recreation and Scenic Values

The locations are in a remote area in Las Animas County on rangeland not accessible to the public. Adverse cumulative impacts are not anticipated because the locations have no nearby public recreation and do not contrast with existing land uses. For infrequent vehicles passing by on CR 177.9, the low profile of the wellheads will not appear as a contrast with other land uses. The producing oil and gas locations within 1 mile of the proposed

locations are DEO's Red Rocks 1-13, 1-14, 1-16, 35-08, 35-11, and 35-15. There are no nearby state parks, state wildlife areas, designated outdoor activity areas, or mapped trails.

B. Measures to Avoid or Minimize Cumulative Impacts

To avoid or minimize public welfare impacts, DEO will:

- Maintain equipment and vehicles in proper working condition to minimize noise.
- Schedule the well pad construction to avoid high wind warnings issued for Las Animas County.
- Water the well pads when indicated by loose soils to stabilize the soil and form a crust.
- Minimize vegetation removal and soil disturbance to the area sufficient to site and level equipment.
- Mound the soil stockpile with a slope of approximately 3:1 to prevent loose soils.

C. Measures to Mitigate or Offset Cumulative Impacts

To mitigate or offset public welfare impacts, DEO will:

- Comply with the noise levels specified in Rule 423.b.(1).
- Avoid truck traffic through use of a gas pipeline for takeaway capacity.
- Reclaim areas not needed to support production during the first growing season and within 6 months for non-cropland.
- Place aggregate as needed at the apron where the access road ties into the public road.

D. Additional Information

See detailed information in the Dust Control, Topsoil Protection, and Interim Reclamation plans submitted with the Form 2As.