

4.0 ENVIRONMENTAL CONSEQUENCES

Chapter 4 describes the effects of implementing the alternatives on the human environment as described in Chapter 3. The effects were evaluated both quantitatively and/or qualitatively, depending on available data and the nature of the resource analyzed. The impact analyses within this chapter assume that all applicant-committed measures in Section 2.3 and mitigation measures in this chapter would be implemented.

4.1 GEOLOGY AND MINERALS

4.1.1 Direct and Indirect Impacts

4.1.1.1 Proposed Action

Geology

Potential impacts to geologic resources from the Proposed Action include changes to the local topography and slope stability. Well pad excavation, road construction, and other surface-disturbing activities would cause topographic changes including square- or rectangular-shaped cuts and fills, which would occur in the sandstone and sandy shale bedrock underlying the CWSA. In addition to cuts and fills, undercutting of side slopes of canyon walls may also be needed for well pad construction. Undercutting of slopes has the potential to generate slope instability. Depending on the slopes involved, this instability could lead to slumping of material adjacent to the well pad. Slumping would likely occur following rainstorms or during snowmelt. However, based on UDOGM and BLM regulations, well pad construction would be designed to minimize the potential for slumping.

Natural Gas

Potential impacts to natural gas resources would include the depletion of gas resources due to active extraction by the Proposed Action. Depletions of recoverable gas from the formations underlying the CWSA would be in accordance with the purpose and need for the Proposed Action and are anticipated to range between 650 billion cubic feet and 850 billion cubic feet.

Gilsonite

Potential impacts to Gilsonite resources are not anticipated from the Proposed Action. Drilling operations would avoid known veins of Gilsonite because the brittle material causes drilling difficulties, including lost circulation. In addition, as discussed in Section 3.1.4, Gilsonite has not been observed in commercial quantities at the surface within the CWSA, and it is unlikely that significant Gilsonite resources are present within the boundaries of the CWSA.

Oil Shale and Tar Sands

Potential impacts to oil shale and tar sand resources include contamination of the resource by drilling fluids and physical obstructions to mining represented by the well casings. If oil shale were to be encountered within a well during drilling, at a depth above 2,000 feet, the resource would be isolated and protected in accordance with BLM Vernal Field Office policy.

Potential impacts to tar sand resources from the Proposed Action are expected to be negligible. Seven areas have been set aside within the Uinta Basin for future leasing and

development of tar sands. None of these areas are within the CWSA. Small quantities of tar sands have been reported to exist within the CWSA, however, it is anticipated that the other, larger deposits would be leased and mined first.

Salable Minerals

Potential impacts to salable mineral resources (sand, gravel, and decorative stone) are not anticipated from the Proposed Action. There is little demand for these materials within the CWSA because more convenient supplies are located on other public lands within the Uinta Basin.

4.1.1.2 No Action

Geology

Under the No Action Alternative, the proposed wells would not be allowed on Federal lands. However, wells would still be drilled on private, State of Utah, and Tribal/allotted lands within the CWSA. A total of 148 wells could be drilled under the No Action Alternative, as compared to 627 wells under the Proposed Action.

Accordingly, the extent of potential changes to the local topography would be less than one-quarter that for the Proposed Action.

Natural Gas

Under the No Action Alternative, the proposed wells would not be allowed on Federal lands. However, wells would still be drilled on private, State of Utah, and Tribal/allotted lands within the CWSA. A total of 148 wells could be drilled under the No Action Alternative, as compared to 627 wells under the Proposed Action. Therefore, assuming that production potential is proportional to the estimated ultimate recovery of gas for the Proposed Action, under the No Action Alternative, the ultimate production volume is anticipated to range between 153 billion cubic feet and 201 billion cubic feet.

Gilsonite

Under the No Action Alternative, the proposed wells would not be allowed on Federal lands. However, wells would still be drilled on private, State of Utah, and Tribal/allotted lands within the CWSA. A total of 148 wells could be drilled under the No Action Alternative, as compared to 627 wells under the Proposed Action. The majority of potential undiscovered Gilsonite resources within the CWSA, if any, would remain available for future extraction.

Oil Shale and Tar Sands

Under the No Action Alternative, the proposed wells would not be allowed on Federal lands. However, wells would still be drilled on private, State of Utah, and Tribal/allotted lands within the CWSA. A total of 148 wells could be drilled under the No Action Alternative, as compared to 627 wells under the Proposed Action. The majority of potentially mineable oil shale and tar sand resources within the CWSA, if any, would remain available for future extraction.

Salable Minerals

Under the No Action Alternative, the proposed wells would not be allowed on Federal lands. However, wells would still be drilled on private, State of Utah, and Tribal/allotted lands within the CWSA. A total of 148 wells could be drilled under the No Action Alternative, as compared to 627 wells under the Proposed Action. Accordingly, the amount of sand and gravel needed for well pad and road construction would be less than one-quarter that needed for the Proposed Action.

4.1.2 Mitigation Measures

- Slope stability issues and multiple mineral development conflicts would be addressed on a case-by-case basis.

4.1.3 Unavoidable Adverse Effects

Depletion of natural gas resources in the CWSA would fulfill the purpose and need for the project. Therefore, no Unavoidable Adverse Effects are anticipated under either alternative.

4.2 WATER RESOURCES

This section addresses potential impacts on surface water and groundwater resources resulting from the development of natural gas in the CWSA. Potential impacts for water resources include increased sediment loading to watersheds, and contamination of surface water and groundwater resulting from spills of fuels or natural petroleum products from pits and tanks.

4.2.1 Direct and Indirect Impacts

4.2.1.1 Surface Water

There are four types of potential direct or indirect effects to surface water resources that could occur as a result of the development of gas wells in the CWSA.

The potential impacts to surface water are:

- Increased sedimentation and turbidity of surface water as a result of surface disturbance and erosion into surface waters via runoff;
- Depletion of water flow in the Green and White Rivers due to project-related water consumption;
- Effects on water quality – i.e., potential contamination of surface water resources with drilling fluids or other wastes generated by natural gas drilling and production activities; and
- Floodplain encroachment – i.e. potential increased risk of property loss and human safety; possible degradation of the natural and beneficial values served by floodplains.

Each of these potential impacts is discussed below under the alternatives.

4.2.1.1.1 Proposed Action**Increased Sedimentation and Turbidity**

Increased sedimentation of ephemeral drainages within the CWSA is possible, especially during the construction of the project facilities. Increased sedimentation could include a short-term increase in turbidity in the CWSA drainages. Both of these effects could have negative impacts on aquatic habitat within affected drainages.

Soil loss calculations (presented in Section 4.4) reveal that an estimated 4,014 tons per year of additional erosion could be expected to occur as a result of the Proposed Action during the short-term. Over time, short-duration precipitation events and snowmelt could cause soil lost from the proposed facilities in the CWSA to reach adjacent ephemeral drainages. This fine sediment could then eventually be transported to the White River to the south and the Green River to the west. In sufficient amounts, sediment from CWSA construction activities and operational facilities potentially could:

- Clog drainages;
- Degrade aquatic habitat by covering the stream substrate with fine sediment;
- Increase the turbidity within the stream; and
- Act as a carrier for other pollutants (trace metals, pesticides, plant nutrients, etc).

Using a conservative assumption that all soil eroded from the project facilities would enter adjacent drainages; the estimated increase in sediment loading from the proposed facilities is about 4,014 tons per year for the short-term. Existing sediment loading in the White River near Watson, Utah, upstream from the CWSA, averages 140,000 tons/month (ranging between 1,160 – 2,182,600 tons), or 1,680,000 tons/year. Existing sediment loading in the Green River at Jensen, Utah, is considerably higher and averages around 807,000 tons/month (ranging between 52,651 and 3,231,564 tons/month), or 9,684,000 tons/year. The highest sediment loading occurs during the months of May and June from snowmelt runoff. Using the conservative (i.e., worst case scenario) assumption that all available sediment from the construction of the project facilities would eventually be transported to the White River, the CWSA project would potentially result in a maximum increased sediment loading to the White River of only 0.24 percent. If all additional sediment were delivered to the Green River, the increase would be about 0.04 percent. However, the actual amount of sediment that would be transported to the rivers is likely much smaller than the conservative estimate presented above. Accordingly, the overall impact of increased sediment loading to the White and Green Rivers from construction of the CWSA project facilities would be negligible.

Direct and Indirect Impacts on Stream Flow Regimes

Total water needed for drilling over the seven-year drilling season would be approximately 7,983,000 barrels (1,029 acre-feet), for a total of approximately 147 acre-feet per year for drilling. On average, approximately 10,000 barrels of water would be needed to complete a single well. Thus, total water needed for completion over the seven-year drilling season would be approximately 6,315,000 barrels (814 acre-feet), for a total of approximately 116 acre-feet per year. Based on this information, approximately 263 acre-feet per year would be needed to drill and complete all 627 proposed wells. For the White River, the average annual flow over the period of record is 693.8 cfs, or 502,250 acre-feet per year (based on flow data from the USGS gauging station at Watson). For the Green River, the average annual flow is 5,614.3 cfs, or 4,064,290 acre-feet per year (based on flow data from the

USGS gauging station at Ouray). If all of the water needed for the project would be withdrawn from the Green River, the flow in this river would be reduced by approximately 0.006 percent per year. If all of the water needed for the project would be withdrawn from the White River, the flow in this river would be reduced by approximately 0.05 percent per year. These potential project-related flow reductions would be insignificant from a hydrologic standpoint.

Direct and Indirect Impacts on Water Quality and Beneficial Uses

Accidental spills of hydrocarbon products, including fuels and fluids produced from the wells, would have the potential to contaminate surface waters if the spills were to occur when flow was present in the ephemeral washes of the CWSA. The impacts from such a spill would be localized and have little chance of migrating to the Green or White Rivers. Based on Utah's 303(d) list of impaired waters, the White River and its tributaries, from the confluence with the Green River to the state line appear to be meeting their designated uses for which they are classified. In the unlikely event that a hydrocarbon spill should reach these drainages, water quality would be degraded, and downstream water users would be impacted.

To reduce the potential for hydrocarbon contamination of surface water, pipelines and associated collection piping would be designed to minimize the potential for spills and leaks. Standard industry practices and safety measures associated with the installation of roads, pipelines, and well pad facilities would be implemented. Storage tanks would be surrounded by berms capable of holding at least 110 percent of the volume of the largest tank within the berm. During well drilling, a lined reserve pit would be used on each new well pad so that no drilling mud or production water would be discharged to shallow groundwater or to the land surface. These measures would lessen the potential for impacts to surface water resources.

Chemical use and storage could potentially result in a leak or spill at the drilling site. The use of berms, lined reserve pits, and other prudent design features required by UDOGM and BLM for using chemicals would reduce the risk of a spill or leak. A Spill Prevention, Control and Countermeasure (SPCC) Plan would be implemented to minimize the risk of accidental spills or introduction of contaminants to CWSA drainages. As a result, if realized, any impact to surface water resources would be temporary and localized in nature.

Direct and Indirect Impacts on Floodplains

Following publication of the CWSA DEIS and review of public comments, EOG committed that they would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor. Furthermore, EOG committed that they would not drill new wells in the White River corridor that would result in new well pads and roads. Twin wells drilled from existing well pads within the White River corridor (but outside the 100-year floodplain of the White River) could still be developed. However, as twin wells within the White River Corridor would not result in the construction of new well pads or access roads, potential erosion and sediment yield to the White River from the twin wells would be minimal. The construction of well pads and access roads within the flood hazard areas of Coyote and Red washes may, however, result in soil erosion and subsequent sediment yield to the White River. Placement of production facilities in the flood hazard areas of Coyote and Red washes may also increase the risk of accidental releases should a major flood event occur. This in turn could increase the potential for negative impacts to downstream water users and/or aquatic resources from hydrocarbon or produced water contamination.

Executive Order 11988 requires Federal agencies to make decisions in a manner that promotes avoidance of adverse impacts and reduces the risk of property loss and human safety due to floodplain development and/or modification, and preserves the natural and beneficial values of floodplains. Floodplain development and/or modification are allowed only if there are no other feasible alternatives. The Book Cliffs RMP supports EO 11988, stating no surface disturbance or occupancy will be allowed within the 100-year floodplain of the following creeks: Bitter, Evacuation, Hill Sweetwater, and Willow; and the Green and White Rivers. This stipulation may be waived by the authorized officer if either the resource values change or the lessee/operator demonstrates that adverse impacts can be mitigated. Furthermore, as discussed in the previous paragraph, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor. Based on this commitment, potential impacts to the 100-year floodplain of the White River on BLM, Tribal, State, or private lands would also be negligible. However, surface disturbance allowed within floodplains of ephemeral drainages on Tribal, State, and private lands would be at the discretion of the appropriate SMA or landowner. Impacts resulting from construction in the floodplains of Coyote and Red washes may result in increased sedimentation down-drainage.

4.2.1.1.2 No Action Alternative

Under the No Action Alternative, the proposed wells, access roads or pipelines would not be allowed on Federal lands. However, wells would still be drilled on private, State of Utah, and Tribal/allotted lands within the CWSA. A total of 148 wells could be drilled under the No Action Alternative, as compared to 627 wells under the Proposed Action.

Increased Sedimentation and Turbidity

Increased sedimentation of ephemeral drainages within the CWSA is possible, especially during the construction of the project facilities. Increased sedimentation could include a short-term increase in turbidity in the CWSA drainages. Both of these effects could have negative impacts on aquatic habitat within affected drainages.

Soil loss calculations (presented in Section 4.4) reveal that an estimated 4,014 tons per year of additional erosion could be expected to occur as a result of the Proposed Action during the short-term. Over time, short-duration precipitation events and snowmelt could cause soil lost from the proposed facilities in the CWSA to reach the drainages of adjacent ephemeral watersheds. This fine sediment could then eventually be transported to the White River to the south and the Green River to the west. In sufficient amounts, sediment from CWSA construction activities and operational facilities potentially could:

- Clog stream channels;
- Degrade aquatic habitat by covering the stream substrate with fine sediment;
- Increase the turbidity within the stream; and
- Act as a carrier for other pollutants (trace metals, pesticides, plant nutrients, etc).

For the No Action Alternative, soil loss from construction is estimated to be about 947.5 tons/year. Using the conservative assumption that all available sediment from the construction of the project facilities would eventually be transported to the White River, the CWSA project would potentially result in a maximum increased sediment loading to the White River of only 0.057 percent. If all additional sediment were delivered to the Green River, the increase would be about 0.01 percent. The actual amount of sediment that would be transported to the rivers is likely much smaller than the calculated maximum presented

above. Therefore, the potential increased sediment loading to the Green and White Rivers from the No Action Alternative is about one-quarter that of the Proposed Action Alternative and would be negligible.

Direct and Indirect Impacts on Stream Flow Regimes

Under the No Action Alternative, total water needed for drilling over the two-year drilling season would be approximately 1,886,000 barrels (243 acre-feet), for a total of approximately 122 acre-feet per year. Total water needed for completion over the two-year drilling season would be approximately 1,490,500 barrels (192 acre-feet), for a total of approximately 96 acre-feet per year.

For the White River, the average annual flow over the period of record is 693.8 cfs, or 502,250 acre-feet per year (based on flow data from the USGS gauging station at Watson). For the Green River, the average annual flow is 5,614.3 cfs, or 4,064,290 acre-feet per year (based on flow data from the USGS gauging station at Ouray). Therefore, the No Action could potentially deplete the flow in each river by approximately 0.04 percent per year for the White River or 0.005 percent per year for the Green River, assuming that all water is drawn from one river. This project-related flow depletion would be insignificant from a hydrologic standpoint.

Direct and Indirect Impacts on Water Quality and Beneficial Uses

Accidental spills of hydrocarbon products, including fuels and fluids produced from the wells, would have the potential to contaminate surface waters if the spills were to occur when flow was present in the ephemeral washes of the CWSA. The impacts from such a spill would be localized and have little chance of migrating to the Green or White Rivers. Based on Utah's 303(d) list of impaired waters, the White River and its tributaries, from the confluence with the Green River to the state line appear to be meeting their designated uses for which they are classified. In the unlikely event that a hydrocarbon spill should reach these drainages, water quality would be degraded, and downstream water users would be impacted.

To reduce the potential for hydrocarbon contamination of surface water, pipelines and associated collection piping would be designed to minimize the potential for spills and leaks. Standard industry practices and safety measures associated with the installation of roads, pipelines, and well pad facilities would be implemented. Storage tanks would be surrounded by berms capable of holding at least 110 percent of the volume of the largest tank within the berm. During well drilling, a lined reserve pit would be used on each new well pad so that no drilling mud or production water would be discharged to shallow groundwater or to the land surface. These measures would lessen the potential for impacts to surface water resources.

Chemical use and storage could potentially result in a leak or spill at the drilling site. The use of berms, lined reserve pits, and other prudent design features required by UDOGM and BLM for using chemicals would reduce the risk of a spill or leak. A Spill Prevention, Control and Countermeasure (SPCC) Plan would be implemented to minimize the risk of accidental spills or introduction of contaminants to CWSA drainages. As a result, if realized, any impact to surface water resources would be temporary and localized in nature.

Direct and Indirect Impacts on Floodplains

Following publication of the CWSA DEIS and review of public comments, EOG committed that they would not drill from new or existing well pads within the 100-year floodplain of the

White River Corridor. Furthermore, EOG committed that they would not drill new wells in the White River corridor that would result in new well pads and roads. Twin wells drilled from existing well pads within the White River corridor (but outside the 100-year floodplain of the White River) could still be developed. However, as twin wells within the White River Corridor would not result in the construction of new well pads or access roads, potential erosion and sediment yield to the White River from the twin wells would be minimal. The construction of well pads and access roads within the flood hazard areas of Coyote and Red washes may, however, result in soil erosion and subsequent sediment yield to the White River. Placement of production facilities in the flood hazard areas of Coyote and Red washes may also increase the risk of accidental releases should a major flood event occur. This in turn could increase the potential for negative impacts to downstream water users and/or aquatic resources from hydrocarbon or produced water contamination.

Executive Order 11988 requires Federal agencies to make decisions in a manner that promotes avoidance of adverse impacts and reduces the risk of property loss and human safety due to floodplain development and/or modification, and preserves the natural and beneficial values of floodplains. Floodplain development and/or modification are allowed only if there are no other feasible alternatives. The Book Cliffs RMP supports Executive Order 11988, stating no surface disturbance or occupancy will be allowed within the 100-year floodplain of the following creeks: Bitter, Evacuation, Hill Sweetwater, and Willow; and the Green and White Rivers. This stipulation may be waived by the authorized officer if either the resource values change or the lessee/operator demonstrates that adverse impacts can be mitigated. Furthermore, as discussed in the previous paragraph, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor. Based on this commitment, potential impacts to the 100-year floodplain of the White River would also be negligible. However, surface disturbance allowed within floodplains of other ephemeral drainages on Tribal, State, and private lands would be at the discretion of the appropriate SMA or landowner.

4.2.1.1.3 Mitigation Measures

The following mitigation measures would apply to both the Proposed Action and the No Action Alternative. Well pads and other project facilities would be constructed to prevent overland flow of water and sediment from leaving the facilities. This will be accomplished through the use of BMPs, including, but not limited to, berms, sediment control structures, grading, and interim reclamation. These measures would minimize the erosion of sediment from the proposed project facilities.

For long-term access road disturbances, BMPs will be employed and maintained in the disturbed areas during construction and during well production to reduce the amount of sediment that reaches the creek. Detailed construction plans for the proposed access roads would be prepared and submitted for review and approval prior to construction during the APD approval process. The road design would include specific drainage components and BMPs that would be utilized to address control of sedimentation of surface waters in the CWSA. Typical BMPs that would be implemented for road construction on a site-specific, case-by-case basis include:

- Erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, and placement of surface rock could be used along proposed road reaches within 100 feet of stream channels and springs.

- New access roads could be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.
- Relief ditches could be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.
- Ditches could be allowed to vegetate and/or could include large rocks or stones (if available) to slow the velocity of drainage and allow sediment to settle out.
- Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.
- Where well pads can not be moved out of the floodplain of Coyote Wash or Red Wash, the well pad could be constructed as far as possible to the edge of the floodplain.
- Roads crossing floodplains could be constructed at the narrowest part of the floodplain, and perpendicular to the floodplain, where feasible. All attempts would be made to follow this guidance however, site-specific conditions would dictate the road construction location.
- Pipelines constructed in washes would be installed in accordance with the BLM's Hydraulic Considerations for Pipeline Crossings of Stream Channels and as directed by the AO.
- Sediment traps or basins could be installed in problem locations where insufficient vegetative buffering is available.
- Road design plans would identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.
- Maintenance and reclamation responsibilities for sediment retention features shall remain with the operator for the life of the permit³.

In addition to the above-listed BMPs that could potentially be implemented on a site-specific basis, EOG would implement an SPCC plan per the provisions of 40 CFR 112. This regulation establishes requirements for facilities to prevent oil spills from reaching the navigable waters of the U.S. or adjoining shorelines. The rule applies to owners or operators of certain facilities that drill, produce, gather, store, process, refine, transfer, distribute, use, or consume oil. The SPCC would contain measures for the construction of containment dikes around production facilities that contain fluids (i.e., production tanks, produced water tanks), additional spill prevention and control measures established for each type of facility or operations, and training materials.

³ This mitigation measure is similar to the applicant-committed measure in Section 2.3.7. However, this mitigation measure would make the proponent responsible for maintenance and reclamation of sediment retention features for as long as they are being utilized, rather than for just the first three years from the time of construction.

4.2.1.2 Groundwater

4.2.1.2.1 *Proposed Action*

Groundwater exists in shallow unconsolidated alluvium along ephemeral washes and in deeper bedrock formations beneath the CWSA. Spills of fuels or produced fluids from well pads, surface pipelines, and compressor stations have the potential to contaminate groundwater resources, especially the shallow alluvial groundwater. Spills from facilities located adjacent to ephemeral washes would have the greatest potential to contaminate groundwater. The impacts from such a spill would be localized and not likely to migrate to the major rivers adjacent to the CWSA. With the application of the mitigation measures described below, the potential for contaminating shallow groundwater aquifers is considered to be low.

Water in the deeper consolidated aquifers is generally high in dissolved solids. The water quality generally becomes poorer and much higher in dissolved solids with depth. Groundwater in the Green River Formation beneath the CWSA is most likely very high in dissolved solids (>3,000 mg/l) and, for the most part, usable for industrial purposes. BLM considers any groundwater from fresh (<1,000 mg/l) to moderately saline (<10,000 mg/l) as usable water. The use of state-of-the-art drilling and completion techniques would make contamination of any deeper groundwater zones very unlikely.

4.2.1.2.2 *No Action*

Under the No Action Alternative, the proposed wells would not be allowed on Federal lands. However, wells would still be drilled on private, State of Utah, and Tribal/allotted lands within the CWSA. A total of 148 wells could be drilled under the No Action Alternative, as compared to 627 wells under the Proposed Action.

The potential for contamination of groundwater from the No Action Alternative is about one-quarter of that for the Proposed Action because considerably less well pads and associated facilities would be developed.

4.2.1.2.3 *Mitigation Measures*

The following mitigation measures would apply to both the Proposed Action and the No Action Alternative.

- Groundwater zones encountered during drilling would be protected as directed by the BLM for Federal or Indian minerals, or UDOGM for fee or state minerals. If encountered, groundwater zones would be reported to the applicable agency. The approved casing and cementing program would be designed to isolate and protect groundwater resources.
- Well completion would be performed in accordance with “Onshore Oil and Gas Order No. #2 (43 CFR 3164.1), which states the following:
 - “Proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones, potentially protective zones, lost circulation zones, and any prospectively valuable deposits of minerals. The use of any isolating medium other than cement shall be approved in advance by the BLM Authorized Officer.”

- EOG would implement an SPCC plan per the provisions of 40 CFR 112. The SPCC would contain measures for the construction of containment dikes around production facilities that contain fluids (i.e., production tanks, produced water tanks), additional spill prevention and control measures established for each type of facility or operations, and training.
- To protect groundwater resources, a requirement for lining the reserve pit would be site-specific and would be based upon the AO's evaluation during the APD process. Generally, a pit liner would not be required in clay or bentonite soils while a liner would usually be required in sandy soil and fractured shale. If it is determined by the AO during the on-site inspection that a pit liner would be necessary, the reserve pit would be lined with a synthetic reinforced liner, a minimum of 12 millimeters thick, and sufficient bedding would be used to cover rocks. The liner would overlap the pit walls and be covered with dirt and/or rocks to hold it in place.

4.2.1.3 Unavoidable Adverse Effects

Despite the application of mitigation measures, under both the Proposed Action and No Action Alternatives, surface disturbance would result in some level of erosion and sedimentation to project area drainages. In addition, there would be some risk of potential contamination of surface waters from potential leaks or spills.

4.3 AIR QUALITY

4.3.1 Direct and Indirect Impacts

4.3.1.1 Proposed Action

Project-related emissions have the potential to affect air quality on both a local and a regional scale. Emission inventories for criteria pollutants [nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and particulates (PM₁₀ and PM_{2.5})] and hazardous air pollutants (HAP) were completed for development and operational-related activities. Pollutant dispersion modeling was performed to assess the potential air quality impacts from the Proposed Action with respect to various significance criteria. The modeling assessment of the CWSA project consists of evaluating air quality impacts on sub-grid, near-field, and far-field scales. The Industrial Source Complex (ISC) dispersion model was used to evaluate the sub-grid and near-field impacts. The CALMET/CALPUFF dispersion model was used to evaluate far-field impacts.

The sub-grid analysis predicted criteria pollutant air quality impacts from short-term activities such as well pad and road construction, well drilling, and well completion activities that would not only be geographically separated, but would not generally occur simultaneously. The sub-grid modeling also assessed HAP impacts during full-field operation after all development activities would be completed.

The near-field analysis addressed the ambient air quality impacts that would occur within an area of up to 10 kilometers beyond the CWSA project boundary that would result from operation of permanent facilities during the 40 year life of the project. This analysis included all well pad, compressor station, and vehicle-related emissions that would occur after the field would be fully developed.

The far-field analysis evaluated ambient air quality and air quality related value impacts (visibility and acid deposition) at distant Federal Class I and selected Class II areas resulting from ongoing project operations.

This section summarizes the potential air quality impacts from the CWSA Proposed Action. A more comprehensive discussion of emissions, processes, modeling methodology, and results is found in the CWSA Air Quality Technical Report, which is available at the BLM Vernal Field Office.

Emissions

Emission inventories were developed for the Proposed Action and alternatives. The annual emissions during both peak-year construction activities and average long-term operations are described in detail in CWSA Air Quality Technical Report, which is available at the BLM Vernal Field Office.

Project emissions would result from the following activities and sources:

- Well pad and road construction: earth-moving equipment producing fugitive dust, earth-moving equipment exhaust, and mobile sources;
- Drilling: vehicles generating fugitive dust on access roads, mobile sources, and drill rig engine exhaust;
- Completion: vehicles generating fugitive dust on access roads and mobile sources;
- Gas well flaring;
- Gas well pad operation: three-phase separator and dehydrator heater emissions, dehydrator still vent emissions, and flashing, working, and breathing emissions from a condensate tank;
- Operation and maintenance: road dust and vehicle tailpipe emissions generated from operations and maintenance vehicles; and
- Gas compression and processing: additional 5,000 horsepower compression capacity anticipated at Questar Gas Management (QGM) Chapita Wells Unit (CWU) compressor station in direct support of the Proposed Action wells.

The following tables summarize the annual emissions associated with well development and operations. Development emissions would occur for the first seven years while operational emissions would last for the 40-year life of the project. The development emissions are based on an average annual development of 90 wells per year. This rate may vary for any number of factors, including rig availability, natural gas prices, and commodity markets. The annual operational emissions are based on the ultimate, full-field development of 627 wells.

Table 4.3-1. CWSA Proposed Action Annual Development Emissions (tons/year)

Pollutant	Pad/Road Construction	Drilling	Completion	Wind Erosion	(tons/yr)
NO _x	6.9	122.0	2.6	0.0	131.5
CO	2.9	42.6	15.9	0.0	61.5
SO ₂	0.2	2.2	0.1	0.0	2.4
PM ₁₀	53.5	387.3	0.2	1.1	442.2
PM _{2.5}	9.0	61.4	0.2	0.4	71.0

Table 4.3-2. CWSA Proposed Action Annual Operations Emissions (tons/year)

Pollutant	QGM CWU Compressor Station	Well Pad Heaters	Operations Vehicles	Operations Total
NO _x	33.8	98.2	1.7	133.7
CO	120.7	20.6	17.2	158.5
SO ₂	0.0	0.0	0.1	0.1
PM ₁₀	3.4	7.5	83.2	94.1
PM _{2.5}	3.4	7.5	12.8	23.6

Note: Emissions based on full-field operation after all development complete

Table 4.3-3. CWSA Proposed Action Annual Operation HAP Emissions (tons/year)

HAP	Well Production	Gas Compression and Processing	Emissions (tons/year)
Benzene	26.9	0.3	27.2
Toluene	56.7	0.1	56.8
Ethylbenzene	3.2	0.0	3.2
Xylene	46.5	0.0	46.5
n-Hexane	8.3	0.0	8.3
Formaldehyde	0.1	3.6	3.7

Near-Field Impacts

Impacts from the Proposed Action development and operations were evaluated using the ISC pollutant dispersion model near the CWSA. The results indicate that the Proposed Action would be in compliance with all applicable air quality standards. **Table 4.3-4** shows the predicted ambient air PM₁₀ impacts during development activities.

Table 4.3-4. CWSA Proposed Action PM₁₀ Development Impacts

Activity	Ambient Air Concentration (µg/m ³) ^a					
	24-Hour Maximum			Annual Average		
	Predicted Conc.	With Background ^b	Percent of 24-Hour Standard ^c	Predicted Conc.	With Background ^d	Percent of Annual Standard ^e
Construction	93.3	121.3	80.8%	14.2	24.2	48.5%
Drilling	61.2	89.2	59.4%	6.3	16.3	32.7%
Completion	115.7	143.7	95.8%	12.0	22.0	43.9%

^a µg/m³ is micrograms of pollutant per cubic meter of air

^b 24-hour PM₁₀ background is 28 µg/m³

^c 24-hour PM₁₀ standard is 150 µg/m³

^d Annual PM₁₀ background is 10 µg/m³

^e Annual PM₁₀ standard is 50 µg/m³

Source: EPA 2005. PM10 Tribal Monitor, Myton, UT, Site ID 490137011. Annual Data from 2002 through 2005

The predicted impacts from operations after all wells have been developed are compared to applicable Utah and NAAQS standards and applicable PSD Class II increments for NO₂ and PM₁₀. Results of all modeling scenarios demonstrate that the impacts from the CWSA Proposed Action would remain below applicable ambient air quality standards.

Table 4.3-5. CWSA Proposed Action Operations Impacts

Pollutant	Averaging Period	CWSA Max (µg/m ³)	% of PSD Class II Increment	Project + Background ^a (µg/m ³)	% of NAAQS (Project + Background)
NO ₂	Annual	3.3	13.1%	13.3	13.3%
PM ₁₀	24-hour	9.4	31.3%	37.4	24.9%
PM ₁₀	Annual	2.2	12.8%	12.2	24.3%
CO	1-hour	459.3	NA	7443.3	18.6%
CO	8-hour	174.3	NA	4410.3	44.1%

^a with NO₂ annual background 10 µg/m³
^a with PM₁₀ 24-hour background 28 µg/m³
^a with PM₁₀ annual background 10 µg/m³
^a with CO 1-hour background 6,984 µg/m³
^a with CO 8-hour background 4,236 µg/m³

NO₂ and CO Source: Dave Prey, Utah Division of Environmental Quality - Division of Air Quality (UDAQ), Personal Communication, November 30th, 2005. Data represent UDAQ estimates for rural areas within the Uintah Basin.

PM₁₀ Source: EPA 2005. PM10 Tribal Monitor, Myton, UT, Site ID 490137011. Annual Data from 2002 through 2005

A “most-likely scenario” was developed to assess the HAP impacts. A modeling grid was developed with the existing QGM CWU compressor station in the center surrounded by multiple well pads.

Since a percentage of the proposed wells would be twin wells drilled from existing locations, the twin well per pad scenario was modeled in order to illustrate the maximum ambient air HAP concentrations that would occur in the CWSA from multiple facilities. HAP emissions were calculated for the following sources:

- Gas well pads: three-phase separator and dehydrator with associated heaters and a condensate tank; and
- Existing QGM CWU compressor station with an incremental 5,000 additional horsepower requirement to support the Proposed Action wells.

Tables 4.3-6 and 4.3-7 demonstrate that ambient air impacts would be well below State and Federal health thresholds.

Table 4.3-6. CWSA Proposed Action Non-Carcinogenic Acute REL and RfC Impacts

HAP	REL (µg/m ³)	Predicted Maximum 1-Hour Impact (µg/m ³)	% of REL	RfC ^c (µg/m ³)	Predicted Maximum Annual Impact (µg/m ³)	% of RfC
Benzene	1,300 ^a	33.8	2.6%	30	0.4	1.4%
Toluene	37,000 ^a	74.9	<1	400	0.9	<1
Ethylbenzene	350,000 ^b	3.6	<1	1,000	<1	<1
Xylenes	22,000 ^a	54.6	<1	100	0.7	<1
n-Hexane	390,000 ^b	6.3	<1	200	0.1	<1
Formaldehyde	94 ^a	16.7	17.8%	9.8	0.5	4.6%

^a EPA Air Toxics Database, Table 2 (EPA 2002)

^b Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA 2002) since no available REL

^c EPA Air Toxics Database, Table 1 (EPA 2002)

Table 4.3-7. CWSA Proposed Action Utah Toxic Screening Level (TSL) Impacts

Pollutant and Averaging Time	Predicted Maximum Impact ($\mu\text{g}/\text{m}^3$)	Toxic Screening Levels ^b ($\mu\text{g}/\text{m}^3$)	Percent of TSL
Formaldehyde (1-hour)	16.7	37	45.1%
Benzene ^a (24-hour)	10.1	53	19.1%
Toluene (24-hour)	22.4	6,280	<1%
Ethylbenzene (1-hour)	3.6	54,274	<1%
Ethylbenzene (24-hour)	1.1	14,473	<1%
Xylene (1-hour)	54.6	65,129	<1%
Xylene (24-hour)	16.4	14,473	<1%
n-Hexane (24-hour)	1.8	5,875	<1%

^a Although there exists an acute TLV for benzene, the State of Utah does not apply a comparison to an acute TSL since the chronic TSL is more stringent.

^b Source: Utah Department of Environmental Quality - Air Quality Division (2000).

Since benzene and formaldehyde are carcinogenic, annual average concentrations of these two HAPs were modeled and expressed as a long-term cancer risk (based on 70-year exposure). Cancer risk was estimated for two exposure scenarios: 1) most likely exposure (MLE) corresponding to a resident that could potentially live an average of 20 years at a particular location in the CWSA, and 2) a maximally exposed individual (MEI) corresponding to an individual that could be exposed for the entire life of the project (assumed as 40 years). Resultant exposure adjustment factors for the MLE and MEI scenarios of 0.286 (20/70) and 0.571 (40/70) were applied to the estimated cancer risk to account for the actual time that an individual would be exposed during a 70-year lifetime.

Table 4.3-8 summarizes predicted HAP cancer risk for the Proposed Action. The significant cancer risk criterion of 1×10^{-6} is at the low end of the range of cancer risks typically considered as acceptable when evaluating the health effects of a particular action. The range of acceptable cancer risks when evaluating the health effects of an action varies from 1 in a million to 1 in 10,000.

Table 4.3-8. CWSA Proposed Action Carcinogenic HAP Risk

HAP	Exposure Scenario	Unit Risk Factor ($1/\mu\text{g}/\text{m}^3$)	Exposure Adjustment Factor	Modeled Annual Impact ($\mu\text{g}/\text{m}^3$)	Cancer Risk
Benzene	MLE	2.2×10^{-6} to 7.8×10^{-6}	0.286	0.42542	0.3 in a million to 1.0 in a million
Formaldehyde	MLE	1.3×10^{-5}	0.286	0.45286	1.7 in a million
Benzene	MEI	2.2×10^{-6} to 7.8×10^{-6}	0.571	0.42542	0.5 in a million to 1.9 in a million
Formaldehyde	MEI	1.3×10^{-5}	0.571	0.45286	3.4 in a million

Far-Field Impacts

Effects on air quality, visibility, acid deposition, and acid neutralizing capacity at high elevation lakes were evaluated at distant Class I and Class II areas using the CALPUFF model. The modeling methodology and results for each Class I and Class II areas are described in detail in the CWSA Air Quality Technical Report, which is available at the BLM Vernal Field Office.

In summary, increases in pollutant concentrations are predicted to be equal to or less than 0.1 percent of all applicable PSD increments except at the adjacent Ouray NWR, approximately 10 kilometers to the west of the CWSA boundary. However, the predicted maximum concentrations at Ouray NWR would be only 0.2 percent of the annual NO₂ PSD Class II increment, 0.4 percent of the 24-hour PM₁₀ PSD Class II increment, and 0.1 percent of the annual PM₁₀ PSD Class II increment.

Incremental increases in total nitrogen and sulfur deposition are predicted to be well below the significance thresholds of 3 kg/ha-yr and 5 kg/ha-yr for each chemical species, respectively. In addition, potential changes in Acid Neutralization Capacity (ANC) at sensitive lakes are predicted to be well below the USDA-Forest Service 10 percent change threshold for lakes with background ANC levels above 25 µeq/l.

The predicted maximum levels of visibility degradation during maximum development and operational activities would be well below the “just noticeable change” significance threshold of 1.0 Δ deciview (dv) in all Class I and II areas. In comparison, the human eye would not be able to detect any difference less than a 1.0 Δ dv. Therefore, it can be concluded that the Proposed Action is not likely to cause any perceptible degradation of visibility at Class I or Class II sensitive areas.

4.3.1.2 No Action

Construction- and operational-related ambient air quality impacts for 148 wells would be roughly 25 percent of those assumed for the Proposed Action because of the lower number of potential pads and roads to be constructed, and fewer wells to be drilled and operated. Because air quality impacts were demonstrated to fall below significance levels under the Proposed Action, it follows that all impacts under the No Action Alternative would likely be below significance levels.

4.3.2 Mitigation

- Mitigation of air quality impacts on Federal, State and fee lands within the CWSA would be accomplished through the permitting of all regulated air pollution sources through the appropriate Federal or State agency. Mitigation of air quality impacts on Tribal/allotted lands or within the Tribal airshed, would be accomplished through the permitting of all regulated air pollution sources through the Ute Indian Tribe and EPA as appropriate.
- The construction and operating permitting processes would typically require the use of clean burning technologies and other emission controls for larger sources of emissions (such as compressor engines) in order to reduce impacts to ambient air quality. For minor sources of air pollution, such as small dehydrators and well pad condensate tanks, impacts are generally insignificant and mitigation may not be warranted.

- To reduce the emission of fugitive dust from major roads, routine road watering and/or application of magnesium chloride would be implemented at the direction of the appropriate SMA.

4.3.3 Unavoidable Adverse Effects

Pollutant emissions from oil and gas facilities would continue for the 40-year life of the project. At the end of the CWSA project, facilities would be dismantled and emissions would cease. However, wind-blown particulate emissions could continue until final reclamation is completed.

4.4 SOIL RESOURCES

4.4.1 Direct and Indirect Impacts

4.4.1.1 Proposed Action

The primary effect of long-term surface disturbances on soil resources is the resulting increase in sediment yield. In order to estimate potential sediment yield increases from surface disturbances on the CWSA, the amount of disturbance was calculated for each soil type within the CWSA using the soil erosion factors published in the SSURGO database and listed in **Table 3.4-1**. For Tribal and private lands, soils have not been mapped, and erosion factors have not been determined. It is assumed that the soil types on Tribal and private lands are similar to those of BLM and State lands within the CWSA. Thus, the average erosion factor for the soil types mapped on BLM and State lands (2.64 tons/acre/year) within the CWSA was used to estimate erosion for the Tribal and private lands.

Table 4.4-1 provides the soil (i.e., surface) disturbance estimates for each of the mapped soil types and an overall estimate for Tribal and private lands. **Table 4.4-1** also provides the calculated potential increase in soil erosion. In total, approximately 1,722 acres of surface soils would be disturbed under the Proposed Action. Based on this, an additional 4,014.4 tons/year of soil erosion is predicted. Eighty percent of this additional erosion would be from four soil units: the Cadrina-Casmos-Rock outcrop association (1,236.2 tons), the Badland-Tipperary association (1,093 tons/year), the Muff-Cadrina, cool association (530.6 tons/year), and the Cadrina association (351.4 tons/year). On Tribal and private lands, the increase in soil erosion is an estimated 668.4 tons/year.

Table 4.4-1. Disturbance by Soil Type and Resulting Soil Erosion under Proposed Action

Soil Name	Surface Disturbance (acres)	Predicted Soil Erosion (tons/year)
Badland-Rock outcrop complex	5.3	5.3
Jenrid sandy loam	2.6	12.9
Jenrid-Eghelm complex	12.9	51.6
Badland-Tipperary association	364.3	1093.0
Muff-Cadrina, cool association	265.3	530.6
Cadrina association	351.4	351.4
Cadrina extremely stony loam-Rock outcrop complex	39.7	39.7
Cadrina-Casmos-Rock outcrop complex	12.7	12.7

Soil Name	Surface Disturbance (acres)	Predicted Soil Erosion (tons/year)
Gilston-Muff-Cadrina, cool complex	412.1	1236.2
Green River-Fluvaquents complex	2.5	12.5
Tribal and Private Land Soils	253.2	668.4
Totals	1,722.0	4,014.4

Minor variations in surface disturbance calculations between soils and vegetation are due to rounding and extrapolation of soil type disturbance on Tribal and private lands.

4.4.1.2 No Action Alternative

Table 4.4-2 provides the soil (i.e., surface) disturbance estimates for each of the mapped soil types and an overall estimate for Tribal and private lands under the No Action Alternative. **Table 4.4-2** also provides the calculated potential increase in soil erosion. Under the No Action Alternative, total surface disturbance would be approximately 329.5 acres. Based on this, an additional 842 tons/year of soil erosion is predicted.

Table 4.4-2. Disturbance by Soil Type and Resulting Soil Erosion under No Action Alternative

Soil Name	Surface Disturbance (acres)	Predicted Soil Erosion (tons/year)
Jenrid-Eghelm complex	2.9	11.6
Badland-Tipperary association	7.0	21
Muff-Cadrina, cool association	22.6	45.2
Cadrina association	18	18
Gilston-Muff-Cadrina, cool complex	25.9	77.7
Tribal and Private Land Soils	253.2	668.4
Totals	329.6	841.9

Minor variations in surface disturbance calculations between soils and vegetation are due to rounding and extrapolation of soil type disturbance on Tribal and private lands.

4.4.1.3 Mitigation Measures

- Maintenance and reclamation responsibilities for sediment retention features shall remain with the operator for the life of the permit⁴.
- Except in native badland soils that are unvegetated, all disturbed areas of access roads, other than the driving surface, shall be revegetated as directed by the AO when the associated well(s) is put into production. This requirement includes but is not limited to the shoulders, drainage ditches, and cut and fill slopes of the access road.

⁴ This mitigation measure is similar to the applicant-committed measure in Section 2.3.7. However, this mitigation measure would make the proponent responsible for maintenance and reclamation of sediment retention features for as long as they are being utilized, rather than for just the first three years from the time of construction.

4.4.1.4 Unavoidable Adverse Effects

Despite the application of mitigation measures, under both the Proposed Action and No Action Alternatives, surface disturbance would result in soil loss and erosion.

4.5 VEGETATION (INCLUDING SPECIAL STATUS SPECIES)

4.5.1 Direct and Indirect Impacts

Vegetation removal and soil handling associated with the construction and installation of well pads, pipelines, access roads, and other facilities would affect vegetation resources both directly and indirectly. Direct effects would include removal of vegetation, modification of structure, species composition, and modification of the extent of cover types. Indirect effects may include increased potential for weed invasion; exposure of soils to accelerated erosion; shifts in species composition and/or changes in plant density; reduction in wildlife habitat and livestock forage; and changes to visual aesthetics. These direct and indirect impacts are discussed further under each alternative.

4.5.1.1 Proposed Action

4.5.1.1.1 Impacts to Vegetation Communities

Under the Proposed Action, a total of approximately 1,735 acres of vegetation would be removed during initial construction, drilling, and completion activities. Disturbance by vegetation community is summarized in **Table 4.5-1**. Disturbance acreages in vegetation communities on BLM and State land were calculated using GIS software. As vegetation communities have not been mapped on Tribal or private lands in the CWSA, the extent of each vegetation community, and subsequent surface disturbance within each community, were extrapolated based on the associated percentages within the BLM and State land portions of the CWSA.

Because of the intrinsic and extrinsic values of riparian and floodplain habitats, the Utah BLM has established a State-wide policy to protect riparian areas on BLM lands. This policy (UT-93-93) requires that riparian areas be maintained and/or improved to “Proper Functioning Condition.” The policy states that no new surface disturbing activities are allowed within 100 m (330 feet) of riparian areas, unless it can be shown that 1) there are no practical alternatives, 2) all long-term impacts can be fully mitigated, or 3) the activity will benefit or enhance the riparian area. The Book Cliffs RMP supports this policy, stating “*no surface disturbance or occupancy will be allowed within riparian habitat. This stipulation may be waived by the authorized officer if either the resource values change or the lessee/operator demonstrates that adverse impacts can be mitigated* (BLM 1985). Furthermore, as discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, and would not drill new wells in the White River corridor that would result in new well pads and roads. Based on the above information, direct impacts to the riparian vegetation community would be reduced.

Table 4.5-1. Disturbance¹ by Vegetation Community – Proposed Action

Vegetation Community	Surface Disturbance (acres)
Sagebrush Shrub	932
Desert Shrub	327
Badlands	48
Desert Sands	428

Vegetation Community	Surface Disturbance (acres)
Total	1,735

¹Slight discrepancies due to rounding.

4.5.1.1.2 Invasive and Noxious Weeds

The spread of non-native plants and noxious weeds is a concern in areas proposed for surface development activities. Many invasive plants can spread through areas undeterred, producing changes in native vegetation communities. Specific negative effects of invasive plants and noxious weeds can include: 1) reduction in the overall visual character of an area; 2) competition with, or elimination of native plants; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion. Construction activities, increased soil disturbance, and higher traffic volumes could potentially spur the introduction and spread of existing and new plant and weed species in the CWSA (Gelbard 2003).

Moderate to high levels of invasive weed infestations already occur on disturbed areas within the CWSA, and along existing roads leading into the CWSA. As such, travel through these areas could lead to the transport of weed seeds throughout the CWSA. Similarly, pull-offs onto road edges with equipment and vehicles, or parking on disturbed areas in route to the CWSA could result in vehicle tires and undercarriages transporting weed seeds to undisturbed locations of the CWSA. However, provided suggested mitigation (see Section 4.5.2) is applied, the above-described potential impacts would be reduced or partially mitigated.

4.5.1.1.3 Special Status Plant Species

As discussed in Section 3.5.3, Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7 (a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a Federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action “*may affect, is likely to adversely affect*” a Federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate and BLM Sensitive species are also managed to prevent a future listing as threatened or endangered. The sections below describe the special status plant species that may be affected by the Proposed Action. Section 4.5.3 includes a table that summarizes the effect determinations for special status plant species potentially affected by the alternatives.

Uinta Basin Hookless Cactus

As discussed in Section 3.5.3.1 of this EIS, potential habitat for the Uinta Basin hookless cactus occurs along the White River corridor, west of the Bonanza power plant, and along the smaller drainages and ridge lines that have clay soils with gravel surfaces. The Federally threatened cactus species has not been identified in the CWSA; however, two known occurrences are located less than ½-mile from the CWSA boundary. As committed to by EOG in Section 2.3.4, *prior to any project-related surface disturbance, all locations proposed for surface disturbance would be examined by a wildlife biologist and botanist approved by the applicable SMA to determine if any Federally Threatened or Endangered (T&E) plant or wildlife species are present. If present, EOG would consult with the appropriate*

SMA prior to initiating any surface disturbance activities, and shall implement appropriate avoidance or mitigation measures. Site-specific T&E species clearances would be performed at the time of the onsite review. Furthermore, USFWS Conservation Measures have been identified in Section 4.5.2. Based on these measures, direct impacts to occupied habitats of Uinta Basin hookless cactus would not occur. Potential direct impacts of the Proposed Action would therefore be limited to loss, fragmentation, or modification of potential habitat. Potential indirect effects are discussed below.

Range-wide, the Uinta Basin hookless cactus is a desired species among cactus collectors (USFWS 1979). Illegal collection of the Uinta Basin hookless cactus is the primary threat to the conservation and recovery of the species on Utah BLM lands (J. Nitschke-Sinclear, BLM, pers. comm., March 2003). BLM land uses that may indirectly contribute to the illegal collection of the Uinta Basin hookless cactus include tracks created by seismic exploration buggies, road construction for oil and gas leases, and OHV use (BLM 2002b). Under the Proposed Action, 99.5 miles of new roads would be constructed. Increased access to the CWSA via proposed roads could result in increased visitation by the public, increased access to occupied Uinta Basin hookless cactus habitats, and consequently, could potentially result in illegal collection of special status plant species. However, measures presented in Section 4.5.2 could reduce or eliminate the potential for illegal collection that could occur as a result of road construction under the Proposed Action, thereby partially mitigating the threat of increased collection.

A second concern related to increased roadway access and vehicle traffic in the CWSA is the potential for the introduction and spread of invasive weed species (see Section 4.5.1.1.2) and the potential for dust deposition on cactus, which can directly affect transpiration rates of the species. Weed species compete with native plants and result in a deterioration of ecological conditions (Gelbard 2003). Weed infestation can interfere with reclamation potential and can lead to weed encroachment into undisturbed areas, including T&E plant species habitats such as that of the Uinta Basin hookless cactus. Based on this information, the potential for weed invasion into Uinta Basin hookless cactus habitat is a potential impact of the Proposed Action. However, provided suggested mitigation (see Section 4.5.2) is successfully implemented, effects of weed invasion on T&E plant habitats would be partially mitigated.

Surface disturbing activities would result in losses of vegetation, thereby potentially reducing habitat for pollinator species of Uinta Basin hookless cactus, as well as potentially resulting in disruption of pollinator activity within available habitats.

Another potential indirect effect includes changes in surface water flow regimes associated with sedimentation and precipitation. Many of the known Uinta Basin hookless cactus populations in the Book Cliffs planning area are associated with small, ephemeral drainages or areas where stormwater flows across slopes. Surface disturbance associated with the construction of well pads, access roads, pipelines, etc., can lead to increased soil erosion, and stormwater runoff with heavy concentrations of sediment. The Uinta Basin hookless cactus is not tolerant of heavy sedimentation. Anecdotal evidence suggests that several cacti in the Vernal Field Office have been lost due to heavy sediment deposition from surface water runoff on unpaved roads. Because of these potential impacts, sedimentation potentially resulting from surface disturbance under the Proposed Action is a concern. However, several applicant-committed measures have been incorporated into the Proposed Action (see Section 2.3.6) in order to reduce erosion and subsequent sediment yield. Furthermore, additional mitigation is provided in Section 4.5.2. These measures would serve

to reduce and partially mitigate the potential effects of sedimentation on Uinta Basin hookless cactus habitats.

Based on the potential for modification or loss of potential habitat and increased access to potential or occupied habitats, the Proposed Action “**may affect, is not likely to adversely affect**” the Uinta Basin hookless cactus.

Ute Ladies’-Tresses

As discussed in Section 3.5.1.2 of this EIS, marginally potential habitat for the Ute ladies’-tresses is present within the riparian corridors of the White River. According to the Book Cliffs Record of Decision Oil and Gas Lease Stipulation No.’s 7 & 8, a “*no surface occupancy*” stipulation would be implemented within riparian habitat. As discussed in the stipulation, exceptions, waivers, or modifications to this stipulation may be granted by the AO provided adverse impacts to riparian habitat can be avoided or mitigated. As discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, and would not drill new wells in the White River corridor that would result in new well pads and roads. These commitments further limit the potential for disturbance of riparian habitat on State or fee lands. Furthermore, as committed to by EOG in Section 2.3.4, *prior to any project-related surface disturbance, all locations proposed for surface disturbance would be examined by a wildlife biologist and botanist approved by the applicable SMA to determine if any Federally Threatened or Endangered (T&E) plant or wildlife species are present. If present, EOG would consult with the appropriate SMA [in this case, the Tribe or private land owners] prior to initiating any surface disturbance activities, and shall implement appropriate avoidance or mitigation measures. Site-specific T&E species clearances would be performed at the time of the onsite review.* Finally, USFWS Conservation Measures have been identified in Section 4.5.2. Based on these measures, direct impacts to occupied habitats of Ute ladies’-tresses would not occur.

Weed invasion into potential Ute ladies’-tresses habitats is an indirect threat to the species. As discussed under the Uinta Basin hookless cactus analysis, weed species compete with native plants and result in a deterioration of ecological conditions (Gelbard 2003). Weed infestation can interfere with reclamation potential and can lead to weed encroachment into undisturbed areas, including T&E plant species habitats such as that of the Ute ladies’-tresses. Based on this information, the potential for weed invasion into Ute ladies’-tresses habitat along the White River is a potential impact of the Proposed Action. However, provided suggested mitigation in Section 4.5.2 is successfully implemented, effects of weed invasion on this T&E species would be minimized or partially mitigated.

Surface disturbing activities under the Proposed Action could indirectly affect the Ute ladies’-tresses by leading to increased sedimentation in potential and occupied habitats. However, potential sedimentation impacts could be reduced and partially mitigated through the application of mitigation measures in Section 4.5.2.

Based on the potential for modification or loss of potential habitat, the Proposed Action “**may affect, is not likely to adversely affect**” the Ute ladies’-tresses.

4.5.1.2 No Action

4.5.1.2.1 Impacts to Vegetation Communities

Under the No Action Alternative, a total of approximately 329.5 acres of vegetation would be removed during construction, drilling, and completion activities on Tribal, State and private lands.

Disturbance by vegetation community is summarized in **Table 4.5-2**. Disturbance acreages in vegetation communities on BLM and State land were calculated using GIS software. As vegetation communities have not been mapped on Tribal/Allotted or private lands in the CWSA, the extent of each vegetation community, and subsequent surface disturbance within each community, were extrapolated based on the associated percentages within the BLM and State land portions of the CWSA.

Table 4.5-2. Disturbance¹ by Vegetation Community – No Action Alternative

Vegetation Community	Surface Disturbance (acres)
Sagebrush Shrub	184
Desert Shrub	71
Badlands	7
Desert Sands	67
Total	329

¹Slight discrepancies due to rounding.

4.5.1.2.2 Invasive and Noxious Weeds

The spread of non-native plants and noxious weeds is a concern in areas proposed for surface development activities. Many invasive plants can spread through areas undeterred, producing changes in native vegetation communities. Specific negative effects of noxious and invasive weeds can include: 1) reduction in the overall visual character of an area; 2) competition with, or elimination of native plants; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion. Construction activities, increased soil disturbance, and higher traffic volumes could potentially spur the introduction and spread of existing and new weed species in the CWSA.

Moderate to high levels of weed infestation already occur on disturbed areas within the CWSA, and along existing roads leading into the CWSA. As such, travel through these areas could lead to the transport of weed seeds throughout the CWSA. Similarly, pull-offs onto road edges with equipment and vehicles, or parking on disturbed areas in route to the CWSA could result in vehicle tires and undercarriages transporting weed seeds to undisturbed locations of the CWSA. However, provided suggested mitigation (see Section 4.5.2) is applied, the above-described potential impacts would be reduced or partially mitigated.

4.5.1.2.3 Special Status Plant Species

The potential effects of the No Action Alternative on the Uinta Basin hookless cactus and Ute ladies'-tresses would be similar to those described for the Proposed Action (see Section 4.5.1.1.3), with the exception that potential habitats for these species on Federal lands would not be affected. Based on the potential impacts to these species (see Section 4.5.1.1.3) on Tribal, State and private lands, the Proposed Action "**may affect, is not likely to adversely affect**" the Uinta Basin hookless cactus and the Ute ladies'-tresses. **Table 4.5.3**

summarizes the effect determinations for special status plant species potentially affected by the alternatives.

Table 4.5.3 Summary of Effect Determinations for Special Status Plants

Species	Effect Determinations under Proposed Action	Effect Determinations under No Action Alternative
Uinta Basin hookless cactus	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Ute ladies'-tresses	May affect, not likely to adversely affect	May affect, not likely to adversely affect

4.5.2 Mitigation Measures

Power washing of all construction and drilling equipment would occur prior to the equipment entering the CWSA from outside the Vernal Field Office area.

EOG would control noxious weeds along its well access roads and pipelines, at well pads, and other facilities installed or operated by EOG, and provide Pesticide/Herbicide Use proposals as specified by the SMA. EOG would reseed in all portions of well pads and ROWs not utilized for the operational phase of the project, as well as any sites within the CWSA determined necessary by the appropriate SMA. Reseeding would be accomplished using seed mixes selected by the AO of the appropriate SMA. Post-construction seeding applications would continue at the direction of the appropriate SMA. Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer of the appropriate SMA. Weed monitoring and reclamation measures would be continued on an annual basis (or as frequently as the SMA determines) throughout the life of the project. Appendix E provides information on interim and final reclamation.

Uinta Basin Hookless Cactus (*Sclerocactus glaucus* (= *brevispinus* and *wetlandicus*)

In order to minimize effects to the Federally threatened Uinta Basin hookless cactus, the BLM in coordination with the USFWS, developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the ESA. The following avoidance and minimization measures would be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat⁵ prior to any ground disturbing activities to determine if suitable Uinta Basin hookless cactus habitat is present.
2. Within suitable habitat⁶, site inventories will be conducted to determine occupancy. Inventories:

⁵ *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.

⁶ *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Uinta Basin hookless cactus. Habitat descriptions can be found in the U.S. Fish and Wildlife Service’s 1990 Recovery Plan and Federal Register Notices for the Uinta Basin hookless cactus (<http://www.fws.gov/angered/wildlife.html>).

- a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols,
 - b. Will be conducted in suitable and occupied⁷ habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods:
 - i. *Sclerocactus brevispinus* surveys should be conducted March 15th to June 30th, unless extended by the BLM
 - ii. *Sclerocactus wetlandicus* surveys can be done any time of the year, provided there is no snow cover,
 - c. Will occur within 115' from the centerline of the proposed ROW for surface pipelines or roads; and within 100' from the perimeter of disturbance for the proposed well pad including the well pad,
 - d. Will include, but not be limited to, plant species lists and habitat characteristics, and
 - e. Will be valid until March 15th the following year for *Sclerocactus brevispinus* and one year from the survey date for *Sclerocactus wetlandicus*.
3. Design project infrastructure to minimize impacts within suitable habitat²:
- a. Reduce well pad size to the minimum needed, without compromising safety,
 - b. Limit new access routes created by the project,
 - c. Roads and utilities should share common ROWs where possible,
 - d. Reduce width of ROWs and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,
 - e. Place signing to limit off-road travel in sensitive areas,
 - f. Stay on designated routes and other cleared/approved areas, and
 - g. All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.
4. Within occupied habitat⁷, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:
- a. Follow the above (#3) recommendations for project design within suitable habitats,
 - b. Buffers of 100 feet minimum between the edge of the ROW (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated,
 - c. Surface pipelines will be laid such that a 100 foot buffer exists between the edge of the ROW and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population,
 - d. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,
 - e. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,
 - f. Designs will avoid concentrating water flows or sediments into occupied habitat,

⁷ *Occupied habitat* is defined as areas currently or historically known to support Uinta Basin hookless cactus; synonymous with "known habitat."

- g. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and
 - h. Minimize the disturbed area of producing well locations through interim and final reclamation (see Appendix E). Reclaim well pads following drilling to the smallest area possible.
5. Occupied Uinta Basin hookless cactus habitats within 100' of the edge of the surface pipelines' ROWs, 100' of the edge of the roads' ROWs, and 100' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.
6. Reinitiation of Section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

Ute ladies'-tresses (*Spiranthes diluvialis*)

In order to minimize effects to the Federally threatened Ute ladies'-tresses, the BLM in coordination with the USFWS, developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the ESA. Ute ladies'-tresses habitat is provided some protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act (CWA). Should plants, habitat, or populations not be protected under these regulatory mechanisms, the following conservation measures would be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area, including areas where hydrology might be affected by project activities, within potential habitat⁸ prior to any ground disturbing activities to determine if suitable Ute ladies'-tresses habitat is present.
2. Within suitable habitat⁹, site inventories will be conducted to determine occupancy. Inventories:
 - a. Must be conducted by qualified individual(s) and according to BLM and

⁸ *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.

⁹ *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Ute ladies'-tresses. Habitat descriptions can be found in Recovery Plans and Federal Register Notices for the species at <<http://www.fws.gov/endangered/wildlife.html>>.

- b. Service accepted survey protocols, Will be conducted in suitable and occupied¹⁰ habitat for all areas proposed for surface disturbance or areas that could experience direct or indirect changes in hydrology from project activities,
 - c. Will be conducted prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods (usually August 1st and August 31st in the Uintah Basin; however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower),
 - d. Will occur within 300' from the centerline of the proposed ROW for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad,
 - e. Will include, but not be limited to, plant species lists, habitat characteristics, source of hydrology, and estimated hydroperiod, and
 - f. Will be valid until August 1st the following year.
3. Design project infrastructure to minimize direct or indirect impacts to suitable habitat⁹ both within and downstream of the project area:
- g. Alteration and disturbance of hydrology will not be permitted,
 - h. Reduce well pad size to the minimum needed, without compromising safety,
 - i. Limit new access routes created by the project,
 - j. Roads and utilities should share common ROWs where possible,
 - k. Reduce width of ROWs and minimize the depth of excavation needed for the road bed,
 - l. Construction and ROW management measures should avoid soil compaction that would impact Ute ladies' tresses habitat,
 - m. Off-site impacts or indirect impacts should be avoided or minimized (i.e. install berms or catchment ditches to prevent spilled materials from reaching occupied or suitable habitat through either surface or groundwater),
 - n. Place signing to limit off-road travel in sensitive areas,
 - o. Stay on designated routes and other cleared/approved areas, and
 - p. All disturbed areas will be re-vegetated with species approved by FWS and BLM botanists.
4. Within occupied habitat¹⁰, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:
- q. Follow the above (#3) recommendations for project design within suitable habitats,
 - r. Buffers of 300 feet minimum between ROW (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated,
 - s. Surface pipelines will be laid such that a 300-foot buffer exists between the edge of the ROW and the plants, using stabilizing and anchoring techniques when the pipeline crosses habitat to ensure the pipelines don't move towards the population,
 - t. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

¹⁰ *Occupied habitat* is defined as areas currently or historically known to support Ute ladies'-tresses; synonymous with "known habitat."

- u. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,
- v. Designs will avoid altering site hydrology and concentrating water flows or sediments into occupied habitat,
- w. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, with berms and catchment ditches to avoid or minimize the potential for materials to reach occupied or suitable habitat, and
- x. Minimize the disturbed area of producing well locations through interim and final reclamation (see Appendix E). Reclaim well pads following drilling to the smallest area possible.

5. Occupied Ute ladies'-tresses habitats within 300' of the edge of the surface pipelines' ROWs, 300' of the edge of the roads' ROWs, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

6. Reinitiation of Section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Ute ladies'-tresses is anticipated as a result of project activities.

Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

4.5.3 Unavoidable Adverse Effects

Unavoidable Adverse Effects to vegetation resources would include long-term losses (40-year life of project plus time required to successfully reclaim disturbed areas) of vegetation under either alternative.

4.6 WILDLIFE AND FISHERIES (INCLUDING SPECIAL STATUS SPECIES)

4.6.1 Direct and Indirect Impacts

The principle wildlife impacts with the potential to occur under the alternatives include: (1) a direct loss or degradation of wildlife habitats, (2) decreased use of certain habitats through displacement of some wildlife species resulting in potential interspecific and intraspecific competition, and subsequent effects of deteriorated physical condition, mortality, and general distress, (3) a decrease in reproductive success and nutritional condition from increased energy expenditure due to physical responses to disturbance, (4) an increase in the potential for wildlife-vehicle collisions because of increased traffic, and (5) an increase in the potential for poaching or harassment of wildlife.

4.6.1.1 Proposed Action**4.6.1.1.1 General Wildlife**

The disturbance of 1,735 acres of wildlife habitat associated with the construction of wells, roads, pipelines, and related facilities and infrastructure would reduce habitat availability for a variety of common wildlife species. The 1,735-acre long-term reduction in habitat is expected to have a minor to moderate impact on the general wildlife species discussed in Section 3.6.2 because of the following:

- 1) Many of the species discussed (e.g., cottontails, jackrabbits, coyotes, skunks, rodents) are habitat generalists, meaning they are not tightly restricted to specific habitat types;
- 2) Many of the wildlife populations in the CWSA have likely adapted to existing gas exploration and production activities;
- 3) Many of the species-specific applicant-committed measures and mitigation measures would indirectly afford some protection to the general wildlife species discussed in this document.

Other direct impacts to general wildlife species would include a potential for accidental mortality caused by equipment or vehicles on construction sites, and an increase in the potential for collisions between wildlife and motor vehicles on roads in the CWSA.

Project implementation would indirectly increase the level of functional habitat loss and habitat fragmentation in the CWSA. Disturbances from drilling activities and increased traffic could also displace wildlife from habitats in areas of human activity. Construction may result in displacement from affected habitats during the entire construction phase of a well, road or pipeline (weeks); whereas production could result in displacement only during well visits (hours). When displaced, individual animals could move into less suitable habitats or into habitats where interspecific and intraspecific competition may occur, resulting in subsequent effects of deteriorated physical condition, reproductive failure, mortality, and general distress. A long-term drought has already reduced forage quality and quantity in the Uinta Basin, which may increase impacts associated with displacement and resulting competition among small mammals and other species falling within the “general wildlife” category.

The severity of the direct and indirect impacts to general wildlife species under the Proposed Action would depend on the availability of habitats within and outside the CWSA, the sensitivity of the species to human activity, the seasonal and daily timing of construction and development activities, and site-specific topography and vegetation (e.g., construction sites that are visually obscured may impact adjacent wildlife less than where construction activities are in full view).

4.6.1.1.2 Big Game**Pronghorn Antelope**

Surface disturbances associated with the Proposed Action would result in the direct loss and fragmentation of approximately 822 acres of high-value year-long habitat, 161 acres of limited year-long habitat, and 714 acres of critical year-long habitat for pronghorn antelope. Habitat loss and fragmentation associated with these disturbances could result in reduced

habitat use by pronghorn within and near disturbed areas, increased animal densities in adjoining habitats, and increased stress from intra- and interspecific competition.

Visual and noise disturbance from human activity would also reduce relative habitat value for pronghorn, especially during periods of heavy snow cover and cold temperatures. Pronghorn are likely to experience physiological stress during winter, particularly gestating females because they require higher energy levels for survival and successful reproduction. The increased presence of vehicles, equipment, and people within the CWSA, combined with the potential for insufficient winter forage, could exacerbate natural levels of winter stress among pronghorn that occupy the CWSA, therefore resulting in increased energy expenditures during severe winter periods. Disturbances in critical year-long range could also prevent access (e.g., travel corridors blocked by human activity) to sufficient amounts of forage necessary for winter survival. The ability of pronghorn to survive the winter and a female's ability to produce viable offspring depends on fat reserves. Increased stress could cause fat reserves to be used more quickly and could reduce the survival of female pronghorn and their fetuses. Where wintering pronghorn are able to vacate areas surrounding construction operations, they could move to adjacent habitats where competition for resources may increase.

Increased vehicular traffic on new and existing access roads would increase potential for vehicle collisions with pronghorn. In addition, increased access to the CWSA could increase the potential for poaching and general harassment of pronghorn.

While the above section describes some of the potential effects of the Proposed Action on pronghorn, it is important to note that the CWSA includes portions of two existing and active oil and gas units; areas where natural gas exploration and production has been on-going for more than 40 years. As such, pronghorn occupying the CWSA have somewhat adapted to the visual and noise impacts associated with this development. While individual pronghorn might be negatively affected by the direct and indirect impacts of the project, the Proposed Action is not likely to negatively impact the species on a population-level basis.

Mule Deer

Surface disturbances associated with the Proposed Action would result in the direct loss and fragmentation of approximately 1,640 acres of limited year-long habitat, 71 acres of critical year-long habitat, and 14 acres of high-value year-long habitat for mule deer. Habitat loss and fragmentation resulting from these disturbances could result in reduced habitat use by mule deer within and near disturbed areas, increased animal densities in adjoining habitats, and increased stress from intra- and interspecific competition.

Disturbance from human activity would also reduce relative habitat values for deer (Nicholson et al 1997), especially during periods of heavy snow cover and cold temperatures. Mule deer typically experience severe physiological stress during the winter; particularly gestating does because they require higher energy levels for survival and successful reproduction (Karpowitz 1984). The increased presence of vehicles, equipment, and people within the CWSA, combined with the potential for insufficient forage due to surface disturbance, could result in increased energy expenditures by CWSA mule deer during severe winter periods (Karpowitz 1984, Garrott and White 1982, Woodward-Clyde 1995, BLM 2003). Disturbances in critical year-long range could also prevent access (e.g., travel corridors blocked by human activity) to sufficient amounts of forage necessary for winter survival. In addition to direct loss and habitat fragmentation associated with the Proposed Action, disturbances from drilling activities and increased traffic could temporarily

displace mule deer from habitats (including winter range) in areas of human activity. Wintering mule deer have been reported to vacate areas surrounding well pads during periods of concentrated human activity during construction operations (Reeve 1996, BLM 2003). When displaced, individual mule deer could move to other adjacent habitats, where competition for resources may increase.

New roads and increased traffic on new and existing roads would also pose potential problems for mule deer. The development of new roads, in combination with existing roads, would facilitate access for other development projects, recreational uses, hunting, and OHV use. Studies have reported that roads generally reduce the overall habitat value for mule deer for distances from 300 feet to 0.5 mi from the road, depending on the type of traffic and adjacent habitat types (Rost and Bailey 1979, Ferris 1997, and BLM 2003). These studies suggest that functional habitat loss for mule deer could occur from anywhere between 300 feet and 0.5 miles from the edge of new roads. Increased vehicular traffic on new and existing access roads would increase potential for vehicle collisions with mule deer. In addition, increased access to the CWSA could increase the potential for poaching and general harassment of mule deer.

While the above section describes some of the potential effects of the Proposed Action on mule deer, it is important to note that the CWSA includes portions of two existing and active oil and gas units; areas where natural gas exploration and production has been on-going for more than 40 years, and mule deer occupying the CWSA have somewhat adapted to the visual and noise impacts associated with this development. Thus, while individual mule deer might be negatively affected by the direct and indirect impacts of the project, the Proposed Action is not likely to negatively impact the species on a population-level basis.

Rocky Mountain Big Horn Sheep

The Proposed Action would not directly disturb critical year-round habitat for Rocky Mountain big horn sheep (bighorn sheep). Where construction and drilling occurs near the White River, visual and noise disturbances could temporarily displace bighorn sheep from habitats. When displaced, bighorn sheep would move to other adjacent habitats, where interspecific and intraspecific competition for resources could occur.

Increased vehicular traffic on new access roads near the White River would increase potential for vehicle collisions with bighorn sheep. In addition, increased access to the CWSA could increase the potential for poaching and general harassment of bighorn sheep.

Conceptually, the above-described impacts could affect individual bighorn sheep occurring within the CWSA. However, due to the small amount of bighorn sheep habitat that occurs in the southwest corner of the CWSA, the fact that direct disturbance to this habitat would not occur (see EOG commitments in Section 2.3.1), and because bighorn sheep habitats near the river are indirectly protected under floodplain and riparian habitat stipulations (e.g., no development within 330 feet of riparian areas), actual negative impacts on bighorn sheep populations would likely be negligible.

4.6.1.1.3 Raptors

Implementation of the Proposed Action could affect breeding, nesting, and wintering raptors, depending on the location of the proposed wells, access roads, pipelines, and other surface-disturbing actions relative to occupied territories, active or inactive nest sites, or wintering areas, and the timing of Proposed Action activities.

Based on the applicant-committed measure discussed in Section 2.3.6, direct impacts on active raptor nests from surface-disturbing activities are not likely to occur. This measure states *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”* While this measure would help prevent direct disturbance to active raptor nests, other indirect impacts could still occur. Since many raptors alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs that are constructed near inactive raptor nests could prevent the nests from being used in the future. These impacts could continue throughout the life of the project, particularly where inactive nests are located near heavily trafficked roads or areas with intense human activity.

In addition to reducing nesting habitat, the surface disturbances associated with the Proposed Action would result in the direct loss of approximately 1,735 acres of habitat for raptor prey species such as small mammals, songbirds, and reptiles (Grant et al. 1991) suggest that incremental loss of habitat for raptors’ prey base (e.g., ground squirrels, rabbits, mice) has had the largest effect on raptor populations in the Uinta Basin.

Construction, drilling, and completion activities would also result in visual disturbances on the landscape, noise from equipment use, increased human presence, and increased vehicle traffic, all of which could cause raptors to avoid affected areas. Such displacement could lead to increased use of adjacent habitats, and could consequently lead to increased interspecific and intraspecific competition for resources in those adjacent habitats.

4.6.1.1.4 Upland Game Birds

Potential impacts on the greater sage-grouse are discussed in Section 4.6.1.1.7.

Implementation of the Proposed Action could result in both direct and indirect impacts on the mourning dove. Direct impacts would include the removal of potential nesting and foraging habitats. If construction, drilling, and completion were to occur during the spring/summer months, the Proposed Action could affect breeding and nest behaviors. Direct impacts could also include the potential for mourning dove contact with petroleum products or produced water in reserve pits.

Construction, drilling, and completion noise and human presence could also cause displacement from foraging or nesting habitats. Displacement may cause mourning doves to move into less suitable habitats or into habitats where interspecific and intraspecific competition may occur.

These potential impacts could affect individual mourning doves. However, given the extent of the species and its habitat throughout the State of Utah, the Proposed Action is not likely to cause a decline in the species on a population-level basis.

4.6.1.1.5 Migratory Birds

Impacts to migratory birds in the CWSA would be dependent upon the seasons of construction, drilling, and completion activities. If these activities are completed in the late fall, many of the migratory species would have left the CWSA for southern wintering grounds. Surface disturbance and visual and noise impacts during this time would be temporary, and project-related impacts would not likely have a measurable impact on migratory bird populations as a whole or individual species in general. If construction, drilling, and completion were to occur during the spring or summer months, the Proposed Action could affect breeding, nesting, and brooding activities. Direct impacts would also include the removal of approximately 1,735 acres of potential nesting and foraging habitats. These impacts would have a greater effect on High-Priority migratory bird species that may be nesting in the CWSA due to their smaller population sizes and limited distribution. Construction, drilling, and completion related noise and human presence could also cause displacement from foraging or resting habitats. As with other wildlife species discussed in this section of the EIS, displacement from the CWSA could cause birds to move into less suitable habitats, or into habitats where interspecific and intraspecific competition may occur. Direct impacts could also include the potential for bird contact with petroleum products or produced water in reserve pits.

4.6.1.1.6 Fisheries

Direct and indirect impacts on fish and fish habitat could potentially result from implementation of the Proposed Action. As discussed in Section 3.6.7, the White River provides habitat for numerous species of fish. As discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor. Furthermore, EOG would not drill new wells in the White River corridor that would result in new well pads and roads. Therefore, direct habitat loss within or degradation of the White River would not occur as a result of the Proposed Action. While several small drainages occur in the CWSA, none of these drainages are perennial, and they do not provide habitat for fish.

Fish habitats would also be indirectly affected via increased erosion and sediments that could be yielded to the White River through CWSA drainages, or via wells, pipelines, or roads constructed near the White River corridor. Similarly, if any spills occurred during a storm event, condensate could potentially be yielded to CWSA drainages, and subsequently to the White River. Consumptive water uses for drilling, completion and dust abatement would reduce flows throughout the Upper Colorado River Basin, leading to habitat loss and degradation for aquatic species.

4.6.1.1.7 Special Status Wildlife Species

As discussed in Section 3.6.8, Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7 (a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a Federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action “*may affect, is likely to adversely affect*” a Federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate and BLM Sensitive species are also managed to prevent a future

listing as threatened or endangered. The sections below describe the special status wildlife and fish species that may be affected by the Proposed Action. Table 4.6-1 summarizes the effect determination statement for each special status species under each alternative.

White-tailed Prairie Dog and Black-footed Ferret

Under the Proposed Action, surface-disturbing activities would result in the loss of approximately 50 discontinuous acres of prairie dog habitat in the CWSA.

In addition to habitat losses, the Proposed Action could potentially increase accidental mortality of white-tailed prairie dogs. Construction and operation of facilities associated with the Proposed Action would expand current roadway systems and increase both traffic and visitation to the CWSA. Increases in traffic and human presence could lead to increased mortality from being run over by vehicles as well as increased recreational prairie dog shooting. In addition to direct human-caused mortality, white-tailed prairie dogs could also be affected through exposure to spills or other sources of petroleum products.

Implementation of the Proposed Action could also alter potential prairie dog habitat, making it less suitable for the establishment of colonies. As traffic volumes and project-related activities increase, adjacent habitats may be avoided due to human presence, noise, and the potential influx of invasive weeds. Although prairie dogs are often found on or near roadways, prairie dog colonies are typically fragmented by road development. When colonies are fragmented by roads and dispersal ability is reduced, prairie dog densities increase (Johnson and Collinge 2004). As prairie dog densities increase, so does the potential for plague transmittance and habitat degradation (e.g., decreased food resources) (Rayor 1985, Cully and Williams 2001, Johnson and Collinge 2004). Habitat quality for these species can also be degraded by the introduction of noxious and invasive weeds. Weed invasions may lead to a decrease in the amount of native perennials and bare ground, thereby degrading habitat for prairie dogs by decreasing visibility, forage quality, and burrow development.

As discussed in Chapter 3, the ferret population within the Coyote Basin is designated as “nonessential-experimental” under Section 10j of the ESA. The provisions of section 10j allow for more flexible management of the animal and ease the more stringent requirements of the ESA. Indirect impacts on the 10j population in or near the CWSA would include loss of prairie dog colonies potentially used for food and shelter, and disturbance/displacement of prairie dogs in the CWSA due to visual and noise impacts from construction and other project-related activities. Increased traffic and construction of well pads, pipelines, and roads associated with the Proposed Action may result in accidental prairie dog mortality, habitat fragmentation and loss, and colony abandonment. These potential impacts on prairie dogs could decrease the viability of the CWSA to support black-footed ferrets.

The Proposed Action could also result in direct impacts to the black-footed ferret. If ferrets occur within or migrate into the CWSA, direct impacts could include mortality resulting from construction activities. Accidental mortality of ferrets could also occur as a result of increased traffic on roads through occupied habitats. Based on the nocturnal nature of ferrets, this latter direct impact would be more likely to potentially occur during drilling operations, when project activities are occurring on a 24-hour/day basis.

Based on this information, the Proposed Action may affect individual black-footed ferrets through direct disturbance of habitat, but would not likely result in a trend towards Federal listing of the species.

Bald Eagle

The bald eagle is a Federally listed threatened species and a State of Utah threatened species. Although no bald eagle nesting has been reported within the CWSA, wintering bald eagles have been documented in cottonwood trees along the White River and feeding on carrion, fish, and waterfowl within and adjacent to the CWSA.

Wintering eagles are likely to search for prey in the CWSA from early November through late March. As bald eagles are sensitive to human activity, they may avoid areas where construction activities are taking place. If construction of wells, pipelines, access roads, and other facilities or infrastructure occurs during these months, these activities could result in temporary displacement from winter foraging habitat.

Indirect effects on bald eagles would include habitat loss (i.e., loss of 1,735 acres) for prey species (e.g., prairie dogs, rabbits, mice, small birds) associated with surface disturbance and changes/losses in vegetation structure from project development. The loss of some prey species may limit foraging opportunities for individual eagles; however, the prey reduction is not likely to cause a decrease in bald eagle populations.

Based on this information and the mitigation measures in Section 4.6.3, the Proposed Action ***“may affect, is not likely to adversely affect”*** the bald eagle.

Golden Eagle

Implementation of the Proposed Action could impact both breeding and wintering golden eagles, depending on the location of surface-disturbing activities and surface facilities relative to occupied territories, active or inactive nest sites, or wintering areas.

Based on the applicant-committed measure discussed in Section 2.3.6, direct impacts on active raptor nests from surface-disturbing activities are not likely to occur. This measure states *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”*

Since eagles often alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs could prevent inactive nests from being used in the future. As golden eagles are sensitive to human activity, they may also avoid hunting grounds where construction activities are taking place. These impacts would continue through project operation, particularly in areas of increased vehicle use and human presence along the project roadways.

In addition to reducing nesting habitat and hunting opportunities, the surface disturbances associated with the Proposed Action would result in the direct loss of approximately 1,735 acres of year-round habitat for prey species such as small mammals, songbirds, and reptiles. Grant et al. (1991) suggest that incremental destruction of habitat for raptors' prey base (e.g., ground squirrels, rabbits, mice) has had the largest effect on raptor populations in the Uinta Basin. This loss of some prey species may limit foraging opportunities for

individual eagles; however, the prey reduction is not likely to cause a decrease in golden eagle populations. Overall, the Proposed Action may affect individual eagles through displacement, habitat loss or degradation, but would not likely result in a trend towards Federal listing of the species.

Western Yellow-billed Cuckoo

The Western yellow-billed cuckoo is an obligate riparian species that feeds in cottonwood groves and nests in willow thickets. According to the Book Cliffs Record of Decision Oil and Gas Lease Stipulation No.'s 7 & 8, a “*no surface occupancy*” stipulation would be implemented within riparian habitat. As discussed in the stipulation, exceptions, waivers, or modifications to this stipulation may be granted by the AO provided adverse impacts to riparian habitat can be avoided or mitigated. Furthermore, as discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, and EOG would not drill new wells in the White River corridor that would result in new well pads and roads. Therefore, direct habitat loss or degradation of riparian habitat on Tribal and State lands would be avoided or limited. Based on these commitments and stipulations, the Proposed Action would have no direct impact on the western yellow-billed cuckoo. Indirect impacts on the Western yellow-billed cuckoo could also occur as a result of decreased water quality due to increased erosion from surface disturbance. Changes in water quality could in turn, lead to a degradation of riparian vegetation, thereby decreasing habitat value for the Western yellow-billed cuckoo. Overall, the Proposed Action may affect individual Western yellow-billed cuckoos through habitat degradation, but would not likely result in a trend towards Federal listing of the species.

Mountain Plover

As discussed in Chapter 3, the potential for mountain plover to occur in the CWSA is low. Therefore, direct impacts to occupied habitats are unlikely. However, as mountain plovers are often found near prairie dog colonies, the species could be indirectly affected by loss or fragmentation of these colonies, which provide potential habitat. Thus, the Proposed Action may affect plovers through potential habitat loss or degradation of prairie dog colonies, but would not likely result in a trend towards Federal listing of the species.

In contrast, some elements of the Proposed Action (e.g. blading/grading of vegetation for well pads, roads and pipeline ROWs) may result in beneficial impacts on mountain plovers. Blading and grading of vegetation produces tracts of open areas that create potential habitat for mountain plovers. In the Powder River Basin of Wyoming, mountain plover nests were found near animal or wheel tracks and birds were seen foraging on the tracks in the morning and evening (Parrish et al. 1993). In addition, Manning and White (2001) observed adult and young mountain plover on well pads and roads both at night and during daylight hours. These open spaces provide potential foraging areas for mountain plover.

Ferruginous Hawk

As discussed in Chapter 3, the ferruginous hawk is relatively common in the CWSA. Thus, the Proposed Action could result in both direct and indirect impacts to the ferruginous hawk.

The ferruginous hawk is particularly susceptible to human-caused disturbances during courtship and incubation periods. Any breeding pairs occupying the CWSA could be disturbed by construction, drilling, or completion activities. However, direct impacts to active ferruginous hawk nests would generally be avoided through the application of the applicant-committed measure in Section 2.3.6, which states: “*In conjunction with the APD, EOG would*

coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”

Surface disturbances associated with the Proposed Action would result in the direct loss of approximately 1,735 acres of year-round habitat for prey species such as small mammals, songbirds, and reptiles. Grant et al. (1991) suggest that incremental destruction of habitat for raptors' prey base (e.g., ground squirrels, rabbits, mice) has had the largest effect on raptor populations in the Uinta Basin. Overall, the Proposed Action may affect individual ferruginous hawks through displacement and habitat loss or degradation, but would not likely result in a trend towards Federal listing of the species.

Short-eared Owl

Direct impacts to short-eared owls would primarily include loss of nesting and foraging habitats. Direct impacts on active nests would be limited based on the application of the applicant-committed measure in Section 2.3.6, which states: *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”* Indirect impacts could include displacement from foraging areas and reduction of prey species.

Overall, the Proposed Action may affect individual short-eared owls, but would not likely result in a trend towards Federal listing of the species.

Western Burrowing Owl

As discussed in Chapter 3, Western burrowing owl use of abandoned prairie dog towns is minimal, and active prairie dog towns are the primary habitat for western burrowing owls. Therefore, loss of prairie dog colonies would directly affect the species by reducing its habitat.

If breeding owls occur in the vicinity of construction activities between April 1 and July 15, the Proposed Action could result in disturbances to breeding, nesting, and fledgling success. Direct impacts on active burrowing owl nests would be limited based on the application of the applicant-committed measure in Section 2.3.6, which states: *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine*

appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.” Indirect negative impacts could include displacement from foraging areas and reduction of prey species.

Overall, the Proposed Action may affect individual western burrowing owls but would not likely result in a trend towards Federal listing of the species.

Greater Sage-Grouse

The Proposed Action could result in both direct and indirect impacts to the sage-grouse. Direct impacts could include disturbance of courtship activities if construction activities occur near active leks between March 1 and June 15. Sage-grouse do not readily accept new leks once existing leks are destroyed or disturbed (Connelly et al. 1981). Human presence and noise associated with surface disturbing activities could affect breeding, nesting, and brood rearing activities (Connelly et al. 1981). Direct impacts would also include a long-term loss of approximately 927 acres of sagebrush habitat.

Overall, the Proposed Action may affect individual sage-grouse, but would not likely result in a trend towards Federal listing of the species.

Common Yellowthroat

According to the Book Cliffs Record of Decision Oil and Gas Lease Stipulation No.'s 7 & 8, a “*no surface occupancy*” stipulation would be implemented within riparian habitat. As discussed in this stipulation, exceptions, waivers, or modifications to this stipulation may be granted by the AO provided adverse impacts to riparian habitat can be avoided or mitigated. Furthermore, as discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, and EOG would not drill new wells in the White River corridor that would result in new well pads and roads. Therefore, direct habitat loss or degradation of riparian habitat on Tribal and State lands would be limited. Based on these stipulations, the Proposed Action would have no direct impact on the common yellowthroat. Indirect impacts on the species could also occur as a result of decreased water quality due to increased erosion from surface disturbance. Changes in water quality could in turn, lead to a degradation of riparian vegetation, thereby decreasing habitat value for the common yellowthroat. Overall, the Proposed Action may affect individual common yellowthroats through direct disturbance of breeding and nesting habitat and indirect habitat degradation, but would not likely result in a trend towards Federal listing of the species.

Utah Milk Snake

Surface disturbance would result in the disturbance of approximately 927 acres of sagebrush-steppe, which provides potential habitat for the Utah milk snake. Given their small size and relatively slow mobility, construction activities (e.g., vegetation and soil excavation, equipment and vehicle movement, etc.) could result in the accidental mortality of milk snakes occupying zones of construction. Overall, the Proposed Action may affect individual Utah milk snakes, but would not likely result in a trend towards Federal listing of the species.

Endangered Colorado River Fish

The Colorado pikeminnow, humpback chub, bonytail, and razorback sucker are affected by activities that degrade the flow of downstream waters into the Upper Colorado River Basin. While several small, ephemeral drainages occur in and near the CWSA, none of these drainages provide the habitat elements required by the Colorado River Endangered Fish. As discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, and EOG would not drill new wells in the White River corridor that would result in new well pads and roads. Furthermore, while critical habitat for the razorback sucker has been identified along the White River approximately seven miles south of the CWSA, no critical habitat has been identified in the CWSA. Therefore, direct surface disturbance impacts on populations of the Colorado River Endangered Fishes or the species' habitat would not occur as a result of the Proposed Action. However, surface disturbance could lead to increased erosion, and sediments or petroleum spills could be yielded to CWSA drainages, and subsequently to the Upper Colorado River Basin and downstream critical habitats.

As discussed in Chapter 2, annual water use during the seven-year drilling and completion phase would be approximately 263 acre-feet per year. Water used for drilling purposes would be obtained from the City of Vernal; the White or Green Rivers as a result of existing water rights with the State of Utah; commercial water source wells (some of which may obtain water from the Upper Colorado River Basin); or recycled water from drilling and completion operations. Water used for completion purposes generally comes from commercial water sources or from the city of Vernal, Utah. However, since the exact sources of water for drilling and completion needs have not yet been identified, the Proposed Action could potentially result in up to a 263 acre-foot per year depletion to the Upper Colorado River Basin. Depleting or consumptive water use reduces flows throughout the Upper Colorado River Basin, leading to cumulative habitat losses for these species. In order to address depletion (and other) impacts on the Colorado River Endangered Fish species, a Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) was initiated on January 22, 1988. Under the 1988 Recovery Program, any water depletions from tributary waters within the Colorado River drainage are considered to “*jeopardize the continued existence*” of these fish. In order to further define and clarify the recovery processes in the Recovery Program, a Section 7 agreement was implemented on October 15, 1993 by Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP). The RIPRAP identifies actions currently believed required to recover the endangered fish species in the most expeditious manner. Included in the RIPRAP was the requirement that a one-time depletion fee would be paid to help support the Recovery Program for all annual depletions of more than 100 acre-feet. These depletion fees were intended to be the reasonable and prudent alternative (RPA) to avoid jeopardy to the endangered fishes by depletions to the Upper Colorado River Basin.

It is important to note that these provisions of the Recovery Program and RIPRAP (and depletion fee requirements) were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fishes. The Recovery Program further states:

“...it is necessary to protect and manage sufficient habitat to support self-sustaining populations of these species. One way to accomplish this is to provide long term protection of the habitat by acquiring or appropriating water rights to ensure instream flows... Since this program sets in place a mechanism and a commitment to assure that the instream flows

are protected under State law, the Service will consider these elements under Section 7 consultation as offsetting project depletion impacts."

Thus, the USFWS has determined that project depletion impacts, which the USFWS has consistently maintained are likely to jeopardize the listed fishes, can be offset by (a) the water project proponent's one-time contribution to the Recovery Program (b) appropriate legal protection of instream flows pursuant to State law, and accomplishment of activities necessary to recover the endangered fishes as specified under the RIPRAP. The USFWS believes it is essential that protection of instream flows proceed expeditiously, before additional water depletions occur.

If depletions would be greater than 100 acre-feet per year, EOG (or their municipal water supplier) would be responsible for paying depletion fees associated with the Proposed Action. However, based upon potential depletion of the Colorado River and the potential for sedimentation to and contamination of the Upper Colorado River Basin, the Proposed Action ***"may affect, is likely to adversely affect"*** the Colorado River Endangered Fish species and their respective critical habitat.

Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker

Direct and indirect impacts on these sensitive fish species could potentially result from implementation of the Proposed Action. The White River provides habitat for the roundtail chub, and downstream areas in the Green River provide habitat for both species of sucker. As discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, and EOG would not drill new wells in the White River corridor that would result in new well pads and roads. Therefore, direct habitat loss or degradation of habitat for the roundtail chub, bluehead sucker, and flannelmouth sucker would not occur as a result of the Proposed Action. Habitats for all three species would indirectly be affected via increased erosion and sediments that could subsequently be yielded to the White and Green rivers through CWSA drainages, or via wells, pipelines, or roads constructed near the White River corridor. Similarly, if any spills occurred during a storm event, condensate could potentially be yielded to CWSA drainages, and subsequently to the White and Green rivers. Consumptive water uses (however minor) for drilling, completion, and dust abatement incrementally reduces flows in the Upper Colorado River Basin, leading to habitat loss and degradation for aquatic species.

4.6.1.2 No Action

4.6.1.2.1 General Wildlife

The disturbance of 329.5 acres of wildlife habitat associated with the construction of wells, roads, pipelines, and related facilities and infrastructure would reduce habitat availability for a variety of common wildlife species. However, this reduction in habitat is not expected to negatively impact general wildlife species discussed in Section 3.6.2 because of the following:

- 1) Many of the species discussed (e.g., cottontails, jackrabbits, coyotes, skunks, rodents) are habitat generalists, meaning they are not tightly restricted to specific habitat types;
- 2) Many of the wildlife populations in the CWSA have likely adapted to existing gas exploration and production activities;

- 3) Many of the species-specific applicant-committed measures and mitigation measures would indirectly afford some protection to the general wildlife species discussed in this document.

Other direct impacts to general wildlife species could include accidental mortality from equipment or vehicles on construction sites, and an increase in the potential for collisions between wildlife and motor vehicles in the CWSA.

Project implementation would indirectly increase the level of functional habitat loss and habitat fragmentation in the CWSA. Disturbances from drilling activities and increased traffic could also temporarily displace wildlife from habitats in areas of human activity. Construction may result in displacement from affected habitats during the entire construction phase of a well, road or pipeline (weeks); whereas production could result in displacement only during well visits (hours). When displaced, individual animals could move into less suitable habitats or into habitats where interspecific and intraspecific competition may occur, resulting in subsequent effects of deteriorated physical condition, reproductive failure, mortality, and general distress.

The severity of the direct and indirect impacts to wildlife under the No Action Alternative would depend on the availability of habitats within and outside affected areas of the CWSA, the sensitivity of the species to human activity, the seasonal and daily timing of construction and development activities, and site-specific topography and vegetation (e.g., construction sites that are visually obscured may impact adjacent wildlife less than where construction activities are in full view).

4.6.1.2.2 Big Game

Pronghorn Antelope

Direct and indirect impacts to pronghorn under the No Action Alternative would be similar to those described for the Proposed Action. However, the intensity of impacts would be spatially and temporally reduced.

Surface disturbances associated with the No Action Alternative would result in the direct, loss and fragmentation of approximately 329 acres of year-long habitats. Habitat loss and fragmentation associated with these disturbances could result in a reduced habitat use by pronghorn within and near disturbed areas, increased animal densities in adjoining habitats, and increased stress from intra- and interspecific competition.

Visual and noise disturbance from human activity would also reduce relative habitat value for pronghorn, especially during periods of heavy snow cover and cold temperatures. Pronghorn are likely to experience physiological stress during winter, particularly gestating females because they require higher energy levels for survival and successful reproduction. The increased presence of vehicles, equipment and people within the CWSA, combined with the potential for insufficient winter forage, could exacerbate natural levels of winter stress among pronghorn that occupy the CWSA, therefore resulting in increased energy expenditures during severe winter periods. Disturbances in critical year-long range could also prevent access (e.g., travel corridors blocked by human activity) to sufficient amounts of forage necessary for winter survival. The ability of pronghorn to survive the winter and a female's ability to produce viable offspring depends on fat reserves. Increased stress would cause fat reserves to be used more quickly and would reduce the survival of the female pronghorn and its fetus. Where wintering pronghorn are able to vacate areas surrounding

construction operations, they could move to adjacent habitats where competition for resources may increase.

Increased vehicular traffic on new and existing access roads would increase potential for vehicle collisions with pronghorn. In addition, increased access to the CWSA could increase the potential for poaching and general harassment of pronghorn.

While the above sections describe some of the potential effects of the No Action Alternative on pronghorn, it is important to note that the CWSA includes portions of two existing and active gas units; areas where natural gas exploration and production has been on-going for more than 40 years. As such, pronghorn occupying the CWSA have somewhat adapted to the visual and noise impacts associated with this development. Thus, while individual pronghorn might be negatively affected by the direct and indirect impacts of the project, the No Action Alternative is not likely to negatively impact the species on a population-level basis.

Mule Deer

Direct and indirect impacts to mule deer under the No Action Alternative would be similar to those described for the Proposed Action. However, the intensity of impacts would be spatially and temporally reduced.

Surface disturbances associated with the No Action Alternative would result in the direct loss and fragmentation of approximately 329 acres of year-long habitats. Habitat loss and fragmentation resulting from these disturbances could result in reduced habitat use by mule deer within and near disturbed areas, increased animal densities in adjoining habitats, and increased stress from intra- and interspecific competition.

Disturbance from human activity would also reduce relative habitat values for deer (Nicholson et al 1997), especially during periods of heavy snow cover and cold temperatures. Mule deer typically experience severe physiological stress during the winter; particularly gestating does because they require higher energy levels for survival and successful reproduction (Karpowitz 1984). The increased presence of vehicles, equipment, and people within the CWSA, combined with the potential for insufficient forage due to surface disturbance, could result in increased energy expenditures by CWSA mule deer during severe winter periods (Karpowitz 1984, Garrott and White 1982, BLM 2003). Disturbances in critical year-long range could also prevent access (e.g., travel corridors blocked by human activity) to sufficient amounts of forage necessary for winter survival. In addition to direct loss and habitat fragmentation associated with the No Action Alternative, disturbances from drilling activities and increased traffic could temporarily displace mule deer from habitats (including winter range) in areas of human activity. Wintering mule deer have been reported to vacate areas surrounding well pads during periods of concentrated human activity during construction operations (Reeve 1996, BLM 2003). When displaced, individual mule deer could move to other adjacent habitats where competition for resources may increase.

New roads and increased traffic on new and existing roads would also pose potential problems for mule deer. The development of new roads, in combination with existing roads, would facilitate access for other development projects, recreational uses, hunting, and OHV use. Studies have reported that roads generally reduce the overall habitat value for mule deer, depending on the type of traffic and adjacent habitat types (Rost and Bailey 1979, Ferris 1977, and BLM 2003). These studies suggest that functional habitat loss for mule

deer could occur from anywhere between 300 feet and 0.5 miles from the edge of new roads. Increased vehicular traffic on new and existing access roads would increase potential for vehicle collisions with mule deer. In addition, increased access to the CWSA could increase the potential for poaching and general harassment of pronghorn.

While the above sections describe some of the potential effects of the No Action Alternative on mule deer, it is important to note that the CWSA includes portions of two existing and active oil and gas units; areas where natural gas exploration and production has been ongoing for more than 40 years. As such, mule deer occupying the CWSA have somewhat adapted to the visual and noise impacts associated with this development. Thus, while individual mule deer might be negatively affected by the direct and indirect impacts of the project, the No Action Alternative is not likely to negatively impact the species on a population-level basis.

Rocky Mountain Big Horn Sheep

The No Action Alternative would not directly disturb critical year-round habitat for Rocky Mountain big horn sheep (bighorn sheep). Where construction and drilling occurs near the White River, visual and noise disturbances could temporarily displace bighorn sheep from habitats. When displaced, bighorn sheep would move to other adjacent habitats, where interspecific and intraspecific competition for resources could occur.

Increased vehicular traffic on new access roads near the White River would increase potential for vehicle collisions with bighorn sheep. In addition, increased access to the CWSA could increase the potential for poaching and general harassment of bighorn sheep.

4.6.1.2.3 Raptors

Implementation of the No Action Alternative could affect breeding, nesting, and wintering raptors, depending on the location of the proposed wells, access roads, pipelines, and other surface-disturbing actions relative to occupied territories, active or inactive nest sites, or wintering areas, and the timing of No Action Alternative activities.

Based on the applicant-committed measure discussed in Section 2.3.6, direct impacts on active raptor nests from surface-disturbing activities are not likely to occur. This measure states *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”* While this measure would help prevent direct disturbance to active raptor nests, other indirect impacts could still occur. Since many raptors alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs that are constructed near inactive raptor nests could prevent the nests from being used in the future. These impacts could continue throughout the life of the project, particularly where inactive nests are located near heavily trafficked roads or areas with intense human activity.

In addition to reducing nesting habitat, the surface disturbances associated with the Proposed Action would result in the direct loss of approximately 329.5 acres of habitat for

raptor prey species such as small mammals, songbirds, and reptiles. Grant et al. (1991) suggest that incremental loss of habitat for raptors' prey base (e.g., ground squirrels, rabbits, mice) has had the largest effect on raptor populations in the Uinta Basin.

Construction, drilling, and completion activities would also result in visual disturbances on the landscape, noise from equipment use, increased human presence, and increased vehicle traffic, all of which could cause raptors to avoid affected areas. Such displacement could lead to increased use of adjacent habitats, and could consequently lead to increased interspecific and intraspecific competition for resources in those adjacent habitats.

4.6.1.2.4 Upland Game Birds

Potential impacts on the greater sage-grouse are discussed in Section 4.6.1.2.7.

Implementation of the No Action Alternative could result in both direct and indirect impacts on the mourning dove. Direct impacts would include the removal of potential nesting and foraging habitats. If construction, drilling, and completion were to occur during the spring/summer months, the No Action Alternative could affect breeding and nest behaviors. Direct impacts could also include the potential for mourning dove contact with petroleum products or produced water in reserve pits.

Construction, drilling, and completion noise and human presence could also cause displacement from foraging or nesting habitats. Displacement may cause mourning doves to move into less suitable habitats or into habitats where interspecific and intraspecific competition may occur.

These potential impacts could affect individual mourning doves. However, given the extent of the species and its habitat throughout the State of Utah, the No Action Alternative is not likely to cause a decline in the species on a population-level basis.

4.6.1.2.5 Migratory Birds

Impacts to migratory birds in the CWSA would be dependent upon the seasons of construction, drilling, and completion activities. If these activities are completed in the late fall, many of the migratory species would have left the CWSA for southern wintering grounds. Surface disturbance and visual and noise impacts during this time would be temporary, and project-related impacts would not likely have a measurable impact on migratory bird populations as a whole or individual species in general. If construction, drilling, and completion were to occur during the spring or summer months, the No Action Alternative could affect breeding, nesting, and brooding activities. Direct impacts would also include the removal of approximately 239.5 acres of potential nesting and foraging habitats. These impacts would have a greater effect on High-Priority migratory bird species that may be nesting in the CWSA due to their smaller population sizes and limited distribution. Construction, drilling, and completion related noise and human presence could also cause displacement from foraging or resting habitats. As with other wildlife species discussed in this section of the EIS, displacement from the CWSA could cause birds to move into less suitable habitats, or into habitats where interspecific and intraspecific competition may occur. Direct impacts could also include the potential for bird contact with petroleum products or produced water in reserve pits.

4.6.1.2.6 Fisheries

Direct and indirect impacts on fish and fish habitat could potentially result from implementation of the No Action alternative. As discussed in Section 3.6.7, the White River provides habitat for numerous species of fish. As discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor. Furthermore, EOG would not drill new wells in the White River corridor that would result in new well pads and roads. Therefore, direct habitat loss within or degradation of the White River would not occur as a result of the No Action alternative. While several small drainages occur in the CWSA, none of these drainages are perennial, and they do not provide habitat for fish.

Fish habitats would also be indirectly affected via increased erosion and sediments that could be yielded to the White River through CWSA drainages, or via wells, pipelines, or roads constructed near the White River corridor. Similarly, if any spills occurred during a storm event, condensate could potentially be yielded to CWSA drainages, and subsequently to the White River. Consumptive water uses for drilling, completion and dust abatement would reduce flows throughout the Upper Colorado River Basin, leading to habitat loss and degradation for aquatic species.

4.6.1.2.7 Special Status Wildlife Species

As discussed in Section 3.6.8, Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7 (a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a Federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action “*may affect, is likely to adversely affect*” a Federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. The sections below describe the special status wildlife and fish species that may be affected by the No Action Alternative. Table 4.6-1 summarizes the effect determination statement for each special status species under each alternative.

White Tailed-Prairie Dog and Black-footed Ferret

Under the No Action Alternative, surface-disturbing activities would result in the loss of approximately 16 discontinuous acres of prairie dog habitat in the CWSA.

In addition to habitat losses, the No Action Alternative could potentially increase accidental mortality of white-tailed prairie dogs. Construction and operation of facilities associated with the No Action Alternative would expand current roadway systems and increase both traffic and visitation to the CWSA. Increases in traffic and human presence could lead to increased mortality from being run over by vehicles as well as increased recreational prairie dog shooting. In addition to direct human-caused mortality, white-tailed prairie dogs could also be affected through exposure to spills or other sources of petroleum products.

Implementation of the No Action Alternative could also alter potential prairie dog habitat, making it less suitable for the establishment of colonies. As traffic volumes and project-related activities increase, adjacent habitats may be avoided due to human presence, noise, and the potential influx of invasive weeds. Although prairie dogs are often found on or near roadways, prairie dog colonies are typically fragmented by road development. When

colonies are fragmented by roads and dispersal ability is reduced, prairie dog densities increase (Johnson and Collinge 2004). As prairie dog densities increase, so does the potential for plague transmittance and habitat degradation (e.g., decreased food resources) (Rayor 1985, Cully and Williams 2001, Johnson and Collinge 2004). Habitat quality for these species can also be degraded by the introduction of noxious and invasive weeds. Weed invasions may lead to a decrease in the amount of native perennials and bare ground, thereby degrading habitat for prairie dogs by decreasing visibility, forage quality, and burrow development.

As discussed in Chapter 3, the ferret population within the Coyote Basin is designated as “nonessential-experimental” under Section 10j of the ESA. The provisions of section 10j allow for more flexible management of the animal and ease the more stringent requirements of the ESA. Indirect impacts on the 10j population in or near the CWSA would include loss of prairie dog colonies potentially used for food and shelter, and disturbance/displacement of prairie dogs in the CWSA due to visual and noise impacts from construction and other project-related activities. Increased traffic and construction of well pads, pipelines, and roads associated with the No Action Alternative may result in accidental prairie dog mortality, habitat fragmentation and loss, and colony abandonment. These potential impacts on prairie dogs could decrease the viability of the CWSA to support black-footed ferrets.

The No Action Alternative could also result in direct impacts to the black-footed ferret. If ferrets occur within or migrate into the CWSA, direct impacts could include mortality resulting from construction activities. Direct mortality of ferrets could also occur as a result of increased traffic on roads through occupied habitats. Based on the nocturnal nature of ferrets, this latter direct impact would be more likely to potentially occur during drilling operations, when project activities are occurring on a 24-hour/day basis.

Based on this information, the No Action Alternative may affect individual black-footed ferrets through direct disturbance of habitat, but would not likely result in a trend towards Federal listing of the species.

Bald Eagle

Wintering eagles are likely to search for prey in the CWSA from early November through late March. As bald eagles are sensitive to human activity, they may avoid areas where construction activities are taking place. If construction of wells, pipelines, access roads, and other facilities or infrastructure occurs during these months, these activities could result in temporary displacement from winter foraging habitat.

Indirect effects on bald eagles would include habitat loss (i.e., loss of 239.5 acres) for prey species (e.g., prairie dogs, rabbits, mice, small birds) associated with surface disturbance and changes/losses in vegetation structure from project development. The loss of some prey species may limit foraging opportunities for individual eagles; however, the prey reduction is not likely to cause a decrease in bald eagle populations.

Based on this information and the mitigation measures in Section 4.6.3, the No Action Alternative ***“may affect, is not likely to adversely affect”*** the bald eagle.

Golden Eagle

Implementation of the No Action Alternative could impact both breeding and wintering golden eagles, depending on the location of surface-disturbing activities and surface facilities relative to occupied territories, active or inactive nest sites, or wintering areas.

Based on the applicant-committed measure discussed in Section 2.3.6, direct impacts on active raptor nests from surface-disturbing activities are not likely to occur. This measure states *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”*

Since eagles often alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs could prevent inactive nests from being used in the future. As golden eagles are sensitive to human activity, they may also avoid hunting grounds where construction activities are taking place. These impacts would continue through project operation, particularly in areas of increased vehicle use and human presence along the project roadways.

In addition to reducing nesting habitat and hunting opportunities, the surface disturbances associated with the No Action Alternative would result in the direct loss of approximately 239.5 acres of year-round habitat for prey species such as small mammals, songbirds, and reptiles. Grant et al. (1991) suggest that incremental destruction of habitat for raptors' prey base (e.g., ground squirrels, rabbits, mice) has had the largest effect on raptor populations in the Uinta Basin. This loss of some prey species may limit foraging opportunities for individual eagles; however, the prey reduction is not likely to cause a decrease in golden eagle populations. Overall, the No Action Alternative may affect individual eagles through displacement, habitat loss or degradation, but would not likely result in a trend towards Federal listing of the species.

Western Yellow-billed Cuckoo

As EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, nor would they drill new wells in the White River corridor that would result in new well pads and roads, direct habitat loss or degradation of White River riparian habitat on Tribal and State lands would be limited. Based on these commitments, the No Action would have no direct impact on the western yellow-billed cuckoo. Indirect impacts on the Western yellow-billed cuckoo could occur as a result of decreased water quality due to increased erosion from surface disturbance. Changes in water quality could in turn, lead to a degradation of riparian vegetation, thereby decreasing habitat value for the Western yellow-billed cuckoo. Overall, the No Action may affect individual Western yellow-billed cuckoos through disturbance of breeding and nesting habitat and indirect habitat degradation, but would not likely result in a trend towards Federal listing of the species.

Mountain Plover

As discussed in Chapter 3, the potential for mountain plover to occur in the CWSA is low. Therefore, direct impacts to occupied habitats are unlikely. However, as mountain plovers are often found near prairie dog colonies, the species could be indirectly affected by loss or fragmentation of these colonies, which provide potential habitat. Thus, the No Action Alternative may affect plovers through potential habitat loss or degradation of prairie dog colonies, but would not likely result in a trend towards Federal listing of the species.

In contrast, some elements of the No Action Alternative (e.g. blading/grading of vegetation for well pads, roads and pipeline ROWs) may result in beneficial impacts on mountain plovers. Blading and grading of vegetation produces tracts of open areas that create potential habitat for mountain plovers. In the Powder River Basin of Wyoming, mountain plover nests were found near animal or wheel tracks and birds were seen foraging on the tracks in the morning and evening (Parrish et al. 1993). In addition, Manning and White (2001) observed adult and young mountain plover on well pads and roads both at night and during daylight hours. These open spaces provide potential foraging areas for mountain plover.

Ferruginous Hawk

Under the No Action Alternative, any breeding pairs of ferruginous hawks occupying the CWSA could be disturbed by construction, drilling, or completion activities. However, direct impacts to active ferruginous hawk nests would generally be avoided through the application of the applicant-committed measure in Section 2.3.6, which states: *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”*

Surface disturbances associated with the No Action Alternative would result in the direct loss of approximately 239.5 acres of year-round habitat for prey species such as small mammals, songbirds, and reptiles. Grante et al. (1991) suggest that incremental destruction of habitat for raptors' prey base (e.g., ground squirrels, rabbits, mice) has had the largest effect on raptor populations in the Uinta Basin. Overall, the No Action Alternative may affect individual ferruginous hawks through displacement and habitat loss or degradation, but would not likely result in a trend towards Federal listing of the species.

Short-eared Owl

Direct impacts to short-eared owls would primarily include loss of nesting and foraging habitats. Direct impacts on active nests would be limited based on the application of the applicant-committed measure in Section 2.3.6, which states: *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid*

disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.” Indirect impacts could include displacement from foraging areas and reduction of prey species.

Overall, the No Action Alternative may affect individual short-eared owls, but would not likely result in a trend towards Federal listing of the species.

Western Burrowing Owl

As discussed in Chapter 3, Western burrowing owl use of abandoned prairie dog towns is minimal, and active prairie dog towns are the primary habitat for western burrowing owls. Therefore, loss of prairie dog colonies would directly affect the species by reducing its habitat.

If breeding owls occur in the vicinity of construction activities between April 1 and July 15, the No Action Alternative could result in disturbances to breeding, nesting, and fledgling success. Direct impacts on active burrowing owl nests would be limited based on the application of the applicant-committed measure in Section 2.3.6, which states: *“In conjunction with the APD, EOG would coordinate with the applicable SMA to have a survey conducted (by an approved biologist) prior to surface-disturbing activities to determine whether raptor nests are present within 0.5 mile of locations proposed for surface disturbance. If nests are determined to be present, the AO from the appropriate SMA shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites or potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Sites (ANS) in appropriate locations.”* Indirect negative impacts could include displacement from foraging areas and reduction of prey species.

Overall, the No Action Alternative may affect individual western burrowing owls but would not likely result in a trend towards Federal listing of the species.

Greater Sage-Grouse

The No Action Alternative could result in both direct and indirect impacts to the sage-grouse. Direct impacts could include disturbance of courtship activities if construction activities occur near active leks between March 1 and June 15. Sage-grouse do not readily accept new leks once existing leks are destroyed or disturbed (Connelly et al. 1981). Human presence and noise associated with surface disturbing activities could affect breeding, nesting, and brood rearing activities (Connelly et al. 1981). Direct impacts would also include a long-term loss of approximately 927 acres of sagebrush habitat.

Overall, the No Action Alternative may affect individual sage-grouse through displacement from leks or nesting habitats, habitat loss or degradation, or direct mortality, but would not likely result in a trend towards Federal listing of the species.

Common Yellowthroat

According to the Book Cliffs Record of Decision Oil and Gas Lease Stipulation No.'s 7 & 8, a “no surface occupancy” stipulation would be implemented within riparian habitat. As discussed in this stipulation, exceptions, waivers, or modifications to this stipulation may be granted by the AO provided adverse impacts to riparian habitat can be avoided or mitigated. Furthermore, as EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, nor would they drill new wells in the White River corridor that would result in new well pads and roads, direct habitat loss or degradation of riparian habitat on Tribal and State lands would be limited. Based on these commitments and stipulations, the No Action Alternative would have no direct impact on the common yellowthroat. Indirect impacts on the species could also occur as a result of decreased water quality due to increased erosion from surface disturbance. Changes in water quality could in turn, lead to a degradation of riparian vegetation, thereby decreasing habitat value for the common yellowthroat. Overall, the No Action Alternative may affect individual common yellowthroats through direct disturbance of breeding and nesting habitat and indirect habitat degradation, but would not likely result in a trend towards Federal listing of the species.

Utah Milk Snake

Surface disturbance would result in the disturbance of approximately 927 acres of sagebrush-steppe, which provides potential habitat for the Utah milk snake. Given their small size and relatively slow mobility, construction activities (e.g., vegetation and soil excavation, equipment and vehicle movement, etc.) could result in the accidental mortality of milk snakes occupying zones of construction. Overall, the No Action Alternative may affect individual Utah milk snakes, but would not likely result in a trend towards Federal listing of the species.

Endangered Colorado River Fish

The Colorado pikeminnow, humpback chub, bonytail, and razorback sucker are affected by activities that degrade the flow of downstream waters into the Upper Colorado River Basin. While several small, ephemeral drainages occur in and near the CWSA, none of these drainages provide the habitat elements required by the Colorado River Endangered Fish. Furthermore, while critical habitat for the razorback sucker has been identified along the White River approximately seven miles south of the CWSA, no critical habitat has been identified in the CWSA. Therefore, direct surface disturbance impacts on populations of the Colorado River Endangered Fishes or the species' habitat would not occur as a result of the Proposed Action. However, surface disturbance could lead to increased erosion, and sediments or petroleum spills could be yielded to CWSA drainages, and subsequently to the Upper Colorado River Basin and downstream critical habitats.

As discussed in Chapter 2, annual water use during the seven-year drilling and completion phase would be approximately 263 acre-feet per year. Water used for drilling purposes would be obtained from the City of Vernal; the White or Green Rivers as a result of existing water rights with the State of Utah; commercial water source wells (some of which may obtain water from the Upper Colorado River Basin); or recycled water from drilling and completion operations. Water used for completion purposes generally comes from commercial water sources or from the city of Vernal, Utah. However, since the exact sources of water for drilling and completion needs have not yet been identified, the No Action Alternative could potentially result in up to a 263 acre-foot per year depletion to the Upper Colorado River

Basin. Depleting or consumptive water use reduces flows throughout the Upper Colorado River Basin, leading to cumulative habitat losses for these species. In order to address depletion (and other) impacts on the Colorado River Endangered Fish species, a Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) was initiated on January 22, 1988. Under the 1988 Recovery Program, any water depletions from tributary waters within the Colorado River drainage are considered to “*jeopardize the continued existence*” of these fish. In order to further define and clarify the recovery processes in the Recovery Program, a Section 7 agreement was implemented on October 15, 1993 by Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP). The RIPRAP identifies actions currently believed required to recover the endangered fish species in the most expeditious manner. Included in the RIPRAP was the requirement that a one-time depletion fee would be paid to help support the Recovery Program for all annual depletions of more than 100 acre-feet. These depletion fees were intended to be the reasonable and prudent alternative (RPA) to avoid jeopardy to the endangered fishes by depletions to the Upper Colorado River Basin.

It is important to note that these provisions of the Recovery Program and RIPRAP (and depletion fee requirements) were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fishes. The Recovery Program further states:

“...it is necessary to protect and manage sufficient habitat to support self-sustaining populations of these species. One way to accomplish this is to provide long term protection of the habitat by acquiring or appropriating water rights to ensure instream flows... Since this program sets in place a mechanism and a commitment to assure that the instream flows are protected under State law, the Service will consider these elements under Section 7 consultation as offsetting project depletion impacts.”

Thus, the USFWS has determined that project depletion impacts, which the USFWS has consistently maintained are likely to jeopardize the listed fishes, can be offset by (a) the water project proponent's one-time contribution to the Recovery Program (b) appropriate legal protection of instream flows pursuant to State law, and accomplishment of activities necessary to recover the endangered fishes as specified under the RIPRAP. The USFWS believes it is essential that protection of instream flows proceed expeditiously, before additional water depletions occur.

If depletions would be greater than 100 acre-feet per year, EOG (or their municipal water supplier) would be responsible for paying depletion fees associated with the Proposed Action. However, based upon potential depletion of the Colorado River and the potential for sedimentation to and contamination of the Upper Colorado River Basin, the No Action Alternative “**may affect, is likely to adversely affect**” the Colorado River Endangered Fish species and their respective critical habitat.

Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker

Direct and indirect impacts on these sensitive fish species could potentially result from implementation of the Proposed Action. As discussed in Chapter 3, the White River provides habitat for the roundtail chub, and downstream areas in the Green River provide habitat for both species of sucker. As discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor, and EOG would not drill new wells in the White River corridor that would result in new well pads and roads. Therefore, direct habitat loss or degradation of habitat for the roundtail chub,

bluehead sucker, and flannelmouth sucker would not occur as a result of the No Action alternative. Habitats for all three species would indirectly be affected via increased erosion and sediments that could subsequently be yielded to the White and Green rivers through CWSA drainages, or via wells, pipelines, or roads constructed near the White River corridor. Similarly, if any spills occurred during a storm event, condensate could potentially be yielded to CWSA drainages, and subsequently to the White and Green rivers. Consumptive water uses (however minor) for drilling, completion, and dust abatement incrementally reduces flows in the Upper Colorado River Basin, leading to habitat loss and degradation for aquatic species.

Table 4.6-1 Summary of Effect Determinations for Special Status Wildlife

Species	Effect Determination under Proposed Action	Effect Determination under No Action Alternative
Black-footed Ferret	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Bald Eagle	<i>may affect, not likely to adversely affect</i>	<i>may affect, not likely to adversely affect</i>
Golden Eagle	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Western Yellow-billed Cuckoo	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Mountain Plover	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Ferruginous Hawk	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Short-eared Owl	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Western Burrowing Owl	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Greater Sage-grouse	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Common Yellowthroat	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Utah Milk Snake	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Bonytail	<i>may affect, likely to adversely affect</i>	<i>may affect, likely to adversely affect</i>
Humpback Chub	<i>may affect, likely to adversely affect</i>	<i>may affect, likely to adversely affect</i>
Colorado Pikeminnow	<i>may affect, likely to adversely affect</i>	<i>may affect, likely to adversely affect</i>
Razorback Sucker	<i>may affect, likely to adversely affect</i>	<i>may affect, likely to adversely affect</i>
Roundtail Chub	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Flannelmouth Sucker	<i>may affect individuals, but would not result in a trend towards Federal listing</i>	<i>may affect individuals, but would not result in a trend towards Federal listing</i>
Bluehead Sucker	<i>may affect individuals, but would</i>	<i>may affect individuals, but would</i>

Species	Effect Determination under Proposed Action	Effect Determination under No Action Alternative
	<i>not result in a trend towards Federal listing</i>	<i>not result in a trend towards Federal listing</i>

4.6.3 Mitigation

Implementation of the following mitigation measures for wildlife resources would be considered by the appropriate SMA on a site-specific basis during the on-site process.

- Where feasible, new well pads, access roads, pipelines, and other facilities or infrastructure would be located in a manner that conceals them from raptor nests (active or inactive) by considering topographical or vegetative screening features.
- Netting of reserve pits would be considered on a site-specific basis in order to avoid or reduce wildlife contact with pit fluids.
- Bald Eagle Protection Mitigation Measures:

In order to protect bald eagles and their habitat, the following would be implemented:

1. Temporary activities within 1.0 mile of nest sites will not occur during the breeding season of January 1 to August 31, unless the area has been surveyed and determined to be unoccupied.
 2. Temporary activities within 0.5 mile of winter roost areas, e.g., cottonwood galleries, will not occur during the winter roost season of November 1 to March 31, unless the area has been surveyed and determined to be unoccupied.
 3. No permanent infrastructure will be placed within 1.0 mile of nest sites.
 4. No permanent infrastructure will be placed within 0.5 mile of winter roost areas.
 5. Contact UDWR for removal of carrion from roadways within bald eagle foraging range.
 6. Avoid loss or disturbance to large cottonwood gallery riparian habitats
 7. Utilize directional drilling to avoid direct impacts to large cottonwood gallery riparian habitats:
 - a. When employing directional drilling techniques, ensure that drilling does not intercept or degrade alluvial aquifers
 8. Re-vegetate with native species indigenous to the area and non-native species that are not likely to invade other areas, all areas of surface disturbance within riparian areas and/or adjacent uplands.
- Surface-disturbing activities would be avoided within habitats supporting riparian vegetation in order to minimize loss or degradation of habitats for the special status fishes, the Western yellow-billed cuckoo, and the common yellowthroat.
 - If surface disturbance within sagebrush habitats is proposed between March 1 and June 15, surveys would be conducted by a qualified biologist to document the presence of active sage grouse leks. All active lek locations would be reported to the AO of the appropriate SMA.
 - No permanent facilities would be allowed within 1,000 feet of any identified greater sage-grouse leks.

- If overhead electric lines were installed, precautionary measures to protect raptors by raptor-proofing power lines per the requirements of the Suggested Practices for Raptor Protection on Power Lines: The State of the Art, Avian Power Line Interaction Committee would be implemented.
- Special Status Fish

Depending on the water year, larval fish may be present in the Green, Colorado, Gunnison, and Yampa Rivers from as early as April 1 to as late as August 31 (earlier in dry years; later in wet years).

1. To avoid entrainment, water should be pumped from an off-channel location – one that does not connect to the river during high spring flows. An infiltration gallery constructed in a BLM and Service approved location is best.
2. If the pump head is located in the river channel where larval fish are known to occur, the following measures apply:
 - a. the pump would not be situated in a low-flow or no-flow area as these habitats tend to concentrate larval fishes;
 - b. the amount of pumping would be limited, to the greatest extent possible, during that period of the year when larval fish may be present (see above); and
 - c. the amount of pumping would be limited, to the greatest extent possible; during the pre-dawn hours as larval drift studies indicate that this is a period of greatest daily activity.
3. All pump intakes would be screened with ¼" mesh material.
4. Any fish impinged on the intake screen would be reported to the Service (801.975.3330) and the Utah Division of Wildlife Resources:

Northeastern Region
152 East 100 North, Vernal, UT 84078
Phone: (435) 781-9453

4.6.4 Unavoidable Adverse Effects

Unavoidable Adverse Effects to wildlife species from the Proposed Action and No Action Alternative would include:

- Long-term losses of pronghorn and mule deer winter ranges.
- Long-term losses of potential raptor breeding, nesting, and foraging habitats.
- Fragmentation of wildlife habitats from construction of well pads, roads, pipelines, and ancillary facilities.
- Displacement of wildlife species due to construction, drilling, and completion of wells, and the construction of roads, pipelines, and ancillary facilities.
- Drilling, completion, and dust abatement activities would result in water depletion from the Colorado River Basin, and would consequently cause adverse impacts to the endangered Colorado River fish species.

4.7 RANGELAND MANAGEMENT

4.7.1 Direct and Indirect Impacts

4.7.1.1 Proposed Action

Direct impacts to rangeland management activities on BLM and State lands in the CWSA would consist of the removal of 1,562 acres on BLM land. This vegetation disturbance would result in a corresponding disturbance of 145 AUMs on BLM lands. This disturbance would result in a temporary reduction of 145 AUMs from BLM grazing permit preferences. Vegetation and AUM disturbance by allotment and surface owner are provided in **Table 4.7-1**.

On Tribal/allotted and private lands where no formal allotments exist, the Proposed Action would result in the removal of approximately 243 acres of vegetation. Based on an assumed average of 13 acres/AUM, the Proposed Action would result in a corresponding disturbance of approximately 19 potential AUMs.

Indirect effects to rangeland management activities on BLM, State, Tribal, and private lands could consist of reduced forage quality due to weed infestation (see Section 4.5); increased gas development-related traffic and potential traffic delays to ranchers accessing the CWSA during the construction and drilling phases; and a potential increase in collisions between vehicle and livestock because of increased traffic.

4.7.2 No Action

Under the No Action Alternative, surface disturbance and subsequent loss of vegetation and AUMs would not occur on Federal lands. Direct impacts to rangeland management activities on State land portions of allotments in the CWSA would consist of the long-term removal of 127 acres of vegetation over the two-year construction period. Vegetation and AUM disturbance by grazing allotment on State land is provided in **Table 4.7-2**.

On Tribal/allotted and private lands where no formal allotments exist, the Proposed Action would result in the removal of approximately 243 acres of vegetation. Based on an assumed average of 13 acres/AUM, the Proposed Action would result in a corresponding disturbance of approximately 19 potential AUMs.

Indirect effects to rangeland management activities on State, Tribal, and private lands could consist of reduced forage quality due to weed infestation (see Section 4.5); increased gas development-related traffic and potential traffic delays to ranchers accessing the CWSA during the construction and drilling phases; and a potential increase in collisions between vehicle and livestock because of increased traffic.

Table 4.7-1. Proposed Action Effects on Grazing Allotments in the CWSA

Allotment Name	Total Allotment Acres	Total Allotment AUMs	Acres / AUM	BLM Land Allotment Acres within CWSA	BLM Land AUMs within CWSA	SITLA Land Allotment Acres within CWSA	SITLA Land AUMs within CWSA	BLM Land Allotment Acres Disturbed within CWSA	BLM AUMs Disturbed within CWSA ¹	SITLA Land Allotment Acres Disturbed within CWSA	SITLA AUMs Disturbed within CWSA	Total BLM and SITLA AUMs Lost within CWSA
Antelope Draw	56,927	3,679	15	5,186	346	654	44	306	20	38	3	23
Horned Toad	19,773	2,238	8	95	12	0	0	6	1	0	0	1
Little Emma	38,472	3,626	10	5,796	580	72	58	476	48	6	1	49
Olsen	103,239	9,268	11	535	49	0	0	223	20	0	0	20
Seven Sisters	1,7051	1,920	8	9,419	81	645	81	395	49	27	3	52
West Tabyago	4,674	187	24	1,686	1,177	604	70	156	7	56	2	9
Total			NA	22,717	2,245	1,975	253	1,562	145	127	9	154

¹“AUMs Lost within CWSA” were calculated by dividing “Acres Disturbed within CWSA” by “Acres/AUM”

Table 4.7-2. No Action Alternative Effects on State-land Portions of Grazing Allotments in the CWSA

Allotment Name	Total Allotment Acres	Total Allotment AUMs	Acres / AUM	SITLA Land Allotment Acres within CWSA	SITLA Land AUMs Within CWSA	SITLA Land Allotment Acres Disturbed within CWSA	SITLA AUMs Disturbed within CWSA
Antelope Draw	56,927	3,679	15	654	44	38	3
Horned Toad	19,773	2,238	8	0	0	0	0
Little Emma	38,472	3,626	10	72	58	6	1
Olsen	103,239	9,268	11	0	0	0	0
Seven Sisters	1,7051	1,920	8	645	81	27	3
West Tabyago	4,674	187	24	604	70	56	2
Total			NA	1,975	253	127	9

¹“AUMs Lost within CWSA” were calculated by dividing “Acres Disturbed within CWSA” by “Acres/AUM”

4.7.3 Mitigation

- Roads, pipelines, well pads or other gas facilities would avoid livestock reservoirs, rain gauges, corrals, springs, guzzlers, and vegetation trend plots currently in place. If there is no means to avoid these existing range facilities, mitigation to replace these would be needed. Parameters for avoidance would be determined on a site-specific basis during the on-site process.
- Catchment basins would be constructed as determined necessary and feasible by the appropriate SMA and EOG to partially mitigate impacts to livestock.
- On BLM lands, each existing fence to be crossed by an access road shall be braced and tied off before cutting the wire. The braces would be at a minimum of 2^{7/8}" outside diameter OD steel pipe, in order to reduce the need for maintenance and to increase the life of the fence. The braces would consist of three posts and two top rail-braces. The brace posts would be cemented in the ground at a minimum of least 3-feet deep, and welded with a 2^{7/8}" top rail, with any open ends capped. The height of the brace posts would be at 42 inches from the ground to the top of the brace. A 16-foot steel powder-river type gate would be welded to the fence brace post adjacent to the cattleguard. The steel gate increases the likelihood of the gate being closed after someone goes through it due to the ease of opening and closing the steel gate as opposed to the wire type gates. A cattleguard would be installed on concrete bases. The fencing, braces, gate, cattleguard, and bases would follow BLM standards. EOG would assume the maintenance of all such cattleguards and gates.

4.7.4 Unavoidable Adverse Effects

A loss of vegetation and resultant AUMs would occur under all alternatives. Additionally, an increased potential for vehicle-livestock collisions would occur over the life of the project, but the probability would decrease after the construction and drilling period when CWSA traffic is reduced to daily operations.

4.8 CULTURAL RESOURCES

The CWSA project is a Federal undertaking in accordance with 36 CFR 800 (regulations implementing provisions of Section 106 of the National Historic Preservation Act (NHPA) of 1966). Any Federal undertaking must consider potential effects to significant historic properties and must conform to Federal regulations (particularly 36 CFR 800) in determining effects that a project may have on significant cultural resources (36 CFR 60.4) and in mitigating those effects determined to be adverse. As defined in 36 CFR 800, adverse effects to significant historic properties include physical alteration, damage, or destruction, alteration of the character of the setting of a property that contributes to its significance, or neglect that results in deterioration or destruction. All of these classes of potential adverse effects are of concern for archaeological, historical, or Native American religious concerns or traditional resources. Other relevant Federal legislation and implementing regulations include the Native American Graves Protection and Repatriation Act (NAGPRA) (43 CFR Part 10) and the Archaeological Resources Protection Act (ARPA) (43 CFR Part 7).

4.8.1 Direct and Indirect Impacts

4.8.1.1 Proposed Action

Cultural resources are sensitive and nonrenewable resources that can be irreversibly damaged or destroyed by surface-disturbing activities, such as well pad, road, and pipeline construction, and secondary surface activities, such as vehicular and pedestrian traffic. Many of the known prehistoric and historic archaeological sites in the Uinta Basin are shallow and therefore, vulnerable to the direct impacts of vegetation clearing, ROW blading, and excavation of soils. Standing historic structures are more visible and more easily avoided by surface-disturbing activities, but these are not the predominant site type in the Uinta Basin.

Cultural resources are also subject to indirect impacts that frequently result from the increased vehicular and pedestrian traffic associated with gas development. Indirect impacts resulting from vandalism, surface artifact collection, excavation, and off-road travel can include inadvertent damage, destruction, or removal of significant scientific information, the loss of research potential, the loss of interpretation possibilities, and the destruction of the character or setting of a site. These impacts can be short-term or can continue well into the future as more of an area is developed and becomes increasingly popular with recreational and other users.

The CWSA and surrounding region has been partially developed for oil and gas production, and the area is moderately accessible to the public via a network of both older and more recently constructed sites and roads. Many of the 87 archaeological sites known to be within the CWSA are within reasonable driving or walking distance of an existing road or site. As a general rule of thumb, proposed well and road locations within two miles of the White River have a 50 percent greater chance of encountering cultural resources than the rest of the CWSA combined. However, the predictability of cultural resources is limited. For any model to achieve high prediction rates, locality-specific sets of variable measurements are needed on such things as soils substrate, local shelter quality, vegetation at the sub-community level, proximity to overlooks, and proximity to seasonal water sources. In the final analysis, site-specific field inventory is the only means to identify resources and any potential or actual impacts to them.

Surface disturbance under the Proposed Action would be approximately 1,735 acres. Efforts to minimize indirect impacts to known and potential sensitive archaeological sites can be made through informing workers of Federal, State, and Tribal laws and regulations intended to protect cultural resources. However, because of the dense network of roads expected in the CWSA over the next seven years, indirect impacts to archaeological sites resulting from potentially increased public access and use would be likely.

4.8.1.2 No Action Alternative

While the scale of potential impacts would be lessened under the No Action Alternative, the types of direct and indirect impacts to cultural resources within the No Action area would be similar to those discussed under the Proposed Action.

4.8.2 Mitigation Measures

- In accordance with Instruction Memorandum No. 2005-003, during the APD process, consultation with Indian tribes would occur on a case-by-case basis where there is

reasonable indication of Tribal concerns in the CWSA based on previous correspondence or discussions with Tribal governments, published ethnographic studies, or other credible known information. All other applicable elements of IM No. 2005-003 would also be implemented.

4.8.3 Unavoidable Adverse Effects

Impacts that cannot be avoided by pre-construction Class III surveys, BMPs, or mitigation measures would result in an irretrievable loss of part of the archaeological record. Non-recognition of significant resources, a lack of information and documentation, erosion, unauthorized collection/excavation, and inadvertent destruction would cause loss of research potential, opportunities for interpretation, government management options, and the sense of place, setting, and feeling.

If appropriate avoidance or mitigation measures cannot be applied to cultural resources during construction, then the disturbance of sites, areas, and resources that may be important to Native American groups would have an adverse effect on Native American Religious Concerns or traditional cultural values and those who practice them. The adverse impact would arise from the destruction of these sites, areas, and resources, the loss of religious values, and the loss of areas where traditional members may practice those beliefs central to their well-being. A concomitant loss of ethnic identity and history could alienate the people from their past and affect their ties to the land. Increased public access via the construction of extra access roads could result in vandalism or theft of known or newly discovered cultural resources.

4.9 PALEONTOLOGICAL RESOURCES

4.9.1 Direct and Indirect Impacts

4.9.1.1 Proposed Action

The Proposed Action would increase both beneficial and adverse impacts to the existing paleontological resources in the CWSA. Where surface-disturbing activities occur on previously disturbed areas, or where they occur within Quaternary alluvium and soils, fossil resources would be unaffected. But, where surface disturbance is proposed in undisturbed areas of Uinta and Duchesne River formations, paleontological resources would be at risk. Where fossils occur on the surface within these areas, they are potentially broken or destroyed if driven over or dozed up. Disturbance of bedrock results in the potential for exposing, breaking, and destroying fossils. On the other hand, exposing fossils increases their likelihood of being discovered. When a paleontologist is present to conduct surveys prior to construction, and where appropriate, present for monitoring of construction, damage and loss can be minimized. In this way, the Proposed Action would benefit paleontological resources in providing a look into sediments that would not otherwise be feasible.

The construction of new access roads in the CWSA could provide increased and easier access routes for fossil hunters. Illegal collection of fossils is a growing concern in the west, and the Uinta Basin is well-known for its rich fossil resources. If fossils were collected illegally as a result of Proposed Action roads, their scientific value would be lost.

4.9.1.2 No Action

The types of beneficial and adverse impacts to paleontological resources under the No Action Alternative would be very similar to those described for the Proposed Action (see Section 4.9.1.1). However, as the magnitude of development and resulting surface disturbance would be considerably less, the magnitude of potential impacts to fossils would also be lower under the No Action Alternative.

4.9.2 Mitigation Measures

- Because of the rich fossil resources that have been demonstrated to occur in the Uinta and Duchesne River formations of the CWSA, paleontological surveys would be conducted by qualified permitted paleontologists prior to any proposed surface disturbance in Condition 1 and Condition 2 areas (see Section 2.3.3 for a similar commitment by EOG). If significant fossils are encountered during the survey, the paleontologist would assess and document the discovery, and either collect the fossils or recommend the area be avoided so as not to destroy the resource. The paleontologist and the appropriate SMA would determine the need for further monitoring or mitigation of the area during ground disturbing activities. If fossils are encountered by EOG during excavation, the appropriate SMA would be notified and construction be suspended until the fossils are assessed by a qualified paleontologist.

4.9.3 Unavoidable Adverse Effects

Any surface-disturbing activities have the potential to adversely affect fossil resources. Even when the presence of fossils cannot be detected on the surface, there is a probability that fossils occur within the bedrock and could be inadvertently damaged or destroyed. Fossils that are especially at high risk include small vertebrate fossils, such as rodents, that cannot be easily recognized.

Surface disturbance increases erosion rates and sometimes modifies the course of erosion where slopes are affected. Such erosion can potentially expose fossils, which can have adverse impacts if not discovered before they deteriorate.

4.10 LAND USE

4.10.1 Direct and Indirect Impacts

4.10.1.1 Proposed Action

Under the Proposed Action, development of 627 wells and associated access roads and facilities would result in the disturbance of approximately 1,735 acres during the seven-year construction period. Approximately 81 percent of the proposed surface disturbance would occur on BLM-administered Federal lands. Of the remaining disturbance, about 5 percent would occur on State lands, 13 percent on Tribal/allotted lands, and less than 1 percent would occur on private lands. **Table 4.10-1** summarizes surface disturbance by landowner. Placement of well pads and easements on State, Tribal, and private lands (i.e., exact locations of surface disturbance) would be negotiated with the respective landowner and secured through the permitting process of the appropriate State, Tribal, and local agencies.

Table 4.10-1. CWSA Land Use Disturbance by Ownership – Proposed Action

Landowner	Surface Disturbance by Landowner (acres)	% Total Surface Area in CWSA by Landowner
BLM	1,405	81%
State	88	5%
Ute Indian Tribe	230	13%
Private	12	>1%
Total	1,735	100%

Potential adjustments to existing land uses would consist of increased access to the CWSA for gas development and production activities due to road construction; long-term losses of livestock forage due to surface disturbance; long-term losses of wildlife habitat and short-term displacement of wildlife from the CWSA due to surface disturbance and human/equipment activity in the area; and temporary visual and traffic impacts to recreational users. Effects on livestock forage and rangeland management were presented in detail in Section 4.7. Effects on wildlife habitat were discussed in Section 4.6. Effects on recreation are discussed in Section 4.12.

As stated in Section 3.10, the development of natural gas resources that would occur under the Proposed Action would be consistent with the planning objectives of the BLM, Uintah County, and the BIA and Ute Tribe.

4.10.1.2 No Action

Under the No Action Alternative, approximately 148 wells and associated access roads could be developed. Approximately 329.5 acres would be disturbed during an approximately two-year construction period. This activity would include 24 wells on State lands, 114 wells on Tribal/allotted lands, and 10 wells on private lands. Of the total surface disturbance, 27 percent would occur on State lands, 70 percent would occur on Tribal/allotted lands, and the remainder would be on leases offered by private land owners. **Table 4.10-2** summarizes surface disturbance by landowner under the No Action Alternative. Placement of well pads and easements on State, Tribal, and private lands (i.e., exact locations of surface disturbance) would be negotiated with the respective landowner and secured through the permitting process of the appropriate State and local agencies.

Table 4.10-2. CWSA Land Use Disturbance by Ownership – No Action

Land Owner	Surface Disturbance by Landowner (acres)*	% Total Surface Area in CWSA by Landowner
BLM	0	0
State	88	27%
Ute Indian Tribe	230	69%
Private	12	4%
Total	330	100%

Slight discrepancies due to rounding.

Like the Proposed Action, potential adjustments to existing land uses would consist of increased access to the CWSA for gas development and production activities due to road construction; long-term losses of livestock forage due to surface disturbance; long-term losses of wildlife habitat and short-term displacement of wildlife from the CWSA due to surface disturbance and human/equipment activity in the area; and temporary visual and

traffic impacts to recreational users. Effects on livestock forage and rangeland management were presented in detail in Section 4.7. Effects on wildlife habitat were discussed in Section 4.6. Effects on recreation are discussed in Section 4.12.

As stated in Section 3.10, the development of natural gas resources that would occur under the No Action Alternative would be consistent with the planning objectives of Uintah County and the BIA and Ute Tribe.

4.10.2 Mitigation

None.

4.10.3 Unavoidable Adverse Effects

Long-term losses of grazing forage and wildlife habitat would be unavoidable for the 40-year life of the project under any alternative.

4.11 TRANSPORTATION

4.11.1 Direct and Indirect Effects

4.11.1.1 Proposed Action

Vehicle traffic would be the highest during the development stage of the CWSA project. Vehicles would be used to transport equipment and personnel to the CWSA for construction of well pads, pipelines, and access roads, and the drilling, and completion of wells. **Table 4.11-1** lists EOG’s estimate of vehicle use during all development phases. During each year of the development phase, approximately 17,480 round trips would be required. In addition to construction, drilling, and completion-related traffic, average annual daily traffic required to operate and maintain the CWSA would include approximately 10 pickups per day transporting personnel around the CWSA to service wells, two tanker trucks per day to collect condensate, and three to five miscellaneous vehicles per day for permanent employee transportation and material/supply deliveries.

Table 4.11-1. Vehicle Usage for CWSA Project

Vehicle Type	Purpose	# Roundtrips/ Development Phase	Annual Round Trips
Construction Vehicles (for 68 sites)			2,040
Semi inbound/outbound	Heavy equipment hauler	6	
Pick-up Truck	Worker transport	24	
Drilling Vehicles (for 90 wells)			10,980
semi inbound/outbound	Rig transport	2	
Haul trucks	Equipment/fuel/water	15	
Pickup Truck	Worker transport	105	
Completion Vehicles (for 90 wells)			4,460
Pickup Truck	Worker transport	77	
Rig Truck	haul in, haul out	2	
Sand Truck	stays on site	2	
Pump Truck	stays on site	2	

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Vehicle Type	Purpose	# Roundtrips/ Development Phase	Annual Round Trips
Frac Truck	stays on site	2	
Fuel Truck	deliver every 3 days	2	
Water Truck	deliver every 2 days	3	
Wireline Truck	stays on site	2	
Production Truck	stays on site	2	
Annual Round Trips (Development)			17,480
Annual Round Trips (Operations)	Condensate trucks, pumper vehicles, employees, deliveries		13,505

Access to the CWSA would be generally limited to three primary roads; Highway 45, Watson Road, and Glen Bench Road. It is assumed that traffic to the CWSA would be equally split on these two access roads. Average annual daily traffic is relatively low and traffic increases on these roads would only be 2.2 to 3.4 percent. Most of this traffic would tend to be in the morning and evening hours when the bulk of construction-related traffic would occur, as well as during shift changes for the crews accomplishing drilling and completion activities. Therefore, the Proposed Action would not result in a major increase in traffic south of Vernal.

The existing road network within the CWSA consists of 120 miles of unpaved access roads. Under the Proposed Action, an additional 99.5 miles of access roads would be constructed to access new well pads from the existing road network. These roads would be constructed according to BLM standards to minimize disturbance and erosion potential.

Construction of proposed roads would conform to standards described in the BLM/Forest Service publication *Surface Operating Standards for Oil and Gas Exploration and Development* (BLM and USFS 2007). EOG, in consultation with Uintah Engineering and Land Surveying, depicted conceptual access routes to the proposed well pads on Figure 2-1 (Appendix A), but the exact location of access roads would be determined and approved by the appropriate SMA at the time of the onsite inspection. Under the Proposed Action, the proposed roads are expected to cross Federal, State, Tribal, and private surfaces.

All construction materials for the proposed access roads would consist of native borrow and soil accumulated during road construction. Mineral materials would not be required. Road construction would utilize standard grading techniques. Road crossings would typically be of the dry creek drainage crossing type. Crossings would be designed to prevent the accumulation of silt or debris and would not be blocked by the roadbed. Water would be diverted from the roadway at frequent intervals. All travel during construction would be restricted to the 30-foot disturbed road width.

Maintenance of new roads would ultimately be the responsibility of the owner. EOG, the County, and the appropriate SMAs would work together to develop a plan that would coordinate and establish road maintenance activities and responsibilities.

4.11.1.2 No Action

Vehicle traffic would be the highest during the development stage of the CWSA project. Vehicles would be used to transport equipment and personnel to the CWSA for construction of well pads and short access roads, drilling, and completion of wells. **Table 4.11-1** lists

EOG's estimate of vehicle use during all development phases. During each year of the two-year development phase under the No Action Alternative, approximately 17,480 round trips would be required. In addition to construction, drilling, and completion-related traffic, average annual daily traffic required to operate and maintain the CWSA would include approximately three pickups per day transporting personnel around the CWSA to service wells, two tanker trucks per day to collect condensate, and one to three miscellaneous vehicles per day for permanent employee transportation and material/supply deliveries.

4.11.2 Mitigation Measures

No mitigation measures are needed under Transportation.

4.11.3 Unavoidable Adverse Effects

Traffic increases would occur during the construction, drilling, and completion phases under either alternative, but would decrease after all wells would be developed. An associated slight increase in traffic incidents/accidents could potentially occur.

4.12 RECREATION

4.12.1 Direct and Indirect Effects

4.12.1.1 Proposed Action

Potential effects to recreation from the Proposed Action would primarily consist of lost recreational opportunities or diminished recreational experience within and near the CWSA. Gas exploration and development has been occurring within the Chapita Wells Unit since 1959 and the Stagecoach Unit since 1960. Existing primary and secondary roads within the CWSA provide abundant access for recreational activities. However, the existing gas facilities have reduced the natural character of the CWSA for visitors seeking solitude and relatively pristine landscapes.

Well pads, associated facilities, roads, and pipelines constructed under the Proposed Action would be visible to hunters, off-highway vehicle users, people accessing Fantasy Canyon, and other recreational users throughout much of the CWSA. However, the presence of these landscape modifications and facilities would not adversely impact recreational experiences in upland areas of the CWSA because numerous gas facilities currently exist within the region.

The proposed 99.5 miles of new access roads would allow recreational users increased access to portions of the CWSA that were not previously accessible by vehicle. However, the increase in noise and traffic associated with construction, drilling, and completion activities could deter recreational users from the area. Furthermore, increased traffic could pose collision hazards to recreationists traveling to/from Fantasy Canyon, the boat take out on the White River, or hunting locations. The applicant-committed measure provided in Section 2.3 would reduce, but would not eliminate the potential for vehicular collisions. Increased access roads could also lead to an increase in illegal recreational use (i.e., trespass) of Tribal/allotted lands.

As discussed in the 1999 Chapita Wells EA (BLM 1999), the construction of well pads where bedrock is near the surface often requires blasting in order to create the level surface that is necessary for the staging of equipment and the construction of reserve pits.

Unmitigated, such blasting activity has the potential to generate flyrock and seismic shock that could fracture and topple some of the more fragile formations associated with Fantasy Canyon. Because of this potential impact, a blasting vibration (i.e., seismic shock) analysis was conducted as part of the 1999 Chapita Wells EA. The entire analysis is included as Appendix E of that document. In short, the analysis determined that a minimum distance of 800 feet is needed between any proposed well pad and Fantasy Canyon formations in order to avoid cracking and degradation of Fantasy Canyon geologic features. This commitment is outlined in Section 2.1.1.1 of the Proposed Action description in this EIS, and therefore, there would be no impact to geologic features of Fantasy Canyon.

Several wells could be constructed along CWSA roads providing access to Fantasy Canyon. As described in the 1999 Chapita Wells EA, there are numerous opportunities to screen views of production facilities. However, the presence of additional wells in close proximity to Fantasy Canyon could degrade the recreational experience of visitors who have expectations of a relatively natural landscape. Short-interval, low rumbling noises emanating from separator/dehydrator units in proximity to Fantasy Canyon could also be audible to visitors.

Following publication of the CWSA DEIS and review of public comments, EOG committed to the following measures:

- EOG commits to applying the following design features to the development of its proposed wells in the CWSA. The features are in addition to others described in the Proposed Action, such as drilling a twin well adjacent to an existing well on a common well pad to reduce surface disturbance. These design features do not replace local, state, Federal or Tribal requirements. EOG decided to voluntarily implement these design features to further minimize impacts to environmental resources in the CWSA.
- EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor.
- EOG would not drill new wells in the White River corridor that would result in new well pads and roads. The White River corridor is defined as the line of sight from the centerline, up to ½ mile, along both sides of the White River. The oil and gas resources beneath the White River corridor in the CWSA have been leased by the United States, and under the terms of such leases, the BLM cannot deny EOG's valid, existing rights to drill and develop this leasehold. EOG may drill new twin wells on existing well pads within the White River corridor (but outside the 100-year floodplain). These twins to existing wells would require no new roads.
- For surface-disturbing activities proposed within the 100-year floodplains of Coyote Wash and Red Wash, additional applicant-committed design features would be considered on a site-specific basis during the onsite inspection in order to maintain and protect wildlife habitat, water quality, quality of the recreation experience, and other land uses. Such site-specific design features could include the use of closed-loop drilling within the 100-year floodplain, directional drilling, placement of surface facilities (other than the associated wellhead and pipeline) outside of the floodplain, and/or other measures designed to eliminate potential impacts to the floodplains. The decision to implement additional, site-specific design features within the 100-year floodplains of Coyote Wash and Red Wash would be determined on a well-by-well basis during the APD approval process.

- Twin wells in the White River corridor (but outside the 100-year floodplain) will be located, designed, or screened to be out of view of recreational boaters on the White River from the upstream boundary of the Chapita Wells Unit to the Mountain Fuel Bridge. The White River Seen Area Analysis (Chapter 4.0, Map 4-1, EOG Resources, Inc., Environmental Assessment Chapita Wells Unit Infill Development, Uintah County Utah, EA No. UT-080 1999-32) is the conceptual guideline used to define areas that are out of view of White River recreational boaters. In conjunction with the APD, EOG and the AO will jointly determine the use of topographic features and placement of facilities, such as low-profile tanks, to prevent facilities from view. EOG will use telemetry/automation to reduce vehicle trips to these locations.
- If drilled, twin wells within the White River corridor (but outside the 100-year floodplain) will be drilled during the months of August through April, outside of the typical boating season, to the extent possible in consideration of other applicable constraints, such as seasonal restrictions associated with wildlife protection. If EOG is unable to schedule drilling operations outside of the boating season, a drilling rig, workover rig, and associated equipment may be visible to recreational boaters on the White River temporarily while a well is being drilled or re-worked.

Based on these applicant-committed measures, impacts to recreational users along the White River would be limited to temporary visual and auditory impacts from potentially drilling twin wells from existing well pads within the White River Corridor (but outside the 100-year floodplain). Specifically, drill rigs (derricks), workover rigs, and associated equipment could be visible during the peak floating/boating season. Noise levels associated with these short-term activities could also be perceived as a nuisance by boaters. However, while a drilling rig, workover rig, and associated equipment could be temporarily visible to recreational boaters on the White River, permanent facilities would be located, designed, or screened to be outside the “seen area”. Similarly, noise impacts from drilling, completion or workover activities would be short-term and specific to the location of the affected well.

4.12.1.2 No Action

Under the No Action Alternative, newly proposed wells would not be constructed within proximity to Fantasy Canyon. Therefore, impacts to recreation under the No Action Alternative would be primarily limited to effects on hunting use and boating on the White River.

The proposed 17.7 miles of new access roads under the No Action Alternative would allow recreational users increased access to portions of the CWSA that were not previously accessible by vehicle. However, the increase in noise and traffic associated with construction, drilling, and completion activities could deter recreational users from the area. Furthermore, increased traffic could pose collision hazards to recreationists traveling to/from the CWSA. The applicant-committed measures provided in Section 2.3 would reduce, but would not eliminate the potential for such vehicular collisions. Increased access roads could also lead to an increase in illegal recreational use (i.e., trespass) of Tribal/allotted lands.

Similar to the Proposed Action, Following publication of the CWSA DEIS and review of public comments, EOG committed to the following measures:

- EOG commits to applying the following design features to the development of its proposed wells in the CWSA. The features are in addition to others described in the Proposed Action, such as drilling a twin well adjacent to an existing well on a

common well pad to reduce surface disturbance. These design features do not replace local, state, Federal or Tribal requirements. EOG decided to voluntarily implement these design features to further minimize impacts to environmental resources in the CWSA.

- EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor.
- EOG would not drill new wells in the White River corridor that would result in new well pads and roads. The White River corridor is defined as the line of sight from the centerline, up to ½ mile, along both sides of the White River. The oil and gas resources beneath the White River corridor in the CWSA have been leased by the United States, and under the terms of such leases, the BLM cannot deny EOG's valid, existing rights to drill and develop this leasehold. EOG may drill new twin wells on existing well pads within the White River corridor (but outside the 100-year floodplain). These twins to existing wells would require no new roads.
- For surface-disturbing activities proposed within the 100-year floodplains of Coyote Wash and Red Wash, additional applicant-committed design features would be considered on a site-specific basis during the onsite inspection in order to maintain and protect wildlife habitat, water quality, quality of the recreation experience, and other land uses. Such site-specific design features could include the use of closed-loop drilling within the 100-year floodplain, directional drilling, placement of surface facilities (other than the associated wellhead and pipeline) outside of the floodplain, and/or other measures designed to eliminate potential impacts to the floodplains. The decision to implement additional, site-specific design features within the 100-year floodplains of Coyote Wash and Red Wash would be determined on a well-by-well basis during the APD approval process.
- Twin wells in the White River corridor (but outside the 100-year floodplain) will be located, designed, or screened to be out of view of recreational boaters on the White River from the upstream boundary of the Chapita Wells Unit to the Mountain Fuel Bridge. The White River Seen Area Analysis (Chapter 4.0, Map 4-1, EOG Resources, Inc., Environmental Assessment Chapita Wells Unit Infill Development, Uintah County Utah, EA No. UT-080 1999-32) is the conceptual guideline used to define areas that are out of view of White River recreational boaters. In conjunction with the APD, EOG and the AO will jointly determine the use of topographic features and placement of facilities, such as low-profile tanks, to prevent facilities from view. EOG will use telemetry/automation to reduce vehicle trips to these locations.
- If drilled, twin wells within the White River corridor (but outside the 100-year floodplain) will be drilled during the months of August through April, outside of the typical boating season, to the extent possible in consideration other applicable constraints, such as seasonal restrictions associated with wildlife protection. If EOG is unable to schedule drilling operations outside of the boating season, a drilling rig, workover rig, and associated equipment may be visible to recreational boaters on the White River temporarily while a well is being drilled or re-worked.

Based on these applicant-committed measures, impacts to recreational users along the White River would be limited to temporary visual and auditory impacts from drilling twin wells from existing well pads within the White River Corridor (but outside the 100-year

floodplain). Specifically, drill rigs (derricks), workover rigs, and associated equipment could be visible during the peak floating/boating season. Noise levels associated with these short-term activities could also be perceived as a nuisance by boaters. However, while a drilling rig, workover rig, and associated equipment could be temporarily visible to recreational boaters on the White River, permanent facilities would be located, designed, or screened to be outside the “seen area”. Similarly, noise impacts from drilling, completion or workover activities would be short-term and specific to the location of the affected well.

4.12.2 Mitigation Measures

- Assuming all blasting that may be required under the Proposed Action would be at least 800 feet from the geologic formations in Fantasy Canyon, no additional mitigation would be required.
- As feasible, drilling and completion of twin wells from existing well pads within the White River corridor (but outside the 100-year floodplain) would be timed to avoid peak recreational use. This measure would eliminate some of the residual noise-related impacts of the Proposed Action or No Action Alternatives on recreational activities.
- To preserve the integrity of the viewshed within the White River Corridor, during APD processing, and as feasible, EOG and the AO will:
 - Jointly determine the use of topographic features to serve as visual screens;
 - Place facilities away from highly visible points such as ridgelines;
 - Use low-profile tanks to reduce visibility where taller tanks would be more visible; and,
 - Avoid excessive side-casting of earth materials from ridgelines and steep slopes.

4.12.3 Unavoidable Adverse Effects

Increased vehicle traffic, surface disturbance, visual impacts, and human activity in the CWSA would result in Unavoidable Adverse Effects to recreational uses that cannot be completely mitigated.

4.13 VISUAL RESOURCES

4.13.1 Direct and Indirect Effects

4.13.1.1 Proposed Action

General Visual Resource Impacts

Short-term visual impacts due to construction, drilling, and completion activities would occur on all new pads and on existing pads where twin wells are proposed. The existing landscape would be further changed by introduction of additional visual modifications within the landscape in the form of new lines, colors, forms, and textures. New well pads, facilities, roads, and pipelines would increase visual contrasts created by gas well construction and production activities (e.g., dozers, drilling rigs, truck traffic, heavy equipment, dust, lights,

etc.) within the CWSA landscape. Construction, drilling, and completion would take place over a seven-year period and would generally occur in clusters. Drilling activities are typically conducted 24-hours per day; therefore, visual impacts during drilling activities would include lighting of drill rigs during nighttime hours.

Long-term visual impacts of the Proposed Action would consist of reduced visual harmony within the overall landscape due to the introduction of additional long-term visual modifications that create contrasts. Long-term landscape contrasts would result from well pad facilities, pipelines, and roads, yielding a more industrialized visual setting.

Based on the applicant-committed measures provided in Section 2.3 (and summarized below under Conformance with VRM Classes), and the fact that the CWSA includes portions of two existing and active oil and gas units that have experienced extensive natural gas development, these short-term and long-term landscape modifications would have moderate, but acceptable visual impacts on the CWSA from a visual resources management perspective.

Conformance with VRM Classes

Under the Proposed Action, approximately eleven single gas wells from new pads, two twin wells from existing pads, 2.3 miles of access road, and 2.2 miles of pipeline would be developed within VRM Class III areas. As discussed in Section 3.13, the management objective of Class III areas is to partially retain the existing character with a moderate level of change to the landscape. Management activities with VRM Class III areas may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. Applicant-committed measures specific to visual resources are summarized here:

- EOG would not drill from new well pads or build new roads within the White River corridor.
- Other new facilities (e.g., pipelines and associated production equipment for twin wells) would be located, designed, or screened to be out of view of recreational boaters on the White River from the upstream boundary of the Chapita Wells Unit to the Mountain Fuel Bridge.
- In conjunction with the APD, EOG and the AO would jointly determine facility locations and surface disturbance requirements on a site-specific basis, using topographic features to shield facilities and surface disturbances from view.
- Operating equipment on all lands contained within the boundaries of the CWSA would be painted in a flat non-reflective color that is compatible with the surrounding landscape as specified by the appropriate SMA. Unpainted steel pipe would be used for surface gathering pipelines, which after rusting would blend with the existing landscape.

Assuming implementation of these BMPs, the Proposed Action would be in conformance with VRM Class III objectives.

Within VRM Class IV areas, 393 single wells, 95 twin wells on existing pads, 85 miles of roads, and 86 miles of pipeline would be constructed. As discussed in Section 3.13, management actions within VRM Class IV may dominate the view and be the major focus of viewer attention. However, every attempt would be made to minimize the impact of activities in areas through careful location, minimal surface disturbance, and repeating the basic

landscape elements. As outlined in the BMPs listed above, EOG would determine facility locations and surface disturbance requirements on a site-specific basis, using topographic features to shield facilities and surface disturbances from view. Based on this information, the Proposed Action would be in compliance with VRM Class IV objectives.

4.13.1.2 No Action

Under the No Action Alternative, new gas well development (i.e., development that hasn't already been approved by the 1999 Chapita Wells EA or development outside the threshold of the Book Cliffs RMP) would not occur on Federal lands within the CWSA. Therefore, there would be no effect to visual resources managed under the BLM's VRM classification system.

Short-term visual impacts due to construction, drilling, and completion activities would occur on all new pads and on existing pads where twin wells are proposed on State, Tribal, and private lands. The existing landscape of these lands would be changed by introduction of additional visual modifications within the landscape in the form of new lines, colors, forms, and textures. New well pads, facilities, roads, and pipelines would increase visual contrasts created by gas well construction and production activities (e.g., dozers, drilling rigs, truck traffic, heavy equipment, dust, lights, etc.) would also result. Under the No Action Alternative, construction, drilling and completion would take place over a two-year period and would generally occur in clusters. Drilling activities typically occur 24-hours per day; therefore, visual impacts during drilling activities include lighting of drill rigs during nighttime hours.

Long-term visual impacts of the No Action Alternative would consist of reduced visual harmony within the overall landscape due to the introduction of additional long-term visual modifications that create contrasts. Long-term landscape contrasts would result from well pad facilities, pipelines and roads, yielding a more industrialized visual setting.

Based on the applicant-committed measures provided in Section 2.3, and the fact that the CWSA includes portions of two existing and active oil and gas units that have experienced extensive natural gas development, these short-term and long-term landscape modifications would have moderate adverse impacts to visual resources on State, Tribal, and private lands.

4.13.2 Mitigation Measures

- Where feasible, existing vegetation on and around proposed well pads would be retained to screen well pad facilities.
- Where determined to be appropriate by the AO based on site-specific conditions, proposed pipelines would be buried. In areas where compacted sandstone or bedrock occurs, chain trenchers and/or rock saws (also known as wheel or disc trenchers) would be used to excavate pipeline trenches. Following pipeline installation, the buried pipeline ROW would be reclaimed in accordance with the measures outlined in Appendix E.
- To preserve the integrity of the viewshed within the White River Corridor, during APD processing, and as feasible, EOG and the AO will:
 - Jointly determine the use of topographic features to serve as visual screens;

- Place facilities away from highly visible points such as ridgelines;
- Use low-profile tanks to reduce visibility where taller tanks would be more visible; and,
- Avoid excessive side-casting of earth materials from ridgelines and steep slopes.

4.13.3 Unavoidable Adverse Effects

Increased surface disturbance and the long-term presence of surface production facilities, roads, and pipelines in the CWSA would result in Unavoidable Adverse Effects to visual resources that cannot be completely mitigated.

4.14 NOISE

4.14.1 Direct and Indirect Impacts

Regulatory noise standards have not been established by BLM, Uintah County, or the State of Utah. However, the EPA established an average 55 dBA noise level as a guideline for acceptable environmental noise. This established EPA environmental noise level is used as a basis for evaluating noise effects when no other local, county, or state standard has been established. It is important to note that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value of the public health and welfare. Additionally, this noise level is directed at sensitive receptors (residences, schools, medical facilities, certain recreational areas) where people would be exposed to an average noise level over a specific period of time. Finally, this noise level represents an average noise level over a period of time, e.g., 24 hours. Higher intermittent and short-term noise levels, e.g., a heavy truck passing a location, could occur during the period of time. However, the short-term higher noise levels would be balanced by lower noise during the long-term period.

The context of public health and welfare includes personal comfort and well-being, the absence of mental anguish, disturbances, and annoyance, as well as the absence of clinical symptoms such as hearing loss or demonstrable physiological injury. Therefore, a 55 dBA noise level is considered a reasonable average noise level that CWSA noise sources could produce without an adverse effect to the public.

In addition to this EPA guideline, the Occupational Safety and Health Administration (OSHA) has established codes that address worker exposure to elevated noise levels. These regulations may be applicable during construction and operation phases of the Proposed Action. These codes limit worker exposure to noise levels of 90 decibels (dB) or lower over an 8-hour period (OSHA 1970).

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

$$L_2 = L_1 - 20 \times \text{LOG} (R_2/R_1)$$

where:

L2 = noise predicted at a selected distance R2 from the source

L1 = noise measured at a distance R1 from the source

LOG = common logarithm base 10

4.14.1.1 Proposed Action

Noise above existing levels would occur during construction, drilling, completion, and operation of natural gas facilities. Elevated noise from construction of well pads, ancillary facilities, roads, and pipelines would occur over the six-day average well pad construction period. Elevated noise levels would occur for longer periods (ranging from three to 35 days) during drilling activities, and for about seven days during the completion phase of a well. After development activities, noise near production facilities and along CWSA roads would occur for the life of the project.

Development Noise Impacts

Construction noise levels would be short-term at any given location. The average construction site noise level would be approximately 85 dBA at 50 feet from the site. Additionally, elevated noise levels would occur along access roads as vehicles and heavy equipment would travel to each site. However, elevated noise levels would occur for a period of a week at any location and would occur only during daytime because construction would not generally occur between sunset and sunrise.

Noise impacts from drilling activities would be moderate and would last longer, on average, than construction activities at any one location. Based on a measured noise level of 50 dBA at ¼ mile (1,320 feet) from a drill rig, the noise would be likely above 55 dBA within 800 feet of a drill rig. Drilling noise would occur continuously for 24 hours per day and would last approximately from 3 to 35 days at a drilling location depending on the depth of the formation.

As discussed in Section 2.3.1, EOG would not drill from new or existing well pads within the 100-year floodplain of the White River Corridor. Furthermore, EOG would not drill new wells in the White River corridor that would result in new well pads and roads. The White River Corridor is defined as the line of sight from the centerline up to ½ mile (whichever is shortest), along both sides of the White River. As previously demonstrated, the noise from a drilling rig would be less than 55 dBA beyond 800 feet from a drill rig. At a distance of ½ mile, the noise would decrease to 44 dBA, a level well below the background level of 56 dBA measured along the White River. If intervening topography would obscure the view of a well from the river, the well could be constructed within the corridor. Although the well would not be visible from the river, the noise of the drill rig engine may be heard although the intervening terrain and the background noise of the river measured to be 56 dBA would muffle the noise somewhat of the drill rig. Twin wells could still be drilled from existing well pads within the corridor, however, based applicant-committed measures in Section 2.3.2, twin wells within the White River corridor will be drilled during the months of August through April, outside of the typical boating season, to the extent possible in consideration other applicable constraints, such as seasonal restrictions associated with wildlife protection. If EOG is unable to schedule drilling operations outside of the boating season, a drilling rig, workover rig, and associated equipment may be visible to recreational boaters on the White River temporarily while a well is being drilled or re-worked. Based on this commitment,

noise from a drilling rig to boaters on the White River would be avoided or limited during peak recreational use of the White River. In spite of this commitment, the distance or intervening terrain, and the background noise of the White River, the noise from a drilling rig may be audible to recreational users on the White River if drilling occurs during the boating season.

Additionally, noise levels would be elevated along access roads during the construction sequences. However, the majority of traffic would occur during the morning and evening hours as workers arrive at and leave from the construction and drilling sites.

The highest noise levels, but much shorter in duration, would occur during venting of gas during well completion for a maximum of 24 hours per day for two days. Venting noise has been measured as 66 dBA at 500 feet. Noise from the venting would be above 55 dBA at distances out to 1,800 feet from the well. However, these elevated noise levels would last for a maximum of two days at any one location.

Operational Noise Impacts

After construction, drilling, and completion activities, the main operational noise would occur near compressor stations. Elevated noise would also occur along access roads from truck traffic and regular maintenance at well sites.

Gas from the proposed wells would likely be processed through the existing Questar Gas Management (QGM) Chapita Wells Unit (CWU) compressor station located within the CWSA. It is estimated that an additional 5,000 horsepower of compression capacity would be required to support the Proposed Action development. Based on the proposed engine type, this would equate to approximately two additional large compressor engines rated at 2,500 horsepower each.

It is important to note that the effect of multiple noise sources is not arithmetically additive, but rather, is a logarithmic summation. Based on the cumulative source air emission inventory available from the final Air Quality Technical Report for the Vernal Planning Area (BLM 2004b), the existing QGM CWU compressor station operates two large compressor engines.

The total effect of multiple collocated noise sources is characterized by the following relationship (Harris 1991):

$$L = 10 * \text{LOG} (10^{L1/10} + 10^{L2/10} + \dots + 10^{Ln/10})$$

where: L₁, L₂, ..., L_n are the source sound levels of individual collocated sources.

L is the overall noise level.

LOG is the common logarithm base 10.

Noise has been measured at typical compressor units (USGS 1981). A noise level of 77 dBA from one large compressor engine can be expected at 50 feet from a compressor engine. This measured baseline value along with the preceding equation were applied to estimate the overall source noise from the QGM CWU station under the existing configuration as well as after the installation of additional compression resulting from the Proposed Action. **Table 4.15-1** shows the predicted noise near the QGM CWU compressor station at 100-foot increments out to 2,000 feet. As shown, the distance at which the noise

level would be below 55 dBA would increase to 1,300 feet after the addition of the proposed compression. Therefore, based upon the published noise level effects, the health and welfare of the general population would not be at risk from any of the identified effects of noise at that level beyond 1,300 feet from the QGM CWU compressor station as a result of the Proposed Action.

Table 4.15-1. Predicted Noise near QGM CWU Compressor Station

Distance (feet)	2 Engines (Existing)	4 Engines (2 existing plus 2 new)
100	74.0	77.0
200	68.0	71.0
300	64.4	67.5
400	61.9	65.0
500	60.0	63.0
600	58.4	61.4
700	57.1	60.1
800	55.9	58.9
900	54.9	57.9
1000	54.0	57.0
1100	53.2	56.2
1200	52.4	55.4
1300	51.7	54.7
1400	51.1	54.1
1500	50.5	53.5
1600	49.9	52.9
1700	49.4	52.4
1800	48.9	51.9
1900	48.4	51.4
2000	48.0	51.0

4.14.1.2 No Action

Noise effects near active construction equipment, drilling rigs, completion rigs, compressor engines, and access roads would be similar to the Proposed Action. However, construction, drilling, and completion noise effects would last for a shorter time period since a much smaller number of wells pads and wells would be developed (about 25 percent of Proposed Action wells would be developed under the No Action Alternative).

4.14.2 Mitigation Measures

- As determined necessary during the onsite process, EOG would position exhaust stacks away from the direction of Fantasy Canyon.
- At the discretion of the SMA, additional mitigation measures to reduce impacts from noise would be determined on a site-specific basis.

4.14.3 Unavoidable Adverse Effects

Elevated noise levels near compressor engines and access roads would occur for the life of the project. However, the extent and intensity of noise at a specific location would decrease after the construction and development phase.

4.15 SOCIOECONOMICS

4.15.1 Direct and Indirect Impacts

4.15.1.1 Proposed Action

Benefits to Uintah County, the Uintah & Ouray Indian Reservation, and the Ute Tribe, from the Proposed Action would include employment opportunities for local workers and purchases of services from local contractors. Fiscal benefits would include royalties and severance taxes paid to the Federal government, State of Utah, Ute Tribe, and Uintah County, as well as sales taxes, income taxes, property taxes, and damage fees to Federal, state and local government.

To the extent that local workers are employed in project work, their spending in the local economy would stimulate a “multiplier effect” in the form of additional jobs and income. EOG is also committed to hiring and training Tribal members for project work to the extent it is feasible. Employment of Tribal members would benefit communities on the Uintah and Ouray Reservation where many Tribal members live and where incomes are low and unemployment is high.

The potential benefits of the Proposed Action are discussed further in the following sections.

Employment

Implementation of the Proposed Action would create additional employment opportunities in the Uintah County region both during the seven-year construction phase and over the production lifetime of the wells (approximately 40 years). Both direct project employment (e.g., positions with EOG or contractors hired for construction, production and decommissioning) and indirect or secondary employment (jobs which become available in support industries as a result of project activities such as parts and materials production, equipment refueling, etc.) would arise as a result of project activities. Projected labor needs for construction, drilling and completion are provided in Section 2.1.9 of Chapter 2. In short, there would be approximately two, five-man construction crews working each month over a seven-year period (i.e., total of 10 employees per month for associated construction). There could be up to four drill rigs running each month over the seven-year drilling and completion phase, with an average of 10 people employed on-site to drill and complete each well (i.e. total of 40 employees per month for drilling and completion). During operational phases of the Proposed Action, approximately ten pumpers would be needed to support production operations (i.e., total of ten full-time employees per year for production support).

The primary influx of employment opportunities would occur during the construction phase of the project. Where possible, EOG plans to use local sub-contractors and workers (i.e., from Uintah County and/or the Ute Indian Tribe). Applicants would be hired by EOG employees and contractors to construct and maintain roads, wells pads, and pipelines. Local contractor jobs would include gravel and water truck drivers, heavy equipment operators, and pipeline workers. Additionally, some employees would be necessary to perform maintenance activities. Some specialized construction expertise (i.e., well drilling

and completion techniques) may not be available in Uintah County and “non-local” contractors may be utilized for these tasks.

Although the construction, drilling and completion phase (construction phase) is estimated to take seven years, many aspects of the construction phase would be shorter-term in nature. Based upon these characteristics, it can be assumed that “non-local” settlement in the area would be dependant upon individual job stability. Those having more long-term job stability may choose to move to the area and would most likely settle in communities adjacent to the CWSA. Married workers probably would likely bring spouses and families to the area, and settlement may occur in Vernal, Roosevelt, Fort Duchesne, or Jensen. It can also be assumed that short-term, non-local construction workers would not bring their families to the local area. Depending on the craft type and worker specialty, some workers may only be required for a few months, while others could be needed for years. Short-term workers would most likely utilize motel accommodations rather than longer-term rental housings such as apartments or houses. In many cases, short-term construction workers may stay in motor homes or travel trailers parked in local trailer parks and long-term campgrounds. Since it is unclear how many short-term construction workers would be utilized, the number of motel rooms, trailer park spaces, and campsites that would be required for the construction work force cannot be accurately estimated.

Once the wells begin production, some level of sustained permanent employment would be required for operation and maintenance of the wells and pipeline, as well as gradual reclamation of the inactive wells and associated access roads. Only a small number of workers would be required to perform these functions.

Wages and Local Economy¹¹

The Proposed Action would contribute to the local economy through increased short- and long-term employment. Average salaries within Uintah County are currently estimated to be about \$3,600 per month for oil and gas industry employees, and an average of \$1,810 per month for the construction and trades industry. Assuming the employees would be equally distributed from these industries, the average monthly salary is estimated to be \$2,700 for the construction-related employees.

Accordingly, the estimated annual payroll for 10 on-location personnel to construct well pads, roads, and other infrastructure supporting the 627 proposed wells during the seven-year construction, drilling and completion phase would be approximately \$324,000 (\$2,700/employee/month x 12 months/year x 10 employees/month), for a total of \$2,268,000 in construction-related, on-location employee wages over the 7-year development period (in constant 2005 dollars). Over time wages may rise in nominal terms because of inflation.

The estimated annual payroll for 10 on-location personnel to drill and complete each well during the seven-year construction, drilling and completion phase would be approximately \$1,296,000 (\$2,700/employee/month x 4 wells/month X 12 months/year x 10 employees/well), for a total of \$9,072,000 in drilling and completion-related, on-location employee wages over the 7-year development period (in constant 2005 dollars). Over time wages may rise in nominal terms because of inflation.

During the operational phase of the project, the approximately ten pumpers that would be needed to maintain production operations would generate approximately \$432,000 in wages

¹¹ Estimated wages generated during the construction, drilling and completion and operational phases of the project do not include any estimates for inflation.

per year (\$3,600/month x 12 months x 10 employees), for a total of approximately \$17,280,000 over the 40-year life of the project (in constant 2005 dollars). Over time wages may rise in nominal terms because of inflation.

Retail sales would likely occur throughout the County from construction workers' purchases of food and goods and services available locally such as clothing and gasoline. A large proportion of construction workers would pay for local housing (either temporary housing such as motels or trailer park rentals or longer term housing in homes and apartments).

Although a significant number of non-local, short-term workers may send paychecks home to families, these workers typically receive a *per diem* payments for daily housing and meal costs. Per diem payments are generally spent on local goods and services.

Local purchases by EOG of construction equipment, materials and supplies would be a local economic benefit. Substantial local purchasing by EOG would potentially raise local employment and income.

Community Services

Non-local construction workers would temporarily increase the populations of local communities to a very small degree. Although the precise number of non-local construction workers cannot be estimated, workers would be distributed among the various communities and would not be expected to significantly increase the demand for local services such as law enforcement, fire protections, or medical services. Since many of the non-local construction workers are not expected to bring their families with them, little or no increase in demand on public schools would result.

Drilling or operational phase emergencies due to the CWSA project may require the occasional assistance of the county Sheriff's Department, Tribal police department, local fire protection districts, or local ambulance services.

Local Government Fiscal Conditions and Revenues from Gas Development

The CWSA project would contribute revenues to various local, Tribal, State, and Federal government entities through payment of taxes and royalties. The following types of revenues would be generated by the Proposed Action.

Property Tax Revenue

Uintah County collects two types of property taxes. The first type of property tax is based on the assessed value of the land and improvements (i.e., buildings, production equipment). The second type of property tax collected is based on the production of the wells. Construction workers renting property would indirectly contribute to property taxes, and construction workers who buy property would directly pay property taxes.

Severance Tax

The State of Utah also collects a severance tax on oil and gas minerals produced. This State tax rate fluctuates between three and five percent of production revenue. Based upon EOG's projected production over the life of the CWSA project, EOG would pay approximately \$1 million to the State Tax Commission general fund.

Sales and Use Tax Revenue

Sales taxes are paid by oil and gas companies when purchases of equipment, materials, or supplies are made in the local area. Project construction would also result in additional sales taxes related to employee purchases of many different goods and retail services. To the extent that EOG purchasing activities generate sales tax revenues, the project would benefit local residents through increased funding. Local retail purchases by construction workers would generate local sales taxes.

Estimated Value of Produced Natural Gas

Based on information provided by EOG, average gas production rates for wells drilled to the Mesaverde Formation would be 79 thousand cubic feet (Mscf) per day, and 43 Mscf per day for Wasatch Formation wells. No estimates were available for Green River or Mancos “B” wells, since wells have not yet been drilled to those formations in the CWSA. Actual production rates would vary based on the targeted formation, characteristics of the individual well, and age of the well (i.e., higher production rates earlier in the life of a well, lower production rates later in the life of a well). For this analysis it was assumed that average daily production of a well in the CWSA would be 61 Mscf.

The natural gas price of \$4.40 per thousand cubic feet used to calculate the estimated value of produced natural gas is the Energy Information Administration’s projected 2025 Annual Energy Outlook price (EIA 2004). This could vary substantially over the life of the project.

The estimated daily revenues generated by a single producing natural gas well in the CWSA would be \$268, or roughly \$98,000 per year and \$3.9 million over the 40-year life of the project. Of the 627 wells proposed, approximately 608 are projected to be producers. Total production revenues generated by 608 wells over the 40-year life of the project would be approximately \$2.3 billion.

Federal Mineral Royalties

Mineral lease royalties are collected by the Minerals Management Service, U.S. Department of the Interior, on fluid minerals produced on Federal leases. At full-field development, 566 gas wells would be completed on Federal minerals in the CWSA, approximately 549 of which would likely be producers. Based on the estimated value of a producing well of \$98,000 per year and a royalty rate of 12.5 percent, 549 producing wells in the CWSA would generate about \$6.7 million a year in mineral lease royalties.

Half of the mineral lease royalties on CWSA production would be returned to the State of Utah. Utah’s royalties would then be distributed in the following manner: 40 percent to the Utah Department of Transportation, 32.5 percent to the Permanent Community Impact Fund (PCIF), and 15.75 percent to the County of Origin (Utah Administrative Code Title 59). Recipients of PCIF funds include counties, special service districts, cities, special improvement districts, towns, water conservancy districts, school districts, water or sewer improvement districts, building authorities, and housing authorities. Eligible projects include provision of public services, construction and maintenance of public facilities, and planning.

Tribal Royalties

Where Tribal/allotted land is underlain by Federal or State minerals, the Tribe will establish a SUA with EOG and may receive any or all of the following: surface damage payments, annual rentals, royalties, and/or a through-put fee per quantity of gas. Production from Tribal minerals on Tribal surface provides royalties, tax revenues, and surface access and use fees to the Tribe, which contributes to the Tribe’s economic independence. Tribal

surface in the CWSA is predominantly owned by the Ute Tribe and/or its allottees. There are a total of 774.5 acres of Indian minerals subject to three different leases within the entire CWSA, all of which are located in T9S:R22E. Royalties from minerals owned by the Ute Tribe are collected and distributed to Tribal members, shareholders of the Ute Distribution Corporation, and allottees. Royalty rates for Tribal/allotted minerals in the CWSA vary depending on the lease terms, and range from 12.5 percent of production value to approximately 16.6 percent, for an average of 14.5 percent of production value. Approximately 15 wells are proposed on the 774.5 acres of Tribal and or allotted minerals. Assuming an average daily production of 61 Mscf per well and an annual production value of \$98,000 per well, the Proposed Action would yield an estimated \$213,150 in Tribal and/or allottee royalties per year.

4.15.1.2 No Action

Employment

Implementation of the No Action would create additional (but less than the Proposed Action) employment opportunities in the Uintah County region both during the two-year construction phase and over the production lifetime of the 148 wells (approximately 40 years). Similar to the Proposed Action, both direct project employment and indirect or secondary employment would arise as a result of project activities. In short, there would be approximately two, five-man construction crews working each month over a two-year period (i.e., total of ten employees per month for associated construction activities). There could be up to four drill rigs running each month over the two-year drilling and completion phase. On average, ten people would be employed on-site to drill and complete each well (i.e., total of approximately 40 people per month for drilling and completion). During operational phases of the Proposed Action, approximately three pumpers would be needed to support production operations (i.e., total of ten full-time employees per year for production support).

As in the Proposed Action, most employment opportunities would occur during the construction phase of the No Action Alternative. However, many aspects of the construction phase would be shorter in duration. Settlement of “non-local” workers in the area would depend on individual job stability. Workers with more stable jobs over the two-year construction phase may choose to temporarily move to the area. These workers would most likely settle in communities adjacent to the CWSA. Since it is unclear how many short-term construction workers would be utilized, the number of motel rooms, trailer park spaces, and campsites that would be required for the construction work force cannot be accurately estimated.

Wages and Local Economy

The No Action Alternative would contribute to the local economy through increased short- and long-term employment. The estimated annual payroll for 10 on-location personnel to construct well pads, roads, and other infrastructure supporting the 148 proposed wells during the two-year construction, drilling and completion phase would be approximately \$324,000 (\$2,700/employee/month x 12 months/year x 10 employees/month), for a total of \$648,000 in construction-related, on-location employee wages over the two-year development period.

The estimated annual payroll for 10 on-location personnel to drill and complete each well during the two-year construction, drilling and completion phase would be approximately \$1,296,000 (\$2,700/employee/month x 4 wells/month X 12 months/year x 10

employees/well), for a total of \$2,592,000 in drilling and completion-related, on-location employee wages over the two-year development period.

During the operational phase of the project, the approximately three pumpers that would be needed to maintain production operations would generate approximately \$129,600 in wages per year (\$3,600/month x 12 months x 3 employees), for a total of approximately \$5,184,000 over the 40-year life of the project (in constant 2005 dollars). Over time nominal wages may rise because of inflation.

Retail sales would likely occur throughout the County from construction workers' purchases of food and goods and services available locally such as clothing and gasoline. A large proportion of construction workers would pay for local housing (either temporary housing such as motels or trailer park rentals or longer term housing in homes and apartments).

Although a significant number of non-local, short-term workers may send paychecks home to families, these workers typically receive a *per diem* payments for daily housing and meal costs. Per diem payments are generally spent on local goods and services.

Local purchases by EOG of construction equipment, materials and supplies would be a local economic benefit. Substantial local purchasing by EOG would potentially raise local employment and income.

Community Services

The No Action Alternative would create demand for community services. The demands would be similar in kind to those of the Proposed Action but lower in proportion to the lower number of wells.

Local Government Fiscal Conditions and Revenues from Gas Development

The No Action Alternative would generate the lower revenues than the Proposed Action for local, State, and Federal government entities.

Estimated Value of Natural Gas

Of the 148 wells proposed, approximately 144 are likely to be producers. Total production revenues generated by 144 wells over the 40-year life of the project would be approximately \$564 million. The estimate assumes the same per well production rate and gas price as estimates for the Proposed Action.

Federal Mineral Royalties

Under the No Action Alternative, 87 gas wells would likely be drilled and completed on Federal surface and minerals in the CWSA, 84 of which would likely be producers. Using the same assumptions as for the Proposed Action, the No Action Alternative would generate a total of \$1.0 million per year in Federal mineral royalties. The return to the State of Utah and distribution and use within the state would be similar to the Proposed Action though the dollar amounts would be lower.

Tribal Royalties

Where Tribal/allotted land is underlain by Federal or State minerals, the Tribe will establish a SUA with EOG and may received any or all of the following: surface damage payments, annual rentals, royalties, and/or a through-put fee per quantity of gas. Production from Tribal minerals on Tribal surface provides royalties, tax revenues, and surface access and use fees to the Tribe, which contributes to the Tribe’s economic independence. Tribal surface in the CWSA is predominantly owned by the Ute Tribe and/or its allottees. There are a total of 774.5 acres of Indian minerals subject to three different leases within the entire CWSA, all of which are located in T9S:R22E. Royalties from minerals owned by the Ute Tribe are collected and distributed to Tribal members, shareholders of the Ute Distribution Corporation, and allottees. Royalty rates for Tribal/allotted minerals in the CWSA vary depending on the lease terms, and range from 12.5 percent to approximately 16.6 percent, for an average of 14.5 percent of production value. Approximately 15 wells are proposed on the 774.5 acres of Tribal and or allotted minerals. Assuming an average daily production of 61 Mscf per well and an annual production value of \$98,000 per well, the Proposed Action would yield an estimated \$213,150 in Tribal and/or allottee royalties per year.

4.15.2 MITIGATION

None.

4.15.3 Unavoidable Adverse Effects

Under the No Action Alternative, employment, wages, tax revenues, and Federal mineral royalties potentially associated with the development of wells on Federal minerals would unavoidably be foregone.

4.16 SUMMARY COMPARISON OF ALTERNATIVES

Table 4.16-1 provides a summary comparison between the Proposed Action and No Action Alternatives.

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Table 4.16-1. Comparison of Activities and Impacts by Alternative

Effects by Resource / Environmental Element	Proposed Action	No Action
Wells	1,260 acres of disturbance	256 acres of disturbance
Roads	362 acres of disturbance	64 acres of disturbance
Pipelines	101 acres of disturbance	7 acres of disturbance
Injection Wells	13 acres of disturbance	2.5 acres of disturbance
Total Surface Disturbance	1,735 acres	329.5 acres
Effects on surface water	<p>Increased sedimentation and turbidity of surface water as a result of ground disturbance and erosion into surface waters via runoff. Potential sediment loading to White River due to surface disturbance and erosion predicted to be approximately 4,014 tons/yr.</p> <p>Up to 263 acre-feet/per year could potentially be depleted from the Green and White Rivers due to project-related water consumption.</p> <p>Possible degradation of the natural and beneficial values served by floodplains of Coyote and Red washes.</p>	<p>Increased sedimentation and turbidity of surface water as a result of ground disturbance and erosion into surface waters via runoff. Potential sediment loading to White River due to surface disturbance and erosion predicted to be approximately 842 tons/yr.</p> <p>Up to 218 acre-feet/per year could potentially be depleted from the Depletion of water flow in the Green and White Rivers due to project-related water consumption.</p> <p>Possible degradation of the natural and beneficial values served by floodplains of Coyote and Red washes.</p>
Effects on ground water	Slight chance of groundwater contamination from spills, but applicant-committed measures as well as other design features of the Proposed Action (e.g., well pad and road construction techniques and drill pit containment) and SPCC plans would reduce potential.	Same as Proposed Action but smaller likelihood because of only 148 wells.
Effects on air quality during construction	Dust generated during construction of pads and roads and drilling wells would result in localized PM ₁₀ effects near construction.	Same as Proposed Action near each individual facility and road. However, effects would occur at 148 locations rather than the 627 locations of the Proposed Action.

Effects by Resource / Environmental Element	Proposed Action	No Action
Effects on air quality during operations	Maximum PM ₁₀ , NO ₂ , and CO ambient air concentrations predicted to be 13, 25, and 44%, respectively, of NAAQS. Maximum NO ₂ and PM ₁₀ predicted to be 13 and 31% of PSD Class II increment. HAP ambient concentrations predicted to be less than 1% of Chronic Inhalation Exposure, Reference Exposure, and Utah Toxic Screening Levels except formaldehyde and benzene, which are predicted to be 18% and 3% of the Reference Exposure Levels, 5% and 2% of the Chronic Inhalation Exposure Levels, and 45% and 20% of the Utah Toxic Screening Levels, respectively.	Maximum PM ₁₀ , NO ₂ , and CO ambient air concentrations predicted to be 3, 6, and 11%, respectively, of NAAQS since project emissions would be about 25% of Proposed Action. Maximum NO ₂ and PM ₁₀ impacts predicted to be 3 and 8% of PSD Class II increment.
Effects to air quality and air quality related values (AQRV) at Class I areas	Ambient pollutant concentrations predicted to be less than 0.1% of Class I increments. Maximum visibility effects predicted to be less than 3% of the “just noticeable change” threshold of 1.0 deciview. Nitrogen deposition value predicted to be less than 1% of 3.0 kg/ha/yr threshold.	Negligible effects that would be significantly less than those described for Proposed Action since project emissions would be 25% of Proposed Action.
Soil Loss	Soil loss estimated to be 4,014 tons/year.	Soil loss estimated to be 842 tons/year.
Loss of Vegetation	1,735 acres removed during construction. Although interim reclamation would be attempted after wells on individual pads are completed (see Appendix E), reclamation may take from years to decades.	329.5 acres removed during construction. Although interim reclamation would be attempted after wells on individual pads are completed (see Appendix E), reclamation may take from years to decades.
Effects on Special Status Vegetation Species	Surface disturbance could result in the loss of potential habitat for the Uinta Basin hookless cactus. Road development and subsequent increased public access could lead to illegal taking of plant.	Surface disturbance could result in the loss of potential habitat for the Uinta Basin hookless cactus. Road development and subsequent increased public access could lead to illegal taking of plant.

Effects by Resource / Environmental Element	Proposed Action	No Action
Loss of Wildlife Habitat	1,735 acres of general wildlife species habitat, habitat for raptor nesting and/or hunting, and habitat for migratory bird nesting and/or foraging removed. 714 acres of critical, year-long antelope habitat within the CWSA would be disturbed by new facilities. 71 acres of mule deer habitat within the CWSA would be disturbed by new facilities.	329.5 acres of general wildlife species habitat, habitat for raptor nesting and/or hunting, and habitat for migratory bird nesting and/or foraging removed. 82 acres of antelope critical year-long habitat within the CWSA would be disturbed by new facilities. 36 acres of critical year-long mule deer habitat within the CWSA would be disturbed by new facilities.
Effects to cultural resources	Pre-construction cultural surveys and subsequent avoidance measures for cultural sites would reduce potential impacts but likelihood exists that some sub-surface artifacts or sites could be inadvertently destroyed.	Pre-construction cultural surveys and subsequent avoidance measures for cultural sites would reduce potential impacts but likelihood exists that some sub-surface artifacts or sites could be inadvertently destroyed.
Effects to paleontological	Fossil-bearing geological formations extend into CWSA. Adverse effects would be minimized by paleontological surveys during APD process and subsequent protection measures developed for fossil resources. Earth-moving activities would immediately stop if fossils are discovered.	Same as Proposed Action but likelihood of discovering sites during surveys or uncovering during construction would be less as surface disturbance would be limited to Tribal, State and private lands.
Effects to land use	Continued use of lands within CWSA for oil and gas development and recreation. Loss of AUMs described in Rangeland Management.	Continued use of lands within CWSA for oil and gas development and recreation. Loss of AUMs described in Rangeland Management.
Effects to transportation	Average Annual Daily Traffic along main roads to the CWSA would increase by 2.2 to 3.4% during 7-year construction phase and less than 1% during operations.	Average Annual Daily Traffic along main roads to the CWSA would increase by 2.2 to 3.4% during 2-year construction phase and less than 1.0% during operations.
Effects to rangeland management	Long-term disturbance of 154 AUMs. Short-term impacts (e.g., traffic related delays) to sheep herding operations where construction and drilling activities occur in actively grazed areas.	Long-term disturbance of 9 AUMs. Short-term impacts (e.g., traffic related delays) to sheep herding operations where construction and drilling activities occur in actively grazed areas.
Effects to recreational opportunities	Continued development would further reduce solitude experience, which may be slightly offset by the construction of new access roads that could increase recreational access. If drilled, twin wells within the White River corridor would be drilled from June 15 through April 15, outside the typical boating season, to the extent possible in consideration of other applicable constraints,	Continued development would further reduce solitude experience, which may be slightly offset by the construction of new access roads that could increase recreational access. If drilled, twin wells within the White River corridor would be drilled from June 15 through April 15, outside the typical boating season, to the extent possible in consideration of other applicable constraints, such as seasonal restrictions

Effects by Resource / Environmental Element	Proposed Action	No Action
	such as seasonal restrictions associated with wildlife protection. If EOG is unable to schedule drilling operations outside of the boating season, a drilling rig, workover rig, and associated equipment may be visible to recreational boaters on the White River temporarily while a well is being drilled.	associated with wildlife protection. If EOG is unable to schedule drilling operations outside of the boating season, a drilling rig, workover rig, and associated equipment may be visible to recreational boaters on the White River temporarily while a well is being drilled.
Effects to visual resources	Project would be in conformance with BLM VRM classes. Project would contribute to a more industrialized setting within the CWSA.	Project would not occur in any areas where VRM classifications apply. Project would contribute to a more industrialized setting within the CWSA, but would not directly affect BLM lands.
Noise effects	Noise would be elevated near drill rigs and compressor stations, and along access roads. No residences are near CWSA facilities or planned since most of the land is Federal- or state-owned. CWSA facilities would be audible but below 55 dBA for recreational users on the White River.	Noise would be elevated near drill rigs and compressor stations, and along access roads. No residences are near CWSA facilities or planned since most of the land is Federal- or state-owned. CWSA facilities would be audible but below 55 dBA for recreational users on the White River.
Socioeconomics effects	<p>Implementation of the Proposed Action would provide both short-term and long-term employment. Local services from commercial to government services could accommodate any new workers from out of local area. Total of approximately \$2,268,000 in construction-related, on-location employee wages over the seven-year development period (in constant 2005 dollars). Total of \$9,072,000 in drilling and completion-related, on-location employee wages over the seven-year development period. Total of approximately \$17,280,000 over the 40-year life of the project (in constant 2005 dollars). Over time wages may rise in nominal terms because of inflation.</p> <p>Total production revenues would be approximately \$2.3 billion. Approximately \$6.7 million would be generated in Federal mineral royalties per year.</p>	<p>Implementation of the No Action Alternative would provide both short-term and long-term employment. Local services from commercial to government services could accommodate any new workers from out of local area. Total of \$648,000 in construction-related, on-location employee wages over the two-year development period. Total of \$2,592,000 in drilling and completion-related, on-location employee wages over the two-year development period. Total of approximately \$5,184,000 over the 40-year life of the project (in constant 2005 dollars). Over time nominal wages may rise because of inflation.</p> <p>Total production revenues generated by all 144 wells over the 40-year life of the project would be approximately \$5.6 million. Approximately \$1.0 million would be generated in Federal mineral royalties per year.</p>