

4.0 ENVIRONMENTAL IMPACTS

This chapter of the EA provides an analysis of the impacts or environmental consequences that would result from implementation Alternatives A through D. An environmental impact or consequence is defined as a modification or change in the existing environment brought about by the action taken.

This chapter assumes the following:

- A producing well would have a 25-year life span.
- It takes approximately seven days to build one well pad location
- It takes up to ten days to drill one location.

This section analyzes the direct and indirect impacts that the Proposed Action or Alternative to the Proposed Action would have on the resources described in Chapter 3. The wells in Section 36 T10S R22E and Section 32 T10S R23E are on State of Utah (SITLA) administered lands, and the wells in the NENW, NWNE, SENE of Section 30 T10S R23E are on private land. Although the impacts of the development of these wells will be analyzed in this section, it should be noted that the BLM has no authority over activities on these lands.

4.1 AREAS OF CRITICAL ENVIRONMENTAL CONCERN

4.1.1 Alternative A – Proposed Action

As there are no ACECs currently designated by the Book Cliffs RMP within the Project Area, no ACECs would be impacted by the Proposed Action. The Proposed Action would, however, result in impacts to those areas being considered for ACEC designation under the Vernal FO Draft RMP.

Within the area proposed as an ACEC under the various alternatives of the Draft RMP, up to 14 new well pads, approximately eight miles of road and pipeline, six miles of water pipeline, and the two water pump systems would be constructed.

The potential impacts to the relevant and important values for which the area was nominated are discussed in the following sections: Potential impacts on wetland and riparian habitats are discussed in Section 4.6.1; potential impacts on Goblin City, the campsite, river recreation, and the White River viewshed are discussed in Section 4.8.1; and potential impacts on wildlife are discussed in Section 4.11.1. Based on the impacts disclosed in those sections, as well as adherence to applicant-committed measures and additional mitigation identified, impacts to the relevant and important values of the proposed ACEC area are expected to be minimal.

Should an alternative containing the proposed ACEC be selected in the Record of Decision of the Vernal FO RMP, the existing Rock House leases would be pre-existing rights which would include the right to be provided reasonable access to the leased parcel and to install or use existing off-lease facilities necessary to develop the oil and gas resources of the parcel.

4.1.2 Alternative B – Resource Protection Alternative

As with Alternative A – Proposed Action, since no ACECs currently exist in the Project Area (as designated by the Book Cliffs RMP), no ACECs would be impacted by Alternative B – Resource Protection Alternative. Impacts to the proposed ACEC areas would be similar in nature to those

described in Section 4.1.1, specific differences related to Alternative B – Resource Protection Alternative are described below.

The potential impacts to the relevant and important values for which the area was nominated are discussed in the following sections: Potential impacts on wetland and riparian habitats are discussed in Section 4.6.2; potential impacts on Goblin City, the campsite, river recreation, and the White River viewshed are discussed in Section 4.8.2; and potential impacts on wildlife are discussed in Section 4.11.2. Based on the impacts disclosed in those sections, as well as adherence to applicant-committed measures and additional mitigation identified, impacts to the relevant and important values of the proposed ACEC area are expected to be minimal.

Under Alternative B, up to 12 new well pads, approximately seven miles of road, six miles of water pipeline, eight miles of gas line, and two water pump systems would be constructed within areas being considered for ACEC designation.

4.1.3 Alternative C – Leasing and Development with Restricted Surface Use

As with Alternative A – Proposed Action, since no ACECs currently exist in the Project Area (as designated by the Book Cliffs RMP), no ACECs would be impacted by Alternative C – Leasing and Development with Restricted Surface Use. Impacts to the proposed ACEC areas would be similar in nature to those described in Section 4.1.1, specific differences related to Alternative C – Leasing and Development with Restricted Surface Use are described below.

The potential impacts to the relevant and important values for which the area was nominated are discussed in the following sections: Potential impacts on wetland and riparian habitats are discussed in Section 4.6.3; potential impacts on Goblin City, the campsite, river recreation, and the White River viewshed are discussed in Section 4.8.3; and potential impacts on wildlife are discussed in Section 4.11.3. Based on the impacts disclosed in those sections, as well as adherence to applicant-committed measures and additional mitigation identified, impacts to the relevant and important values of the proposed ACEC area are expected to be minimal.

Up to ten new well pads, approximately eight miles of road, four miles of water pipeline, and nine mile of gas line would be constructed within the area being considered for ACEC designation. Increases in development related to road and pipeline construction as compared with the other alternatives would be related to the restricted surface use on lease #UTU-81737 requiring realignment of roads and pipelines of the lease.

4.1.4 Alternative D – No Action

ACEC designations do not apply to State or private lands. As such, implementation of Alternative D would have no impact on ACECs in the Project Area.

4.2 CULTURAL RESOURCES

Cultural resources are sensitive and nonrenewable resources that can be irreversibly damaged or destroyed by ground-disturbing activities, such as site and road construction, and secondary surface activities, such as vehicular and pedestrian traffic. Oil and gas development in the Project Area is a Federal undertaking in accordance with 36 CFR 800 (regulations implementing provisions of Section 106 of the National Historic Preservation Act of 1966). Any potential undertaking must consider potential effects to significant historic properties and must conform to Federal regulations in determining effects

that a project may have on significant cultural resources 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.

4.2.1 Alternative A – Proposed Action

Enduring Resources has initiated and agreed to fund a historically-sensitive stabilization and restoration project for the Rock House (42Un5015). The goals of the project are to 1) preserve the integrity of the existing stone cabin; 2) slow the natural agents of deterioration; 3) reduce possible public hazards; 4) place an interpretive sign or kiosk; and 5) construct an appropriate fence surrounding the structure. This would involve extensive stabilization and restoration of the stone walls that make up the structure of the cabin, the pine log roof, and the historic fencing. In addition, the project would incorporate an interpretive sign or kiosk that would inform visitors to the site of the historical significance of the Rock House. This stabilization and restoration effort is consistent with Federal and state objectives toward responsible environmental stewardship and the principles of sustainable multiple use. Direct impacts to this historic site would also be avoided by routing the proposed access road/pipeline in the site's vicinity to the east and north of the site's boundaries.

The other known eligible site (42Un3075) would be avoided by routing the proposed access road/pipeline in the site's vicinity to the west by a distance of at least 50 feet away from the western boundary of the site.

Generally speaking, many of the known archaeological sites in the Uinta Basin are shallow and therefore vulnerable to the direct impacts of vegetation clearing, right-of-way blading, and excavation of soils. As noted in the Applicant-Committed Mitigation Measures described in Section 2.8, Class III inventories would be conducted in all areas proposed for surface disturbance. These surveys would be conducted on a site-specific basis prior to the issuance of an APD. At each proposed well location, a ten acre square parcel will be defined, centered on the well pad center stake. The interior of the well location would be examined for cultural resources by an archaeologist walking parallel transects spaced no more than 10 m (30 ft) apart. The access and pipeline routes will be surveyed to a width of 69 m (200 ft). If cultural resources are identified during the Class III inventories, a determination of NRHP eligibility would be determined in consultation with SHPO prior to any surface disturbance. All prehistoric and historic sites documented during the Class III inventory as eligible for listing on the NRHP, as well as areas identified as having a high probability of significant subsurface materials would be avoided by development. Specifically, well pad locations and access/pipeline routes would be altered or rerouted as necessary to avoid impacting NRHP-eligible sites. If avoidance is not feasible or does not provide the required protection, adverse effects would be mitigated (e.g., data recovery through excavation).

Cultural resources are subject to indirect impacts that frequently result from increased vehicular and pedestrian traffic associated with 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 opened to energy exploration. To minimize any potential indirect impact to cultural resources and to maintain compliance with Federal and State cultural resource legislation, the operator has committed to numerous mitigation measures that would reduce or eliminate these impacts (Section 2.8.1).

4.2.2 Alternative B – Resource Protection Alternative

Under Alternative B – Resource Protection Alternative, potential impacts to cultural resources including site damage or destruction due to ground disturbing activities would be similar to those described under Alternative A – Proposed Action. An exception is that Alternative B is not anticipated to directly impact one known eligible site (42Un3075). All Applicant-Committed Mitigation Measures designed to prevent impacts to cultural resources, described in Section 2.8, would also be performed under Alternative B – Resource Protection Alternative. As such, potential impacts to cultural resources under Alternative B – Resource Protection Alternative would be identical to those presented under Alternative A – Proposed Action.

4.2.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C - Leasing and Development with Restricted Surface Use, potential impacts to cultural resources including site damage or destruction due to ground disturbing activities would be similar to those described under Alternative A – Proposed Action. An exception is that Alternative B is not anticipated to directly impact one known eligible site (42Un3075). All Applicant-Committed Mitigation Measures designed to prevent impacts to cultural resources, described in Section 2.8, would also be performed under Alternative C - Leasing and Development with Restricted Surface Use. As such, potential impacts to cultural resources under Alternative C - Leasing and Development with Restricted Surface Use would be identical to those presented under Alternative A – Proposed Action.

4.2.4 Alternative D – No Action

Because the areas of surface disturbance under Alternative D – No Action occur exclusively on State lands, the operator would follow all State laws and regulations intended to locate, document, and evaluate potential effects to cultural resources. If necessary, the operator would develop mitigation measures designed to protect cultural resources within the Project Area. As such, potential impacts to cultural resources including site damage or destruction due to ground disturbing activities would be similar to those described under Alternative A – Proposed Action, however, these impacts would only occur on State lands. In addition, no direct impacts to the Rock House (42Un5015) or to the other known eligible site (42Un3075) would occur under Alternative D – No Action, and the recommended avoidance measures and restoration project designed to protect these resources would not occur.

4.3 PALEONTOLOGICAL RESOURCES

The Uinta and Green River Formations are categorized as Condition 1 and Condition 2 paleontological formations. Condition 1 formations are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils, and Condition 2 formations have a high probability to contain fossils (Hamblin 2006). Surface-disturbing activities, such as site and road construction, and secondary surface activities, such as vehicular and pedestrian traffic, can irreversibly damage or destroy sensitive paleontological resources and result in the loss of scientifically important fossils. Alternatively, construction of well pads, access roads, and pipeline corridors may have a positive effect by uncovering or revealing scientifically important fossils.

Where surface-disturbing activities occur on previously disturbed areas, fossil resources would not be affected. However, where surface disturbance is proposed on undisturbed areas, paleontological resources would be at risk. Where fossils occur on the surface within these areas, they may potentially be broken or destroyed during surface-disturbing activities. Disturbance of bedrock for the construction of reserve pits and access roads also results in the potential for exposing, breaking, and destroying fossils.

4.3.1 Alternative A – Proposed Action

As noted in the Applicant Committed Mitigation Measures presented in Section 2.8, direct impacts to potentially sensitive paleontological sites within areas of proposed surface disturbance would be avoided under the Alternative A - Proposed Action. Because of the potential for fossil resources to occur in the Project Area, paleontological surveys would be conducted by a SMA-approved paleontologist prior to any surface disturbance under Alternative A - Proposed Action. 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 SMA would determine the need for further monitoring of the area or mitigation of the site during surface-disturbing activities. Also, if fossils are encountered by the project operator during excavation, construction would be suspended and the appropriate SMA would be notified. Construction would not resume until the fossils are assessed by the SMA Authorized Officer, and appropriate mitigation, monitoring, and/or compliance measures are developed and implemented.

If vertebrate fossils or noteworthy invertebrate or plant fossils are found, steps would be taken, as directed by the SMA Authorized Officer, to prevent loss of paleontological information and resources. Those steps would likely include an appropriate combination of the following avoidance and mitigation strategies:

- Sampling.** Fossil material may be sampled if needed to determine the significance of the find.
- Salvage.** Salvage may be required if the fossil discovery is of scientific interest and the proposed development would destroy the site, if time- and cost-effective. Much of the fossil material from this area is small and can be quickly collected. Often, once the material from a particular site has been collected and properly recorded, the need for further protection ceases.
- Rerouting.** Rerouting of project facilities may be suggested if critical or significant fossil material is discovered directly on a road or pipeline route or proposed well pad. This option would be considered if the fossil locality is scientifically very important and should be left undisturbed for subsequent scientific evaluation.
- Relocation.** Occasionally it might be appropriate to move fossils out of the impact zone and relocate them nearby. This option might apply to poorly-preserved fossils of limited extent.
- Monitoring.** If field surveys suggest that critical or significant fossil material is likely to be encountered in a certain area, monitoring by a qualified paleontologist during surface-disturbing activities may be required.

4.3.2 Alternative B – Resource Protection Alternative

Although the amount of surface disturbance under Alternative B – Resource Protection Alternative would be less than for the Proposed Action, the potential impacts to paleontological resources, including damage or destruction to sensitive and scientifically important fossils due to surface-disturbing activities, would be similar.

4.3.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C - Leasing and Development with Restricted Surface Use, potential impacts to paleontological resources, including damage or destruction to sensitive and scientifically important fossils due to surface-disturbing activities would be similar to those described for the Proposed Action.

4.3.4 Alternative D – No Action

Under Alternative D, potential impacts to paleontological resources, including damage or destruction to sensitive and scientifically important fossils due to ground-disturbing activities would be similar to those described for the Proposed Action. However, the amount of surface disturbed would be substantially less (less than 1% of that for the Alternative A - Proposed Action), and would only occur on State lands.

4.4 WATERSHED RESOURCES

4.4.1 Alternative A – Proposed Action

Potential impacts to surface water resources, including the White River, from the Proposed Action include increased erosion and sedimentation to area watercourses, pollution of surface water due to accidental spills or loss of containment of petroleum products, fuels and other chemicals, depletion of water available to downstream users, and damage to floodplains and associated wetlands. Potential impacts to floodplains are discussed in Section 4.5 and potential impacts to wetlands are discussed in Section 4.6.

Increased erosion of soil surfaces could lead to increased sediment delivery to the ephemeral drainages in the Project Area, and eventually, the White River. As discussed in Section 4.10, the total expected additional erosion initially produced by the Proposed Action would be about 307 tons per year.

Sedimentation control devices would be used along the proposed access roads and at drilling locations to minimize the amount of sediment that reaches any ephemeral drainage in the Project Area. The sedimentation control devices to be used would be specified during the APD process for each proposed well pad, access road, and other project facilities. With the proper application of sedimentation control devices, the actual amount of sediment that would be transported to the ephemeral drainages within the proposed Project Area and on to the White River would be much less than additional gross erosion estimated. Studies concerning the effectiveness of sedimentation control devices for oil and gas sites are not available. However, several studies conducted in urban settings provide insight into the potential effectiveness of the sedimentation control devices that would likely be employed for erosion control in the Project Area. EPA (1999) estimated that the expected TSS removal efficiency for retention basins, infiltration basins, and vegetated filter strips are all in the range of 50-80%. Actual performance for these sedimentation control devices was reported to be 70% for retention basins, 89% for infiltration basins, and 81% for vegetated filter strips. In another study, EPA (2004) reported ranges of TSS removal of 58-78% for retention basins, 75% for infiltration basins, and 54-84% for vegetated filter strips. Using these studies as examples, it is assumed that the sedimentation control devices employed for this project would be about 80% effective at removing TSS from runoff.

In addition to the sedimentation control devices, natural factors which attenuate the transport of sediment into creeks include water available for overland flow, the texture of the eroded material, the amount and kind of ground cover, the slope shape, gradient, and length, and surface roughness (Barfield et al 1981). Assuming the installation of sedimentation control devices on every disturbed area, assuming an 80% effectiveness of those devices in reducing TSS, and ignoring the natural factors that affect sediment delivery, the estimated additional sediment delivery to the White River would be about 61.4 tons per year. For the White River, the current sediment loading rate, calculated at the USGS gauging station near Ouray, is about 2,200,000 tons annually. Therefore, the additional sediment loading to the White River from the Proposed Action would be less than 0.003%. Turbidity could be expected to increase by a similar amount.

Accidental spills or leaks of hydrocarbon products, including fluids produced from the wells and fuels used to power generators and pumps, would have the potential to contaminate surface waters. The Proposed Action has been designed to minimize the chance of spills or leaks of petroleum and other fuels or fluids. Standard industry practices and safety measures associated with the installation of roads, pipelines, water pumps, and well pad facilities would be implemented to minimize the risk of accidental spills or introduction of contaminants to Project Area drainages. For example, the operator would implement a Spill Prevention, Control, and Countermeasure (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 SPCC Plan would contain measures for the construction of containment dikes around production facilities that contain fluids (i.e., production tanks, produced water tanks), and additional spill prevention and control measures established for each type of facility or operations, and training materials. To minimize the chance of leaks, or ruptures, all pipelines would be hydrostatically tested as described in Section 2.3.6. In addition, produced water would be confined within a closed-loop system or a lined reserve pit during drilling. Tanks containing produced fluids (i.e., condensate or produced water) would be surrounded by berms capable of holding 110% of the tank contents. Each tank would be periodically pumped and the contents either disposed of offsite at a certified commercial facility or reused at other drilling locations.

Any spills of oil, natural gas condensate, produced water, fuels, or other fluids that occur during the construction, drilling, completion, operation, or abandonment phase of the proposed project would be immediately reported to the BLM and any other responsible regulatory agencies (e.g., EPA National Response Center, State of Utah). Strict cleanup efforts would be initiated immediately.

Under the Proposed Action, approximately 51 acre-feet of water would be utilized for the drilling and completion of 60 proposed wells and dust abatement over an assumed 4-6 year development period. Annual flow depletion from the White River would therefore be 8.5-12.8 acre-feet per year. The water would be obtained from the White River. The average annual flow in the White River at Asphalt Wash is about 387,426 acre-feet. Therefore, the Proposed Action would deplete the flow in the White River by only about 0.002-0.003% annually. This project-related flow depletion would be insignificant from a hydrologic standpoint.

Potential impacts to groundwater resources could include contamination of aquifers from drilling pipe leaks. Adherence to Onshore Order #2 and the approved drilling program would effectively isolate all geologic formation in the drill hole and would eliminate contamination between hydro-carbon-bearing zones and water aquifers. As such, it is highly unlikely there would be an impact to groundwater resources.

4.4.2 Alternative B – Resource Protection Alternative

Under Alternative B – Resource Protection Alternative, potential impacts to watershed resources would be similar to those described for the Proposed Action.

Under Alternative B – Resource Protection Alternative, the additional erosion would initially be approximately 267 tons per year, or about 21% less than that for the Proposed Action. All of this decrease in sediment transport would occur in the Saddletree Draw drainage. Assuming that the sediment control devices employed would be about 80% effective at removing TSS, and if the natural factors that affect sediment delivery are ignored, the estimated additional sediment delivery to the White River would be about 53.4 tons per year. If it is assumed that all sediment delivered to the ephemeral drainages in the Project Area would be eventually transported to the White River, the additional sediment loading to the White River from Alternative B would be less than 0.003%. Turbidity could be expected to increase by a similar amount.

The potential impacts to water quality from Alternative B – Resource Protection Alternative are similar to those for the Alternative A - Proposed Action. However, the probability of a spill occurring in Saddletree Draw is lower than for the Alternative A - Proposed Action. Under Alternative B – Resource Protection Alternative, the standard industry practices and safety measures described above for Alternative A - Proposed Action would be implemented to minimize the risk of accidental spills or introduction of contaminants to Project Area drainages.

Under Alternative B – Resource Protection Alternative, approximately 37.4 acre-feet of water would be utilized for the drilling and completion of 44 proposed wells and dust abatement over an assumed 4-6 year development period. Therefore, annual water depletion would be 6.2-9.4 acre-feet per year. Accordingly, Alternative B – Resource Protection Alternative would deplete the flow in the White River by only about 0.0014-0.002% annually. This project-related flow depletion would be insignificant from a hydrologic standpoint.

4.4.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C – Leasing and Development with Restricted Surface Use, potential impacts to watershed resources would be similar to those described for the Proposed Action.

Under Alternative C – Leasing and Development with Restricted Surface Use, the additional erosion would initially be approximately 307 tons per year, identical to that for the Alternative A - Proposed Action. Although initial surface disturbance under Alternative C – Leasing and Development with Restricted Surface Use would be identical to the Proposed Action, the locations of these disturbances would be different. Under Alternative C – Leasing and Development with Restricted Surface Use, access road development would not occur on the ridge tops in Sections 30 and 31 T10S R23E, instead these access routes would be realigned to parallel existing ephemeral drainages. As these drainages are extremely narrow and steep, road development would require extensive cuts and fills. In addition to road re-alignments, a proposed pipeline would also be constructed under Alternative C that would parallel Saddletree Draw to transport gas from well pads located on private lands in Section 30, and a section of existing road within the upper portion of the drainage would be improved. As such, potential detrimental impacts to water resources such as the potential for accidental spills directly into Saddletree Draw would be the highest under this alternative.

Assuming that the sedimentation devices employed would be about 80% effective at removing TSS, and if the natural factors that affect sediment delivery are ignored, the estimated additional sediment delivery to the White River would be about 61.4 tons per year. If it assumed that all sediment delivered to the ephemeral drainages in the Project Area would be eventually transported to the White River, the additional sediment loading to the White River from Alternative C – Leasing and Development with Restricted Surface Use would be about 0.003%. Turbidity could be expected to increase by a similar amount.

Under Alternative C – Leasing and Development with Restricted Surface Use, the standard industry practices and safety measures described above for Alternative A- Proposed Action would be implemented to minimize the risk of accidental spills or introduction of contaminants to Project Area drainages.

Under Alternative C – Leasing and Development with Restricted Surface Use, approximately 47.6 acre-feet of water would be utilized for the drilling and completion of 56 proposed wells and dust abatement over an assumed 4-6 year development period. Therefore, annual water depletion would be 7.9-11.9 acre-feet per year. Accordingly, Alternative C – Leasing and Development with Restricted Surface Use would

deplete the flow in the White River by only about 0.0018-0.0027% annually. This project-related flow depletion would be insignificant from a hydrologic standpoint.

4.4.4 Alternative D – No Action

Potential impacts to watershed resources under Alternative D – No Action would be similar in nature as those described for the Proposed Action but of much less magnitude.

Under Alternative D – No Action, the additional erosion would initially be approximately four tons per year, or about 1% of that for Alternative A - Proposed Action. Assuming that the sediment control devices employed would be about 80% effective at removing TSS, and if the natural factors that affect sediment delivery are ignored, the estimated additional sediment delivery to the White River would be less than one ton per year.

Under Alternative D – No Action no development would occur in Saddletree Draw or Atchees Wash, therefore, water quality in this wash would not be affected. Under Alternative D – No Action, the standard industry practices and safety measures described above for Alternative A - Proposed Action would be implemented to minimize the risk of accidental spills or introduction of contaminants to other Project Area drainages.

Under Alternative D – No Action, approximately three acre-feet of water would be utilized for the drilling and completion of nine proposed wells and dust abatement over an assumed 4-6 year development period. Therefore, annual water depletion would be 0.5-0.75 acre-feet per year. This project-related flow depletion would be insignificant from a hydrologic standpoint.

4.5 FLOODPLAINS

4.5.1 Alternative A – Proposed Action

Potential impacts to floodplains from the Proposed Action are similar to those for surface water, and include increased sedimentation, pollution of surface water or shallow groundwater due to accidental spills or loss of containment of petroleum products, fuels and other chemicals, and damage to or loss of riparian vegetation.

Executive Order 11988 requires Federal agencies to make decisions in a manner that promotes the avoidance of 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. The Book Cliffs RMP (BLM 1985) supports Executive Order 11988, stating that no surface disturbance or occupancy will be allowed on the 100-year floodplains of Bitter, Evacuation, Hill, Sweetwater, and Willow Creeks, and the Green and White Rivers. This stipulation may be waived by the Authorized Officer if the operator demonstrates that adverse impacts can be mitigated. No restrictions were proposed for Saddletree Draw or Atchees Wash.

Portions of the White River 100-year floodplain occur in the northern portion of the Project Area. Under Alternative A – Proposed Action, portions of the proposed water collection pumps, sump, water pipes, and water hoses would be placed in these areas. The amount of vegetation disturbed from utilization of this pump system would be minimal (less than 0.01 acres) and would have negligible impacts on floodplain habitats. Potential indirect impacts associated with this Alternative include the potential for contamination of floodplain habitat in the case of a fuel spill. To reduce the potential for contamination, the trailer-mounted Baldor Mobile Power Generator, would be placed outside of the White River 100-

year floodplain, and would be placed inside of a lined earthen berm to prevent contamination of adjacent waterways in the case of an accidental spill of diesel fuel or other hydrocarbons. Use of the water collection system would actually decrease cumulative potential impacts to the White River 100-year floodplain by eliminating vehicle (water truck) traffic in these areas, thereby decreasing the potential spread of invasive or noxious weeds, and the amount of produced fugitive dust and sedimentation associated with heavy truck traffic. As a result, implementation of the water pump system would produce fewer adverse impacts in comparison to a truck/transport system (see Section 2.3.10). As use of the water pump system would be temporary (lasting until drilling is complete) and would not cause any detrimental impacts to the ecological functionality of the 100-year floodplain, the action would be consistent with EO11988 and the Book Cliffs RMP.

Under Alternative A - Proposed Action, no proposed well pad locations would be located within the 100-year floodplain of Saddletree Draw. However, the existing road within this drainage would be realigned to move the road off of the 100-year floodplain as much as possible, as restricted by topography, as described in Section 2.3.3. The proposed alignment was chosen to accommodate increased traffic, reduce sedimentation, and create an all-weather road. Although the road realignment adjacent to the drainage would disturb existing vegetation, potentially increasing sedimentation in the short-term, the new alignment would be expected to reduce impacts to the 100-year floodplain within Saddletree Draw over the long-term.

Three well pads would be developed along the existing Atchees Wash road within or adjacent to the 100-year floodplain of Atchees Wash. These well pad locations were selected by the BLM during on-sites, in an effort to decrease overall surface disturbance and subsequent erosion and sedimentation, by reducing additional road development. It was determined by the Utah Department of Water Rights that a 404 Stream Alteration Permit would not be required (UDWR 2006) for these actions. Should a large rain event cause flooding in Atchees Wash, well pads located in the 100-year floodplain could be temporarily submerged. However based upon their proposed locations (i.e., periphery of the 100-year floodplain, approximately 25 feet above the active channel), water flows across these locations would be minor and would not cause damage to the existing facilities. Applicant-committed mitigation measures that would be implemented at these locations to minimize impacts to floodplains include closed loop drilling, the use of earthen berms around production facilities, and the installation of silt fencing or other approved erosion control methods (Section 2.2.12.3). With implementation of these measures, the potential impacts to the existing floodplain are expected to be minor.

In addition to well pad development along Atchees Wash, the existing road within Atchees Wash would be realigned to move the road off of the floodplain to the extent possible, as restricted by topography, as discussed in Section 2.2.3. The proposed alignment was chosen to accommodate increased traffic, reduce sedimentation, create an all-weather road, protect important drainage patterns, and to remove vehicular traffic from the drainage bottom. Although the road realignment in and adjacent to the drainage would disturb existing vegetation, potentially increased sedimentation in the short term, the new alignment would be expected to reduce impacts to the floodplain in Atchees Wash over the long-term.

4.5.2 Alternative B – Resource Protection Alternative

Potential impacts to floodplains under Alternative B – Resource Protection Alternative would be similar in nature to those for the Proposed Action. However, under Alternative B, two well pads and associated access roads and co-located pipelines proposed for the center of Lease UTU-81737 would not be constructed. In addition, two well pads located on State lands in Section 32 would not be expanded for directional drilling. Therefore, there would be less surface disturbance in the watershed of Saddletree Draw, and less potential increased sedimentation to the floodplain along this drainage. Potential impacts to the floodplain along Atchees Wash would be the same as for the Proposed Action.

4.5.3 Alternative C – Leasing and Development with Restricted Surface Use

Potential impacts to floodplains under Alternative C – Leasing and Development with Restricted Surface Use would be similar in nature to those for the Proposed Action. However, under Alternative C, restricted surface use would be applied in Lease UTU-81737, eliminating four well pads and associated access roads and co-located pipelines from the watershed of Saddletree Draw, and greatly reducing potential increased sediment delivery to the floodplain of this drainage as compared to the Proposed Action. However, under Alternative C, a pipeline would be installed within the floodplain of Saddletree Draw for a distance of approximately two miles to serve the additional wells that would be drilled on the existing well pads on State lands located along Saddletree Draw. In addition, a new road would be constructed north of Lease UTU-18737 to provide reasonable access to this lease. The existing road in the upper portion of the Saddletree Draw would also be improved under this alternative. The installation of this pipeline and improvements to the existing road would disturb surface soils on this floodplain and increase the short-term sediment production rates and the probability that spills would occur and reach Saddletree Draw or the White River. Because of the construction of the roads and pipelines within Saddletree Draw, this alternative would have the greatest potential impacts to the floodplain of Saddletree Draw. Potential impacts to the floodplain along Atchees Wash would be the same as for the Proposed Action. In addition, as the pump and truck system proposed under Alternative C would only be used for a portion of the proposed wells and as the remaining wells would use water obtained by tanker truck directly from the White River, impacts (i.e., spread of invasive or noxious weeds, and the amount of produced fugitive dust and sedimentation) to the White River floodplain would also increase under Alternative C.

4.5.4 Alternative D – No Action Alternative

Under Alternative D – No Action, no well pads, roads, or pipelines would be constructed in Saddletree Draw, Atchees Wash, or the White River, and there would be no impacts to the floodplains of these drainages.

4.6 WETLANDS/RIPARIAN ZONES

4.6.1 Alternative A – Proposed Action

Wetlands and riparian habitats occur along the White River. Under Alternative A – Proposed Action, portions of the proposed water collection pumps, sump, and water pipes would be placed in these areas. The amount of vegetation disturbed from their development would be minimal (less than 0.01 acres) and would have negligible impacts on these habitats. Potential indirect impacts associated with this Alternative include the potential for contamination of wetland and riparian habitat in the case of a fuel spill. To reduce the potential for contamination, the trailer-mounted Baldor Mobile Power Generator, would be placed outside of the White River floodplain, and would be placed inside of a lined earthen berm to prevent contamination of adjacent waterways in the case of an accidental spill of diesel fuel or other hydrocarbons. Use of the water collection system would actually decrease cumulative potential impacts to wetlands and riparian zones by eliminating vehicle (water truck) traffic in these areas, thereby decreasing the potential spread of invasive or noxious weeds, and the amount of produced fugitive dust and sedimentation associated with heavy truck traffic. As a result, implementation of the water pump system would produce fewer adverse impacts in comparison to a truck/transport system (see Section 2.3.10).

4.6.2 Alternative B – Resource Protection Alternative

As wetlands and riparian zones only occur along the White River and as the water pump system under Alternative B – Resource Protection Alternative is identical to that under Alternative A – Proposed Action, potential impacts to wetlands and riparian zones Under Alternative B – Resource Protection Alternative would be to those described under Alternative A - Proposed Action.

4.6.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C – Leasing and Development with Restricted Surface Use, potential impacts to wetlands and riparian zones would be similar to those described under Alternative A - Proposed Action. However, under Alternative C - Leasing and Development with Restricted Surface Use, only one submersible pump would be installed, and the amount of disturbance in riparian and wetland habitat as a result of installation of the pump, sump, and associated piping would be decreased. It should be noted however that under both Alternatives, the amount of vegetation disturbed would be less than the 1.0 acre. As the pump and truck system proposed under Alternative C would only be used for a portion of the proposed wells and as the remaining wells would use water obtained by tanker truck directly from the White River, the potential spread of invasive or noxious weeds, and the amount of produced fugitive dust and sedimentation from truck traffic along the White River would increase under Alternative C. As such, impacts to wetland and riparian areas under Alternative C would be greater than those described under the Proposed Action.

4.6.4 Alternative D – No Action Alternative

Under Alternative D – No Action, all water needed for the project would be provided via tanker trucks and no submersible pumps would be installed within wetlands or riparian zones. Therefore, no wetland or riparian vegetation would be directly impacted by Alternative D – No Action.

4.7 INVASIVE AND NOXIOUS SPECIES

4.7.1 Alternative A – Proposed Action

Roads provide a major conduit for the spread of exotic plants into natural areas, particularly in arid and semiarid landscapes of the American West (Gelbard and Belnap 2003). Plant communities that are both physically invasible (e.g., characterized by deep or fertile soils) and disturbed appear to be most vulnerable. Under the Proposed Action, there would be an increased potential for encroachment of invasive and noxious plant species across newly disturbed soil surfaces from seeds which could be imported on the tires and frames of vehicles previously in weed infested areas. A total of approximately 106 acres would be directly disturbed by implementation of the Proposed Action. Reclamation would occur on unused portions of the well pads, within 90 days of completion of the wells for production. Until native vegetation is reestablished on disturbed areas, weed invasion could occur.

Specific negative effects of invasive plants and noxious weeds could 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 Project Area (Gelbard and Belnap 2003). However, as Enduring has committed to implementation of a reclamation and weed control program, these impacts are expected to be minimal across the Project Area.

4.7.2 Alternative B – Resource Protection Alternative

Under Alternative B – Resource Protection Alternative, Enduring would also commit to a reclamation and weed control program. As such, potential impacts from invasive and noxious plant species would be similar to those described under Alternative A - Proposed Action.

4.7.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C - Leasing and Development with Restricted Surface Use, Enduring would also commit to a reclamation and weed control program. However, as truck traffic under Alternative C – Leasing and Development with Restricted Surface Use would be greater, potential impacts from invasive and noxious weeds would be increased.

4.7.4 Alternative D – No Action Alternative

Under Alternative D – No Action, four existing wells pads would be expanded, and no well pads would be developed on Federal lands. As such, the potential impacts from invasive and noxious weeds Under Alternative D – No Action would be drastically lower than Alternative A – Proposed Action. It should be noted however, that water for the drilling of wells under Alternative D – No Action would be trucked from the White River and no water pump system would be utilized. This increased traffic would increase the potential spread of weeds into the area, and as Enduring would not be committed to develop a Weed Control Program, weeds could establish in development areas.

4.8 RECREATION

4.8.1 Alternative A – Proposed Action

Potential impacts to recreation from Alternative A - Proposed Action would consist of lost recreational opportunities or diminished recreational experience within and near the Project Area. Surface disturbance associated with the 13 new and seven expanded well pads (60 wells), as well as associated facilities, roads, and pipelines would be visible to recreational users within the core Project Area. The shift to an even more developed landscape, in combination with an increase in noise and traffic associated with construction, drilling, and completion activities would diminish the recreational experience of visitors seeking a more primitive environment.

Recreational impacts to specific sites and types of use are discussed below.

Goblin City: Although impacts to Goblin City itself would not occur, according to the viewshed analysis, five new well pads and two expanded pads could potentially be seen from the Goblin City Overlook (Figure 8), When the approximate locations of the proposed well pads are compared against an aerial photograph, however, it appears that most of these locations would be hidden by topography and vegetative screening (which is not factored into the viewshed analysis). In addition, Enduring has committed to painting the facilities a blending earth-tone color (Olive Black), to match the color and shadows of the surrounding vegetation and rocks. All wells would be located at a sufficient distance (0.6 miles or more) from the Goblin City Overlook and associated trail so that no noise impacts would occur to recreationists during operational activities.

No immediate impact on the number of users hiking to the Goblin City Overlook is expected as a result of the drilling of the proposed wells. However, a slight decrease in future use could occur as an increase in

oil and gas activity in the area may deter future users (BLM 1999) due to a perceived reduction in desired setting and recreational experience.

Atchee Wash Campsite: The closest well to the campsite would be located approximately one mile up the canyon. No audible disturbance is expected at the campsite due to distance and topographic screening. Although no surface disturbance would occur near the Atchee Wash Campsite, short-term visual impacts would be evident due to the presence of a temporary water collection hose that would run 50 feet from the White River to the Atchee Wash water pump, and a water pipeline which would run along Atchees Wash road from the Atchees Wash water pump. Additionally, a ¼-inch electrical line would run along the river corridor from Saddletree Wash to Atchees Wash, but would be largely screened from the view of the casual observer. These visual intrusions may detract from the recreational experience of those visitors expecting a more primitive setting.

River Recreation: According to the Book Cliffs RMP, no access road, earth cut and fill, and structures other than an active drilling rig, will be permitted if it can be viewed from the White River. This stipulation may be waived by the authorized officer if the operator can demonstrate that adverse impacts can be mitigated.

If the Proposed Action were implemented, all of the proposed and existing well pads would be hidden from the viewshed of White River by topographical screening; however, some proposed roads as well as the proposed water pumps, hose, and pipe may be visible (Figure 9). To mitigate adverse impacts above-ground structures would be painted Carlsbad Canyon to blend with the natural surroundings. The water pump generator, pumps, hose and connection line would be small structures that would be screened from view by topography and vegetation. Enduring's proposed water pump system would also reduce visual impacts by eliminating project related truck traffic and associated fugitive dust in the White River corridor.

Under Alternative A - Proposed Action, the nearest well pad would be ¾ of a mile away from the river. The nearest new road would be ¼ of a mile away from the river. The proposed wells may or may not be drilled during the primary recreational season. If wells were drilled during the recreation season, river recreationists may be able to see drill rigs on well pads closest to the river, and could possibly see fugitive dust plumes along access roads. Each drilling rig would be operational for up to 20 days, 24 hours/day per well. Night lighting would be visible for long distances. Following drilling, completion rigs could also be visible for another 10 days. Visible development activities would diminish the recreational experience of some visitors seeking a natural setting devoid of human influence.

The standard sound level for the proposed water pump generator, located approximately 100 feet from the river) is 67 dBA at 21 feet. As such, the sound level of the generator at the river can be estimated to be approximately 37 dBA (Harris 1991). However, since the generator muffler would be directed away from the river, the estimated sound level would most likely be less than 37 dBA. On May 3rd, 2006 the average sound level of the White River at the mouth of Saddletree Draw was 55.9 dBA. Based upon this information, it can be assumed that although the generator may be heard from the river, the sound would be muffled by the natural sound of the river, and would not be the dominant sound feature. The noise from the generator, therefore, would not likely impact recreational users on the river.

Off Highway Vehicle Use: Construction of access roads would provide increased access throughout the Project Area, and subsequent increased opportunities for OHV use. The area is currently managed as "open" to OHV use, with the exception of a ¼-mile buffer of the White River, which is closed to OHV use. No new roads would be located within ¼-mile of the White River, but one road is located at the ¼-mile boundary. The new access roads in the Project Area may invite access by OHV, which (except for within ¼ mile of the White River) would be within OHV management objectives. The new road that is

proposed to be ¼ mile from the White River may provide an opportunity for OHV recreationists to illegally use the closed area, however this impact is expected to be minimal as the new road branches off of the existing Saddletree Draw road. To minimize this impact, Enduring would place signs along the proposed road identifying where OHV travel is closed. Existing roads in the within ¼ mile of the White River (including Atchee Wash and Saddletree Draw roads) already provide OHV recreationists with an opportunity to access the closed area should they choose to ignore, or are ignorant of, the closed designation. The Draft Vernal FO RMP proposes to change the OHV category to either limited or closed depending on the category. Changes in OHV designations would not affect Enduring's lease rights nor would the OHV Alternatives in the Draft RMP be precluded by the Proposed Action.

Other Recreation: Recreationists (hunters, hikers, OHV users, etc.) who are in the Project Area during the construction or drilling period, might be able to hear the noise of construction and drilling operations, depending on proximity and topography. Recreationists who are on the roads in the Project Area during the drilling operations may notice an increase in traffic and human presence. The sights and sounds of human activity related to development, and the shift to an even more developed landscape, would diminish the recreational experience of visitors seeking a more pristine setting. For more information on the impacts to primitive and unconfined recreation please refer to Section 4.15 - Wilderness

4.8.2 Alternative B – Resource Protection Alternative

In general, impacts on recreation from the implementation of Alternative B – Resource Protection Alternative would be similar in nature to those described under Section 4.8.1 for the Proposed Action. Specific differences are described below.

General Recreation: Under Alternative B – Resource Protection Alternative, a total of 11 new and five expanded well pads (44 wells) are proposed along with necessary infrastructure. Surface disturbance and impacts associated with construction would be reduced to a small degree as compared to the Proposed Action.

Goblin City: According to the viewshed analysis, four new well pads and two expanded pads could potentially be seen from the Goblin City Overlook under Alternative B – Resource Protection Alternative. As with the Proposed Action, it appears that most of these locations would be hidden by vegetative screening.

4.8.3 Alternative C – Leasing and Development with Restricted Surface Use

In general, impacts on recreation from the implementation of Alternative C – Leasing and Development with Restricted Surface Use would be similar in nature to those described under Section 4.8.1 for the Proposed Action. Specific differences are described below.

General Recreation: Under Alternative C – Leasing and Development with Restricted Surface Use, a total of nine new and seven expanded well pads (56 wells) are proposed along with necessary infrastructure. Surface disturbance and impacts associated with construction would be reduced as compared to the Proposed Action.

Goblin City: According to the viewshed analysis, under Alternative C – Leasing and Development with Restricted Surface Use no new well pads and two expanded pads could potentially be seen from the Goblin City Overlook (Figure 8). As with the Proposed Action, it appears that most of these locations would be hidden by vegetative screening.

Atchee Wash Campsite: Under Alternative C – Leasing and Development with Restricted Surface Use, the closest well to the campsite would be approximately one mile up the canyon. No audible disturbance is expected to occur to visitors at the campsite due to distance and topographical screening. Although no surface disturbance would occur near the Atchee Wash Campsite, short-term visual impacts would be evident due to the presence of the water pump generator and water collection hoses that would run from the White River to Atchee Wash.

4.8.4 Alternative D – No Action Alternative

In general, impacts on recreation from the implementation of Alternative D – No Action would be similar in nature but substantially less than those described under Section 4.8.1 for the Proposed Action.

Under Alternative D, four existing well pads would be expanded. Alternative D would result in the least amount of surface disturbance and impacts associated with construction.

No expanded well pads would be constructed within the viewsheds of either the White River or Goblin City overlook. The water pump system would not be constructed along the White River and potential impacts of that system would not occur.

4.9 LIVESTOCK GRAZING

4.9.1 Alternative A – Proposed Action

Direct impacts to livestock grazing on BLM lands in the Project Area would consist of the removal of 72 usable acres of vegetation in the Olsen grazing allotment. These vegetation disturbances would result in a corresponding disturbance of approximately 12 AUMs which constitutes approximately 6% of the AUMs for the allotment. Indirect effects to livestock grazing on BLM lands could consist of reduced forage quality due to potential weed infestations (see Section 4.12); increased gas development-related traffic and potential traffic delays to ranchers accessing the Project Area during construction and drilling phases; and a potential increase in vehicle and livestock collisions because of increased traffic.

4.9.2 Alternative B – Resource Protection Alternative

Under Alternative B – Resource Protection Alternative, general short-term and long-term impacts to livestock grazing due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action. Specific differences are described below.

Direct impacts to livestock grazing on BLM lands in the Project Area would consist of the removal of approximately 61 usable acres of vegetation in the Olsen grazing allotment. These vegetation disturbances would result in a corresponding disturbance of approximately six AUMs which constitutes 5% of the AUMs for the allotment.

4.9.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C – Leasing and Development with Restricted Surface Use, general short-term and long-term impacts to livestock grazing due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action. Specific differences are described below.

Direct impacts to livestock grazing on BLM lands in the Project Area would consist of the removal of 65 usable acres of vegetation in the Olsen grazing allotment. These vegetation disturbances would result in a corresponding disturbance of approximately six AUMs which constitutes 5% of the AUMs for the allotment.

4.9.4 Alternative D – No Action Alternative

Under Alternative D – No Action, general short-term and long-term impacts to livestock grazing due to construction, drilling, and completion activities would be negligible as surface disturbing activities under this Alternative would be less than one acre.

4.10 SOILS

Potential impacts to soils in the Project Area from Alternatives A-D include the removal of vegetation, mixing of soil horizons, soil compaction, increased susceptibility of the soils to wind and water erosion, contamination of soils with petroleum products, and loss of topsoil productivity.

4.10.1 Alternative A – Proposed Action

Under Alternative A - Proposed Action, 17 well pads, 8.4 miles of access roads, and 8.9 miles of pipelines would be constructed, resulting in approximately 106 acres of new initial surface disturbance, or about 2.2 percent of the total Project Area of 4,826 acres. After interim reclamation, the residual surface disturbance would be about 76 acres (1.6 percent of the Project Area).

The primary effect of surface disturbances on soil resources is increased erosion and the resulting potential increase in sediment yield to nearby ephemeral drainages and perennial streams. The proposed project facilities would be located in areas characterized by badlands, rock outcrops and shallow, highly erosive soils. The delivery of sediment in this area is highly efficient because of the high gradient drainages and proximity to the White River.

The current average erosion rate for soils in the Uinta Basin is reported to be about 1.45 tons per acre per year (BLM 1984). Studies concerning the amount of increased erosion generated by the construction of oil and gas facilities have not been conducted. However, two studies conducted on sediment yield from disturbed surfaces provide insight into the amount of increased erosion that could be expected from construction of well pads, roads, and other project facilities in the Project Area. Lusby and Toy (1976) reported that yields from reclaimed surface mines were initially 300 percent to 600 percent higher than from undisturbed surfaces. Frickel et al. (1975) found that yields increased to about 2.9 tons/acre/year (about a 100 percent increase) in the Piceance Basin of Colorado after construction of oil shale project facilities. Using these studies as examples, it is assumed that average erosion rates for disturbed soils in the Project Area would initially triple from about 1.45 tons/acre/yr to about 4.35 tons/acre/yr, as shown below:

Background Rate	106 acres x 1.45 tons/acre/year = 154 tons/year
Initial Disturbance	106 acres x 4.35 tons/acre/year = 461 tons/year
Residual Disturbance	76 acres x 4.35 tons/acre/year = 331 tons/year

Using these numbers, during the initial period prior to interim reclamation, an additional 307 tons of erosion could be expected annually. Using the standard statistical measure Relative Percent Difference (RPD), this represents a theoretical increase in the erosion rate for the entire Project Area of about 4.3

percent. Following interim reclamation, the additional erosion would be reduced to about 177 tons per year.

Contamination of surface and subsurface soils near gas facilities can occur in oil and gas fields. Sources of potential contamination include leaks or spills of natural gas condensate liquids from wellheads, reserve pits, produced water sumps, and condensate storage tanks located on the well pads, leaks from natural gas gathering and conveyance pipelines, and spills of produced water or condensate from tanker trucks during transport of these materials. Of these materials, leaks or spills of natural gas condensate would have the greatest potential environmental impact. Leaks or spills of produced water, hydrofracturing chemicals, fuels, and lubricants could also result in soil contamination.

Depending on the size and type of spill, the effect on soils would primarily consist of the potential loss of soil productivity. In addition, petroleum released to surface soils infiltrates the soil and, under the right conditions, can migrate vertically until the water table is encountered, thus contaminating shallow groundwater. Contaminated groundwater could then potentially be discharged by springs or as baseflow into stream channels, leading to surface water contamination.

To reduce the potential for hydrocarbon contamination of soils, pipelines and associated collection piping would be designed to minimize the potential for spills and leaks. Storage tanks would be surrounded by berms capable of holding at least 110 percent of the largest single tank volume. Reserve pits would be lined with an impermeable liner to prevent infiltration of drilling fluids into the subsurface. Implementation of the project SPCC Plans would minimize the risk of such spills by providing safeguards against spills and detailing reporting and cleanup measures to be taken in the event of a spill.

Compaction due to construction activities at the well pads and along access roads would reduce aeration, permeability, and water-holding capacity of the soils. An increase in surface runoff could be expected, potentially causing increased sheet, rill, and gully erosion. The amount of additional runoff generated is expected to be negligible, based on the small amount of surface disturbance proposed.

4.10.2 Alternative B – Resource Protection Alternative

Under Alternative B, general initial and residual impacts to soil resources due to construction, drilling, and completion activities would be similar to those described for the Proposed Action.

Under Alternative B, 15 well pads, 7.8 miles of access roads, and 8.3 miles of pipelines would be constructed, resulting in approximately 92 acres of new initial surface disturbance, or about 1.9 percent of the total Project Area of 4,826 acres. After interim reclamation, the residual surface disturbance would be about 68 acres (1.4 percent of the Project Area)

Average erosion rates for disturbed soils in the Project Area would initially triple from about 1.45 tons/acre/yr to about 4.35 tons/acre/yr, as shown below:

Background Rate	92 acres x 1.45 tons/acre/year = 133 tons/year
Initial Disturbance	92 acres x 4.35 tons/acre/year = 400 tons/year
Residual Disturbance	68 acres x 4.35 tons/acre/year = 296 tons/year

Using these numbers, during the initial period prior to interim reclamation, an additional 267 tons of erosion could be initially expected annually, a decrease of about 21 percent from the additional erosion that would be generated by the Proposed Action. Following interim reclamation, the additional erosion would be reduced to about 163 tons per year.

Potential impacts to soils due to leaks or spills of produced water, hydrofracturing chemicals, fuels, and lubricants, and increased compaction, would be similar to those described for the Proposed Action.

4.10.3 Alternative C – Leasing and Development with NSO Stipulation

Under Alternative C, general short-term and long-term impacts to soil resources due to construction, drilling, and completion activities would be nearly identical to those described for the Proposed Action.

Under Alternative C, 13 well pads, 10.1 miles of access roads, and 10.0 miles of pipelines would be constructed, resulting in approximately 106 acres of new initial surface disturbance, or about 2.2 of the total Project Area of 4,862 acres. Even though less well pads would be constructed, the initial surface disturbance is the same as for the Proposed Action due to increased lengths of roads and pipelines that would be needed. After interim reclamation, the residual surface disturbance would be about 75 acres (1.6 percent of the Project Area).

Average erosion rates for disturbed soils would initially triple from about 1.45 tons/acre/yr to about 4.35 tons/acre/yr, as shown below:

Background Rate	106 acres x 1.45 tons/acre/year = 154 tons/year
Initial Disturbance	106 acres x 4.35 tons/acre/year = 461 tons/year
Residual Disturbance	75 acres x 4.35 tons/acre/year = 326 tons/year

Using these numbers, during the initial period prior to interim reclamation, an additional 307 tons of erosion could be initially expected annually, the same as for the Proposed Action. Following interim reclamation, the additional erosion would be reduced to about 172 tons per year.

Potential impacts to soils due to leaks or spills of produced water, hydrofracturing chemicals, fuels, and lubricants, and increased compaction, would be similar to those described for the Proposed Action.

4.10.4 Alternative D – No Action Alternative

Under Alternative D – No Action, general short-term and long-term impacts to soil resources due to construction, drilling, and completion activities would be negligible as surface disturbing activities under this Alternative would be less than one acre.

4.11 THREATENED, ENDANGERED, AND SENSITIVE ANIMAL SPECIES AND OTHER WILDLIFE

4.11.1 Alternative A – Proposed Action

Bald Eagle

The Project Area is approximately one mile south of the White River. As bald eagles typically utilize river habitats during winter months (November 1 – March 31), construction and drilling activities taking place during this time frame could disrupt bald eagles potentially roosting along the White River and/or foraging on upland habitats within the Project Area. Under Alternative A – Proposed Action, two submersible pump systems would be installed along to the White River, powered by a trailer-mounted generator. The generator would be in use only when water was needed for drilling and completion projects. Since drilling activities may occur year-round, noise from the generator has the potential to disrupt bald eagles during winter roosting periods. As mentioned in Section 2.3.10, the standard sound

level for the generator is 67 dBA at 21 feet. As such, the sound level of the generator at the river (~100 feet away) can be estimated to be approximately 37 dBA (Harris 1991). As the generator would be placed inside of an insulated steel building and would be situated so that the muffler would be directed away from the White River, the estimated sound level would most likely be less than 37 dBA. On May 3rd, 2006 the average sound level of the White River at the mouth of Saddletree Draw was 55.9 dBA. Based upon this information, it can be assumed that although the generator may be heard from the river, it would be muffled by the natural sound of the river, and would not be the dominant sound feature. In addition, during winter months (i.e., November 1 – March 31) Enduring has committed to only operate the generator during hours when bald eagles are typically not at roost locations (i.e., 9:00 am – 4:00 pm). As such, during the winter, increased sound levels along the White River and within the Project Area from use of a generator would not likely result in temporary displacement of bald eagles from roosting or foraging habitats, nor affect the viability of bald eagle populations within the region.

Mexican Spotted Owl

The Project Area is not within MSO critical habitat as designated by the USFWS, and no potential MSO nesting habitats occur within or near the Project Area (BLM 2007). Although no nesting habitat occurs within or near the Project Area, Alternative A – Proposed Action would result in the loss of approximately 106 acres potential foraging habitat for MSO prey species such as small mammals, songbirds, and reptiles. This would constitute a 3% reduction in foraging habitat for the species across the 3,492 acre Project Area.

Given the short-term nature of construction and drilling activities and the minimal amount of surface disturbance, the impacts associated with Alternative A - Proposed Action would have “*no affect*” on the MSO.

Greater Sage-grouse

Surface disturbance associated with the Proposed Action would result in the direct loss of sagebrush habitats. Sage-grouse are a sagebrush-obligate, and rely almost exclusively on contiguous sagebrush ecosystems for leks, nesting sites, feeding sites, rearing sites, protection and wintering grounds. Although sagebrush habitat occurs in the Project Area, this habitat is not contiguous. Sagebrush areas in the Project Area primarily occur in drainage bottoms surrounded by pinyon-juniper woodlands. According to UDWR and BLM data, sage-grouse do not utilize sagebrush habitats in the Project Area for breeding or nesting, however these areas may be used for foraging and brooding. Numerous studies have determined that sage-grouse are affected by human activity (Lyon and Anderson 2003; Remington and Braun 1991; Braun 1986). The primary effect of the Proposed Action on sage-grouse in the Project Area would be potential displacement or avoidance of potentially suitable habitats due to increased disturbance from human activity, increased traffic, and noise associated with construction and drilling activities. Based on the above information, implementation of the Alternative A - Proposed Action may impact individual sage-grouse, but is not likely to result in a loss of viability, nor cause a trend to Federal listing of the species.

Federally Listed and State Sensitive Fish Species

Habitat for the humpback chub, bonytail, razorback sucker, Colorado pikeminnow, flannelmouth sucker, bluehead sucker, and roundtail chub is located in the White River. Although no ground disturbing activities would occur in aquatic habitat for these species as a result of Alternative A - Proposed Action, these fish could be impacted by activities such as water pumping/removal at the White River, and by exposures to hazardous substances in the case of an accidental spill.

Water Depletions

The proposed project would utilize water from the Upper Colorado River system (i.e., White River) at Saddletree Draw and Atchees Wash for drilling and completion activities, as well as dust abatement. Approximately $\frac{3}{4}$ -acre feet of water would be used for drilling and completion of each well (60 wells) and approximately 0.1 acre-feet of water would be used for dust abatement. As such, Alternative A - Proposed Action would cause a total depletion of approximately 51 acre-feet to the White River in the Upper Colorado River Basin. As drilling would occur over a four to six year period, the project would be responsible for a depletion of 8.5 to 12.8 acre-feet per year. Depletions can reduce the ability of the river to create and maintain the physical habitat (areas inhabited or potentially habitable to special status fish for use of spawning, development of fish larvae, feeding, or serving as corridors between these areas) and the biological environment. Water depletions can also contribute to alterations in flow regimes that favor nonnative fish.

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. As depletions would not be greater than 100 acre-feet per year, Enduring (or their municipal water supplier) would not be responsible for paying depletion fees associated with Alternative A - Proposed Action.

Based upon the discussion above, water depletions associated with Alternative A - Proposed Action “*may affect, is likely to adversely affect*” the humpback chub, bonytail, razorback sucker, Colorado pikeminnow. In addition, these depletions may impact the flannelmouth sucker, bluehead sucker, and roundtail chub, but would not likely to result in a loss of viability, nor cause a trend to Federal listing of these species.

Other Project Activities

Although portions of the proposed water pump system (i.e., pumps, hose, and pipe) would occur within the 100-year floodplain of the White River, no surface disturbing activities would in these areas. Three well pads, and several miles of road and pipeline would be constructed near or within the 100-year floodplains of Atchees Wash and Saddletree Draw, both of which are ephemeral tributaries of the White River. As potential spills of hydrocarbons could enter these drainages due to the proximity of oil and gas structures to these drainages, downstream fish habitats could also be negatively impacted. With implementation of closed loop drilling, silt fencing, earthen berms, and shut-off valves these potential impacts would be minimized. Although existing roads occur within these drainages, new road alignments were established in cooperation with the BLM and Uintah County during the on-site process, in an effort to create all-weather roads that would support the expected increase in traffic. Although road realignments in and adjacent to the drainages would disturb existing vegetation, therefore leading to increased sedimentation, the new alignments would reduce impacts to these drainages and the White River over the long-term. In addition, the small amount of estimated increased sedimentation of 0.003 percent from project activities is hydrologically negligible and would therefore not impact fish species.

To collect water for drilling, completion, and dust abatement, two submersible pump systems would be installed adjacent to the White River at the Saddletree Draw (NWSW Sec. 20) and Atchees Wash locations (SWSE Sec. 21). The pumps would be powered by a trailer-mounted Baldor Mobile Power Generator, which would be placed outside of the White River 100-year floodplain, about 50 feet away from the Saddletree Draw pump. Spills/leaks from this structure could potentially result in impacts to sensitive fish species and their habitats, depending on the size of the spill/leak, its location with respect to the White River, and the contents of the spill/leak (USFWS 1999; USFWS 2000; Krahn et al. 1986; API 1998). The White River is a large river with high dilution factors. However, if a spill/leak were to enter the river, contaminants would likely accumulate in backwater/depressional areas with reduced dilution and less flushing capacity (Woodward et al. 1985). Many of the sensitive fish species described above use these sites which provide cover and a food source. Research is limited regarding threats posed by petroleum products to these fish species (Woodward et al. 1985; Krahn et al. 1986; Mayer and Eilersieck 1986). However, studies have shown that contaminants, including petroleum hydrocarbons released via spills/leaks, can affect behavioral functions which have been shown to impair feeding behavior (Woodward et al. 1985). Although the potential for spills/leaks does exist, the generator would be placed in a lined earthen berm to prevent these contaminants from reaching the Whiter River (Section 2.3.10).

As mentioned previously, two 4-inch hoses would collect water from collections points in the White River. These pumps could impact sensitive fish species by removal of fish larvae and hatchlings from the river system. Larvae can be captured by pumps removing water from locations located in low flow environments (slow moving water; backwaters, eddies, or the mouth of tributaries), especially during the months of July and August when larvae would be most concentrated in the low flow environments. To prevent these impacts, Enduring has committed to place the intake of the pipe in the active channel of the White River so as to avoid potential habitats typically utilized by the Endangered Colorado River Fish. In addition to placing the intake of the pipe in the active channel, the intake of the pipe would also be covered with a maximum ¼-inch mesh screening to prevent fish and larvae from being drawn into the pump system (Section 2.3.10 and 2.8.5).

Base upon the discussion above, project activities associated with the Alternative A – Proposed Action “*may affect are likely to adversely affect*” the humpback chub, bonytail, razorback sucker, Colorado pikeminnow. In addition, these activities may impact the flannelmouth sucker, bluehead sucker, and roundtail chub, but would not likely to result in a loss of viability, nor cause a trend to Federal listing of these species.

General Wildlife

The initial disturbance of 106 acres of wildlife and raptor habitat associated with the construction of well pads, roads, and pipelines would reduce habitat availability for a variety of wildlife species. Project implementation would also indirectly increase the level of functional habitat loss and habitat fragmentation in the area. Although these impacts may occur, successful interim reclamation of areas not utilized for production activities would reestablish wildlife habitat overtime (1-3 years), and the long-term reduction (25+ years) in habitat is not expected to negatively impact population trends for these species.

Disturbances from drilling activities and increased traffic could temporarily displace wildlife and raptors 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 inter- and intra-specific competition may occur, resulting in subsequent effects of deteriorated physical condition and general distress. The applicant committed measures would help to reduce these impacts by avoiding active raptor nests (Section 2.8.6).

Migratory Birds

Impacts to migratory birds in the Project Area 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 Project Area 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, Alternative A - Proposed Action could result in displacement from foraging or nesting habitats. Displacement from the Project Area could cause birds to move into less suitable habitats or into habitats where interspecific and intraspecific competition may occur, potentially resulting in deteriorated physical condition and general distress. In addition to potential displacement caused by project activities, approximately 106 acres of potential nesting and foraging habitats for migratory birds would also be disturbed under the Proposed Action. Based on the above information, implementation of the Alternative A - Proposed Action may impact individual migratory birds, but is not likely to result in a loss of viability, nor cause a trend to Federal listing of any of the species.

4.11.2 Alternative B – Resource Protection Alternative

Under Alternative B, general initial and residual impacts to threatened, endangered, and sensitive animal species and other wildlife resources due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action. As such, all effects determinations are the same as Alternative A – Proposed Action, unless noted below.

Mexican Spotted Owl

Alternative B would result in the loss of approximately 92 acres potential foraging habitat for MSO prey species such as small mammals, songbirds, and reptiles. This would constitute a 2.6% reduction in foraging habitat for the species across the 3,492 acre Project Area.

Federally Listed and State Sensitive Fish Species

The proposed project would utilize water from the Upper Colorado River system (i.e., White River) at Saddletree Draw and Atchees Wash for drilling and completion activities, as well as dust abatement. Approximately $\frac{3}{4}$ -acre feet of water would be used for each well (44 wells) during drilling and completion, and 0.1 acre-feet of would be used per well for dust abatement. As such, Alternative B – Resource Protection Alternative would cause a total depletion of approximately 37.4 acre-feet to the White River in the Upper Colorado River Basin. As drilling would occur over a four to six year period, the project would be responsible for a depletion of 6.2 to 9.4 acre-feet per year.

General Wildlife

Under Alternative B – resource Protection Alternative, the initial disturbance of 92 acres of wildlife and raptor habitat associated with the construction of well pads, roads, and pipelines would reduce habitat availability for a variety of wildlife species.

Migratory Birds

In addition to potential displacement caused by project activities, approximately 92 acres of potential nesting and foraging habitats for migratory birds would also be disturbed under Alternative B – Resource Protection Alternative.

4.11.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C, general initial and residual impacts to threatened, endangered, and sensitive animal species and other wildlife resources due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action. As such, all effects determinations are the same as Alternative A – Proposed Action, unless noted below.

Federally Listed and State Sensitive Fish Species

Under Alternative C – Leasing and Development with Restricted Surface Use, the proposed project would utilize water from the Upper Colorado River system (i.e., White River) at Atchees Wash for drilling and completion activities, as well as dust abatement. Approximately ¾-acre feet of water would be used for each well (56 wells) during drilling and completion, and 0.1 acre-feet of would be used per well for dust abatement. As such, Alternative C - Leasing and Development with Restricted Surface Use would cause a total depletion of approximately 47.6 acre-feet to the White River in the Upper Colorado River Basin. As drilling would occur over a four to six year period, the project would be responsible for a depletion of 7.9 to 11.9 acre-feet per year.

Additionally, only one submersible pump at Atchee's Wash would be used under Alternative C - Leasing and Development with Restricted Surface Use. This would reduce the overall amount of truck traffic within the Project Area, but not to the extent that would occur under Alternatives A – Proposed Action or Alternative B – Resource Protection Alternative. This increased traffic would increase the potential for the introduction of invasive species, increased sedimentation, and increased fugitive dust. These impacts may reduce the overall habitat of Federally listed and sensitive fish species.

4.11.4 Alternative D – No Action Alternative

Under Alternative D – No Action, general initial and residual impacts to threatened, endangered, and sensitive animal species and other wildlife resources due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action, however these impacts would likely be greatly reduced due to the extent of development under this Alternative. Other specific differences are described below.

Bald Eagle

Under Alternative D – No Action, submersible pumps would not be used for water collection and the associated noise impacts would not occur. Tank trucks would transport all water needed for drilling, increasing traffic levels in the Project Area. The increase in traffic on proposed and existing roads would likely have greater impacts on potential roosting and foraging bald eagles as disturbances would not be constant and human activity would increase in and around the White River.

Federally Listed and State Sensitive Fish Species

The proposed project would utilize water from the Upper Colorado River system (i.e., White River), however under Alternative D – No Action all water would be collected into truck tanks at a permitted location, and then hauled over existing roads. Approximately ¾-acre feet of water would be used for each well (four wells) during drilling and completion operations, and an additional 0.1 acre-feet would be

utilized per well for dust abatement. As such, the Proposed Action would cause a total depletion of approximately 3.4 acre-feet to the White River in the Upper Colorado River Basin. As drilling would occur over a four to six year period, the project would be responsible for a depletion of 0.6 to 0.85 acre-feet per year.

Additionally, as no submersible pumps would be used under Alternative D – No Action, an overall increase in truck traffic would occur in the Project Area. This increased traffic would increase the potential for the introduction of invasive species, increased sedimentation, and increased fugitive dust. These impacts may reduce the overall habitat of Federally listed and sensitive fish species.

4.12 VEGETATION INCLUDING SPECIAL STATUS PLANTS

4.12.1 Alternative A – Proposed Action

Under the Proposed Action, a total of 106 acres of vegetation would be removed during initial construction, drilling, and completion activities. Disturbances would primarily occur in the pinyon-juniper, sagebrush, and desert shrub communities. Vegetation removal and soil handling associated with these activities would have both direct and indirect impacts on vegetation resources. Direct effects would include removal of vegetation, modification of structure, species composition, and modification of the extent of cover types. Indirect impacts 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.

Special Status Plant Species

As discussed in Section 3.2.12 the special status plant species potentially occurring in the Project Area include the Graham beardtongue, the White River penstemon, and the Uinta Basin hookless cactus. These species have not been reported in the Project Area, however isolated pockets of potential habitat for the Graham beardtongue and White River penstemon are present on the exposures of the Green River formation in Atchees Wash (B&A 2005), and potential habitat for the Uinta Basin hookless cactus is present along the river terrace slopes of the White River (BLM 2007).

Based on the applicant-committed mitigation measure (Section 2.8), direct impacts to occupied habitats of the Graham beardtongue, White River penstemon, and Uinta Basin hookless cactus would not occur. Therefore, the potential impacts of Alternative A - Proposed Action would be limited to indirect impacts including loss or modification of potential habitat, and illegal collection due to increased human access. These impacts are discussed in detail below.

Under Alternative A - Proposed Action, 8.4 miles of new roads would be constructed. Increased access to the Project Area via proposed roads could result in increased visitation by the public, and subsequently, result in illegal collection of special status plant species.

Increased roadway access and vehicle traffic in the Project Area may result in the spread of invasive weed species. Weed species can displace native plant species, often forming monocultures that alter ecosystem processes, like nutrient cycling, fire frequency, hydrologic cycles, sediment deposition and erosion (CIPM 2006). These alterations not only promote the colonization of additional invasive weed species, but also disrupt the pollination capabilities of existing native species. In addition to these impacts, weed infestation can also interfere with interim reclamation potential and can lead to weed encroachment into undisturbed areas, including special status plant species habitats (e.g., Graham beardtongue and White River penstemon). Based on this information, the potential for weed invasion into Graham beardtongue and White River penstemon habitat is a potential impact of the Proposed Action. However, with the

implementation of the applicant committed weed control measures, effects of weed invasion on threatened and endangered plant habitats would be minimized.

Direct impacts will not occur as a result of the Proposed Action. Indirect impacts are expected to be minimal and should never reach the scale where take occurs. Therefore, the Proposed Action “*may affect, is not likely to adversely affect*” the Uinta Basin hookless cactus. The Proposed Action “*may affect, but is not likely to lead to the need for Federal listing*” of the Graham’s beardtongue and White River penstemon.

4.12.2 Alternative B – Resource Protection Alternative

Under Alternative B – Resource Protection Alternative, general initial and residual impacts to vegetation including Special Status Plant Species due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action. Specific differences are described below.

Under Alternative B – Resource Protection Alternative, approximately 92 acres of vegetation would be disturbed. As well pads and roads originally proposed in the E1/2 of Section 31 would not occur under Alternative B - Resource Protection Alternative, pinyon juniper woodlands along this ridge would not be impacted. All impacts to Special Status Plant Species under Alternative B – Resource Protection Alternative would be similar in nature to Alternative A – Proposed Action.

4.12.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C – Leasing and Development with Restricted Surface Use, general initial and residual impacts to vegetation including Special Status Plant Species due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action. Specific differences are described below.

Although initial surface disturbance (106 acres) under Alternative C – Leasing and Development with Restricted Surface Use would be identical to Alternative A – Proposed Action, the locations of these disturbances would be much different. Under Alternative C, access road development would not occur on the ridge tops in Sections 30 and 31 T10S R23E, instead these access routes would be realigned to parallel existing ephemeral drainages. As such, vegetation disturbances under this Alternative would occur in sagebrush and desert shrub communities rather than pinyon juniper woodlands. All impacts to Special Status Plant Species under Alternative C – Leasing and Development with Restricted Surface Use would be similar in nature to Alternative A – Proposed Action.

4.12.4 Alternative D – No Action Alternative

Under Alternative D – No Action, general initial and residual impacts to vegetation including Special Status Plant Species due to construction, drilling, and completion activities would be similar in nature as those described above under Alternative A - Proposed Action, however these impacts would likely be greatly reduced due to the extent of development under this Alternative. Specific differences are described below.

Alternative D – No Action would result in the loss of less than one acre acres potential vegetation. As no ground disturbing activities would occur in or near Atchees Wash under Alternative D, Special Status Plant Species would not be impacted under this Alternative.

4.13 VISUAL RESOURCES

4.13.1 Alternative A – Proposed Action

Visual impacts due to construction, drilling, and completion activities would occur as a result of Alternative A - Proposed Action. The landscape would be changed by the introduction of 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 Project Area. Construction, drilling, and completion would take place over a four to six year period and would generally occur in clusters. Drilling activity typically occurs 24-hours per day; therefore, visual impacts during drilling activities would include lighting of drilling rigs during nighttime hours.

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

The vast majority of new (16) and expanded (7) well pads, as well as associated pipelines and roads lie within VRM Class IV areas and would, therefore, be in conformance with VRM management objectives. Along with the existing development in the Project Area, described in Section 3.2.13, the proposed development would add to a more developed visual setting in the Project Area. Potential visual impacts to recreational resources/sites are discussed in Section 4.1 Recreation.

A single proposed well pad, approximately two miles of proposed road and pipeline, and approximately four miles of proposed water pipe would be constructed in VRM Class II areas. Additionally, the water pump generator and approximately two miles of connection line would also fall within the VRM Class II area along the White River. As mentioned in Section 3.2.13, VRM Class II areas allow for management activities to be seen, but those activities should not attract the attention of a casual viewer. Through implementation of applicant committed environmental protection measures, Enduring Resources would endeavor to minimize the impact of development activities in Class II areas by locating and designing the well pad and associated infrastructure so that they would be screened from view by topographic features and vegetation. In addition, all operating equipment would be painted a flat non-reflective color that is compatible with the surrounding landscape as specified by the BLM. The generator, pumps, and connection lines along the White River corridor would be small structures that would likely not attract the attention of casual viewers from the river due to the ability to site the facilities to maximize vegetative cover for screening. In addition to minimizing the visual impacts of proposed physical structures in the Project Area, Enduring's proposed water pump system would also reduce visual impacts by reducing truck traffic and associated fugitive dust in and around the Project Area. Based upon adherence to applicant committed environmental protection measures, the Proposed Action would be in compliance with the VRM Class II objectives.

The Vernal FO Draft RMP analyzes changing the VRM class under all alternatives except Alternative D. However, the existing leases for this project would be pre-existing rights which would include the right to develop and to construct reasonable access to the leases along with key infrastructure necessary to develop the resources.

4.13.2 Alternative B – Resource Protection Alternative

General initial and residual visual impacts due to construction, drilling, and completion activities would be identical in nature as described in Section 4.13.1 for Alternative A - Proposed Action. Under Alternative B – Resource Protection Alternative, 14 new and five expanded well pads would fall within VRM Class IV areas. Impacts within VRM Class II areas would be identical to those described in Section 4.13.1 for Alternative A – Proposed Action. Potential visual impacts to recreational resources/sites are discussed in Section 4.1 Recreation.

The two new well pads removed from Alternative B – Resource Protection Alternative fall within the boundary of Mineral Lease #UTU-81737 along a ridgeline out of the line of sight of the casual observer. Along with the exclusion of two well pads, there would also be a reduction of approximately half of a mile of pipeline. The net reduction in surface disturbance within the VRM Class IV area, as compared to Alternative A - Proposed Action, would be approximately nine acres.

4.13.3 Alternative C – Leasing and Development with Restricted Surface Use

General initial and residual visual impacts due to construction, drilling, and completion activities would be identical in nature as described in Section 4.13.1 for Alternative A - Proposed Action. Specific differences are described below.

As with Alternatives A – Proposed Action and Alternative B – Resource Protection Alternative, the majority of the proposed well pads fall within VRM Class IV areas (12 new and 7 expanded), and would conform with VRM management objectives. Impacts within VRM Class II areas would be identical to those described in Section 4.13.1 for Alternative A – Proposed Action. Potential visual impacts to recreational resources/sites are discussed in Section 4.1 Recreation.

Alternative C – Leasing and Development with Restricted Surface Use would result in a reduction of four well pads and associated pipeline and roads within the lease area, as compared with Alternative A - Proposed Action. To access the well pads in other portions of the Project Area, roads would be realigned to the west and north of Lease #UTU-81737. Realigned roads would result in a net increase of approximately two miles of road and pipeline as compared to Alternative A - Proposed Action. One mile of realigned road and pipeline would occur within VRM Class IV areas and the other mile would be located in the VRM Class II area associated with the White River. Due to these road realignments, there would be a 13-acre net increase in surface disturbance within the VRM Class II area as compared to Alternatives A and B. As the road and pipeline would be constructed using applicable guidelines and standards and with Enduring's adherence to applicant committed environmental protection measures, Alternative C would be in compliance with VRM Class II objectives.

4.13.4 Alternative D – No Action Alternative

Under Alternative D – No Action, development would be limited to State and private lands on which VRM guidelines do not apply.

4.14 WILD AND SCENIC RIVERS

4.14.1 Alternative A – Proposed Action

The Book Cliffs RMP does not set aside any lands as eligible for a wild and scenic river designation, therefore Alternative A - Proposed Action would not have any impacts on established Wild and Scenic

rivers. Impacts to the segment of the White River north of the Project Area tentatively classified as “wild” are discussed below.

The proposed generator, pump, one mile of water pipeline, and 2.4 miles of connecting line would be located within the ¼-mile wide corridor extending from the center of the river which was found to meet the eligibility criteria of the National Wild and Scenic Rivers Act in the Vernal FO Draft RMP. A very small segment of new road would be in line-of-sight of the river (Figure 9), however it would intersect the existing Saddletree Draw road (at approximately the ¼-mile river boundary), which is also in line of site of the river and would, therefore, not represent a substantial new disturbance. The generator, pumps, and water pipelines would be small structures that would likely be only slightly noticeable from the river due to the ability to site the facilities to maximize vegetative cover for screening. Generator maintenance (refueling with diesel) would require three weekly visits by pickup truck.

The new road and associated traffic, whether permitted or casual, along with the water pump equipment, would directly impact the tentative wild classification. However, since the area was considered to be eligible as “wild” with existing development (approximately four miles of existing road), and given the applicant committed measures identified for recreation, wildlife, and cultural resources, additional development and resulting impacts to the tentative WSR classification are expected to be minimal. The potential impacts to the resource values for which the area was nominated are discussed in the following sections: potential impact to historic resources are discussed in Section 4.2.1; potential impacts on Goblin City, the campsite, river recreation, and the White River viewshed are discussed in Section 4.8.1; and potential impacts on wildlife are discussed in Section 4.11.1.

4.14.2 Alternative B – Resource Protection Alternative

As with Alternative A – Proposed Action, since the Book Cliffs RMP does not set aside any lands as eligible for a wild and scenic river designation, Alternative B – Resource Protection Alternative would not have any impacts on established Wild and Scenic rivers. Impacts to the segment of the White River tentatively classified as “wild” would be identical to those described in Section 4.14.1. The potential impacts of Alternative B to the resource values for which the area was nominated are discussed in the following sections: potential impact to historic resources are discussed in Section 4.2.2; potential impacts on Goblin City, the campsite, river recreation, and the White River viewshed are discussed in Section 4.8.2; and potential impacts on wildlife are discussed in Section 4.11.2.

4.14.3 Alternative C – Leasing and Development with Restricted Surface Use

As with Alternative A – Proposed Action and Alternative B – Resource Protection Alternative, since the Book Cliffs RMP does not set aside any lands as eligible for a wild and scenic river designation, Alternative C – Leasing and Development with Restricted Surface Use would not have any impacts on established Wild and Scenic rivers. Impacts to the segment of the White River tentatively classified as “wild” would be identical in nature to those described in Section 4.14.1. As only one water pump system would be used under Alternative C, impacts under this alternative would be limited to placement of this system at the Atchees Wash location. The potential impacts of Alternative C to the resource values for which the area was nominated are discussed in the following sections: potential impact to historic resources are discussed in Section 4.2.3; potential impacts on Goblin City, the campsite, river recreation, and the White River viewshed are discussed in Section 4.8.3; and potential impacts on wildlife are discussed in Section 4.11.3.

4.14.4 Alternative D – No Action Alternative

Alternative D would not impact any established Wild and Scenic river segments.

4.15 WHITE RIVER WILDERNESS CHARACTERISTICS AREA

4.15.1 Alternative A – Proposed Action

The proposed development has the potential to impact wilderness characteristics by altering or isolating the attributes that are used to define and categorize areas as with or likely to have wilderness characteristics. The attributes that may be affected by land disturbing activities are size, naturalness and outstanding opportunities for solitude and primitive and unconfined recreation.

Size: Under Alternative A - Proposed Action, 11 new well pads, approximately eight miles of access roads and pipelines, six miles of waterline, two water pumps, 2.4 miles of connecting line, and one generator would be constructed within the area identified as having wilderness characteristics. Total surface disturbance would be approximately 84 acres or less than 0.4 percent of the total area defined as having wilderness characteristics. However, the Proposed Action would result in the segregation of up to 3,701 acres of wilderness characteristics from the larger block of wilderness characteristics that occurs north and east of the Project Area. The electrical cord is not expected to be a noticeable or permanent disturbance to the point that it would segregate wilderness characteristics from the larger portion of the wilderness characteristics area. The segregated acreage extends out of the Project Area boundary because currently wilderness characteristics exist south of the Project Area that would also be segregated from the larger portion of the wilderness characteristics area. Segregation of lands may affect the manageability of the area for the preservation of wilderness characteristics, however the majority of the area would retain wilderness characteristics. However, that planning decision will be made in the land use plan revision process.

Naturalness: Any surface disturbance that would occur as a result of the construction and production of proposed roads, wells, and associated ancillary facilities would cause a direct loss of naturalness. The Proposed Action would result in the loss of approximately 84 acres of natural landscape within the White River wilderness characteristics area. In addition to direct impacts to naturalness caused by surface disturbance, activities associated with the Proposed Action (i.e., increased traffic and human presence) as well as project facilities would also indirectly diminish the naturalness of the area by impacting scenic views. However, due to the rugged topography and overall size of the impacted area, many of these activities and facilities would be visually screened both topographically and by vegetation. In addition, the majority of the proposed facilities are on plateaus that, for the most part, are not within sight of the drainages leading into the White River. As most wilderness-related uses take place along the river and in these valleys, indirect visual impacts to these users would be minimal (see Section 4.13). In addition, due to the rugged topography of the area, the impacts of any one action would be limited in space. For example, a well on a ridge top would not affect wilderness characteristics in the draw below. The impacts would be further isolated geographically since only one drill rig would be operating in the area at any given time. The impacts would also be limited in time, in that visual and auditory disturbances would occur primarily during the construction and development period (4 to 6 years). Finally, project facilities will be painted to blend into the natural surroundings. Therefore, naturalness may still exist in isolated pockets throughout the area.

Solitude: During the construction, drilling, and production phase noise from equipment and increased vehicle and human traffic would reduce the opportunity for solitude within the White River wilderness characteristics area. These noise effects would be temporary in that they would last only during the time it

would take to construct (daytime activity only) and drill (around the clock activity) each well. Additionally, these sight and sound impacts would be further temporally limited to the 4 to 6 year construction and drilling cycle. During production, the loss of solitude that would occur from the noise and associated visual effects of the one vehicle per day (on average) that would access the wells to perform on-site well inspections, calibrations, and metering duties. This would be expected to last only for the length of time it would take for the company representative to drive onto the well location, check the meters, etc., and drive off of the well location (an average of 15 minutes per well per day). Slight impacts to solitude may also occur with the limited increase that can be expected in recreational and/or administrative use of the new access roads. Constructing, drilling and maintaining the proposed wells, road, and pipeline would result in a loss of solitude on a portion of the 3,701 acres segregated from the main body of the wilderness characteristics area. However, due to the rugged topography and overall size of the impacted area, many of these activities and facilities would be visually screened. Again, as mentioned above, the majority of the development is planned on plateaus, the development would not be, for the most part, within sight of the drainages leading into the White River. As most wilderness-related uses take place along the river and in these valleys, indirect visual impacts to these users would be minimal (see Section 4.13). Additionally, project facilities will be painted to blend into the natural surroundings. Therefore, opportunities for solitude may still exist in isolated pockets throughout the area.

Outstanding Opportunities for Primitive and Unconfined Recreation: Opportunities for primitive and unconfined recreation would be diminished for hiking and photography, possibly in proportion to the expected loss of solitude. This loss of opportunity for primitive recreation would be related to the change from an undeveloped setting to a more industrial setting in isolated locations. However, due to the rugged topography and overall size of the impacted area, many of these activities and facilities would be visually screened. Therefore, opportunities for primitive and unconfined recreation may still exist in isolated pockets throughout the area, however they may not be outstanding.

Supplemental Values: Impacts to supplemental values within the White River wilderness characteristics area are appropriately discussed in sections 4.13 Visual Resources, 4.11 Threatened, Endangered, and Sensitive Animal Species and other Wildlife, and 4.12 Vegetation including Special Status Plants.

Impacts to wilderness characteristics would last the life of the project until reclamation is complete. After plugging and abandonment of the wells, and subsequent reclamation, sagebrush, grasses, and forbs would reestablish themselves and the site would begin to replicate in color, texture, and form some of the natural character of the area. Given adequate time, lands will regain wilderness characteristics. Based upon applicant committed measures, impacts to supplemental values are expected to be minor.

4.15.2 Alternative B – Resource Protection Alternative

Impacts to those characteristics for which the area was identified as Non-WSA lands with wilderness characteristics are identical in nature to those described in Section 4.15.1 for Alternative A - Proposed Action. However, when compared with Alternative A, direct impacts would be reduced in proportion to the reductions in proposed development.

Under Alternative B – Resource Protection Alternative, 13 new well pads, approximately seven miles of access roads and pipelines, two pumps, 2.4 miles of connecting line, one generator, and six miles of water pipe would be constructed within the White River wilderness characteristics area. Total surface disturbance would be approximately 71 acres (or approximately 0.3% of the total unit), which is approximately 15 percent less than what is proposed under Alternative A. However, Alternative B would result in the segregation of up to 3,701 acres of wilderness characteristics from the larger block of wilderness characteristics that occurs north and east of the Project Area, which is identical to that which

would result from the implementation of Alternative A. However, that planning decision will be made in the land use plan revision process.

4.15.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C – Leasing and Development with Restricted Surface Use, nine new well pads, approximately eight miles of access roads and pipelines, two pumps, one generator, and four miles of water pipe would be constructed within the White River wilderness characteristics area. Total surface disturbance would be approximately 77 acres (or approximately 0.4% of the total unit). However, Alternative C would result in the segregation of up to 3,788 acres of wilderness characteristics from the larger block of wilderness characteristics that occurs north and east of the Project Area. That planning decision will be made in the land use plan revision process. Impacts to those characteristics for which the area was identified as Non-WSA lands with wilderness characteristics are identical in nature to those described in Section 4.15.1 for Alternative A - Proposed Action. Direct impacts would be proportional to the level of development.

4.15.4 Alternative D – No Action Alternative

As discussed in Section 3.2.15, the boundary defining the White River non-WSA lands with wilderness characteristics excludes State and private parcels. As such, Alternative D would have no impacts on any established lands possessing wilderness characteristics.

4.16 AIR QUALITY

4.16.1 Alternative A - Proposed Action

Emission inventories for criteria pollutants [nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and particulates (PM₁₀ and PM_{2.5})], volatile organic compounds (VOC), and hazardous air pollutants (HAP) [benzene, toluene, ethylbenzene, xylene (BTEX), n-hexane, and formaldehyde] were completed for development and operational-related activities. Pollutant dispersion modeling was performed for NO_x emissions from drill rigs using the SCREEN3 dispersion model.

Air quality impacts as predicted with the SCREEN3 model are generally conservative and reflect maximum impacts that would be observed under less favorable meteorological conditions. Since winds and atmospheric stability play an important role in pollutant dispersion, pollutants will generally be better dispersed and diluted during convective conditions when there is greater turbulence and better mixing in the lower atmosphere. As indicated, the Project Area exhibits a high frequency of strong winds and tends to favor convective conditions, during the summer months and the daytime when the ground is rapidly heated and vertical movement is enhanced.

An annual emission inventory was developed for Alternative A - Proposed Action representing the average level of emissions that would be released on an annual basis during well development and operations over the life of the project. Emission rates were calculated using applicable EPA emission factors and anticipated level of operational activities, such as estimated vehicle trips, load factors, and hours of operation. Emissions would result from the following project activities and sources:

- Well pad and road construction: earth-moving equipment fugitive dust, earth-moving equipment exhaust, and mobile source tailpipe emissions on access roads;
- Drilling: mobile source tailpipe emissions, fugitive dust emissions on access roads, and drill rig engine exhaust;

- Completion: mobile source tailpipe emissions, fugitive dust emissions on access roads, well venting emissions, and well fracturing engine emissions;
- Well pad operation: separator heater emissions, and flashing, working, and breathing emissions from condensate tanks;
- Gas processing: central dehydrator emissions, mobile source tailpipe emissions, and fugitive dust emissions on access roads; and
- Operation and maintenance: mobile source tailpipe emissions and fugitive dust emissions on access roads.

Total estimated emissions for Alternative A - Proposed Action are summarized in Table 4-1. All temporary development-related emission calculations, which include well location and access road construction, well drilling, and well completion, are based on a development period of 4 years. Annual emissions are estimated after all facilities have been constructed and are fully operational.

Table 4-1. Annual Emissions Based on Maximum Development

Pollutant	Project Emissions (tons/year) ^a		Total Emissions (tons/year)
	Well Development	Well Production	
NO _x	53	13	66
CO	28	12	40
VOC	7	165	172
SO ₂	1	0	1
PM ₁₀	144	123	267
PM _{2.5}	23	20	43
Benzene	0	25	25
Toluene	0	38	38
Ethylbenzene	0	3	3
Xylene	0	21	21
n-Hexane	0	3	3
Formaldehyde	0	0	0

^a Assumes development scenario of 15 wells and 5 pads per year for 4 years.

Well Development Impacts

Based on the proposed project schedule, a well location and associated access road would be constructed in approximately seven days. The time to drill a well would average ten days. A well would then be completed in approximately five days. Well drilling was assumed to occur 24 hours per day, while construction and completion activities were assumed to occur ten hours per day during daylight hours only.

The pollutant emitted in the greatest quantities during well development would be PM₁₀ from earth-moving operations and travel upon unpaved roads. NO_x and SO₂ would originate from the operation of heavy equipment, such as drill rig engines and vehicle tailpipe emissions. PM₁₀ emissions will be spread out over a large area. Maximum hourly emissions of NO_x were estimated and used for comparison to applicable short-term and annual ambient air quality standards. Comparison to annual standards is provided for consistency. However, the annual impacts are conservative in that they assume annual emissions allocated to the same locations for the entire development period, which is not the case.

The impacts from the drilling are shown in Tables 4-2 below. It is important to note that these impacts are localized and temporary in nature and will decrease significantly with distance from the immediate activity. Impacts from other activities in adjacent fields will be sufficiently separated by distance and time such that short-term impacts should not overlap with each other.

As shown, expected ambient air concentrations would be below all standards for the lengths of these three development activities. The annual NO₂ results demonstrate that even if the proposed annual pace of development occurred in the same location during a single year, the effects would still be less than all ambient air quality standards.

Table 4-2. Proposed Action Development Phase NO₂ Impacts

Pollutant and Averaging Period	Averaging Period	Ambient Air Concentration (µg/m ³) ^b				
		Predicted	Background ^c	Total	NAAQS	% of NAAQS (Project + Background)
NO ₂	Annual	24	5	29	100	29 %

^a Impact presented is highest results from drilling

^b µ/m³ is micrograms of pollutant per cubic meter of air

^c 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 Uinta Basin.

Operational Impacts

Since NO₂ emissions from the drill rig engine operation for well development accounted for 61% of the total emissions for the project, a combination of well development and operations, the maximum concentration for the criteria pollutant impact would remain below all applicable standards.

There are no applicable State or Federal ambient air quality standards for evaluating Hazardous Air Pollutant (HAP) impacts. However, comparisons were made to State of Utah Toxic Screening Levels (TSLs) which are thresholds applied during the air permitting process to assist in the evaluation of HAPs released into the atmosphere (Utah Department of Environmental Quality-Air Quality Division 2000). These levels are not standards that must be met, but rather screening thresholds which if exceeded, would suggest that additional information is needed to evaluate potential health and environmental impacts.

Estimated project emissions of HAPs would be well below the levels that would create either acute, chronic, or carcinogenic health risks for individuals exposed to those compounds. Air quality impacts related to emissions of HAPs as a result of Alternative A - Proposed Action would be negligible.

In summary, while an emissions increase of both criteria and hazardous air pollutants is expected as a result of the Proposed Action activities, these emissions are not predicted to result in a violation of any ambient air quality standard or hazardous pollutant threshold. Accordingly, air quality impacts that would occur as a result of the Proposed Action during both the short-term development phase and long-term operations phase would likely be minor.

4.16.2 Alternative B – Resource Protection Alternative

Under Alternative B – Resource Protection Alternative, 44 wells would be developed within the Project Area on BLM, State and private lands. Construction- and operational-related ambient air quality impacts for the forty-four wells would be roughly 73% of those assumed for Alternative A - Proposed Action. Because air quality impacts for Alternative A - Proposed Action were demonstrated to be below significance levels, it follows that impacts under this alternative would also be below significance levels.

4.16.3 Alternative C – Leasing and Development with Restricted Surface Use

Under Alternative C – Leasing and Development with Restricted Surface Use, 57 wells would be developed within the Project Area on BLM, State and private lands. Construction- and operational-related ambient air quality impacts for the 57 wells would be roughly 95% of those assumed for Alternative A - Proposed Action. Because air quality impacts for Alternative A - Proposed Action were demonstrated to be below significance levels, it follows that impacts under this alternative would also be below significance levels.

4.16.4 Alternative D – No Action Alternative

Under Alternative D – No Action, four wells would be developed within the Project Area on State lands. Construction- and operational-related ambient air quality impacts for the four wells would be roughly 3% of those assumed for Alternative A - Proposed Action. Because air quality impacts for Alternative A - Proposed Action were demonstrated to be below significance levels, it follows that impacts under this alternative would also be below significance levels.

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5.0 CUMULATIVE IMPACTS ANALYSIS

Cumulative impacts result from the incremental impacts of an action when added to past, present, and reasonably foreseeable future actions, regardless of who takes the action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. This chapter discusses cumulative impacts as the incremental effect to specific resources or issues that would occur from Alternatives A-D, in conjunction with other cumulative actions.

5.1 REASONABLY FORESEEABLE DEVELOPMENT

In support of the cumulative impact discussion, this chapter provides discussion on past and present oil and gas activities in the Uinta Basin, both of which serve as introductions to the outlook for reasonably foreseeable development (RFD) in the Project Area and the greater Uinta Basin. The cumulative impact and RFD analysis is based upon the level of activities and actions identified in the Vernal FO Draft RMP (BLM 2005). Within the Vernal FO Draft RMP, projected oil and gas activity would be the most significant activity expected in the Vernal Field Office area. Other significant activities would be livestock grazing and recreational projects. The Cumulative Impact Analysis Area (CIAA) for most resources is Vernal FO Planning Area which encompasses approximately 5.5 millions acres in Duchesne, Dagget, Uintah and Grand Counties. For some resources, the CIAA is much larger.

5.1.1 Oil and Gas

The Uinta Basin is a significant source of natural gas and oil, and it is currently one of the most active oil and gas producing areas in the onshore U.S. In September 2004, the Utah BLM's quarterly oil and gas lease sale broke the record of most acreage, revenues, and bidders for any lease sale. The focus of the bidding seemed to be both on known producing areas in the Uinta Basin and in frontier areas in the central portion of the State. In the case of the Uinta Basin, past exploration has been in shallow areas up to 8,000 feet. Companies are just now beginning to tap the huge gas reserves that are 10,000-20,000 feet deep due to new technology and economics (BLM 2004b).

Oil and gas development is at an all-time high in the basin, with more rigs operating, and more applications for permit to drill (APDs) being processed than ever before. For example, over half (i.e., 8,737 wells) of the total oil and gas wells drilled in Utah between 1911 and November of 2000 were drilled within the Uinta Basin. APDs and ROW applications processed by the BLM Vernal Field Office have illustrated a significant upward trend, estimated to be approximately 15 percent annually. In support of the Vernal FO Draft RMP, a mineral potential report was prepared (BLM, 2002b). In that report it was estimated that a total of about 6,530 wells could be drilled in the Uinta Basin by various oil and gas operators over a 15-year period (BLM 2002b), of which about 67 percent would be new gas wells. Table 5-1 shows field development documents that are recently completed or currently ongoing in the Vernal Field Office. These documents assess anticipated development strategies in the specific fields.

Table 5-1. Oil and Gas NEPA Projects in Vernal Field Office

NEPA Project	Lead Agency	Record of Decision ¹	Number of Approved / Proposed Wells ²
Existing Oil and Gas Field Development NEPA Documents			
EA (No. 3) of Oil and Gas Development in the Duchesne River Area	BLM VFO	Jan-82	41
Monument Butte / Myton Bench EA (EA No. UT-080-1994-77)	BLM VFO	Jun-95	296
Chapita Wells EA	BLM VFO	Jan-98	99
Wexpro Company EA Island Unit (EA No. UT-080-1997-51)	BLM VFO	Apr-99	97
Chapita Wells Unit Infill Development EA (EA No. UT-080-1999-32)	BLM VFO	Apr-00	161
Castle Peak and Eight Mile Flat Oil and Gas Expansion Project EIS	BLM VFO	Aug-05	776
Castle Peak and 8-Mile Flat EIS	BLM VFO	Aug-05	920
North Chapita Natural Gas Field Development EA	BLM VFO	Jan-06	264
West Bonanza Development EA	BLM VFO	Jun-06	133
Bonanza Area EA	BLM VFO	Jul-06	94
Love Unit EA	BLM VFO	Aug-06	130
Resource Development Group EIS	BLM VFO	Aug-06	420
Riverbend Natural Gas Drilling Project EA	BLM VFO	Dec-06	49
Reasonably Foreseeable Oil and Gas Field Development NEPA Documents			
North Alger Natural Gas Expansion Project	BLM VFO	May-07	44
Tumbleweed Unit Exploratory Gas Well Development EA	BLM VFO	June-07	6
Chapita Wells-Stagecoach Area EIS	BLM VFO	Aug-07	627
Greater Deadman Bench EIS	BLM VFO	Aug-07	1,239
Kings Canyon EA	BLM VFO	Sep-07	285
LCU/HCU/BPU EA	BLM VFO	Oct-07	344
Gasco Development EIS	BLM VFO	Mar-08	1,500

¹Known or anticipated date for publication of Decision Record or ROD

²Number of proposed wells includes best estimate at the time of publication of this EA.

Exploratory drilling is currently proposed in the western and southwestern portions of the Uinta Basin, including BLM, Tribal and National Forest lands. Production of exploratory wells typically lags discovery by many years. These exploratory wells are typically characterized by larger, deeper, more remote locations requiring greater per-well expenditures, potential delays in infrastructure access and, therefore, greater financial risk (Linden 2003).

Future oil and gas development in the Uinta Basin will depend upon the feasibility of exploration, as determined by the underlying geology and further infill development projects within the Basin. Future development will be dependent upon the geologic feasibility each prospect, the cost to develop the resources, and engineering technological advancements. Development of Tribal lands will continue and perhaps increase as exploratory wells are drilled in the Hill Creek Extension. Drilling in the Ashley National Forest will likely increase as a result of new leasing and management strategies. However, the level of development on Tribal and National Forest System lands is unknown.

The cumulative scenario for this EA is based on the number of existing wells in the Vernal FO Planning Area, as well as the estimated total number of wells anticipated to be drilled over the coming 15-20 years in this same area. As of March 2007, there were 5,671 producing oil and gas wells in the Vernal FO planning area (UDOGM 2007). Under the Vernal FO Draft RMP Preferred Alternative, an estimated 6,530 oil and gas wells are anticipated in the Vernal FO Planning Area. The following surface disturbance assumptions have been applied regarding future construction associated with oil and gas development:

- Surface disturbance for a well pad: 2.4 acres;
- Surface disturbance for an access road, assuming 0.2 mile/well: .73 acres/well;
- Surface disturbance for pipelines and flowlines: 0.47 acres/well;
- Surface disturbance for transmission lines: 0.79 acre surface disturbance/well
- Surface for compressor stations: 2 acres;
- Surface disturbance for water pipelines: equals disturbance for oil well roads; and
- Surface disturbance for new sales pipelines: 0.47 acres for every new well.
- Surface disturbance for powerlines: 0.25 acre per mile of powerline

Based on these assumptions, the additional surface disturbance of the cumulative scenario for oil and gas development would be 44,091 acres, or 0.8 % of the 5.5 million acre CIAA. The details are shown in Table 5-2.

Table 5-2. Cumulative Oil and Gas Development Surface Disturbance

Planning Area	Existing Wells	RFD Wells	Total # Wells	Well Pads (acres) ¹	Access Roads (acres)	Total Pipelines (acres)	Compressor Stations (acres)	Total Disturbance (acres)
Vernal FO	5,671	6,530	12,201	29,282	8,907	5,734	168	44,091

¹Well pad disturbance is overestimated, since it assumes one well per pad. In some cases, two or more wells may be drilled from a single well pad.

5.1.2 Livestock Grazing

Livestock grazing is currently a permitted use of public lands within the Vernal FO Planning Area. Although some minor changes may be expected over the next few years, it is reasonable to expect that livestock grazing would continue. Allocated AUMs would remain essentially unchanged; however, based on use trends over the past seven years actual use may decline based on individual grazing permittee's operations and market conditions. The Vernal Field Office (VFO) currently administers grazing on 147 allotments. The 147 allotments within the VFO boundary designated for livestock grazing encompass

approximately 2,268,120 acres (1,696,416 acres of BLM land; 571,704 acres of private, State, and Tribal lands). Within the grazing allotments managed by the Vernal Field Office, 153,370 AUMs are allocated for livestock.

5.1.3 Recreation

Reasonable foreseeable recreation decisions potentially affecting cumulative impacts in the Vernal FO RMP area could include likely designation of Backcountry Byways, ACECs, WSRs, and Special Recreation Management Areas (SRMAs), as well as trail, campground, and cabin development. These designations and developments would have beneficial impacts on recreation, but would also affect the management of other resources in the Cumulative Impact Analysis Area (CIAA).

5.2 CUMULATIVE IMPACTS

This section discloses the impacts expected when the Proposed Action is added to the past and reasonably foreseeable actions.

5.2.1 Areas of Critical Environmental Concern

Currently there are no ACECs in the Project Area, and therefore the Alternatives would have no cumulative impacts on these resources. However as mentioned previously, under the Vernal FO Draft RMP, portions of the proposed White River ACEC would occur within the Project Area. Cumulative impacts to the values for which the Vernal FO Draft RMP considers designating the White River potential ACEC are below.

For this analysis, the CIAA is largest potential area (i.e., 47,130 acres) of the White River ACEC which is being considered for designation in the Vernal FO Draft RMP. As of June 1, 2007, 187 gas wells currently exist in the CIAA, and approximately 191 wells are currently in the APD process and will likely be developed in this area in the future. In addition, the following projects have been approved and would add to reasonable foreseeable development in the CIAA: Kerr McGee's Bonanza Project, RDG's Project, Enduring Resource's West Bonanza Project, and EOG's Chapita Wells – Stagecoach Project. Based upon examination of proposed well locations in approved NEPA documents for these projects, approximately 106 additional wells would likely be developed in the CIAA. Based upon the assumptions used in Section 5.1.1 above, surface disturbance in the CIAA associated with development of 484 past, present, and RFD wells and associated roads and pipelines would be approximately 1,742 acres. Recreation and livestock grazing activities would also contribute to cumulative impacts, but the incremental contribution is impossible to quantify.

Cumulative impacts from the implementation of mineral resource development within and outside of BLM-administered lands within the Uinta Basin "...could result in major adverse impacts to resource values in some areas, depending upon the alternative" (Vernal FO Draft RMP, p. 4-353). Cumulative impacts to the relevant and important values for which the White River ACEC was nominated are discussed in detail in the following sections: potential cumulative impacts on wetland and riparian habitats are discussed in Section 5.2.6; potential cumulative impacts on Goblin City, the campsite, river recreation and the White River viewshed are discussed in Section 5.2.8; and potential impacts on wildlife are discussed in Section 5.2.11. Primary impacts associated with the Rock House project include increased surface disturbance and human activity. Table 5-3 shows the number of wells and estimated amount of surface disturbance that would occur under each alternative of the Rock House EA. Due to the minimal amount of additional disturbance to the CIAA as a result of the Rock House project in combination with design features and operations strategies that would minimize development impacts in

these areas (e.g. install mufflers on engines, topographical and vegetative screening of roads and facilities, avoiding construction on rigelines), the proposed project would have minimal cumulative impacts on the White River ACEC.

Table 5-3. Cumulative Impacts of the Proposed Alternatives on the Proposed White River ACEC

	Estimated Surface Disturbance (acres)	% of Past, Present, and RFD Surface Disturbance in the CIAA ¹	Total Reasonably Foreseeable Surface Disturbance in the CIAA	% of CIAA Disturbed By Past Present, RFD, and Alternatives
Alternative A	91	5.2	1,833	3.9
Alternative B	77	4.4	1,819	3.9
Alternative C	84	4.8	1,826	3.9
Alternative D	<1	<0.05	1,742	3.7

¹Assumes the selection of the largest proposed area for the White River ACEC in the Vernal FO Draft RMP.

5.2.2 Cultural Resources

As potential impacts to cultural resources across a geographic landscape are not additive, the CIAA for cultural resources is defined as the existing Rock House Project Area. Cumulative impacts to cultural resources are defined as any damage to, or destruction of cultural resources which result from the incremental impact of the action when added to other past, present, and RFD actions (40 CFR 1508.7). The magnitude of the impacts may be greater or lesser depending on 1) the cultural resource site densities present in the areas of project-related activity; 2) the significance of the cultural resources present; and 3) the final magnitude and scope of RFD actions over the next 20 years. Cumulative impacts to the cultural resources in the CIAA would primarily result from activities associated with surface and subsurface disturbance such as oil and gas development projects, increased visitation to the Project Area, recreational/OHV use, and fire management. Impacts may, however, result from specific cultural resource management decisions and from non-surface disturbing activities that create atmospheric, visual, and/or auditory effects. These latter impacts would apply to sites or locations that together comprise the overall cultural experience for all visitors to the area, and especially to those deemed sacred or traditionally important by Native American Tribes and used by these groups in such a manner that atmospheric changes, visual obstructions, and/or noise levels impinge upon that use. These types of impacts cumulatively affect not only the historic setting, feeling, and viewshed of cultural properties, but also their eligibility potential for nomination to the NRHP.

As cultural resource surveys would occur prior to any surface-disturbing activities in the Project Area, and as all significant cultural resources would be avoided or appropriately mitigated, direct, cumulative impacts to these resources are expected to be minimal. The greater cumulative threat to cultural resources would be indirect. When considered alongside other past, present, and RFD actions, the impacts of the Proposed Action may cumulatively impact unknown cultural resources in the Project Area by introducing atmospheric, visual, and auditory intrusions, increased visitation and pedestrian traffic during well field development and operation, vandalism, OHV and other motorized vehicle use, erosion, and unknown impacts to unidentified TCPs and cultural landscapes, all of which may contribute to an alteration of the overall historic setting and feeling of the CIAA. Generally speaking, project-related activities could incrementally and cumulatively add to the loss of important cultural resources across the CIAA. These types of impacts present significant consequences for the breadth, completeness, and interpretive value of the archaeological record. Beneficial cumulative impacts would also likely occur as undocumented cultural resources could be discovered and preserved. This would include Enduring's commitment to restore the existing Rock House Cultural Site (42Un5015).

As noted in Sections 2.8.1, the project alternatives incorporate several Applicant-Committed Mitigation Measures that are intended to reduce, minimize, or avoid project-specific and cumulative impacts to cultural resources. In addition, many potential cumulative impacts to cultural resources would be reduced or eliminated through the implementation of Federal regulatory laws, actions, and guidelines designed to protect cultural resources, and through the consultation process with the SHPO and Native American Tribal representatives. However, it is anticipated that such measures would not prevent all cumulative impacts from occurring.

5.2.3 Paleontological Resources

As potential impacts to paleontological resources across a geographic landscape are not additive, the CIAA for paleontological resources is defined as the existing Rock House Project Area. Cumulative impacts to paleontological resources would primarily result from activities associated with surface and subsurface disturbance such as oil and gas development projects, recreational use/OHV travel, and fire management. These activities could have short- and long-term cumulative effects on paleontological resources in the CIAA. Surface-disturbing activities could affect paleontological resources by damaging or destroying fossils. Adverse effects include physical damage to or destruction of fossils, as well as increased vandalism and theft that result from improved access to fossil localities. However, as site-specific paleontological surveys would be conducted prior to surface disturbing activities in the Rock House Project Area, and as all identified paleontological resources would be avoided or impacts mitigated, cumulative impacts associated with the Alternatives A, B, C, and D would be reduced or eliminated. Public education and, where necessary, law enforcement actions would reduce unauthorized fossil collecting.

Surface-disturbing activities could also have a beneficial effect on paleontological resources by drawing the attention of a qualified paleontologist to areas that are not currently being researched, resulting in the collection of specimens and data that would not otherwise be recovered.

5.2.4 Watershed Resources

The CIAA for water resources is the BLM Vernal FO Planning Area. In the CIAA, construction of oil and gas facilities would likely have the greatest potential impact on water resources due to increased erosion and sedimentation rates. In addition to oil and gas development, recreational activities (OHV use and the development of facilities including campgrounds), mining activities (Gilsonite, sand and gravel, and, potentially oil shale), county and private road construction, agricultural activities (livestock grazing), and prescribed burns also increase natural erosion rates and contribute sediment to the rivers in the CIAA.

Erosion and Sedimentation

Surface disturbance associated with past, present and reasonable foreseeable oil and gas development (i.e., 12,201 wells = 44,091 acres) in the CIAA would increase background erosion rates from 63,932 tons per year to approximately 191,795 tons per year. If it assumed that sedimentation control devices employed for the reasonably foreseeable projects would be about 80 percent effective, the sediment delivery from these projects would be about 38,359 tons per year. Some of this increased sediment would be delivered to the White River and some to the Green River. Additional increases in sediment delivery could also be expected from expanded recreational use, mining activities, livestock grazing, prescribed burns, and construction or improvement of county and private roads.

Table 5-4 shows the estimated increased erosion and sediment yield associated with each Alternative of the Rock House project. The Proposed Action and Alternatives would result in a slight increase in erosion rates and sediment yield during the short-term. If reclamation and mitigation measures are not

successful, additional sedimentation and turbidity of surface water, including that in the White River, could persist. Rapid and successful reclamation/re-vegetation of temporarily disturbed areas and installation of sediment control devices are particularly important in minimizing water quality impacts and to assure maintenance of long-term stream health. Design features of the Proposed Action and alternatives, including berms, sediment control structures, and proper grading of well pads and access roads, would minimize the erosion of sediment from the proposed project facilities. In addition, mitigation measures applied to the project would minimize the additional sedimentation and the chance for contamination of surface water and groundwater. As such, the increased erosion and sedimentation, combined with increases associated with other oil and gas development, recreational activities including OHV use, livestock grazing, and mining, would have minimal cumulative negative impacts on aquatic habitat within affected drainages.

Table 5-4. Estimated Increased Erosion and Sediment Yield Associated with Each Alternative of the Rock House Project

	Surface Disturbance (acres)	Increase in Erosion (tons/year)	Increase in Sediment Loading (tons/year) ¹	% of Total Sediment Loading Estimated for Past, Present, and RFD in the CIAA
Alternative A	106	307	61	0.2 %
Alternative B	92	267	53	0.1 %
Alternative C	106	307	61	0.2 %
Alternative D	<1	3	<1	<0.01 %

¹Assumes that sedimentation control devices employed for the project would be about 80 percent effective.

Water Depletion

Assuming an average of approximately 0.75 acre-feet of water would be required to drill an oil or gas well, and assuming all water would come from the Upper Colorado River Basin, RFD in the CIAA would deplete flow in the Upper Colorado River Basin by 4,898 acre-feet. Project-related water consumption would deplete the flow in the White River by about 0.001-0.003 percent, depending on the Alternative selected. This depletion would incrementally add to the depletion from other past, present, and reasonably foreseeable oil and gas activities, and diversions of water for agricultural and industrial uses, including mining activities. The cumulative depletion of the White River flows from all of these sources would still be less than 1 percent of the projected 1,175,000 acre-feet per year that will be annually depleted from the Upper Colorado River Basin by 2020. Therefore, no diversions or alterations of flow regimes of the White River are expected to occur as a result of the Proposed Action or Alternatives.

The Proposed Action or alternatives, combined with other oil and gas development and increased recreational activities, would slightly increase the chance that accidental spills of fuels, lubricants, and other petroleum products would occur and contaminate surface water within the CIAA. Spills of fuels or produced fluids from well pads, pipelines, and compressor stations also have the potential to contaminate the shallow alluvial groundwater along Project Area drainages and the White River.

5.2.5 Floodplains

The CIAA for floodplains is the BLM Vernal FO Planning Area. In the CIAA, floodplains would most likely be impacted by oil and gas development, recreational activities (OHV use and the development of facilities including campgrounds), mining activities (Gilsonite, sand and gravel, and, potentially oil shale), county and private road construction, agricultural activities (livestock grazing), and prescribed burns. These activities increase natural erosion rates and contribute sediment to adjacent floodplains therefore decreasing the sustainability of these habitats. As shown above in Table 5-4, the Proposed Action and Alternatives would result in a slight increase in erosion rates and sediment yield in the CIAA. If reclamation and mitigation measures are not successful, additional sedimentation of adjacent floodplains could persist. Rapid and successful reclamation/re-vegetation of temporarily disturbed areas and installation of sediment control devices are particularly important in maintaining the ecological function of the floodplains. Design features of the Proposed Action and Alternatives, including berms, sediment control structures, and proper grading of well pads and access roads, would minimize the erosion of sediment from the proposed project facilities. In addition, mitigation measures applied to the project would minimize the additional sedimentation and the chance for contamination of adjacent floodplains. As such, the increased erosion and sedimentation, combined with increases associated with other oil and gas development, recreational activities including OHV use, livestock grazing, and mining, would have minimal cumulative negative impacts on the ecological function of floodplains throughout the CIAA.

5.2.6 Wetlands/Riparian Zones

The CIAA for wetlands and riparian zones is the BLM Vernal FO Planning Area. As not all wetland and riparian zones have been mapped in the CIAA, past, present, and reasonably foreseeable actions in these areas can not be quantified. In the CIAA, wetlands and riparian zones would most likely be impacted by oil and gas development, recreational activities (OHV use and the development of facilities including campgrounds), county and private road construction, and agricultural activities (livestock grazing).

Wetlands and riparian habitats in the Rock House Project Area occur along the White River. Under the Proposed Action and Alternatives, portions of the proposed water collection pumps, sump, and water pipes would be placed in these areas. The amount of vegetation disturbed from their development would be minimal (less than 0.01 acres) and would have negligible impacts on these habitats. In addition, design features of the Proposed Action and Alternatives, including berms, sediment control structures, and proper grading of well pads and access roads, would minimize impacts to wetlands and riparian zones. As such, impacts of the Proposed Action and Alternatives, combined with other oil and gas development, recreational activities including OHV use, livestock grazing, and mining, would have minimal cumulative impacts on wetlands and riparian zones throughout the CIAA.

5.2.7 Invasive and Noxious Species

The CIAA for invasive and noxious weeds is the BLM Vernal FO Planning Area. Invasive and noxious weed species are a major concern in the Basin. Weed Management Areas have been established involving interagency planning and coordination and treatment to search and destroy stands of invasive and noxious species. Past, present and reasonable foreseeable oil and gas projects in the CIAA would potentially include the construction of upgrade of approximately 2,440 miles of road, and disturbance of approximately 44,091 acres of existing vegetation. In addition, to vegetation lost from oil and gas developments, past, present and reasonably foreseeable forage use by livestock grazing, wild horses, and wildlife, additional recreational use of habitats mining activities, and prescribed burns would also potentially increase noxious and invasive weeds throughout the CIAA. Specific negative effects of

invasive plants and noxious weeds associated with proposed development in the CIAA could include 1) reduction in the overall visual character of the area; 2) competition with, or elimination of native plants; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion.

Table 5-5 shows the amount of road development and overall surface disturbance associated with each Alternative in the Rock House project. Based upon the minimal amount of road development and surface disturbance associated with the Alternatives when compared to RFD in the CIAA, along with the applicant-committed measures that would be implemented under each Alternative to aggressively treat infestations, and to maximize interim and final reclamation, the cumulative impacts of each Alternative would result in minimal cumulative impacts to invasive and noxious weeds.

Table 5-5. Road Development and Surface Disturbance Associated with the Proposed Action and Alternatives

	Road Development (Miles)	% of Road Development for Past, Present, and RFD in the CIAA	Surface Disturbance (acres)	% of Surface Disturbance for Past, Present, and RFD in the CIAA	Total Reasonably Foreseeable Surface Disturbance in the CIAA	% of CIAA Disturbed By Past Present, RFD, and Alternatives
Alternative A	8.4	0.09 %	106	0.2 %	44,197	0.8%
Alternative B	7.8	0.09 %	92	0.2 %	44,183	0.8%
Alternative C	10.1	0.11 %	106	0.2 %	44,197	0.8%
Alternative D	0.0	0.00 %	<1	<0.01 %	44,091	0.8%

5.2.8 Recreation

The CIAA for recreational resources is the BLM Vernal FO Planning Area. Reasonable foreseeable recreation decisions potentially affecting cumulative impacts in the CIAA could include designation of Backcountry Byways, ACECs, WSRs, and Special Recreation Management Areas (SRMAs), as well as trail, campground, and cabin development. These designations and developments would have beneficial impacts on recreation, but would also affect the management of other resources in the CIAA.

Detrimental cumulative impacts to recreational resources in the CIAA would be primarily caused by oil and gas development. However, mining activities, prescribed burns, and livestock grazing activities also contribute to cumulative impacts, but the incremental contribution is impossible to quantify. Adverse impacts associated with these activities would mainly include short and long-term recreational closures, restrictions, and/or a diminished recreational experience due to the presence of noise and human activity. BLM and County plans are anticipated to manage for the availability and quality of recreation in consideration of increasing oil and gas development in the CIAA. For people not negatively influenced by development and the presence of infrastructure, increased road surfaces in the CIAA would increase recreational access.

Cumulative activities, in general, are increasingly modifying the natural landscape through surface disturbance, construction and installation of facilities, pipelines and roads, all of which could affect the quality of a recreational experience in particular areas where recreational opportunities are also available. The Project Area contains numerous existing roads and oil and gas facilities, which has reduced the value

of the Project Area for recreationists seeking pristine landscapes. Recreation activities on public lands in the winter months generally include hunting of mule deer, pronghorn, and elk. Throughout the remainder of the year, recreational use can be classified best as dispersed and is generally quite low, or centered around features of interest (such as the White River and the Goblin City overlook). The addition of Enduring's proposed wells under the Proposed Action and Alternatives in combination with RFD activities in the CIAA would result in potential impacts including temporary and long-term displacement of recreation opportunities. Short-term impacts would primarily occur during the initial construction and drilling phases of the project. Long-term impacts would occur as a result of people avoiding areas of human infrastructure. However, as shown in Table 5-5 above, road development and surface disturbance associated with the Proposed Action and Alternatives when compared to past, present, and reasonably foreseeable actions would have minimal impacts on recreational resources across the CIAA.

5.2.9 Livestock Grazing

The CIAA for livestock grazing is the Olsen AMP Grazing Allotment. Cumulative impacts from oil and gas development to livestock grazing would include the loss of AUMs during the life of the disturbance. Recreation activities, mining activities, and prescribed burns also contribute to cumulative impacts, but the incremental contribution is impossible to quantify. Table 5-6 below, displays the past and reasonably foreseeable oil and gas development in the Olsen AMP grazing allotment.

Table 5-6. AUMs Lost from Past and Reasonable Foreseeable Oil and Gas Developments in the Olsen AMP Grazing Allotment

	Total Allotment AUMs	Past Action AUMs Lost	RFD AUMs Lost	AUMs Lost per Alternative	Total Reasonably Foreseeable AUMs Lost	% of Total Allotment AUMs Lost
Alternative A	134,307	29	97	12	138	0.1%
Alternative B	134,307	29	97	6	132	0.1%
Alternative C	134,307	29	97	6	132	0.1%
Alternative D	134,307	29	97	0	126	0.1%

In addition to loss of AUMs, increased roads within the Project Area would cumulatively contribute to difficulties in controlling livestock as more natural barriers to livestock movement are removed, and as more livestock use roads as travel routes. Furthermore, increased road and pipeline ROWs could contribute to changes in water flow, thereby reducing flows to livestock ponds. In addition, loss of vegetation and increased traffic and human activity in the Project Area would cumulatively add to livestock displacement that is occurring throughout the Project Area as a result of recreational activities and other land uses. These past, present, and future construction activities, and other visual and noise impacts in the Project Area could cause livestock to move to adjacent undisturbed areas, thereby leading to additional livestock impacts on vegetation in those locations.

5.2.10 Soils

The CIAA for soil resources is the Vernal FO Planning Area. Under the RFD scenario, 23,676 acres of soils are expected to be disturbed in addition to the current estimated 20,415 acres of soil disturbance from oil and gas activities in the CIAA. Any land-disturbing activity that removes native vegetation and topsoil can result in an increase in erosion rates and sediment yield. Authorized actions that could result in increased erosion and sediment yield within the CIAA include oil and gas development, livestock grazing, recreation, mining activities (Gilsonite, sand and gravel, and, potentially oil shale), and county and private road construction. Of these potential soil-disturbing activities, existing and proposed roads are the features of highest concern. Unlike surface and buried pipelines, active roadways and well pads are not reclaimed, thus sediment yield from roads can continue at rates two to three times above background rates into the indefinite future.

Compaction due to construction activities at well pads, along access roads, and in other disturbed areas would result in a small increase in surface runoff from the area. This slightly increased runoff could in turn cause increased sheet, rill, and gully erosion. The construction and operation of each well would incrementally increase the chance that leaks or spills of saline water, hydro-fracturing chemicals, fuels, and lubricants would occur within the CIAA. Spills of this nature could increase the loss of soil productivity within the area.

As shown in Table 5-5 above, road development and surface disturbance associated with the Proposed Action and Alternatives when compared to past, present, and reasonably foreseeable actions would have minimal impacts on soil resources across the CIAA. In addition, design features including berms, sediment control structures, and proper grading of well pads and access roads, would reduce the impacts of the Proposed Action and Alternative on soil resources by minimizing soil erosion and compaction, and by reducing the potential for soil contamination.

5.2.11 Threatened, Endangered, and Sensitive Animal Species and other Wildlife

The CIAA for threatened, endangered, and sensitive animal species and other wildlife is the Vernal FO Planning Area. Past and RFD actions in the CIAA have reduced habitat, contributed to habitat fragmentation, displaced individual wildlife species, resulted in collisions between wildlife and vehicles, and potentially contributed to poaching of animals. Past, and reasonably foreseeable surface disturbance, and thus, wildlife habitat loss, from oil and gas activity in the CIAA is approximately 44,091 acres. Recreational activities, livestock grazing, mining activities, and prescribed burns would also contribute to cumulative impacts, but the incremental contribution is difficult to quantify. Future surface disturbance in the CIAA would primarily result from oil and gas development, although livestock grazing, recreation and development of dedicated recreational facilities, and growth of Uinta Basin communities may also remove habitat from use by wildlife. While surface disturbance does somewhat correspond to associated wildlife impacts, accurate calculations of cumulative wildlife habitat loss are not determinable because the direct impacts are species-specific and dependent upon the following: status and condition of the population(s) or individual animals being affected; seasonal timing of the disturbances; value or quality of the project area as well as adjacent habitats; physical parameters of the affected and nearby habitats (e.g., extent of topographical relief and vegetative cover); and type of surface disturbance. On Federal lands, surveys are required in potential or known habitats of threatened, endangered or otherwise special status species prior to project implementation. These surveys help determine the presence of any special status wildlife species or extent of habitat, and protective measures would generally be taken to avoid or minimize direct disturbance in these critical areas.

As shown in Table 5-5 above, road development and surface disturbance associated with the Proposed Action and Alternatives when compared to past, present, and reasonably foreseeable actions would have minimal impacts on wildlife habitats across the CIAA. Yet in the context of cumulative impact analyses, each acre of vegetation disturbance adds to a cumulative impact by increasing erosion, incrementally

adding to overall native vegetation loss, and potentially increasing invasion of noxious weeds. Ongoing and planned oil and gas activities and other land uses within the CIAA would further reduce the amount of available cover, foraging opportunities, and breeding areas for a wide variety of wildlife trophic levels. Additional development could displace wildlife or preclude wildlife from using areas of more intensive human activity. Although implementation of the Proposed Action and Alternatives, and the resulting long-term disturbance, in combination with other activities in the CIAA may affect individual wildlife species including bald eagles, migratory birds and sage-grouse, it is not likely to result in a loss of viability, nor cause a trend to Federal listing of these species. As no nesting habitat for the MSO occurs in the RBU Project Area impacts associated with the Proposed Action and Alternatives would be limited to removal of foraging habitats. Given the minimal amount of surface disturbance associated with these Alternatives, the impacts associated with Proposed Action and Alternatives in combination with other activities in the CIAA would have “no affect” on the MSO. In addition, with Enduring’s commitment to implement protective mitigation measures, activities associated with the Proposed Action and Alternatives, “may affect, are not likely to adversely affect” the Colorado River Endangered fish species. However, water depletions associated with the Proposed Action and Alternatives in combination with depletions from other activities in the CIAA would reduce the ability of the Upper Colorado River Basin to create and maintain the physical habitat (areas inhabited or potentially habitable to special status fish for use of spawning, development of fish larvae, feeding, or serving as corridors between these areas) and the biological environment for the Colorado River Endangered Fish Species. As such, these depletions “may affect, are likely to adversely affect” these species.

5.2.12 Vegetation including Special Status Species

The CIAA for vegetation including special status plant species is the Vernal FO Planning Area. Past and RFD oil and gas projects in the CIAA would potentially disturbance of approximately 44,091 acres of existing vegetation. In addition, to vegetation lost from oil and gas developments, past, present, and reasonably foreseeable forage use by livestock grazing, wild horses, and wildlife, additional recreational use of habitats, mining activities, and prescribed burns would also potentially disturb existing vegetation throughout the CIAA. Specific negative effects associated with the proposed development in the CIAA could include 1) reduction in the overall visual character of an area; 2) reduction or fragmentation of wildlife habitats; and 3) increased soil erosion.

As shown in Table 5-5 above, road development and surface disturbance associated with the Proposed Action and Alternatives when compared to past, present, and reasonably foreseeable actions would have minimal impacts on vegetation across the CIAA. Yet in the context of cumulative impact analyses, each acre of vegetation disturbance adds to a cumulative impact by increasing erosion, incrementally adding to overall native vegetation loss, and potentially increasing invasion of noxious weeds. However, based upon the minimal amount of road development and surface disturbance associated with the Alternatives when compared to RFD in the CIAA, along with the applicant-committed measures that would be implemented under each Alternative to maximize interim and final reclamation, the cumulative impacts of each Alternative would result in minimal cumulative impacts to vegetation resources.

Special Status Plants

Public lands involving TEC plant species habitats have been leased with terms and conditions to protect these species and their habitat. However, continued encroachment on these habitats without understanding what it would take to restore them if altered or what size habitat is needed to ensure sustainability could impact these species and their habitats. To prevent or reduce the negative impacts of habitat encroachment on TES plant species, the BLM in cooperation with the USFWS drafted a list of species specific conservation measures that would moderate development in these areas and afford protective distances from proposed development to plants and/or their occupied habitats. As these

measures (see Appendix C) would be implemented under the Proposed Action and Alternatives, as well as for other surface disturbing Federal actions (e.g., other oil and gas development, road development, etc.) occurring in TEC plant habitats in the CIAA, these activities would likely have minimal impacts to TEC plant species. As such, the Proposed Action and Alternatives in combination with other activities in the CIAA, “*may affect, are not likely to adversely affect*” the Uinta Basin hookless cactus, and “*may affect, but are not likely to lead to the need for Federal listing*” of the Graham’s beardtongue and White River penstemon.

5.2.13 Visual Resources

As recreational activities and human activities are concentrated along the White River, the CIAA for visual resources is defined as the largest potential area for the proposed White River ACEC (i.e., 47,130 acres). The current management objective for visual resources in the CIAA is to manage the public lands in such a way as to preserve those scenic vistas that are deemed most important and to design or mitigate all visual intrusions so that the intrusions do not exceed the established VRM class objectives. Within the CIAA area, approximately 23,856 acres are VRM Class II, 2,864 acres are VRM Class III, and 29,471 acres are Class IV. Activities within the CIAA that could potentially cause visual intrusions and have an impact on scenic quality are primarily surface-disturbing activities, including minerals exploration and development. Recreation and livestock grazing activities also contribute to cumulative impacts, but the incremental contribution is impossible to quantify. Generally, the greater the degree of surface disturbance, the greater the impact would be to scenic quality.

Oil and gas activities are the predominant source of modification to the landscape and visual environment in the CIAA. Currently, 187 gas wells occur in the CIAA (1 in VRM Class II, 19 in VRM Class III, and 167 in Class IV). RFD in the CIAA includes 191 wells that are currently in the APD process and 106 wells that area currently proposed in the Kerr McGee’s Bonanza Project, RDG’s Project, Enduring Resource’s West Bonanza Project, and EOG’s Chapita Wells – Stagecoach Project. Past and RFD in the CIAA would include 21 wells in VRM Class II, 23 wells in VRM Class III, and 440 wells in Class IV. Based upon the assumptions used in Section 5.1.1 above, surface disturbance in the CIAA associated with development of 484 past, present, and RFD wells and associated roads and pipelines would be approximately 1,742 acres (75 acres = Class II; 83 acres = Class III; 1,584 = Class IV). In addition, roads and pipelines have been developed and are proposed which would also have both direct and indirect impacts on visual quality. The cumulative effects on visual quality would include strong visual contrasts from (and not limited to) the construction of well pads, access roads, drilling rigs, pipelines, and processing and support facilities. Indirect impacts to visual quality, both short-term and long-term, would occur as a result of soil erosion from disturbed areas and fugitive dust from disturbed areas.

Table 5-7 shows the estimated amount of surface disturbance that would occur in each VRM Class under each alternative of the Rock House EA. The vast majority of the lands in the Project Area fall within VRM Class IV (i.e., the level of change to the landscape in Class IV areas can be high). Due to the minimal amount of additional disturbance to the CIAA as a result of the Rock House project, in combination with implementation of design features and operations strategies that would minimize visual impacts in these area (e.g., topographical and vegetative screening of roads and facilities, avoiding construction on ridgelines), the proposed project would have minimal cumulative impacts on the visual resources in the CIAA.

Table 5-7. Cumulative Impacts of the Proposed Alternatives on the Visual Resources

	Proposed Surface Disturbance in Class II	% of Past, Present, and RFD in Class II in	Proposed Surface Disturbance in Class	% of Past, Present, and RFD in Class III in the	Proposed Surface Disturbance in Class IV	% of Past, Present, and RFD in Class IV in the

	(acres)	the CIAA ¹	III (acres)	CIAA ¹	(acres)	CIAA ¹
Alternative A	11	14.6	0	0.0	85	5.4
Alternative B	11	14.6	0	0.0	66	4.1
Alternative C	24	32.0	0	0.0	60	3.8
Alternative D	0	0.0	0	0.0	<1	<0.01%

¹Assumes the selection of the largest proposed area for the White River ACEC in the Vernal FO Draft RMP.

5.2.14 Wild and Scenic Rivers

Currently, no WSRs exist within the Project Area, and implementation of the Proposed Action would have no cumulative impacts on these resources. However, the Vernal FO Draft RMP has proposed 28 BLM-administered miles of the White River and ¼ mile to either side of the White River as a WSR due to its scenic, recreational, historic, and wildlife values. As such, the CIAA for WSR is the current boundary of the proposed White River WSR. Oil and gas activities are the predominant source of modification to the landscape in the CIAA. Currently, 23 gas well occurs in the CIAA. RFD in the CIAA includes 6 wells that are currently in the APD process, and 354 wells that are currently proposed in the Kerr McGee's Bonanza Project, Enduring Resource's West Bonanza Project, and Anadarko's Natural Buttes Project. Past, present and RFD oil and gas projects in the CIAA would potentially include disturbance of approximately 1,379 acres of existing vegetation. In addition, to vegetation lost from oil and gas developments, past, present and reasonably foreseeable forage use by livestock grazing, wild horses, and wildlife, and additional recreational use of habitats will also potentially increase surface disturbance and noxious and invasive weeds throughout the CIAA.

Overall surface disturbance in the Proposed White River WSR associated with Alternatives A, B, and C would consist of installation of the proposed generator, sump, pump, and water pipeline (less than 0.1 acres). Based upon the minimal amount of surface disturbance associated with the Alternatives when compared to RFD in the CIAA, along with the applicant-committed measures that would be implemented under each Alternative to maximize interim and final reclamation, the cumulative impacts of each Alternative would result in minimal cumulative impacts to the existing resource values that make the river eligible for WSR designation. Detailed discussion on the cumulative impacts to these resources can be found in the following sections: potential impact to historic resources are discussed in 5.2.2 – Cultural Resources; potential impacts on Goblin City, the campsite, and river recreation in 5.2.8 – Recreation; potential impacts on wildlife in 5.2.11 – Threatened, Endangered, and Sensitive Animal Species and Other Wildlife; and potential impacts on the White River viewshed in 5.2.13 – Visual Resources. As these the proposed generator, sump, pump, and water pipeline would not be utilized under Alternative D, there would be no cumulative impacts to WSR.

5.2.15 Wilderness Characteristics

The CIAA for wilderness characteristics is defined as the area in the White River WIA that was determined by the Vernal FO to possess all of the criteria needed for wilderness values defined as “naturalness” and possessing “opportunities for solitude and primitive and unconfined recreation” (i.e., 21,211 acres). Current developments in the CIAA (Federal lands only) include one plugged and abandoned well, and one producing well. In addition, the Utah Division of Oil, Gas, and Mining has approved 44 Applications for Permit to Drill (APDs). To date, the BLM has not finalized the processing of these APDs. In addition to existing development, 36% of the CIAA has been previously leased for oil and gas development. According to proposed well locations in Kerr McGee's Bonanza Project, Enduring Resource's West Bonanza Project, and RDG's Project 26 wells are currently proposed on lands possessing wilderness characteristics in the CIAA. If all 26 wells are developed, approximately 97.2 acres of existing vegetation would be lost and approximately 780 acres of lands possessing wilderness

characteristics would be segregated from the area. In addition, to vegetation lost from oil and gas developments, past, present and reasonably foreseeable forage use by livestock grazing, wild horses, and wildlife, and additional recreational use of habitats will also potentially increase surface disturbance throughout the CIAA. Any surface disturbance associated with these activities would cause a direct loss of naturalness in the CIAA, and would reduce the overall solitude and outstanding opportunities for primitive and unconfined recreation.

Table 5-8 shows the amount of overall surface disturbance as well as the amount of acreage that would be separated from other lands possessing wilderness characteristics associated with each Alternative and reasonable foreseeable oil and gas development. Based upon the minimal amount of surface disturbance associated with the Alternatives when compared to RFD in the CIAA, along with the applicant-committed measures that would be implemented under each Alternative to maximize interim and final reclamation, the cumulative impacts of each Alternative would result in minimal cumulative surface disturbing impacts in these areas. Although large portions of the wilderness characteristics areas would be separated by the Alternatives in combination with reasonable foreseeable oil and gas developments, the rugged topography and overall size of the impacted areas would not cause this separation to significantly alter the attributes used to define and categorize the wilderness characteristics area.

Table 5-8. Road Development and Surface Disturbance in the Wilderness Characteristics Area CIAA Associated with the Proposed Action and Alternatives

	Proposed Surface Disturbance in the Wilderness Characteristics CIAA (acres)	Acreage Separated from the Existing Wilderness Characteristics Area	Reasonable Foreseeable Acreage Separated from the Existing Wilderness Characteristics Area	Total Acreage Separated from the Existing Wilderness Characteristics	% of Total Wilderness Characteristics Area Separated Due to RFD
Alternative A	84	3,701	780	4,481	21.1
Alternative B	71	3,701	780	4,481	21.1
Alternative C	77	3,788	780	4,568	21.5
Alternative D	0	0	780	780	3.6

5.2.16 Air Quality

Cumulative air quality impacts are defined as the combination of emissions resulting from the Proposed Action, existing nearby permitted sources, and Reasonably Foreseeable Development (RFD) within the region. Areas of concern include the Uinta Basin, the High Uintah Wilderness Area, as well as nearby mandatory federal PSD Class I areas such as Arches and Canyonlands National Parks. Potential Air Quality Related Value (AQRV) impacts to sensitive areas include regional impacts on visibility, total nitrogen and sulfur deposition, and Acid Neutralization Capacity (ANC).

It is anticipated that the pace and level of natural gas development within this region of the State will continue over the next few years. The Vernal Field Office has recently addressed the impacts to air quality in the Uinta Basin and surrounding areas of special concern (BLM 2002), considering both existing permitted sources and an extended look at development over a fifteen year timeframe as described in the mineral potential report. The development scenarios were based on BLM's proposed plans for resource development, which included estimates for the number of wells drilled for oil and gas, compressor stations, and pipelines, along with other foreseeable development activities by non-BLM

entities. In general, results from this analysis indicate that existing air quality in the region is good, and based on Reasonable Development Scenarios in conjunction with existing sources, is not of great concern.

In particular, cumulative well development activities in the Uinta Basin are not expected to affect attainment of NAAQS standards or regional PSD increments. Existing and RFD stationary sources, including compressor engines and turbines, while of greater concern, are anticipated to be adequately spaced to allow for favorable dispersion conditions. A cumulative effects analysis on visibility impairment within nearby Class I and selected Class II areas found that potential changes in visibility and acid deposition were within acceptable guidelines.

The Proposed Action would cumulatively contribute to disturbances occurring immediately adjacent to the Project Area and within the greater Uinta Basin. In general, the increase in emissions associated with the Proposed Action will be localized, in some cases temporary (construction and drilling phases), and on a limited scale in comparison with regional emissions. Therefore, it is unlikely that the Proposed Action would strongly impact the cumulative air quality of the region.