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5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

This section analyzes the cumulative impacts to specific resource values and uses that could occur from implementation of the Proposed Action and the other alternatives, in conjunction with other impacts from past, ongoing, and reasonably foreseeable future actions. In addition to the evaluation of direct impacts, NEPA regulations require an assessment of cumulative impacts (40 C.F.R § 1508.7, 1508.25). CEQ regulations implementing NEPA define a cumulative impact as:

“... The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

The following sections identify the time frame for effects; the past, present, and reasonably foreseeable future projects to be analyzed; and the cumulative impacts for each resource. The primary human influences in the area have been oil and gas development, historic and current gilsonite mining, and livestock grazing. The compilation of these actions provides the basis for estimating future environmental changes that may affect the extent and quality of the natural and human environment. **Figure 5.1-1 (Attachment 1)** shows the locations of past, present, and reasonably foreseeable future actions included in the general cumulative effects area for oil and gas field development projects.

The geographic scope of each specific Cumulative Impact Analysis Area (CIAA) varies by resource and is larger for resources that are mobile or migrate as compared to those that are stationary. The CIAA for many of the resources discussed in this section includes the watersheds that intersect the MBPA. For some resources, the CIAA is smaller due to the geographically confined nature of cumulative impacts (e.g., areas of special designation), while for others (e.g., socioeconomics) the CIAA is much larger and includes both Duchesne and Uintah Counties. **Table 5.1-1** identifies the CIAAs for individual resources and resource issues as well as the rationale for the selection of each area. **Figure 5.1-2 (Attachment 1)** depicts each of the resource specific CIAAs within the greater cumulative impact area for the EIS.

In general, the timeframe of the analysis is the 41 to 51-year anticipated LOP anticipated under the Proposed Action and Alternative C. However, the timeframe of cumulative impacts may vary from one resource value or use to another, depending on variations in the duration of different actions.

Although much of this analysis focuses on adverse cumulative impacts, it should be noted that cumulative impacts may also be beneficial. For example, there are significant positive cumulative economic effects of oil and gas development, including additional employment opportunities in the region, additional tax revenues to local governments, increased royalties to the federal government, and reduced dependence on foreign sources of energy.

Table 5.1-1. Cumulative Impact Analysis Areas

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Air Quality	Uinta Basin, nearby Class I areas	Construction, development, and production activities from implementation of the alternatives would cumulatively contribute to changes in air quality occurring immediately adjacent to the MBPA and within the greater Uinta Basin.
Geology and Minerals – Topography, Physiography, Oil and Gas Resources, and Other Leasable, Locatable, and Saleable Minerals	MBPA	Oil and gas operations would have an impact on subsurface resource uses located within the MBPA and underlying the MPBA either by contaminating other possible mineral resources or preventing access to those sources.
Geology and Minerals – Tar Sands	Special Tar Sand Areas Entirely or Partially within the MBPA	Oil and gas operations would have an impact on the commercial extraction of tar sands within STSAs by impeding the development of tar sand extraction facilities and operations.
Geology and Minerals – Oil Shale	Known Oil Shale Lease Areas Entirely or Partially within the MBPA	Oil and gas operations would have an impact on oil shale extraction activities within KOSLAs by impeding the development of oil shale extraction facilities and operations.
Paleontological Resources	MBPA	Project activities impacting paleontological resources would only affect those present in the MBPA and would not cause additive affects to those occurring elsewhere.
Soil Resources	All Watersheds within the MBPA	Project activities impacting soils would only affect soil types present in the Greater Monument Butte watersheds and would not cause additive affects to those occurring elsewhere.
Water Resources ¹	All Watersheds within the MBPA	Because all project activities would occur in the Greater Monument Butte watersheds, impacts associated with these activities would only affect these watersheds and would not cause additive affects to those occurring elsewhere.
Vegetation ²	All Watersheds within the MBPA	Project activities impacting vegetation would only affect species present in the watersheds of the MBPA and would not cause additive affects to those occurring elsewhere.

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Range Resources	All Grazing Allotments within the MBPA	Because all project activities on BLM-administered lands would occur on these allotments, impacts associated with these activities would only affect these areas and would not cause additive effects to those occurring elsewhere.
Fish and Wildlife	All Watersheds within the MBPA	Besides neotropical migratory birds, the home ranges of wildlife species analyzed in this document are located within the Greater Monument Butte watersheds.
Special Status Plant, Fish, and Wildlife Species	Extent of Potential Habitat for the Uinta Basin hookless cactus and Pariette cactus; all Watersheds within the MBPA for all other special status plant, fish, and wildlife species	Only activities occurring within potential habitat or near individual special status plant, fish, and wildlife species would contribute to impacts.
Cultural Resources	MBPA	Construction activities impacting cultural resources would only affect those present in the MBPA and would not cause additive affects to those occurring elsewhere.
Land Use and Transportation	MBPA	Impacts to land use and transportation would be limited to the MBPA because all construction and land disturbance occurs within the MBPA and would have no additive impacts on the surrounding lands and roads.
Recreation Resources	MBPA and a 2-mile Buffer Surrounding the MBPA	Impacts to recreation resources would be limited to a 2-mile buffer surrounding and including the MBPA from which public users may hear industrial noise, increased traffic, etc. from oil and gas operations. Impacts associated with these activities would only affect these areas and would not cause additive effects to those occurring elsewhere.
Visual Resources	Lower Green River ACEC and the Wild and Scenic Green River Corridor within a 2-mile Buffer Surrounding the MBPA	Project activities impacting visual resources would only affect those present in the MBPA and would not cause additive affects to those occurring elsewhere.
Special Designations	Special Designation Areas within a 2-mile Buffer Surrounding the MBPA	Direct effect would only come from those ground disturbing activities that occur directly within these special designation areas.

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Socioeconomics	Uintah and Duchesne Counties	This spatial boundary was selected because oil and gas development within the Uinta Basin has had substantial impact on taxes and royalties collected by the State of Utah, a portion of which has been reallocated to Duchesne and Uintah Counties. Because minority, low-income, and Tribal populations currently reside in these counties, they would all be considered when evaluating environmental justice concerns for oil and gas projects.

¹ Includes floodplains.

² Includes noxious and invasive weeds, and wetland/riparian zones.

5.2 AIR QUALITY

The CIAA for air quality includes the Uinta Basin and regional Class I areas, sensitive Class II areas, and sensitive lakes located in eastern Utah and western Colorado. The CIAA is the same as the far-field impact modeling domain shown in the Air Quality Technical Support Document (AQTSD), **Appendix B**. For the CIAA, potential emissions from the proposed project, existing nearby permitted sources, and RFD within the region must be assessed. Areas of concern include the Uinta Basin; the High Uintas Wilderness Area; nearby PSD Class I areas such as Arches and Canyonlands National Parks; nearby sensitive Class II areas such as Dinosaur National Monument; and distant Class I and II areas and sensitive lakes. Potential cumulative air quality impacts were assessed by comparing project impacts to NAAQS, PSD increments (as a point of information only, not a regulatory PSD assessment), and AQRV impacts. The AQRV impacts include potential changes in regional haze, potential adverse acid deposition (total nitrogen and sulfur deposition), and potential change in ANC of sensitive lakes located in the Rocky Mountains of Colorado.

The BLM is developing a specific photochemical modeling platform as part of its ARMS for the Uinta Basin. The ARMS modeling platform will become the standard photochemical modeling system for assessing project specific and cumulative impacts on both near- and far-field ozone concentrations for projects in the Uinta Basin and will replace other modeling systems for far-field cumulative impact analyses. Accordingly, this air quality impact analysis did not explicitly model the far-field cumulative potential impacts of the Proposed Action and alternatives or the project-specific impact on local and distant ozone concentrations. Rather, the cumulative and ozone impact assessment conducted as part of the Greater Natural Buttes (GNB) Final Environmental Impact Statement (BLM 2012a) was incorporated into this EIS by reference, since the Monument Butte project was included in that study.

Other than ozone, maximum near-field air quality impacts are localized and independent of other development in the region because the maximum impact points are very close to the individual source of emissions, as shown in the AQTSD. Therefore, in the near field, the maximum cumulative air quality impacts are the same as the proposed project impacts presented in **Section 4.2**, which showed that none of the maximum near-field impacts exceeded the evaluation criteria.

Cumulative impacts of potential oil and gas and other emission sources in the Uinta Basin were extensively evaluated in the GNB Final EIS. The GNB FEIS evaluated the potential impact of existing,

proposed and RFD in the Uinta Basin and explicitly included Newfield's proposed plan for oil and gas development, of which was derived the Proposed Action (Alternative A). GNB analyzed the cumulative air quality impact of 15,188 wells in Uintah and Duchesne Counties and approximately another 2,000 wells in other nearby counties projected for calendar year 2018 (see Table 3-11 of GNB Appendix G). The 15,188 wells is an increase of 9,679 wells from year 2006. Total oil production (condensate plus oil well production) for Uintah and Duchesne Counties in 2018 was estimated as 26,218 million barrels. Under the Proposed Action (Alternative A), Newfield will have developed a net addition of approximately 574 producing oil and gas wells in the MBPA between 2012 and 2018 (see discussions in **Appendix B** [Section 4.2 and Table 4-2 of the AQTSD]). This increase of 574 wells constitutes about 5 percent of the total increase in Uintah and Duchesne Counties.

5.2.1 Criteria Pollutants Other Than Ozone

GNB evaluated both near-field and long-range transport potential impacts with respect to the NAAQS for NO₂, CO, SO₂, PM₁₀, and PM_{2.5}. GNB concluded that the near-field cumulative impact of GNB, RFD, and existing background concentrations due to natural emissions and emissions from existing sources would not cause an exceedance of a NAAQS. The maximum cumulative impacts with respect to the NAAQS were for the 1-hour NO₂ and annual PM_{2.5} impacts. The majority of the maximum 1-hour NO₂ impacts resulted from local impacts of the proposed GNB project (87 percent of the total). On the other hand, the proposed GNB project represents only 6 percent of the total PM_{2.5} impact, with 94 percent from existing sources and natural background. GNB found that for all except 1-hour NO₂, the incremental impact of cumulative emissions with respect to the NAAQS above the potential impact of the project alone is essentially zero. For 1-hour NO₂, the cumulative impact contributed a one-tenth of one percent incremental increase over the maximum impacts of GNB alone. The GNB analysis demonstrated that, when evaluating maximum NO₂, CO, SO₂, PM₁₀, and PM_{2.5}, cumulative impacts caused by emissions from distant sources are *de minimis* when compared to local sources of emissions. Accordingly, the cumulative impacts of the Proposed Action (Alternative A) will be essentially the same as the impacts presented in **Section 4.2** for the Proposed Action alone; and the cumulative impacts of all sources will be less than the applicable NAAQS.

To assess potential cumulative air quality impacts for NO₂, CO, SO₂, PM₁₀, and PM_{2.5} at distant areas of interest, GNB analyzed the cumulative impacts of the proposed GNB plus RFD plus background impacts from existing sources at 12 distant Class I areas (including the closest Class I areas of Arches and Canyonlands National Parks) as well as eight Class II areas of special interest (including the Dinosaur National Monument). The analysis demonstrated that the cumulative impacts at these Class I and Class II areas were all much less than the NAAQS. Therefore, the cumulative emissions from the Proposed Action (Alternative A) and other existing and planned sources will not contribute to an exceedance of the NAAQS at these areas of interest. With respect to PSD increments, all impacts were less than the applicable PSD increments except for 24-hour PM₁₀.

5.2.2 Hazardous Air Pollutants

The potential impact of HAPs is assessed on an incremental basis, not cumulative. This is due the fact that HAP impacts are localized and the evaluation criteria are based on potential incremental health effects, not cumulative.

5.2.3 Visual Air Quality

The GNB FEIS analyzed the potential impacts of cumulative emissions on regional haze in the Class I and sensitive Class II areas. Although the analysis showed that GNB alone (3,675 wells) would not cause an incremental increase of regional haze over the baseline greater than the 1.0 deciview threshold at Class I areas, cumulative emissions from all current and future development could cause an exceedance of the 1.0 deciview threshold from 223 to 365 days per year at several of the Class I areas. The lowest value, 223 days per year, was for Canyonlands National Park. Similar results were found for the sensitive Class II areas, with the lowest number of days (206) being recorded at the Browns Park National Wildlife Reserve. Both the GNB project and the Newfield Proposed Action (Alternative A) constitutes less than about 5 percent of the cumulative number of wells analyzed, virtually all of the cumulative impact on regional haze will be from sources other than the Proposed Action. Therefore, the Proposed Action should be essentially the same as the cumulative impacts of the GNB project.

5.2.4 Acid Deposition

Potential acid deposition is analyzed in two different forms: deposition of nitrogen and sulfur, and change in ANC. The threshold of concern used in the GNB FEIS for nitrogen deposition was 3 kilograms per hectare per year (kg/ha-yr) and 5 kg/ha-yr of sulfur deposition. The threshold for change in ANC is a change of more than 10 percent for lakes with a background ANC of greater than 25 micro equivalents per liter (ueq/l), or less than 1.0 ueq/l change in ANC for lakes with background ANC of less than 25 ueq/l. GNB analyzed the cumulative and incremental impacts of GNB on acid deposition at 12 distant Class I areas and eight sensitive Class II areas of interest. Although the nitrogen and sulfur deposition rates from the GNB project alone were much less than the thresholds (i.e., less than 2 percent of the nitrogen and less than 0.03 percent of the sulfur thresholds) and the maximum percent change in ANC from the GNB project alone was less than one-twentieth of the threshold, the cumulative impact of all projects in the region did cause nitrogen deposition rates greater than the threshold of 3 kg/ha-yr at one (1) national park; namely, Mesa Verde National Park. Cumulative sulfur deposition rates were all much less than the threshold at all of the Class I and Class II areas. Cumulative changes in ANC exceeded the thresholds at several lakes; however, the contribution of the GNB project to the exceedances was much less than one percent of the cumulative impact.

5.2.5 Ozone Concentrations

Potential ozone impacts are evaluated by comparing maximum potential ozone concentrations to the NAAQS and by determining the maximum incremental increase of ozone concentrations. Potential cumulative impacts of emissions from existing, GNB, and RFD emissions on regional ozone concentrations were evaluated in the GNB FEIS. The GNB FEIS analysis showed that cumulative emissions would not cause an exceedance of the NAAQS at any location in the modeling domain (i.e., the eastern two-thirds of Utah and all of Colorado west of the Front Range). The GNB FEIS showed that the proposed GNB project (3,675 wells) could cause an increase in ozone concentrations of 0.2 parts per billion (ppb) over much of Uintah County and into Colorado. The maximum increase due to the proposed GNB project alone was 2.4 ppb. Because the contribution of emissions to potential ozone formation is not linear with respect to emissions, Newfield's 5,750-well Proposed Action should have approximately the same impact on ozone as the 3,675-well GNB Project.

The GNB FEIS ozone impact assessment used the current state-of-the-art photochemical models. These models have been demonstrated reasonable for traditional ozone formation, which typically occurs during the summer when photochemical reactions in the atmosphere are the largest. However, as discussed in

Chapter 3 and **4**, ozone concentrations exceeding the NAAQS have been observed during the winter months in the Uinta Basin. Methods for modeling and assessing this winter time ozone formation are in development (i.e., the ARMS modeling platform), but are not yet available. Therefore, the contribution of the Proposed Action (Alternative A) and the contribution of cumulative emissions in the region to winter ozone exceedances cannot be determined at this time.

As discussed in **Section 4.2**, the Proposed Action Annual Development will not proceed beyond the point at which there is a substantial increase in ozone precursor emissions. Development of the Proposed Action can continue into approximately early calendar year 2021 for total ozone precursor (NO_x plus VOC) emissions, late 2019 for VOC emissions alone, and beyond 2022 for NO_x emissions alone without causing an increase greater than the No Action Alternative. A caveat to this would be if project-specific and cumulative ozone impact modeling with the ARMS modeling platform has already been conducted.

5.2.6 Greenhouse Gas Emissions

Many elements of human society and the environment are sensitive to climate variability and change. Rising average temperatures are already affecting the environment. Some observed changes include shrinking of glaciers, thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, lengthening of growing seasons, shifts in plant and animal ranges, and earlier flowering of trees (IPCC 2007).

Global temperatures are expected to continue to rise as human activities continue to add CO₂, methane (CH₄), nitrogen oxides, and other greenhouse (or heat-trapping) gases to the atmosphere. Most of the United States is expected to experience an increase in average temperature (IPCC 2007). Precipitation changes, which are also very important to consider when assessing climate change effects, are more difficult to predict. Whether or not rainfall will increase or decrease remains difficult to forecast for specific regions.

The extent of climate change effects, and whether these effects prove harmful or beneficial, will vary by region, over time, and based on the ability of different societal and environmental systems to adapt to or cope with the change. The Intergovernmental Panel on Climate Change (IPCC) concludes that “impacts of climate change will vary regionally but, aggregated and discounted to the present, they are very likely to impose net annual costs which will increase over time as global temperatures increase.” The IPCC estimates that some places and sectors will see beneficial impacts resulting from increases in global mean temperature of less than 1-3°C (1.8-5.4° F) above 1990 levels, while others will experience harmful ones. Some low-latitude and polar regions are expected to experience net costs even with small increases in temperature. For temperature increases greater than 2-3°C (3.6-5.4°F), the IPCC states that it is very likely that all regions will experience either declines in net benefits or increases in net costs. “Taken as a whole,” the IPCC concludes, “the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time.”

Table 5.2.6-1 shows global, U.S., and State of Utah anthropogenic greenhouse gas (GHG) emissions pertaining to global warming potential or carbon dioxide equivalents from 1990 through 2020 (USEPA 2013). The data represents all GHGs and all anthropogenic sources of GHGs, but does not include sinks of GHGs. The emissions data was compiled from different sources of information that use different methodology and assumptions. As a result, data values for some of the years are not readily available for comparison. The data for global GHG emissions has not been published since 2004. However, it is estimated that global CO₂ emissions have continued to increase about 3 percent per year on average from 2000 through 2012 (CDIAC 2013). Consequently, this same rate of growth was applied to

the values in **Table 5.2.6-1** beyond year 2004. It should be noted that U.S. GHG emissions have been relatively constant since 2005, while global and State of Utah emissions have increased.

Table 5.2.6-1 Global, U.S. and Utah GHG Emissions

Year	Global GHG Emissions ^a (million metric tons CO ₂ e)	U.S. GHG Emissions ^b (million metric tons CO ₂ e)	Utah GHG Emissions ^c (million metric tons CO ₂ e)
1970	28,700	NA ^d	NA
1980	35,600	NA	NA
1990	39,400	6,175	49
2000	44,700	7,204	66
2004	49,000	NA	NA
2005	50,500	7,204	69
2006	52,000	7,159	NA
2007	53,500	7,253	NA
2008	55,100	7,048	NA
2009	56,800	6,608	NA
2010	58,500	6,822	76
2020	NA	NA	96

^a Source: IPCC Fourth Assessment Report: Climate Change 2007, Figure 2.1. (IPCC 2007).

^b Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010 Table ES-2. (USEPA 2012c).

^c Source: GNB FEIS, Table 4.1-7.

^d NA = data not readily available from the sources cited.

Climate change analyses are comprised of several factors including, but not limited to, GHGs, land use management practices, and the albedo effect. While emissions from oil and gas activities may contribute to the effects of climate change to some extent, it currently is not possible to associate any of these particular actions with the creation of any specific climate-related environmental effects. The tools necessary to quantify climatic impacts of single or a small group of projects are presently unavailable. As a consequence, impact assessments of specific effects of anthropogenic activities cannot be determined. Additionally, specific levels of significance have not yet been established. Therefore, climate change analysis for the purpose of this document focuses on GHG emissions for the proposed project in comparison to global and regional totals.

GHG operational emissions under the Proposed Action (Alternative A) are approximately 3.7 million short tons of carbon dioxide equivalents (CO₂e, see **Section 4.2**), or approximately 3.3 million metric tons CO₂e. These emissions are less than about five hundredths of a percent of the U.S. total shown for 2010 and about 3 percent of the state-wide total projected for 2020. Note that the emission estimates do not account for the fact that if natural gas is used as an energy source instead of sources such as coal, there is a net reduction of GHGs.

Under the No Action Alternative (Alternative B), cumulative emissions in the region will continue to increase. The GNB analysis showed that the proposed 3,675-well GNB Project contributed either none or a very small percentage to the cumulative air quality impacts. A similar result would be expected for this proposed project. Therefore, the cumulative air quality impacts under Alternative B would be the same or nearly the same as those under the Proposed Action.

Project-related emissions would be substantially less under Alternative C than those for Alternative A. Therefore, cumulative impacts are also like to be less. However, since the contribution of the Proposed Action to cumulative impacts is relatively small, there will be essentially no difference in cumulative impacts between Alternative A and Alternative C.

Project-related emissions would be less under Alternative D than would occur under the Proposed Action (Alternative A) because there will be slightly fewer wells drilled and operating (5,058 wells under Alternative D versus 5,750 wells under Alternative A). Therefore, cumulative impacts would also be less. However, since the contribution of the Proposed Action to cumulative impacts is relatively small, there will be essentially no difference in cumulative impacts between Alternative A and Alternative D.

Alternatives A, C, and D include measures to protect air quality resources by incorporating several ACEPMs (see **Section 2.2.12.1**) that are intended to minimize or avoid project-specific and cumulative impacts.

5.3 GEOLOGY AND MINERALS

The CIAA for geology and minerals varies by mineral resource. For impacts to local physiography, topography, bedrock geology, and oil and gas exploration, the CIAA is defined as the MBPA. Cumulative impacts to these resources in the CIAA would primarily occur as a result of oil and gas development, which would deplete recoverable oil and gas from the formations underlying the CIAA and alter local topography due to surface disturbance.

As indicated in **Table 5.3-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally impact local physiography, topography, bedrock geology, and oil and gas exploration, and contribute to increased surface disturbance.

Table 5.3-1. Surface Disturbance Estimates for Existing, Ongoing, and Pending Oil and Gas Projects in the CIAA for Geology and Minerals, Paleontological Resources, Cultural Resources, and Land Use & Transportation

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	2,444	8,798	100	8,798
Gasco Uinta Basin EIS	206,826	1,538	10,302	19.3	1,990
Castle Peak and Eight Mile Flat	65,381	973	3,701	100	3,701

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
EIS					
Total Existing, Operational, and Proposed Projects	-	4,955	22,801	-	14,489
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	5,750	16,129	100	16,129
Grand Total (if Proposed Action is selected)	-	10,705	38,930	-	30,618
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	788	870	100	1,335
Grand Total (if No Action Alternative is selected)	-	5,743	23,671	-	15,824
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	5,750	16,308	100	16,308
Grand Total (if Alternative C is selected)	-	10,705	39,109	-	30,797
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	5,058	9,805	100	9,805
Grand Total (if Alternative D is selected)	-	10,013	32,606	-	24,294

¹ Acreage for each project area was compiled from various notices and NEPA documents.

² Number of proposed wells for each project was compiled from various notices and NEPA documents.

³ Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

5.3.1 Oil and Gas Exploration, Development, and Production

Oil and gas development has historically been prevalent within the CIAA and is expected to continue within the Uinta Basin as a whole. Cumulatively, the oil and gas fields within the CIAA have produced over 55 MMBO and 164 MMCF of natural gas as of December 2011 (UDOGM 2012b). A list of cumulative oil and natural gas production by field is presented in **Table 5.3.1-1**.

Table 5.3.1-1. Cumulative Oil and Natural Gas Production by Field

Production Field	Cumulative Oil Production (bbls ^a)	Cumulative Natural Gas Production (Mcf ^b)
Castle Peak	68,928	167,181
Monument Butte	52,915,105	120,413,217
Eight Mile Flat North	362,300	6,119,074
Pariette Bench	1,723,312	37,953,000
Total Production	55,069,645	164,652,472

^a barrels

^b thousand cubic feet

Potential recovery of oil and natural gas resources associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect the amount of oil and gas reserves within the CIAA. As shown in **Table 5.3.1-1**, approximately 55 MMBO and 165 Mcf have already been extracted within the CIAA. Depending on the alternative selected, the total amount of oil and gas resources extracted within the CIAA would be approximately 390 MMBO and 7.4 Tcf of natural gas under Alternative A – Proposed Action; 119 MMBO and 1.2 Tcf of natural gas under Alternative B – No Action Alternative; 390 MMBO and 7.4 Tcf of natural gas under Alternative C – Field-wide Electrification; or 349 MMBO and 6.4 Tcf of natural gas under Alternative D - Resource Protection. The continual and increased rate of oil and gas extraction would irreversibly and cumulatively increase the depletions from the targeted geologic formations within the CIAA.

5.3.2 Gilsonite

While there are no currently leased or producing gilsonite veins within the MBPA, increased oil and gas facility density within the CIAA could preclude the future leasing of the six mapped gilsonite veins within the area for the LOP. The Vernal Mineral Potential Report (MPR) projects 10 leases within the VFO within the next 15 years, but cannot predict the number of new mines that would be developed by lessees within the CIAA.

5.3.3 Tar Sands

The CIAA for tar sands are all STSAs located entirely or partially within the MBPA, comprising 19,529.7 acres. Surface and subsurface disturbance of STSAs could impede the extraction of tar sands in those areas. High production costs of tar sands along with current oil and gas prices are making the extraction of oil from bituminous tar sands economically infeasible. Currently, Uintah County uses tar sands that are found in the area for asphalt, although the material originates from a private source. According to the *Approved Land Use Plan Amendments/Record of Decision for Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the Bureau of Land Management in Colorado, Utah and Wyoming and Final Programmatic Environmental Impact Statement (LUPA)*, tar sand resources are not a proven commercially viable energy source (BLM 2013). The LUPA further concluded that additional analysis of the environmental consequences of tar sand development is necessary before initiating broad-scale commercial development. Therefore, cumulative impacts to the development of tar sands by the

Proposed Action or alternatives are expected to be minimal. **Table 5.3.3-1** summarizes surface disturbance estimates for tar sands.

Table 5.3.3-1. Surface Disturbance Estimates for Impacts to Special Tar Sands Areas from Existing, Ongoing, and Pending Oil and Gas Projects in the CIAA

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	2,444	8,798	11.9	739.3
Gasco Uinta Basin EIS	206,826	1,538	10,302	0	0
Castle Peak and Eight Mile Flat EIS	65,381	973	3,701	14.0	264.4
Total Existing, Operational, and Proposed Projects	-	4,955	22,801		1003.7
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	5,750	16,129	11.9	1355.4
Grand Total (if Proposed Action is selected)	-	10,705	38,930		2359.1
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	788	870	11.9	73.1
Grand Total (if No Action Alternative is selected)	-	5,743	23,671		1076.8
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	5,750	16,308	11.9	1370.4
Grand Total (if Alternative C is selected)	-	10,705	39,109		2374.1
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	5,058	9,805	11.9	823.9
Grand Total (if Alternative D is selected)	-	10,013	32,606		1827.6

¹ Acreage for each project area was compiled from various notices and NEPA documents.

² Number of proposed wells for each project was compiled from various notices and NEPA documents.

³ Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

5.3.4 Oil Shale

The CIAA for oil shale resources are all KOSLAs located entirely or partially within the MBPA, and comprise 444,957.7 acres. The current price of oil and levels of extraction technology are preventing oil shale from becoming an economically viable source of oil and gas. Under the LUPA, areas allocated as open for future oil shale leasing are open only to research, development, and demonstration (RD&D) leases (BLM 2013). The BLM would issue a commercial lease only when a lessee satisfies the conditions of its RD&D lease and the regulations in the CFR. Therefore, cumulative impacts to the development of oil shale by the Proposed Action and alternatives are expected to be minimal. **Table 5.3.4-1** summarizes the surface disturbance for oil shale resources.

Table 5.3.4-1 Surface Disturbance Estimates for Impacts to Known Oil Shale Lease Areas from Existing, Ongoing, and Pending Oil and Gas Projects in the CIAA

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	2,444	8,798	20.8	423
Gasco Uinta Basin EIS	206,826	1,538	10,302	13.4	1380
Castle Peak and Eight Mile Flat EIS	65,381	973	3,701	29.3	1084
Total Existing, Operational, and Proposed Projects	-	4,955	22,801		2887
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	5,750	16,129	20.8	3355
Grand Total (if Proposed Action is selected)	-	10,705	38,930		6242
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	788	870	20.8	181
Grand Total (if No Action Alternative is selected)	-	5,743	23,671		3068
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	5,750	16,308	20.8	3392
Grand Total (if Alternative C is selected)	-	10,705	39,109		6279
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	5,058	9,805	20.8	2039
Grand Total (if Alternative D is selected)	-	10,013	32,606		4926

¹ Acreage for each project area was compiled from various notices and NEPA documents.

² Number of proposed wells for each project was compiled from various notices and NEPA documents.

³ Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

5.3.5 Other Leasable, Locatable, and Salable Minerals

Oil and gas development within the MBPA (the CIAA for other leasable, locatable, and salable minerals) would increase the density and quantity of surface disturbance within the CIAA. Because mineral resources within the MBPA are recovered through the surface, disturbance associated with oil and gas activity would prevent the recovery of other mineral resources within the MBPA. For example, sand and gravel pits are currently in operation within the MBPA. While the Proposed Action or alternatives are not likely to impact existing sand and gravel operations within the CIAA, they may prevent future extraction of these resources. Up to six new gravel pits are anticipated within the Uinta Basin, with a possibility that one or more gravel pits could occur in the CIAA due to its proximity to the Green River and its ephemeral drainages (BLM 2002a).

Locatable uranium is the only known mineral to exist in the formations underlying the CIAA. Because there are no mining claims to these locatable minerals within the CIAA, there would be no impact to these resources. Additionally, there is a low potential for new mining claims to be issued in the foreseeable future because the geology of the area is not well suited for economic development of locatable mineral deposits (BLM 2002a).

5.4 PALEONTOLOGICAL RESOURCES

The CIAA for paleontological resources is defined as the MBPA. The severity of cumulative impacts to paleontological resources is dependent on the paleontological site density that is present near project and related activity, the relative importance of the paleontological resources that are present, and the final magnitude of the reasonably foreseeable operations over the next 20 years. While the magnitude of damage to paleontological sources relies on these factors, it is important to remember that damage to or destruction of these resources is generally site-specific and not additive across a landscape.

Impacts to paleontological resources within the CIAA could result from past, present, and reasonably foreseeable actions that cause surface and subsurface disturbance to fossiliferous rocks from oil and gas development. Such activity could damage or destroy fossils or formations that house fossils. If damage occurs as a result of these actions, fossils could be irreversibly and irretrievably removed from the paleontological information base and would no longer be available for analysis. In addition to the loss of paleontological resources from damage and destruction, the increased human exposure from improved vehicle and pedestrian access may increase loss of fossils due to theft and vandalism.

As shown in **Table 5.3-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect soils and subsurface lands across the CIAA. Approximately 14,489 acres of land within the MBPA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the proposed project may increase the total surface disturbance to paleontological resources within the CIAA to 30,618 acres under Alternative A – Proposed Action; 15,824 acres under Alternative B – No Action Alternative; 30,797 acres under Alternative C – Field-wide Electrification; or 24,294 acres under Alternative D - Resource Protection.

Specific direct impacts to presently unknown paleontological resources in the CIA as a result of the alternatives and other reasonably foreseeable actions would be unknown until paleontological surveys are completed for all areas of proposed surface disturbance. However, for surface disturbing activities located on previously disturbed sites, fossil resources would not be directly affected. While the potential for impacts to fossils would likely increase within the CIAA due to the surface disturbance of the Proposed Action and alternatives, these impacts can be reduced through the preparation and execution of the mitigation measures detailed in the ACEPMs (see **Section 2.2.11**).

Although paleontological sites within the disturbance areas would be avoided or mitigated, sites outside of and adjacent to surface disturbing areas are vulnerable to indirect impacts. Ground-disturbing actions (including soil compaction and/or fracturing of surface or fossiliferous bedrock), increased pedestrian and vehicle traffic during project construction and operation, as well as past, present, and reasonably foreseeable oil and gas projects could cumulatively affect unknown paleontological resources within the CIAA. These changes could lead not only to increased instances of illegal collection and vandalism of fossils, but also to increased damage from dust and erosion at sites within the vicinity of well pads, pipelines, and roads where vegetation cover has been removed or cleared. All of these indirect impacts would incrementally and cumulatively add to the loss of scientifically important fossils within the CIAA. Such losses would influence the breadth, integrity, and value of the paleontological record.

Surface disturbing activities within the CIAA also have beneficial impacts to paleontological resources and fossil recovery. The total area surveyed within the CIAA will increase because each surface disturbing site will be surveyed by a qualified paleontologist prior to construction. Increased research at these sites may lead to the collection of specimens and other data that would have otherwise not been recovered.

Under the No Action Alternative, paleontological resources would be protected by site-specific mitigation measures on a well-by-well basis as a part of the APD process. Under Alternatives C and D, impacts would be similar to those of the Proposed Action but would vary in scope and severity based on the amount of proposed surface disturbance in previously undisturbed areas. Alternatives A, C, and D include measures to protect paleontological resources by incorporating several ACEPMs (see **Section 2.2.12.2**) that are intended to minimize or avoid project-specific and cumulative impacts. In addition, many potential cumulative impacts to paleontological resources would be reduced or eliminated for all alternatives through the implementation of Federal regulatory laws, actions, and guidelines as well as coordination with the appropriate SMA.

5.5 SOIL RESOURCES

The CIAA for soil resources is defined as all of the watersheds¹ that are contained within or intersect the MBPA. Any surface disturbing activity that removes native vegetation and topsoil from these watersheds may cumulatively and incrementally affect soils by increasing erosion and sediment yield, which in turn, reduces soil productivity and stability as measured by the amounts and types of vegetative cover and forage. In addition, oil and gas exploration and production operations have the potential to release drilling fluids and other petroleum products to the ground surface, resulting in the contamination of soil resources. Past, present, and reasonably foreseeable actions that could result in increased erosion,

¹ Drainages within the CIAA include the Castle Peak Draw, Desert Spring Wash, Gilsonite Draw, Kings-Canyon- Green River, Lower Big Wash, Lower Pleasant Valley Wash, Lower Wells Draw, Outlet Pariette Draw, Pariette Bench, Sheep Wash, Upper Big Wash, Upper Pleasant Valley Wash, Upper South Myton Bench, Upper Wells Draw, and the Uteland Butte Wash.

sediment yield, and soil contamination within the CIAA include oil and gas exploration and development, forage use for livestock grazing and wildlife recreation, mining activities, public land use and recreation, and county and private road construction.

As shown in **Table 5.5-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, when added to past, present, and other reasonably foreseeable actions, would cumulatively and incrementally affect soil resources across the CIAA.

Table 5.5-1. Surface Disturbance Estimates for Existing, Ongoing, and Pending Oil and Gas Projects in the CIAA for Soil Resources, Water Resources, Vegetation, Fish & Wildlife, and Special Status Plant, Fish & Wildlife Species (Excluding Uinta Basin Hookless Cactus and Pariette Cactus)

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	2,444	8,798	100	8,798
Gasco Uinta Basin EIS	206,826	1,538	10,302	70.4	7,253
XTO Kings Canyon EA	44,637	297	1,131	45.6	516
XTO River Bend Unit EA	16,719	484	1,075	3	32
EOG North Alger II EA	2,390	2	110	100	110
KMG Greater Natural Buttes EIS	162,848	3,675	12,658	1.5	190
Castle Peak and Eight Mile Flat EIS	65,381	973	3,701	100	3,701
Newfield EDA #1 EA	77,647	500	2,494	87.5	2,182
Rocky Point EDA EA	92,098	66	345	26.1	90
Ouray Field EA	10,759	232	835	1.1	9
Randlett EDA EA	53,380	500	2,613	27.4	716
Total Existing, Operational, and Proposed Projects	-	10,711	44,062	-	23,597
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	5,750	16,129	100	16,129
Grand Total (if Proposed Action is selected)	-	16,461	60,191	-	39,726
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	788	870	100	1,335
Grand Total (if No Action Alternative is selected)	-	11,499	44,932	-	24,932
Newfield's Greater Monument Butte Oil & Gas Development	119,743	5,750	16,308	100	16,308

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Project (if Alternative C is selected)					
Grand Total (if Alternative C is selected)	-	16,461	60,370	-	39,905
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is Selected)	119,743	5,058	9,805	100	9,805
Grand Total (If Alternative D is selected)	-	15,769	53,867	-	33,402

¹ Acreage for each project area was compiled from various notices and NEPA documents.

² Number of proposed wells for each project was compiled from various notices and NEPA documents.

³ Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

Note: Drainages within the CIAA include the Castle Peak Draw, Desert Spring Wash, Gilsonite Draw, Kings-Canyon- Green River, Lower Big Wash, Lower Pleasant Valley Wash, Lower Wells Draw, Outlet Parquette Draw, Parquette Bench, Sheep Wash, Upper Big Wash, Upper Pleasant Valley Wash, Upper South Myton Bench, Upper Wells Draw, and the Uteland Butte Wash.

Cumulative impacts to soils from surface disturbance for past, present, and reasonably foreseeable projects within the CIAA are projected to be 23,597 acres (**Table 5.5-1**). Under the Proposed Action, approximately 16,129 acres of new disturbance would increase the total past, present, and future surface disturbance within the CIAA to approximately 39,726 acres (68 percent). Under Alternatives B, C, and D, cumulative surface disturbance within the CIAA would increase to approximately 24,932 acres (6 percent); 39,905 acres (69 percent); and 33,402 acres (42 percent), respectively.

Cumulative impacts to soils from the surface release of drilling and production fluids during exploration and production activities would be largely localized to the area immediately surrounding the wells and storage tanks, with additional potential within pipeline ROWs and along access roads. Similar to the impacts to BSC communities, the degree of soil contamination is assumed to be correlated to the number of wells as well as the extent and type of infrastructure under each alternative. However, while the greatest amount of surface disturbance would occur under Alternative C, the electrification of the MBPA would result in the reduction of gas-fired engines initially installed to power operational field equipment, and therefore, a reduction in the amount of surface soil contamination associated with emissions from the engines. Therefore, the greatest incremental contribution to cumulative surface soil contamination would occur under Alternative A, and the lowest relative impact would occur under the No Action Alternative.

The current soil loss from oil and gas activities in the CIAA is estimated at approximately 476 tons per year. Soil erosion resulting from the Proposed Action would increase the projected total soil loss across the CIAA by about 254 tons annually. Similarly, implementation of Alternatives B, C, or D would contribute to annual soil loss within the CIAA by approximately 189 tons, 254 tons, or 205 tons, respectively.

In addition to oil and gas development activities, other activities which may increase soil erosion in the CIAA include grazing, recreation, and road construction. Grazing and other agricultural activities

contribute to the loss of vegetation that could impair soil function through diminished ability of the soils to recycle nutrients and regulate water. The new roads would increase access throughout the CIAA, possibly providing new access opportunities for recreationists. Although road densities contribute to the magnitude of erosion, construction of all-weather roads could reduce sediment loss.

Additionally, ground disturbing activities could remove valuable BSCs from the CIAA. Under each alternative, pinyon-juniper woodlands and sagebrush communities (both of which are associated with BSCs) would be disturbed as a result of project activities. Since BSC communities recolonize and regrow very slowly following disturbance, the soil stabilization, nitrogen fixing, and carbon-fixing benefits of soil crusts may take as long as 250 years to become fully reestablished. The degree of removal of BSCs would be directly correlated to the amount of surface disturbance under each alternative; therefore, the greatest incremental contribution to the cumulative loss of BSCs would occur under Alternative C, and the lowest relative impact would occur under the No Action Alternative.

Under all alternatives, soil resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process. Alternatives A, C, and D include measures to protect soil resources by incorporating several ACEPMs (see **Section 2.2.12.3**) that are intended to minimize or avoid project-specific and cumulative impacts.

5.6 WATER RESOURCES

The CIAA for water resources (including floodplains) is defined as the Pariette Draw (Upper and Lower), Sheep Wash-Green River, and the Antelope Creek-Duchesne River watersheds within the MBPA. This CIAA considers impacts to water resources that are collectively affected by ongoing resource management and energy development in this region. Oil and gas development typically includes the construction of well pads, pipelines, roads, compressor stations, power lines, and other facilities. These land disturbing activities can result in increased sedimentation, water runoff, and surface and ground water quality degradation. Potential direct and indirect impacts to surface water resources may include surface water depletion and surface water degradation from hazardous material spills, sediment, salinity, and selenium. Any surface-disturbing activity that removes native vegetation and topsoil from these watersheds may cumulatively and incrementally affect water resources by increasing erosion and sediment yield to area drainages and surface water features. Past, present, and reasonably foreseeable actions that could result in increased erosion and sediment yield within the CIAA include oil and gas development, forage use for livestock grazing and wildlife, recreation, mining activities, and county and private road use and construction.

As shown in **Table 5.5-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect sediment yield across the CIAA.

The current estimated sediment yield from oil and gas activities in the CIAA is approximately 64 tons per year. Sediment yield resulting from the Proposed Action would increase the projected total sediment yield across the CIAA by approximately 32 tons per year during the production phase. Under Alternatives B, C, and D, the annual sediment yield would increase by 25 tons, 64 tons, and 29 tons, respectively, during the production phase. Disturbance would last for the duration of oil and gas development and production, until such time that reclamation has proven successful. Factors such as drought, reclamation requirements, as well as other known and unknown factors may affect the success of reclamation within the CIAA.

Additional drilling and production activities in the MBPA could result in cumulative adverse impacts to usable groundwater aquifers. Based on available data, fresh water resources are relatively shallow and of limited extent in the MBPA; however, there is the potential for impacts to these resources resulting from drilling activities, including improper well completion, water-flooding, disposal wells, and hydraulic fracturing. Drilling techniques are designed to isolate the upper portion of the aquifer system from the lower levels where drilling activities occur and protect these water zones.

The casing and cementing program would be designed to isolate and protect the shallower formations encountered in the wellbore and to prohibit pressure communication or fluid migration between different formations. In addition, the cement would protect the well by preventing formation pressure from damaging the casing and retarding corrosion by minimizing contact between the casing and formation. Groundwater zones would be protected by cementing the surface casing to the ground surface and also bringing the cement for the production or intermediate casing to at least 200 feet above the surface casing shoe. As a result of the well bore casing and cementing program the project is not expected to contribute to cumulative effects on groundwater aquifers.

The alternatives will use a minor amount of surface water as compared to those used by agriculture and the total amount available. However, agricultural use is typically returned to the stream except for losses due to evaporation and infiltration. Any water used for oil and gas production will be secured from existing water sources appropriated for industrial or oil and gas use (refer to Table 2.2.8-1) or the proposed water collector well.

It is expected that surface waters in the CIAA would experience increased erosion and sediment transport from oil and gas activities such as new roads, increased road traffic, well pads, and other land disturbance activities. These effects, when combined with increased erosion from other authorized actions, could have negative impacts on aquatic habitat within affected drainages. These impacts include increased turbidity and salinity; the covering of stream substrates with fine sediment and clogging of the interstitial pores of the substrate; increased transport of pollutants, including trace metals, herbicides, and petroleum constituents; and increased down-cutting of the channel and bank destabilization. The construction and operation of each well would also incrementally increase the potential for leaks or spills of saline water, hydro-fracturing chemicals, fuels, and lubricants to occur within the CIAA. Spills of this nature could contaminate surface water within the area.

Under all alternatives, water resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process using Instruction Memorandum (IM) No. UT 2010-055. Alternatives A, C, and D include measures to protect water resources by incorporating several ACEPMs (see **Section 2.2.12.4**) that are intended to minimize or avoid project-specific and cumulative impacts.

5.7 VEGETATION

5.7.1 General Vegetation

The CIAA for vegetation is defined as all of the watersheds that are contained within or intersect the MBPA. All surface disturbing activities that involve removing native vegetation and/or topsoil from these watersheds may cumulatively and incrementally affect vegetation by fragmenting communities and increasing competition with noxious and invasive weeds. Habitat fragmentation as a result of surface disturbing activities can have many negative impacts on native plant species. Impacts from fragmentation

could include the isolation of small populations, decreases in species density, increased pressure from grazing, increased competition, introduction of noxious weed species, and decreased pollination.

Surface disturbing activities may compact or destabilize soil causing an increase in soil erosion and sediment yield. These effects will lead to increases in fugitive dust that may adversely affect vegetative communities. Other cumulative impacts associated with the removal of vegetation resources within the CIAA include loss of species biodiversity, agricultural lands, wildlife forage and habitat, and available forage for livestock grazing operations. Such changes to the landscape may decrease plant productivity and composition within the CIAA. Past, present, and reasonably foreseeable actions and activities within the CIAA that may contribute to negative effects on vegetation communities include oil and gas development, mining activities, forage use by wildlife and cattle, conversion of agricultural lands, recreation, and county and private road construction.

As shown in **Table 5.5-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect the vegetation communities across the CIAA. Approximately 23,597 acres of land within the MBPA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to vegetation within the CIAA would increase to approximately 39,726 acres, or 33 percent of the MBPA under Alternative A – Proposed Action; 24,932 acres, or 21 percent of the MBPA Under Alternative B – No Action Alternative; 39,905 acres, or 33 percent of the MBPA under Alternative C – Field-wide Electrification; or 33,402 acres, or 28 percent of the MBPA under Alternative D - Resource Protection. Disturbance and reduced productivity would last for the duration of oil and gas development and production, until such time that reclamation has proven successful. Application of an adaptive management approach to reclamation (including a regular monitoring program over the LOP) would provide important information on the relative success of applied interim and long-term reclamation actions. In addition, this approach could minimize the effects of drought as well as other known and unknown factors that may affect the success of reclamation within the CIAA.

Under all alternatives, vegetation resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process. Alternatives A, C, and D include measures to protect vegetation resources by incorporating several ACEPMs (see **Section 2.2.12.5**) that are intended to minimize or avoid project-specific and cumulative impacts. In addition, interim and final reclamation, in aggregate with mitigation measures such as noxious weed management, erosion control and topsoil stockpiling would reduce the impacts associated with vegetation communities by decreasing soil erosion, minimizing fragmentation and reducing the opportunity for introduction and competition with invasive and noxious weed species.

5.7.2 Invasive and Noxious Weeds

Any surface-disturbing activity that removes native vegetation and topsoil from these watersheds may cumulatively and incrementally contribute to the introduction, spread, and available habitat for invasive and noxious weeds. Negative impacts associated with the introduction and presences of noxious weeds include:

- a reduction in the overall visual character of the area affected;
- competition with and possible elimination of native plants;
- a reduction in the overall value of forage for wildlife and livestock;
- fragmentation of available forage for wildlife and livestock; and

- increased soil erosion.

Increased disturbance and presence of noxious weeds may be a result of introduction to a previously uninhabited area or increased size and density within an already inhabited area. These impacts would be most prevalent along road corridors, which undergo frequent activity and disturbance, and are often a conduit for the spread of noxious weeds into previously uninhabited areas.

Correspondingly, the potential for the invasion and establishment of noxious weed species would be directly proportional to the amount of surface disturbance associated with each alternative. As shown in **Table 5.5-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable oil and gas development would cumulatively and incrementally increase the potential for the invasion and establishment of noxious weeds across the CIAA. Depending on the alternative selected, the potential for impacts from invasive and noxious weed species would be highest for Alternatives A and C and lowest for Alternatives B and D. Factors such as drought, overall reclamation success, as well as other known and unknown factors may affect the severity of impacts from invasive and noxious weed species within the CIAA.

5.8 RANGE RESOURCES

The CIAA for range resources is defined as the six grazing allotments that are contained within or intersect the MBPA. Cumulative impacts to range resources as a result of oil and gas development may include direct loss of usable acres during the life of development and operations. Other activities that contribute incremental and cumulative impacts and loss of usable acres within the CIAA are mining activities, recreational activities, and prescribed burns; however, the incremental contribution of these activities is unfeasible to quantify.

As shown in **Table 5.8-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect range resources across the CIAA. Approximately 18,914 acres of land within the MBPA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to range resources within the CIAA could be up to 31,208 acres. Disturbance would last for the duration of oil and gas development and production, until such time that reclamation has proven successful.

Table 5.8-1. Surface Disturbance Estimates for Existing, Ongoing, and Pending Oil and Gas Projects in the CIAA for Range Resources

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	2,444	8,798	100	8,798
Gasco Uinta Basin EIS	206,826	1,298	3,604	60.0	2,163
XTO Kings Canyon EA	44,637	297	1,131	21.0	238

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Castle Peak Eight Mile Flat EIS	65,381	973	3,701	100	3,701
Total Existing, Operational, and Proposed Projects	-	5,102	17,234	-	14,900
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	5,750	16,129	100	16,129
Grand Total (if Proposed Action is selected)	-	10,852	33,363	-	31,029
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	788	870	100	1,335
Grand Total (if No Action Alternative is selected)	-	5,890	18,104	-	16,235
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	5,750	16,308	100	16,308
Grand Total (if Alternative C is selected)	-	10,852	33,542	-	31,208
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	5,058	9,805	100	9,805
Grand Total (if Alternative D is selected)	-	10,160	27,039	-	24,705

¹ Acreage for each project area was compiled from various notices and NEPA documents.

² Number of proposed wells for each project was compiled from various notices and NEPA documents.

³ Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

In addition to loss of usable forage, increased access road development within the MBPA could incrementally and cumulatively contribute to difficulties in controlling livestock because more natural barriers to movement may be removed and more livestock could use roads as travel routes. Range facilities such as water sources, fences, cattle guards, and corrals could be damaged as a result of oil and gas construction and operation activities within the CIAA. Conversely, road development may benefit livestock grazing because it can assist in moving cattle from one allotment to another and may allow cattle to access portions of an allotment that were previously inaccessible due to geographic limitations, distance from water, or a combination of both. Increased road quantity, vehicle traffic, and livestock use may increase the probability and occurrence of vehicle-cattle collisions. Furthermore, increased competition for available forage may result if allocated AUMs are not decreased according to loss of forage from increased construction activities.

Other impacts to range resources that may cumulatively affect livestock within the CIAA include decreased flows to livestock ponds as a result of changes in water flow regimes from construction activities, as well as increased displacement resulting from vegetation loss, human activity, and traffic. Livestock will typically move into adjacent undisturbed areas if displaced, and as a result, additional impacts may occur in these locations.

Under all alternatives, range resources would be protected by site-specific mitigation measures on a well-by-well basis as a part of the APD process. In addition, impacts to rangelands would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;
- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield's Weed Control Plan (see **Section 2.2.12.5**).

Furthermore, ACEPMs detailed in **Section 2.2.12.6** would also ensure management of livestock while on their allotments.

5.9 FISH AND WILDLIFE

The CIAA for fish and wildlife is defined as the spatial boundary of all the watersheds that are contained within or intersect the MBPA (**Table 5.1-1**). The cumulative impact analysis is centralized around the regional wildlife resources and how these species within the designated watersheds may be susceptible to the impacts of this Project in conjunction with existing and foreseeable conditions. This analysis assumes that: (1) human use of the CIAA would increase with the implementation of the proposed project; and (2) the overall region has been previously impacted by past and present (existing and ongoing) oil and gas activity and other land uses.

Past, present, and reasonably foreseeable surface disturbance resulting from oil and gas activity within the CIAA will continue to reduce wildlife habitat, fragment habitat, disrupt seasonal patterns and migration routes, displace individual wildlife species, increase the potential for vehicle and wildlife collisions, and potentially contribute to harassment and poaching of wildlife species. Other permitted activities that may contribute to the cumulative impacts to wildlife are livestock grazing, mining activities, and recreational activities. However, the contribution of these other activities to the overall cumulative impacts on wildlife is difficult to quantify. As such, this analysis will assume that all future disturbances within the CIAA would primarily result from surface disturbing activities from oil and gas activities. Although this analysis is limited to oil and gas activity, it is also understood that activities such as grazing, recreation, subsequent development of dedicated recreational facilities, and continued growth of communities within the CIAA may also remove habitat from use by or otherwise disturb wildlife.

As shown in **Table 5.5-1**, surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect wildlife habitat across the CIAA. Approximately 23,597 acres of land within the MBPA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to fish and wildlife within the CIAA would be approximately 39,726 acres under Alternative A – Proposed Action; 24,932 acres under Alternative B – No Action Alternative; 39,905 acres under Alternative C –

Field-wide Electrification; or 33,402 acres under Alternative D - Resource Protection. Disturbance would last for the duration of oil and gas development and production, until such time that reclamation has proven successful.

Big game (especially pronghorn) would be most susceptible to cumulative impacts because past disturbance associated with oil and gas development has resulted in a substantial increase in the amount of habitat loss, habitat fragmentation, and displacement to pronghorn in UDWR-designated seasonal ranges (e.g., year-long crucial fawning habitat or year-long substantial habitat). Other wildlife species, such as raptors and migratory birds, also would be susceptible to cumulative impacts since encroaching human activities in the region resulted in (or could result in) habitat loss and fragmentation and animal displacement in areas that may be at their relative carrying capacity for these resident species. Many of the local wildlife populations (e.g., general wildlife or upland game) within the CIAA would likely continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative habitat loss and disturbance from incremental development.

While surface disturbance corresponds directly to associated wildlife impacts, quantification of these cumulative impacts cannot be accurately determined as direct impacts are species specific and depend on a number of factors including (1) status and condition of the population or individual animals affected; (2) quality of habitats present in the Project Area; (3) seasonal timing of disturbance; (4) type of surface disturbance; and (5) physical parameters of the affected and nearby habitats (e.g. topographical relief and vegetative cover). 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 would help determine the presence of any special status wildlife species or extent of habitat. Furthermore, protective measures would generally be taken to avoid or minimize direct disturbance in these areas. A list of ACEPMs with respect to fish and wildlife species is presented in **Section 2.2.12.7**.

5.10 SPECIAL STATUS SPECIES AND STATE SPECIES OF CONCERN

The CIAA for special status plant, fish and wildlife species (including those listed as threatened or endangered under the ESA of 1973, as amended; BLM sensitive species; species proposed for listing; species of special concern; other USFWS or BLM species identified as unique or rare; other UDWR or UNHP species designated as unique or rare and excluding Uinta Basin hookless cactus and Pariette cactus) is defined as the spatial boundary all the watersheds that are contained within or intersect the MBPA (refer to **Table 5.1-1**).

5.10.1 Special Status Fish and Wildlife Species and State Species of Concern

Cumulative impacts to special status fish and wildlife species and state species of concern would be similar to those discussed in **Section 5.9** for general fish and wildlife but on a much larger scale. Given ongoing habitat loss and sensitivity to disturbance, special status species would likely be more susceptible to the impacts associated with oil and gas related development when combined with other past, present, and reasonably foreseeable actions. However, on BLM-managed lands, surveys are typically required in areas where there are potential or known habitats of threatened, endangered, or otherwise special designation species. These surveys would help determine the presence of any special status fish and wildlife species or the extent of their habitat. Protective measures generally would be taken for any BLM approved activities to avoid or minimize direct disturbance in these crucial areas. Given the status of the Uinta Basin hookless cactus, Pariette cactus, and Colorado River endangered fish species, cumulative impacts for these species may be more pronounced than those for other special status plant, fish, and wildlife species.

5.10.1.1 Colorado River Fish Species, Including Colorado Pikeminnow, Razorback Sucker, Humpback Chub, Bonytail Chub, Bluehead Sucker, Flannelmouth Sucker, and Roundtail Chub

The Colorado River fish species (i.e., Colorado pikeminnow, razorback sucker, humpback chub, bonytail chub, bluehead sucker, flannelmouth sucker, and roundtail chub) would be impacted by activities that deplete or degrade the flow of downstream waters of the Upper Colorado River Basin. Portions of the Green River that occur within the CIAA provide habitat elements required by the Colorado River endangered fish. Cumulative impacts associated with the Proposed Action and other alternatives, in combination with impacts linked with other oil and gas development, livestock grazing, recreational activities, wildlife habitat management, and other land uses within the CIAA, would cumulatively reduce the quality and quantity of aquatic habitat for Colorado River endangered fish species.

Implementation of the alternatives combine with other past, present, and reasonably foreseeable activities in the CIAA could also result in the adverse modification of designated critical habitat for the Colorado River fish in the Green River by increasing erosion and sediment yield. Increased sediment loading from surface disturbing activities could lead to slightly higher temperatures in Pariette Draw, which could have an adverse cumulative effect on fisheries and other aquatic species. Sediment deposition may bury and suffocate fish eggs and larvae that may affect spawning and rearing. In addition, reduced visibility created by sediment load may inhibit the ability of fish to see prey, which could impact feeding behavior (USEPA 2003). Physiological impacts such as gill clogging and the ingestion of large quantities of sediment could also cause illness, reduced growth, and eventual death (USEPA 2003). Due to existing surface disturbance, ongoing projects, and poor reclamation success of previously disturbed areas within the MBPA and surrounding region, increased cumulative erosion and subsequent sediment yield would likely occur within these watersheds.

The total annual sediment yield over existing conditions during the Production Phase associated with the Proposed Action and Alternatives B, C, and D would be approximately 7, 0, 7, and 4 tons, respectively. Annual sediment loading in the Green River at Ouray, Utah, is estimated at 6.8 million tons. Therefore, implementation of the Proposed Action or Alternatives B, C, or D would contribute to this total by a fraction of a percent, which would be considered negligible from a hydrologic standpoint. However, in the context of cumulative effects, the sediment loading contributions from this project, when coupled with other oil and gas projects, livestock grazing, wildlife habitat management, and recreational activities has a potential to substantially increase sediment loading in the Green River.

Colorado River fish species are also affected by activities that deplete the flow of downstream waters into the Upper Colorado River Basin (USFWS 1987). Depletion from the proposed project coupled with depletions from other oil and gas projects, ranching, commercial, and residential water use has the potential to substantially reduce flow in the Upper Colorado River Basin. In addition to reducing the quantity of water with sufficient quality in a specific location, water depletions can also reduce a river's ability to create and maintain the physical habitat (areas inhabited by, or potentially inhabitable by, special status fish for use in spawning, nursery, feeding, and rearing, or access to these habitats) and the biological environment (food supply, predation, and competition).

The direct withdrawal of water from the Green River for drilling, dust abatement, water-flooding, ranching, commercial water use, and residential water use could also increase the potential to impinge fish on intake screens. In addition, the increased potential for release of natural gas condensate, hydrocarbons, or other toxic substances into the Green River or its tributaries from this project or other past, present, and reasonably foreseeable activities may cause direct mortality of individual fish.

5.10.1.2 Western Yellow-billed Cuckoo and Lewis's Woodpecker

Cumulative impacts to the WYBC and Lewis's woodpecker, if present within the CIAA, could occur as a result of long-term surface disturbance of Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation, which serves as potential nesting and foraging habitat for these species. Oil and gas development, livestock grazing, and recreational activities that occur during the breeding season for these species (March through July) can lead to direct impacts such as the loss of nests, eggs, or young, or the disruption of breeding activities for that season.

As shown in **Table 5.1-1**, surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect the vegetation communities across the CIAA. Approximately 23,597 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. It is unknown what percentage of this total is Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation. Similarly, it is difficult to quantify past, present and reasonably foreseeable surface disturbance impacts from other land uses such as livestock grazing and recreation. Nevertheless, the incremental contribution of the proposed project to the total surface disturbance of Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation within the CIAA would range from a low of one (1) acre under Alternatives B and D to a high of 20 acres under the Proposed Action and Alternative C. While these surface disturbance acreages are relatively low, they must be considered as contributions to cumulative impacts on these species.

5.10.1.3 Raptor Species, Including the Bald Eagle, Golden Eagle, Ferruginous Hawk, Short-eared Owl, and Burrowing Owl

Cumulative impacts to special status raptor species, including the bald eagle, golden eagle, ferruginous hawk, short-eared owl, and burrowing owl would be similar to those identified and assessed in **Section 4.9.1.1.6** for raptors. Impacts from implementation of the proposed project combined with other past, present, and reasonably foreseeable actions could include displacement caused by increased human activity; nest desertions and/or reproductive failure caused by project-related disturbances; increased public access and subsequent human disturbance resulting from new road construction; and temporary reductions in prey populations due to habitat fragmentation and alteration.

As shown in **Table 5.1-1**, surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development would cumulatively and incrementally affect the vegetation communities across the CIAA. Approximately 23,597 acres of potential habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits) within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to potential habitat for prey species within the CIAA would be approximately 39,726 acres under Alternative A – Proposed Action; 24,932 acres under Alternative B – No Action Alternative; 39,905 acres under Alternative C – Field-wide Electrification; or 33,402 acres under Alternative D - Resource Protection.

Data from past raptor inventories conducted within the region from the period of 1995 to 2008 were used to evaluate the level of nesting activity for special status raptor species within the CIAA (BLM 2009b). At the time the data were collected, the results identified a total of 231 special status raptor nests within the CIAA, of which 125 were golden eagles; 93 were ferruginous hawks; 12 were burrowing owls; and one (1) was a short-eared owl.

It is unknown what amount of surface disturbance exists within 0.5 mile of these identified nests. Nevertheless, the incremental contribution of the proposed project to the total surface disturbance within 0.5 mile of a golden eagle nest could range from a low of 199 acres under Alternative B to a high of 2,688 acres under Alternative C. The incremental contribution of the proposed project to the total surface disturbance within 0.5 miles of a documented ferruginous hawk nest could range from a low of 192 acres under Alternative B to a high of 2,181 acres under Alternative C. The incremental contribution of the proposed project to the total surface disturbance within 0.25 mile of a documented short-eared owl nest could range from a low of 2 acres under Alternative B to a high of 19 acres under Alternative C. Additionally, the incremental contribution of the proposed project to the total surface disturbance within 0.25 mile of a documented burrowing owl nest could range from a low of one (1) acre under Alternative B to a high of 166 acres under the Proposed Action.

5.10.1.4 Fringed Myotis, Spotted Bat, and Townsend's Big-eared Bat

The amount of surface disturbance to pinyon-juniper woodland, desert shrub, and riparian woodland habitats used for foraging by the fringed myotis, spotted bat, and Townsend's big-eared bat within the CIAA is currently unknown. However, the surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D combined with other past, present, and reasonably foreseeable actions would cumulatively and incrementally affect vegetation communities that these bat species potentially use for foraging across the CIAA. Depending on the alternative selected, the total surface disturbance to pinyon-juniper woodland, desert shrub, and riparian woodland habitats within the CIAA would be approximately 7,996 acres under Alternative A – Proposed Action; 242 acres under Alternative B – No Action Alternative; 8,092 acres under Alternative C – Field-wide Electrification; or 4,630 acres under Alternative D - Resource Protection.

Under the proposed project, the total surface disturbance to Colorado Plateau Mixed Bedrock Canyon and Tableland habitats potentially used for roosting by these species within the CIAA would be approximately 491 acres under Alternative A – Proposed Action; 18 acres under Alternative B – No Action Alternative; 478 acres under Alternative C – Field-wide Electrification; or 144 acres under Alternative D - Resource Protection. Indirect cumulative impacts to these species would likely include noise from construction activities, vehicle traffic, and increased human presence. However, these impacts would be impossible to quantify.

Additionally, bat species within the CIAA could be impacted by the increase in open pits (i.e., reserve pits) under all alternatives. While the impacts from each individual pit would be relatively small and short term, the simultaneous presence of large numbers of open pits on the landscape presents a potentially significant cumulative hazard to bat species. These impacts would be greatest under the Proposed Action and Alternative C as they propose the largest number of wells.

5.10.1.5 White-tailed Prairie Dog

The amount of surface disturbance to mapped white-tailed prairie dog colonies within the CIAA is currently unknown. However, the surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D combined with other past, present, and reasonably foreseeable actions would cumulatively and incrementally affect white-tailed prairie dog colonies within the CIAA. Depending on the alternative selected, the total surface disturbance to mapped white-tailed prairie dog colonies within the CIAA would be approximately 1,317 acres under Alternative A – Proposed Action; 40 acres under Alternative B – No Action Alternative; 1,367 acres under Alternative C – Field-wide Electrification; or 770 acres under Alternative D - Resource Protection.

5.10.1.6 Greater Sage-grouse

While it is likely that some sage-grouse use portions of the Project Area on a limited basis, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA. Therefore, incremental impacts from the proposed project on sage-grouse within the CIAA would not be cumulatively considerable.

5.10.1.7 Mountain Plover

Although there has been only one documented occurrence of mountain plover nesting within the Uinta Basin, the potential for future nesting in the CIAA area cannot be entirely discounted. The majority of potential mountain plover habitat and all of the concentration areas for mountain plover within the CIAA are contained within the MBPA. The total surface disturbance to mountain plover concentration areas within the CIAA under each alternative would be:

- Alternative A (Proposed Action) – 71 acres
- Alternative B (No Action) – 0 acres
- Alternative C (Field-wide Electrification – 79 acres
- Alternative D (Resource Protection) – 56 acres

Depending on the alternative selected, the total surface disturbance to potential mountain plover habitat within the CIAA would be approximately 10,446 acres under Alternative A – Proposed Action; 386 acres under Alternative B – No Action Alternative; 10,698 acres under Alternative C – Field-wide Electrification; or 6,900 acres under Alternative D - Resource Protection. This combined with impacts from other past, present and reasonably foreseeable oil and gas development, livestock grazing, and recreational activities has the potential to result in substantial cumulative loss and fragmentation of plover habitat.

5.10.2 Special Status Plant Species and State Species of Concern

Impacts to special status plant species and state species of concern would be similar to those discussed in **Section 5.7.1** for general vegetation. However, given their ongoing habitat loss, declining population, and sensitivity to disturbance these species would likely be more susceptible to the impacts associated with oil and gas development within the CIAA.

5.10.2.1 Uinta Basin Hookless Cactus and Pariette Cactus

The CIAA for the Uinta Basin hookless cactus and the Pariette cactus is the extent of potential habitat for the Uinta Basin hookless cactus and the Pariette cactus in the Vernal Planning Area. Direct cumulative impacts to this species could result from direct individual loss from trampling; temporary or permanent removal of aboveground cover; the temporary or permanent loss of suitable habitat; and soil compaction as a result of construction and operation activities, grazing, and recreational use. Indirect cumulative impacts include:

- Habitat fragmentation;
- Increased dust effects;
- Introduction and spread of invasive and noxious weed species;
- Temporary or permanent loss of suitable habitat; and

- Changes to the composition of the native vegetative community from surface disturbance activities such as oil and gas development, grazing, access road construction, seismic surveys, well staking, cultural resources surveys, biological surveys, and other human activities.

Changes in land use patterns or increased human encroachment could also adversely impact occupied and suitable habitats. In addition, recovery and reclamation of suitable habitats could be compounded by limiting reclamation conditions (e.g., drought).

According to the latest potential habitat polygon for the Uinta Basin hookless cactus and the Pariette cactus, the current area for potential habitat is approximately 537,564 acres encompassing federal, state, Indian trust, and private land ownership. Relatively recent geographic data for the Uinta Basin hookless cactus and Pariette cactus includes over 18,400 points representing approximately 40,528 individual cacti. These counts include both living and dead plants; however the numbers do not include hybrids of the Uinta Basin hookless cactus and Pariette cactus, which occur outside of the area where the two species overlap. Based on recent survey data (BLM and USFWS 2011) and extrapolation to unsurveyed suitable habitat, the total count for the Uinta Basin hookless cactus and Pariette cactus is approximately 50,000 individuals.

To estimate the approximate amount of surface disturbance that currently exists within the potential habitat polygon for the Uinta Basin hookless cactus and Pariette cactus, GIS data was obtained from UDOGM that shows approximately 5,161 oil and gas well locations within the habitat boundary (see **Table 5.10.2.1-1**). A conservative estimate of 5 acres of surface disturbance for each well (which includes associated roads and pipelines) was used to calculate the amount of acreage within the potential habitat polygon that is already disturbed by energy development. Based on these calculations, it is estimated that over 25,805 acres (5-percent) of habitat within the potential habitat polygon for the Uinta Basin hookless cactus and Pariette cactus is currently disturbed as a result of past, present, are reasonably foreseeable oil and gas development. An undetermined number of additional wells are planned for development in the Uinta Basin in upcoming years; therefore, the amount of surface disturbance across Uinta Basin hookless cactus habitat and Pariette cactus can be expected to increase substantially.

Table 5.10.2.1-1. Summary of Impacts to Uinta Basin Hookless Cactus and Pariette Cactus Habitat within the CIAA

Habitat Type	Area (Acres)	Estimated Number of Wells within Habitat	Estimated Acreage of Disturbance from Past, Present, and Future Oil and Gas Activity	Disturbance by Alternative (Acres)	Cumulative Total Disturbance (Acres)
Potential Habitat	537,564	5,161	25,805	--	25,805
Alternative A	--		25,805	7,662	33,467
Alternative B	--		25,805	172	25,977
Alternative C	--		25,805	7,846	33,651
Alternative D	--		25,805	4,307	30,112
Level 1 Core Habitat	38,769	647	3,235	--	3,235

Habitat Type	Area (Acres)	Estimated Number of Wells within Habitat	Estimated Acreage of Disturbance from Past, Present, and Future Oil and Gas Activity	Disturbance by Alternative (Acres)	Cumulative Total Disturbance (Acres)
Alternative A	--	69	3,235	946	4,181
Alternative B	--	4	3,235	6	3,241
Alternative C	--	69	3,235	951	4,186
Alternative D	--	0	3,235	0	3,235
Level 2 Core Habitat	85,134	1,487	7,435	--	7,435
Alternative A	--	92	7,435	1,853	9,288
Alternative B	--	35	7,435	69	7,504
Alternative C	--	92	7,435	1,889	9,324
Alternative D	--	647	7,435	1,093	8,528

Similar methods were used to quantify the number of oil and gas wells located within the Level 1 and 2 Core Conservation Areas for the Uinta Basin hookless cactus and Pariette cactus. Based on GIS data obtained from UDOGM, there are approximately 524 existing wells and 123 proposed wells within the Level 1 Core Conservation Area. Assuming a conservative estimate of 5 acres of disturbance per well, about 3,235 acres (8-percent) of disturbance to Level 1 Core Conservation Areas for the Uinta Basin hookless cactus and Pariette cactus has been or could be disturbed by past, present, and reasonably foreseeable future oil and gas activities.

Additionally, there are currently 1,270 existing and 217 proposed oil and gas wells within the Level 2 Core Conservation Areas. Again, using the conservative estimate of 5 acres of surface disturbance for each well, an estimated 7,435 acres (9-percent) of Level 2 Core conservation Areas has been or will be disturbed by past, present, and reasonably foreseeable future oil and gas activities. Cumulatively, there are approximately 10,670 acres (9-percent) of disturbance from past, present, and future oil and gas wells to Level 1 and Level 2 Core Conservation Areas for the Uinta Basin hookless cactus and Pariette cactus (see **Table 5.10.2.1-1**).

Surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development would cumulatively and incrementally affect potential habitat for Uinta Basin hookless cactus and Pariette cactus across the CIAA. Approximately 25,805 acres of potential habitat for these species within the CIAA has already been disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to potential habitat for these species within the CIAA would be increased to approximately 33,467 acres under Alternative A – Proposed Action; 26,411 acres under Alternative B – No Action Alternative; 33,651 acres under Alternative C – Field-wide Electrification; or 30,112 acres under Alternative D - Resource Protection (see **Table 5.10.2.1-1**). Disturbance would last for the duration of oil and gas development and production, until such time that reclamation has proven successful.

Existing surface disturbance in Level 1 and 2 Core Conservation Areas for Uinta Basin hookless cactus and Pariette cactus is estimated at 3,235 acres and 7,435 acres, respectively. Depending on the alternative selected, the total surface disturbance to Level 1 Core Conservation Areas for Uinta Basin hookless cactus and Pariette cactus within the CIAA would be increased to approximately 4,181 acres under Alternative A – Proposed Action; 3,264 acres under Alternative B – No Action Alternative; 4,186 acres under Alternative C – Field-wide Electrification; or no increase in disturbance under Alternative D - Resource Protection. Depending on the alternative selected, the total surface disturbance to Level 2 Core Conservation Areas for Uinta Basin hookless cactus and Pariette cactus within the CIAA would be increased to approximately 9,288 acres under Alternative A – Proposed Action; 7,570 acres under Alternative B – No Action Alternative; 9,324 acres under Alternative C – Field-wide Electrification; or 8,528 acres in disturbance under Alternative D - Resource Protection (refer to **Table 5.10.2.1-1**).

5.10.2.2 Ute Ladies'-tresses

Since habitat for the Ute Ladies'-tresses is generally limited to the convergence of the Green River and Pariette Draw and within portions of the Pariette Wetlands, its potential distribution within the CIAA is limited. Direct disturbance to potential habitat for this species is unlikely because little disturbance to wetlands would likely occur under implementation of any of the four alternatives. For the same reasons, the potential for occurrence of indirect and dispersed direct effects to this species would be unlikely to occur. Therefore, incremental impacts from the proposed Project on the Ute Ladies'-tresses within the CIAA are unlikely to be cumulatively considerable.

5.10.2.3 Barneby's Catseye, Graham's Catseye, and Sterile Yucca

The amount of surface disturbance to potential habitat for Barneby's catseye, Graham's catseye, and sterile yucca within the CIAA is currently unknown. However, the surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D would cumulatively and incrementally affect potential habitat for these species. Depending on the alternative selected, the incremental contribution of total surface disturbance to suitable habitat for Barneby's catseye within the CIAA would be approximately 1,292 acres under Alternative A – Proposed Action; 80 acres under Alternative B – No Action Alternative; 1,320 acres under Alternative C – Field-wide Electrification; or 786 acres under Alternative D - Resource Protection.

The total incremental contribution of surface disturbance to suitable habitat for Graham's catseye within the CIAA would be approximately 7,399 acres under Alternative A – Proposed Action; 438 acres under Alternative B – No Action Alternative; 7,596 acres under Alternative C – Field-wide Electrification; or 4,470 acres under Alternative D - Resource Protection. With regard to sterile yucca, the total surface disturbance to suitable habitat for this species within the CIAA would be approximately 1,518 acres under Alternative A – Proposed Action; 100 acres under Alternative B – No Action Alternative; 1,533 acres under Alternative C – Field-wide Electrification; or 910 acres under Alternative D - Resource Protection.

5.10.2.4 Green River Greenthread

Since Green River greenthread is generally limited to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited, and direct disturbance to potential habitat for this species is unlikely. Therefore, incremental impacts from the proposed project on this species within the CIAA are unlikely to be cumulatively considerable.

5.11 CULTURAL RESOURCES

The CIAA for cultural resources is the boundary of the MBPA. Cumulative impacts to cultural resources are defined as any damage to or destruction of cultural resources that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions (40 CFR 1508.7). The magnitude of impacts may be greater or less depending on: 1) the cultural resource site densities present in the area of project-related activities; 2) the importance of the cultural resources present; and 3) the final magnitude and scope of reasonably foreseeable actions over the next 20 years. However, it is important to remember that damage to or destruction of these resources is often site-specific and not additive across a landscape.

Impacts to cultural resources within the CIAA from past, present, or reasonably foreseeable future actions would primarily result from activities associated with surface and subsurface disturbance. Impacts to cultural resources may also 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. For example, Native American tribes often interpret cultural resource sites or locations as sacred or traditionally important and use them in such a manner that atmospheric change, visual obstructions, and/or noise levels could impinge upon such 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 shown in **Table 5.3-1**, approximately 14,489 acres of land within the MBPA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to cultural resources within the CIAA would be increased to 30,619 acres under Alternative A – Proposed Action; 15,824 acres under Alternative B – No Action Alternative; 30,797 acres under Alternative C – Field-wide Electrification; or 24,294 acres under Alternative D - Resource Protection.

As discussed in **Section 3.11.6**, there are approximately 1,123 previously documented archaeological sites with the MBPA. These sites include prehistoric (n= 599), historic (n= 468), and multicomponent (n= 56). Specific direct impacts to presently unknown cultural resources from reasonably foreseeable development would not be known until surveys are completed for all areas within the CIAA where surface disturbance is proposed. Cultural resource properties would be evaluated for their eligibility for listing on the NRHP. While the potential for direct impacts to eligible cultural resources would likely increase as a result of increased surface disturbance, these impacts can be reduced through the preparation and execution of appropriate mitigation measures approved by the responsible Federal and State agencies. Because cultural resource surveys would be required prior to any surface-disturbing activities in the MBPA and all NRHP-eligible sites would be avoided or appropriately mitigated, cumulative contributions to direct impacts on cultural resources would likely be minimal.

Although archaeological sites located within disturbance areas would be avoided or mitigated, sites located outside of and adjacent to disturbance areas would be vulnerable to indirect impacts. Implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with other past, present, and reasonably foreseeable action could cumulatively affect unknown cultural resources in the MBPA. These actions may include the introduction of atmospheric, visual, and auditory intrusions; increased visitation and pedestrian traffic during well field development and operation; OHV and other motorized vehicle use; and unknown impacts to cultural resource sites and cultural landscapes.

It is anticipated that there could be a cumulative increase in vandalism, illegal collection, and dust due to the new roads in the MBPA, as well as increased erosion at sites located in the vicinity of well pads, roads, and pipelines where vegetation cover has been reduced or eliminated. These impacts may alter the overall historic setting and visitor experience throughout the CIAA. Generally speaking, project-related activities would incrementally and cumulatively add to the loss of important cultural resources across the CIAA. These types of impacts pose consequences for the breadth, completeness, and interpretative value of the archaeological record. Nevertheless, beneficial cumulative impacts would likely occur as undocumented cultural resources are discovered and preserved.

Under all alternatives, cultural resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process. Alternatives A, C, and D include measures to protect cultural resources by incorporating several ACEPMs (see **Section 2.2.12.8**) that are intended to minimize or avoid project-specific and cumulative impacts. In addition, many potential cumulative impacts to cultural resources would be reduced or eliminated through implementation of Federal regulatory laws, actions, and guidelines designed to protect cultural resources, as well as through the coordination and consultation with the SHPO and Native American Tribal representatives.

5.12 LAND USE AND TRANSPORTATION

The CIAA for land use and transportation is defined as the MBPA plus the many roads and highways between Vernal, Fort Duchesne, Roosevelt, and Duchesne that would be used to access the MBPA for project related activities. Oil and gas development has been prominent on the landscape in and around the MBPA for many years and is likely to continue in the future.

As shown in **Table 5.3-1**, surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development would cumulatively and incrementally affect lands across the CIAA. Approximately 14,489 acres of land within the MBPA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to land use and transportation within the CIAA would increase to approximately 30,618 acres under Alternative A – Proposed Action; 15,824 acres under Alternative B – No Action Alternative; 30,797 acres under Alternative C – Field-wide Electrification; or 24,294 acres under Alternative D - Resource Protection.

5.12.1 Land Use

The proposed oil and natural gas development project would be consistent with other development within the CIAA, which is mostly oil and gas exploration and production activities. There are no commercial buildings/facilities or private residences within the MBPA; therefore, cumulative development would not affect these land uses. As discussed in **Section 5.7.1**, the proposed project may contribute to negative effects on vegetation communities, including lands used for agriculture, ranching, and wildlife habitat management.

5.12.2 Transportation

The CIAA has an existing road network in place that serves local land uses, including oil and gas well development activities. Further expansion of the road network in the MBPA to accommodate oil and gas development would have both adverse and beneficial impacts. Adverse impacts could include an incremental increase in project-related traffic and accidents associated with primary access roads within and a greater need for maintenance on new and existing roads as heavy truck traffic increases. Similarly,

roads outside but leading to the MBPA would receive heavier traffic and would lead to cumulative effects on traffic and road deterioration when combined with vehicle use from other past, present, and reasonably foreseeable activities. A potential beneficial cumulative impact within the MBPA would include the expansion of a maintained road network that would serve both recreational visitors and the oil and gas development workforce.

In areas where oil and gas development is already in existence, more dead-end roads would be built as additional wells are drilled. As infill development moves into areas with a less developed road network, both collector and dead-end roads would be constructed to meet transportation needs. Project-related traffic on these roads would be greatest during construction, drilling, and completion phases. However, it is expected that use of telemetry (when operationally feasible) would enable remote monitoring in some locations, which would reduce the need for vehicle trips.

New road construction could lead to greater access to areas where recreational activities could be enjoyed (see **Section 5.13**). As the volume of passenger vehicle traffic rises, the probability of experiencing accidents with large trucks using the same access roads would increase.

5.13 RECREATION

The CIAA for recreation is as defined as MBPA and a 2-mile buffer surrounding the MBPA. It includes not only portions of the Gasco EIS, XTO River Bend Unit EA, and Newfield EDA #1 Project Areas, but also the entire Newfield Castle Peak and Eight Mile Flat EIS Project Area. Cumulative impacts to recreation could include altered recreational experiences due to noise and activities associated with oil and gas development.

As shown in **Table 5.13-1**, surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with past, present, and reasonably foreseeable actions would cumulatively and incrementally affect lands across the CIAA. Approximately 17,132 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to recreation within the CIAA would increase to approximately 32,261 acres under Alternative A – Proposed Action; 18,467 acres under Alternative B – No Action Alternative; 33,440 acres under Alternative C – Field-wide Electrification; or 26,937 acres under Alternative D – Resource Protection.

Table 5.13-1. Surface Disturbance Estimates for Existing, Ongoing, and Pending Oil and Gas Projects in the CIAA for Recreation

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	2,444	8,798	100	8,798
Gasco Uinta Basin EIS	206,826	1,538	10,302	35	3,581
XTO Kings Canyon EA	44,637	297	1,131	3	36

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
XTO River Bend Unit EA	16,719	484	1,075	3	32
Newfield Castle Peak and Eight Mile Flat EIS	65,381	973	3,701	100	3,701
Newfield EDA #1	77,647	500	2,494	39	984
Total Existing, Operational, and Proposed Projects	-	6,236	27,501	-	17,132
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	5,750	16,129	100	16,129
Grand Total (if Proposed Action is selected)	-	11,986	43,630	-	32,261
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	788	870	100	1,335
Grand Total (if No Action Alternative is selected)	-	7,024	28,371	-	18,467
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	5,750	16,308	100	16,308
Grand Total (if Alternative C is selected)	-	11,986	43,809	-	33,440
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	5,058	9,805	100	9,805
Grand Total (if Alternative D is selected)	-	11,294	37,305	-	26,937

¹ Acreage for each project area was compiled from various notices and NEPA documents.

² Number of proposed wells for each project was compiled from various notices and NEPA documents.

³ Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

While areas near the Green River would be affected by industrial noise from oil and gas operations, the addition of wells from the proposed project would have a minimal cumulative impact to recreational activities within the CIAA. No direct physical impact would occur to the recreational areas, nor would access to these areas be restricted.

Prior oil and gas development has already built an existing road network throughout the CIAA. These roads have reduced the character of primitive recreational activities in the area, including naturalness, unconfined recreation, and solitude. Each of the four alternatives would contribute to impact on primitive recreational activities; however, the No Action Alternative would contribute significantly less to this

cumulative impact than those for the Proposed Action and other action alternatives. On the other hand, additional roads associated with new development would provide recreational users with even more potential access, especially for motorized recreation. Restrictions and closures during oil and gas construction and development could impact some recreationists in the short term, while production intensive activities could cause other recreationalist (e.g., hunters and OHV users) to avoid areas that have been heavily developed over the long term.

5.14 VISUAL RESOURCES

The CIAA for visual resources is defined as the Lower Green River ACEC and the Wild and Scenic Green River Corridor within a 2-mile buffer surrounding the MBPA. Cumulative impacts to visual resources are affected by ongoing resource management and energy extraction in this area and are generally managed under a common land use plan. Development of oil and gas typically includes construction of roads, well pads, pipelines, power lines, compressors, and other facilities.

Oil and gas development has transformed the land to a more roaded, developed, and somewhat industrial landscape. Depending on the landform, vegetation type, and well spacing, the surface disturbance and production facilities associated with oil and gas development are visible in the landscape to varying degrees. This type of development dominates the landscape in most of the CIAA. Oil and gas development or other similar surface disturbing activities are consistent with VRM Class III and IV management objectives. However, surface disturbing activities on these same lands may not be consistent with VRM Class II objectives. Unless the disturbances are associated with pre-RMP leases, they would need to be mitigated to a level where they would not attract the attention of a casual observer; that is, if the lease was signed pre-RMP, it would be a valid pre-existing contractual right that may not be subject to visual objectives.

As shown in **Table 5.14-1**, surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with past, present, and reasonably foreseeable actions would cumulatively and incrementally affect lands across the CIAA. Approximately 14,831 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to visual resources (the characteristic landscape) within the CIAA would increase to approximately 30,960 acres under Alternative A – Proposed Action; 16,166 acres under Alternative B – No Action Alternative; 31,139 acres under Alternative C – Field-wide Electrification; or 24,636 acres under Alternative D – Resource Protection.

Other public land uses have resulted in an unknown quantity of surface-disturbing activities that have affected the character of the landscape. For example, construction of livestock facilities (e.g., fences and waters), cross-country OHV driving, and vegetation treatments (e.g., chainings) have altered the existing character of the landscape by changing vegetation patterns and introducing human-made features on the land.

Table 5.14-1. Surface Disturbance Estimates for Existing, Ongoing, and Pending Oil and Gas Projects in the CIAA for Visual Resources

Project Name	Totals per Project			Totals in CIAA	
	Project Area (acres) ¹	Wells ²	Surface Disturbance (acres) ³	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	2,444	8,798	100	8,798
Gasco Uinta Basin EIS	206,826	1,538	10,302	21	2,133
XTO Kings Canyon EA	44,637	297	1,131	17	188
XTO River Bend Unit EA	16,719	484	1,075	0.4	4
Newfield Castle Peak and Eight Mile Flat EIS	65,381	973	3,701	100	3,701
Newfield EDA #1	77,647	500	2,494	0.3	7
Total Existing, Operational, and Proposed Projects	-	6,236	27,501	-	14,831
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	5,750	16,129	100	16,129
Grand Total (if Proposed Action is selected)	-	11,986	43,630	-	30,960
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	788	870	100	1,335
Grand Total (if No Action Alternative is selected)	-	7,024	28,371	-	16,166
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	5,750	16,308	100	16,308
Grand Total (if Alternative C is selected)	-	11,986	43,809	-	31,139
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	5,058	9,805	100	9,805
Grand Total (if Alternative D is selected)	-	11,294	37,306	-	24,636

¹ Acreage for each project area was compiled from various notices and NEPA documents.

² Number of proposed wells for each project was compiled from various notices and NEPA documents.

³ Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

Variations in the amount of surface disturbance, road construction, and placement of facilities would be different among the alternatives, but the cumulative effects would be similar.

5.15 SPECIAL DESIGNATIONS

The CIAA for impacts to special designations is defined as the special designation areas themselves. These areas include the Pariette Wetlands ACEC, the Lower Green River Corridor ACEC, and the proposed Lower Green River WSR area (see **Figure 3.15-1 – Attachment 1**).

Past oil and gas exploration has resulted in approximately 38,234 acres of long-term disturbance within the CIAA. Development of oil and gas typically includes construction of roads, well pads, pipelines, power lines, compressors, and other facilities. This type of development has created surface disturbance and altered the land, but has not eliminated the relevant and important values of the Pariette Wetlands ACEC (wetland, and special-status species values) or the Lower Green River ACEC (riparian and scenic values), nor has it eliminated the ORVs of the Lower Green River WSR (fish and recreation values). Other land uses, such as livestock grazing and OHV driving, have resulted in an unknown quantity of surface-disturbing activities.

As described above, reasonably foreseeable development would create surface disturbances that would have similar impacts to special management areas. Reasonably foreseeable actions include other oil and gas projects that fall within ACECs in the MBPA vicinity, including the Newfield EDA, Newfield Castle Peak and Eight Mile Flat, Gasco Uinta Basin, and the XTO Riverbend projects. These projects would result in some amount of surface disturbance in at least one of the ACECs. As discussed in **Section 4.15**, if the Proposed Action were implemented, up to 1,209 acres would be initially disturbed in the Pariette Wetlands ACEC, while the No Action Alternative would initially disturb 62 acres. Under Alternative C there would be approximately 1,211 acres of initial disturbance within the Pariette Wetlands ACEC, while there would be no new surface disturbance under Alternative D.

However, as described in **Section 4.15**, surface disturbance within special designation areas would not necessarily result in significant adverse impacts to the identified relevant and important values for which the ACECs were designated, or to the ORVs for which the WSR had been analyzed. BLM policy requires protection of the values that make these places eligible for consideration as special designation areas (subject to valid existing rights), but this requirement would not necessarily preclude oil and gas well development. Although some surface disturbance would occur in each special designation area as a result of the project, mitigation would ensure that the ACECs and proposed WSR would maintain eligibility for their respective designations.

For special designated areas where VRM Class II occurs, VRM Class II objectives could be used to benefit other relevant and important values for which the ACEC was designated and ORV values for which the WSR has been analyzed. Such objectives would be applicable to maintaining the wetland habitat value of the Pariette Wetlands ACEC and the scenic value of the Lower Green River ACEC, with indirect impacts on other relevant and important ACEC values and ORVs.

5.16 SOCIOECONOMICS

The CIAA for socioeconomic impacts is defined as the spatial boundary of Duchesne and Uintah Counties. This spatial boundary was selected because oil and gas development within the Uinta Basin has had substantial impact on taxes and royalties collected by the State of Utah, much of which has been reallocated to Duchesne and Uintah Counties. Because minority, low-income, and Tribal populations currently reside in these counties, they would all be considered when evaluating environmental justice concerns for oil and gas projects. Moreover, oil and gas development is the largest variable component of reasonably foreseeable actions in the CIAA. As an industry, it supports large segments of the local

economy (e.g., funding local public facilities and services) and is a key driver affecting local population, demographic, and migration trends. Other historically and economically important segments of the CIAA economic base are grazing and recreation. However, information regarding trends in those economic segments is lacking and can only be evaluated on a qualitative basis.

5.16.1 Socioeconomics

5.16.1.1 Economic Effects

Without a vast supply of energy resource reserves in the area, the CIAA likely would be much less developed and populated than it is today. As a result of the ongoing development of oil and gas resources in the Uinta Basin, the rural communities within the CIAA have experienced considerable population growth. Such growth provides much of the impetus for new residential and commercial development and expansion of local government infrastructure and services. This economic activity underlies important economic and social conditions and trends in the area. For example, labor markets are characterized by unemployment that is commonly below statewide levels, higher transient elements of the workforce, competition and shortage of qualified labor, and higher labor compensation costs. Cumulative social effects also have occurred and energy resource development has resulted in some conflicts with recreation, tourism, and grazing on public lands.

Implementation of the proposed project would coincide with other future development activity in the area to create similar cumulative effects. The Proposed Action or other alternatives is one of several active and proposed oil and gas projects in the area. Prior to the onset of the current economic recession, more than 25 oil and gas drilling rigs were active in Uintah and Duchesne counties (Baker Hughes Inc. 2008). More than 500 wells were spudded in Duchesne County in 2006 and 2007, with more than 1,350 additional wells spudded in Uintah County during the same period. Weaker demand and lower commodity prices in 2008 and 2009 contributed to slowdowns in the rate of exploration and development; therefore, the number of new wells spudded in the two counties was less than half the levels in the preceding 3 years (BLM 2010a). Beginning in 2010, the number of new wells spudded in both Duchesne and Uintah Counties has returned to near pre-recession levels. Approximately 400 new wells were spudded in Duchesne County each year on average between 2010 and 2012. As of October 1, 2013, 318 wells have been spudded in the county (UDOGM 2013c). Uintah County has spudded about 540 new wells each year on average between 2010 and 2012. So far this year, 369 new wells have been spudded in Uintah County (UDOGM 2013c).

Despite the recent slowdown, long-term energy market forecasts call for higher prices and rising production in the Mountain region, which encompasses Utah, North Dakota, South Dakota, Montana, Wyoming, Idaho, Nevada, Colorado, Arizona, and western New Mexico. In order to achieve the 20 percent growth in projected natural gas production by 2030 (including the production needed to offset declining production from existing wells), renewed development in the Uinta Basin is needed (BLM 2010a). As shown in **Figure 5.16.1.1-1 (Attachment 1)**, the approximately 561 million cubic feet of natural gas production over the LOP of the Proposed Action or other alternatives is nearly equivalent to one-tenth of a single year's total production for the entire Mountain region. Over an assumed 25 years of production, the average annual production under the Proposed Action or other alternatives also would represent approximately 5 percent of the 2011 gas production for the State of Utah, which was 462 billion cubic feet (UDOGM 2013a). This development would likely be accompanied by investments in treatment, processing, compression, and transmission capacity to move the production to market (BLM 2010a).

The Utah Governor's Office of Planning and Budget periodically prepares economic and demographic forecasts that examine future energy development activity and provide a perspective on cumulative growth in the region. Current projections, which were released in 2012, indicate that total employment in Duchesne and Uintah Counties will grow to 37,148 by 2040, nearly a 27 percent increase from 2010 (GOPB 2012). For example, the Proposed Action is projected to directly support 526 jobs over the LOP and would be a major source of economic activity and personal income in the region. The employment growth is also expected to drive long-term population growth. Under the current forecasts, the two counties are projected to reach a combined population of 68,411 residents by 2040, an approximate increase of 33.5 percent over their combined 2010 populations. Although long-term projections portray a pattern of steady growth, future growth will likely be characterized by periods of more rapid growth and decline that reflect the scale and timing of cumulative actions.

After vacant housing, vacant commercial and industrial space, and available capacities in public facilities have been absorbed, additional accommodations for future growth would require new residential and non-residential development and public infrastructure expansion. Public sector expenditures would likely increase in conjunction with infrastructure expansion and growth in staffing and services to meet higher demands. The level of development and employment associated with the Proposed Action or other alternatives would be one of many contributors to growth pressures over the next decade. Once the development phase is completed, the incremental contribution margin attributable to the proposed project would decline in terms of employment, population, housing demand, and demands on public services because other activities would be responsible for increasing shares of future growth.

Implementation of the Proposed Action or other alternatives would combine taxes, royalties, and other public sector revenues with those generated by other cumulative actions to help fund local governments, school districts, and the State of Utah government. Due to the vast federal, Indian trust, and state lands in the area, energy resource development generates substantial revenues in the form of mineral lease royalties and severance taxes.

Federal mineral lease royalties would accrue to federal and state governments. Because no Indian trust lands or minerals are present within the MBPA, no mineral lease royalties would benefit the Ute Tribe. Severance taxes royalties on production from state lands would accrue to the state's coffers. Substantial ad valorem (property) taxes levied on the value of production as well as production, processing, and transportation equipment and facilities would accrue to local entities, principally the counties and school districts. A 2009 University of Utah study reported that approximately \$416 million in federal mineral royalties and lease bonus payments and about \$65.5 million in severance taxes were generated from oil and gas production in Utah in 2008, the bulk of which were associated with activity in the Uinta Basin. Property taxes and royalties derived from production on state lands yielded approximately \$62 million (University of Utah 2009). Oil and gas development generates sales and use taxes and other fees (both directly and indirectly) from households and incomes supported by development and production.

Cumulative actions, including the Proposed Action or other alternatives, would continue to generate these kinds of revenues over the long term, although they would fluctuate over time in response to changes in commodity prices and production levels. For example, under the Proposed Action, public sector revenues that would be generated from future production are projected to be approximately \$162 million to the combined Uintah County and Duchesne County economies over the LOP (see **Table 4.16.1.1.3-2**). These project-related revenues would continue for decades following the initial effects on population growth, housing, and demands on public facilities and services. More than 60 percent of these revenues would accrue to the benefit of the state's general fund, Permanent Community Impact Fund, Permanent Public

School Fund, UDOT, Duchesne and Uintah Counties, school districts in the two counties, and several other state agencies.

Cumulative adverse impacts to grazing and recreation could potentially occur within the CIAA. Economic impacts on grazing would occur as the combined effects of past, present, and future energy resource development adversely affect portions of one or more grazing allotments within the MBPA, resulting in further reductions to grazing as disturbed portions of the allotments become unavailable. Economic impacts to recreation would occur as the cumulative levels of development adversely affect the quality of the recreation experiences and potentially the level of recreation activity. These impacts could have slight incremental effects on the local tourism and outdoor recreation related industries; however, the timing, magnitude, and intensity of these effects are uncertain.

Cumulative impacts to economic and demographic conditions are subject to underlying uncertainties regarding the timing and pace of development for the various cumulative actions. These actions, in turn would be linked to factors including the availability of drilling capacity, labor force, natural gas transmission capacity, capital to implement programs, energy commodity prices, and market demand. Potential outcomes would include: 1) accelerated growth with higher population levels and greater demands on housing and services; or 2) sustained development activity over a longer time horizon that results in future production, which is characterized by a less pronounced peak and subsequent decline commonly associated with a single project. Because energy-related population growth and decline can be sudden and/or unexpected, it is difficult for rural communities with limited resources to prepare for these cycles (GOED 2006). Increased population growth could increase the demand for public services. Even with additional revenues, oil and gas development within the CIAA could eventually exceed the costs of providing these services, and impacts associated with the immediacy of the issues would not be resolved.

5.16.1.2 Social Effects

Research suggests that dramatic increases in population can have a disruptive effect on the social well-being of some segments of the local population within a rural community. Negative social consequences could include a collapse of informal social structures; conflict and tension between advocates and opponents of growth; the absence of social integration; changes in neighboring ties; decreases in community satisfaction; and a deteriorating quality of life. Rural communities impacted by boom periods can experience increases in school drop-out rates, juvenile delinquency, criminal activity, domestic/family violence, and drug and alcohol problems. These issues, in turn, can affect police and social services. However, literature also suggests that these socially disruptive effects may not be permanent. Rather, the disruptive effects associated with boom growth subside in the years after the boom phase has ended, with no evidence of lasting disruption (Smith et al. 2001).

On the other hand, the benefits (positive social impacts) of boom periods resulting from oil and gas development in Duchesne and Uintah Counties would include lower unemployment, higher incomes, higher housing values, less crime due to lower unemployment and higher incomes, formation of new businesses, more revenue for public improvements, etc.

While the pace of drilling is always subject to short-term variability, which causes cycles of expansion and contraction in communities, a growing inventory of producing wells and field facilities can support workforces for a generation or longer. By enlarging the well base, development of the proposed project would potentially add stability to the region's population. Though typically smaller than the transient job waves that accompany drilling runs, a production workforce potentially invests in and integrates with communities where industry employment is present. Communities in the Uinta Basin that have

experienced rapid population change from past energy development may respond to these changes more favorably than communities that have not experienced boom-and-bust cycles (Smith et al. 2001). Furthermore, research has shown that some of the communities within the region of the MBPA have a documented history of resilient social and community responses to increases in population associated with oil and gas-related activities (Bloyer 2002). Implementation of the Proposed Action or other alternatives could generate revenues to help fund services that would address these social impacts in the longer term.

5.16.2 Environmental Justice

Under the Proposed Action and other alternatives, environmental justice would be a primary area of concern for the Tribal communities on the Uintah and Ouray Reservation. As discussed in **Section 3.15**, the communities of Fort Duchesne CDP, Randlett CDP, and Whiterocks CDP have a poverty rate of over 50 percent, where greater than 90 percent of their populations are minorities, mainly American Indian.

Future oil and gas development in Duchesne and Uintah Counties would likely impact Reservation lands of which residents of the concerned communities are members. In areas where the Ute Tribe has mineral ownership, lease royalties would be collected. In areas where surface and mineral ownership are held in split estate, the Tribe would collect revenue by entering into Surface Use Agreements that provide compensation for the disturbance and/or the loss of income (e.g., lost agricultural land and crop production as a result of oil and gas development). The Ute Tribe also charges a severance tax on all oil and gas that is produced, transported, or sold. Revenues from these sources would likely increase as cumulative development occurs on Reservation lands. The Ute Tribe could use these additional revenues to provide services to its members, including those who reside in the environmental justice communities. Therefore, cumulative development on Reservation lands would be a benefit to these communities. As discussed above, cumulative oil and gas development would lead to increased employment opportunities in Duchesne and Uintah Counties. The Proposed Action or other alternatives would contribute to this cumulative effect. These employment opportunities would also be available to members of the Ute Tribe, including those who live in environmental justice communities. An increase in employment resulting from drilling and production activities would reduce the high poverty rates in these communities and would likely generate higher wages. Consequently, implementation of the Proposed Action or other alternatives would contribute cumulatively to beneficial impacts in environmental justice communities.

The social impacts of this cumulative development on the environmental justice communities are less clear. On the one hand, the increased employment and the potential increased availability of services would likely have a beneficial impact on the social well-being of the residents in these communities. On the other hand, these communities could experience social disruptions similar to those experienced by other communities where economic booms occur (see **Section 3.16.1.2**). Whether the potential cumulative beneficial impacts outweigh the potential cumulative adverse impacts is unknown. However, as described above, cumulative development may contribute cumulatively to improvements in socioeconomic conditions within the region, which would likely contribute to improvements in the environmental justice communities.

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