

The following section supplements the analysis found in Chapter Three, [Section 3.21 - Heritage and Cultural Resources](#) of the Draft EIS beginning on page 3.433, “Impacts Related to Oil and Gas Management”.

DIRECT AND INDIRECT IMPACTS

Potential impacts from oil and gas leasing and development previously described in the Draft EIS are the same types of impacts that could be expected from the projected GSGP development. However, the potential for impacts could be greater given the projected increase of approximately four-times the amount of wells, roads and acres of disturbance. In general, examples of impacts from oil and gas leasing and potential development could include inadvertently damaged or destroyed sites; vandalized or looted sites; sites undergoing impacts from accelerated erosion; loss of sites due to data recovery; and loss of elements of integrity of such as setting, feeling and association.

It is difficult to measure individual adverse impact components; therefore, the number of acres of ground disturbance is used as a relative comparison of alternatives. Given the size of the GSGP (approximately 354,800 acres) and the diversity of its landscapes (displaying a wide variability of heritage/cultural site densities, ranging from 2.8 sites per square mile to more than 16 sites per square mile) it would be very difficult to make reasonably accurate quantitative assessments of impacts without specific activity locality information. Therefore, a descriptive, qualitative analysis of the impacts is presented at this stage - identification of lands available for lease. Site specific analysis will be completed during future oil and gas exploration and development phases.

Projected development of oil and gas could involve local areas of earth disturbance (including the drilling location itself, well pad and support areas, access roads, pipelines, and additional support facilities, such as meter stations and water handling facilities). Any earth-disturbing activities could destroy or diminish heritage/cultural resources, as well as the setting and context that are part of their importance. Direct physical impacts to heritage/cultural resources related to the potential construction and operation of oil and gas facilities could be immediate and irreversible. Examples could include surface disturbance, soil compaction, erosion, and alteration of a heritage/cultural resource setting and/or landscape (including introduction of atmospheric or audible intrusions); however, most of these impacts would be avoidable through the Section 106 process. It is expected that these impacts could be localized.

Indirect impacts to cultural resource sites are not always as obvious or immediate as direct impacts, and could include impacts that occur off-site from project areas. Indirect impacts could include accelerated erosion due to increased traffic, construction, loss or changes of vegetation, and changes in drainage patterns. Oil and gas development projects could also result in piecemeal or incremental loss or degradation of the various elements of integrity such as setting, feeling, location (which includes visual and auditory elements) that could be integral to the cultural landscape and individual site significance. Potential indirect physical impacts related to oil and gas development to heritage/cultural resources could also include deterioration of structures or rock art from vibration, dust, or exhaust produced by construction or operation. While it is assumed that most oil and gas roads would be closed to public use, there is still the potential indirect impact of increased access. This accessibility could result in the potential for more people to visit sites and, thereby, increase the chance for unintentional deterioration or intentional vandalism.

Every alternative would seek to minimize this loss through inventory and evaluation, monitoring, preservation and stabilization, research, interpretation, education, and improved project implementation. In spite of inventories, the potential exists for undiscovered sites to be exposed and/or damaged by surface disturbance and/or other events. These sites could, or could not, be noticed in time to allow mitigation. This damage would represent an unavoidable adverse impact related to management activities and programs, which could be similar under all of the alternatives.

As described in the Draft EIS, the following are lease stipulations that would apply to management and protection of heritage/cultural resources within the GSGP. The stipulations are required of Alternatives B, C, and D and not all are required of Alternative A due to its emphasis of continuing current leasing direction.

- 1) Anasazi Archaeological District would be designated Administratively Not Available for lease. This area contains very significant archaeological resources and these resource values would be very difficult, if not impossible, to avoid or mitigate. The Anasazi Archaeological District has a very high site density, with 907 sites listed on the National Register of Historic Places (NRHP).
- 2) The following National Register Districts, Proposed National Register Districts, Special Management Areas and sites would be protected with NSO in the identified alternatives:
 - Lost Canyon National Register District - Alternatives B, C and D
 - Mesa Verde Escarpment - All Alternatives
 - Anasazi Areas of Critical Environmental Concern (ACEC) remnant (a.k.a. Mud Springs) - Alternatives B, C and D
 - Indian Henry Cabin - All Alternatives
 - Bull Canyon Rockshelter - Alternatives B, C and D
 - Dolores River Corridor - All Alternatives

In addition to Standards and Guidelines and Additional Referenced Guidance found in the Draft LMP on page 277, standard stipulations and Section 106 of the National Historic Preservation Act of 1966 (NHPA) would apply to all heritage/cultural resources unless they are not available for lease or covered by NSO stipulations.

Due to the high site density within some portions of the GSGP where development is expected, direct negative impacts to cultural resources could be unavoidable, in which case mitigation of impacts would be required. Mitigation measures could include excavation. While excavation is beneficial as it expands the archaeological knowledge base, it also results in the loss of archaeological resources and is considered an adverse effect under the National Historic Preservation Act. Indirect and cumulative impacts related to oil and gas management could be moderate, especially in areas with high site densities.

Section 106 archaeological surveys and excavations associated with oil and gas development have long been a major contributor to knowledge and understanding of heritage/cultural resources. This beneficial impact to archaeology and cultural resource management could continue under all of the alternatives.

Alternative Comparison: There could be some irreversible loss of heritage/cultural resources regardless of the alternative selected and the oil and gas development projected in each alternative. Given that there is only a maximum variation of 76 acres of disturbance between Alternatives A, B, C and D, the expected impacts resulting from these alternatives would not be measurably different. No additional development

would occur on currently unleased lands; therefore, the No Lease Alternative would result in substantially less potential impact to heritage/cultural resources than the other action alternatives.

CUMULATIVE IMPACTS

The cumulative effects boundary for this analysis is the Paradox Basin within the planning area which includes the GSGP, as well as the adjacent area with conventional and gas shale development, in Montezuma, Dolores and San Miguel counties, and includes the potential impacts from projected oil and gas development on leased and unleased federal lands, and private and state leases.

It is not possible to make definitive qualitative statements about the cumulative impacts to cultural resources from oil and gas development without having specific location information. It is possible to make gross projections based on existing site data. If one assumes an average site density of 9.4 cultural resource sites per square mile within the 554 square miles of federal lands within the GSGP, then there could potentially be 5,208 sites on federal lands. If one assumes an average of 1 in 10 sites to be eligible for the National Register of Historic Places, then there could potentially be 520 eligible sites on the federal lands within the GSGP. Since 34% of the federal lands within the GSGP are currently leased we could estimate that there are potentially 177 eligible cultural resources sites which could be impacted by oil and gas development on lands currently held under lease. The remaining estimate of 343 eligible cultural resource sites could potentially be impacted by oil and gas development on the 66% of lands that are currently unleased within the GSGP. While these estimates are based on projections from existing data, the actual numbers may be far different due to numerous variables such as topography, variation in favorable resource conditions/availability over the last 12,000 years, variation in site density, variation in percentage of eligible sites, and variation in site preservation to name a few. As stated above, all oil and gas development would be subject to Section 106 review prior to approval.

Oil and gas development occurring on private lands with private minerals would not be conducted with the above listed protection and mitigation measures. Therefore cumulative impacts to heritage and cultural resources on private lands/private minerals could be major, especially when oil and gas development is focused on private lands/private minerals to avoid the costs/restrictions associated with federal protection and mitigation measures.

Over the long term the combined direct and indirect impacts described above could result in a cumulative net loss or degradation of heritage/cultural resources due to the development of oil and gas. All of the alternatives could result in moderate cumulative impacts especially in areas with high site densities.

Cumulative impacts could also occur to heritage/cultural resources as a result of non-sanctioned activities (including vandalism, looting, or illegal excavation). Efforts to control and monitor these activities would be similar under all of the alternatives, and could; therefore, result in a similar moderate level of cumulative adverse impacts to heritage/cultural resources.