U.S. Department of the Interior
Bureau of Land Management
Fish & Wildlife Service

Northern Corridor – Highway Right-of-Way, Issuance of an Incidental Take Permit Draft Environmental Impact Statement and Draft Resource Management Plan Amendments

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Chapter 1. Purpose and Need for Action

1.1 Introduction

The Utah Department of Transportation (UDOT) applied to the Bureau of Land Management (BLM) for a right-of-way (ROW) grant on September 18, 2018, to construct a multi-lane, divided highway (referred to as the Northern Corridor) across the Red Cliffs National Conservation Area (NCA). The Red Cliffs NCA was designated by Congress through the Omnibus Public Land Management Act of 2009 (OPLMA) (16 USC 460www; Public Law 111-11, Title 1, Subtitle O, Section 1974). The Congressionally defined purpose of the 45,000-acre NCA is to conserve, protect, and enhance for the benefit and enjoyment of present and future generations the ecological, scenic, wildlife, recreational, cultural, historical, natural, educational, and scientific resources of the Red Cliffs NCA and to protect each species that is located in the NCA and listed as a threatened or endangered species under the Endangered Species Act (ESA). Section 1974 states that the NCA shall be managed by the Secretary of the Interior through the BLM and that the Secretary shall only allow uses of the NCA that the Secretary determines would further a purpose for which the NCA was designated.

OPLMA Subtitle O, Section 1977 also directs the Secretary to develop a comprehensive travel management plan for the land managed by the BLM in Washington County and, in accordance with the Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701 *et seq.*), "in developing the travel management plan, the Secretary shall—(A) in consultation with appropriate Federal agencies, State, tribal, and local governmental entities (including Washington County and St. George City, Utah), and the public, identify one or more alternatives for a northern transportation route in the County."

The BLM is considering several alternative northern transportation routes as part of this Draft EIS in response to the UDOT ROW application.[1] The BLM is utilizing the National Environmental Policy Act of 1969 (NEPA) process to, in addition to analyzing the potential impacts of the proposed ROW, evaluate if the ROW application is consistent with the statutory purposes of the Red Cliffs NCA and whether it is necessary to amend the Red Cliffs NCA RMP to accommodate a ROW, or deny UDOT's application. If a ROW is granted and the RMP is also amended, BLM will then be able to fully consider that ROW as a specific northern transportation route (i.e. a Northern Corridor) as part of a future travel management planning process as Congress has instructed in Section 1977 of OPLMA.

Fully evaluating UDOT's ROW application and potential amendments to the Red Cliffs NCA RMP will also further the Department of the Interior's policy goals, as stated in the Strategic Plan for Fiscal Years 2018-2022, to "enhance conservation stewardship whereby all levels of government and private landowners work cooperatively together in an atmosphere of mutual respect to achieve shared natural resource management goals across landscapes" and to "[develop] and [maintain] strong partnerships with State, local, and private stakeholders in shared conservation stewardship." UDOT is seeking to meet the transportation demands of Washington County's anticipated continued growth through 2050 and Washington County is also seeking a renewed Incidental Take Permit (ITP) in order to meet the needs of its increasing population. Washington County's current transportation infrastructure may not accommodate the County's projected growth, and it is trying to balance that future growth with the statutory and regulatory provisions

[1] The term "Northern Corridor" is a general reference to the concept of a corridor between Interstate 15 and Utah State Highway 18, while "northern transportation route" is the specific term of art connecting in Section 1977 of OPLMA. Although the terms "Northern Corridor," "northern transportation route," and ROW are used throughout the DEIS, UDOT's ROW application has not been designated the "Northern Corridor."

governing the Red Cliffs NCA and larger Red Cliffs Desert Reserve, and the protected wildlife that resides on those lands.

The Red Cliffs NCA comprises 73 percent of the land base of a multi-jurisdictional, 62,000-acre reserve known locally as the Red Cliffs Desert Reserve (the Reserve). The Reserve was established in 1996 in connection with the U.S. Fish and Wildlife Service's (USFWS) approval of the County's Habitat Conservation Plan (HCP) for the threatened Mojave desert tortoise. Also in 1996, the USFWS issued an ITP to the County for the take associated with otherwise lawful activities in the County. As a result of the ITP and protective management of the Reserve's land base by the respective land managing agencies, necessary development has been able to occur in tortoise habitat on non-Federal lands in the County.

1.2 Applicants' Objectives

1.2.1 Right-of-way Applicant's Objectives

UDOT submitted a ROW application for construction, operation, and maintenance of a new highway with the objective of reducing congestion, increasing capacity, and improving east-west mobility on arterial and interstate roadways between State Route 18 (SR 18) and Interstate 15 (I-15) at milepost 13. This objective is driven by the current and forecasted population growth within the county, which will continue to increase demand on the transportation network. Currently, the existing transportation network between SR 18 and I-15 is not adequate to meet future (2050) travel demand in the northeastern and northwestern areas of St. George based on traffic projections from the Dixie Metropolitan Planning Organization's (DMPO) regional travel demand model (DMPO 2019).

1.2.2 Incidental Take Permit Applicant's Objectives

Washington County, in coordination with the USFWS, prepared an HCP in 1995 that provided for the conservation of the Upper Virgin River population of the Mojave desert tortoise and supported issuance of an ITP by the USFWS to Washington County in 1996. The ITP issued to Washington County expired in 2016. Prior to its expiration, the County applied to renew the ITP. Pursuant to 50 CFR 13.22, activities authorized by the ITP are continuing while USFWS processes the application. Washington County's objective is to continue its successful partnership with the USFWS and other HCP Partners for a 25-year extended ITP term to authorize take in Washington County and to complete the contemplated conservation actions. The County is restating and amending the HCP to carry forward the conservation measures from the 1995 HCP along with such amendments as addressing the changed circumstance of the Northern Corridor if a route is approved that crosses the Reserve.

1.3 Purpose and Need for Federal Actions

The purpose and need for Federal actions have been developed in accordance with applicable authorizing laws and regulations as detailed in Appendix C.

1.3.1 Right-of-way Application and Red Cliffs National Conservation Area Resource Management Plan Amendment

UDOT has applied for a ROW to construct a multi-lane, divided highway on BLM-administered lands within the Red Cliffs NCA and the overlapping Red Cliffs Desert Reserve with the objective of reducing congestion, increasing capacity, and improving east-west mobility on arterial and interstate roadways between SR 18 and I-15 at milepost 13. In accordance with and taking into account the provisions of OPLMA and Department of Interior policies, the BLM's purpose and need for action is to respond to UDOT's application for a ROW grant under Title V of FLPMA, BLM's ROW

regulations, 43 CFR part 2800, and other applicable Federal laws. In this Draft EIS, the BLM will consider the potential impacts of the proposed ROW (Alternative 3, as described in Chapter 2) and reasonable alternatives. At the conclusion of the NEPA process, the BLM will decide whether to approve, approve with modifications, or deny issuance of a ROW grant to UDOT for the Northern Corridor and whether to approve an amendment to the RMP.

In particular, under OPLMA Subtitle O, Section 1977, the BLM is required to develop a comprehensive travel management plan for the land managed by the BLM in Washington County and, in doing so, to "identify one or more alternatives for a northern transportation route" in the county. In 2016, as part of developing the current Red Cliffs NCA RMP, BLM considered an alternative that included a Northern Corridor in the NCA. However, at that time, BLM did not have a specific ROW application to consider as part of that planning process. Instead, the BLM relied on several conceptual alignments from the Dixie Metropolitan Planning Organization that were based on Washington County's, a cooperating agency in developing that RMP, recommendations. While the BLM eventually selected a different alternative that did not include a corridor, the selected alternative did create an avoidance area that could accommodate a Northern Corridor alignment in the NCA. Under the 2016 RMP, an avoidance area is an area identified through resource management planning to be avoided but that may be available for ROW location with special stipulations.

The BLM has now received a specific ROW application from UDOT. The ROW application is designed to address the growing population and transportation needs in Washington County. However, the application seeks a ROW in the NCA that is larger than the current avoidance area can accommodate and, thus, cannot be granted without also amending the Red Cliffs NCA RMP.

Responding to UDOT's ROW application also furthers the Department of the Interior's policy goals, as stated in the Strategic Plan for Fiscal Years 2018-2022, to "enhance conservation stewardship whereby all levels of government and private landowners work cooperatively together in an atmosphere of mutual respect to achieve shared natural resource management goals across landscapes" and to "[develop] and [maintain] strong partnerships with State, local, and private stakeholders in shared conservation stewardship." UDOT is seeking to meet the transportation demands of Washington County's anticipated continued growth through 2050 and Washington County is also seeking a renewed ITP in order to meet the needs of its increasing population. Washington County's current transportation infrastructure may not accommodate the County's projected growth, and it is trying to balance that future growth with the statutory and regulatory provisions governing the Red Cliffs NCA and larger Red Cliffs Desert Reserve, and the protected wildlife that resides on those lands.

1.3.2 Issuance of Incidental Take Permit and Amended Habitat Conservation Plan

The purpose of the USFWS's Federal action of approving an Amended HCP and issuing an ITP is to authorize take of the Mojave desert tortoise incidental to the covered activities proposed by the County, while ensuring conservation of the species by minimizing and mitigating the impacts from the anticipated take to the maximum extent practicable. Issuance of such a permit will allow the County to proceed with covered activities while complying with the ESA. It also will provide regulatory assurances to the County that the USFWS would not impose additional Mojave desert tortoise conservation measures during the 25-year duration of the permit as long as the County is properly implementing the Amended HCP and the existence of any listed species is not jeopardized. The applicant's Amended HCP must include all elements as required by ESA Section 10(a)(2)(A) and satisfy the issuance criteria for incidental take authorization that are outlined in Section 10(a)(2)(B).

The need for the USFWS's proposed action is to respond to the County's application for an ITP that addresses covered activities that have the potential to result in take of threatened and endangered species, pursuant to ESA Section 10(a)(1)(B) and its implementing regulations and policies. Before making a permit issuance decision, the USFWS must analyze the impacts of implementing the proposed Amended HCP and ITP to the human environment, disclose those analyses to the public, and consider public feedback. The USFWS must conduct intra-USFWS ESA Section 7 consultation to ensure the permit issuance criterion for not jeopardizing the continued existence of federally listed species is met. The USFWS must determine if the HCP satisfies all statutory and regulatory requirements, including ESA Section 10(a)(2)(B) issuance criteria. The USFWS will evaluate whether the amended conservation strategy offsets to the maximum extent practicable the take requested in the Amended HCP.

1.3.3 St. George Field Office Resource Management Plan Amendment

Washington County has submitted an Amended HCP to the USFWS that would expand the Reserve by approximately 6,800 acres to include proposed Reserve Zone 6 (refer to Map 1.1-1). The purpose of the SGFO RMP Amendment is to allow for possible management changes for approximately 3,471 acres in proposed Zone 6 to offset impacts if a ROW is granted within the Red Cliffs NCA and Reserve. The need for this amendment is to allow the BLM to consider measures to support the proposed Washington County HCP and the associated HCP Implementation Agreement.

1.4 Federal Decisions

There are three Federal decisions to be made by the BLM based on the analysis in this Draft EIS:

1) The BLM must decide whether to grant a ROW to UDOT in response to its application.
2) The BLM must decide whether to make amendments to the Red Cliffs NCA RMP.
3) The BLM must decide whether to make amendments to the SGFO RMP.

There is one Federal decision to be made by the USFWS:

1) The USFWS must determine whether the Amended HCP is statutorily complete and otherwise meets regulatory and policy requirements applicable to a permit application before issuing an ITP.

1.5 Issues and Related Resource Topics Identified through Scoping

The BLM and the USFWS have identified issues to be addressed in the Draft EIS through public and internal scoping and through outreach to cooperating agencies and American Indian Tribes. The public scoping period began December 5, 2019, and extended through January 6, 2020. A public scoping meeting was held in St. George on December 17, 2019. A total of 17,258 submissions were received from the public during the scoping period. Comments were documented, reviewed, and organized into issue categories, which were either to be analyzed in detail in the Draft EIS or were beyond the scope of the Draft EIS, and therefore, not analyzed in detail in the Draft EIS.

Many of the public comments received during the scoping period raised issues that were beyond the scope of the development of the Draft EIS. When deciding which issues to address, the agencies considered the following:

- How the issues related to the purpose and need for the actions.
- Whether the issues address points of disagreements, debate, or dispute about an anticipated outcome from a proposed action.

- Whether a detailed analysis of environmental impacts related to the issue is necessary to make a reasoned choice between alternatives.
- Whether environmental impacts associated with the issue are a significant point of contention among the public and other agencies.
- Whether there are potentially significant impacts on resources associated with the issue and can those impacts be mitigated.

1.5.1 Issues Analyzed in Detail in the Environmental Impact Statement

Table 1.5-1 presents the primary issues identified during scoping that are within the scope of the development of the Draft EIS. Additional detail about the scoping process, scoping comments received, and issues identified during scoping is available in the *Northern Corridor – Highway Right-of-Way with Associated Issuance of an Incidental Take Permit and Resource Management Plan Amendments Scoping Report* (Horrocks Engineers 2020a) on the BLM's ePlanning website.

Table 1.5-1. Issues Analyzed in Detail in the Draft EIS

Resource Topic	Issues
Air Quality	How would the proposed Northern Corridor impact the air quality of the community?
Alternatives	Why would the UDOT Application Alignment be chosen for the proposed Northern Corridor? Could Red Hills Parkway be used as an alternative to the proposed Northern Corridor? Could access from Red Hills Parkway to I-15 be provided? Would the BLM consider Conserve Southwest Utah's Community Transportation Alternative? Are alternatives to the proposed Northern Corridor outside of the Red Cliffs NCA available? Would a no action alternative to the proposed Northern Corridor be considered? Could improvements to other roadways in St. George or Washington County be used as an alternative to the proposed Northern Corridor? Could transit improvements be used as an alternative to the proposed Northern Corridor? Could alternative land use development strategies be used as an alternative to the proposed Northern Corridor? Could active transportation improvements be used as an alternative to the proposed Northern Corridor? Could a more northern route (than the UDOT Application Alignment) be used as an alternative to the proposed Northern Corridor? Could the proposed Northern Corridor be elevated to limit impacts to sensitive areas? Would mitigation for the effects of the proposed Northern Corridor be included? Could an alternative route to the proposed Northern Corridor be considered that avoids impacts to Green Springs' residents? Would the proposed Northern Corridor allow utility easements in the same ROW? Would the proposed Northern Corridor result in additional congestion to area roadways? Is the proposed Northern Corridor a viable solution to accomplish the traffic objectives? Would the Northern Corridor alleviate existing and future congestion caused by increased population?
Cultural Resources and Native American Concerns	How would cultural and historic resources be preserved?

Resource Topic	Issues
Fire and Fuels Management	Would the proposed Northern Corridor introduce invasive plant species resulting in an increased risk of fire?
Geology, Mineral Resources, and Soils	How would the proposed Northern Corridor affect soil, rock formations, and biological soil crusts?
Human Health and Safety	Would the proposed Northern Corridor affect the health of those who use the Red Cliffs NCA?
Land Use and Access	How would the Northern Corridor affect existing land uses and/or users and access? Would impacts be temporary or long-term?
Noise	Would noise from the proposed Northern Corridor have an effect on the surrounding residents and wildlife?
Paleontological	How would the proposed Northern Corridor impact paleontological resources?
Proposed Zone 6	Could the proposed Zone 6 successfully mitigate for impacts to the Mojave desert tortoise? How would the management of the proposed Zone 6 impact existing recreation use?
Recreation Resources	How would the proposed Northern Corridor impact existing recreational opportunities?
Red Cliffs National Conservation Area and the Red Cliffs Desert Reserve	Would the Red Cliffs NCA be harmed by the proposed Northern Corridor? Would the entire Red Bluff Area of Critical Environmental Concern (ACEC) be used as the new reserve?
Socioeconomics	How would the proposed Northern Corridor impact the local economy of Washington County? How would the proposed Northern Corridor impact homes in the area? How would the proposed Northern Corridor impact local businesses?
Vegetative Communities, including Noxious Weeds	How would the proposed Northern Corridor impact plants and ecology of the Red Cliffs NCA and Reserve? Would the proposed Northern Corridor result in an increase in invasive plant species?
Visual Resources	How would visual resources be maintained and protected? Would there be increased light impacts from the proposed Northern Corridor?
Wildlife	How would the proposed Northern Corridor impact the Mojave desert tortoise? Would proposed mitigation measures allow for tortoise to cross the new road? How would the proposed Northern Corridor impact all wildlife in the area? What is the impact to the Mojave desert tortoise if the HCP is amended for the proposed Northern Corridor? Would impacts to the Mojave desert tortoise be mitigated?
Water Resources	How would the Northern Corridor affect water resources and water quality, including groundwater?

1.5.2 Issues Considered but Not Analyzed in Detail

The BLM and the USFWS are only required to analyze issues that relate to how the alternatives respond to the purpose and need or when associated with significant impacts. As part of the planning process for the ROW and Red Cliffs NCA, the BLM and the USFWS identified several issues that do not meet these criteria. These resource topics and issues considered but dismissed from detailed analysis in this Draft EIS are listed in Table 1.5-2, along with the rationale for dismissal.

Table 1.5-2. Issues Dismissed from Detailed Analysis

Resource Topic	Rationale for Dismissal from Detailed Analysis
Planning Processes and Regulations	The issue or concern is whether the BLM and the USFWS are following Federal laws and allowing for adequate public comment. The Draft EIS and associated public involvement process are being conducted in accordance with NEPA requirements, as required by the BLM and the USFWS and other applicable laws and regulations as detailed in Appendix C.
Alternatives	The issue or concern is whether a cost-benefit analysis will be performed for the alternatives. A cost-benefit analysis is not necessary to make a reasoned choice between alternatives since there are important qualitative considerations that are described in the Draft EIS.
Washington Parkway	The issue or concern is whether the Northern Corridor has been improperly segmented from the previously approved extension of the Washington Parkway. The Washington Parkway project from North Green Spring Drive to I-15 is an action taken by UDOT and the laws under which such actions were taken are described in the Categorical Exclusion for the project (UDOT 2019a) approved on August 26, 2019, and other documents in the UDOT project records (*Federal Register* 2019). The previously approved Washington Parkway has independent utility from the proposed Northern Corridor and is addressed under cumulative impacts as a separate reasonably foreseeable future action.
Decision to Allow the Northern Corridor	The issue or concern is that the decision to approve the Northern Corridor has already been made by the BLM. The Draft EIS will evaluate multiple alternatives for the Northern Corridor. The BLM will decide whether to issue a ROW grant to UDOT for the proposed Northern Corridor based on the analysis in the Draft EIS.

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Chapter 2. Proposed Action and Alternatives

This chapter describes the alternatives that were considered for the four Federal actions described in Chapter 1. Section 2.6 presents combined alternatives for analysis in this Draft EIS that integrate the four interrelated and interdependent Federal actions. All alternatives analyzed in detail must meet the applicable Federal agency's purpose and need for action and be consistent with Federal laws and applicable agency policies including FLPMA, OPLMA, the National Historic Preservation Act (NHPA), and the ESA. The agencies' final decision on which alternatives to analyze in the Draft EIS is made by the Authorized Officer (BLM)/Deciding Official (USFWS).

In addition to describing the alternatives, this chapter presents information regarding the proposed Northern Corridor, the BLM's processing of UDOT's ROW application, and the Washington County HCP.

This Draft EIS includes both land use planning and implementation-level decisions as defined in BLM Handbook H-1601-1, *Land Use Planning Handbook* (BLM 2005). Following completion of the Final EIS and proposed Red Cliffs NCA RMP and SGFO RMP amendments, pursuant to the BLM's planning regulations (43 CFR 1610.5-2), any person who participated in the planning process and has an interest that is or may be adversely affected by the planning decisions may protest their approval. Unlike land use planning decisions, implementation decisions are not subject to protest under BLM planning regulations, but typically are subject to an administrative review process through the Interior Board of Land Appeals.

2.1 Alternative Development

For each Federal action, the agencies' alternative development process considered the following:

- Issues and alternatives raised during public scoping.
- Consultation and coordination with cooperating agencies.
- Review of issues raised by agency resource specialists.

This process is consistent with NEPA Section 102(2)(A) and the Council on Environmental Quality implementing regulations at 40 CFR 1507.2, which directs the agencies to use "a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on the human environment."

The Federal actions associated with the Northern Corridor, Red Cliffs NCA RMP Amendment, SGFO RMP Amendment, and Washington County HCP and ITP, as described in Chapter 1, are interrelated, and some of the actions are interdependent. A reasonable range of alternatives was developed for each of the four proposed actions, as described in Sections 2.2 through 2.5. The interrelated alternatives for each action were then combined into collective alternatives for the purposes of analysis in this Draft EIS, as described in Section 2.6.

Public and agency input received during the scoping process was considered in the development of the alternatives. The public scoping process is described in more detail in the *Northern Corridor – Highway Right-of-Way, Issuance of an Incidental Take Permit and Resource Management Plan Amendments Scoping Report* (Horrocks Engineers 2020a), available on the project website at https://go.usa.gov/xw8TX. Input consisted of questions and concerns from the public that resulted in additional alternatives and modifications to existing alternatives. The project team used all comments regarding alternatives to evaluate and refine the range of alternatives.

Conceptual alternatives were presented at a cooperating agency meeting held in St. George on January 28, 2020. The project team sought input from cooperating agencies during the alternative development and screening process and provided updates to these agencies based on additional refinement of the conceptual alternatives. Chapter 4 provides additional detail on consultation and coordination related to this planning process.

2.2 Northern Corridor Highway

This section describes the six alternatives considered in detail for the Northern Corridor (including the No Action Alternative). The alternatives are shown on Map 2.2-1 (Appendix B) and described in additional detail in the Northern Corridor Highway Alternatives Development Technical Report (Appendix J; Jacobs 2020b). The range of Northern Corridor action alternatives is in accordance with the Council on Environmental Quality regulations implementing NEPA at 40 CFR 1500 and with the BLM NEPA Handbook (Handbook H-1790-1; BLM 2008). The BLM has analyzed in detail alternatives that are within the BLM's decision-making jurisdiction as well as an alternative that is outside the BLM's decision-making jurisdiction and could be completed without BLM action. These alternatives represent different potential approaches to resolving conflicts concerning alternative uses of available resources.

For the alternatives that would include a new highway across BLM-administered public lands, the BLM's action would be the issuance of a ROW grant to UDOT for the construction, operation, and maintenance of the Northern Corridor across BLM-administered lands. The ROW grant to UDOT would be issued subject to terms and conditions determined to be appropriate by the BLM in coordination with the USFWS. This issuance of the ROW grant by the BLM would allow for UDOT to construct the Northern Corridor across BLM-administered lands, as further described in Sections 2.2.2 through 2.2.4. It is assumed the ROW grant would be issued for a 30-year term and eligible for renewal at that point.

The five Northern Corridor action alternatives were developed through collaborative discussions with traffic engineers, environmental resource leads, agency stakeholders, and the public. For comparison purposes, all alternatives assume that all other planned transportation improvements included in approved regional and local plans would be completed by 2050. These include all improvements, regardless of transportation mode, in the DMPO's 2019–2050 Regional Transportation Plan, the UDOT Long Range Plan, and the master transportation plans of the municipalities in and around the study area. The No Action Alternative and the five Northern Corridor alternatives are described in Sections 2.2.1 through 2.2.6.

Three action alternatives (T-Bone Mesa Alignment, UDOT Application Alignment, and Southern Alignment) pass within the NCA, while the Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet alternatives lie predominantly or entirely outside the NCA. The three alternatives within the NCA would be a multi-lane, divided highway with the following common features, as described in the Plan of Development (POD).

- Up to 500-foot-wide ROW. The total width of the ROW would vary between 300 and 500 feet because of variations in the cut and fill slopes and construction requirements along the length of the proposed highway. These variations would be based on geotechnical analysis, terrain type (for example, rock or dirt), and further design to minimize impacts. The 500-foot study corridor width was selected to accommodate those areas requiring cut and fill slopes that would extend beyond the standard 300-foot typical section, which was based on the conceptual engineering design using readily available topographical and design-related information.
- 4-lane highway with two 12-foot-wide travel lanes in each direction, 8-foot shoulders, and a 20-foot center median.

- A combination of curb and gutter, drainage swales, and ditches.
- 10- to 14-foot-wide multi-use, paved trail accommodating bicyclists and pedestrians on both sides of the proposed highway.
- Associated signage and fencing (refer to Section 2.2.9 and Appendix D).
- Posted speed limit of 50 miles per hour.
- A new intersection for connection to Red Hills Parkway, consisting initially of an at-grade intersection with traffic signals and lighting. The intersection would later be converted to a grade-separated interchange with bridges, ramps, and lighting similar to a freeway interchange. The conversion to the interchange would occur by 2050, based on traffic levels and available funding. This ultimate interchange condition is considered for the impact analysis in Chapter 3.
- A new at-grade intersection with traffic signals at Cottonwood Springs Road (also known as Old Dump Road or Turkey Farm Road); this connection would fit within the 500-foot ROW.

The highway may be constructed in two phases. Though specific details of the phased construction would be determined by the applicant during the final design of the highway, the first construction phase would result in one lane in each direction, likely with the center median. The second phase would provide an additional lane in each direction and conversion of the intersection with Red Hills Parkway to an interchange at a later date. The Northern Corridor alternatives vary in location within the NCA and in their tie-in locations with Red Hills Parkway and it is assumed that the BLM would make any necessary ROW amendments to the City of St. George's existing FLPMA Title V ROW for the Red Hills Parkway. Sections 2.2.2 through 2.2.4 focus on describing the variations among these alternatives.

2.2.1 Northern Corridor: No Action Alternative

Under the No Action Alternative, the BLM would deny UDOT's application for a ROW grant across public lands in the Red Cliffs NCA for the Northern Corridor. The alternative reflects all the roadway and transit improvements from the applicable local, regional, and statewide transportation plans that would be completed by 2050, absent the Northern Corridor. It provides a baseline against which the other Northern Corridor alternatives will be compared based on traffic performance.

2.2.2 Northern Corridor: T-Bone Mesa Alignment

The BLM would issue a ROW grant to UDOT across public lands in the Red Cliffs NCA for the Northern Corridor on the T-Bone Mesa Alignment (Map 2.2-1). This alignment would connect Green Spring Drive on the east to Red Hills Parkway on the west just north of the Pioneer Hills trailhead parking area. Under this alternative, the Northern Corridor would skirt the southern edge of T-Bone Mesa. The Northern Corridor would be approximately 4 miles long, approximately 2.2 miles of which would be across BLM-administered lands.

2.2.3 Northern Corridor: UDOT Application Alignment

The BLM would issue a ROW grant to UDOT across public lands in the Red Cliffs NCA for the Northern Corridor for the alignment included in UDOT's ROW application (Map 2.2-1). This alignment would connect Green Spring Drive on the east to Red Hills Parkway on the west just north of the Pioneer Hills trailhead parking area. Under this alternative, the Northern Corridor would be approximately 4.3 miles long, approximately 1.9 miles of which would be across BLM-administered lands.

2.2.4 Northern Corridor: Southern Alignment

The BLM would issue a ROW grant to UDOT across public lands in the Red Cliffs NCA for the Northern Corridor on the Southern Alignment (Map 2.2-1). Under this alternative, the Northern Corridor would nearly skirt the southern border of the NCA, connecting Green Spring Drive on the east to Red Hills Parkway on the west just south of, and slightly encroaching onto, the Pioneer Hills trailhead parking area. The Northern Corridor would be approximately 5.3 miles long, approximately 1.5 miles of which would be across BLM-administered lands.

2.2.5 Red Hills Parkway Expressway

The Red Hills Parkway Expressway Alternative proposes changes to Red Hills Parkway instead of a new road across BLM-administered lands within the NCA (Map 2.2-1). This alternative assumes that the BLM would not issue UDOT a ROW grant across the Red Cliffs NCA for the Northern Corridor. Rather, the BLM would need to grant necessary ROW amendments to the City of St. George's existing FLPMA Title V ROW for the Red Hills Parkway. This alternative would convert Red Hills Parkway into a grade-separated expressway between I-15 and Bluff Street. Improvements would include new east-to-north and south-to-west connections to I-15 to connect Red Hills Parkway directly to I-15, including an additional lane in each direction extending most of the length between 200 East and 900 East. The alternative would also convert the existing at-grade signalized intersections at 200 East (Skyline Drive) and 1000 East to grade-separated interchanges with necessary modifications to the mainline roadway to accommodate the new interchanges. New flyover ramps would be constructed to connect Red Hills Parkway to I-15.

The intersections at 900 East and Industrial Road would be closed or converted to right-in-right-out movements only because of their proximity to the 1000 East interchange and the I-15 flyover ramps. The intersection at Highland Drive would be closed. Existing driveways along the existing roadway to public and private properties would either be closed or converted to right-in-right-out movements only; all left turns in and out would be prohibited.

Additional widening of Red Hills Parkway at various locations between 200 East and 900 East would be required to add exclusive turning lanes for access to individual properties or public use areas where feasible. Section 3.26 details these areas requiring widening and lists the partial and full acquisitions and changes in access that would be required to accommodate the widening. Fencing with tortoise mesh exists along the entire length of the Red Hills Parkway; Section 3.5 describes any areas for the roadway widening that would fall outside the tortoise fencing. The existing pedestrian trail along Red Hills Parkway would be relocated in various locations between 200 East and 900 East to accommodate improvements, including lengthening of the existing pedestrian tunnel under Red Hills Parkway in the Pioneer Park area. The speed limit for the expressway would be 45 to 50 miles per hour.

2.2.6 St. George Boulevard/100 South One-way Couplet

The One-way Couplet Alternative proposes changes to existing St. George Boulevard and 100 South instead of a new road across BLM-administered lands within the NCA (Map 2.2-1). This alternative assumes that the BLM would not issue UDOT a ROW grant across the Red Cliffs NCA for the Northern Corridor. Rather, the alternative would include modifications to St. George Boulevard and 100 South to respond to future transportation demands in Washington County. The two roadways would be converted into a one-way couplet system between I-15 and Bluff Street, wherein St. George Boulevard would only accommodate westbound traffic and 100 South would only accommodate eastbound traffic. St. George Boulevard would be converted from its existing two lanes in each direction (with a raised center median and turn pockets) to three westbound lanes. Modifications to the cross streets between I-15 and Bluff Street would disallow eastbound

left and right turns from the cross streets. Similarly, 100 South would be converted from its existing one lane in each direction (with a center-turn lane), to three eastbound lanes. Modifications to the intersections at cross streets between I-15 and Bluff Street would disallow westbound left and right turns from the cross streets. There may also be other minor reconstructions to storm drain and utility systems that would be required to safely convert these streets to one-way operations.

On St. George Boulevard, the raised and landscaped medians and irrigation systems would be removed and the median lighting would be replaced or relocated to the sides of the road. In addition, the Diverging Diamond Interchange at I-15/St. George Boulevard would be reconfigured to a more conventional diamond intersection configuration. On 100 South, the center two-way-left-turn median and shoulders would be reconfigured.

In addition, the existing interchange with I-15 at St. George Boulevard would be reconfigured and combined with a new interchange at 100 South to provide a split interchange system between these two roadways connected by one-way ramps. Southbound interstate traffic would exit at St. George Boulevard and enter from 100 South. Similarly, northbound interstate traffic would exit at 100 South and enter from St. George Boulevard. Speed limits would be 35 miles per hour along St. George Boulevard and 30 to 35 miles per hour along 100 South, depending on location.

2.2.7 Plan of Development

As required by the BLM's ROW processing regulations at 43 CFR part 2800, UDOT submitted a preliminary POD to the BLM along with the agency's application for a ROW. The POD includes information about the design, construction, and maintenance of the project, including construction procedures, environmental requirements, project design criteria, and measures that would be implemented by UDOT to reduce the environmental effects of the project. The POD will be refined through the NEPA and project design process as additional information and project detail becomes available. The POD is available on the BLM's ePlanning website.

The BLM requires that the POD be developed to support the NEPA process, contain sufficient information to inform the environmental analyses (e.g., conceptual project design and the determination of cut and fill limits to define the overall project footprint), support BLM decision-making, and apply site-specific measures to reduce environmental impacts.

If the BLM selects a Northern Corridor alternative that crosses the Red Cliffs NCA, the BLM will require the preparation of a Final POD for this alternative before the issuance of a Notice to Proceed (NTP) with construction. The NTP would be phased to match the phasing and nature of construction; a partial NTP could be issued. Additional NTPs would need to be issued to address any additional terms and conditions that would reflect the management prescriptions that are current at that time. The Final POD would be informed by pedestrian resource surveys and would identify the site-specific ROW needs and disturbance areas, include maps of all proposed facilities, site-specific construction actions, temporary work areas, and any other facilities required for the project. The Final POD would also identify the site-specific application of design features and mitigation measures identified in the Record of Decision (ROD). Design features and mitigation measures would be informed by surveys completed to support the NEPA analysis and compliance with other environmental laws and regulations.

2.2.8 Construction and Phasing

Based on funding and/or traffic demand, construction of the T-Bone Mesa Alignment, UDOT Application Alignment, or Southern Alignment may be phased by building one lane in each direction, with subsequent phases adding another lane, accompanying trails, and connections with

Cottonwood Springs Road and Red Hills Parkway. A forward-compatible approach will allow these additional phases to be constructed without requiring tearing out previous phases (e.g., installing drainage pipes sized to handle runoff for the full design in the first phase instead of incrementally increasing to match each phase of construction). Construction of the project would be completed using established highway construction practices, standards, and specifications with special provisions added based on agency direction. This delayed phasing would require additional coordination with the agencies to confirm the final design for each phase conforms to the stipulations, conditions, and supporting analysis for the decision issued by the BLM.

After construction, the project area would be stabilized using erosion and sediment control measures, have topsoil placed over fill material, and be seeded with a BLM-approved seed mixture to establish vegetation. The long-term operation and maintenance of the project will be managed by UDOT, including regular inspections that all equipment, structures, and best management practices are in good working order. For more information regarding the design, construction, and operation and maintenance of the project, please refer to the POD on the BLM's ePlanning website.

2.2.9 Avoidance, Minimization, and Mitigation Measures

If a ROW is issued, the BLM would require the application of avoidance, minimization, and mitigation measures to reduce the environmental impacts of the project, meet resource management goals and objectives outlined in OPLMA and the Red Cliffs NCA RMP. Two types of measures would be applied. The first type are measures the applicant would implement as standard practice of construction, operation, or maintenance. Referred to as design features of the proposed action for environmental protection, these environmental design features include measures that were included in the POD submitted with the UDOT's ROW application as well as best management practices outlined in the Red Cliffs NCA RMP. The other type comprises measures that the BLM would apply to the ROW grant as terms and conditions or items that must be completed before the BLM would issue a NTP with construction. These measures are referred to as mitigation measures and terms and conditions.

2.2.9.1 Design Features of the Proposed Action

Appendix D contains a list of the design features of the proposed action for environmental protection that were included in the POD submitted by UDOT with the agency's application for a ROW, as well as applicable best management practices identified in the Red Cliffs NCA RMP. For each design feature, Table D-1 in Appendix D indicates the phase of the project to which the design feature would apply and the applicable environmental resource. These environmental design features are applied to all lands, regardless of jurisdiction or ownership, where appropriate.

2.2.9.2 Mitigation Measures and Terms and Conditions

The BLM is using the analysis contained in the Draft EIS to evaluate the potential need for additional mitigation measures, terms and conditions, or NTP requirements, should an alternative crossing BLM-administered lands be selected for the Northern Corridor. These mitigation measures, terms and conditions, and NTP requirements would be in response to potential environmental impacts identified in the analysis contained in this Draft EIS or to address standard BLM practice for ROWs and would be in addition to the applicant committed design features of the proposed action.

The mitigation measures, terms and conditions, and NTP requirements listed here would be implemented for the Northern Corridor on BLM-administered lands. The BLM will evaluate the potential need for additional mitigation measures, terms and conditions, and NTP requirements

through the EIS process. All required mitigation measures and terms and conditions would be identified in the BLM ROD and would become an enforceable condition of the ROW grant, should a route crossing BLM-administered lands be selected.

- Completion of Final POD: The BLM would place a NTP requirement on any ROW grant issued that would require the completion of a Final POD prior to the initiation of construction (refer to Section 2.2.7).
- Mojave desert tortoise fencing and shade structures: The BLM would require the installation and maintenance of Mojave desert tortoise exclusion fencing and shade structures along the approved ROW to preclude Mojave desert tortoise from entering the construction area or completed highway and to provide thermal cover for desert tortoise that encounter the exclusion fencing. Attachment 1 in Appendix D provides additional guidance on this measure.
- Mojave desert tortoise passages: The BLM would require passageways under the highway that could be used by Mojave desert tortoise where exclusion fencing has been placed along the highway. Passageways spacing and design would follow USFWS Passage Spacing Guidance (maximum spacing 508 meters [approximately 1,667 feet] apart) as interpreted with best practices and new science. Attachment 2 in Appendix D provides additional guidance on this measure.

2.3 Red Cliffs National Conservation Area Resource Management Plan Amendments

An amendment to the Red Cliffs NCA RMP would be necessary for any of the Northern Corridor action alternatives that would cross areas identified as avoidance areas for new ROWs in the 2016 Red Cliffs NCA RMP (BLM 2016). As described in Section 2.6, the BLM has developed two action alternatives for the Red Cliffs NCA RMP Amendment that could be applied to Northern Corridor alternatives that are located within the avoidance areas established in the 2016 Red Cliffs NCA RMP. Either of the action alternatives could be selected by the BLM in association with a Northern Corridor ROW alternative that crosses the existing avoidance areas in the Red Cliffs NCA. The No Action Alternative represents current management of the Red Cliffs NCA and could be applied to the No Action Alternative for the Northern Corridor or Northern Corridor alternatives located outside the Red Cliffs NCA.

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Table 2.3-1. Red Cliffs National Conservation Area Resource Management Plan Amendments, Alternatives Considered in Detail

Red Cliffs NCA RMP Amendment Alternative A: (Current Management – No Action)	Red Cliffs NCA RMP Amendment Alternative B	Red Cliffs NCA RMP Amendment Alternative C
LAR-13: Designate ROW Avoidance and Exclusion areas and retain an existing ROW corridor as follows: Exclusion areas: (areas that are not available for location of ROWs under any conditions, including all designated wilderness within the NCA): 38,472 acres Avoidance areas: 6,367 acres; while considering a new proposed ROW application, the BLM will: a) Consider options for routing or siting the ROW outside of the NCA. b) Ensure consistency of the ROW with the established purpose of the NCA, as identified in OPLMA. c) Ensure that new ROWs share, parallel, or adjoin existing ROWs. d) Apply special stipulations and mitigation measures within avoidance areas consistent with BLM Visual Resource Management (VRM) objectives and the purpose of the NCA. e) Authorize new ROWs only when the project-specific NEPA analysis indicates that the construction and operation of the facility would not result in the take of Federally listed species; the adverse modification of designated critical habitats; or adverse effects to National Register of Historic Places (NRHP)-listed or eligible properties, and the following criteria are met: 1. Construction could be accomplished through methods that minimize new surface disturbances and resource impacts. 2. New ROW access roads would not be required for construction, operation, and maintenance. 3. Existing ROW access roads would not be permanently widened or upgraded for construction, operation, and maintenance; temporary enlargements or modifications to existing access routes needed during construction would be rehabilitated immediately after construction is complete. 4. Construction, operations, and maintenance would not require off-road travel by motorized vehicles. Designated ROW Corridor: 20 acres Retain the existing corridor along SR-18 through the NCA (150 feet either side of centerline of highway) to minimize adverse environmental impacts and the proliferation of separate rights-of-way.	Same as Alternative A, except allow for a one-time exception to LAR-13 Criteria E for the issuance of a Title V ROW for the Northern Corridor project.	Same as Alternative A, except designate a new ROW corridor as follows: Up to 500-foot corridor located along the selected route for the Northern Corridor (Map 2.3-1). Manage the new corridor as follows: Open to aboveground and buried utilities. Ensure that new ROWs share, parallel, or adjoin existing ROWs to the extent feasible. Apply mitigation measures as a condition of approval to ensure that authorized ROWs are consistent with the visual, cultural, threatened and endangered species, and other management objectives and the purpose of the NCA.
VRM-7: Manage the NCA as follows (Map 2.3-2, refer to Section 3.13 of the Draft EIS for BLM VRM class descriptions): VRM Class I: 19,989 acres VRM Class II: 18,525 acres VRM Class III: 6,160 acres VRM Class IV: 183 acres	Same as Alternative A, except manage the ROW for the Northern Corridor as VRM Class IV (Map 2.3-3).	Same as Alternative A, except manage the ROW corridor around the selected route for the Northern Corridor as VRM Class IV (Map 2.3-3).
REC-4: Red Cliffs NCA Special Recreation Management Area (SRMA), Recreation and Visitor Services Objectives: Foster a sense of awareness and stewardship in recreational participants and local community partners to maintain recreation values in the NCA. Provide opportunities for public land users to develop an understanding and appreciation of the NCA through on- and off-site educational and interpretive materials. Develop a nationally recognized, non-motorized trail system that provides high-quality opportunities for a wide range of recreational activities. Develop trailheads and waysides that share a signature design emblematic of the NCA. Establish four Recreation Management Zones (RMZs) within the Red Cliffs SRMA as management tools to assist in setting priorities for facilities development, maintenance, and law enforcement. Each zone would have consistent management objectives across alternatives but would vary in size. See Table 4 [BLM 2016b] for information about each zone and Appendix G of the Red Cliffs NCA ROD and Approved RMP for detailed RMZ descriptions and objectives. REC-5: Manage the RMZs as follows (Map 2.3-4): Rural Zone: 1,224 acres Frontcountry Zone: 14,937 acres Backcountry Zone: 8,709 acres Primitive Zone: 19,989 acres	Same as Alternative A, except manage a 600-foot-wide area around the selected route for the Northern Corridor as part of the Rural Zone (Map 2.3-5).	Same as Alternative B.

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2.4 Washington County Habitat Conservation Plan and Incidental Take Permit

A proposed action being evaluated by this Draft EIS is the issuance of an ITP by the USFWS that would authorize take of the Mojave desert tortoise, incidental to Covered Activities (e.g., residential and commercial activities) in Washington County, Utah, and implementation of the HCP, in accordance with the statutory and regulatory requirements of the ESA. The USFWS will be reviewing the Draft Amended HCP and whether to issue an ITP is determined by whether permit issuance criteria contained in Section 10(a)(2)(B) of the ESA are met. If the following criteria are met and the HCP and supporting information are statutorily complete, the permit must be issued:

1) The taking will be incidental.
2) The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
3) The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided.
4) The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.
5) The applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided.
6) The USFWS has received such other assurances as may be required that the HCP will be implemented.

In reviewing whether the HCP submitted by Washington County meets the permit issuance criteria, the USFWS will evaluate the Draft Amended HCP and consider the best available information before making a determination to issue an ITP.

The Draft Amended HCP includes the potential ROW for the Northern Corridor as a changed circumstance. The changed circumstance provisions are triggered if the BLM approves a ROW for the Northern Corridor across Reserve Zone 3. If a new ROW through the Reserve is not approved, the changed circumstance provision is not triggered.

In accordance with 40 CFR 1502.14, the USFWS considered alternatives for the issuance of an ITP to Washington County based on Washington County's Amended HCP (refer to Section 2.7). The ability for the USFWS to exercise discretion over an ESA permit applicant's non-Federal activities is limited to ensuring the non-Federal entity's permit application meets the statutory and regulatory criteria in ESA Section 10(a)(2)(B) and 50 CFR 17.22 (b)(l) and 17.32(b)(l). This means that the ability of the USFWS to exercise control and responsibility over an applicant's non-Federal activities under the ESA is limited to what is "necessary or appropriate for purposes of the plan" (50 CFR 17.22 (b)(1)(iii)(D)). This interpretation is consistent with the basic tenet that the USFWS does not authorize the applicant's activities causing the incidental take, but rather the take resulting from the applicant's activities. The USFWS will evaluate the Federal action via its ESA authority to determine whether an application complies with ESA.

2.4.1 Habitat Conservation Plan and Incidental Take Permit No Action Alternative

Under this alternative, the USFWS would not reissue an ITP to Washington County authorizing the take of Mojave desert tortoise subject to the conservation measures in the Amended HCP, and the ITP issued based on the 1995 HCP would expire. Washington County would not implement the Amended HCP, would cease implementing the 1995 HCP, and would not be authorized for any take of the Mojave desert tortoise. Washington County would not provide future funding for Mojave desert tortoise conservation including facilitating land acquisitions within the Reserve, monitoring, tortoise relocations, fence maintenance, law enforcement, outreach, recreation management, or

other tortoise conservation actions. The Washington County staff positions created to support HCP implementation would be terminated, and the Habitat Conservation Advisory Committee and Technical Committee would be dissolved. Management decisions and activities on lands within the Reserve would remain under the jurisdiction and responsibility of the respective landowner, but regular coordination and collaborative adaptive management would no longer be supported by Washington County. Lands not yet acquired for the Reserve would cease to be managed for the benefit of the Mojave desert tortoise.

Under the No Action Alternative, otherwise lawful, non-Federal land uses and activities in Washington County would be anticipated to continue in a similar manner to how they would under the action alternatives. However, incidental take of the Mojave desert tortoise arising from otherwise lawful, non-Federal activities would not be authorized under the Amended HCP and ITP. Project proponents performing non-Federal land use or land development activities would have the responsibility to comply with the ESA on a project-by-project basis or through a separate programmatic approach. Prior to initiating a non-Federal activity, each non-Federal project proponent would have the responsibility to review its own activities to determine if the activity is reasonably certain to result in the incidental take of a listed species. If incidental take is likely, the project proponent could either modify the activity to avoid the reasonable certainty of take or seek authorization for such take from the USFWS. Given the distribution and density of Mojave desert tortoise within the Plan Area proposed in the Amended HCP, it is anticipated that many project proponents would be able to avoid the reasonable certainty of take through environmental due diligence (e.g., performing pre-activity surveys and installing best management practices to preclude Mojave desert tortoise from entering project areas). Project-specific permitting increases the processing time and staffing burden on both project proponents and the USFWS. Given the uncertainty associated with processing times for HCPs, project proponents may be at risk for project delays, and some proponents may cancel project plans. Some unacquired SITLA and private lands within the Reserve would likely be removed from their current protected status and developed, though these developments would be required to comply with the ESA.

2.4.2 Habitat Conservation Plan and Incidental Take Permit Action Alternative – Issue Incidental Take Permit subject to Mojave Desert Tortoise Conservation Measures in Amended HCP

Under the HCP and ITP action alternatives, the USFWS would issue Washington County an ITP authorizing incidental take of the Mojave desert tortoise-occupied or potential Mojave desert tortoise habitat as a result of otherwise lawful land use and development activities over a 25-year term. The ITP would be issued based on Washington County's Amended HCP and Implementation Agreement. The full Amended HCP and Implementation Agreement submitted by Washington County to support the County's application for ITP renewal is available on the USFWS and BLM websites. The following sections summarize the primary components of the Amended HCP that are analyzed in this Draft EIS.

Upon issuance of the ITP, Washington County would begin implementing the Amended HCP and would cease implementing the 1995 HCP.

2.4.2.1 Washington County Amended HCP Administration

The County would be the ITP permittee and would be responsible for administering the Amended HCP and complying with the terms and conditions of the ITP. The actions of the County are made through the deliberations and actions of the respective County legislative and executive bodies. The Washington County Commission provides final approval for all actions taken on behalf of the County pertaining to the Amended HCP.

Municipalities within Washington County contribute to the Amended HCP through Interlocal Agreements with the County (the Municipal Partners). The Municipal Partners collect fees from land developers and builders necessary for the implementation of the Amended HCP. As of 2020, all municipalities with jurisdiction in the Permit Area, except for the Town of Leeds, are Municipal Partners. Other entities performing activities not under the direct regulatory control of the County or a Municipal Partner may enter into a Participation Agreement with the County to participate in the Amended HCP in return for paying any necessary fees and implementing any other necessary conservation actions as prescribed in the Amended HCP.

The County uses the fees collected to fund and carry out the commitments in the Amended HCP. The County would have primary responsibility for administering the HCP, surveying for and removing Mojave desert tortoise from certain lands subject to Covered Activities, and providing financial support to the BLM and UDNR toward acquisition, management, and monitoring actions within the Reserve. To fulfil these functions, the County would continue to provide for an HCP Administrator and HCP Biologist staff positions necessary to support the administration of the Amended HCP.

2.4.2.2 Habitat Conservation Plan Area and Incidental Take Permit Area

As defined in the Amended HCP, the Plan Area is the geographic area where the Covered Activities and conservation measures performed in accordance with the Amended HCP would occur. The Plan Area for the Amended HCP is the entirety of Washington County, Utah. The Permit Area for the ITP is limited to that portion of the Plan Area that occurs outside of the Mojave desert tortoise Northeastern Mojave Recovery Unit. The Permit Area contains approximately 1,372,742 acres, or 88 percent, of Washington County, generally located to the east of the Beaver Dam Mountains (Map 2.4-1). The Plan Area and Permit Area proposed in the Amended HCP are nearly identical to those in the 1995 HCP, though the amount of desert tortoise habitat on non-Federal lands in the Permit Area in 2020 (approximately 66,301 acres) is more than what was known in 1995.

The distribution of resources within the Plan Area and the Permit Area, and the nature and location of the environmental effects anticipated from the Federal actions analyzed in the Draft EIS, were used by the BLM and the USFWS to define analysis areas for each resource, which are described in Chapter 3.

2.4.2.3 Amount of Take Requested

The Amended HCP submitted by the County requests incidental take of the Mojave desert tortoise associated with the Covered Activities in an amount equivalent to the direct loss of up to 14,466 acres of occupied Mojave desert tortoise habitat and 51,835 acres of potential Mojave desert tortoise habitat within the Permit Area. These combined 66,301 acres represent the extent of Mojave desert tortoise habitat occurring within the Permit Area, outside of the Reserve boundary, on lands that are not under Federal or Tribal management at the time the Amended HCP was prepared.

Within the Reserve, the amount of Mojave desert tortoise habitat within the Reserve that may be permanently lost to Covered Activities will not exceed 200 acres over the duration of the ITP Term.

2.4.2.4 Covered Activities

Covered Activities are those otherwise lawful, non-Federal activities that are reasonably certain to take one or more Mojave desert tortoise and for which authorization for such take would be provided by the ITP. Covered Activities must be (1) otherwise lawful, (2) non-Federal, and (3) under the direct control of the permittee. The applicant is also responsible for complying with other applicable local, State, and Federal laws. Non-Federal activities are those that are not funded, authorized, or carried out by a Federal agency. Activities under the direct control of the permittee

are those that the entity controls through jurisdictional authority, employment, contracts, leases, or land ownership. Within the Reserve, the Covered Activities are restricted to a narrow list of activities.

Generally speaking, the Covered Activities addressed by the 1995 HCP and carried forward into the Amended HCP are of two categories:

- Land development and land use activities that may occur on non-Federal land outside the Reserve.
- Certain land development and land use activities that may occur on land inside the Reserve when performed in accordance with the applicable protocols and other measures specified in the conservation program of the Amended HCP.

The Covered Activities, whether inside or outside of the Reserve, are subject to the following criteria:

- Must be non-Federal and performed within the Permit Area.
- Must be otherwise lawful and conducted in accordance with all applicable local, State, and Federal laws, regulations, ordinances, and policy.
- Are subject to the direct control of the County, a non-Federal HCP Partner, or a Municipal Partner through regulatory control such as zoning, or permitting, or other legal authority.
- Effects of the activities have been analyzed in the Amended HCP.
- Must be reasonably certain to cause incidental take of the Mojave desert tortoise.

The County, as the ITP permittee, establishes direct control over Covered Activities through a variety of mechanisms, including the Implementing Agreement with HCP Partners, Interlocal Agreements with Municipal Partners, Participation Agreements and Certificates of Inclusion, or local zoning, permitting, or other legal authorities, as applicable.

Activities that are not reasonably certain to take Mojave desert tortoise are not subject to the terms and conditions of the Amended ITP, even if such activities are similar to the Covered Activities (e.g., land development in an area that is not habitat for the Mojave desert tortoise). The proposed Northern Corridor is not a Covered Activity of the Amended HCP.

Covered Activities outside the Reserve

The ITP issued by the USFWS would allow for incidental take of Mojave desert tortoise resulting from otherwise lawful, non-Federal activities outside the Reserve, including the following:

- Livestock grazing.
- Creation of new utility easements and the maintenance of existing utility easements, including, but not limited to, power, telephone, and cable television lines; water, sewer, and natural gas pipelines; and associated access roads.
- Land clearing.
- Building construction.
- Vehicle use.
- Agricultural land treatments such as plowing, disking, mowing, swathing, and harrowing.
- Mining.
- Drilling for resources, including, but not limited to, petroleum, natural gas, other hydrocarbon, and water for exploration or production purposes.

- Firefighting to abate public nuisance and protect life and property.
- Clearing for landfill exploration or production purposes.
- Renewable energy development.

The geographic restrictions on this set of Covered Activities (i.e., "non-Federal lands" and "outside of the Reserve") are applied at the time the otherwise lawful activity occurs.

Covered Activities inside the Reserve

The ITP issued by the USFWS would allow for incidental take of Mojave desert tortoise resulting from a specific list of otherwise lawful, non-Federal activities inside the Reserve performed in accordance with the applicable protocols, other measures specified in the conservation program of the Amended HCP or long-term management guidance (e.g., the applicable BLM RMP). Specific to take occurring within the Reserve, the County's Amended HCP includes conservation measures that address recommendations for offsetting impacts to Mojave desert tortoise taken by Covered Activities inside the Reserve, which may include the following:

- The acquisition and protection of Mojave desert tortoise habitat outside of the Reserve at impact-to-protection ratios consistent with guidance in *Compensation for the Desert Tortoise* (Desert Tortoise Compensation Team 1991).
- Case-by-case consideration for conservation credit generated by actions that enhance connectivity of Mojave desert tortoise habitat across the Plan Area, restore degraded Mojave desert tortoise habitat, prevent wildfire within the Reserve, control invasive species within the Reserve, or contribute to Mojave desert tortoise head-starting or population augmentation efforts within the Plan Area.
- Conservation credit acquired from in-lieu fee programs or third-party conservation banks, if such program becomes available in the future.

The County's Amended HCP acknowledges that the impact-to-conservation ratios appropriate for actions other than habitat acquisition and protection may be greater than those recommended by Desert Tortoise Compensation Team (1991).

The Covered Activities inside the Reserve would be as follows:

- Recreation Uses and Related Facilities: Individual or small-group forms of recreation on designated trails or use areas within the Reserve, when performed in accordance with the conservation measures specified in the Public Use Plan. As established in the 1995 HCP, this set of Covered Activities explicitly includes hiking, birdwatching, photography, camping, horseback riding, and hunting by unorganized individuals or small groups of individuals in guided or controlled tours. The construction, operation, and maintenance of facilities associated with covered recreational uses of the Reserve are also Covered Activities when performed in accordance with the conservation measures specified in the Development Protocols. This allowed use also includes emergency search and rescue actions necessary to protect human health and safety.
- Utilities, Access Roads, Water Development, and Flood Control: Construction, operation, use, maintenance, upgrade or expansion, decommissioning, or emergency repair of otherwise lawful infrastructure facilities related to the distribution or transmission of utilities (including, but not limited to, electric, telephone, cable, water, wastewater, and natural gas), water development projects (including, but not limited to, wells, pump stations, and reservoirs), flood/stormwater control facilities (including, but not limited to, detention ponds and sedimentation ponds), and access roads needed to construct and maintain such facilities, when performed within designated ROWs on lands within the Reserve in accordance with the conservation measures specified in the Development Protocols.

- General Reserve Management: Reserve management activities may include, but are not limited to, vegetation management, invasive species control, firefighting, controlled burns, predator control, recreation management, and the installation and maintenance of fencing. Some Reserve management activities may be in response to emergency situations, such as wildfires or floods. Promptly addressing such events is essential to protect the overall conservation value of the Reserve and to protect human health and safety.
- Zone-specific Allowed Uses: The Reserve is divided into five zones to facilitate management (Map 2.4-3). Certain uses of Reserve lands not already addressed in the categories above were identified in and subsequently carried forward from the 1995 HCP. Reserve Zone 5 does not have zone-specific allowed uses.
  - Reserve Zone 1: Low-density residential development limited to a maximum overall density of one unit per acre with minimized surface disturbance during development and retention of native vegetation and restrictions on exotic plant materials.
  - Reserve Zone 2: Existing State and local government uses are Covered Activities, including existing public recreational access and use of related facilities and various infrastructure facilities (e.g., detention basins, wells, and utility access roads).
  - Reserve Zone 3: Existing State and local government uses are Covered Activities, including the continued operation, use, and maintenance of facilities associated with the City of St. George law enforcement training range, the debris basin behind City Creek dam, Pioneer Park, and other various infrastructure facilities (e.g., detention basins, wells, and utility access roads).

2.4.2.5 Mojave Desert Tortoise Conservation Measures

The Amended HCP contains Mojave desert tortoise conservation measures that would be implemented by Washington County or the HCP Partners to minimize and mitigate the impacts of the taking of Mojave desert tortoise that would be authorized under the ITP or to further the biological goals and objectives of the Amended HCP. The Mojave desert tortoise conservation measures contained in the Amended HCP are very similar to those contained in the 1995 HCP and include the ongoing acquisition and management of the Reserve (created by the 1995 HCP), other actions to minimize and mitigate impacts of the take, and adaptive management and monitoring.

Red Cliffs Desert Reserve

The acquisition and management of the Reserve is the primary conservation measure of the 1995 HCP. The 1995 HCP established the Reserve with an area of 61,022 acres. Between 1995 and 2019, Washington County and the HCP Partners identified and capitalized on opportunities for expanding the size of the Reserve. The Amended HCP formalizes these boundary changes for an updated Reserve boundary that includes 62,031 acres (Map 2.4-2).

The Reserve boundary is also the target area for the consolidation of private and SITLA-owned lands into BLM or Utah Department of Natural Resources (UDNR) ownership. Reserve acquisitions will be limited to those transactions involving willing participants. As of February 2020, approximately 665 acres of private land and 6,432 acres of SITLA land occur within the Reserve and remain to be acquired for long-term management. Future acquisition of the remaining private and SITLA lands in the Reserve will be a responsibility of the BLM under the Amended HCP and Implementation Agreement. However, Washington County would provide support for Reserve land acquisitions through administrative and financial assistance as well as grant-funded transactions (with the additional support of the UDNR and the USFWS), when resources and willing sellers are available.

Management of Reserve lands is currently and would continue to be accomplished by a variety of land management agencies under the Amended HCP and Implementation Agreement using their respective authorities.

Other Actions to Minimize and Mitigate the Impact of Take

In addition to the design, acquisition, and long-term management of the Reserve, the Amended HCP identifies other conservation measures to minimize and mitigate the impacts of the Covered Activities on the Mojave desert tortoise or to further the biological goals and objectives of the Amended HCP. See the Draft Amended HCP and Implementation Agreement for more information on responsible parties for each conservation measure. These conservation measures include the following:

- Reserve Fencing: Maintenance of fencing within the Reserve to reduce direct mortality and injury of Mojave desert tortoise from Covered Activities.
- Law Enforcement: Law enforcement to ensure that lands within the Reserve are used in accordance with applicable Federal, State, and local rules.
- Community Education and Outreach: Ongoing operation of the Red Cliffs Desert Reserve Visitor Center, a County-maintained website for the Reserve, and implementing educational programs or materials about the Reserve, its natural resources, wildlife, and recreational opportunities. Planning and funding to construct a new Red Cliffs Visitor Center facility in Washington County, as contemplated in the 1995 HCP. This new facility may also serve as a holding facility for Mojave desert tortoise awaiting translocation, adoption, or head-starting. The BLM and UDNR will also continue their respective programs for education and outreach regarding the Mojave desert tortoise, other rare and sensitive resources, and the Mojave Desert ecosystem.
- Tortoise Translocation: Washington County will continue to implement clearance protocols to collect Mojave desert tortoise from areas subject to Covered Activities outside of the Reserve. Upon collection, the County will continue to provide temporary care for collected Mojave desert tortoise until transfer to the UDNR for translocation or adoption. The UDNR will continue to perform health screenings for collected Mojave desert tortoise to assess overall fitness and disease risk. See Draft Amended HCP for a complete copy of the most recent protocols.
- Utility Development Protocols: The utility development protocols minimize impacts to Mojave desert tortoise through additional project-specific review, the application of clearance protocols, collecting Mojave desert tortoise for translocation, use of biological monitors, application of seasonal restrictions, minimization of disturbance footprints, training construction personnel, and similar activities (see Draft Amended HCP for a complete copy of the most recent protocols).
- Recreation Management: Responsibility for managing public recreational activities within the Reserve rests with the respective land manager. However, the HCP Partners prepared the Red Cliffs Desert Reserve Public Use Plan (PUP; Washington County HCP Administration 2000) to provide guidance for managing public recreation in the Reserve. The PUP addresses allowed and disallowed uses, on- and off-trail uses, trail etiquette, campfires and firewood collecting, parking, damage of rocks and plants, day use parks and user facilities, pets, motorized vehicle use, signage, and commercial or organized competitive recreational activities (for example, guided activities, instructional programs, filmmaking, or races). The PUP also provides activity-specific guidance for hiking, camping, bicycling, equestrian use, rock climbing and sport rappelling, rock scrambling, hunting, and other recreational uses.
- Reserve Habitat and Fire Management: The Reserve habitat and fire management guidelines set priorities for Reserve management and to provide guidance to Washington County, the HCP Partners, and fire crews for addressing wildfire-related threats within the Reserve. In addition,

Washington County would establish an adaptive management fund to help support planning, monitoring, and responses for fire management in the Reserve.

Adaptive Management and Monitoring

The Amended HCP would continue to rely on the deliberations of the Habitat Conservation Advisory Committee and Technical Committee for adaptive management recommendations. The Habitat Conservation Advisory Committee is composed of representatives of the HCP Partners and other community stakeholders, and the Technical Committee is composed of biologists and other conservation or technical professionals. These committees meet regularly to review actions taken to implement the conservation program. The Habitat Conservation Advisory Committee makes recommendations or proposed amendments, including funding expenditures, to the Washington County Commission.

The Amended HCP would also continue biological monitoring program including baseline Reserve population monitoring completed by the Utah Division of Wildlife Resources (UDWR) and special topic monitoring that may be recommended through the adaptive management process.

2.4.2.6 Changed Circumstances

USFWS regulations define changed circumstances as "changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that can reasonably be anticipated by plan or agreement developers and the Service [USFWS] and that can be planned for (for example, the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)" (50 CFR 17.3). To the extent that an ITP permittee provides for a changed circumstance in the HCP, the permittee must implement the prescribed response to the changed circumstance, if it occurs, to remain eligible for the assurances of the No Surprises rule.

The Amended HCP identifies nine changed circumstances that may occur over the extended ITP term and the responsive actions required to remedy each changed circumstance. Each of these changed circumstances is described in detail in the Amended HCP. Eight of the changed circumstances are administrative in nature. The triggering of these changed circumstances would temporarily modify funding for or the County's implementation procedures for elements of the HCP. However, these changed circumstances would not modify the environmental impacts of the USFWS issuing an ITP to Washington County analyzed and disclosed in this Draft EIS. Because of its relevance to the analysis included in this Draft EIS, the approval of the Northern Corridor across the Reserve changed circumstance is described in detail as follows.

Approval of the Northern Corridor across the Reserve

The changed circumstance would be triggered upon BLM approval of a new ROW grant for the Northern Corridor across Reserve Zone 3. However, if the proposed Northern Corridor does not receive a new BLM ROW grant or if an alternative route for the Northern Corridor is selected that does not result in a new road crossing the Reserve, this changed circumstance would not be triggered. In response to this changed circumstance, Washington County and the HCP Partners would implement the following additional conservation measures, which are described in more detail in the Amended HCP.

Establish Reserve Zone 6

The Amended HCP would establish a Reserve Zone 6 if the changed circumstance is triggered (Map 2.4-4). Proposed Reserve Zone 6 would include approximately 6,812 acres of primarily SITLA-owned or BLM-administered lands. Over time, the BLM or other conservation entity would acquire the non-Federal lands for long-term conservation purposes. The County would fund the acquisition of a portion of the non-Federal lands within proposed Reserve Zone 6. The funding would be enough to acquire three times the acreage of land within the proposed Northern Corridor

highway ROW. This commitment would be satisfied prior to the start of construction. The remainder of the non-Federal lands within the proposed Reserve Zone 6 would be subject to acquisition following the acquisition strategy identified for Reserve Zones 1 through 5. In the interim, the remaining non-Federal lands would be managed by the County to promote the conservation of the Mojave desert tortoise until such time that they are acquired.

Allowed uses in proposed Reserve Zone 6 would include those uses allowed in the Reserve with respect to recreation uses and related facilities when performed in accordance with the PUP (with zone-specific amendments as described following); utilities, access roads, water development, and flood control when performed in accordance with the utility development protocols; and general Reserve management when performed in accordance with the Amended HCP or long-term management guidance (for example, the BLM RMP). In addition, the following zone-specific allowed uses would be established for the proposed Reserve Zone 6:

- Existing State and local government infrastructure and uses.
- Competitive use events that have the approval of a special recreation permit (SRP) issued by the appropriate land management entity, as applicable.

Upon triggering this changed circumstance, or as otherwise specified below, Washington County would implement the following conservation actions associated with proposed Reserve Zone 6:

- Reserve Administration: Washington County would provide additional funding for increased staffing and administrative costs associated with the establishment of proposed Reserve Zone 6 and the implementation of these conservation actions. Washington County will add up to three full-time HCP support staff to include an Outreach Coordinator, Field Technician, and Administrative Assistant.
- Reserve Fencing: Washington County would obtain the appropriate site-specific authorizations and install the necessary fencing along the eastern parts of the proposed Reserve Zone 6 boundary (approximately 19 miles of new fencing on both SITLA lands and BLM-administered lands, as authorized) and along the Navajo Road corridor to prevent motorized access outside the road right-of-way, and in other areas to enhance protections for ESA-listed plant species within proposed Reserve Zone 6. Washington County and the HCP Partners would finalize and implement the fencing plan for proposed Reserve Zone 6 prior to construction of the proposed Northern Corridor, if approved.
- Law Enforcement: Washington County would provide additional funding for Washington County Sheriff Deputy patrols within the Reserve for the duration of the extended ITP term. Law enforcement will support Reserve integrity, help manage allowed uses of the Reserve, and minimize impacts on Mojave desert tortoise and ESA-listed plants within proposed Reserve Zone 6.
- Community Education and Outreach: Washington County would provide additional funding to expand education and outreach efforts promoting interest in the Mojave desert tortoise, the Mojave Desert ecosystem, and related natural and cultural resources that may include videos, advertising, handouts, community engagement, contractor training, and volunteer coordination. The additional funding will help existing users of lands within proposed Reserve Zone 6 understand and abide by new recreation and use restrictions.
- Grazing Permit Acquisition and Retirement: Washington County and the HCP Partners would coordinate with the holders of active grazing permits applicable to proposed Reserve Zone 6 and attempt to negotiate the acquisition of such grazing permits or portions thereof from willing sellers.
- Utility Development Protocols: Washington County and the HCP Partners would subject the allowed uses of non-Federal lands in proposed Reserve Zone 6 to the applicable provisions of

the utility development protocols. Washington County and the HCP Partners will apply those portions of the utility development protocols that pertain to lands within the Reserve to Zone 6.

- Recreation Management*:* Recreational uses within the Reserve would be an allowed use of proposed Reserve Zone 6, including competitive use events that have the approval of a SRP issued by the appropriate land management entity, as applicable.

  Washington County, the BLM, SITLA, and the other HCP Partners would reduce the total mileage of designated recreation access routes within proposed Reserve Zone 6 to approximately 65 miles of primarily non-motorized trails. Consideration would be retained for some motorized access as necessary and appropriate to facilitate efficient management of proposed Reserve Zone 6 and to provide appropriate opportunities for motorized recreational access west of proposed Reserve Zone 6.

  Washington County, the BLM, SITLA, and the other HCP Partners would coordinate on developing a comprehensive travel and transportation plan for BLM-administered lands and an equivalent process for management of any non-Federal lands, both with public participation, to create a final trail plan that implements the targeted level of trail reduction within proposed Reserve Zone 6. Washington County would act within its discretion to complete the plan for non-Federal lands within the first 5 years after this changed circumstance is triggered.

  Washington County would fund recreation management activities within proposed Reserve Zone 6 for the duration of the extended ITP term such as the installation and maintenance of regulatory signs, information kiosks, trail maintenance or enhancement, parking improvements, and similar actions.

- Reserve Habitat and Fire Management*:* Washington County would provide additional funds to support the habitat restoration and fire management of SITLA-owned lands in proposed Reserve Zone 6. These additional funds may also be used by the HCP Partners for long-term management of proposed Reserve Zone 6.

- Monitoring and Adaptive Management Planning: Washington County and the HCP Partners would expand the biological monitoring program to proposed Reserve Zone 6. To support this expansion, Washington County will provide additional funding for baseline Reserve population monitoring and special topic monitoring, with a focus on actions pertaining to SITLA-owned lands.

Take Authorization within Proposed Reserve Zone 6

Upon the triggering of the changed circumstance, the County would no longer seek take authorization resulting from Covered Activities outside the Reserve on approximately 3,338 acres of Mojave desert tortoise habitat that would otherwise be authorized by the Amended HCP without the changed circumstance. This amount of incidental take authorization is equivalent to the acres of non-federal lands within proposed Reserve Zone 6.

Cottonwood Springs Road Tortoise Culverts

Under the changed circumstance, the County and HCP Partners would provide funding and technical assistance to UDOT for the addition of culverts under Cottonwood Springs Road within Reserve Zone 3 that restore the potential for Mojave desert tortoise movement across this pre-existing barrier.

2.5 St. George Field Office Resource Management Plan Amendments

As described in greater detail in Table 2.5-1, if a Northern Corridor alignment crossing Zone 3 of the Reserve is approved by the BLM, the Washington County HCP would trigger a changed circumstance that would establish and manage the proposed Zone 6 of the Reserve.

Table 2.5-1. St. George Field Office Resource Management Plan Amendments Alternatives Considered in Detail

SGFO RMP Amendment Alternative A: (Current Management – No Action)	SGFO RMP Amendment Alternative B	SGFO RMP Amendment Alternative C
[Adopted from SGFO RMP decision LD-19] Manage 2,639.5 acres of proposed Reserve Zone 6 as a ROW avoidance area. Manage 860.2 acres of proposed Reserve Zone 6 as open to new ROWs (Map 2.5-1).	Manage proposed Reserve Zone 6 as an exclusion area for new ROWs (Map 2.5-2). New rights-of-way will be granted in these areas only when required by law or Federal court action.	Manage proposed Reserve Zone 6 as an avoidance area for new ROWs (Map 2.5-3). When considering a new proposed ROW application, the BLM will: Consider options for routing or siting the ROW outside of proposed Reserve Zone 6. Ensure consistency of the ROW with the conservation objectives of proposed Reserve Zone 6. Ensure that new ROWs share, parallel, or adjoin existing ROWs. Apply special stipulations and mitigation measures consistent with the avoidance and minimization of impacts on Mojave desert tortoise and its habitat. Authorize new ROWs only when the project-specific NEPA analysis indicates that the construction and operation of the facility would meet the following criteria: • Construction could be accomplished through methods that minimize new surface disturbances and resource impacts. • New ROW access roads would not be required for construction, operation, and maintenance. • Existing ROW access roads would not be permanently widened or upgraded for construction, operation, and maintenance; temporary enlargements or modifications to existing access routes needed during construction would be rehabilitated immediately after construction is completed. • Construction, operations, and maintenance would not require off-road travel by motorized vehicles.
Land Tenure Adjustments - Land Acquisition		
[Adopted from SGFO RMP decision LD-05] No lands have been identified for acquisition within proposed Reserve Zone 6 (Map 2.5-4).	Identify all non-Federal lands within Reserve Zone 6 for acquisition through purchase, exchange, or donation. Manage all acquired lands consistent with the prescriptions applied to the remainder of Zone 6 (Map 2.5-5).	Same as SGFO RMP Amendment Alternative B.
Land Tenure Adjustments - Land Transfer/Disposal		
[Adopted from SGFO RMP decision LD-06] Manage 176.0 acres of proposed Reserve Zone 6 as lands that may be transferred out of public ownership (Map 2.5-4).	Retain all Federal lands within Reserve Zone 6 with no exception (Map 2.5-5).	Same as SGFO RMP Amendment Alternative B.
Land Withdrawals and Classifications		
[Adopted from SGFO RMP decision LD-20] Manage 2,352.8 acres of Reserve Zone 6 as proposed for withdrawal from mineral exploration and entry (Map 2.5-6).	Retain all existing proposed withdrawals within Reserve Zone 6. Recommend all Federal lands within Zone 6 for withdrawal from locatable mineral exploration and entry (Map 2.5-7). Manage acquired lands within Zone 6 as recommended for withdrawal for locatable mineral exploration and entry.	Same as SGFO RMP Amendment Alternative B.
Fluid Minerals		
[Adopted from SGFO RMP decision MI-01] Manage Reserve Zone 6 for fluid mineral leasing as follows (Map 2.5-8): Open – 594.8 acres Controlled Surface Use (CSU) – 333.1 acres No Surface Occupancy (NSO) – 2,446.7 acres Closed – 122.2 acres of lands within Incorporated City Boundaries (at the time of the 1999 RMP)	Manage Reserve Zone 6 as closed for fluid mineral leasing (Map 2.5-9).	Manage unincorporated areas of proposed Reserve Zone 6 as open for fluid mineral leasing, subject to NSO stipulations with no exceptions, modifications, or waivers. Manage incorporated areas of proposed Reserve Zone 6 as closed for fluid mineral leasing (Map 2.5-10).

SGFO RMP Amendment Alternative A: (Current Management – No Action)	SGFO RMP Amendment Alternative B	SGFO RMP Amendment Alternative C
MI-06: Exploration, drilling, and production will be subject to the operation and reclamation standards described in the SGFO RMP for surface disturbing activities.	Manage proposed Reserve Zone 6 as closed to fluid mineral exploration, including seismic exploration activities.	Same as SGFO RMP Amendment Alternative B.
Locatable Minerals		
[Adopted from SGFO RMP decision MI-07] Manage proposed Reserve Zone 6 for locatable mineral entry as follows (Map 2.5-11): Open – 1,146.7 acres Proposed Withdrawal – 2,355.9 acres Restricted – 4.8 acres Plans of Operation are required for all development in ACECs.	Recommend all lands within proposed Reserve Zone 6 for withdrawal from locatable mineral entry (Map 2.5-12). Pending approval of the recommended withdrawal, Plans of Operation are required for all exploration and development within proposed Reserve Zone 6.	Same as SGFO RMP Amendment Alternative B.
Mineral Materials		
[Adopted from SGFO RMP decision MI-16] Manage proposed Reserve Zone 6 for mineral material sales as follows (Map 2.5-13): Open – 1,142.8 acres Closed – 2,360.0 acres Restricted – 4.8 acres	Manage proposed Reserve Zone 6 as closed to mineral material sales (Map 2.5-14).	Same as SGFO RMP Amendment Alternative B.
Special Status Species		
Management decisions pertaining to reintroduction, relocation, translocation, and population augmentation of Mojave desert tortoises and other special status species were not included in the SGFO RMP.	Allow the reintroduction, relocation, translocation, and population augmentation of Mojave desert tortoise and other special status species into current or historic habitats in proposed Reserve Zone 6, in coordination with the USFWS, UDWR, and local governments, subject to guidance provided by BLM's 6840 policy and by existing or future Memorandum of Understanding.	Same as SGFO RMP Amendment Alternative B.
Management decisions to authorize or restrict native seed harvesting for commercial or non-commercial purposes were not included in the SGFO RMP.	Do not authorize native seed harvesting for commercial or non-commercial purposes in proposed Reserve Zone 6.	Same as SGFO RMP Amendment Alternative B.
Goal/Objective: The BLM will work collaboratively with local, State, and Federal partners to accomplish the goals and the objectives of the Washington County HCP and Red Cliffs Desert Reserve. Major goals include the preservation and protection of the desert tortoise and its habitat so as to achieve full recovery of the tortoise as well as other listed or sensitive species found within the Upper Virgin River Recovery Unit (UVRRU).	Same as SGFO RMP Amendment Alternative A, except within proposed Reserve Zone 6, add the following objectives: Land uses and authorized activities are managed to conserve, protect, and restore habitats to meet the nutritional, metabolic (shade/cover), reproductive, and home range requirements of viable Mojave desert tortoise populations. Ecologically intact areas of Mojave desert tortoise habitat are conserved and protected from fragmentation and loss of native vegetation communities through appropriate land use allocations and management actions across BLM programs. Ecological integrity of damaged native vegetation communities is restored through appropriate revegetation methods and the control and eradication of noxious weeds and nonnative invasive species. Land uses and authorized activities are managed so that habitats provide ecological diversity and connectivity to create genetic resilience for Mojave desert tortoise populations under changing climatic conditions. Research is supported that increases the knowledge of Mojave desert tortoise life histories and population dynamics in proposed Reserve Zone 6. BLM will work collaboratively with local, State, and Federal partners to accomplish the goals and the objectives of the Washington County HCP and its implementation agreement.	Same as SGFO RMP Amendment Alternative B.

SGFO RMP Amendment Alternative A: (Current Management – No Action)	SGFO RMP Amendment Alternative B	SGFO RMP Amendment Alternative C
The 1999 St. George RMP was amended by the 2005 Utah Land Use Plan Amendment for Fire and Fuels Management. The current management of wildland fire in proposed Reserve Zone 6 is summarized as follows: • Manage creosote/bursage vegetated areas to achieve the Desired Wildland Fire Conditions. These conditions are for fire to be mostly excluded from these vegetation types. Historically, fire seldom to rarely occurs because of the lack of surface fuels in these communities. • Do not allow fire to burn into these vegetation types since fire rarely occurs and the potential for cheatgrass invasion is high. • Treat creosote and bursage types using mechanical, chemical, or biological treatments to reduce annual grass cover. • Following wildfire, aggressively seed to reduce potential for annual grasses and other invasive weeds.	Same as SGFO RMP Amendment Alternative A, except also manage proposed Reserve Zone 6 as follows: • Employ rapid and appropriate suppression responses to minimize fire size and duration in proposed Reserve Zone 6. • Conserve and protect unburned areas through appropriate fire suppression responses, while prioritizing firefighter and public safety and the protection of private property. • Use Resource Advisors to guide suppression actions for all fires to help ensure that ecological systems and resource values are conserved and protected to the maximum extent possible. • Evaluate the use of "backfiring" as a fire suppression tactic in late successional shrublands, including Joshua tree woodlands and blackbrush communities, on a case-by-case basis. Require BLM Field Manager approval prior to employing this tactic. • Naturally ignited wildfires are not authorized to accomplish a resource objective as there are no fire-adapted vegetative communities present in which fire has historically played an important role in ecosystem function. • Do not authorize the use of management-ignited (prescriptive) fire in any of the ecological systems for hazard fuel reduction or vegetation type conversions, as these are not fire-adapted communities in which fire has historically played an important role in ecosystem function.	Same as SGFO RMP Amendment Alternative B.
FW-21 In collaboration with affected State and Federal agencies, predator control in either area may be allowed using techniques designed to control target species only. This will reduce the loss of hatchlings and juvenile tortoises to predators such as coyotes and ravens.	In proposed Reserve Zone 6, collaborate with the USFWS, UDWR, and appropriate U.S. Department of Agriculture agencies on predator control, if other management actions have not been successful in reducing documented predation levels that have been shown to be measurably impacting the recovery of viable Mojave desert tortoise populations. Require the development of target species-specific predator control plans supported by NEPA analyses that identify the purpose of and need for action, designate specific goals to be met, and evaluate the least invasive and most ecologically sensitive methods to accomplish those goals.	Same as SGFO RMP Amendment Alternative B.
Livestock Grazing		
GZ-10: Manage proposed Reserve Zone 6, including the portions of the Curly Hollow and Box Canyon allotments as available for livestock grazing (Map 2.5-16).	Make all lands within proposed Reserve Zone 6 unavailable for livestock grazing (Map 2.5-17).	Make the portions of the Box Canyon allotment within proposed Reserve Zone 6 unavailable for livestock grazing. Make the portions of the Holding Pasture of the Curly Hollow allotment within proposed Reserve Zone 6 unavailable for livestock grazing. Continue to make the River Pasture of the Curly Hollow allotment within proposed Reserve Zone 6 available for livestock grazing (Map 2.5-18).
Recreation – Extensive Recreation Management Areas		
Management decisions related to geocaches and virtual geocaches were not included in the SGFO RMP.	Prohibit physical geocaches in proposed Reserve Zone 6. Allow virtual geocaches in proposed Reserve Zone 6, provided they are compliant with other zone restrictions. Written approval from the BLM Field Manager would be required prior to the public posting of any virtual geocache placement.	Same as SGFO RMP Amendment Alternative B.
Management decisions allowing or prohibiting take-off and landing of powered parachutes, ultralight aircraft, remote-controlled aircraft, and unmanned aerial vehicle systems were not included in the SGFO RMP.	Prohibit the take-off and landing of powered parachutes, ultralight aircraft, remote-controlled aircraft, and unmanned aerial vehicles in proposed Reserve Zone 6.	Same as SGFO RMP Amendment Alternative B.
RC-05 Dispersed camping in undeveloped areas will be allowed in accordance with the public notice of December 14, 1992 (*Federal Register*, Vol. 57, No. 240, p. 59121), where the lands are not otherwise closed to such use. To prevent degradation of natural resources and the use of public lands for unauthorized occupancy, dispersed camping by any person or group of persons will be limited to 14 days within a 30-mile radius in a 28-day period. RC-10 Groups of more than 75 persons will be required to obtain a letter of authorization prior to camping on undeveloped public lands except where more restrictive rules apply. Such groups will be required to provide their own portable sanitary facilities, properly dispose of garbage, and comply with other good sense rules for public safety and protecting the land.	Manage proposed Reserve Zone 6 as closed to camping. Prohibit campfires within proposed Reserve Zone 6.	Manage proposed Reserve Zone 6 as closed to camping outside of designated sites. Prohibit campfires outside of metal campfire containers within designated sites.

SGFO RMP Amendment Alternative A: (Current Management – No Action)	SGFO RMP Amendment Alternative B	SGFO RMP Amendment Alternative C
Management decisions related to recreational target shooting were not included in the SGFO RMP.	Manage proposed Reserve Zone 6 as closed to recreational target shooting.	Allow the discharge of firearms in proposed Reserve Zone 6. Except in the act of licensed hunting, all firearms must be discharged toward a proper backstop sufficient to stop the projectile's forward progress. Targets must be constructed of wood, cardboard, paper, or similar unbreakable materials. All targets, clays, and shells are considered litter after use and must be removed and disposed of properly.
Special Recreation Permit Management – no specific decisions outside of ACECs. OV-09 BLM will continue to work with off-highway vehicle sponsors and organizations to authorize competitive events, commercial touring, and organized rides on a case-by-case basis subject to site-specific analysis. Limited administrative capabilities in the BLM and the need to provide for critical resource protection and site rehabilitation will restrict the number of large competitive events (up to 300 participants) authorized on public lands. Collaboration with adjacent BLM units on the Arizona Strip will be encouraged to allow joint management or sponsorship of such events, increase options for alternative route selection, and provide for yearly rotation of established routes for large events to promote rehabilitation and reduce long-term cumulative impacts. Limitations on the number of participants and spectators to all competitive events will be applied where warranted based on design of the competition and site capabilities.	Do not authorize SRPs for competitive equestrian events in proposed Reserve Zone 6. Do not authorize SRPs for competitive motorized events in proposed Reserve Zone 6. Limit SRPs for motorized commercial and organized group recreation activities to roads and primitive roads authorized for use by the public.	SRPs are required for all commercial, competitive, or advertised recreational events within proposed Reserve Zone 6. Consider issuing SRPs within proposed Reserve Zone 6 on a case-by-case basis with the following restrictions: • Competitive, non-motorized cycling and running events are allowed. All competitive, non-motorized events would be limited to designated routes. All spectators would be limited to areas pre-approved by the BLM. • All event staging and parking would be required to occur outside of proposed Reserve Zone 6. • Prohibit competitive motorized events in proposed Reserve Zone 6. • Limit non-competitive, motorized SRPs to only those that pass through proposed Reserve Zone 6 on designated routes.
Management decisions related to developing an implementation-level recreation management plan, monitoring program, and related trailhead signage were not included in the SGFO RMP.	In collaboration with Washington County, SITLA, and the USFWS, develop an implementation-level recreation area management plan for proposed Reserve Zone 6 within 5 years of approval of the Washington County HCP or prior to construction of the proposed Northern Corridor, whichever occurs first. At a minimum, the implementation-level recreation area management plan would address the following: *(continued in next row)*	Same as SGFO RMP Amendment Alternative B.

SGFO RMP Amendment Alternative A: (Current Management – No Action)	SGFO RMP Amendment Alternative B	SGFO RMP Amendment Alternative C
Management decisions related to developing an implementation-level recreation management plan, monitoring program, and related trailhead signage were not included in the SGFO RMP.	Trails and Trail Amenities • In conjunction with the comprehensive travel and transportation plan for the SGFO, develop a network of routes and supporting recreational amenities that minimizes impacts to the Mojave desert tortoise and other Federally listed and candidate species and their habitats, while providing a quality recreation experience. • Through the BLM's implementation-level comprehensive travel and transportation plan, existing routes would be designated as open or closed and overall mileage of open routes would be limited to approximately 4 miles of motorized and 35 miles of non-motorized roads and trails. • Supporting recreational amenities could include trailheads, information kiosks, ride-overs or step-overs, restrooms, and expanded parking. • Additional measures to support compliance may include, but are not limited to, fencing along routes that are prone to social trailing or educational or directional signage. Rock climbing • Identify areas where climbing could be authorized. • Identify potential climbing restrictions such as group size limits or seasonal closures. • Establish monitoring protocols to identify resource impacts. Boundary Fencing • Identify appropriate locations to construct a minimum of 5 miles of wildlife-friendly boundary fencing on BLM-administered lands to manage dispersed recreational usage and limit adverse impacts to habitat within proposed Reserve Zone 6. Adaptive Management • Establish a monitoring protocol to identify changes related to recreational uses, habitat quantity, and quality for Mojave desert tortoise and impacts to other species including special status plants and biological soil crusts. • Develop a list of trigger points and responsive management actions to address observed conflicts between users and protection of natural resources.	Same as SGFO RMP Amendment Alternative B.
Management decisions related to pet leash requirements were not included in the SGFO RMP.	All pets must be on leash at all times within proposed Reserve Zone 6.	Same as SGFO RMP Amendment Alternative B.
Management decisions related to paintball activities were not included in the SGFO RMP.	Prohibit paintball activities of any kind within proposed Reserve Zone 6.	Same as SGFO RMP Amendment Alternative B.
Management decisions related to recreation use sanitation requirements were not included in the SGFO RMP.	Require users to pack out all solid human and pet waste.	Same as SGFO RMP Amendment Alternative B.
Travel and Transportation Management		
SGFO RMP Amendment 2016: Mountain biking and off-highway vehicle use in proposed Reserve Zone 6 is currently managed as limited to existing routes, and upon approval of the Travel Management Plan, would shift to Limited to Designated Routes category.	Same as SGFO RMP Amendment Alternative A, except travel systems will be managed with an emphasis on improving the sustainability of the travel network in a comprehensive manner to minimize impacts on Mojave desert tortoise, maintain visitor safety, and prevent unauthorized cross-country travel while meeting access needs in proposed Reserve Zone 6. To do so, it may be necessary to improve portions of existing routes, close existing routes, or create new routes that meet user group needs, thereby reducing the potential for pioneering unauthorized routes. Within Zone 6, motorized and non-motorized routes would be limited as identified in the Recreation section. The BLM would work with the USFWS, SITLA, and Washington County to ensure a cohesive transportation system in the area and would make specific route designations through the comprehensive travel and transportation plan. The emphasis of the comprehensive travel and transportation planning will be placed on having a neutral or positive effect on Mojave desert tortoise habitat.	Same as SGFO RMP Amendment Alternative B.

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The BLM is a signatory to the HCP Implementation Agreement. If the changed circumstance described in the Amended HCP is triggered, the BLM would amend the existing SGFO RMP to align the management of the BLM-administered lands within proposed Reserve Zone 6 with the management described in the Washington County HCP. The BLM has developed the alternatives described in Table 2.5-1 to complete this task.

In addition to the planning-level actions described, future implementation-level actions may be required to fully implement the management of proposed Reserve Zone 6 as described in the Washington County HCP. The BLM would work with Washington County, UDOT, SITLA, and other HCP Partners to complete necessary implementation-level actions in accordance with the HCP. Additional NEPA analysis may be necessary for the BLM to implement some actions.

2.6 Alternatives for Analysis

The Federal actions associated with the Northern Corridor, Red Cliffs NCA RMP Amendment, SGFO RMP Amendment, and Washington County HCP and ITP are interrelated, and some of the actions are interdependent. The USFWS's decision of whether to issue an ITP is determined by whether permit issuance criteria are met. If permit issuance criteria are met, USFWS could select the action alternative independent of any BLM decision. The BLM's decision regarding amendments to the Red Cliffs NCA and SGFO RMPs will inform the location and nature of the Northern Corridor ROW, as well as determine whether the changed circumstance related to the construction of the proposed Northern Corridor across Zone 3 of the Reserve in the Washington County HCP is triggered. Therefore, the BLM and the USFWS have developed distinct alternatives containing the relevant Federal actions for analysis in this Draft EIS. These alternatives are outlined in Table 2.6-1 and described in more detail in Sections 2.6.1 through 2.6.6. The BLM and the USFWS have identified Alternative 3 (UDOT Application Northern Corridor Alignment and issuing an ITP based on the Amended HCP) as the agencies' preferred ROW alignment and ITP issuance alternative for the purposes of public comment and review, with Alternative B identified as the preferred for the two RMP amendments.

Table 2.6-1. Combined Alternatives for Analysis in the Draft EIS

Federal Actions	Alternative 1 – No Action Alternative	Alternative 2 – T-Bone Mesa Northern Corridor Alignment	Alternative 3 – UDOT Application Northern Corridor Alignment	Alternative 4 – Southern Northern Corridor Alignment	Alternative 5 – Red Hills Parkway Expressway Northern Corridor Alignment	Alternative 6 – One-way Couplet for Northern Corridor Alignment
Northern Corridor BLM ROW Action	Deny ROW Request (No - Action)	Grant ROW for T-Bone Mesa Alignment	Grant ROW for UDOT Application Alignment	Grant ROW for Southern Alignment	Grant ROW amendments necessary for Red Hills Expressway Alignment	Deny ROW Request (No Action)
USFWS ITP Action	Deny ITP Request (No Action)	Issue ITP subject to the conservation measures in the revised HCP, Northern Corridor changed circumstance triggered	Issue ITP subject to the conservation measures in the revised HCP, Northern Corridor changed circumstance triggered	Issue ITP subject to the conservation measures in the revised HCP, Northern Corridor changed circumstance triggered	Issue ITP subject to the conservation measures in the revised HCP, Northern Corridor changed circumstance not triggered	Issue ITP subject to the conservation measures in the revised HCP, Northern Corridor changed circumstance not triggered

Federal Actions	Alternative 1 – No Action Alternative	Alternative 2 – T-Bone Mesa Northern Corridor Alignment	Alternative 3 – UDOT Application Northern Corridor Alignment	Alternative 4 – Southern Northern Corridor Alignment	Alternative 5 – Red Hills Parkway Expressway Northern Corridor Alignment	Alternative 6 – One-way Couplet for Northern Corridor Alignment
BLM SGFO RMP Amendment	No Action	SGFO RMP Amendment Alternative B	SGFO RMP Amendment Alternative B	SGFO RMP Amendment Alternative B	No Action	No Action
BLM SGFO RMP Amendment	No Action	SGFO RMP Amendment Alternative C	SGFO RMP Amendment Alternative C	SGFO RMP Amendment Alternative C	No Action	No Action
BLM Red Cliffs NCA RMP Amendments	No Action	Red Cliffs NCA RMP Amendment Alternative B	Red Cliffs NCA RMP Amendment Alternative B	Red Cliffs NCA RMP Amendment Alternative B	No Action	No Action
BLM Red Cliffs NCA RMP Amendments	No Action	Red Cliffs NCA RMP Amendment Alternative C	Red Cliffs NCA RMP Amendment Alternative C	Red Cliffs NCA RMP Amendment Alternative C	No Action	No Action

2.6.1 Alternative 1 – No Action Alternative

Under Alternative 1, the BLM would deny UDOT's application for a ROW grant across the Red Cliffs NCA for the Northern Corridor, and the USFWS would deny Washington County's application for an ITP. The BLM would not amend the RMPs for the Red Cliffs NCA or SGFO. The Northern Corridor would not be constructed, and compliance with the ESA for lawful activities in Washington County that may result in the take of Mojave desert tortoise would be completed through other avenues.

2.6.2 Alternative 2 – T-Bone Mesa Alignment for the Northern Corridor

Under Alternative 2, the BLM would grant UDOT a ROW across the public lands in the Red Cliffs NCA for the Northern Corridor on the T-Bone Mesa Alignment, and the USFWS would issue an ITP for the take of Mojave desert tortoise to Washington County as described in Section 2.4. The changed circumstance related to the construction of the Northern Corridor across the Reserve described in the HCP would be triggered, and proposed Zone 6 of the Reserve would be created. The BLM would amend both the Red Cliffs NCA and SGFO RMPs, though the nature of the amendments could vary as described in Sections 2.3 and 2.4 of this Draft EIS.

2.6.3 Alternative 3 – UDOT Application Alignment for the Northern Corridor

Under Alternative 3, the BLM would grant UDOT a ROW across public lands in the Red Cliffs NCA for the Northern Corridor on the UDOT ROW application alignment, and the USFWS would issue an ITP for the take of Mojave desert tortoise to Washington County as described in Section 2.4. The changed circumstance related to the construction of the Northern Corridor across the Reserve described in the HCP would be triggered, and proposed Zone 6 of the Reserve would be created. The BLM would amend both the Red Cliffs NCA and SGFO RMPs, though the nature of the amendments could vary as described in Sections 2.3 and 2.4 of this Draft EIS.

2.6.4 Alternative 4 – Southern Alignment for the Northern Corridor

Under Alternative 4, the BLM would grant UDOT a ROW across public lands in the Red Cliffs NCA for the Northern Corridor on the Southern Alignment, and the USFWS would issue an ITP for the take of Mojave desert tortoise to Washington County as described in Section 2.4. The

changed circumstance related to the construction of the Northern Corridor across the Reserve described in the HCP would be triggered, and proposed Zone 6 of the Reserve would be created. The BLM would amend both the Red Cliffs NCA and SGFO RMPs, though the nature of the amendments could vary as described in Sections 2.3 and 2.4 of this Draft EIS.

2.6.5 Alternative 5 – Red Hills Parkway Expressway for the Northern Corridor

Under Alternative 5, the BLM would grant necessary ROW amendments to the existing FLPMA Title V ROW for the Red Hills Parkway, and the USFWS would issue an ITP for the take of Mojave desert tortoise to Washington County as described in Section 2.4. The changed circumstance related to the construction of the Northern Corridor across the Reserve described in the HCP would not be triggered, and proposed Zone 6 of the Reserve would not be created. The BLM would not amend the Red Cliffs NCA RMP or the SGFO RMP.

2.6.6 Alternative 6 – St. George Boulevard/100 South One-way Couplet for the Northern Corridor

Under Alternative 6, the BLM would not grant a ROW in the Red Cliffs NCA for the Northern Corridor, but improvements to St. George Boulevard and 100 South would be made to respond to future transportation needs in Washington County. The USFWS would issue an ITP for the take of Mojave desert tortoise to Washington County as described in Section 2.4. The changed circumstance related to the construction of the Northern Corridor across the Reserve described in the HCP would not be triggered, and proposed Zone 6 of the Reserve would not be created. The BLM would not amend the Red Cliffs NCA and SGFO RMPs and would request UDOT withdraw the ROW application.

2.7 Alternatives Considered but Eliminated from Detailed Analysis

The alternatives presented in this Draft EIS for each Federal action were informed by and developed using past plans and studies; discussions with Federal, State, and local agency staff and stakeholders; elected officials; and input received from the public during scoping.

When preparing an EIS, the BLM analyzes a range of reasonable alternatives, which include those that are technically and economically practical or feasible and that satisfy the purpose and need of the proposed action. The BLM may eliminate an action alternative from detailed analysis if one or more of the following is true:

- It does not respond to the purpose and need.
- It is not technically or economically feasible.
- It is not consistent with the overall policy objectives for the area.
- Its implementation is remote or speculative.
- It is not substantively different in design from an alternative being analyzed in detail.
- It would have substantively similar effects from an alternative being analyzed in detail.

For the USFWS, alternatives considered in detail in addition to the No Action Alternative and proposed action alternatives must take into consideration the applicant's purpose and means to implement potential alternatives. If an HCP meets issuance criteria, the USFWS is obliged to issue a permit. This requirement affects what the USFWS might consider as reasonable when developing a range of alternatives (43 CFR 46.420(c)). The USFWS may consider more alternatives as might be identified by public comments or may use additional alternatives to evaluate unresolved conflicts concerning project impacts, mitigation plans, or alternative uses of available resources.

During the preparation of the Draft EIS, the BLM identified several alternatives that do not meet the criteria for alternatives to be analyzed in detail. This section describes the alternatives that the BLM considered during the alternatives development process that were not carried forward for detailed analysis in the Draft EIS.

2.7.1 Northern Corridor Highway Alternatives Considered but Eliminated

2.7.1.1 Twist Hollow Alignment (Northern T-Bone)

The Twist Hollow Alignment came from agency input as part of the alternative development process and is a northern variation to the location of the T-Bone Mesa Alignment described in Section 2.2.2. This alignment would cross the Red Cliffs NCA north of T-Bone Mesa. It would connect with I-15 at milepost 16 on the east and with SR 18 on the west approximately 1.5 miles north of the Red Hills Parkway/Snow Canyon Parkway interchange. The alignment was developed to be located as far north as possible in the Red Cliffs NCA while still connecting to I-15 and Bluff Street at locations closer to the urbanized areas to increase the corridor's transportation utilization.

The Twist Hollow Alignment was not carried forward for detailed analysis in the Draft EIS. The Twist Hollow Alignment only partially meets the BLM's purpose and need. Although the location may address some resource conflicts with the Mojave desert tortoise, it would not meet the purpose and need to provide for consistency with the statutory purposes of the Red Cliffs NCA, which includes other ecological and scenic resources. Discussions with BLM and USFWS biologists indicate that the Twist Hollow area is a highly sensitive and diverse biological area for many species besides the Mojave desert tortoise and would likely result in comparatively more effects to wildlife and sensitive species than to similar alternatives carried forward for detailed analysis in the Draft EIS.

2.7.1.2 Increased Use of Mass Transit

Comments received during the scoping process suggested the increased use of mass transit as a Northern Corridor alternative for consideration. Transit usage in the St. George urbanized area is currently limited by the size of the area, the number of routes, and the locations served. With full implementation of the transit improvements shown in the DMPO Regional Transportation Plan, 2050 transit use accounts for less than 1 percent of all trips (DMPO 2019). Based on local planning and available funding, it is unreasonable to assume the St. George urbanized area could develop a robust transit system within the planning horizon represented by the Draft EIS that would eliminate a substantial amount of vehicle trips from the transportation system. The Increased Use of Mass Transit Alternative would be substantially similar to the No Action Alternative and was not carried forward for detailed analysis in the Draft EIS.

2.7.1.3 Active Transportation

Comments received during the scoping process suggested active transportation, including pedestrian and bicycle facilities, as a Northern Corridor alternative for consideration. Non-motorized travel in the St. George urbanized area represents a miniscule amount of all travel and is insignificant when it comes to serving the area's transportation needs. The Active Transportation Alternative would not meet the future east-west travel demand and reduce future intersection congestion within the St. George urbanized area and would be substantially similar to the No Action Alternative. This alternative was not carried forward for detailed analysis.

2.7.1.4 Land Use / Growth Regulation

Comments received during the scoping process suggested limiting development in Washington County, or setting growth regulations as a Northern Corridor alternative for consideration. Land use planning, including existing and planned development, is controlled by the local municipalities within Washington County as outlined in each city's general planning documents. Limiting development in Washington County, or setting growth regulations, is inconsistent with current local government general land use and zoning plans. The Land Use/Growth Regulation Alternative would be inconsistent with the managing objectives of the local municipalities over land use planning and its implementation is remote or speculative. Therefore, the alternative has been eliminated from detailed analysis in the Draft EIS.

2.7.1.5 Community Transportation Alternative

During the scoping process, the nonprofit organization Conserve Southwest Utah presented their proposed "Community Transportation Alternative" which includes the following alternatives, ranging from roadway, land use, and transit to active transportation options:

- Alternative 1: Red Hills Parkway – I-15 Viaduct/Flyover Connection.
- Alternative 2: Improvements to Red Hills Parkway between I-15 Exits 8 and 13.
- Alternative 3: More Porous I-15 to Move Traffic North-South around Congestion Areas. This sub-alternative suggests new I-15 underpass crossings on 400 East, 700 East, and 1240 East.
- Alternative 5: Implement/Plan for Technological Improvements (i.e., traffic management using technology).
- Alternative 6: Implement Congestion Reduction Land Use Principles (Vision Dixie).
- Alternative 7: Downtown St George Loop.
- Alternative 8: Address Moving People Rather than Vehicles - Transit Options.
- Alternative 9: Long-term Thru-Traffic St. George Bypass.
- Alternative 10: Industrial Park Reuse.

Several of the alternatives suggested as part of the Conserve Southwest Utah's Community Transportation Alternative are similar to other alternatives that have been considered as part of the alternative development in the planning process for the Draft EIS. Based on the following conclusions, the Community Transportation Alternative has been eliminated from detailed analysis in the Draft EIS:

- Alternatives 1, 2, and 7 include suggested roadway projects that are being considered as standalone Northern Corridor alternatives, including the Red Hills Parkway Expressway, Widen Red Hills Parkway Alternative, and the St. George/100 South One-way Couplet Alternative as described previously.
- Land use planning, including existing and planned development, is controlled by the local municipalities within Washington County as outlined in each city's general planning documents. Alternatives 5, 6, and 10 of the Community Transportation Alternative, as it relates to land use planning and traffic management, are not in the decision space of this planning process. Land use planning and traffic management are under the decision authority of the local jurisdictions and are outside the decision space for this Draft EIS; therefore, this alternative has not been carried forward for detailed analysis in the Draft EIS.

- Alternatives 3, 8, and 9 are suggested roadway and transit improvements that would not considerably improve east-west travel demand in the St. George urbanized area when compared to other alternatives analyzed in the Draft EIS and would be substantially similar to the No Action Alternative. Therefore, these alternatives were not carried forward for detailed analysis in the Draft EIS.

2.7.1.6 Widen Red Hills Parkway to Six Lanes

This alternative would widen Red Hills Parkway from four to six lanes between Bluff Street and Green Spring Drive and widen Buena Vista Boulevard from two to six lanes between Green Spring Drive and Washington Parkway (Map 2.7-1). The Widen Red Hills Parkway Alternative would have substantially similar effects to many resources as Alternative 5 carried forward in the Draft EIS, but would result in comparatively greater effects to some resources such as socioeconomics because of the potential need to expand on to adjoining properties. In addition, its implementation is remote or speculative and it may not be economically feasible because of the amount of private property that may need to be acquired to accommodate the larger footprint. Therefore, this alternative was not carried forward for detailed analysis in the Draft EIS.

2.7.1.7 Widen St. George Boulevard

The Widen St. George Boulevard Alternative would widen St. George Boulevard to three lanes in each direction between Bluff Street and River Road (Map 2.7-1). This alternative would have substantially similar effects to many resources as Alternative 6 carried forward in the Draft EIS, but would result in comparatively greater effects to some resources such as socioeconomics because of the need to expand onto more adjoining properties. In addition, its implementation is remote or speculative since it completely falls outside the jurisdiction of the Federal agencies and it may not be economically feasible because of the amount of private property that may need to be acquired to accommodate the larger footprint. Therefore, the Widen St. George Boulevard Alternative was eliminated from detailed analysis in the Draft EIS.

2.7.1.8 Northern Alignment (North of Cottonwood Wilderness Area)

An alignment crossing the Red Cliffs NCA and Dixie National Forest north of the Cottonwood Wilderness Area was considered during the Northern Corridor alternative development process (Map 2.7-1). The Northern Alignment would result in the same traffic conditions as the No Action Alternative, showing no improvement to future congestion or east-west connectivity in the St. George urbanized area. The implementation of this alternative is remote or speculative because of the increased length of the potential roadway and the associated increased cost, which may make it economically infeasible to construct since it does not result in reduced congestion. Therefore, the Northern Alignment is not considered a reasonable alternative to the proposed action and was not carried forward for detailed analysis.

2.7.2 Red Cliffs NCA RMP Amendment Alternatives Considered but Eliminated

2.7.2.1 Different Locations or Widths of ROW Corridor

These alternatives would have located a ROW corridor in different areas of the Red Cliffs NCA or would have designated a ROW corridor of different widths. Different locations of a ROW corridor were eliminated from detailed consideration because they do not align with the Northern Corridor alternatives carried forward for detailed analysis and therefore did not meet the BLM's purpose for the amendment, which includes considering alternatives that would allow a ROW for the Northern Corridor to be issued in conformance with the RMP. Different widths of ROW corridor were eliminated from detailed consideration because they were not adequate to accommodate the ROW for the Northern Corridor and other potential future

utilities. A wider ROW corridor would have had comparatively higher impacts on NCA resource values than the alternatives considered in detail.

2.7.2.2 Modifying the Criteria for Issuing ROWs in ROW Avoidance Areas Across the Entire NCA

This alternative would have modified decision LAR-13 in the existing Red Cliffs NCA RMP to amend or eliminate the criteria for issuing a ROW in ROW avoidance areas. This alternative would have allowed the BLM to issue a ROW for the Northern Corridor in the ROW avoidance areas but was eliminated from detailed analysis because it would not be consistent with the purpose and need for amendments to be related to the ROW proposal. This alternative would potentially modify management for other future ROW proposals in other areas of the NCA and it would have comparatively higher impacts on NCA resource values than the more geographically limited Red Cliffs NCA alternatives considered in detail.

2.7.2.3 Amending ROW Avoidance and Exclusion Area Boundaries

This alternative would have modified the existing ROW avoidance and exclusion areas in the existing Red Cliffs NCA RMP to remove portions of the ROW avoidance areas and add additional ROW exclusion areas. Removing portions of the ROW avoidance areas would have allowed the BLM to issue a ROW for the Northern Corridor but was eliminated from detailed analysis because it would have comparatively higher impacts on NCA resource values than the alternatives considered in detail. Adding additional ROW exclusion areas was eliminated from detailed analysis because this change would not be consistent with the BLM's purpose for the amendment, which focuses on management actions related to responding to the ROW application for the Northern Corridor in the Red Cliffs NCA.

2.7.3 Washington County Habitat Conservation Plan and Incidental Take Permit

During development of the HCP, the USFWS worked with Washington County on various approaches for the HCP. Section 10 of the ESA and its regulations require that the HCP describe actions the applicant considered as alternatives to the take that would result from the proposed action and the reasons why they are not using those alternatives. The USFWS HCP Handbook recommends that the applicant should focus on significant differences in project design that would avoid or reduce the take.

2.7.3.1 Reduced Take Alternative

During preparation of the Draft Amended HCP, an alternative explored to minimize take included using the original 1995 HCP and 1996 ITP take metrics, limiting the loss to 12,264 acres of occupied Mojave desert tortoise habitat. This alternative does not meet the purpose and need for the USFWS's action analyzed in this Draft EIS since it does not ensure regulatory certainty because it likely would not provide sufficient take for the developing communities for the next 25 years.

2.7.3.2 Smaller Permit Area

During preparation of the Draft Amended HCP, the USFWS and the County also discussed evaluating a smaller permit area as an alternative to the taking, focusing only on areas where known desert tortoises overlapped with known future development areas. This would have resulted in less take of tortoise because less occupied habitat or potential habitat would have been destroyed. This alternative does not meet the purpose and need for the USFWS's action analyzed in this Draft EIS; it does not meet the HCP community goals and objectives of providing regulatory certainty or streamlining the ESA compliance process (e.g., if a landowner in tortoise habitat resided outside the Permit Area and would need to provide their own HCP with its own conservation strategy at a later date).

2.7.4 St. George Field Office RMP Amendment Alternatives Considered but Eliminated

2.7.4.1 Including Implementation-Level Travel and Recreation Planning

This alternative would have included an implementation-level recreation area management plan, Travel Management Plan, or both in the BLM's alternatives for the management of proposed Reserve Zone 6. This alternative was eliminated from detailed consideration because it was not reasonable at this time. The completion of the implementation-level plans and their associated conservation uplift is not required to be effective until the time at which the take of Mojave desert tortoise or its habitat associated with the potential construction of the Northern Corridor occur, the BLM is currently in the process of completing a separate implementation-level Travel Management Plan for the entire SGFO, and completing these implementation-level actions in the future allows additional time for detailed planning with the HCP Partners and use of resources that would be provided by Washington County under the revised HCP.

2.7.4.2 More or Less Restrictive Recreation Management

This alternative would have considered more or less restrictive recreation management on BLM-administered lands in proposed Reserve Zone 6. This alternative was eliminated from detailed consideration because it did not meet the BLM's purpose for the SGFO RMP Amendment, which includes amending the RMP to be consistent with the management of proposed Reserve Zone 6 included in the Washington County HCP.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the existing condition of the environment that could be affected by implementing the Federal actions described in Chapter 2 and the potential effects on the existing environment that could result from implementation of these Federal actions.

3.1.1 Background

Prior to initiating the analysis described in this chapter, the BLM and the USFWS completed agency and public scoping to determine the issues that require analysis in the Draft EIS (refer to Section 1.5). Table 3.1-1 identifies the resources that were evaluated and were determined to be either not present or not impacted by one or more of the Federal actions analyzed in this Draft EIS. Resources not present or not impacted are not addressed in the analysis for those actions indicated. While both the BLM and the USFWS staff supported the review of resources for each action, the BLM made the final determination of which resources were analyzed for the Northern Corridor and RMP amendments, and the USFWS made the final determination of which resources were analyzed for the issuance of an ITP to Washington County.

The size of the analysis area for each resource was determined by the locations where impacts on that resource could occur and therefore varies by resource. The four Federal actions and their geographic scope are as follows:

1) The potential Northern Corridor ROWs identified on Map 2.2-1 encompass up to a 500-foot-wide ROW for each alternative.

2) The Red Cliffs NCA RMP Amendment may alter the management of a 600-foot-wide swath of BLM-administered lands surrounding Northern Corridor Alternatives 2, 3, and 4.

3) The SGFO RMP Amendment may alter the management of BLM-administered lands within proposed Zone 6.

4) The issuance of an ITP by the USFWS may affect areas that contain Mojave desert tortoise habitat on non-Federal lands in Washington County, lands within proposed Zone 6, and lands within the Reserve.

3.1.2 Analysis Methods and Assumptions

Potential impacts are identified as direct or indirect effects and are described in terms of type, context, duration, and intensity, as generally defined here.

Direct and indirect impacts: Direct impacts are caused by a management action or implementation of an alternative and occur at the same time and place. Indirect impacts result from implementing a management action or alternative and are reasonably certain to occur but usually occur later in time or are removed in distance.

Context: Context describes the area or site-specific, local, or regional location where the impact would occur. Site-specific impacts would occur at the location of the management action, local impacts would occur in the general vicinity of the action area, and regional impacts would extend beyond the general vicinity of the management action.

Intensity: Intensity describes the impact and its anticipated duration and context. Quantitative data are used to provide additional detail where possible.

Table 3.1-1. Resources Not Addressed for One or More Actions

Resource or Issue	Northern Corridor ROW	Red Cliffs NCA RMP Amendment	SGFO RMP Amendment for Proposed Zone 6	Issuance of ITP to Washington County	Rationale
Air Quality Climate Change and Greenhouse Gas Emissions	Analyze	Not Impacted	Not Impacted	Not Impacted	*Red Cliffs NCA RMP*: The NCA RMP amendments are an administrative action with no effect on air quality. *SGFO RMP*: Management changes within proposed Zone 6 would not degrade air quality. *ITP*: The potential issuance of an ITP would not change land use in a manner that would influence air quality.
Noise	Analyze	Not Impacted	Not Impacted	Not Impacted	*Red Cliffs NCA RMP*: The NCA RMP amendments are an administrative action with no effect on noise. *SGFO RMP*: Management changes in proposed Zone 6 would not change noise levels from current conditions. *ITP:* The potential issuance of an ITP would not change land use in a manner that would influence noise.
Area of Critical Environmental Concern (ACEC)	Not Present	Not Present	Analyze	Not Impacted	*Highway ROW and Red Cliffs NCA RMP*: There are no ACECs within the area impacted by these actions. *ITP*: With the exception of the specific actions related to proposed Zone 6 analyzed in detail, the USFWS's issuance of a new ITP would not affect ACECs because all development authorized by the HCP would occur on non-Federal lands.
Environmental Justice	Analyze	Analyze	Analyze	Not Impacted	*ITP:* Development on non-Federal lands would occur with or without the ITP so the alternatives do not influence the potential to affect environmental justice populations.
Fire and Fuels Management	Analyze	Analyze	Analyze	Not Impacted	*ITP:* With the exception of the specific actions related to proposed Zone 6 analyzed in detail, the USFWS's issuance of a new ITP would not affect BLM fire and fuels management because all development authorized by the HCP would occur on non-Federal lands.
Hazardous Materials and Solid Waste	Analyze	Analyze	Analyze	Not Impacted	*ITP:* Development on non-Federal lands would occur with or without the ITP so the alternatives do not influence the potential generation of waste or development in areas previously impacted by hazardous material spills or solid waste disposal.
Human Health and Safety	Analyze	Analyze	Not Impacted	Not Impacted	*SGFO RMP:* Management actions for proposed Zone 6 are unlikely to influence human health and safety risks. *ITP:* Development on non-Federal lands would occur with or without the ITP so the alternatives would not influence human health and safety.

Resource or Issue	Northern Corridor ROW	Red Cliffs NCA RMP Amendment	SGFO RMP Amendment for Proposed Zone 6	Issuance of ITP to Washington County	Rationale
Lands with Wilderness Characteristics	Not Present	Not Present	Not Present	Not Impacted	*All Actions*: No lands with wilderness characteristics are within the area impacted the actions proposed on BLM-administered lands. The USFWS's issuance of a new ITP would not affect lands with wilderness characteristics because all development authorized by the HCP would occur on non-Federal lands.
BLM Lands and Realty	Analyze	Analyze	Analyze	Not Impacted	*ITP:* With the exception of the specific actions related to proposed Zone 6 analyzed in detail, the USFWS's issuance of a new ITP would not affect BLM-administered lands and realty actions because all development authorized by the HCP would occur on non-Federal lands.
Livestock Grazing	Not Present	Not Present	Analyze	Not Impacted	*Highway ROW and Red Cliffs NCA RMP:* The lands within the Red Cliffs NCA are unavailable for livestock grazing. *ITP:* The decisions to be made by the USFWS related to the HCP would not affect livestock grazing outside of proposed Zone 6.
Mineral Resources	Not Impacted	Not Impacted	Analyze	Analyze	*Highway ROW and Red Cliffs NCA RMP:* The lands within the Red Cliffs NCA are withdrawn from locatable mineral entry, mineral materials sales, and fluid mineral development.
NCAs	Analyze	Analyze	Not Present	Not Impacted	*SGFO RMP:* The planning area for the SGFO RMP does not include any NCAs. *ITP:* The ITP that may be issued would address take of Mojave desert tortoise on non-Federal lands and would not affect the management of resources in NCA.
Prime and Unique Farmland	Analyze	Not Present	Analyze	Not Impacted	*Red Cliffs NCA RMP:* There are no prime and unique farmlands within the NCA. *ITP:* The issuance of an ITP would not influence conversion of prime or unique farmland or farmlands of statewide importance.
Recreation Resources	Analyze	Analyze	Analyze	Analyze	*ITP:* With the exception of recreation management changes in proposed Zone 6, issuance of an ITP would not affect recreation resources throughout the county.

Resource or Issue	Northern Corridor ROW	Red Cliffs NCA RMP Amendment	SGFO RMP Amendment for Proposed Zone 6	Issuance of ITP to Washington County	Rationale
Endangered Species Act (ESA) Section 6 Land Acquisition Grants	Analyze	Not Present	Not Present	Not Impacted	*Red Cliffs NCA RMP:* ESA Section 6 grants are awarded for non-Federal lands; therefore, no Section 6 lands are present within the NCA. *ITP:* The ITP is an administrative action and parcels acquired within the Reserve or on other non-Federal lands within the county using ESA Section 6 land grants would be unaffected by issuance of the ITP. *SGFO RMP:* No Section 6 lands occur in proposed Zone 6.
Land and Water Conservation Fund (LWCF) Act Lands [Section 6(f) Properties]	Analyze	Not Impacted	Not Present	Not Impacted	*Red Cliffs NCA RMP and ITP:* These actions are administrative and would not result in a conversion of Section 6(f) properties to a non-compliant use. *SGFO RMP:* No Section 6(f) properties occur in proposed Zone 6.
BLM Transportation and Travel Management	Analyze	Analyze	Analyze	Not Impacted	*ITP:* The HCP addresses development on non-Federal lands and would not affect BLM travel and transportation management.
Visual Resources	Analyze	Analyze	Analyze	Not Impacted	*ITP*: The decisions to be made by the USFWS related to the issuance of an ITP would not affect visual resources outside of Zone 6.
Wild and Scenic Rivers	Not Present	Not Present	Not Impacted	Not Impacted	*All Actions*: Decisions to be made would not affect wild and scenic rivers.
Wild Horses and Burros	Not Present	Not Present	Not Present	Not Present	*All Actions*: There are no Federally managed wild horses or burros in the NCA or the SGFO RMPs, or the development areas on non-Federal lands that would be covered by the ITP.
Woodlands and Forestry	Not Present	Not Present	Not Impacted	Not Impacted	*Highway ROW and Red Cliffs NCA RMP:* Red Cliffs NCA has been closed to woodland harvesting since 1999. *SGFO RMP and ITP*: The USFWS's issuance of a new ITP would not affect woodlands management because all development authorized using the ITP would occur on non-Federal lands and there are no woodlands within proposed Zone 6.

Duration: For the evaluation of the Northern Corridor and other construction-related impacts, short-term impacts are typically changes that occur through the construction period. Long-term impacts are those that extend into the post-construction period until disturbed areas become stabilized, which can vary with seasonal conditions but typically take approximately 1 to 2 years. Impacts that would remain for the life of the project, which would be the 30-year term of the ROW grant and possibly longer if renewed, were considered permanent for analysis purposes.

Assumptions for analysis were developed to assist in determining the potential impacts of the alternatives on the affected environment. The assumptions do not constrain or define management and are based on expected trends, demands on resource uses, observations, historical trends, and professional judgment. Assumptions applicable to all resources and resource uses are described in the following text. Resource-specific assumptions are described in the sections that follow.

The following assumptions were used in the analysis for all resources:

- Future implementation-level Federal actions (e.g., completion of a recreation area management plan for proposed Zone 6 and review of a future utility application in the Red Cliffs NCA) would be subject to further environmental review, including NEPA, NHPA, and ESA compliance, as appropriate.
- All authorized and casual uses would comply with agency restrictions and regulations pertaining to that use.
- As described in Section 2.4, the USFWS is using best available information to evaluate the ROW alternatives and conservation options depending on the alternative selected. As part of this analysis, the USFWS is considering using a modeling approach or other tools to evaluate whether various measures—such as habitat restoration, enhancing or providing for additional passage of Mojave desert tortoise through the Northern Corridor or other existing roadways, and/or other actions that would provide additional conservation or reduce impacts on Mojave desert tortoise— should be included to minimize and mitigate impacts to the Mojave desert tortoise. This analysis could be used by the USFWS to evaluate potential reasonable and prudent alternatives, measures, and other terms and conditions if the BLM initiates formal ESA Section 7 consultation on a Northern Corridor alternative that impacts the Reserve. Where possible, the priority is to mitigate impacts at the site of the activity. However, depending on the Northern Corridor alignment that is ultimately selected, the USFWS may determine that additional actions, beyond those that may occur onsite, may be required to meet legal requirements. Conservation measures would be identified in the Final EIS with appropriate analysis to support a decision to issue an ITP, if that alternative is selected. If a Northern Corridor alignment within the NCA is selected, any conservation measures applied to the selected alignment will be incorporated into the final plan of development for the roadway. Any other conservation measures required on Federal lands outside of a selected alignment may be subject to subsequent environmental review, including NEPA, NHPA, and ESA compliance.

The best available data were used in the preparation of the analysis contained in the Draft EIS. The data have been gathered from a variety of sources, including the BLM and the USFWS staff, other agencies, field investigations completed to support the analysis, published and unpublished reports, databases, and websites. The nature of geospatial calculations, which might include processing byproducts and differences in spatial reference, may cause minor rounding errors and variance in agency databases, resulting in minor differences in area and length results. The scope of the impact analysis is commensurate with the level of detail of the management actions presented in Chapter 2 and the availability, quality, or both, of data necessary to assess impacts. Where appropriate, indicators are presented for each resource or resource use to further describe current conditions and potential impacts. However, certain information may not be available for some resources. Therefore, some impacts can be discussed only in qualitative terms.

Geographic information system (GIS) data have been used to describe resources, analyze and compare potential impacts among the alternatives, and generate the maps in Appendix B. These maps should be reviewed in conjunction with the impact analyses. The use of calculations depends on the quality and availability of data. Acreage figures and other numbers are approximate projections for comparison and analysis only; readers should not infer that they reflect exact measurements. For example, the Red Hills Parkway Expressway environmental analysis is based on a conceptual roadway design that assumes no additional ground disturbance outside the current fencing would be necessary. However, geospatial information related to ROWs has been acquired via remote sensing, and ground-truthing during final design would be necessary to resolve inconsistencies in the location of desert tortoise exclusion fence, property lines, and roadway design features that may result in very minor additional impacts that have not been considered.

3.2 Vegetative Communities Including Noxious Weeds and Invasive Species

3.2.1 Affected Environment

Washington County is in an ecologically rich and diverse transition zone where ecoregions with varying physiography, precipitation, soils, and climates converge, contributing to the county having the highest vascular plant species richness of any county in Utah. The analysis area defined for this section herein is referred to as the Mojave Desert Tortoise Analysis Area and includes all potential and suitable Mojave desert tortoise habitat modeled inside the HCP Permit Area (up to 4,000-feet elevation) with an additional 1,000 feet of elevation included to capture future habitat expansion, meaning the area includes current and future Mojave desert tortoise habitat up to 5,000-feet elevation. The Mojave Desert Tortoise Analysis Area is approximately 242,000 acres and falls predominantly within the warm desert's (deserts with very hot summers and little winter rainfall) Mojave Basin and Range ecoregion (Map 3.2-1). The Mojave Basin and Range ecoregion supports creosote bush desert scrub-dominated basins (at elevations of 2,200 to 4,000 feet), sparsely vegetated arid foot slopes (at elevations of 3,000 to 5,000 feet), and sparsely vegetated mountain woodland and shrublands (at elevations of 4,000 to 7,800 feet; Woods et al. 2001).

3.2.1.1 Dominant Vegetation Communities

For ease of descriptive, comprehensive, and analytical purposes in this section, the larger Mojave Desert Tortoise Analysis Area is delineated into three smaller analysis areas that will experience varying degrees of impacts resulting from implementation of the proposed action alternatives. The analysis areas are as follows: the Red Cliffs NCA/Red Cliffs Desert Reserve[1] (only areas that support Mojave desert tortoise habitat), the Proposed Zone 6 Analysis Area (6,760 acres out of 6,813 are considered occupied Mojave desert tortoise habitat), and the Analysis Area for the HCP.[2] There are 105 distinct vegetation communities identified within the larger Mojave Desert Tortoise Analysis Area, as mapped using the U.S. Department of Agriculture and U.S. Department of the Interior joint LANDFIRE Remap 2016 (updated 2019) mapping system (refer to Appendix E, Ecological Systems [Vegetation Communities] within the Mojave Desert Tortoise Analysis Area, to review the full list). For ease of comprehension, the 105 vegetation communities have been combined into groups based on similar characteristics (physiognomy) and dominance across the

[1] The Red Cliffs NCA and Red Cliffs Desert Reserve are two distinct entities, as the Red Cliffs NCA pertains only to the public lands administered by the BLM. However, the Red Cliffs NCA boundary encompassing those public lands, as well as State, private, and Tribal lands, is similar to the Red Cliffs Desert Reserve boundary and is grouped together here; each term is used independently throughout this section based on the entity being referred to.

[2] The Analysis Area for the HCP includes all Mojave desert tortoise suitable habitat and potential habitat (Mojave Desert Tortoise Analysis Area) identified on private and State-owned land (i.e., excludes Federal and Tribal lands) outside the Red Cliffs Desert Reserve boundaries.

Mojave Desert Tortoise Analysis Area; these are listed in Table 3.2-1 and displayed in Maps 3.2-2a and 3.2-2b, 3.2-3, and 3.2-4. Vegetation groupings within the Mojave Desert Tortoise Analysis Area, in order of prevalence, include desert scrub, exotic invasive species-dominated systems, shrublands, pinyon-juniper woodlands, and sagebrush. These dominant vegetation communities, as well as riparian communities, are described herein. For conciseness, several ecological systems mapped throughout the Mojave Desert Tortoise Analysis Area are not included in Table 3.2-1 because they represent less than 1 percent of the overall vegetation cover in the analysis area and are therefore not discussed further.

Table 3.2-1. Grouped LANDFIRE Vegetation Ecological Systems throughout the Analysis Areas

Ecological System Groups	% Cover, Mojave Desert Tortoise Analysis Area (approximately 242,000 acres)	% Cover, Red Cliffs Desert Reserve - Mojave Desert Tortoise Analysis Areas [a] (approximately 41,500 acres)	% Cover, Proposed Zone 6 Analysis Area (approximately 6,800 acres)	% Cover, Analysis Area for the HCP (approximately 70,515 acres)
Desert Scrub	67%	68%	88%	66%
Exotic Invasive Species	14%	22%	10%	13%
Shrubland	5%	3%	1%	5%
Pinyon-Juniper Woodland	4%	3%	0.1%	4%
Sagebrush	3%	0.1%	None mapped	3%
Developed	2%	1%	<0.5%	5%
Chaparral	2%	3%	<0.1%	0.5%
Sparsely Vegetated	1%	<0.1	1%	1%
Other [b]	1.5%	<0.4%	None mapped	2%
Riparian and Washes	<0.3%	0.1%	None mapped	<0.5%
Open Water	0.1%	0.1%	None mapped	<0.5%
Total	**100%**	**100%**	**100%**	**100%**

[a] The percent cover was calculated by incorporating all Mojave Desert Tortoise Analysis Area lands within the Red Cliffs Desert Reserve boundary, regardless of landownership (i.e., BLM, State, or private).

[b] Other = Vegetation communities that make up less than 1% of the total cover of the area.

Notes:

<= less than
% = percent

Desert Scrub: This group ranges from a sparse, mostly barren ground surface to a moderately dense layer (1 to 50 percent cover) of evergreen or drought-deciduous, broad-leaved shrubs and/or succulent species adapted to an environment with little water availability. Dominant shrubs may include creosotebush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), saltbush (*Altriplex canescens*), big sagebrush (*Artemisia tridentata*), yuccas (*Yucca* sp.), blackbrush (*Coleogyne ramosissima*), or rabbitbrush (*Ericameria* sp. or *Chrysothamnus* sp.). The exotic invasive forbs, cheatgrass (*Bromus tectorum*), red brome (*B. rubens*), and African mustard (*Malcomia africana*) have been identified as a dominant understory throughout this community group in the analysis areas (Miller 2018). The Desert Scrub group includes the dominant vegetation types Mojave Mid-Elevation Mixed Desert Scrub and Sonora-Mojave Creosotebush-White Bursage Desert Scrub, which is becoming a rare community in Washington County, presumably because of removal and development within the community (pers. com. Kellam 2019).

Exotic Invasive Species: This group represents all forms of vegetation from grasslands, forbs, shrubs, scrub, and forests, as well as 10 distinct ecological systems in the Mojave Desert Tortoise Analysis Area. This grouping describes vegetation communities that are strongly dominated (greater than 90 percent relative canopy cover) by invasive species, exotic species, or ruderal

species (NatureServe 2017). Exotic and invasive grasses include annual bromes (cheatgrass, red brome), and split grasses (*Schismus arabicus, S. barbatus*). Characteristic forbs may include tall tumble mustard (*Sisymbrium altissimum*), black mustard (*Brassica nigra)*, or African mustard. Within riparian areas, invasive tree species include Russian olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix ramossisimum*; NatureServe 2017). All dominant communities described herein support some degree of exotic invasive species infestation; however, this grouping of vegetation communities is delineated specifically because exotic invasive species completely dominate the native vegetation.

Shrubland: This group is dominated by Colorado Plateau Blackbrush-Mormon-Tea Shrubland, which is found at elevations ranging from 1,800 to 5,500 feet on benchlands, colluvial slopes, and bajadas. Dominant species include blackbrush, Mormon tea (*Ephedra viridis* or *E. Torreyana*), and hop sage (*Grayia spinosa*). Perennial and annual grasses are typically present as well as snakeweed (*Gutierrezia sarothrae*) and rabbitbrush. Ecological systems within this community may be similar to those in the desert scrub group (NatureServe 2018). Cheatgrass, red brome, and African mustard dominate the understory (Miller 2018).

Pinyon-juniper Woodland: This group is dominated by the Great Basin Pinyon-Juniper Woodland community and is characterized by an open to moderately dense tree canopy of pinyon pine (*Pinus monophyla* or *P. edulis*) and Utah juniper (*Juniperus osteosperma*). This community is found on warm, dry sites on mountain slopes, mesas, plateaus, and ridges from 4,000 to 9,200 feet in elevation (NatureServe 2018). Sagebrush and blackbrush may form a dense short-shrub layer as well (NatureServe 2018). Cheatgrass, red brome, and African mustard dominate the understory (Miller 2018).

Sagebrush: This group is characterized as a widespread matrix-forming shrub and grassland on deep and non-saline soils. Within the county, it may be dominated by one of several different sagebrush species (*Artemisia* sp.), including sand sagebrush, fringed sagebrush, big sagebrush, or black sagebrush, and may also be dominated by perennial grasses and forbs. It is found throughout much of the interior western United States at elevations from 2,600 to 9,800 feet (NatureServe 2018). The dominant community type in the Mojave Desert Tortoise Analysis Area is Intermountain Basins Big Sagebrush Shrubland. Cheatgrass, red brome, and African mustard dominate the understory (Miller 2018).

Riparian: A very small percentage of riparian vegetation communities is recorded within the Mojave Desert Tortoise Analysis Area. The two main river systems supporting riparian vegetation are the Santa Clara River and the Virgin River. According to LANDFIRE mapping, dominant riparian vegetation types include Interior West Ruderal Riparian Scrub and North American Warm Desert Riparian woodland, shrubland, and herbaceous communities. Interior West Ruderal Riparian Scrub is defined as low-elevation riparian areas, seeps, and springs that are dominated by nonnative invasive woody species including saltcedar, which can be found along the Virgin River throughout the St. George area (NatureServe 2017).

3.2.1.2 Exotic and Invasive Plant Species

Most vegetation communities in the analysis areas, particularly those described previously, as well as all areas that have been burned in the last two decades (refer to Section 3.22), have been invaded by exotic invasive grasses that are continuing to spread. As reported in the 2016 Red Cliffs NCA Resource Management Plan, exotic annual grasses and forbs reach almost every area inside the Red Cliffs NCA ranging from 5 to 30 percent coverage within the landscape (BLM 2016a). To supplement the LANDFIRE Remap vegetation discussion in Section 3.2.1.1, other types of exotic and invasive species identification efforts throughout the analysis areas are summarized herein.

The U.S. Geological Survey (USGS) modeled early season invasive forbs (red brome, cheatgrass, and African mustard) in Washington County from 2001 to 2010 (Miller 2018). Depending on the year, the model shows early season invasive species touching almost all areas of the county, particularly dominating the southern half, which includes the Red Cliffs Desert Reserve, Proposed Zone 6, and the Analysis Area for the HCP. The spring and early summer of 2005 showed a particularly high density of early invasive species (Miller 2018). The percent cover varies from year to year, depending on weather patterns.

A modeling and mapping effort by The Nature Conservancy (TNC 2011) discovered that vegetation communities within the Red Cliffs NCA are 90 to 100 percent departed ecologically from what their original reference community was described to be (TNC 2011). This is because of the infestation of exotic, invasive annual grasses and forbs and the destruction of native shrubs that are slow to recover from fire.

Mapping efforts by LANDFIRE in 2014, prior to a 2016 base layer mapping revision (Remap), show a large, almost-solid, exotic herbaceous layer (classified as *introduced annual and perennial grasslands and forblands*) in the middle of the Red Cliffs Desert Reserve covering most of the upper western half of Zone 3. An extensive cover of an exotic herbaceous layer also blankets the eastern bajadas of the Beaver Dam Mountains, just west of proposed Zone 6.

Localized vegetation surveys were conducted across the three proposed highway alignments on Federal, State, and private lands within the boundaries of the Red Cliffs NCA in March and April of 2020. Survey methods followed the BLM's assessment, inventory, and monitoring (AIM) protocol and returned results that indicate exotic invasive species represent a substantial amount of the plant cover within the ROW areas specifically. A total of 84 different plant species, or varieties, (including 18 graminoids, 38 forbs, and 28 shrubs/subshrub species) were identified in the AIM survey plots (Vegetation Survey Technical Report; Jacobs 2020f). Averaged across all plots, only about one-fourth of these proposed alternative alignments are dominated by native vegetation, predominantly creosote bush, Mormon tea blackbrush, broom snakeweed, Sandberg bluegrass (*Poa secunda*), and big galleta (*Pleuraphis rigida*). Across the 46 plots surveyed, more than 73 percent of the foliage cover identified inside the AIM plots was made up of five exotic invasive plant species: cheatgrass (46 percent), redstem stork's bill (*Erodium cicutarium*) (12 percent), split/Mediterranean grass (6 percent), tall tumble mustard (5 percent), and red brome (4 percent). Several other unidentifiable grasses, forbs, and shrubs were documented during the effort. The T-Bone Mesa Alignment supports a minimum of 75 percent foliar cover of exotic or invasive species, of which 52 percent is cheatgrass (Vegetation Survey Technical Report; Jacobs 2020f). The UDOT Application Alignment supports a minimum foliar cover of 67 percent exotic or invasive species, of which 41 percent is cheatgrass (Vegetation Survey Technical Report; Jacobs 2020f). The Southern Alignment supports a minimum foliar cover of 78 percent exotic or invasive species, of which 46 percent cover is cheatgrass, and 14 percent is split/Mediterranean grass (Vegetation Survey Technical Report; Jacobs 2020f).

3.2.2 Environmental Consequences

Native woody vegetation within the Mojave Desert Tortoise Analysis Area is slow-growing and even slower to recover when directly impacted. Exotic invasive vegetation, specifically annual grasses and forbs, is fast growing and typically spreads as a result of direct impacts (e.g., ground-disturbing activities including construction and fire). Both native and exotic invasive vegetation will be directly and indirectly impacted by implementation of the proposed action alternatives. Direct impacts could include complete removal of plants, soil destruction, root compaction, and trampling because of construction within the ROW and other development areas. Indirect impacts include increased dust deposition outside of the impact areas during construction, which could reduce plant reproductive success; the unintentional spread of exotic invasive species because of

ground disturbance and seed dispersal; the removal of seed sources and disruption to pollination and reproductive success because of fragmentation of vegetation communities; and increased exposure to the urban interface, which brings in human-related disturbances (e.g., trampling from recreation and increased fire risk).

3.2.2.1 Analysis Methods and Assumptions

Analysis for vegetation communities is conducted by calculating the presumed loss of acres of vegetation from the footprint for each alternative and the presumed conservation and calculation of acres protected by conserving land as applicable. A consolidated and grouped LANDFIRE dataset using Existing Vegetation Types was used to describe the analysis areas and to summarize impacts. The Existing Vegetation Type is mapped using modeling, field data, Landsat imagery, elevation, and biophysical gradient data (USGS 2019a). In addition, a 1-kilometer buffer was placed around each proposed new highway ROW (i.e., T-Bone Mesa Alignment, Utah Application Alignment, and Southern Alignment) and the Analysis Area for the HCP. A 300-foot buffer was placed around each proposed existing road expansion (i.e., Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet). This buffer represents the geographical limit for the spread of dust and dust deposition from construction activities as well as the potential spread of exotic invasive species outward from the ground disturbance areas.

The following assumptions apply to this analysis:

- All vegetation (i.e., vegetation communities) located within the boundaries of the proposed Northern Corridor ROWs and within the Analysis Area for the HCP is presumed to be directly and permanently impacted, regardless of where the ground disturbance would take place. Vegetation may be graded, scraped, removed, trampled, compacted, and broken by equipment and crews during construction or on access roads and staging areas. Therefore, vegetation is presumed to be permanently impacted because of the nature and slow re-growth of the desert vegetation.
- Indirect impacts from dust deposition, as well as from the spread of exotic invasive species, is presumed to extend up to 1 kilometer from the edge of the ROW boundaries for Alternatives 2, 3, and 4, and the Analysis Area for the HCP; and up to 300 feet from the edge of the ROW boundaries for Alternatives 5 and 6.
- Amendments made to the Red Cliffs RMP and SGFO RMP would not result in direct impacts to vegetation communities; however, amendments will facilitate the potential for future impacts. Future impacts are discussed under the ROW and HCP Covered Activities discussions.
- Urban expansion and development will continue regardless of if the HCP is amended. For the purposes of this analysis, development on private lands within the Analysis Area for the HCP is presumed to continue, although additional regulatory permitting requirements could delay some development projects where avoidance of take of desert tortoise may not be possible.
- For the sake of analysis, it is presumed all lands that fall within the Analysis Area for the HCP could eventually be developed and therefore permanently impact vegetation communities. The total impacts described under this action are understood to be the maximum potential impact (i.e., if all private land is developed) with regard to vegetation communities and represent impacts in perpetuity.
- Approximately one-third of the Proposed Zone 6 Analysis Area falls within the Red Bluff ACEC, which provides specific protections for biological and natural resources. Protections include recreation and off-highway vehicle (OHV) travel limited to designated roads and trails and increased stipulations on mineral materials leasing. Protection benefits already provided to lands within the ACEC are not included within the beneficial impacts provided by designation of the Proposed Zone 6 Analysis Area.

- Because of the nature of geospatial calculations, which might include processing byproducts and differences in spatial reference, minor rounding errors and variance in agency databases can result in minor discrepancies in area and length results.

3.2.2.2 Direct and Indirect Impacts from Alternative 1

Alternative 1, the No Action Alternative, would result in no direct and adverse impacts to native vegetation communities within the Red Cliffs NCA (Tables 3.2-2 through 3.2-5). All vegetation communities within the Analysis Area for the HCP have potential to be directly and adversely impacted as a result of regular development throughout the St. George area (Table 3.2-4). However, if development is slowed under the No Action Alternative because of regulatory permitting in areas where potentially suitable desert tortoise habitat occurs and avoidance of take may not be possible, the speed of direct impacts to vegetation communities could be reduced in the short-term. Dust and exotic invasive species spread would continue because of regular development on private lands. Uses of vegetation communities within the Proposed Zone 6 Analysis Area would continue as previously defined in the SGFO RMP, including continued protections on ACEC lands, continued grazing, and the potential for mineral exploration in specific areas. There would be no additional protections to vegetation communities (Table 3.2-5) because the Proposed Zone 6 Analysis Area would not be added to the Red Cliffs Desert Reserve.

3.2.2.3 Direct and Indirect Impacts from Alternative 2

Alternative 2, T-Bone Mesa Alignment, would result in direct and adverse impacts to vegetation communities, particularly on native desert scrub vegetation, within the Red Cliffs NCA Mojave Desert Tortoise Analysis Area (Table 3.2-2). Dust deposition on surrounding native plants would occur up to 1 kilometer outside of the ROW (Table 3.2-3) and Analysis Area for the HCP. Exotic invasive species, particularly annual grasses, are anticipated to spread up to 1 kilometer outside of the ROW and Analysis Area for the HCP. All vegetation within the Analysis Area for the HCP (Table 3.2-4) has potential to be directly and adversely impacted as a result of regular development throughout the St. George area under the HCP ITP. Native vegetation within the Proposed Zone 6 Analysis Area would benefit from the establishment of additional conservation measures, including fencing along the eastern borders to prevent OHV access in non-designated areas; reducing or eliminating grazing; reducing the total mileage of designated access routes; and providing additional funding for habitat restoration. These actions would protect and enhance existing native vegetation and potentially reduce the spread of exotic invasive species (Table 3.2-5).

Alternatives B and C for the Red Cliffs NCA RMP Amendment both allow for the designation of a highway ROW within the Red Cliffs NCA; however, Alternative C allows for the option to allow future utility development within the approved ROW. Future development would cause ground disturbance and continue the spread of exotic invasive species as well as potentially impact native vegetation that may have begun to reestablish after the initial disturbances from highway construction. To account for these impacts, all vegetation within the entire highway ROW is assumed to be permanently impacted. However, future indirect impacts from exotic invasive species spread and dust deposition could occur each time a utility is granted a ROW resulting in ground-disturbing activities (such as scraping and trenching).

The SGFO RMP Amendment Alternatives B and C have varying degrees of protections within the Proposed Zone 6 Analysis Area that could specifically impact native vegetation communities. Alternative B provides greater protections within the Proposed Zone 6 Analysis Area by managing it as an exclusion area for new ROWs and closing the area to camping, livestock grazing, and target shooting. Alternative C allows the Proposed Zone 6 Analysis Area to be managed as an avoidance area for ROWs and, with stipulations or geographic restrictions, allows for livestock grazing, camping, and the discharge of firearms. Compared to Alternative B, Alternative C has a

higher likelihood of causing adverse impacts, particularly by allowing camping and target shooting that could increase the risk of wildfires. In addition, allowing grazing and ROWs has the potential to spread exotic invasive species and cause ground disturbance, soil destruction, and direct impacts to native vegetation.

3.2.2.4 Direct and Indirect Impacts from Alternatives 3 and 4

The types of impacts from Alternatives 3, UDOT Application Alignment, and 4, Southern Alignment, would be relatively similar to those described in Section 3.2.2.3. Alternative 4 would have the greatest impact to desert scrub vegetation communities by removing the highest acreage of desert scrub, specifically creosotebush-white bursage desert scrub, while Alternative 3 would remove the least amount of overall desert scrub vegetation. Tables 3.2-2 through 3.2-5 specify potential impacts to vegetation resources by alternative. Impacts to vegetation within the Analysis Area for the HCP would be the same as described in Section 3.2.2.3.

3.2.2.5 Direct and Indirect Impacts from Alternatives 5 and 6

Impacts on native vegetation communities and exotic invasive species spread from Alternative 5, Red Hills Parkway Expressway, and Alternative 6, St. George Boulevard/100 South One-way Couplet, would be minimal compared to Alternatives 2, 3, and 4. Tables 3.2-2 through 3.2-5 specify potential impacts to vegetation resources. Proposed Zone 6 would not be established, so no additional benefits to native vegetation communities would occur in that area (Table 3.2-5). Impacts to vegetation within the Analysis Area for the HCP would be the same as described in Section 3.2.2.3.

Table 3.2-2. Highway Corridor Impacts on Ecological System Groups per Alignment

Ecological Systems (Vegetation Group)	No Action Alternative (acres)	T-Bone Mesa Alignment (acres)	UDOT Application Alignment (acres)	Southern Alignment (acres)	Red Hills Parkway Expressway (acres) [a]	St. George Boulevard/100 South One-way Couplet (acres)
Desert Scrub	None	236 (155 of CWBDS)	204 (174 of CWBDS)	252 (219 of CWBDS)	3 (1 of CWBDS)	1 (0.7 of CWBDS)
Exotic – Invasive Species	None	23	31	29	None	None
Shrubland	None	7	5	5	None	None
Total [b]	**None**	**266 acres**	**240 acres**	**286 acres**	**4 acres**	**1 acre**

[a] The Red Hills Parkway Expressway environmental analysis is based on a conceptual roadway design that assumes no additional ground disturbance outside the current fencing would be necessary. However, geospatial information related to ROWs has been acquired via remote sensing, and ground-truthing during final design will be necessary to resolve inconsistencies in the location of roadway design features that may result in very minor additional impacts that have not been considered.

[b] The LANDFIRE data are not intended to imply 100 percent accuracy on the ground. Therefore, acres of mapped vegetation groups were rounded to the nearest whole number so as not to give the impression that the calculations are exact. Vegetation groups with less than 1 acre of potential impact (e.g., 0.4 acre of pinyon-juniper woodland) and areas classified as "developed" (specific to the Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet Alternatives) were removed from the table.

Note:

CWBDS = Creosotebush-White Bursage Desert Scrub Community

Table 3.2-3. Highway Corridor Indirect Impacts on Vegetation Groups from Potential Dust and Exotic Invasive Species Spread

Ecological Systems (Vegetation Group)	No Action Alternative (acres)	T-Bone Mesa Alignment (acres)	UDOT Application Alignment (acres)	Southern Alignment (acres)	Red Hills Parkway Expressway (acres)	St. George Boulevard/100 South One-way Couplet (acres)
Chaparral	None	58	16	6	6	None
Desert Scrub	None	3,335	3,320	3,229	32	6
Exotic Invasive Species Dominated	None	433	420	401	1	2
Less than 1% [a]	None	29	38	38	3	1
Riparian	None	1	1	2	3	None
Shrubland	None	110	84	72	None	None
Total [a]	**None**	**3,966**	**3,879**	**3,748**	**45**	**9**

[a] Includes all subdominant vegetation groups with less than 1 percent total impacted coverage (e.g., agriculture, pinyon-juniper woodlands, and sparsely vegetated communities).

Table 3.2-4. HCP Covered Activities Area (Action and No Action) Potential Impacts [a] on Vegetation Communities

Vegetation Group	Acres
Desert Scrub	46,829 (23,763 CWBDS)
Exotic Invasive Species	8,884
Shrubland	3,193
Pinyon-Juniper	2,550
Sagebrush	2,189
Less than 1%	1,397 [b]
Sparsely Vegetated	939
Chaparral	352
Riparian	308
Open Water	189

[a] Maximum potential impact if all private lands within the Analysis Area for the HCP are developed.

[b] Including, but not limited to, the following communities: agriculture, salt desert scrub, grassland, sand shrubland, and greasewood shrubland.

Table 3.2-5. Indirect Beneficial Impacts to Vegetation Communities in Proposed Zone 6

Vegetation Community Groupings	Acres Benefited (inside the ACEC)	Acres Benefited (outside the ACEC)[a]
Desert Scrub	2,050	3,974
Exotic Invasive Species Dominated	268	379
Shrubland	22	42
Sparsely Vegetated	3	53
Pinyon-Juniper	<1	6
Chaparral	2	2
Salt Desert Scrub	1	1
Total	**2,344**	**4,455**

[a] This area includes SITLA lands; prior to being acquired by the BLM, if applicable, protections on SITLA lands would include fencing along the eastern border of the zone and reducing the number of trails within the property.

3.3 Special Status Plants

3.3.1 Affected Environment

Special status plants are defined as those listed as endangered or threatened under the ESA and those listed as sensitive by the BLM. Special status plants within the Mojave Desert Tortoise Analysis Area[3] face threats because of their limited distributions and specialized habitat requirements. For example, many of the special status plants grow on soils that do not support most other plants and that are easily erodible or have required properties that can be easily destroyed (NRCS 2011). Recreation on public lands in the Mojave Desert Tortoise Analysis Area can be destructive to the sensitive soils that many of these plants require. Soil-disturbing activities include off-road vehicle use, mountain biking, and hiking. Plant populations located on private lands are vulnerable to urban development because of the population growth within the St. George area. Other threats include utility and transportation corridors, grazing, fire, mining, invasive species, pest infestations, habitat fragmentation, and climate change (NRCS 2011).

For ease of descriptive, comprehensive, and analytical purposes in this section, the larger Mojave Desert Tortoise Analysis Area is delineated into three smaller analysis areas that will experience varying degrees of impacts resulting from implementation of the proposed action alternatives. These three analysis areas are the Red Cliffs NCA (only areas that support Mojave desert tortoise habitat), the Proposed Zone 6 Analysis Area (6,760 acres out of 6,813 are considered occupied Mojave desert tortoise habitat), and the Analysis Area for the HCP.[4]

3.3.1.1 Federally Listed Plants

Table 3.3-1 lists the five Federally listed plant species known to occur within the Mojave Desert Tortoise Analysis Area and their locations relative to the proposed analysis areas. Each species is described in more detail in the following subsections.

[3] The Mojave Desert Tortoise Analysis Area includes all potential and suitable Mojave desert tortoise habitat modeled in the HCP Permit Area (up to 4,000-feet elevation) with an additional 1,000 feet of elevation included to capture future habitat expansion. In other words, The Mojave Desert Tortoise Analysis Area includes current and future Mojave desert tortoise habitat up to 5,000 feet elevation.

[4] The Analysis Area for the HCP includes all Mojave desert tortoise suitable habitat and potential habitat (Mojave Desert Tortoise Analysis Area) identified on private and State-owned land (i.e., excludes Federal and Tribal lands) outside of the Red Cliffs Desert Reserve boundaries.

Table 3.3-1. Federally Listed Plant Species—Occupied Habitat (Reported Extant Occurrences), Designated Critical Habitat, and Modeled Suitable Habitat within the Boundaries of the Analysis Areas

Species	Mojave Desert Tortoise Analysis Area Occupied Habitat, Critical Habitat, and Suitable Habitat	Red Cliffs Desert Reserve-Mojave Desert Tortoise Analysis Area [a] Occupied Habitat, Critical Habitat, and Suitable Habitat	Proposed Zone 6 Analysis Area Occupied Habitat, Critical Habitat, and Suitable Habitat	Analysis Area for the HCP Occupied Habitat, Critical Habitat, and Suitable Habitat
Dwarf bear-poppy (*Arctomecon humilis*)	• Present • Critical Habitat Not Applicable • Suitable Habitat Present	• Not Present • Critical Habitat Not Applicable • Suitable Habitat Present	• Present • Critical Habitat Not Applicable • Suitable Habitat Present	• Present • Critical Habitat Not Applicable • Suitable Habitat Present
Gierisch mallow (*Sphaeralcea gierischii*) and Critical Habitat	• Present • Critical Habitat Present • Suitable Habitat Present	• Not Present • Critical Habitat Not Present • Suitable Habitat Not Present	• Not Present • Critical Habitat Not Present • Suitable Habitat Not Present	• Not Present • Critical Habitat Present • Suitable Habitat Present
Holmgren (Paradox) milk-vetch (*Astragalus holmgreniorum*) and Critical Habitat	• Present • Critical Habitat Present • Suitable Habitat Present	• Not Present • Critical Habitat Not Present • Suitable Habitat Not Present	• Present • Critical Habitat Present • Suitable Habitat Present	• Present • Critical Habitat Present • Suitable Habitat Present
Shivwits milk-vetch (*Astragalus ampullarioides*) and Critical Habitat	• Present • Critical Habitat Present • Suitable Habitat Present	• Present • Critical Habitat Present • Suitable Habitat Present	• Not Present • Critical Habitat Not Present • Suitable Habitat Present	• Present • Critical Habitat Present • Suitable Habitat Present
Siler pincushion cactus (*Pediocactus* [*Echinocactus utahia*] *sileri*)	• Present • Critical Habitat Not Applicable • Suitable Habitat Present	• Not Present • Critical Habitat Not Applicable • Suitable Habitat Present	• Not Present • Critical Habitat Not Applicable • Suitable Habitat Present	• Present • Critical Habitat Not Applicable • Suitable Habitat Present

[a] The Mojave Desert Tortoise Analysis Area – Red Cliffs Desert Reserve includes all potential and suitable Mojave desert tortoise habitat within the Red Cliffs Desert Reserve boundary, regardless of landownership (i.e., the BLM, State, or private).

Dwarf Bear-poppy (Arctomecon humilis)

The dwarf bear-poppy (also known as dwarf bearclaw poppy) is listed as Federally endangered (USFWS 1979). There is no proposed or finalized critical habitat for the species. It is a mound-forming perennial forb in the Papaveraceae (poppy) family. It grows up to 10 inches in diameter, typically produces 20 to 30 flowers per plant and, less commonly, may produce up to 400 flowers per plant (USFWS 2016). Dwarf bear-poppy habitat is restricted to soil types of the geologic Moenkopi Formation that are gypsum-rich and highly erosive and located within mixed warm desert shrub with sparse vegetation. It is found at elevations of 2,700 to 3,300 feet (USFWS 2013a). The species is endemic to Utah and restricted to approximately 9,000 acres of habitat around St. George in Washington County (USFWS 2016). There are nine recognized populations within Washington County, the larger populations of which are near Red Bluff Hill, Webb Hill, White Dome, Punchbowl Dome, and Atkinville (USFWS 2016, NRCS 2011, UDWR 2019b). Seventy percent (more than 6,000 acres) of available habitat is located on Federal lands managed by the

BLM (USFWS 2016). USFWS modeling has identified potential suitable habitat for the species across the Mojave Basin and Range and the Colorado Plateaus ecoregions, westward to the Nevada border, southward to the Arizona border, and eastward to Zion National Park and southeast to Hildale, Utah (Maps 3.2-1 and 3.3-1a and 3.3-1b). However, actual plant populations (occupied habitat) have so far only been recorded as far east as the Sand Mountain and Warner Valley Spring areas and as far west as the White Hills. Modeled potential suitable habitat is found within the Red Cliffs NCA, proposed Zone 6, and Analysis Area for the HCP.

Occupied Habitat is found within the Analysis Area for the HCP and proposed Zone 6 mapped within the boundaries of the larger Analysis Area for the HCP, which also includes the non-Federal lands within the Proposed Zone 6 Analysis Area. Approximately two-thirds of the records are located on SITLA lands and the rest are on private lands, a small amount of which are designated as conservation lands. General locations of extant occupied habitat for the dwarf bear-poppy (UDWR 2019b) are summarized as follows:

- Harrisburg Dome: A small and newly discovered population adjacent to the Harrisburg Dome (private ownership).
- Warner Valley: Several plants recorded in 2018 in the Warner Valley (SITLA ownership).
- Beehive Dome: Over 600 recorded locations reported in 2016 and 2018 (BLM-administered land and SITLA ownership).
- White Dome: Several records surrounding White Dome (SITLA- and privately owned).
- Price City Hills: A 2016 small population of mature plants north of the Price City Hills abutting a housing development (private ownership).
- Proposed Zone 6: The large populations found within and just eastward of the proposed Zone 6 boundary described in the following paragraph.

Occupied habitat within proposed Zone 6 is mostly found in the western and southern portions of the analysis area where required soils are present. The populations located on BLM-administered lands within this area fall within the Red Bluff ACEC, which was established to protect the known dwarf bear-poppy populations. Currently, a majority of the location records are located on SITLA-owned lands. The abundance of plants within proposed Zone 6 was approximated to be at least 3,000 individuals in 2018, most of which were seedlings or juveniles; however, plant abundance for this species can fluctuate substantially (UDNR 2018). Some of the occupied habitat within proposed Zone 6 is located among heavily used bike trails, contains areas with garbage because of recreationists, and includes areas used for target practice. Other areas of occupied habitat are relatively undisturbed and characterized as high-quality habitat according to notes in the data files (UDWR 2019b).

Dwarf bear-poppy is particularly vulnerable to development and OHV use. Strip mining for gypsum deposits, climate change resulting in prolonged droughts, and other outdoor recreation activities are also potential threats to the plant (NRCS 2011). Fragmentation and increased distances between plants results in a decrease of reproductive success. In addition, propagation and cultivation of the species has not been successful (NRCS 2011). Livestock use may result in trampling of dwarf bear-poppy and its associated plant communities that are alternative food sources for native bees, the principal pollinator for the species. Reduced availability of pollinators because of habitat loss, fragmentation, and degradation could severely reduce dwarf bear-poppy population viability. In addition, several invasive plant species, including African mustard, cheatgrass, barb-wire Russian thistle (*Salsola paulsenii*), redstem stork's-bill, and split grass threaten the dwarf bear-poppy's habitat.

Gierisch Mallow (Sphaeralcea gierischii)

The Gierisch mallow is listed as Federally endangered, and critical habitat was finalized in 2013 (USFWS 2013b). Within Washington County, the Starvation Point Critical Habitat Unit is designated along the Utah and Arizona border south of the Virgin River and north of I-15. The Gierisch mallow is a perennial flowering plant in the Malvaceae (mallow) family with dark red-purple stems, bright green glaborous foliage, and orange flowers. Plant stems typically range in height from 1.5 to 3.5 feet tall. Gierisch mallow is found in warm desert scrub on gypsum outcrops associated with the Harrisburg Member of the Kaibab Formation in northern Mohave County, Arizona, and adjacent Washington County, Utah (USFWS 2012a). Many are found on hillsides or steep slopes (NRCS 2011).

The species is endemic to Mohave and Washington counties (USFWS 2013b). There are 18 known populations restricted to 460 acres in Arizona and Utah. The Utah population is located within 2 miles of the Arizona and Utah border and falls within designated critical habitat boundaries (USFWS 2013b). Only one population is known in Utah and it is estimated to be 5,000 to 8,000 individual plants (USFWS 2013b). All reported occurrences of the species are located on BLM-administered public land (UDWR 2019a). USFWS modeling has identified potential suitable habitat for the species west of the proposed Zone 6 boundary extending to the Beaver Dam Mountains; south of proposed Zone 6 in the Little and Big Round Valley areas; on the Price City Hills, Washington Dome, and Harrisburg Dome; and along the Hurricane Cliffs marking the westernmost boundary of the Colorado Plateaus ecoregion within the county (refer to Maps 3.2-1 and 3.3-2a and 3.3-2b in Appendix B). However, the species has only been reported within the Little Round Valley Area.

No reported occurrences and no occupied habitat are within the analysis areas for proposed Zone 6, the Red Cliffs NCA, or the Analysis Area for the HCP. However, approximately 185 acres of critical habitat are designated on SITLA-administered lands and are located within the Analysis Area for the HCP. An additional 2,031 acres of critical habitat are administered by the BLM within Washington County.

Gierisch mallow is vulnerable to plant loss, habitat loss, and habitat degradation from OHV use, gypsum mining, and livestock grazing, particularly during drought years, which reduces seed production and recruitment (NRCS 2011). Grazing occurs on one allotment, spreading across BLM-administered and SITLA-owned lands that support the species and its suitable habitat. Climate change resulting in extended droughts could further threaten the species. Exotic and invasive species threaten Gierisch mallow habitat during wet years when they can be particularly abundant.

Holmgren (Paradox) Milk-vetch (Astragalus holmgreniorum)

The Holmgren milk-vetch (sometimes referred to as paradox milk-vetch) is listed as Federally endangered (USFWS 2001); critical habitat was finalized for the species in 2006 (USFWS 2006a). Five critical habitat units for Holmgren milk-vetch occur within Washington County: Central Valley, Purgatory Flat, South Hills, State Line, and Stucki Spring. Holmgren milk-vetch is a stemless herbaceous perennial in the Fabaceae (pea) family. It is mostly prostrate with small purple flowers and ranges in height from 1.5 to 4.5 inches (NRCS 2011). It is associated with geological layers or parent materials found within the Moenkopi Formation. The plant is found at elevations between 2,480 and 2,999 feet and adjacent to or above drainages that are tributary to the Santa Clara and Virgin rivers in areas that are sparsely vegetated (less than 15 percent cover; USFWS 2007a). Holmgren milk-vetch is known only to Washington County in Utah and Mohave County in Arizona with an estimated population size of 7,100 plants (pers. com. Lewinsohn 2020).

As of 2007, six populations of Holmgren milk-vetch were known to exist, all within 10 miles of St. George in Utah and Arizona (USFWS 2007a). A population of approximately 300 individuals

recently was discovered east and southeast of the Green Valley Gap and north of Bloomington Hill, along a utility corridor, adjacent to the proposed Zone 6 boundary (UDNR 2018). One population is located within the Proposed Zone 6 Analysis Area in the Stucki Spring Critical Habitat Unit and another is recorded less than 1-mile northeast in the South Hills Critical Habitat Unit, south of Santa Clara, Utah. There are an estimated 350 plants between these two locations (pers. com. Lewinsohn 2020). The Analysis Area for the HCP includes several recorded populations of Holmgren milk-vetch including the Green Valley Gap area, a portion of the State Line and Little Round Valley population east of I-15, and the Central Valley population. The Central Valley population is one of the larger populations, estimated to contain 3,000 plants, within SITLA-owned land located east of I-15 (pers. com. Lewinsohn 2020). A single, disjunct population of approximately 30 plants is recorded southeast of the Red Cliffs NCA near Harrisburg Junction, Utah (within the Purgatory Flat Critical Habitat Unit on BLM-administered land; UDWR 2019a, pers. com. Lewinsohn 2020). USFWS modeling has identified potential suitable habitat for the species within the Mojave Basin and Range ecoregion of the county, specifically inside and surrounding the proposed Zone 6 boundary and south of the Red Cliffs NCA (refer to Maps 3.2-1, 3.3-3a, and 3.3-3b). Occurrences are reported throughout the modeled potential suitable habitat.

Within Washington County, designated critical habitat is located within the following land ownerships: BLM-administered (2,447 acres), SITLA (1,896 acres), private (64 acres), and Washington County (22 acres) (USFWS 2006a). The Proposed Zone 6 Analysis Area includes 140 acres of critical habitat (Stucki Spring unit). The Analysis Area for the HCP includes a total of 1,333 acres of SITLA-owned critical habitat and 90 acres of privately owned critical habitat.

The predominant threat to Holmgren milk-vetch is habitat loss, fragmentation, and plant loss because of development, habitat degradation from OHV use, and competition from exotic and invasive plant species. Habitat fragmentation, utility and roadway development, and trampling from cattle are additional threats (NRCS 2011). Reduced availability of pollinators because of habitat loss, fragmentation, and degradation could severely reduce Holmgren milk-vetch population viability. Direct impacts to the Central Valley population is of particular concern because it supports an estimated 42 percent of all Holmgren milk-vetch individuals and 25 percent of designated critical habitat (pers. com. Lewinsohn 2020). Exotic and invasive annuals make up the highest percentage of living cover in Holmgren milk-vetch habitat, and they tend to emerge prior to Holmgren milk-vetch, thus potentially competing for soil moisture and nutrients. Holmgren milk-vetch is a poor competitor with exotic and invasive annuals; during high precipitation years, Holmgren milk-vetch recruitment is reduced while annual brome cover increases.

Shivwits Milk-vetch (Astragalus ampullarioides)

The Shivwits milk-vetch (*Astragalus ampullarioides*) is listed as Federally endangered (USFWS 2001); critical habitat was finalized for the species in 2006 (USFWS 2006a). Six critical habitat units for Shivwits milk-vetch are within Washington County: Pahcoon Spring Wash, Coral Canyon, Silver Reef, Zion, Shivwits, and Harrisburg Bench and Cottonwood. Shivwits milk-vetch is a perennial forb, in the Fabaceae (pea) family, and ranges in height from 8 to 26 inches. It has cream yellow flowers in a raceme and pinnately compound leaves (NRCS 2011). Shivwits milk-vetch is found in isolated pockets of purple-hued, soft clay soil found on Chinle Formation around St. George. This species is found between 3,018 and 4,363 feet in elevation with sparse habitat (approximately 12 percent cover; USFWS 2007a). Shivwits milk-vetch is known only to Washington County.

Six populations of Shivwits milk-vetch are known to exist, with an estimated total of 4,000 to 5,000 individual plants (USFWS 2007a, NRCS 2011, pers. com. Lewinsohn 2020). One population is located within the Red Cliffs NCA analysis area, north of Harrisburg in the Silver Reef Critical

Habitat Unit. Estimates for this population were 213 plants in 2019 (Meyer et al. 2020). One recorded location is directly adjacent, if not within, the Analysis Area for the HCP. This record is also within the Coral Canyon Critical Habitat Unit and is on SITLA-owned or privately owned land. The total population size within the Coral Canyon Critical Habitat Unit was estimated at less than 200 in 2006 (USFWS 2007a). All other extant populations are associated with designated critical habitat and are located near the Pachoon Spring Wash, Harrisburg, Harrisburg Junction, and Zion National Park. USFWS modeling has identified potential suitable habitat for the species across the Mojave Basin and Range and the Colorado Plateaus ecoregions within the county, including the Red Cliffs NCA and Analysis Area for the HCP (Maps 3.2-1, 3.3-4a, and 3.3-4b).

Within Washington County, Shivwits milk-vetch critical habitat is designated under the following land jurisdiction: National Park Service (1,201 acres), BLM-administered (819 acres), private (85 acres), and SITLA (76 acres) (USFWS 2006a). The Red Cliffs NCA analysis area includes 422 acres spread across two critical habitat units (Silver Reef and Harrisburg Bench and Cottonwood). The Analysis Area for the HCP includes 92 acres spread over three critical habitat units (Coral Canyon, Silver Reef, and Harrisburg Bench and Cottonwood), of which approximately 54 acres are on SITLA-owned lands (Coral Canyon), while the remaining 31 acres are on privately owned parcels.

Threats to Shivwits milk-vetch include plant and habitat loss because of urban expansion, habitat degradation from OHV use, cattle grazing (the plant is highly palatable to domestic livestock), trampling, and soil disturbance (NRCS 2011). Invasive exotic species and increased fire frequencies also pose a threat. Direct impacts are a concern for the two critical habitat units (Coral Canyon and Harrisburg Junction) of the Shivwits milk-vetch that represent approximately 4 percent of the estimated population and as much as 35 percent of known occupied habitat of the species (USFWS 2006a). Development in unoccupied, suitable habitat also limits the potential expansion of the species. Reduced availability of pollinators because of habitat loss, fragmentation, and degradation could severely reduce Shivwits milk-vetch population viability.

Siler Pincushion Cactus (Pediocactus [Echinocactus utahia] sileri)

Siler pincushion (*Pediocactus* [*Echinocactus utahia*] *sileri*) is Federally listed as threatened (USFWS 1993); no critical habitat is designated for the species. Siler pincushion is a small globose cactus in the Cactaceae (cactus) family with yellow petaled flowers with purplish veins (NRCS 2013). It grows up to 10 inches tall and 4.5 inches wide and has blackish brown central spines and white radial spines (NRCS 2013). Siler pincushion cactus grows in Great Basin desert shrub, Mojave desert scrub, pinyon-juniper forestlands, and grasslands on gypsiferous clay and sandy soils from the Moenkopi Formation. It is found at elevations between 2,800 and 5,400 feet (NRCS 2013). The species is known to Kane and Washington counties in Utah and Mohave and Coconino counties in Arizona (NRCS 2013). The total population size for the species was estimated at more than 10,000 individuals in 2006 (USFWS 2008b). The extant populations within Washington County are located along the Utah-Arizona border. The Analysis Area for the HCP includes two areas of occupied habitat of Siler pincushion cactus. One area includes the southern portion of an estimated 1,000 plant population spanning the western slope of the Warner Ridge/Beehive Dome on SITLA-owned land. The other area is along the north and east slopes of White Dome, spread across private conservation land and SITLA-owned lands. USFWS modeling has identified potential suitable habitat for the species across the Mojave Basin and Range and Colorado Plateaus ecoregions within the county, including within the Red Cliffs NCA, proposed Zone 6, and the Analysis Area for the HCP (refer to Maps 3.2-1 and 3.3-5a and 3.3-5b).

Threats to the Siler pincushion cactus include degradation to habitat from OHV use, trampling and grazing by cattle, soil erosion, and mining (NRCS 2011). Plant loss, habitat loss, and habitat fragmentation resulting from land development is of concern for the White Dome population and

other non-Federal lands containing Siler pincushion cactus that represents approximately 2 percent of the estimated population (pers. com. Lewinsohn 2020). Grazing occurs in one allotment, spreading across BLM- and SITLA-owned lands, that contains the Siler pincushion cactus and its habitat.

3.3.1.2 BLM Sensitive Plant Species

Five BLM-listed sensitive plant species are known to occur within the Mojave Desert Tortoise Analysis Area; the species, their required habitat, and their known locations relative to the proposed project actions are listed in Table 3.3-2 and shown in Maps 3.3-6a and 3.3-6b. The table uses location information provided by UDWR as of December 2019 (UDWR 2019b) and lists all records of BLM-listed sensitive plants regardless of whether they are reported within or outside of BLM-administered land. Jurisdiction for BLM-listed sensitive plants is restricted to BLM-administered lands only, and protections do not carry over to non-BLM-administered lands (i.e., the Analysis Area for the HCP).

Table 3.3-2. BLM-Listed Sensitive Species—Known Reported Occurrences in the Analysis Areas

Species	Habitat Description	Mojave Desert Tortoise Analysis Area	Red Cliffs Desert Reserve-Mojave Desert Tortoise Analysis Area [a]	Proposed Zone 6 Analysis Area [b]	Analysis Area for the HCP [c]
Escarpment milk-vetch (*Astragalus striatiflorus*)	Grows in interdunal valleys, sand depressions on ledges and on bars and terraces in stream channels, in pinyon-juniper, ponderosa pine, and sandy desert shrub at 4,900 to 6,600 feet.	Present	Not Present	Not Present	Present
Jones indigo-bush (*Psorothamnus nummularius*)	Shadscale, mat-saltbush, Ephedra, and galleta communities on Mancos Shale Formation, and less commonly on sandy terrace gravels at 4,200 to 4,900 feet elevation.	Present	Present	Not Present	Not Present
Parry sandpaper-plant (*Petalonyx parryi*)	Shadscale, indigo-bush, creosote bush, and ambrosia communities, on Chinle and Moenkopi outcrops between 2,550 to 4,000 feet elevation.	Present	Present	Present	Present
Pinyon penstemon (*Penstemon pinorum*)	Pinyon-juniper, mountain mahogany, Ephedra, oak, sagebrush, and less commonly greasewood communities, often on Claron Limestone or its gravels at 5,600 to 6,700 feet elevation.	Present	Not Present	Not Present	Not Present
Virgin thistle (*Cirsium virginense*)	Hanging gardens, saline seeps and stream terraces at 2,800 to 3,100 feet elevation.	Present	Present	Not Present	Present

[a] The Mojave Desert Tortoise Analysis Area – Red Cliffs Desert Reserve includes all potential and suitable Mojave desert tortoise habitat within the Red Cliffs Desert Reserve boundary, regardless of landownership (i.e., the BLM, State, or private).

[b] Proposed Zone 6 includes 6,813 acres of which 6,760 are considered occupied Mojave desert tortoise habitat; 53 acres were not included as suitable Mojave desert tortoise habitat based on USGS modeled criteria.

[c] BLM sensitive plant jurisdiction is limited to BLM-administered lands only. The Analysis Area for the HCP does not include BLM-administered public land. However, private and State lands may be transferred to BLM ownership in the future.

Sources: NatureServe 2019, Utah Native Plant Society 2020

As described in Table 3.3-2, out of the five BLM sensitive plants in the Mojave Desert Tortoise Analysis Area, three are located within BLM-administered lands within the analysis areas: Jones indigo-bush, Parry sandpaper-plant, and Virgin thistle. Two recorded occurrences of Jones indigo-bush are in the Red Cliffs NCA east of I-15 near Little Purgatory. The population estimate for these occurrences is unknown. This area also includes recorded occurrences of Parry sandpaper-plant. The occupied Mojave desert tortoise habitat within the Proposed Zone 6 Analysis Area supports at least two locations of Parry sandpaper-plants, one within BLM-administered lands and one currently on SITLA-owned lands. There are an estimated 100 individual plants between these populations (UDNR 2018). In addition, a few Virgin thistle recorded locations are within and directly adjacent to the Red Cliffs NCA in the vicinity of the Red Hills Parkway, including one near the intersection of Skyline Drive (UDWR 2019b). The abundance of plants at each location is unknown; however, because of its preferred habitat within hanging gardens and seeps, the Virgin thistle is likely to be relatively confined to its reported locations within wet areas. One recorded occurrence of Virgin thistle is within the Analysis Area for the HCP in a wash southeast of the Washington Parkway and I-15 junction on SITLA-administered land.

3.3.2 Environmental Consequences

Implementation of Alternatives 2, 3, 4, and 5 have potential to adversely impact special status plants. However, implementation of Alternatives 2, 3, and 4 also have potential to beneficially impact special status plants. Ground disturbance and associated construction activities may do the following:

- Cause direct loss of plant populations, loss of modeled suitable habitat, or both.
- Reduce population expansion into unoccupied modeled suitable habitat.
- Fragment populations, resulting in reduced reproductive success.
- Reduce pollinators, resulting in reduced reproductive success.
- Introduce or spread exotic and invasive weeds that may outcompete special status plants.
- Increase dust deposition on existing plant populations; and expand use of Federal lands, which brings in human-related disturbances (e.g., trampling from recreation and increased fire risk).

Special status plants that fall within the boundaries of occupied Mojave desert tortoise habitat within proposed Zone 6 may benefit from management prescriptions to protect resources in this area. Tables referenced in and located at the end of the analysis outline the potential adverse or beneficial impacts to special status plant occupied habitat, modeled suitable habitat, and critical habitat associated with each alternative.

3.3.2.1 Analysis Methods and Assumptions

Analysis for special status plants was conducted by calculating the presumed loss of known recorded populations (occupied habitat), the loss of acres of modeled suitable habitat from the footprint for each alternative, and the presumed conservation and calculation of acres protected by conserving land, as applicable. The following assumptions apply to this analysis:

- Any occupied habitat, modeled suitable habitat, or critical habitat located within the action areas are presumed to be directly and permanently impacted, regardless of where the ground disturbance will take place, because of the sensitivity of the special status plants and their

habitats. Plants, and the specialized soils they require, may be graded, scraped, removed, trampled, compacted, and broken by equipment and crews during construction or on access roads and staging areas.

- Indirect impacts from dust deposition and from the increased spread of exotic invasive species are presumed to extend up to 1 kilometer from the edge of the ROW boundaries for the T-Bone Mesa Alignment, UDOT Application Alignment, Southern Alignment, and the Analysis Area for the HCP and are presumed to extend up to 300 feet from the edge of the ROW boundaries for the Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet Alternatives.
- Approval of the Proposed Zone 6 Analysis Area would result in a beneficial effect to special status plants and modeled suitable habitat and would include partial to full protections from grazing, mineral extraction, and recreation uses.
- Amendments made to the Red Cliffs RMP and SGFO RMP would not result in direct impacts to special status plants and habitat; however, amendments would facilitate the potential for future impacts. Future impacts are discussed under the ROW and HCP Covered Activities discussions.
- Urban expansion and development will continue regardless if the HCP is amended. For the purposes of this analysis, development on private lands within the Analysis Area for the HCP is presumed to continue, although it is possible the pace of development would be slowed under the No Action Alternative because of additional regulatory permitting required for proposed development, particularly in areas where higher densities of desert tortoise occur and avoidance of take may not be possible. For the sake of analysis, it is presumed that all lands that fall within the Analysis Area for the HCP could eventually be developed and therefore permanently impact special status plant habitat. Total impacts described under this action are understood to be the maximum potential impact (i.e., if all private land is developed) with regards to special status plant habitat and represent impacts in perpetuity.
- Approximately one-third of the Proposed Zone 6 Analysis Area falls within the Red Bluff ACEC, which provides specific protections for the special status dwarf bear-poppy. Protections include limiting recreation and OHV travel to designated roads and trails and increased stipulations on fluid mineral leasing. Protection benefits already provided to land supporting special status plants within the ACEC are not included in the beneficial impacts provided by designation of proposed Zone 6 into the Red Cliffs Desert Reserve.
- Proposed Zone 6 consists of 6,813 acres, of which 6,760 are considered occupied Mojave desert tortoise habitat; 53 acres were not included as suitable Mojave desert tortoise habitat based on USGS modeled criteria.
- Because of the nature of geospatial calculations, which might include processing byproducts and differences in spatial reference, minor rounding errors and variance in agency databases can result in minor discrepancies in area and length results.

3.3.2.2 Direct and Indirect Impacts from Alternative 1

Alternative 1, the No Action Alternative, would have no direct or indirect adverse impacts to special status plant occupied habitat, critical habitat, or modeled suitable habitat within the Red Cliffs NCA analysis area (Table 3.3-3 and Table 3.3-4). All special status plant occupied habitat, critical habitat, and modeled suitable habitat within the Analysis Area for the HCP (privately owned land) has potential to be directly and adversely impacted as a result of regular development throughout the St. George area (Tables 3.3-3, 3.3-4, and 3.3-5). However, in areas where higher densities of desert tortoise occur and avoidance of take may not be possible, the extra time to obtain permits could reduce the speed of direct impacts to special status plants in the short term with the No Action Alternative. Permanent and adverse impacts would occur on occupied habitat for four Federally

listed plants: dwarf bear-poppy, Holmgren milk-vetch, Shivwits milk-vetch, and Siler pincushion. Permanent and adverse impacts would occur on modeled suitable habitat for five Federally listed plant species: dwarf bear-poppy, Gierisch mallow, Holmgren milk-vetch, Shivwits milk-vetch, and Siler pincushion (Table 3.3-5). Permanent and adverse impacts would occur on critical habitat for three Federally listed plant species: Gierisch mallow, Holmgren milk-vetch, and Shivwits milk-vetch (Table 3.3-3). Dust and exotic invasive species spread (up to 1 kilometer outside of the development areas) would continue as a result of regular development on private lands (Table 3.3-4).

Management of the Proposed Zone 6 Analysis Area would continue to include recreational uses, grazing and mineral exploration in specific areas. Proposed Zone 6 would not be added to the Red Cliffs Desert Reserve and the SGFO RMP management prescriptions would not be amended to protect special status plant populations in this area (Table 3.3-3 and 3.3-4).

3.3.2.3 Direct and Indirect Impacts from Alternative 2

Alternative 2, T-Bone Mesa Alignment, would not adversely impact special status plant occupied habitat, critical habitat, or modeled suitable habitat within the Red Cliffs NCA analysis area (Tables 3.3-3, 3.3-4, and 3.3-5). Indirect impacts, including dust deposition and spread of exotic invasive species into special status plant habitat is not expected.

Development facilitated by the HCP ITP would continue to directly and adversely impact all special status plant populations, suitable habitat, and critical habitat located within the Analysis Area for the HCP (Tables 3.3-3, 3.3-4, and 3.3-5). Amendment of the HCP would facilitate permit requirements for development and could increase the speed of direct impacts to special status plant habitat. However, direct and indirect impacts are presumed to be the same as described under the No Action Alternative (Section 3.3.2.2) with the exception of the beneficial impacts attached to implementing the HCP (i.e., proposed Zone 6). Table 3.3-3 summarizes impacts to occupied habitat and critical habitat. Table 3.3-4 summarizes impacts to modeled suitable habitat.

Designation and incorporation of proposed Zone 6 into the Red Cliffs Desert Reserve would be beneficial to the following special status plants: dwarf bear-poppy (occupied and suitable habitat), Holmgren milk-vetch (occupied habitat, critical habitat, and suitable habitat), Shivwits milk-vetch (suitable habitat), Siler pincushion cactus (suitable habitat), and Parry sandpaper-plant (occupied habitat) (Tables 3.3-3, 3.3-4, and 3.3-5). The HCP, as supported by the SGFO RMP Amendment for Alternative 2 would protect habitat in proposed Zone 6 by fencing the eastern borders to prevent OHV access in non-designated areas; reducing or eliminating grazing; reducing the total mileage of designated access routes; and providing additional funding for habitat restoration and fire management. These actions would protect and enhance special status plants and potentially reduce the spread of exotic invasive species.

Alternatives B and C for the Red Cliffs NCA RMP Amendment both allow for the designation of a highway ROW within the Red Cliffs NCA; however, Alternative C allows for the option to allow future utility development within the approved ROW. Future development would cause ground disturbance and continue the spread of exotic invasive species as well as potentially impact the modeled suitable habitat, that may have begun to reestablish after the initial disturbances from highway construction. To account for these impacts, all modeled suitable habitat within the entire highway ROW is assumed to be permanently impacted. However, future indirect impacts from exotic invasive species spread and dust deposition could occur each time a utility is given a ROW resulting in ground-disturbing activities (such as scraping and trenching).

The SGFO RMP Amendment Alternative B protects special status plant habitat by managing proposed Zone 6 as an exclusion area for new ROWs, closing fluid mineral leasing, closing camping, closing all lands to livestock grazing, and closing the area to target shooting. Alternative C for the SGFO RMP Amendment allows the Proposed Zone 6 Analysis Area to be

managed as an avoidance area for ROWs and, with stipulations or geographic restrictions, allows for fluid mineral leasing (with no surface occupancy), livestock grazing, camping, and the discharge of firearms. Compared to Alternative B, Alternative C is more likely to adversely impact protected plants by allowing camping and target shooting, which could increase the risk of wildfires. In addition, allowing grazing and ROWs have the potential to spread exotic invasive species and cause ground disturbance, soil destruction, and direct impacts to special status plant habitat.

3.3.2.4 Direct and Indirect Impacts from Alternative 3

Alternative 3, UDOT Application Alignment, would result in direct and adverse impacts to dwarf bear-poppy suitable habitat (Map 3.3-1a) and potentially indirect adverse impacts to Virgin thistle occupied habitat (Map 3.3-6a) within the Red Cliffs NCA analysis area (Tables 3.3-4 and 3.3-5). No occupied habitat or critical habitat would be directly impacted (Table 3.3-3). One Virgin thistle recorded location (the number of plants recorded in this location is unknown) falls within the 1-kilometer dust and exotic invasive species buffer zone and therefore individuals may be indirectly impacted by dust deposition or competition from the spread of exotic invasive species.

Direct and indirect impacts within the Analysis Area for the HCP would be the same as described under Alternative 1. Impacts resulting from the designation of Zone 6 and the RMP amendments would be the same as described under Alternative 2.

3.3.2.5 Direct and Indirect Impacts from Alternative 4

Alternative 4, Southern Alignment, would result in direct and adverse impacts to dwarf bear-poppy suitable habitat (Map 3.3-1a) and potentially indirect adverse impacts to Virgin thistle occupied habitat (Map 3.3-6a) within the Red Cliffs NCA analysis area (Tables 3.3-3 and 3.3-4). No occupied habitat or critical habitat would be directly impacted (Table 3.3-3). Two Virgin thistle recorded locations within the Red Cliffs NCA analysis area (the number of plants recorded in each location is unknown) fall within the 1-kilometer buffer zone so individuals may be indirectly impacted by dust deposition or competition from the spread of exotic invasive species.

Direct and indirect impacts within the Analysis Area for the HCP would be the same as described under Alternative 1. Impacts resulting from the designation of Zone 6 and the RMP amendments would be the same as described under Alternative 2.

3.3.2.6 Direct and Indirect Impacts from Alternative 5

Alternative 5, Red Hills Parkway Expressway, would result in direct and adverse impacts to dwarf bear-poppy suitable habitat (Map 3.3-1a) and potentially indirect adverse impacts to Virgin thistle occupied habitat (Map 3.3-6a) within the Red Cliffs NCA analysis area (Table 3.3-5). No occupied habitat or critical habitat for Federally listed plants would be directly impacted (Table 3.3-3).

Direct and indirect impacts within the Analysis Area for the HCP would be the same as described under Alternative 1. Proposed Zone 6 would not be designated within the Reserve, so special status plant habitat would not benefit from the proposed management prescriptions identified in the Amended HCP and SGFO RMP Amendment to limit human use of this area (Tables 3.3-3 and 3.3-5).

3.3.2.7 Direct and Indirect Impacts from Alternative 6

Alternative 6, St. George Boulevard/100 South One-way Couplet, would have no adverse direct or indirect impacts to occupied habitat, suitable habitat, or critical habitat for special status plants within the Red Cliffs NCA analysis area (Table 3.3-3). Direct and indirect impacts within the Analysis Area for the HCP would be the same as described under Alternative 1. Like Alternative 5, proposed Zone 6 would not be designated, so protections for special status plant habitat in this area would remain unchanged from current conditions.

Table 3.3-3. Special Status Plant Occupied Habitat (Recorded Occurrences) and Critical Habitat—Potential Direct Impacts Per Alternative Action

Category	Special Status Plant Species	No Action Alt	ROW T-Bone Mesa Alignment	ROW UDOT Application Alignment	ROW Southern Alignment	ROW Red Hills Parkway Expressway [a]	ROW St. George Boulevard/ 100 South One-way Couplet	No HCP (%) [b]	HCP Amendment (with Zone 6) (%)	Proposed Zone 6 Designation (Beneficial)
Federally Listed Plant Species Occupied Habitat	Dwarf bear-poppy	No	No	No	No	No	No	Zone 6 (60%) Price City Hills (100%) White Dome (50%) Harrisburg Dome (100%) Warner Valley (75%) Beehive Dome (3%)	Price City Hills (100%) White Dome (50%) Harrisburg Dome (100%) Warner Valley (75%) Beehive Dome (3%)	60% of the local population records protected
	Gierisch mallow	No	No	No	No	No	No	No	No	No
	Holmgren milk-vetch	No	No	No	No	No	No	Central Valley (100%) Green Valley Gap (100%) State Line (0.5%)	Central Valley (100%) Green Valley Gap (100%) State Line (0.5%)	Stucki Spring population may indirectly benefit from incorporation into the Reserve
	Shivwits milk-vetch	No	No	No	No	No	No	Coral Canyon (approximately 25%)	Coral Canyon (approximately 25%)	No
	Siler pincushion cactus	No	No	No	No	No	No	White Dome (25%) Warner Ridge (16%)	White Dome (25%) Warner Ridge (16%)	No

Category	Special Status Plant Species	No Action Alt	ROW T-Bone Mesa Alignment	ROW UDOT Application Alignment	ROW Southern Alignment	ROW Red Hills Parkway Expressway [a]	ROW St. George Boulevard/ 100 South One-way Couplet	No HCP (%) [b]	HCP Amendment (with Zone 6) (%)	Proposed Zone 6 Designation (Beneficial)
Critical Habitat	Gierisch mallow	No	No	No	No	No	No	185 acres (SITLA)	185 acres (SITLA)	Not Applicable
	Holmgren milk-vetch	No	No	No	No	No	No	1,333 acres (SITLA) 90 acres (private)	1,333 acres (SITLA) 90 acres (private)	Stucki Spring population may indirectly benefit from incorporation into the Reserve
	Shivwits milk-vetch	No	No	No	No	No	No	54 acres (SITLA) 31 acres (private)	54 acres (SITLA) 31 acres (private)	Not Applicable
BLM Sensitive Plants	Virgin Thistle	No	No	No	No	No	No	One recorded occurrence (outside of BLM jurisdiction)	One recorded occurrence (outside of BLM jurisdiction)	No
	Parry Sandpaper-plant	No	No	No	No	No	No	Proposed Zone 6 - SITLA land (100%)	No	100% of the population within proposed Zone 6
	Escarpment milk-vetch	No	No	No	No	No	No	One recorded occurrence (outside BLM jurisdiction)	One recorded occurrence (outside BLM jurisdiction)	No

[a] The Red Hills Parkway Expressway environmental analysis is based on a conceptual roadway design that assumes no additional ground disturbance outside the current fencing would be necessary. However, geospatial information related to rights-of-way has been acquired via remote sensing, and ground-truthing during final design will be necessary to resolve inconsistencies in the location of roadway design features that may result in very minor additional impacts that have not been considered.

[b] The percentage represents the estimated percentage of extant recorded occurrences within the localized population that could be impacted by future development. A recorded occurrence may represent one to several plants.

The Analysis Area for the HCP includes 3,341 acres of State and private land within the boundaries of the Proposed Zone 6 Analysis Area. If proposed Zone 6 is approved and designated as part of the Red Cliffs Desert Reserve (Alternatives 2, 3, or 4) this land would be managed to be protected from development.

Table 3.3-4. Special Status Plant Occupied Habitat and Critical Habitat - Potential Indirect Impacts (Dust Deposition and Exotic Invasive Species 1-kilometer Buffer) Per Alternative Action

Category	Special Status Plant Occurrences	ROW No Action Alternative	ROW T-Bone Mesa Alignment	ROW UDOT Application Alignment	ROW Southern Alignment	ROW Red Hills Parkway Expressway	ROW St. George Boulevard/100 South One-way Couplet	Analysis Area for the HCP
Federally Listed Plant Species	Dwarf bear-poppy	No	No	No	No	No	No	Yes
	Gierisch mallow	No	No	No	No	No	No	Yes
	Holmgren milk-vetch	No	No	No	No	No	No	Yes
	Shivwits milk-vetch	No	No	No	No	No	No	Yes
	Siler pincushion cactus	No	No	No	No	No	No	Yes
Critical Habitat	Gierisch mallow	No	No	No	No	No	No	Yes – Unit 1
	Critical Habitat Holmgren milk-vetch	No	No	No	No	No	No	Yes – All Critical Habitat Units
	Critical Habitat Shivwits milk-vetch	No	No	No	No	No	No	Yes – 4 Critical Habitat Units
BLM-listed plant species	Virgin Thistle	No	No	Yes	Yes	Yes	No	Yes
	Parry Sandpaper-plant	No	No	No	No	No	No	Yes
	Jones Indigo-bush	No	No	No	No	No	No	Yes

Table 3.3-5. Special Status Plant Modeled Suitable Habitat—Potential Direct Impacts Per Alternative Action

Special Status Plant Modeled Suitable Habitat	ROW No Action Alt (acre)	ROW T-Bone Mesa Alignment (acre)	ROW UDOT Application Alignment (acre)	ROW Southern Alignment (acre)	ROW Red Hills Parkway Expressway (acre)	ROW St. George Boulevard/ 100 South One-way Couplet (acre)	No Action HCP (acre)	HCP Amendment (with Zone 6) (acre)	Proposed Zone 6 Designation (additional protected acres outside of the ACEC) (acre)
Dwarf bear-poppy	0	0	8.6	51	2.9[a]	0	18,130	12,737	3,091
Gierisch mallow	0	0	0	0	0	0	2,776	2,776	0
Holmgren milk-vetch	0	0	0	0	0	0	13,340	8,681	3,187
Shivwits milk-vetch	0	0	0	0	0	0	5,196	4,919	277
Siler pincushion cactus	0	0	0	0	0	0	18,834	13,441	3,091

[a] Most of this modeled suitable habitat is adjacent to the existing roadway or other developments and presumably has been previously disturbed; therefore, it may not support quality habitat for the dwarf bear-poppy. However, The Red Hills Parkway Expressway environmental analysis is based on a conceptual roadway design that assumes no additional ground disturbance outside the current fencing would be necessary. However, geospatial information related to rights-of-way has been acquired via remote sensing, and ground-truthing during final design will be necessary to resolve inconsistencies in the location of roadway design features that may result in very minor additional impacts that have not been considered.

3.4 General Wildlife

3.4.1 Affected Environment

A variety of wildlife inhabit the analysis area throughout all or a portion of the year. Species present in these areas include badgers (*Taxidea taxus*); black-tailed jackrabbits *(Lepus californicus);* desert cottontails *(Sylvilagus audubonii);* white-tailed antelope squirrels (*Ammospermophilus leucurus*); Ord's kangaroo rats (*Dipodomys ordii*); deer mice (*Peromyscus* spp.); desert wood rats (*Neotoma lepida*); various bats, such as Mexican free-tailed bats (*Tadarida brasiliensis*), little brown myotis (*Myotis lucifigus*), pallid bats (*Antrozous pallidus*), and Townsend's big-eared bats (*Corynorhinus townsendii*); Gambel's quail (*Lophortyx gambelii*); mourning doves (*Zenaida macroura*); common ravens (*Corvus corax*); canyon wrens (*Catherpes mexicanus); rock wrens* (*Salpinctes obsoletus*); side-blotched lizards (*Uta stansburiana*); and western whiptails (*Aspidoscelis* [*Cnemidophorus] tigris*). Larger animals include coyotes (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), mountain lion (*Puma concolor*), and mule deer (*Odocoileus hemionus*). Life history and occurrence information for wildlife species known to occur in the analysis area is available in Sections 3.12, 3.34, and 3.46 of the Draft Resource Management Plans for the Beaver Dam Wash National Conservation Area and the Red Cliffs National Conservation Area, Draft Amendment to the St. George Field Office Resource Management Plan, and Draft Environmental Impact Statement (BLM 2015a).

While big game species, including mule deer and mountain lion, are found within the analysis area, no big game movement corridors, crucial wintering areas or lambing or fawning areas are present (UDWR 2019d).

Migratory bird species, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and songbirds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 and Executive Order 13186. The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. The MBTA protects species or families of birds that live, reproduce, or migrate within or across international borders during their life cycle. Under authority of the MBTA, it is unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs, including the disturbance or destruction of a migratory bird nest that results in the loss of eggs or young. According to Solicitor's Opinion M-37050 issued in December 2017, MBTA prohibitions apply only to actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs; incidental take is not prohibited. Executive Order 13186 was enacted, in part, to ensure that environmental analyses of Federal actions evaluate the impacts of actions and agency plans on migratory birds. The order also states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and it prohibits the take of any migratory bird without authorization from the USFWS. Several migratory bird species may use the project area yearlong, or for a portion of the year. Within Washington County, the migratory bird nesting season can be divided into the following two major timeframes:

- Early Nesting Season: January 1 to March 31 (e.g., eagles, owls, falcons, and hawks).
- Primary Nesting Season: April 1 to July 15 (e.g., songbirds, flycatchers, cuckoos, and the majority of species).

However, the maximum period for the migratory bird nesting season can extend from December 1 through August 31 (USFWS 2020b). Various habitats used by migratory birds are present in the areas where project actions are proposed. This includes riparian and upland habitats used as migration stop-over areas when species move through the area in the spring and fall, as well as breeding areas during the spring and summer. Local vegetation provides necessary cover and foraging opportunities needed by migratory birds.

The USFWS prepared *Birds of Conservation Concern* (USFWS 2008a) pursuant to a mandate under the 1988 Fish and Wildlife Conservation Act amendment to identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA. This 2008 report divides the United States into regions and provides a list of birds of conservation concern for each; the project area is located within region 16. Appendix F includes a list of the birds of conservation concern identified for Regions 9, 16, and 33 that occur in the analysis area. In 2002, Utah Partners in Flight prepared an avian conservation strategy that includes information on Utah's breeding birds and detailed information for 24 birds identified as priority species (Parrish et al. 2002). This report identifies breeding bird distribution in the state by physiographic regions; the project area is located within the Mojave Desert region. Appendix F includes breeding birds identified as priority species within the Basin and Range, Colorado Plateau, and Mojave Desert regions that occur in the analysis area.

In addition to MBTA protections, the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) are protected from a variety of harmful activities in the Bald and Golden Eagle Protection Act, which protects bald and golden eagles, their nests, young, eggs, and parts. "Take" of bald and golden eagles is prohibited unless permitted by the USFWS. The definition of take is "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb." The USFWS has developed guidance to avoid take of eagles in the 2007 National Bald Eagle Management Guidelines (USFWS 2007b) and has a website with further information on eagle management (https://www.fws.gov/birds/management/managed-species/eagle-management.php).

3.4.2 Environmental Consequences

This section discusses potential impacts to common wildlife, big game species, and migratory birds, collectively referred to as general wildlife.

3.4.2.1 Analysis Methods and Assumptions

The analysis of impacts to general wildlife is done through a qualitative assessment of direct and indirect impacts that would result from each alternative.

The following assumptions apply to this analysis:

- Urban expansion and development will continue regardless of whether the HCP is amended or not. For the purposes of this analysis, development on private lands within the HCP Permit Area is presumed to continue, although additional regulatory permitting requirements could delay some development projects where avoidance of take of desert tortoise may not be possible. It is presumed that all non-Federal lands that fall within the HCP Permit Area could eventually be developed.
- Mojave desert tortoise suitable and potential habitat identified on private and State-owned land outside the boundaries is referred in this analysis as the Analysis Area for the HCP. General wildlife is widespread within the Analysis Area for the HCP, and presumed to be directly and indirectly impacted by covered activities.
- Amendments made to the Red Cliffs NCA RMP and SGFO RMP would not result in direct impacts to general wildlife; however, these amendments would facilitate the potential for future indirect impacts. Indirect impacts are included in the ROW and HCP analysis.
- Approximately one-third of the Proposed Zone 6 Analysis Area falls within the Red Bluff ACEC, which provides specific protections for biological and natural resources. Protections include limiting recreation and OHV travel to designated roads and trails, and increasing stipulations on fluid mineral leasing. Protection benefits already provided to general wildlife on lands

within the ACEC are not included within the beneficial impacts provided by designation of proposed Zone 6.

3.4.2.2 Direct and Indirect Impacts from Alternative 1

Alternative 1, the No Action Alternative, would result in no direct or indirect adverse impacts to general wildlife within the Red Cliffs NCA. All general wildlife within the Analysis Area for the HCP have potential to be directly and adversely impacted by habitat loss and fragmentation from ongoing and continued development on private lands. Without implementation of the Washington County HCP (that is, separate HCPs would be prepared for activities proposed by individuals instead), mitigation would likely be more piecemeal, and so effects to wildlife may be greater without the landscape-level, comprehensive mitigation approach that would be provided by a countywide HCP. No additional protections would be afforded to general wildlife under Alternative 1 because proposed Zone 6 would not be added to the Red Cliffs Desert Reserve.

3.4.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Alternative 2, T-Bone Mesa Alignment, would result in direct and indirect adverse impacts to general wildlife within the Red Cliffs NCA from the Northern Corridor. Construction of the highway would result in habitat loss within the footprint of the highway, and habitat degradation to areas that remain unpaved within the ROW, and areas adjacent to the ROW. Some animals may be injured or killed when they attempt to cross the road. Two types of mesh ROW fencing would be installed that would prevent most small and large wildlife species from attempting to cross the highway, reducing the potential for injuries and mortalities resulting from vehicular interactions. However, the mesh fencing, along with the highway, would result in habitat fragmentation by precluding the movement of small and large wildlife species across the 500-foot-wide corridor, except at drainages where bridges or culverts would be installed, and thus preventing individuals from using habitat on both sides of the road. Avian species would continue to be at risk from collisions with vehicles and with any utility lines that might also be authorized within the highway ROW corridor. Noise from construction of the highway would disturb wildlife in the vicinity and potentially cause reproductive failure for species breeding nearby. Construction of the new highway would be expected to increase the spread of exotic invasive species, particularly annual grasses, that reduce the quality of foraging habitat and increase the potential for a wildfire. The number of ravens, which are attracted to roadkill, may increase after the new highway is constructed, and ravens are known to have a negative impact on certain wildlife species.

In a comparison of Northern Corridor alternatives within the boundaries of the Reserve, the Southern Alignment would have the greatest amount of general wildlife permanent habitat loss because the highway would be the longest, and the T-Bone Mesa Alignment would have the least amount because the highway would be the shortest. However, the T-Bone Mesa Alignment would result in the most habitat fragmented south of the alignment to the Reserve boundary, while the Southern Alignment would fragment the least amount of habitat within the Reserve.

Alternatives B and C for the Red Cliffs NCA RMP Amendment are similar in that both allow for the designation of a highway ROW within the Red Cliffs NCA; however, Alternative C affords the option to allow future utility development within the approved ROW corridor. Future development would result in additional habitat loss and degradation from ground disturbance and continued spread of exotic invasive species. To account for these impacts, all wildlife habitat within the entire highway ROW is assumed to be permanently impacted. However, future indirect impacts, such as the spread of exotic invasive species, could occur each time a new utility is installed, resulting in additional ground-disturbing activities (e.g., scraping or trenching), injury or mortality of individual animals, and noise impacts.

With or without the implementation of the HCP, development on non-Federal lands throughout Washington County would result in habitat loss and degradation, potential injury or mortality of wildlife, noise disturbance, and increased spread of exotic invasive species that would further degrade habitat. Development on land most susceptible to take of desert tortoise may happen more quickly because developers would not need individual ITPs, but the ultimate effects on wildlife would be the same.

Management prescriptions addressed in the Amended HCP and SGFO RMP Amendment for proposed Zone 6 would benefit general wildlife by establishing additional conservation measures. These include protections to general wildlife such as fencing along the eastern borders to prevent OHV access in non-designated areas, reducing or eliminating grazing, reducing the total mileage of designated access routes, and providing additional funding for habitat restoration and fire management. Fencing the eastern border of proposed Zone 6 would also result in adverse impacts to wildlife. These include fragmentation of wildlife habitat because the fence would create a border that wildlife would not be able to cross, and result in potential injury or mortality if animals collide with or become entangled in the fence.

The SGFO RMP Amendment Alternatives B and C have varying degrees of protections. Alternative B provides greater protections by managing proposed Zone 6 as an exclusion area for new ROWs, and closing the area to fluid mineral leasing, camping, livestock grazing, and target shooting. Alternative C allows proposed Zone 6 to be managed as an avoidance area for ROWs and, with stipulations or geographic restrictions, allows for fluid mineral leasing, livestock grazing, camping, and the discharge of firearms. By allowing camping and target shooting, Alternative C has a higher potential to disturb wildlife and increase the risk of wildfires that could destroy wildlife habitat compared to Alternative B. In addition, allowing grazing and ROWs has the potential to spread exotic invasive species and cause ground disturbance, soil destruction, and direct impacts to general wildlife through habitat loss, fragmentation, and noise disturbance. Furthermore, Alternative C may have a higher potential for wildlife habitat fragmentation than Alternative B because there is a greater chance that ROWs would be permitted with proposed Zone 6 being an avoidance area compared to Alternative B where proposed Zone 6 would be an exclusion area. However, both Alternatives B and C would have fewer impacts on wildlife than Alternative 1, the No Action Alternative, because of the additional restrictions that would be imposed on activities in proposed Zone 6 outside the ACEC.

3.4.2.4 Direct and Indirect Impacts from Alternatives 5 and 6

Impacts to general wildlife from Alternative 5, Red Hills Parkway Expressway, and Alternative 6, St. George Boulevard/100 South One-way Couplet, would be minimal compared to Alternatives 2, 3, and 4 because existing paved roadways with very little wildlife habitat would be converted to the Northern Corridor rather than a new highway being constructed across suitable wildlife habitat. Habitat for general wildlife would only be affected at tie-in locations where construction activities would include some areas that are currently unpaved. Direct and indirect impacts of the HCP would be the same as described under Alternatives 2, 3, and 4, except that proposed Zone 6 would not be established; therefore, no additional benefits to general wildlife would occur in that area because activities would continue without the restrictions that would be imposed if proposed Zone 6 was designated.

3.5 Special Status Wildlife

3.5.1 Affected Environment

3.5.1.1 Endangered Species Act Listed Wildlife

Table 3.5-1 identifies ESA-listed wildlife species that may be affected by one or more of the proposed actions. A complete list of threatened and endangered species evaluated for potential presence within the area affected by one or more proposed actions, along with a justification for excluding species not analyzed in detail, is included in Appendix G.

Table 3.5-1. Listed Wildlife Species that May be Affected by the Proposed Actions

Scientific Name	Common Name	Proposed Actions that Would Affect Each Species
Gopherus agasizii	Mojave desert tortoise	HCP Amendment: yes Red Cliffs NCA RMP Amendment: yes SGFO RMP Amendment: yes Northern Corridor: yes
Strix occidentalis lucida	Mexican spotted owl	HCP Amendment: yes Red Cliffs NCA RMP Amendment: no SGFO RMP Amendment: no Northern Corridor: no

Mojave Desert Tortoise

Life History

The Mojave desert tortoise is most active during the spring and early summer, when annual plants are available for forage, ambient temperatures are not extreme, and some precipitation may occur. As a result of the relatively moderate summer temperatures in Washington County compared to other parts of the Mojave desert tortoise range, Mojave desert tortoises in this area tend to be active during the mid-summer months as well (USFWS 2008c), and may be active any time of the year (USFWS 2018).

The Mojave desert tortoise feeds on herbaceous perennials and winter annuals, but also on perennial grasses, perennial shrubs, and cacti (USFWS 2011a). In addition, Mojave desert tortoises have been observed consuming bone material, possibly for mineral supplementation to benefit shell and bone condition and egg production (Brennan 2012, Esque and Peters 1994, Jennings 1997, Walde et al. 2007). The diet of a desert tortoise varies according to the temporal availability of preferred food plants. Mojave desert tortoises are selective herbivores that may seek out certain rare herbaceous perennials (Jennings and Berry 2015). Native forage plants are more highly preferred over nonnative plants (Jennings 1997, Jennings and Berry 2015), and a diet composed mostly of nonnative annual grasses does not promote growth of hatchling tortoises (Drake et al. 2016). Nonnative grasses may compete directly with forbs (either native or nonnative) and the overall nutritional value of tortoise diets could be reduced by the lower-quality grasses (Nagy et al. 1998, Hazard et al. 2010).

Mojave desert tortoises grow slowly, live long, and take 13 to 20 years to reach sexual maturity (USFWS 2011a). Male Mojave desert tortoises begin competing for females in March and April and can continue this breeding activity into October. After mating, females can store sperm for 5 or more years. Females normally lay a clutch of one to 10 eggs. During years of low rainfall, few to no eggs are laid (Henen 1997, Wallis et al. 1999). Eggs are deposited in a shallow nest from late spring to early summer. During incubation, the soil temperature can determine the sex of the hatchlings, with temperatures equal to or below 86.9 degrees Fahrenheit (°F) producing all males and temperatures equal to or above 90.5°F producing all females. A temperature of approximately 88.3°F results in a 1:1 sex ratio of males and females (Rostal et al. 2002). The

typical length of incubation is between 90 and 120 days (USFWS 2008c). Like many other characteristics of Mojave desert tortoise life history, growth and reproduction increase during years with higher precipitation and subsequent higher annual plant production (USFWS 2011a).

Home range sizes for Mojave desert tortoise vary between individuals, and fluctuate depending on the sex, location, available resources, and weather patterns. Male home range sizes can be as large as 89 hectares, but female home ranges may be only half that size (Franks et al. 2011, USFWS 2011a). The home ranges of individual Mojave desert tortoise overlap, and Mojave desert tortoises do not defend or maintain specific use areas (Harless et al. 2009). Mojave desert tortoise use an average of seven to 12 different burrows within their home range (O'Connor et al. 1994), and Mojave desert tortoises occasionally travel outside of their home ranges on long-distance forays. Typical movements are short and concentrated in local areas containing one or more burrows, and seasonally they may move among multiple activity centers (Sadoti et al. 2017). Over the lifetime of a Mojave desert tortoise, one individual may use more than 1.5 square miles (almost 1,000 acres) of habitat and may occasionally venture more than 7 miles outside of its home range (Berry 1986).

Mojave desert tortoises seek shelter during unfavorable conditions in dug-out burrows, rodent or other animal burrows, and caliche caves (USFWS 2011a), and may remain mostly inactive during periods of drought (Duda el al. 1999). The availability of such shelter sites is an important aspect of habitat suitability. Even when Mojave desert tortoises are active, burrows or shrubs are used as cover during the night or hottest part of the day (Nagy and Medica 1986, Zimmerman et al. 1994).

Mojave desert tortoises are most often found on desert flats and along gently sloping terrains associated with desert scrub and desert grassland habitat (Nussear et al. 2009). Typical habitat for the desert tortoise in the Mojave Desert has been characterized as creosote bush scrub below 1,677 meters (5,500 feet), where precipitation ranges from 5 to 20 centimeters (2 to 8 inches), the diversity of perennial plants is relatively high, and production of ephemerals is high (USFWS 2011a). Peak desert tortoise observation frequency was modeled between 2,000 and 3,300 feet in elevation (Nussear et al. 2009). However, desert tortoises occur from below sea level to an elevation of 2,225 meters (7,300 feet; USFWS 2011a).

Threats

According to the USFWS, "the most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects, and those that fragment and degrade habitats, such as proliferation of roads and highways, OHV activity, and habitat invasion by nonnative invasive plant species" (USFWS 2019a). The USFWS has also indicated that predation, disease, drought, fire, and climate change threaten Mojave desert tortoise populations (USFWS 2019a).

Habitat Loss and Fragmentation

Habitat loss, predominately from development has led to reduced populations or loss of Mojave desert tortoise in its range (USFWS 2019a), including in Washington County and the Analysis Area for the HCP. Habitat fragmentation occurs when habitat blocks are broken into small, isolated pieces. Increased development, including buildings, roadways, and utility corridors, leads to an expanding urban footprint that reduces natural Mojave desert scrub habitat and expands the wildland-urban interface. The wildland-urban interface intensifies the potential effects of fragmentation and habitat loss and facilitates human/tortoise interactions. The Reserve borders private and municipal lands in the cities of St. George, Ivins, Washington, and Hurricane. As habitat fragments become smaller and increasingly isolated, effective population size decreases, species may become more vulnerable to genetic drift and inbreeding, genetic variation declines, and heterozygosity decreases (Berry and Murphy 2019). Because Mojave desert tortoises are a

low-mobility species, they require corridors or linkages that can sustain multi-generational populations (Averill-Murray et al. 2013).

Averill-Murray et al. (2013) recommend broad habitat linkages rather than narrow bands. If a population were to experience a catastrophic decline as a result of drought, wildfire, disease outbreak, or other stochastic event, its recovery may rely heavily on the immigration of new individuals from adjacent populations for recovery (Edwards et. al 2004). The inability to repopulate may be a more important factor in Mojave desert tortoise's long-term survival than the lack of genetic variability (USFWS 2019b). According to the USFWS, 3,000 adult Mojave desert tortoises may be a realistic management goal for targeting a minimum effective population size to prevent genetic deterioration (USFWS 2019b).

Within the Reserve, Mojave desert tortoise exclusion fencing is present along both sides of Cottonwood Springs Road to prevent vehicular collisions with Mojave desert tortoise. The fencing bisects a portion of the Red Cliffs NCA from south to north and creates a nearly absolute barrier to natural Mojave desert tortoise movements resulting in two separate populations. In addition, several roads including SR 18, Red Hills Parkway, Tuacahn Drive, and I-15 preclude the natural connection of Mojave desert tortoise populations on either side of the roadways. According to the USFWS, new habitat fragmentation impacts from ongoing development would pose significant risks to the recovery unit population and further hasten rapid environmental change (USFWS 2020a).

Roadways

The placement of roads through Mojave desert tortoise habitat is well understood to cause disruptions by influencing movements, fragmenting habitats, and causing direct mortality during crossing attempts. It has been shown that wide, heavily traveled roads, as well as fenced roads, disrupt movement, dispersal, and gene flow of Mojave desert tortoise populations (USFWS 2018). Tortoises are slow-moving animals with large home ranges. Road expansion and tortoise exclusion fencing increase habitat fragmentation and limit habitat connectivity. However, fencing of roads also minimizes potential Mojave desert tortoise mortalities and habitat destruction by reducing the risk of collisions and limiting access of off-road vehicles into Mojave desert tortoise habitat.

How much of an impact a roadway has on an individual tortoise or population is a function of the size and frequency of use of the road. Von Seckendorff Hoff and Marlow (2002) identified a direct correlation between higher traffic levels and greater road avoidance distances in Nevada. They reported that the magnitude of the road impact zone for roads without exclusion fencing varied from 2,150 to 4,250 meters for 2-lane to 4-lane highways, and 1,090 to 1,389 meters for graded and maintained electrical-transmission-line access roads. The zone of impact increased significantly with increasing traffic levels, and populations were found to be depressed from less than 175 meters to up to 4.6 kilometers from a roadway (Von Seckendorff Hoff and Marlow 2002).

Beyond direct mortality and habitat fragmentation, several potential indirect impacts on Mojave desert tortoise result from the presence of roads in suitable habitat. Recent research by Peaden et al. (2017) showed that carapace temperatures, which can result in increased thermal stress sometimes leading to death, were greater when animals were within 20 meters of a road or fence compared to when animals were farther away. The same study found that "tortoise movement velocity was greater when animals were near a fence or road than away from them," which can result in increased energy expenditure and stress (Peaden et. al 2017). Adult tortoises located near high traffic roads were at least 30 percent smaller (and below the typical size for sexual maturity) than tortoises associated with lower traffic volumes or no roads (Nafus et al. 2013). A reduction in the average size of individuals may result in lower population growth rates. Overall, these observations may indicate that habitat near roads used by as few as 300 vehicles per day represents sink habitat for desert tortoises (Nafus et al. 2013). Desert tortoises often pace along

new fences attempting to gain access to the other side or return to areas from which they were removed (USFWS 2009).

The 2011 *Mojave Desert Tortoise Recovery Plan* (USFW 2011) referred to the 1994 Recovery Plan identifying noise and vibration as having potentially significant effects on the desert tortoise's behavior, communication, and hearing (USFWS 1994). While there are no studies regarding the effects of road noise to desert tortoise populations, a number of other vertebrate species are significantly negatively affected by road noise (Reijnen and Poppen 2006, Fahrig and Rytwinski 2009, Benitez-Lopez et al. 2010, Rytwinski and Fahrig 2012). Therefore, road noise, vibration, and lights have potential adverse effects on desert tortoises and other wildlife species for which the Red Cliffs NCA provides an important habitat. Tortoises protected by exclusion fencing along Red Hills Parkway within the Reserve are regularly found and are present in burrows immediately adjacent to ROW fencing; however, no studies have been conducted to determine if this represents high site fidelity, if carapace size is decreased, or if new recruits are establishing their home ranges adjacent to roads.

Road crossing mortality has been found to impact nesting females, which can skew sex ratios of tortoises, contributing to a decline in population growth and viability (Aresco 2005 as cited in Peaden et. al 2017). Research suggests that roads alter the movements of Mojave desert tortoise by promoting movement along the road, rather than across it, which can affect genetic diversity (Latch et al. 2011). If tortoise roadway fencing is not maintained, tortoises may gain access to the roadway through gaps in fencing and be crushed.

Roads also provide human access into habitat, magnifying effects such as poaching, predation, and habitat degradation (Latch et al. 2011). Litter and roadkill can attract Mojave desert tortoise predators, such as ravens, coyotes, and golden eagles. An increase in raven populations has been documented when there is easy access to carrion (Berry and Murphy 2019). An increase in the number of ravens is correlated to increase predation on tortoises, especially juveniles whose shells are not yet ossified and are still soft enough to puncture easily (USFWS 2011). During road construction, desert tortoises that remain in the ROW may be crushed or trapped in burrows. In addition, roads and linear corridors add impervious surfaces to the landscape, which concentrate runoff and erosion (Lovich and Bainbridge 1999).

Within the Analysis Area for the HCP, road development, expansion, and maintenance are often tied to private development projects or municipal jurisdictions on non-Federal lands. Within the Reserve (refer to Section 3.17 and Map 3.17-2), roads have been consolidated and some unpaved non-designated roads have been closed to all OHV use or have limited OHV use as a management strategy to reduce fragmentation and restore habitat. Red Hills Parkway and Tuacahn Drive in the Reserve have culverts designed to serve as under-roadway crossing structures to reduce the effects of habitat fragmentation; however, no tortoises have been documented crossing or have been recaptured on the other side of Red Hills Parkway, and only one tortoise has been documented crossing Tuacahn Drive (USFWS 2020a). Ongoing studies by the USFWS and the BLM in Nevada along highway US 93 and US 95 find that at least one adult tortoise has crossed back and forth using under-roadway culverts (Deffner 2020). However, more research is needed to determine whether tortoises are motivated to use culverts in all environmental and density conditions to access or expand their home ranges, and if passage would support desert tortoise population recovery or demographic needs (USFWS 2020a).

Between the years 1987 and 2019, 146 injured or dead Mojave desert tortoises were observed along roads or trails within the Reserve or surrounding areas. Since 2015, 25 desert tortoise mortalities on roadways within the Reserve were reported to UDWR. Seven desert tortoise mortalities occurred in 2015, six in 2017, four in 2018, and eight in 2019 of which six were on Snow Canyon Drive, and two on SR 18 (UDWR 2019e). Since the accounts consist of anecdotal

observations provided by many sources including local, State, and Federal agencies, and reports from the general public, the actual number of mortalities may be underestimated.

Roads increase the spread of nonnative plant species (Brooks and Berry 2006, Brooks and Chambers 2011), which reduces Mojave desert tortoise forage quality and increases the risk of fire within Mojave desert tortoise habitat. Roads can be a direct source of fire ignition, increased litter, increased presence of predators, and increased toxicants into the environment (Forman and Sperling 2003). Herbicide use and weed control, as part of a long-term plan, may reduce the spread of invasive species during road construction, maintenance, and use; however, the presence of nonnative species, and nonnative grasses in particular, is pervasive. Staff from the BLM, UDWR, and Washington County, and many volunteers have spent many hours removing invasive species in heavily impacted areas of the Reserve, such as the upper Cottonwood Springs Road area (Washington County 2019b).

Utilities, Renewable Energy Resources, Mining, Drilling for Resources, Water Development, and Flood Control

Utility projects may result in fragmenting Mojave desert tortoise habitat, imposing barriers to movement (many of these facilities and ROWs are fenced with tortoise-proof fencing), removing suitable land from use by Mojave desert tortoise, attracting predators, and increasing the risk of fire (Cameron et al. 2012, Lovich and Ennen 2011 and 2013). Utility projects typically result in removal of natural vegetation and alteration of habitat. Short-term, construction-related activities could include clearing vegetation, trenching, placing a temporary or permanent access road, and other sources of ground disturbance. Removal of vegetation reduces forage potential and the availability of Mojave desert tortoise cover sites, and could encourage the establishment of nonnative, invasive plant species. Mojave desert tortoise could be crushed by vehicles or equipment. Noise, dust, and vibrations generated by large equipment during construction could disturb individual Mojave desert tortoise patterns (Tuma et al. 2016, Berry and Murphy 2019), possibly causing them to leave protected sites and increase their vulnerability for injury or death. Standing water from water leaks can draw Mojave desert tortoise and predators to the project site. Overhead transmission lines provide perching sites for ravens, and towers may provide sites for nests; ravens are a known Mojave desert tortoise predator. Operations and maintenance activities may maintain all or a portion of the site in disturbed condition, and regular use of access roads and presence of workers may disturb, injure, or kill Mojave desert tortoise.

Within the Reserve, 38 existing ROWs are authorized on BLM-administered lands, with all being granted before the designation of the NCA. These include roadways, phone lines, power stations, wells and water tanks, water pipelines, detention dams, and water and power lines (refer to Section 3.20.1.2, Table 3.20-2, and Table 3.20-3). One utility corridor crosses the NCA, following SR 18 (BLM 2016a). There are restrictions on developing new ROWs on BLM-administered lands. Road ROWs within the Reserve intersect with 48 acres of tortoise habitat, of which 10 acres are within tortoise exclusion fencing. Within the proposed Zone 6, tortoise habitat intersects with 18.6 acres of roads.

Filing new mining claims is no longer authorized in the Red Cliffs NCA under OPLMA Sections 1974 (refer to Section 3.7.1.3). Valid existing claims could be developed in the future contingent on regulatory requirements to minimize loss or degradation of Mojave desert tortoise habitat as described in 43 CFR 3809 and 3715 (BLM 2016a). Within proposed Zone 6, mining can be allowed on SITLA lands if a permit is obtained. Portions of the BLM-administered lands within proposed Zone 6 are closed to fluid mineral development (approximately 122 acres), while the remaining acres are open with varying levels of restrictions. The BLM-administered lands within proposed Zone 6 are also categorized as opened or opened with restrictions to locatable minerals.

Additionally, approximately 1,150 acres within the area are closed to mineral materials development, while the rest currently remain open (BLM 1999).

Recreation Uses and Related Facilities

Each year, the Reserve attracts outdoor enthusiasts that partake in recreational activities such as sightseeing, hiking, camping, mountain biking, OHV use, rock-climbing, and horseback riding. The Red Cliffs NCA had an estimated 151,000 visits in 2016, mostly in the form of day use by hikers, mountain bikers, and equestrians (BLM 2017a). Between October 1, 2018, and September 30, 2019, visitor numbers for the Red Cliffs NCA were 190,000 (BLM 2019b). Snow Canyon State Park had over 511,000 visitors between July 2018 and June 2019 (Utah State Parks 2020). Other parts of the Reserve also receive visitors that are not included in the data for the Red Cliffs NCA. Recreation offers opportunities for people to have close experiences with wildlife, but outdoor activities have the potential to induce wildlife responses that affect behavior and modify use of suitable habitat (Taylor and Knight 2003, USFWS 2020a). Habitat characteristics such as vegetation, soil, water, and microclimates can be impacted directly by human activity (Knight and Cole 1995). Closely approaching wildlife can potentially stress the animal and increased human presence can facilitate opportunities for people to illegally collect (refer to Predation section), handle, disturb, or deliberately injure or kill an animal they encounter (USFWS 2020a).

Non-motorized recreational activities are permitted within the Reserve and result in impacts to Mojave desert tortoise habitat through the development of trails. Recreation in the Red Cliffs NCA includes more than 130 miles of trails (BLM 2019a) (refer to Section 3.15 and Map 3.15-1). There are approximately 262 miles of trails within the Reserve, with 108 miles designated and approximately 66 miles of non-designated social trails on BLM-administered lands and 88 miles of both designated and social trails on non-Federal lands (BLM 2020b, AGRC 2020). Of these 262 miles of trails, 197 miles occur within suitable Mojave desert tortoise habitat in the Reserve (73 miles on designated trails, 53 miles on social trails, and 71 miles on non-Federal lands). A 2019/2020 study (Eastep 2020) monitored almost 35 miles of trails used for non-motorized activities within the Upper Red Cliff and Babylon areas of the Reserve to assess disturbance impacts. The study found that impacts have increased on the trails that have been monitored since 2013, including additional erosion, social trails, and spurs off the established trails. The proliferation of these unauthorized trails into prime tortoise habitat can disturb wildlife, trample and compact soils, and spread nonnative plant species resulting in degradation of fragile tortoise habitat (USFWS 2020a). Appropriate signage that directs access to hiking and climbing areas reduces impacts from off-trail trampling that facilitates erosion, degrades biotic crusts, and results in loss of microbial biodiversity (Pietrasiak et al. 2011).

OHV use has been shown to negatively affect Mojave desert tortoises and their habitat in numerous ways, including direct mortality of tortoises, collapse of burrows, soil compaction, erosion, loss of vegetation, increased exposure to and spread of nonnative invasive plant species, and changes in hydrology (Bury and Luckenbach 2002, Keith et al. 2008). Over time, the compaction of hardened soils can impede native plant growth. The noise and vibrations associated with vehicle use in the desert can disturb animals and alter normal behavior patterns causing a significant decrease of Mojave desert tortoise activity adjacent to roads used by motorized vehicles (Hughson and Darby 2013). Mojave desert tortoise typically stop moving when frightened by noise or vibrations and their use of burrow networks near roads are reduced (Hughson and Darby 2013). Burrows may collapse, entrapping or crushing tortoises. OHV use has shown a significant negative effect on evidence of Mojave desert tortoise presence (Berry et al. 2014). High speeds and low visibility from dust plumes from motorized vehicle tires can result in unintended collisions with Mojave desert tortoise causing severe injury or direct mortality. Cross-country OHV use is prohibited within the Reserve, and OHV use is limited to designated routes (BLM 2017a).

Mountain biking is allowed on designated trails on both the SITLA and BLM-administered lands (SITLA 2020a, BLM 2020b). Very little is known about whether wildlife responds differently to mountain biking versus hiking. Mountain bikes travel at faster speeds than hikers and may increase chances of accidental encounters or collisions with Mojave desert tortoise. The faster speeds of an approaching bike may startle a tortoise, which could result in the tortoise voiding its bladder and put it at risk of dehydration. Faster speeds may also reduce reaction time by bicyclists to avoid collisions. Management has restricted bicycle use to designated trails throughout the Reserve.

Within the Red Cliff NCA, hunting is allowed during prescribed seasons and with required licenses. With a valid hunting license and during official seasons, hunting dogs may be allowed off leash in the NCA, though owners must keep dogs under their control at all times (BLM 2016b). Dogs may disturb or frighten Mojave desert tortoise into voiding their bladder during an encounter and put a tortoise at risk of dehydration and death, especially during the dry season. Dogs may also prey on tortoises, as discussed in Predation section.

Unauthorized target shooting can result in direct mortality to Mojave desert tortoise and other wildlife.

Proposed Zone 6 is a popular recreation destination (refer to Section 3.15, Recreation and Visitor Services) with over 100 miles of roads and trails, including unpaved roads, and motorized and non-motorized trails, many of which were user-created (refer to Map 3.15-2 and 3.17-1). An estimated 42 miles of social trails have been created in addition to the 74 miles of designated trails within proposed Zone 6. With 82,775 annual visits (refer to Section 3.15), proposed Zone 6 has a higher density of recreation use than any area on public land in the Red Cliffs NCA. Uses include hiking, camping, rock-climbing, equestrian use, and sightseeing (refer to Section 3.15). Within proposed Zone 6, the SITLA lands also support extensive OHV use. This intensive human use may impact desert tortoise and their habitat (Taylor and Knight 2003).

Indirect threats from recreational activities include trash and litter along trails, campgrounds, parking areas, or rock-climbing access routes. Recreation activities that promote awareness, protection, and community science data may contribute to public education and the distributional database for desert tortoise (BLM 2017a, Washington County 2017b and 2018a). However, the collection of community science data can also impact tortoises and habitat if people leave trails to handle or approach tortoises for pictures or other data. Recreationalists may encounter wildlife and often report locations of sightings. In 2017 and 2018, signage was posted to request submittal of Mojave desert tortoise sightings in several locations outside the Reserve (i.e., Red Bluff Area, BLM ACEC lands, and SITLA lands near Moe's Valley) (Washington County 2017b, Washington County 2018a). Data from these sightings confirmed Mojave desert tortoise distribution in areas where formal surveys were not conducted.

Grazing by Livestock

Grazing impacts Mojave desert tortoise by reducing the availability of native plants, increasing the spread of nonnative vegetation, compacting soil, and disrupting biocrusts that support soil stability, provide nutrients, and increase soil water holding capacity (Lovich and Bainbridge 1999, Fleischner 1994, Reisner et al. 2013). Boarman (2002), in a review of threats to Mojave desert tortoise, cites Gifford and Hawkins' (1978) conclusion that grazing at any intensity reduces the infiltration rate of the soil. Livestock can also trample Mojave desert tortoise individuals and collapse burrows (Nussear et al. 2012, Lovich and Bainbridge 1999). Studies have shown that grazing has a negative correlation with presence of Mojave desert tortoise sign, and the adverse effects of grazing intensify with higher levels of livestock use (Berry et al. 2014, Keith et al. 2008). Recovery of fragile or slow-growing vegetation may take years following grazing removal, and the

proliferation of low forage quality invasive species may continue to limit the productivity of an area for Mojave desert tortoise. Grazing by livestock has been eliminated within Reserve Zones 1 through 5 but is currently permitted in proposed Zone 6.

Grazing by livestock is generally permitted on all or most BLM-administered lands in tortoise habitat (below 5,000 feet elevation) within the Analysis Area for the HCP, excluding the Reserve. Within proposed Reserve Zone 6, approximately 1,462 of the 3,225 acres of SITLA lands are currently under active grazing leases (SITLA 2020a, 2020b), as are almost all BLM-administered lands (3,446 of 3,471 acres). The BLM administers two allotments that overlap portions of proposed Zone 6, with 2,793 acres and 150 animal unit month (AUMs) associated with the Curly Hollow Allotment (UT1401503), and 653 acres and 48 AUMs with the Box Canyon Allotment (UT0400901) (BLM 2020b; Section 3.21 and Map 3.21-1). Virtually no grazing is within the River Pasture of the Curly Hollow Allotment in the southwest quadrant of proposed Zone 6 because of a lack of desirable species and recreation pressure. Portions of the Box Canyon Allotment and the Holding Pasture of the Curly Hollow allotment within proposed Zone 6 receive some active grazing.

Predation

The Mojave desert tortoise is preyed upon by many different animals, and adult Mojave desert tortoises are predated on less often than eggs and juveniles (Marlow 2000, Berry and Murphy 2019). Some Mojave desert tortoise predators benefit greatly from human presence (referred to as subsidized predators) and increases of discarded food, garbage, and other trash. One subsidized predator, the raven, is a known natural predator primarily of young tortoises (Berry et al. 2014, Kristan and Boarman 2003). The addition of man-made structures such as transmission and water lines can support raven nesting and feeding (Boarman et al. 2006) and has led to a boom in the raven population throughout the Mojave desert tortoise range (Fleischer et al. 2008) increasing the potential of tortoise predation. Corvid predation is noted to be highest and most successful along habitat edges and fragments (Liebezeit and George 2002). While raven predation in the Reserve has been occurring for many years, some baseline data have been gathered annually since 2015 (Washington County 2018b). Surveys are conducted at all known raven nesting areas and along transmission lines on Federal and non-Federal lands within and adjacent to the Reserve. Surveys have identified raven predation on hatchling and juvenile Mojave desert tortoises, including two individuals in 2015 (Washington County 2015), eight in 2017 (Washington County 2017a), four in 2018 (Washington County 2018b), and fourteen in 2019 (Washington County 2019c). Ten of the Mojave desert tortoise remains found in 2019 were attributed to a single raven nest at Red Mountain (Washington County 2019c). As of 2019, all active raven nests were located on cliffs or cottonwood trees. Only remnants of old nests have been found on transmission line towers since the power companies often remove the nests. Ravens may have learned that juvenile Mojave desert tortoises are a reliable food source. Learned feeding behavior can be passed to offspring, which may result in generations of Mojave desert tortoise predation (Boarman 2014). Ravens appear to be spreading across the Reserve and intensive survey and monitoring of raven nests on the Reserve will continue (Washington County 2018b).

Coyotes and dogs also prey on Mojave desert tortoise (Esque et al. 2010, Lovich et al. 2014, Cypher et al. 2018). Frequency of coyotes preying on tortoises appears to increase during drought conditions, as other food sources become less available (Esque et al. 2010). However, Mojave desert tortoise is likely an incidental prey item and consumed opportunistically by the coyote (Cypher et al. 2018). Domestic dogs, when left to roam (i.e., off leash), function as subsidized predators (USFWS 1994) and can have a significant impact on wildlife, including Mojave desert tortoise (Young et al. 2011). Domestic dogs are typically associated with human settlements; these hunters may occur singly but also in packs, expanding out from the urban interface (Esque et al. 2010, Berry and Murphy 2019). Dogs can prey on both juvenile and adult tortoises (Esque

et al. 2010). Dogs have been observed attacking tortoises and tortoise remains have been found in dog scat (Boyer and Boyer 2006, Berry et al. 2014). Pets are required to be on a leash within the Reserve, with the exception of hunting dogs who are with a licensed hunter during official hunting seasons. Various reports over the last 10 years indicate predation of tortoises by dogs. Approximately six tortoise shells were observed near the Black Rock climbing area in Snow Canyon State Park, and officials speculated that the tortoises were either scavenged or predated on by dogs (UDWR 2019f). Several years ago, two tortoises were injured as disclosed by the owner of the dogs that had mauled the tortoises. Although no official report was made, the HCP office has a report of a citizen seeing a dog running through the Reserve in Paradise Canyon in 2019 and carrying a tortoise in its mouth (pers. com. McLuckie 2020). The tortoise was released near a bush and appeared to be unharmed by the encounter.

Along with dogs and wild animals, people have been recorded intentionally removing tortoises from their habitat. A 2019 field report by UDWR indicated 38 incidents of suspected or confirmed illegal take of Mojave desert tortoises from the Reserve and surrounding areas (UDWR 2019f). The majority of these reports involved reproductive adults (84 percent); fewer reported incidents of juveniles and immature tortoises being taken are likely because of their small size and therefore, increased difficulty in encountering them (UDWR 2019f). While 17 of the tortoises were returned to the Reserve after testing negative for disease, 13 were not able to be returned, and 6 were found dead or were euthanized because of injuries. It was not clear what became of two of the tortoises.

Disease

Upper Respiratory Tract Disease (URTD) occurs in both wild and captive populations of Mojave desert tortoise (Jacobson et al. 1991). This disease is caused by a bacterium, *Mycoplasma agassizii*, that is likely transmitted among Mojave desert tortoise by contact or aerosols (Brown et al. 1994). URTD causes lesions in the nasal cavity, excessive nasal discharge, swollen eyelids, and sunken eyes. In its advanced stage it can lead to lethargy and death. This condition could be further heightened by environmental stresses, malnutrition, and immune deficiencies (Jacobson et al. 1991). Typically, tortoises are not translocated to a recipient site if there is an active disease outbreak (Rideout 2015). Other diseases such as herpes virus, cutaneous dyskeratosis (shell disease), and shell necrosis affect Mojave desert tortoise (USFWS 2011b, Berry and Murphy 2019). Cutaneous dyskeratosis and shell necrosis can be caused by increased environmental toxins such as heavy metals, mercury, arsenic, and chlorinated hydrocarbons (Jacobson et al. 1994, Chaffee and Berry 2006, Martel et al. 2009).

Proximity to urban areas can contribute to disease occurrence in Mojave desert tortoise (Berry et al. 2006, Jacobson et al. 2014). Interaction with diseased pet tortoises that have been released into the wild population or wild tortoises that have been translocated from areas with a higher exposure to disease can increase the risk of acquiring diseases. Mojave desert tortoise within the Reserve have both URTD and shell disease (UDWR 2018). Shell disease was observed in relatively high-density Mojave desert tortoise areas. In addition, URTD has been observed throughout the Reserve, and the presence of Mojave desert tortoise with URTD clinical signs has increased since 2013 (UDWR 2018). Mojave desert tortoise translocated long distance (e.g., greater than 300 meters) and into Zone 4 of the Reserve require a health screening prior to release. Health evaluations, which include blood tests, reduce the potential for Mojave desert tortoise to expose others to disease.

Invasive Species

Invasive grasses, particularly red brome and cheatgrass, can easily outcompete native grasses and forbs, because these grasses require about half as much water as most native plants to germinate (Tilly et al. 2013). A dominance of invasive grasses, which are lower in nutrients than forbs, alters

the quality of food available for Mojave desert tortoise. In addition, red brome seeds are made up of barb-like hairs that can embed into tissue causing mucosal inflammation, which often resembles URTD clinical signs (Drake et al. 2016). Juvenile tortoises fed only invasive red brome showed signs of weakened immune systems, and declines in growth, overall body condition, and survival (Drake et al. 2016). Tortoises seek foods rich in protein and low in fiber, which generally would result in a diet with more digestible energy, calcium, magnesium, phosphorus, and potassium—important elements for producing bones, shells, and eggs (Tracy et al. 2006).

Exotic and invasive grasses, including annual bromes (cheatgrass and red brome) and split grasses, and herbaceous weeds such as nonnative black mustard, African mustard, and London rocket, are pervasive throughout the Analysis Area for the HCP. These invasive grasses and forbs reach almost every area inside the NCA, ranging from 5 to 30 percent coverage within the landscape (BLM 2016a). Many vegetation communities, particularly desert scrub, shrubland, and pinyon-juniper woodlands within the Red Cliffs NCA, as well as all areas that have been burned in the last two decades (refer to Section 3.22 and Map 3.22-1), are 90 to 100 percent departed ecologically from what their original reference community was described to be (TNC 2011) (refer to Section 3.2 and Map 3.2-3). However, because shrubs remain on the landscape, tortoise departure was worse in the moderate class—25 to 50 percent in most tortoise habitats (blackbrush mesic and creosote-white bursage). Information on ecological departure in the rest of the Analysis Area for the HCP is not available. According to LANDFIRE Remap data (2019), 640 acres or 10 percent of proposed Zone 6 is classified as ruderal scrub, ruderal shrub, or exotic annual grassland, with exotic species-dominated understory as well as exotic-dominated herbaceous stands (refer to Map 3.2-4). Approximately 7 percent of the Analysis Area for the HCP is dominated by exotic invasive vegetation communities mapped as introduced or ruderal grasslands, ruderal shrublands, and ruderal scrub (USGS 2019a).

Fire

Fire is an increasing threat to Mojave desert tortoise and their habitat. Fire and fuels have increased with the introduction and spread of nonnative invasive plants, such as red brome, cheatgrass, and split grasses (BLM 2015a, Brooks 1999, Brooks and Esque 2002). After a fire, nonnative vegetation is likely to increase in density, causing further habitat degradation (Boarman 2002). The likelihood of major vegetation community type conversion from native shrub to nonnative annual grasses and forbs is much greater where there are multiple, successive fires. An increase of nonnative and invasive plants has been shown to occur with increased habitat fragmentation and disturbance (Alston and Richardson 2006). The increased threat of larger, catastrophic wildfires is a continued concern for Mojave desert tortoise recovery and management. Impacts to Mojave desert tortoise from wildfires can be variable (Esque et al. 2003), with direct mortality or injuries from contact with fire, dehydration, exposure to high temperatures, or smoke inhalation, and loss of forage, change in ecotypes and hydrology, and damage to soil and burrows.

Since 1976 there have been 207 fires within the Analysis Area for the HCP covering 266,196 acres, with 56,672 acres double burned; there were no fires within proposed Zone 6. Twenty-two fires burned 15,913 acres within the Reserve since 1976, with over 3,808 acres burning multiple times (24 percent of all burned acres) (refer to Section 3.22 and Map 3.22-1). During the summer of 2005, lightning cause multiple large fires within the Reserve, burning approximately 10,244 acres of Mojave desert tortoise critical habitat and 1,267 acres of additional Mojave desert tortoise habitat within the Reserve (USFWS 2008c and 2018, UDWR 2018). It is estimated that 15 percent of adult Mojave desert tortoise within Reserve Zone 3 died because of wildfires that year (UDWR 2007). Not only was mortality directly attributed to fire, but fire also caused the loss of Mojave desert tortoise forage (UDWR 2016). The proliferation of invasive annual grasses is fueling an annual burn-reburn wildfire cycle in the Red Cliffs Reserve (BLM 2016a). Nonnative annual

grasses (typically red brome and cheatgrass) are pervasive in every major vegetation community, which increase fire frequency and intensity (TNC 2011). Exotic annual grasses and forbs reach almost every area of the Red Cliffs Reserve (refer to Map 3.2-3), ranging from 5 to 30 percent coverage within the landscape, with areas approaching 90 percent cover of nonnative grasses (BLM 2016a, USGS 2019a). The change in fire regime, mentioned in Section 3.22, to a burn-reburn cycle demonstrates the cause-and-effect relationship between above-average fall and winter precipitation that triggers increased production of invasive annual brome grasses, and uncharacteristically large natural or human-caused wildfires during the summer months (BLM 2015a). Because of prevalence of nonnative annual grasses and forbs along roadways and the presence of humans, the probability of human-caused fires is increased (Gucinski et al. 2001).

Drought

Extended periods of drought can increase immunosuppression in tortoises (Boarman 2002), cause stress and other physiological responses, and limit forage availability. Short-term droughts can result in reduced reproductive potential, and long-term droughts could have significant consequences on Mojave desert tortoise populations (USFWS 2019a). Drought conditions reduce water availability, promote nonnative annual grasses, and decrease native forb growth, which could diminish the ability of Mojave desert tortoise to satisfy its nutritional needs. Within the Reserve, a severe drought in 2002 resulted in no perennial or annual plant growth that year. Abnormal Mojave desert tortoise behavior was observed, including failure to hibernate, and there was an increase in URTD and the presence of emaciated tortoises (UDWR 2018). The following year, surveys identified 2.7 times the normal amount of shell remains, presumably a result of increased mortality from the drought. In 2003 the estimated population had dropped to 16.5 individuals per square kilometer from the 28.3 individuals per square kilometer recorded in 2001 (UDWR 2018).

Climate Change

Climate change is predicted to affect the American Southwest with increased drought events and increased temperatures (The Global Change Research Program as cited in Berry and Murphy 2019). Locally, most models predict that the frequency of severe drought will increase over the next 50 years. In the past 25 years, Washington County has seen average annual temperatures above the mean of 61°F and precipitation has generally been lower than the annual mean of 12 inches (NOAA 2020a, Rangwala 2020). Historically, the hottest summer day had a temperature of 105°F, and it is anticipated that the number of higher temperature summer days will continue to increase, while precipitation is predicted to fluctuate within 10 percent above or below the mean. Under drought conditions, nonnative grasses would proliferate, which would also increase fuel loads, thereby making habitat more susceptible to wildfires, and could cause direct mortality and loss of habitat for Mojave desert tortoise (Berry and Murphy 2019, Drake et al. 2016). Because this species' sex determination is temperature dependent, a predicted increase in ambient temperatures could skew sex ratios toward more females.

Translocation

Long-distance translocation (greater than 300 meters) is the practice where animals are moved from one location to another outside their home range, while short-distance translocation (less than 300 meters) involves moving an animal a shorter distance within its home range. These practices have been used as a management tool for decades and the use is increasing as a form of mitigation for vulnerable species (Germano et al. 2017). Long-distance translocation may remove Mojave desert tortoise from the danger of being injured or killed when their habitat is lost as a result of changes in land use, but may also expose individuals to other risks, including disease, increased energy expenditure, and compromised genetic integrity (Berry et al. 2002,

Murphy et al. 2007, Nussear et al. 2012, Germano et al. 2017, Nafus et al. 2017). Studies suggest that long-distance translocation results in a short-term (first season of activity) change in tortoise behavior (Farnsworth et al. 2015, Nussear et al. 2012, Field et al. 2007). Homing behavior appears to be present in Mojave desert tortoise, which causes Mojave desert tortoise to return to their previous capture site (Hinderle et al. 2015). Long-distance translocated tortoises move a significantly longer distance and show increased movement patterns the first season after long-distance translocation than resident tortoises (Farnsworth et al. 2015, Davey et al. 2011), with long-distance movements decreasing over time as they became more familiar with available resources and establish home ranges (Nussear et al. 2012). Mulder et al. (2017) reported that long-distance translocated males produced significantly fewer young than resident males over a 4-year period.

Since 1996, Mojave desert tortoises were moved out of harm's way prior to land development in Washington County where the habitat has been permanently removed or altered. These tortoises have been long-distance translocated to Zone 4 of the Reserve (refer to Map 2.4-3), an area where Mojave desert tortoises have not previously been observed or put into the State's adoption program, which requires movement outside the species' range and recovery unit (USFWS 2020a). A total of 277 tortoises have been entered into the adoption program (pers. com. Rognan 2020), while 485 tortoises (including 317 adults) have been long-distance translocated into Zone 4 between 1999 and 2018 (UDWR 2019c). The current estimated abundance of Mojave desert tortoise in Zone 4 is approximately 285 (160 to 507) individuals (USFWS 2020a). Analysis of 15 years of data (2003 through 2017) indicate that annual adult Mojave desert tortoise survival in Zone 4 was estimated at 90 percent (UDWR 2019c), which is low for a long-lived species such as Mojave desert tortoise (pers. com. Kellam 2019). Long-distance translocated Mojave desert tortoise within Reserve Zone 4 substantially increased in abundance and density, and shows an overall positive trend since 1987 (UDWR 2019c). Long-distance translocated tortoises within Zone 4 have established a persistent and viable population as long-term trends (2003 to 2017) indicate a substantial increase in desert tortoise abundance and density. In 2017, Zone 4 supported approximately 289 adult tortoises; an estimated 13.43 adult Mojave desert tortoise per square kilometer, with juvenile and immature Mojave desert tortoise present (UDWR 2019c). In 2018, the majority of long-distance translocated Mojave desert tortoises appeared to be healthy. Long-distance translocated Mojave desert tortoises in Reserve Zone 4 appear to have higher growth rates than Mojave desert tortoises monitored in other parts of the Reserve zones (UDWR 2019c).

Range, Recovery Units, Analytical Units, and Designated Critical Habitat. The Mojave desert tortoise is found across portions of four states to the north and west of the Colorado River in southwestern Utah, northwestern Arizona, southern Nevada, and southeastern California. The Mojave desert tortoise occurs in both the Mojave and Sonoran deserts (USFWS 2011a, Edwards et al. 2016). For recovery planning purposes, the USFWS identified five recovery units that encompass the entire range of the species: Western Mojave, Colorado Desert, Northeastern Mojave, Eastern Mojave, and Upper Virgin River (Map 3.5-1; USFWS 2011a). The recovery unit boundaries identify evolutionarily significant Mojave desert tortoise populations and are based (in part) on approximate ecosystem boundaries relevant to the Mojave desert tortoise. The recovery units also take into consideration information on genetic variability, behavior patterns, and morphology. Each recovery unit included a Desert Wildlife Management Area (managed as ACECs on BLM-administered lands) that supports at least one viable Mojave desert tortoise population relatively resistant to extinction processes (i.e., a minimum geographic extent of 1,000 square miles and a density of 3.9 adult Mojave desert tortoises per square kilometer [10.1 Mojave desert tortoises per square mile, which totals 10,000 Mojave desert tortoises for a viable population]; USFWS 1994, USFWS 2011, USFWS 2019a).

The Upper Virgin River Recovery Unit (UVRRU) (Map 3.5-2) is the smallest recovery unit, and while Arizona is jurisdictionally outside the original UVRRU boundaries, contiguous Mojave desert

tortoise habitat extends south of the Utah-Arizona state line (USFWS 2020a). The UVRRU is also the most isolated of the recovery units, being situated at the northeast end of the Mojave desert tortoise range. It shares its western border with the Northeastern Mojave Recovery Unit, and the crest of the Beaver Dam Mountains separates the UVRRU population of Mojave desert tortoise from the Beaver Dam Slope population (refer to Map 3.5-1), with limited potential habitat connectivity between the UVRRU and the Northeastern Mojave Desert Recovery Unit. The USFWS (2020a) has identified four potential habitat connectivity corridors linking the UVRRU and the Northeastern Mojave Recovery Unit. These habitat corridors include habitats from Snow Canyon Analytical Unit through Far West or Green Valley Analytical Units, and one that includes habitats through the Arizona Analytical Unit. Connecting the UVRRU and the Northeastern Mojave Recovery Unit could benefit tortoise access to larger habitats and maintain genetic and demographic connectivity (USFWS 2020a).

USFWS designated 10,072 square miles (6,446,200 acres) as critical habitat for the Mojave desert tortoise in 1994 (59 *Federal Register* 5820), distributed across 12 critical habitat units (refer to Map 3.5-1). Designated critical habitat within the UVRRU totals 54,600 acres, which is less than 1.0 percent of the total acreage of designated critical habitat for the species range-wide. Critical habitat within the UVRRU (i.e., Analysis Area for the HCP) includes 46,849 acres within the Reserve (of which 46,098 acres are within the boundaries of the Red Cliffs NCA); outside the Reserve there are a total of 7,791 acres of designated critical habitat (BLM 1,336 acres, UDNR 695 acres, SITLA 939 acres, private 2,577 acres, and Tribal 2,244 acres). However, this relatively small amount of critical habitat includes the densest Mojave desert tortoise population across the species' range, but only accounts for less than 0.5 percent of the total estimated range-wide population of Mojave desert tortoise in 2014 (USFWS 2019a, Allison and McLuckie 2018). The specific physical and biological features of Mojave desert tortoise critical habitat follows (59 *Federal Register* 5820–5866):

- Sufficient space to support viable populations within each of the recovery units and to provide for movement, dispersal, and gene flow.
- Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species.
- Suitable substrates for burrowing, nesting, and overwintering.
- Burrows, caliche caves, and other shelter sites.
- Sufficient vegetation for shelter from temperature extremes and predators.
- Habitat protected from disturbance and human-caused mortality.

The UVRRU was divided into 11 geographic analytical units (Map 3.5-3) based on known Mojave desert tortoise occurrences and likely barriers to movement (topographical or human-caused) (USFWS 2019b). To maintain viability, connectivity among analytical units is to provide for repopulation of adjacent analytical units without human assistance following stochastic population declines (USFWS 2019b). Each analytical unit has a management target of 3,000 individuals, and was ranked (e.g., good, moderate, poor, or critical) for its resiliency, redundancy, and representation based on a series of factors that include habitat condition, demographic needs, and connectivity/fragmentation (USFWS 2020a). Each analytical unit has unique habitat conditions and is subject to a wide array of threats, with wildfire, invasive plants, drought or climate change, disease, and predators common to all analytical units (USFWS 2020a). The analytical units, listed from west to east, are as follows:

1) Far West: Includes Shivwits Reservation; closest to Northeastern Mojave Recovery Unit, higher elevation, diverse soils and geology, limestone and washes, caliche burrows; threats include urbanization, recreational activities.

   Suitable habitat acres: 45,412 Condition: Poor

2) Arizona: Creosote flats, cliffy on far west, lower diversity of vegetation, disturbed with fires; threats include urbanization. The Arizona Analytical Unit is jurisdictionally outside of the original UVRRU boundaries (USFWS 1994 and 2011), but predicted habitat extends continuously south of the Utah-Arizona state line (Nussear et al. 2009). This area may provide linkages between Utah and Arizona desert tortoises in the UVRRU, and linkages between the UVRRU and nearby Northeastern Mojave Recovery Unit.

   Suitable habitat acres: 86,894 Condition: Moderate

3) Green Valley: Includes proposed Zone 6; caliche and limestone, gypsiferous/badlands soils, cliffs, creosote, dwarf bear-poppy, and barrel cactus; threats include urbanization, poor connectivity.

   Suitable habitat acres: 30,830 Condition: Good

4) Snow Canyon: Sand, bunchgrasses, large area of high elevation and cliffs unsuitable for Mojave desert tortoise; threats include roads.

   Suitable habitat acres: 6,326 Condition: Moderate

5) Urban Interface: Three isolated Mojave desert tortoise units; sandstone and basalt, cliffy, rock shelters; threats include urbanization, roads, poor connectivity; Mojave desert tortoises are removed as habitat is developed.

   Suitable habitat acres: 1,828 Condition: Poor

6) West Cottonwood: Isolated pockets of unburned habitat, islands of habitat with no or very little invasive plant species, sand dunes; threats include roads, poor connectivity.

   Suitable habitat acres: 7,499 Condition: Moderate

7) East Cottonwood: Diverse vegetation, sandstone outcrops, partially burned, high prevalence of invasive plant species; threats include urbanization, roads, poor connectivity.

   Suitable habitat acres: 21,761 Condition: Moderate

8) Sand Mountain: Sandy soils and dunes; threats include roads, OHV use.

   Suitable habitat acres: 41,158 Condition: Moderate

9) Babylon: Translocation site, cinder and basalt outcrops, sandstone outcrops, washes, badlands soils, sand; threats include roads, poor connectivity.

   Suitable habitat acres: 5,481 Condition: Moderate

10) Cinder Knolls: Basalt, creosote dominant; threats include roads, poor connectivity.

    Suitable habitat acres: 457 Condition: Moderate

11) Springdale: High elevation, soils are claylike, sandstone boulders, very cliffy, less creosote; threats include urbanization, roads, poor connectivity, isolated, small area.

    Suitable habitat acres: 290 Condition: Poor

Population Size, Density, and Trends

Efforts have been made to estimate Mojave desert tortoise population numbers through a combination of habitat modeling and on-the-ground surveys (USFWS 2015, Allison and McLuckie

2018, UDWR 2018).[5] Based on modeling and extrapolation from surveys, an estimated 212,343 Mojave desert tortoises occupy approximately 17 million acres of modeled habitat across the five recovery units comprising the Mojave desert tortoise range (Allison and McLuckie 2018). This range-wide population estimate is believed to overestimate the true population of Mojave desert tortoise, because it is based on density estimates from survey data collected from Tortoise Conservation Areas (TCAs) that are believed to contain the densest populations of Mojave desert tortoises and that have been extrapolated to all potentially suitable habitats across the range (USFWS 2019a). Table 3.5-2 summarizes the distribution of this estimated Mojave desert tortoise population across the five recovery units. The 2014 range-wide Mojave desert tortoise population estimate represents a decline of almost 125,000 adults over a 10-year period, a nearly 37 percent overall population decline (Allison and McLuckie 2018). This decline is not evenly distributed across the range of the species.

Table 3.5-2. Population and Density Estimates by Recovery Unit

Mojave Desert Tortoise Recovery Unit	Modeled Mojave Desert Tortoise Habitat (square kilometers)	2004 Estimated Mojave Desert Tortoise Abundance	2014 Estimated Mojave Desert Tortoise Abundance	Change in Estimated Abundance (2004 to 2014)
Western Mojave	23,139	131,540	64,871	-50.6%
Colorado Desert	18,024	103,675	66,097	-36.2%
Northeastern Mojave	10,664	12,610	46,701	+270.3%
Eastern Mojave	16,061	75,342	24,664	-67.3%
Upper Virgin River	613	13,226	10,010	-24.3%
Total Range-wide	**68,501**	**336,393**	**212,343**	**-36.9%**

Note: Abundance numbers are extrapolated from modeled habitat based on estimated densities derived from TCAs. The standard error for the total estimated abundance is 31,391 Mojave desert tortoises.
Source: USFWS 2019a, Allison and McLuckie 2018

The USFWS estimate, using UDWR survey data, for the Reserve TCA, a subset of the UVRRU, was extrapolated across the 613 square kilometers of modeled Mojave desert tortoise habitat within the UVRRU, resulting in an estimated population within the UVRRU of 10,010 Mojave desert tortoises (USFWS 2015 and 2019a, Allison and McLuckie 2018). Because this likely overestimates the UVRRU population as a result of this species' clustered distribution within suitable habitat in the TCA, the USFWS recently recalculated tortoise density outside the Reserve and proposed Zone 6 based on the Beaver Dam National Conservation Area, which shares many ecological characteristics with the UVRRU (USFWS 2020a). The USFWS (2020a) used a tortoise density value of 3.4 adult tortoises per square mile to estimate a total abundance of 4,450 adult Mojave desert tortoises in the UVRRU, with more than half in the Reserve.

In addition, because of the protections afforded to desert tortoise within the Reserve, the decline rate of desert tortoise outside the Reserve is presumably underestimated as well. The estimated Mojave desert tortoise population of the UVRRU represents approximately 5 percent of the total

[5] It is important to note that surveys and modeling have occurred across a variety of spatial geographies associated with the conservation and management of the Mojave desert tortoise: USFWS recovery units, TCAs, and critical habitat units. These geographies can often become conflated when describing Mojave desert tortoise population and density estimates. There are five recovery units, which are the largest management boundaries and essentially capture the entire range of the species. The 17 TCAs, which are focal areas for conservation and management of Mojave desert tortoise delineated within the recovery units, typically encompass critical habitat units and other protected lands within the recovery units. The 12 critical habitat units typically fall within or are adjacent to a TCA (USFWS 2011a). Reserve Zones 1 through 5 are a TCA within the larger UVRRU and overlap with most, but not all, of the Upper Virgin River Critical Habitat Unit.

range-wide Mojave desert tortoise population. The UDWR estimate of adult Mojave desert tortoises in the Reserve is shown in Table 3.5-3.

Table 3.5-3. Approximate Mojave Desert Tortoise Population and Density Estimates Associated with the Reserve (Zones 2, 3, and 5)

Survey Year	Estimated Adult Mojave Desert Tortoise Abundance	Mean Density of Adult Mojave Desert Tortoise (square kilometers)
2017	2,250 (Zones 2, 3, and 5) 1,710 (Zone 3 only)	19.6 (Zones 2, 3, and 5) 17.2 (Zone 3 only)
2019	2,011 (Zones 2, 3, and 5) 1,181 (Zone 3 only)	17.2 (Zones 2, 3, and 5) 12.3 (Zone 3 only)

Source: UDWR 2018, UDWR 2020

The USFWS concluded that a minimum density of less than 3.9 adult Mojave desert tortoises per square kilometer is likely not viable (USFWS 1994 and 2019a). The Reserve TCA hosts a higher density of adult Mojave desert tortoises than any other TCA (Berry and Murphy 2019). According to density estimates within portions of the Reserve, between 2009 and 2019, the mean density within Zones 2, 3, and 5 have ranged from a low of 13.7 Mojave desert tortoises per square kilometer to a high of 19.1 Mojave desert tortoises per square kilometer (UDWR 2020). Even though the Reserve has some of the highest densities, the small geographic size of both the Reserve and the UVRRU compromises the potential viability of the Mojave desert tortoise population. Tortoise abundance in each of the analytical units is lower than the 3,000 animals recommended by USFWS (USFWS 2020a).

Within the UVRRU, the 2014 population estimate represents a 24 percent decrease from an estimated 13,226 Mojave desert tortoises in 2004 (Allison and McLuckie 2018). However, this rate of decline is based on data collected within the Reserve; therefore, the rate of decline outside of the Reserve could be greater. Within the Reserve, UDWR surveys between 1999 (3,404 Mojave desert tortoises) and 2020 (2,011 Mojave desert tortoises) show an overall decline of 41 percent (UDWR 2020). These estimated declines include losses as a result of a 2002 drought and a 2005 wildfire. Survey results for estimated Mojave desert tortoise abundance conducted after the 2005 wildfire (2007 and 2019) have ranged from a low of 1,603 (2009) to a high of 2,238 (2011). As a result, UDWR considers that the population may be stable, although more years of data without a stochastic event are needed to confirm this assumption (UDWR 2020).

According to overall extrapolated density estimates within the UVRRU, densities of Mojave desert tortoise are declining at a rate of approximately 3.2 percent per year (Allison and McLuckie 2018). Prior to wildfires, densities were as high as 29.6 Mojave desert tortoises per square kilometer. Within Reserve Zone 4, long-distance translocations of tortoises are increasing tortoise density (estimated to be 12.2 Mojave desert tortoises per square kilometer in 2019); it is unclear if this population would be self-sustainable without continued long-distance translocations (UDWR 2020).

The proposed Zone 6 area comprises 6,813 acres. These lands are owned or managed by SITLA (3,225 acres), the BLM (3,471 acres, of which 2,345 acres are designated as an ACEC), UDOT (71 acres), and local government and private landowners (45 acres) (refer to Map 2.5-15). The non-Federal lands within proposed Zone 6 are 3,341 acres (49 percent of the total; refer to Section 3.20.1.1). When the 1995 HCP was prepared, this area was thought to contain only a small population of Mojave desert tortoise and most of the area was not considered potential Mojave desert tortoise habitat. However, in 2017 Mojave desert tortoise surveys were conducted on 3,000 acres of SITLA and 2,150 acres of BLM-administered land, most of which is included in proposed Zone 6. The survey revealed that a much larger population of Mojave desert tortoise exists in this area. A total of 76 live tortoises were located in a patchy distribution along 342

linear kilometers of transects. Preliminary data show that tortoise density could be as high as 22.5 per square kilometers (Washington County 2017). However, conducted using the USFWS pre-project survey protocol (USFWS 2017) that is only intended to locate individual tortoises and not to derive density estimates. Therefore, this density estimate is not comparable with other Mojave desert tortoise populations. Additional years of survey data will be needed to validate Mojave desert tortoise density in proposed Zone 6.

Mojave Desert Tortoise Habitat Mapping for the UVRRU.

The USGS peer-reviewed habitat model (Nussear et al. 2009) to estimate the distribution of Mojave desert tortoise across its entire range was used to estimate the current extent of Mojave desert tortoise habitat within the UVRRU. The model quantifies the statistical probability of Mojave desert tortoise "habitat potential" at a spatial resolution of 1 square kilometer, based on an analysis of 16 environmental data layers and Mojave desert tortoise occurrences (Nussear et al. 2009). However, the scale of the model is relatively coarse, and the model does not account for anthropogenic changes to the landscape, such as urban development (Nussear et al. 2009). In coordination with USFWS and UDNR, the following refinements to the output of the USGS model were made:

1) Removed areas with less than 50 percent probability of habitat potential.
2) Removed areas above 5,000 feet in elevation.
3) Excluded hardscape areas, surface waters, and the Virgin River. Excluded hardscape areas were identified from three spatial data sources (Jacobs 2020): Washington County's developed land dataset that identifies parcels approved for development through the HCP and no longer available for Mojave desert tortoise conservation (Washington County 2019a), SWReGAP mapping, LandSat imagery for surface hardness (Lowry et al. 2005), and LANDFIRE overlays (USGS 2019a).
4) Removed agricultural (farmed) lands.
5) Removed areas previously cleared of Mojave desert tortoise under the 1995 HCP and so are no longer available for Mojave desert tortoise conservation.
6) Removed small patches of modeled habitat less than 1 square kilometer in size when isolated by open water or hardscape.
7) Removed data points located within hardscaped areas or those suspected to be escaped captives.

Mojave desert tortoise habitat from the modified USGS model was classified as either occupied Mojave desert tortoise habitat or potential Mojave desert tortoise habitat. Occupied Mojave desert tortoise habitat is modeled habitat associated with 8,750 documented Mojave desert tortoise observations and sign. Potential Mojave desert tortoise habitat is modeled habitat that is not associated with a documented Mojave desert tortoise occurrence, but is modeled as suitable for use by Mojave desert tortoise. Many areas of potential Mojave desert tortoise habitat have not been surveyed for Mojave desert tortoises. Much of the available Mojave desert tortoise observation data are the result of opportunistic occurrence reports or surveys with limited geographic scope. Tortoise occurrences located on hardscape, in developed areas, or identified by Washington County or the BLM as escaped captives were removed from the data set. Each remaining Mojave desert tortoise data point was buffered by a 1-kilometer-radius circle to capture the maximum home range size and most long-distance movements of Mojave desert tortoises (Franks et al. 2011, Drake 2015, Berry and Murphy 2019). Tables 3.5-4 and 3.5-5 and Maps 3.5-4a and 3.5-4b summarize and depict the extent of occupied and potential Mojave desert tortoise habitat within the UVRRU.

Table 3.5-4. Acres of Occupied and Potential Mojave Desert Tortoise Habitats on Federal and Tribal Lands in the UVRRU

Landowner or Management Agency	Occupied	Potential	All Mojave Desert Tortoise Habitats
BLM	46,944	85,489	132,433
Other Federal Land Managers [a]	264	2,928	3,192
Total Federal	**47,208**	**88,417**	**135,625**
Tribal	1,222	19,919	21,141

[a] Includes lands managed by Department of Defense, National Park Service, or U.S. Forest Service.
Note: Numbers may not sum correctly because of rounding errors.

Table 3.5-5. Acres of Occupied and Potential Mojave Desert Tortoise Habitats on Non-Federal Lands in the UVRRU

Landowner or Management Agency	Occupied	Potential	All Mojave Desert Tortoise Habitats
SITLA	12,535	18,671	31,206
UDNR	5,387	380	5,767
UDOT	77	190	267
Local Governments and Private	10,981	36,517	47,498
Total	**28,980**	**55,758**	**84,738**

The updated estimates of occupied and potential Mojave desert tortoise habitats are substantially greater than the estimates used in the Washington County HCP (1995). While the Washington County HCP (1995) explicitly identifies only 87,229 acres of the ITP area as occupied or potential habitat for the Mojave desert tortoise, the HCP states that Mojave desert tortoise could also be found in "non-habitat" areas. Data collected in the years since 1995 have demonstrated that Mojave desert tortoises occur more broadly across the UVRRU portion of Washington County than previously understood. Within the Green Valley Analytical Unit, where proposed Zone 6 is located, 24,230 acres were mapped as Mojave desert tortoise-occupied habitat and 18,008 acres as potential habitat.

The UVRRU population of Mojave desert tortoise is at the northeast edge of the species' range, where winters are relatively longer and colder and summers are milder compared to the rest of the species' range. With the relatively mild summer climate, Mojave desert tortoises in the UVRRU are more active during the summer than in other parts of the species' range (USFWS 2011a). Within the UVRRU, Mojave desert tortoises have been found to use rugged terrain such as mesas, sand dunes, and canyons. Here, Mojave desert tortoises will often use sandstone and lava caves, as well as burrows (Bury et al. 1994). Mojave desert tortoises in the UVRRU are associated with creosote-bursage and thermic blackbrush habitat (Jones et al. 2015).

Within the Red Cliffs NCA (which is contained within the Reserve), preliminary habitat analysis and modeling indicate that Mojave desert tortoise presence is associated with mid to low elevations, flat to gentle slopes (mean slope of 8 percent), and south to southwest exposures (Jones et al. 2015). An analysis of 8,750 observations of Mojave desert tortoise or their sign within the UVRRU found that 16 percent of these observations were from locations above 4,000 feet in elevation (NPS 2019b). All but nine observations are from the vicinity of an apparently isolated Mojave desert tortoise population near Springdale that some believe is introduced (Washington County HCP 1995, UDWR 2000) though more testing is needed (UDWR 2000, USFWS 2020a). It is expected that Mojave desert tortoise occurs above 4,000 feet in elevation although at lower densities (pers. com. Kellam 2019). Because formal surveys of Mojave desert tortoise are not

conducted above 4,000 feet elevation, all data on high-elevation Mojave desert tortoises are based only on incidental observations.

Mexican Spotted Owl

Status

The USFWS listed the Mexican spotted owl (*Strix occidentalis lucida*) as a threatened species in March 1993 (USFWS 1993b). It is found in the southern and eastern parts of Utah on the Colorado Plateau, where it is a rare, permanent resident. In Washington County, Mexican spotted owls are known from Zion National Park (Utah Natural Heritage Program 2019). The USFWS (2012b) reports that 95.5 percent of all known owl sites documented in the Colorado Plateau Ecological Management Unit since 1989 have been documented on lands administered by the National Park Service, the BLM, or U.S. Forest Service.

Habitat Description

The Mexican spotted owl is non-migratory. This species nests, roosts, and forages in a wide variety of biotic communities. It is typically associated with mature mixed-conifer, pine-oak, and riparian forests (USFWS 2004). In Utah, breeding spotted owls primarily inhabit deep, steep-walled canyons and hanging canyons (USFWS 2012b) with access to a water source. While owls forage in a diverse range of habitats, they are very selective about roosting and nesting sites, usually choosing locations with higher canopy closure, live-tree basal areas, snag density, and fallen logs than random areas (Ganey 1988 as reported in Gutiérrez et al. 1995). One study by Ganey and Balda (1989) radio-marked owls and found the species used unlogged forests more than expected and selectively logged forests less than expected.

The USFWS (2012b) identified the following physical and biological features of Mexican spotted owl habitat necessary for nesting, roosting, foraging, and dispersing:

- Presence of water (often providing cooler air temperatures and often higher humidity than the surrounding areas).
- Clumps or stringers of mixed-conifer, pine-oak, pinyon-juniper, or riparian vegetation.
- Canyon walls containing crevices, ledges, or caves.
- High percentage of ground litter and woody debris.

Critical Habitat

The USFWS designated Final Critical Habitat for the Mexican spotted owl in 2004 (USFWS 2004) encompassing 8.6 million acres of Federal lands in Arizona, Colorado, New Mexico, and Utah. Approximately 260,105 acres of critical habitat are designated in Washington County, all east of I-15. This area is located within critical habitat unit CP-11, which includes portions of Iron, Washington, and Kane counties (USFWS 2004). USFWS (2012b) indicates that within unit CP-11, State and private lands are not designated as critical habitat. The primary constituent elements of critical habitat are listed subsequently (USFWS 2004).

Primary constituent elements related to forest structure are as follows:

- A range of tree species, including mixed-conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with a trunk diameter of 12 inches (0.3 meter) or more when measured at 4.5 feet (1.4 meters) from the ground.
- A shade canopy created by the tree branches covering 40 percent or more of the ground.

- Large dead trees (snags) with a trunk diameter of at least 12 inches (0.3 meter) when measured at 4.5 feet (1.4 meters) from the ground.

Primary constituent elements related to maintenance of adequate prey species are as follows:

- High volumes of fallen trees and other woody debris.
- A wide range of tree and plant species, including hardwoods.
- Adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration.

Primary constituent elements related to canyon habitat include one or more of the following:

- Presence of water (often providing cooler temperatures and often higher humidity than the surrounding areas).
- Clumps or stringers of mixed-conifer, pine-oak, pinyon-juniper, or riparian vegetation.
- Canyon wall containing crevices, ledges, or caves.
- High percent of ground litter and woody debris.

Threats

The Mexican spotted owl is threatened by the risk of stand-replacing wildland fire because of the intensification of drought cycles and overstocked forested habitats, which can result in larger and more severe fires (USFWS 2013c). Other threats include grazing, recreation, fuels-reduction treatments, resource extraction, and development (USFWS 2013c).

Species Distribution

According to USGS gap analysis data (Boykin et al. 2007, USGS 2007), the range and predicted habitat mapped in Utah is predominantly east of I-15 and northeast of Hurricane, Utah, concentrated in and around Zion National Park (Boykin et al. 2007, USGS 2007). In southern Utah, researchers conducted surveys and modeled habitat for the Mexican spotted owl to determine habitat characteristics associated with owl presence (Lewis 2014). Lewis found that the most important variables for predicting species presence in southern Utah included surface ratio (i.e., topographic roughness) and curvature (i.e., a measure of tablelands, cliff tops, and canyons across the landscape). Lewis determined that the probability for owl presence increased with positive surface ratios, indicating a more complex landscape (e.g., canyon formations), and increased with negative curvature values, indicating a preference for steep canyons, while avoiding flat areas. Lewis also compared sites with and without owl presence to determine variables associated with Mexican spotted owl presence, finding that owl presence occurred at sites with significantly narrower canyons, greater canopy cover, and higher vegetation height and density (Lewis 2014).

Status in the Action Area

No suitable or critical habitat for the Mexican spotted owl is present in proposed Zone 6 or within the Reserve.

Mexican spotted owls are known to occur within Washington County (USFWS 2012b). HCP Covered Activities may occur near the town of Springdale, less than 0.5 mile from suitable Mexican spotted owl habitat, active Protected Activity Centers, and a dense Mexican spotted owl population (pers. com. Whitcomb 2020). Habitats preferred and used by desert tortoises (i.e., desert scrub and gravelly soils in which to burrow) are generally dissimilar to those preferred by Mexican spotted owls (such as moist pockets of forest or steep-walled canyons), and broad areas of habitat for these two species typically would not overlap. Desert tortoise habitats lack the physical and biological features of owl nesting, roosting, foraging, and dispersing habitat (USFWS 2012b).

Therefore, Mexican spotted owls are not located within the area where HCP Covered Activities would occur but are potentially present in the action area nearby.

Designated critical habitat for the Mexican spotted owl occurs within Washington County east of I-15, in and surrounding Zion National Park (Map 3.5-6). Nearly all critical habitat for this species in Washington County occurs on Federally managed lands that are not subject to Covered Activities under the HCP. Private land just outside of Zion National Park near the town of Springdale, where HCP Covered Activities could occur, is located within the boundary of critical habitat. Critical habitat is not designated on private land in critical habitat unit CP-11 and no primary constituent elements of spotted owl critical habitat are present in this area; therefore, critical habitat is not present in the action area.

3.5.1.2 Other Special Status Wildlife

There are 166 sensitive species included on the Utah BLM State Director's sensitive species list for BLM-administered lands (IM 2011-037). Included on this list are 58 animals (fish, amphibians, reptiles, birds, insects, mammals) and 108 plants considered sensitive species. These species are not Federally protected under the ESA but warrant special attention and management to keep them from becoming listed in the future. In some cases, the public lands offer the best hope for recovery of species threatened by encroaching urban or agricultural development. The Utah BLM State Director's sensitive species list currently includes 23 special status species that have been observed or could potentially be found within the areas where project actions are proposed (Map 3.5-7 and Map 3.5-8 identify documented locations of special status wildlife species within the Red Cliffs NCA and proposed Zone 6, respectively). Those species are divided into four taxonomic groups: reptiles and amphibians, birds, mammals, and invertebrates petitioned for ESA listing. Each taxonomic group is briefly described in this section.

Sensitive reptiles and amphibians are found throughout the areas where project actions are proposed. The wide variety of habitats used by individual species ranges from riparian areas with washes, dense vegetation, and moist soils to sparsely vegetated upland desert areas to large cliff areas, rocky slopes, and sand dunes. Rocks are commonly used as basking sites and rock crevices as shelter. A few of the sensitive reptile species, such as the western threadsnake and sidewinder, seek shelter in or create burrows for shelter (UDWR 2005a and 2005b). The sensitive reptiles listed in Table 3.5-6 occur within the areas where project actions are proposed.

Table 3.5-6. BLM Sensitive Reptiles and Amphibians that May Occur within the Area Where Project Actions are Proposed

Species	Habitat Description
Arizona toad (*Anaxyrus microscaphus*)	Found in streams, washes, irrigated crop lands, reservoirs, and uplands adjacent to water.
Common chuckwalla (*Sauromalus ater*)	Found near cliffs, boulders, or rocky slopes.
Desert night lizard (*Xantusia vigilis*)	Found in rugged slopes and boulder fields; shelters under dead plants and in rock crevices.
Gila monster (*Heloderma suspectum*)	Found in desert scrub and sagebrush habitats that are adjacent to basalt/sandstone rocky hills/formations and sandy areas.
Sidewinder (*Crotalus cerastes*)	Found in sandy open terrain.
Western banded gecko (*Coleonyx variegatus*)	Found in many types of habitats from extremely dry, wind-blown sand dunes and creosote bush flats, to rugged rocky slopes and hillsides, and relatively barren high desert plateaus.
Western threadsnake (*Leptotyphlops humilis*)	Found in moist loose soil.
Zebra-tailed lizard (*Callisaurus draconoides*)	Found in sparsely vegetated desert areas with hard packed soils.

Special status birds use an array of habitats but are most often found in riparian areas, open grasslands, cliffs, and shrub steppe. Large trees, cliffs, and other high vantage points are used during hunting and nesting. Burrowing owls are one of the only bird species found in Utah that use burrows for nesting and cover (Audubon 2019). Some of the species, like the short-eared owl, are winter residents. The sensitive birds listed in Table 3.5-7 occur within the areas where project actions are proposed.

Table 3.5-7. BLM Sensitive Birds that May Occur within the Area Where Project Actions are Proposed

Species	Habitat Description
Bald eagles (*Haliaeetus leucocephalus*)	Found in forested areas adjacent to large bodies of water. Can be found in upland habitat near water during the winter.
Burrowing owl (*Athene cunicularia*)	Open areas within deserts, grasslands, and sagebrush steppe communities.
Ferruginous hawk (*Buteo regalis*)	Nests in flat and rolling terrain in grassland or shrub steppe.
Golden eagles (*Aquila chrysaetos*)	Found in open country, particularly around mountains, hills, and cliffs.
Short-eared owl (*Asio flammeus*)	Grasslands, shrublands, and other open habitats.

Sensitive mammal species are most often found in riparian areas, grasslands, and rocky outcroppings. Sensitive bat species use caves, mines, rock crevices, and trees as roosting or hibernation locations. Open riparian areas, shrublands, and grasslands are often used for foraging. The kit fox is more of a generalist species, using a wide variety of lower elevation habitats such as sand dunes, desert scrub, and grasslands (Cypher and List 2014). They use burrows for shelter and raising young, while they forage in the surrounding habitat for small mammals and insects. The sensitive mammals listed in Table 3.5-8 occur within the areas where project actions are proposed.

Table 3.5-8. BLM Sensitive Mammals that May Occur within the Area Where Project Actions are Proposed

Species	Habitat Description
Allen's big-eared bat (*Idionycteris phyllotis*)	Found in rocky and riparian areas in woodland and scrubland regions.
Big free-tailed bat (*Nyctinomops macrotis*)	Prefers rocky and woodland habitats and roosts in caves, mines, old buildings, and rock crevices.
Fringed myotis (*Myotis thysanodes*)	Lives in caves and mines in colonies of several hundred individuals.
Kit fox (*Vulpes macrotis*)	Found in a variety of habitats, including sand dunes, creosote scrub, grasslands, and rocky canyons.
Spotted bat (*Euderma maculatum*)	Found in various habitats, from desert to montane coniferous stands.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Occurs in many types of habitats, but often found near forested areas. Caves and mines are frequently used for day roosting and winter hibernation.
Western red bat (*Lasiurus blossevillii*)	Often associated with riparian habitats with a variety of trees or shrubs.

Three invertebrate species have been petitioned for ESA listing that may occur within the areas where project actions are proposed. Table 3.5-9 lists these species and describes their habitat.

Table 3.5-9. Invertebrates Petitioned for Endangered Species Act Listing that May Occur within the Area Where Project Actions are Proposed

Species	Habitat Description
Mojave poppy bee (*Perdita meconis*)	Little known regarding habitat requirements. Forages on two species of bear poppies (*Arctomecon humilis* and *A. californica*) and prickly poppies (Argemone). Presumed to excavate nests in soil.
Monarch butterfly (*Danaus plexippus*)	Breeds in patches of milkweed (*Asclepias*) throughout North America. Overwinters in Mexican conifer forests, coastal California conifer, and eucalyptus groves.
Western bumble bee (*Bombus occidentalis*)	Found in open coniferous, deciduous and mixed-wood forests, wet and dry meadows, montane meadows and prairie grasslands, meadows bordering riparian zones, and along roadsides in taiga adjacent to wooded areas, urban parks, gardens and agricultural areas, subalpine habitats, and more isolated natural areas.

3.5.2 Environmental Consequences

3.5.2.1 Endangered Species Act Listed Species

Mojave Desert Tortoise

Survival and recovery of the Mojave desert tortoise is the goal of the Washington County HCP, and the mandate for all Federal agencies [ESA Section 7(a)(1)]. Evaluating project-related impacts in concert with conservation measures provides a perspective on the long-term success of this goal.

Analysis Methods and Assumptions

The analysis of impacts to Mojave desert tortoise includes both quantitative and qualitative assessments of direct and indirect impacts to Mojave desert tortoise and its suitable (i.e., occupied and potential) habitat. Analysis of project-related direct effects to Mojave desert tortoise was based on calculating the number of acres of lost suitable habitat within the proposed ROW within the Reserve and the number of Mojave desert tortoises to be relocated from the proposed ROW, with calculations based on the 2019 estimate of abundance of Mojave desert tortoise in the Reserve.

Indirect effects were evaluated based on the number of acres and number of Mojave desert tortoises where Mojave desert tortoise home range may be impacted because of the presence of the project activities through noise, vibration, the presence of humans, or impacts that would otherwise disrupt Mojave desert tortoise behavior and movement patterns. The issue of indirect effects because of habitat fragmentation was quantified using the number of acres of Mojave desert tortoise habitat located between each ROW alternative and the southern Reserve boundary, for which connectivity to the larger tortoise population may be impaired. Evaluation of proposed Zone 6 considered acres of Mojave desert tortoise habitat with improved conservation status, and a qualitative review of beneficial management actions.

Mojave desert tortoise surveys are periodically conducted in the Reserve. The proposed highway ROW alternatives fall only within Zone 3. Surveys conducted in Zone 3 during 2017 resulted in a density estimate of 17.2 Mojave desert tortoises per square kilometer (95 percent confidence interval of 12.6 to 23.4; UDWR 2018). The 2019 surveys of Zone 3 resulted in a density estimate of 12.3 animals per square kilometer (95 percent confidence interval of 8.7 to 17.5; UDWR 2020; refer to Table 3.5-3). Recognizing that the 95 percent confidence intervals from 2017 and 2019 surveys overlap, and that the surveys of proposed Zone 6 were conducted in 2017, the USFWS has indicated that the density estimates for Zone 3 for 2017 represents the most consistent approach for estimating Mojave desert tortoise density in this analysis. All subsequent analyses in Zone 3 uses the density estimate of 17.2 Mojave desert tortoises per square kilometer.

Project-specific surveys for Mojave desert tortoise were not required by USFWS (pers. com. Allison 2019) because pre-project protocol surveys (USFWS 2017) would not provide sufficient resolution to distinguish among alignments that are in proximity, have similar habitat suitability and presumably similar numbers of tortoises, and that result in broad survey confidence intervals associated with the difficulties of surveying for tortoises (e.g., variable number of animals surface-active, may move long distances, and behavior strongly influenced by weather conditions).

Climate change may potentially affect future distribution and habitat use by Mojave desert tortoises. Assuming a general increase in temperatures, vegetation communities may shift to higher elevation as may tortoise populations. Most documented Mojave desert tortoises in the Reserve are found below 4,000 feet elevation. The approximately 2,360 acres of potential habitat on the Reserve between 4,000 and 5,000 feet elevation would not be restricted by any project-related actions.

The following assumptions apply to this analysis:

- The HCP analysis area for direct effects includes occupied and potential Mojave desert tortoise habitats on non-Federal lands outside the Reserve within the Analysis Area for the HCP (i.e., UVRRU).
- The HCP analysis area for indirect effects includes all Mojave desert tortoise suitable habitats within a 1-kilometer-radius buffer of the HCP Covered Activities Area. This buffer approximates the cumulative home range size of 1.5 square miles and most long-distance movements of male Mojave desert tortoises (Berry and Murphy 2019; Drake et al. 2015; Franks et al. 2011). The 1-kilometer buffer was used to model Mojave desert tortoise habitat suitability as occupied or potential based on documented occupancy. Occupied Habitat is modeled habitat associated with documented Mojave desert tortoise occurrences. Potential Habitat is modeled habitat that is not associated with a documented Mojave desert tortoise occurrence but may be suitable for use by Mojave desert tortoise. The analysis area for direct effects from the proposed Northern Corridor includes suitable Mojave desert tortoise habitat in the ROW.
- The analysis area for indirect effects from the Northern Corridor alternatives in the Reserve that require construction of a new roadway includes suitable Mojave desert tortoise habitat within 508 meters on either side of the ROW. The 508-meter buffer is based on the annual home range size of an adult male Mojave desert tortoise of 200 acres (Franks et al. 2011, USFWS 2011a). The annual home range was applied because of the short-term indirect effects of noise, vibration, and other construction-related disturbances. The indirect effects analysis also considers the impacts of fragmentation to the entire Reserve, and habitat fragmented from the main population within the Reserve Zone 3. The area for long-term effects because of fragmentation by the road is variable and extends from each road alternative to the southern boundary of the Reserve.
- The analysis area for indirect effects from the Northern Corridor alternatives that do not require construction of a new roadway includes suitable Mojave desert tortoise habitats within 300 feet on either side of the ROW within the Reserve. The analysis area is smaller because ROW fencing on both sides of the highway excludes tortoises from entering the ROW, and tortoises occupying this area have likely been exposed to the wildland-urban interface, including the existing road.
- The analysis area for the Red Cliff NCA RMP Amendment is BLM-administered land within the NCA.
- The analysis area for the SGFO RMP Amendment includes suitable Mojave desert tortoise habitats on BLM-administered land in the portion of proposed Zone 6 that is not currently protected within the Red Bluff ACEC, and the Green Valley Analytical Unit (USFWS 2020a) because of the relationship of proposed Zone 6 to potential landscape-level Mojave desert tortoise population connectivity between UVRRU and the East Mojave Recovery Unit.

- The assumptions and types of impacts and threats discussed for Mojave desert tortoise in Section 3.5.1, apply to this assessment of effect on Mojave desert tortoise and its habitat, and are not reiterated in this section.
- Amendments made to the Red Cliffs RMP and SGFO RMP would not result in direct impacts to Mojave desert tortoise or its habitat; however, amendments could facilitate the potential for future impacts. Future potential impacts are discussed under the ROW authorization and HCP ITP.
- All habitats within the Reserve below 4,500 feet in elevation are considered currently occupied Mojave desert tortoise habitat, and all habitats between 4,500 feet and 5,000 feet are considered potential future occupied habitats.
- Proposed Zone 6 consists of 6,813 acres, of which 6,760 are considered occupied Mojave desert tortoise habitat; 53 acres were not included as suitable Mojave desert tortoise habitat based on USGS modeled criteria.
- As a result of the nature of geospatial calculations, which might include processing byproducts and differences in spatial reference, minor rounding errors, and variance in agency databases can result in minor discrepancies in area and length results.
- Estimation of the number of Mojave desert tortoises impacted within the Reserve is based upon UDWR (2018) estimate of abundance of Mojave desert tortoise in Zone 3, for 2017 (17.2 animals per square kilometer).
- The Red Hills Parkway Expressway environmental analysis is based on a conceptual roadway design that assumes no additional ground disturbance outside the current fencing would be necessary. However, geospatial information related to rights-of-way has been acquired via remote sensing, and ground-truthing during final design will be necessary to resolve inconsistencies in the location of tortoise exclusion fence, property lines, and roadway design features that may result in very minor additional impacts that have not been considered.
- Approximately one-third of the Proposed Zone 6 Analysis Area falls within the Red Bluff ACEC, which is managed to protect biological and natural resources by limiting recreation and OHV travel to designated roads and trails and by increasing stipulations on mineral materials leasing. Protection benefits already provided to Mojave desert tortoise on lands within the ACEC are not included within the beneficial impacts provided by designation of proposed Zone 6.

Other Potential Analysis Tools

Depending on the final alternative selected for the specific Northern Corridor route, the impacts to the species as evaluated under ESA section 7 interagency consultation may result in more or less amount of take of desert tortoise. For some potential routes the amount of take anticipated may mean that the USFWS will recommend to BLM or UDOT additional conservation actions that would minimize the impacts of the taking, as further described subsequently. Any conservation measures on Federal lands outside of the ROW boundary for the selected alignment may be subject to subsequent environmental review.

The USFWS is exploring various tools to assist in evaluating the impacts of the BLM decisions and the proposed conservation measures to replace the resources potentially impacted by the ROW and RMP revisions. For example, the USFWS worked with internal and external biological experts to develop a draft biological report. This biological report provides biological information included elsewhere in this Draft EIS. The USFWS is considering existing modeling approaches for the Mojave desert tortoise including a spatial decision support model used to evaluate impacts and conservation measures of proposed land use activities. Another possible tool to aid in this analysis is a resource equivalency analysis. This model evaluates the biological values over time including both the losses from the project and the gains from proposed conservation measures. USFWS is

considering these and other approaches to evaluate both the potential impacts to the Reserve, impacts to the tortoise and its habitat, and the conservation value of the proposed conservation measures.

There are numerous factors to be considered to evaluate the potential impacts of the ROW alternatives and the proposed conservation measures. Important biological factors include:

- Zone 3 is an important area of the Reserve because of the density and abundance of tortoises compared to other zones. An important area of desert tortoise density is located along the proposed alignments within the Reserve.
- Impacts to Zone 3 are likely more substantial than impacts to other areas of the Reserve.
- The desert tortoise population in the Reserve declined at an average rate of 3.2 percent (±2.0 standard error) annually over the past 20 years, which is also reflective of declines in Zone 3. Much of the decline was likely related to wildland fires that occurred in the late 2000s. Recent stabilization of the population may be occurring, though at lower levels than pre-fire conditions.
- The area of effects to desert tortoises for the highway includes the ROW, some habitat north of the highway, and habitat south of the ROW that could be disconnected from the rest of Zone 3. It is anticipated that desert tortoise habitat south of the ROW would be fragmented from the rest of the Reserve, though this could be partially offset with the installation of culverts or viaducts (raised highway segments that allow wildlife to pass underneath; see last bullet).
- The biological value of Zone 6 for tortoises and adding it to the Reserve, if appropriate, and including measures consistent with the Amended HCP changed circumstances provisions.
- Consideration of alternative structures for tortoise passage could include viaducts (long-span raised highway segments that allow wildlife to pass underneath); these are likely more effective than culverts to allow desert tortoise passage.

As part of the review process, the USFWS may determine that measures in addition to those proposed should be included to minimize and mitigate ROW and RMP revisions. Additional measures could include:

- Improving tortoise passage along existing roadways within and outside the Reserve (e.g. Cottonwood Springs Road, State Route 18, and Old Highway 91) through construction of viaducts that increase habitat connectivity within the UVRRU.
- Habitat restoration projects in Zone 3 or other zones of the Reserve.
- Acquisition of land from willing sellers to provide additional protection of habitat.
- Other actions to minimize or mitigate effects on Mojave desert tortoise.

This analysis could also be used by the USFWS to evaluate potential reasonable and prudent alternatives, measures, and other terms and conditions if the BLM initiates formal ESA Section 7 consultation on a Northern Corridor alternative that impacts the Reserve.

Direct and Indirect Impacts from Alternative 1

HCP and ITP No Action Alternative: Under the No Action Alternative, the USFWS would not grant an ITP to Washington County, and the 1995 Washington County HCP would expire. Development of non-Federal lands within Mojave desert tortoise habitat may continue; however, absent the centralized ITP held by the County, each developer would need to prepare their own HCP for issuance of ITPs by USFWS on a case-by-case basis. Development of non-Federal lands within the Amended Analysis Area for the HCP (refer to Map 2.4-1) is expected to continue, but ESA compliance for development projects would be slowed or some development plans may be postponed or canceled by the proponent. The effects of development on Mojave desert tortoise

(e.g., habitat loss and fragmentation) on non-Federal land would largely be the same as under the Countywide ITP, but without the benefit of a comprehensive conservation program (e.g., beneficial indirect effects). Because the County would no longer be operating under an ITP, no additional costs would be charged to developers, though higher costs may be associated with preparing individual ITPs and implementing individual conservation strategies. Funding for Reserve staff could be reduced or eliminated; the County would not have enough funds to continue all aspects of the Mojave desert tortoise conservation program (e.g., conducting clearance surveys and short-distance translocation of Mojave desert tortoise on lands slated for development). There would be a loss of management continuity of the Reserve, though the BLM retains management responsibility for the Red Cliffs NCA.

Northern Corridor No Action Alternative: Under this alternative, the BLM would not issue a ROW grant to UDOT and the Northern Corridor highway project would not be built. There would be no change in the distribution or abundance of Mojave desert tortoise within the Reserve associated with highway development; no habitat would be lost or fragmented (Table 3.5-10). In addition, proposed Zone 6 would not be managed as part of the Reserve for the conservation of the Mojave desert tortoise.

Table 3.5-10. Impacted Acres of Mojave Desert Tortoise Habitat from Northern Corridor Alternatives

Northern Corridor Alternative	Total ROW (acres)	ROW within Red Cliffs Desert Reserve (acres)	508-meter Buffer of ROW within Red Cliffs Desert Reserve (acres); Acres North and South of ROW	Fragmented Habitat inside Red Cliffs Desert Reserve (acres) South of each Alternative	Total Indirect Impacts (acres)
No Action	0	0	0	0	**0**
T-Bone Mesa Alignment	266	264	Total 1,786 • North of ROW (934) • South of ROW (852)	Total 2,652 • West of Cottonwood Springs Road (1,325) • East of Cottonwood Springs Road (1,327)	**3,586**
UDOT Application Alignment	287	285	Total 1,857 • North of ROW (998) • South of ROW (859)	Total 1,654 • West of Cottonwood Springs Road (1,035) • East of Cottonwood Springs Road (619)	**2,652**
Southern Alignment	360	358	Total 1,933 • North of ROW (1,140) • South of ROW (793)	Total 881 • West of Cottonwood Springs Road (486) • East of Cottonwood Springs Road (395)	**2,021**
Red Hills Parkway Expressway	68	0	Total 170 • North of ROW (93) • South of ROW (77) (based on 300-foot-wide buffer)	0	**170**
St. George Boulevard/100 South One-way Couplet	45	0	Total 0 • North of ROW (0) • South of ROW (0) (based on 300-foot-wide buffer)	0	**0**

Note: Total acres impacted by indirect effects include all Reserve lands within the 508-meter buffer (or 300-foot buffer if a previously established roadway) to the north and south of each alternative ROW, and any additional fragmented habitat south of each ROW.

Red Cliffs NCA RMP Amendment Alternative A: The BLM would not issue a ROW grant for the Northern Corridor or modify existing ROW authorizations on BLM-administered lands within the Red Cliffs NCA. Therefore, an amendment to the Red Cliffs NCA RMP would not be needed.

SGFO RMP Amendment Alternative A: If a ROW grant is not issued for the construction of the Northern Corridor, then proposed Zone 6 would not be included as part of the Reserve to benefit Mojave desert tortoise conservation. Management of BLM-administered lands within proposed Zone 6 would continue as previously defined in the SGFO RMP, including habitat protection on the Red Bluff ACEC, and continued grazing and recreational activities on 1,169 acres of other BLM-administered lands within proposed Zone 6. No amendments would be made to the SGFO RMP.

Direct and Indirect Impacts from Alternative 2

HCP ITP Action Alternative: Under Alternative 2, the USFWS would approve the Amended Washington County HCP and grant an ITP effective for a term of 25 years. Implementation of this alternative would reauthorize the unrealized incidental take of Mojave desert tortoise from the 1995 HCP associated with Covered Activities. The take request in the draft HCP is as follows: "The County requests the renewal of as yet unrealized incidental take of the MDT [Mojave desert tortoise] associated with the Covered Activities in an amount equivalent to the direct loss of up to 14,466 acres of Occupied MDT Habitat and 51,835 acres of Potential MDT Habitat within the Permit Area. These combined 66,301 acres represent the current extent of MDT Habitat occurring within the Permit Area, outside of the 2019 Reserve boundary, on lands that are not under federal or Tribal management as of the preparation of this Amended HCP. Non-federal lands within the Permit Area without MDT Habitat are not subject to the provisions of this Amended HCP as incidental take of MDT is not reasonably certain to occur. Similarly, otherwise lawful activities performed on lands absent of use by MDT are also not subject to the provisions of this Amended HCP…Consistent with the 1995 HCP, these non-habitat areas are automatically 'released' for otherwise lawful land use activities" (Washington County 2020).

Development facilitated by the HCP ITP in suitable Mojave desert tortoise habitats on non-Federal lands within the Analysis Area for the HCP (refer to Map 3.5-2) would result in direct loss of habitat. Mojave desert tortoises displaced by development would be translocated (i.e., moved outside their home range) to appropriate locations facilitated by the county's Mojave desert tortoise conservation program in coordination with UDWR. Translocations would occur through the term of the ITP (25 years) or until such time that all covered activities are finished, or all clearances have been completed and there would be no more need for salvage collection. This loss of habitat contributes to increasing fragmentation of Mojave desert tortoise habitat within an already highly fragmented landscape. The non-Federal lands likely to be cleared and developed can generally be defined as isolated or minimally connected patches of habitat. The level of fragmentation continues to increase, exacerbated by more development, resulting in the many indirect effects associated with an expanding urban interface for both non-Federal and Federal land.

Generally speaking, the Covered Activities addressed by the 1995 HCP and carried forward into this Amended HCP are of two categories: land development and land use activities that may occur on non-Federal land outside the Reserve, and certain land development and land use activities that may occur on land inside the Reserve when performed in accordance with the applicable protocols and other measures specified in the conservation program of the Amended HCP.

The Covered Activities, whether inside or outside of the Reserve, are subject to the following criteria:

- Must be non-Federal and performed within the Analysis Area for the HCP.
- Must be otherwise lawful and conducted in accordance with all applicable local, State, and Federal laws, regulations, ordinances, and permissions.
- Are subject to the direct control of the County, a non-federal HCP Partner, or a Municipal Partner through regulatory control such as zoning, or permitting, or other legal authority.
- Effects of the activities have been analyzed in the Amended HCP.
- Must be reasonably certain to cause incidental take of the Mojave desert tortoise.

The County, as the ITP permittee, establishes direct control over Covered Activities through a variety of mechanisms, including the Implementing Agreement with HCP Partners, Interlocal Agreements with Municipal Partners, Participation Agreements and Certificates of Inclusion, or local zoning, permitting, or other legal authorities, as applicable.

Activities that are not reasonably certain to take Mojave desert tortoise are not subject to the terms and conditions of the issued ITP, even if such activities are similar to the Covered Activities (e.g., land development in an area that is not habitat for the Mojave desert tortoise).

The HCP and ITP also implement conservation programs operated by the County, which include management of the Reserve, public education, working with UDWR on the long-distance translocation of displaced Mojave desert tortoises, and carrying out Mojave desert tortoise conservation projects funded by fees imposed by the County for issuance of permits allowing for development within Mojave desert tortoise habitat on non-Federal land.

Northern Corridor T-Bone Mesa Alignment: If the BLM issues UDOT a ROW grant for the T-Bone Mesa Alignment, it is anticipated that UDOT would design and construct a highway through the Reserve and Red Cliffs NCA. This would cause direct loss of occupied Mojave desert tortoise habitats, displacement and short-distance translocation of Mojave desert tortoise, and destruction of burrows, including the geologic and edaphic factors that facilitate borrow construction. Indirect effects include disturbance of Mojave desert tortoise adjacent to the ROW from noise and vibrations associated with construction and use of the highway, facilitating human intrusion into Mojave desert tortoise habitat, spreading trash and toxins in the environment, influencing predator abundance and distribution, facilitating invasion of nonnative plants, increasing the probability of fire ignition, disrupting home range and landscape movement patterns, and fragmenting habitat within lands specifically identified for the protection and long-term management of Mojave desert tortoise through the designation of Mojave desert tortoise critical habitat, establishment of the Reserve, and designation of the Red Cliffs NCA. Mojave desert tortoise habitat within the designated ROW would be destroyed (Table 3.5-11) including designated critical habitat. Of the 46,849 acres of critical habitat within the Reserve, each alternative would impact less than 1 percent of this critical habitat unit (refer to Table 3.5-11).

If highway construction would occur, then tortoises would be removed from the ROW and translocated a short distance away, presumably within their existing home range, prior to construction. Preconstruction short-distance translocation clearance surveys for Mojave desert tortoise following current USFWS clearance protocols would be conducted in association with exclusion fencing to reduce or eliminate Mojave desert tortoise mortality within the ROW. However, even with the most thorough surveys, animals located deep in burrows, as well as eggs, hatchlings, and juveniles, could be missed and killed. Prior to translocation, a project-specific Mojave desert tortoise translocation and monitoring plan would be prepared and approved by USFWS. This plan would detail the procedures for short-distance translocation, and for monitoring

translocated Mojave desert tortoises and resident tortoises within 1.5 square kilometers of the release site.

The estimated number of Mojave desert tortoises to be relocated from the ROW (refer to Table 3.5-11) is based upon UDWR (2018) estimates of abundance of Mojave desert tortoise in Zone 3 for 2017, at 17.2 adult animals per square kilometer (refer to Table 3.5-3). The 95 percent confidence interval ranges from 12.6 to 23.4 tortoises per square kilometer and tortoises move about and are not evenly distributed across the landscape, resulting in little functional difference in the number of tortoises that may actually need to be removed under any of the three proposed new alignments through the Reserve. Permanently modified habitat, loss of areas with concentrated tortoise use, and habitat fragmentation may result in long-term consequences to the conservation of the Mojave desert tortoise.

Table 3.5-11. Mojave Desert Tortoise Critical Habitat and Potential Number of Adult Tortoises Impacted in the Reserve

Northern Corridor Alternative	Potential Number of Adult Tortoises Translocated	Number of Adult Tortoises with Indirect Impacts	Disturbed Critical Habitat within Red Cliffs Desert Reserve (acres)	Percent of Critical Habitat Lost from Red Cliffs Desert Reserve
No Action	0	0	0	0
T-Bone Mesa Alignment	19	250	266	0.57
UDOT Application Alignment	20	185	287	0.61
Southern Alignment	25	141	360	0.77
Red Hills Parkway Expressway	0	12 (based on 300-foot-wide buffer)	0	0
St. George Boulevard/100 South One-way Couplet	0	0 (based on 300-foot-wide buffer)	0	0

The proposed highway through Reserve Zone 3 would be fenced with tortoise exclusion fencing and fragment Mojave desert tortoise habitat north and south of the corridor. As habitat fragments become smaller and increasingly isolated, genetic heterozygosity may decrease and smaller groups of individuals become more vulnerable to stochastic events. Larger population size and improved survivorship increases viability.

The concern regarding fragmentation is exacerbated by the presence of tortoise exclusion fencing along Cottonwood Springs Road, forming an absolute barrier to Mojave desert tortoise east-west movement across Reserve Zone 3. With construction of the highway, Reserve Zone 3 would be fractured into four divided units, east and west of Cottonwood Springs Road (refer to Table 3.5-10) and north and south of the Northern Corridor (USFWS 2015; refer to Table 3.5-10). The continued fragmentation compromises the integrity of the entire Reserve (USFWS 2015). As the functional population is reduced in size, the susceptibility to stochastic events increases. To maintain connectivity and reduce the effects of habitat fragmentation from the 500-foot-wide (152-meter) Northern Corridor highway, crossing structures (e.g., culverts, viaducts, or bridges) would be provided in appropriate locations not less than every 254 meters (834 feet) apart to accommodate nesting females to support demographics on both sides of the roadway. It is likely that bridges and viaducts would be more effective at maintaining desert tortoise habitat and population connectivity as compared to culverts. Bridging large washes with elevated structures provides habitat linkages where Mojave desert tortoises may continue to live and interact with other Mojave

desert tortoises. This would also reduce destruction of burrows, which tend to be concentrated along washes and exposed bedrock shelves forming canyon walls above the wash. However, the design and location of crossing structures have not been finalized, because they would be identified through the final engineering and design process for the selected alternative in compliance with applicable ROW stipulations. With approval of a highway alternative through the Reserve, Washington County would provide funding and technical assistance to UDOT for culverts under Cottonwood Springs Road within Reserve Zone 3 that would help restore some of the potential for Mojave desert tortoise movement across this preexisting internal barrier. Even with crossing structures, Mojave desert tortoises south of the Northern Corridor alignment remain relatively fragmented. The cumulative desert tortoise home range averages 1.5 square miles (Berry 1986), and all desert tortoises south of this alignment would be impacted by the roadway. The T-Bone Mesa Alignment results in more acres fragmented south of the ROW than other alternatives and more related habitat fragmentation (2,652 acres) as compared to the more southerly alignments (refer to Table 3.5-10).

Relative density of Mojave desert tortoise throughout the Reserve was mapped based on desert tortoise survey data collected by UDWR at the Reserve between 2011 and 2017 (only using the most recent capture data per animal and deleting older recapture data). Those survey data were used to generate a kernel density surface that models the relative abundance of desert tortoises on the landscape (Map 3.5-5). This reveals there is an important desert tortoise population cluster located within the path of the T-Bone Mesa Alignment, UDOT Application Alignment, and Southern Alignment Alternatives within the Reserve. This may be the most important high-density cluster of desert tortoises in the recovery unit (USFWS 2020a). Map 3.5-5 provides a visual representation of the habitat fragmentation discussed previously.

In addition to habitat fragmentation, indirect impacts from construction activities and the presence of a highway would impact Mojave desert tortoise outside of the ROW as a result of numerous factors including noise, vibration, lighting, the increase in environmental toxins, expanding predator populations, and the presence of people. Mojave desert tortoises may be adversely affected when these impacts occur within their home range. The annual home range of an adult male Mojave desert tortoise is considered to be 508 meters in diameter. The total number of acres of Mojave desert tortoise habitat impacted by indirect effects, including habitat fragmentation south of the ROW, is provided in Table 3.5-10 and the total number of Mojave desert tortoises associated with this habitat (assuming 17.2 animals per square kilometer) is provided in Table 3.5-11. Of the three alternatives crossing through Reserve Zone 3, the indirect effects associated with Alternative 2 impacts the greatest amount of occupied Mojave desert tortoise habitat (3,586 acres) and individual Mojave desert tortoises (250 animals).

Red Cliffs NCA RMP Amendment: The Red Cliffs NCA RMP Amendment is an administrative function that would have no direct effects to Mojave desert tortoise but could result in indirect effects by issuance of a ROW grant that would allow future development of a ROW. Red Cliffs NCA RMP Amendment Alternatives B and C would allow for the designation of a 500-foot-wide transportation facility ROW within the Red Cliffs NCA along the T-Bone Mesa Alignment. Acres of Mojave desert tortoise habitat that would be authorized through the RMP Amendment that could be modified or destroyed is provided in Table 3.5-10. Alternative B would preclude the use of this ROW for installation of utilities; however, Alternative C would allow the option for future development of utilities within a designated ROW corridor. No additional habitat loss would be associated with Alternative C, but because the utility development could be at a different time than highway construction, additional take of desert tortoise could occur in bridged washes from the loss of burrows, relocation of desert tortoises, and loss of undetected eggs, hatchlings, juveniles, and adults. New utilities may cause disturbance to Mojave desert tortoises from noise and vibration, the presence of construction workers, and facilitating the spread of nonnative

vegetation, which could occur each time an additional utility is developed or maintained in the ROW.

SGFO RMP Amendment: The SGFO RMP Amendment is an administrative function that would have no direct effects to Mojave desert tortoise but could result in indirect effects. With the authorization of a ROW through the Reserve and NCA, as designated in the Red Cliffs NCA RMP Amendment, the SGFO RMP Amendment would establish a Reserve Zone 6 as provided for under changed circumstances in the HCP. Proposed Zone 6 includes 6,813 acres of which 6,760 acres are considered occupied Mojave desert tortoise habitat, which may support Mojave desert tortoise densities similar to the Reserve. As outlined in the Amended HCP, proposed Zone 6 would be managed consistent with the conservation goals of Zone 3, elevating the protection of Mojave desert tortoise habitat and removal or reduction of specific threats through actions such as fencing the eastern borders to prevent OHV access in non-designated areas; reducing the total mileage of designated access routes; and providing additional funding for law enforcement, education, monitoring, habitat restoration, litter control, and fire management. However, many specific protections for biological and natural resources are already provided on the Red Bluff ACEC, of which a portion (2,345 acres) is within proposed Zone 6. Over time the BLM or other conservation entity would acquire the non-Federal lands within proposed Zone 6 for long-term conservation purposes, including acquisition of 3,225 acres of SITLA lands. This action, combined with the management prescriptions proposed with the SGFO RMP Amendment, would have the indirect effect of expanding the protections and management actions for the benefit of the Mojave desert tortoise.

SGFO RMP Amendment, Alternatives B and C would have varying degrees of protection for Mojave desert tortoise within proposed Zone 6. Alternative B would provide greater protections by managing proposed Zone 6 as an exclusion area for new ROWs, closing fluid mineral leasing, closing camping, eliminating grazing by livestock, and closing the area to target shooting (refer to Maps 2.5-2 and 2.5-17). Alternative C allows proposed Zone 6 to be managed as an avoidance area for ROWs, allows unincorporated areas to be open for fluid mineral leasing, designates some lands as unavailable to livestock grazing, allows camping within designated sites, and allows the discharge of firearms (refer to Maps 2.5-3 and 2.5-18). Alternative C has a higher likelihood than Alternative B to result in adverse impacts to Mojave desert tortoise, particularly by allowing grazing and recreational activities that would degrade habitat, cause disturbance to Mojave desert tortoise, and increase the risk of mortality in collapsed burrows. Allowing camping and target shooting could increase the risk of wildfire. In addition, allowing grazing and mineral leasing results in ground disturbance that has the potential to facilitate the spread of exotic invasive species. However, both alternatives offer greater protection than Alternative A, which is the No Action Alternative.

Allowed uses of Reserve Zone 6 would include those uses allowed in the Reserve (e.g., maintenance of utilities, access roads, water developments, and flood control) when performed in accordance with the development protocols. Allowed uses would include continued special recreation permitted events.

Proposed Zone 6 is within the UVRRU, which does not directly adjoin any other recovery unit. The Beaver Dam Mountains separate the UVRRU from the Northeastern Mojave Recovery Unit. Potential habitat connectivity between the two recovery units is limited to an approximately 0.6-mile-wide area around the north end of the Beaver Dam Mountains west from proposed Zone 6. The USGS (Nussear et al. 2009) also maps potentially suitable Mojave desert tortoise habitat to the south, which connects to the Northeastern Mojave Recovery Unit through the Virgin River Gorge and is limited to an area approximately 2 miles wide following the Virgin River floodplain in Mohave County, Arizona. Proposed Zone 6 may connect to higher elevation habitat on

the east slope of the Beaver Dam Mountains and provide linkage to the Northeastern Mojave Recovery Unit. Proposed Zone 6 is also functionally isolated from the Reserve, providing some redundancy in population representation within the UVRRU against stochastic events that may seriously impact either of the population areas.

Proposed Zone 6 is a relatively small size (6,813 acres) and is unlikely to support an abundance of tortoises on its own, relying on its connectivity to the larger Green Valley Analytical Unit and habitat connectivity corridors for resiliency (USFWS 2020a). Recent studies show that there is an apparent, relatively high, but non-quantified, density of tortoises within proposed Zone 6 and these tortoises may provide a clustered population that could benefit the UVRRU overall if continuity to the western analytical units and Northeastern Mojave Recovery Unit is maintained (USFWS 2020a). However, proposed Zone 6 currently provides for a high number of recreational enthusiasts, as discussed in Recreation Uses and Related Facilities in Section 3.5.1.1 and in Section 3.15, Recreation and Visitor Services. The impacts from recreational use may include additional roads and trails, degradation of soil and vegetation, and increased raven predation because raven populations may be subsidized by an increase in food left behind by recreationists; by managing the area for conservation purposes, many of these impacts to tortoises may be reduced.

Direct and Indirect Impacts from Alternative 3

The UDOT Application Alignment would result in the same types of direct and indirect impacts as the T-Bone Mesa Alignment described in Alternative 2, though the location of the highway ROW within the Red Cliffs NCA and Reserve would differ, as would the number of impacted acres and Mojave desert tortoises. The amount of habitat and number of desert tortoises that would be impacted by the UDOT Application Alignment are identified in Tables 3.5-10 and 3.5-11, respectively. The UDOT Application Alignment would be located slightly south of the T-Bone Mesa Alignment and would result in 1,654 acres of habitat within the Reserve being fragmented to the south of the ROW, 998 acres less than the T-Bone Mesa Alignment. The UDOT Application Alignment would result in the direct loss of 287 acres of Mojave desert tortoise habitat, which would be similar to the 266 acres under the T-Bone Mesa Alignment (refer to Table 3.5-10). It is estimated that 20 tortoises would potentially need to be relocated with the UDOT Application Alignment (refer to Table 3.5-11).

Direct and indirect impacts resulting from HCP and ITP Covered Activities, the Red Cliffs NCA RMP Amendment, and the SGFO RMP Amendment with the designation of proposed Reserve Zone 6 would be as described under Alternative 2.

Direct and Indirect Impacts from Alternative 4

The types of impacts to Mojave desert tortoise from the Southern Alignment would be the same as those described for the T-Bone Mesa Alignment in Alternative 2, with additional loss of Mojave desert tortoise habitat (refer to Table 3.5-10). The Southern Alignment would be located south of the UDOT Application Alignment and would tend to follow the southern boundary of the Reserve. Of all Northern Corridor alternatives, the Southern Alignment would be the longest and would result in the greatest loss of Mojave desert tortoise habitat in the Reserve (358 acres). However, the Southern Alignment results in the least amount of habitat fragmented (881 acres) between the alignment and the Reserve's southern boundary (refer to Table 3.5-10). The Southern Alignment fragments 1,771 fewer acres than the T-Bone Alignment and 773 fewer acres than the UDOT Application Alignment (Table 3.5-10). The Southern Alignment generally follows the outer boundaries of the already built up city limits and is located closer to developed areas than the T-Bone Mesa or UDOT Application alignments. These developed areas near the southern boundary of the Reserve are already creating a southern barrier to the Reserve that impacts tortoise

movements and fragments habitat. Approximately 25 Mojave desert tortoises would potentially need to be translocated (refer to Table 3.5-11).

Direct and indirect impacts resulting from HCP and ITP Covered Activities, the Red Cliffs NCA RMP Amendment, and the SGFO RMP Amendment with the designation of proposed Reserve Zone 6 would be as described under Alternative 2.

Direct and Indirect Impacts from Alternative 5

The Red Hills Parkway Expressway Alignment would result in similar indirect adverse impacts as the T-Bone Mesa Alignment described in Alternative 2, though the location of the highway ROW within the Reserve is primarily within an existing highway corridor (i.e., Red Hills Parkway) and the number of acres within the Reserve that would be directly or indirectly impacted would be much less under this alternative (refer to Table 3.5-10).

Red Hills Parkway presently has a wide ROW with tortoise exclusion fencing on both sides that precludes tortoises from unpaved habitat within the ROW; no additional Mojave desert tortoise habitat would be lost within the Reserve. It is also not anticipated that Mojave desert tortoise short-distance translocation would be necessary (refer to Table 3.5-11). Because the Red Hills Parkway Expressway Alignment consists of an existing paved roadway, the analysis for indirect effects occurs within a 300-foot buffer (as noted in the assumptions). Temporary, indirect effects from noise and vibrations to Mojave desert tortoise living adjacent to construction areas are as described for the T-Bone Mesa Alignment in Alternative 2, although disturbance effects would be much smaller (e.g., smaller amounts of dust created for modifications such as turn lanes, vibrations from roadway traffic, noise) and would occur on 170 acres. The Red Hills Parkway Expressway Alternative would not result in additional fragmentation of Mojave desert tortoise habitat in the Reserve (refer to Table 3.5-10).

Under Alternative 5, direct and indirect impacts of the HCP would be the same as described under Alternative 2, except proposed Zone 6 would not be designated as part of the Reserve; therefore, Mojave desert tortoise habitats would not benefit from the management prescriptions identified in the proposed SGFO RMP Amendment for Alternatives 2 through 4 to limit impacts to this area.

Direct and Indirect Impacts from Alternative 6

The St. George Boulevard/100 South One-way Couplet would involve a reconfiguration of existing roadways in a developed area within the City of St. George. No disturbance would occur to Mojave desert tortoise or its habitat (refer to Table 3.5-10). No habitat would be fragmented within the Reserve and it is anticipated that no tortoises would require translocation (refer to Tables 3.5-10 and 3.5-11). Impacts related to the HCP and SGFO RMP Amendment would be the same as Alternative 5.

Mexican Spotted Owl

Analysis Methods and Assumptions

The analysis of impacts to Mexican spotted owl is a qualitative assessment of direct and indirect effects that may occur as a result of the proposed actions.

The following assumptions apply to this analysis:

- There is no occupied Mexican spotted owl habitat within the Reserve or proposed Zone 6; therefore, the analysis area for direct and indirect effects to the Mexican spotted owl includes spotted owl habitat within 0.5 mile of occupied and potential Mojave desert tortoise habitat on non-Federal lands outside the Reserve within the Analysis Area for the HCP.
- Even though a portion of the HCP Covered Activities Area overlaps the boundary of Mexican spotted owl critical habitat in the vicinity of Springdale, critical habitat is not designated on

State or private lands in this critical habitat unit. Therefore, HCP Covered Activities would not affect critical habitat, and potential effects to critical habitat from these activities are not discussed further in this section.

- Mexican spotted owl suitable habitat does not exist in the areas impacted by the Red Cliffs NCA RMP Amendment, the SGFO RMP Amendment, or the proposed Northern Corridor. Therefore, no take of Mexican spotted owls or their habitat would occur. In addition, no direct or indirect effects to the Mexican spotted owl are expected as a result of these actions, and these actions are not discussed further in this section.

Direct and Indirect Impacts from All Alternatives

Regular development near Springdale would continue under all alternatives. No suitable habitat for Mexican spotted owl is located within the HCP Covered Activities Area, so these activities would not result in any degradation or loss of habitat. However, suitable habitat is located within 0.5 mile of areas where HCP Covered Activities could occur.

Noise-related disturbance from HCP Covered Activities could affect nesting, roosting, and feeding activities of Mexican spotted owls. Reactions of wildlife to noise are complex. Delaney et al. (1999) found that raptors are more susceptible to disturbance-caused nest abandonment early in the nesting season. Delaney et al. (1999) found that nesting birds did not flush from roosts when noise levels from helicopters were less than 92 decibels and less than 46 decibels for chainsaws when greater than 344 feet away. Of particular note from that study, no owl flushed during non-breeding or breeding season when noise disturbance, regardless of source, was greater than 820 feet.

Nest sites in noisy habitats are exposed to higher levels of noise and visual disturbances and have likely habituated to these human activities (USFWS 2006b). Birds in these sites have habituated to a base level of human activities, which is below the upper threshold to cause abandonment of the site, but above ambient noise levels found in natural sites (USFWS 2006b). Normal conversation levels are typically between 60 and 70 decibels and can increase 3 decibels for multiple conversations held concurrently (USFWS 2006b). In addition, several studies indicate a differential response of birds that inhabit areas with higher human activity and noise than those that inhabit more natural sites (Poole 1981, Knight and Knight 1984, Delaney et al. 1999). Nest sites in noisy habitats are exposed to higher levels of noise and visual disturbances and have likely habituated to these human activities (USFWS 2006b). Numerous nest sites have been identified near campgrounds, highways, and other sources where they are exposed and habituated to human disturbance (USFWS 2012b). Birds in these sites have habituated to a base level of human activities, which is below the upper threshold to cause abandonment of the site, but above ambient noise levels found in natural sites (USFWS 2012b). Human activity is continuous at Zion National Park, and owls in this area are habituated to human use of the area.

USFWS (2006b) established injury and disturbance thresholds for northern spotted owls and murrelets according to maximum decibel level (in A-weighted decibels [dBA]). The estimated sound-only injury is approximately 92 dBA at nest sites. The disturbance threshold was estimated at 70 dBA, the sound detectability threshold was estimated at 44 dBA, and the alert threshold was estimated to be 57 dBA. Construction equipment has been modeled according to decibels at various distances from a point source (i.e., the construction equipment) (refer to Table 4 in Appendix K, the Noise Technical Report, for more information).

A desktop analysis was conducted using GIS to determine where spotted owl habitat (in particular, steep slopes) may be present in relation to the analysis area. The nearest spotted owl potential nesting habitat is at least 0.2 mile away from locations where HCP Covered Activities may occur. According to the data presented in Table 4 in Appendix K, Noise Technical Report, construction noise at this distance attenuates such that, while spotted owls may be alerted by the noise, it

would not reach a level that causes disturbance. Therefore, while HCP Covered Activities may impact Mexican spotted owls, it is anticipated that these impacts would be minor and not result in adverse effects to the Mexican spotted owl.

3.5.2.2 Other Special Status Species

This section discusses potential impacts to other special status wildlife species, including BLM sensitive species and species petitioned for ESA listing.

Analysis Methods and Assumptions

The analysis of impacts to special status wildlife includes a quantitative assessment of direct and indirect impacts to suitable habitat for each special status species. Suitable habitat acreages for each species were calculated using LANDFIRE vegetation data clipped to the analysis area. Vegetation community types were grouped together into general habitat types used by special status species (e.g., desert scrub, grassland, shrubland, cliffs and rocky areas, riparian). Acres of each habitat type used by a species were added together to get a total amount of habitat available in the analysis area for that species. The analysis area varies by Federal action, as follows:

- The analysis area for direct effects of HCP Covered Activities includes suitable habitat for species petitioned for ESA listing on all suitable, occupied, and potential Mojave desert tortoise habitats on non-Federal lands outside the Reserve within the Analysis Area for the HCP.
- The analysis area for indirect effects of HCP Covered Activities includes all suitable habitat for species petitioned for ESA listing, and suitable habitat on BLM-administered lands for BLM sensitive species, within a 1-kilometer buffer of the HCP Covered Activities Area.
- The analysis area for direct effects from the Northern Corridor includes suitable habitat for each special status wildlife species in the ROW plus a 1-kilometer buffer.
- The analysis area for indirect effects from the Northern Corridor includes suitable habitat for each special status wildlife species within the Red Cliffs NCA.
- The analysis area for beneficial effects from conservation actions within proposed Zone 6 includes suitable habitat for each special status wildlife species in the portion of proposed Zone 6 that is not currently protected within the Red Bluff ACEC.

The following assumptions apply to this analysis:

- The assumptions discussed for general wildlife in Section 3.4.2.1 apply to special status wildlife species and are not reiterated in this section.
- Impacts to BLM sensitive species are only analyzed on BLM-administered lands. The HCP Covered Activities Area does not include any BLM-administered lands, so HCP Covered Activities would only result in indirect impacts to BLM sensitive species.

Direct and Indirect Impacts from Alternative 1

Alternative 1, the No Action Alternative, would result in no direct or indirect adverse impacts to special status wildlife species within the Red Cliffs NCA and Northern Corridor analysis areas (Table 3.5-12 and Table 3.5-13). Table 1 in Appendix N, Special Status Wildlife Species Habitat Types, identifies all the habitat types that were considered as suitable habitat for each special status wildlife species when determining number of acres impacted.

Table 3.5-12. Acres of Direct Impacts to Special Status Wildlife Habitat as a Result of Northern Corridor Alternatives

Taxonomic Group	Special Status Wildlife Species	No Action Alternative (acres)	T-Bone Mesa Alignment (acres)	UDOT Application Alignment (acres)	Southern Alignment (acres)	Red Hills Parkway Expressway (acres)	St. George Boulevard/ 100 South One-way Couplet (acres)
Reptiles and Amphibians	Arizona toad	0	0	0	3	0	0
	Common chuckwalla	0	1,326	1,250	1,186	0	0
	Desert night lizard	0	1,355	1,265	1,190	0	0
	Gila monster	0	1,326	1,250	1,186	0	0
	Sidewinder	0	1,326	1,250	1,185	0	0
	Western banded gecko	0	1,326	1,250	1,186	0	0
	Western thread snake	0	1,355	1,265	1,190	0	0
	Zebra-tailed lizard	0	1,326	1,250	1,186	0	0
Birds	Bald eagle	0	0	0	2	0	0
	Burrowing owl	0	1,457	1,366	1,281	0	0
	Ferruginous hawk	0	131	116	72	0	0
	Golden eagle	0	1,543	1,428	1,332	0	0
	Short-eared owl	0	217	178	145	0	0
Mammals	Allen's big-eared bat	0	1,418	1,316	1,241	0	0
	Big free-tailed bat	0	1,418	1,316	1,239	0	0
	Fringed myotis	0	1,442	1,327	1,239	0	0
	Kit fox	0	1,442	1,327	1,239	0	0
	Spotted bat	0	1,355	1,265	1,192	0	0
	Townsend's big-eared bat	0	1,418	1,316	1,241	0	0
	Western red bat	0	87	62	52	0	0
Invertebrates	Mojave poppy bee	0	256	574	1,630	2	17
	Monarch butterfly	0	1	1	20	0	0
	Western bumble bee	0	15	14	16	16	0

Notes: Habitat analyzed includes the 500-foot Northern Corridor ROW plus a 1-kilometer buffer for the T-Bone Mesa, UDOT Application, and Southern alignments, and just the 500-foot Northern Corridor ROW for the Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet Alignments.

Table 3.5-13. Acres of Indirect Impacts to Special Status Wildlife Habitat as a Result of Northern Corridor Alternatives

Taxonomic Group	Special Status Wildlife Species	No Action Alternative (acres)	T-Bone Mesa Alignment (acres)	UDOT Application Alignment (acres)	Southern Alignment (acres)	Red Hills Parkway Expressway (acres)	St. George Boulevard/ 100 South One-way Couplet (acres)
Reptiles and Amphibians	Arizona toad	0	162	162	162	0	0
	Common chuckwalla	0	24,986	24,986	24,986	24	0
	Desert night lizard	0	31,479	31,479	31,479	24	0
	Gila monster	0	27,296	27,296	27,296	24	0
	Sidewinder	0	27,056	27,056	27,056	24	0
	Western banded gecko	0	27,479	27,479	27,479	24	0
	Western thread snake	0	31,252	31,252	31,252	24	0
	Zebra-tailed lizard	0	27,063	27,063	27,063	24	0
Birds	Bald eagle	0	162	162	162	0	0
	Burrowing owl	0	36,841	36,841	36,841	24	0
	Ferruginous hawk	0	12,094	12,094	12,094	0	0
	Golden eagle	0	35,799	35,799	35,799	24	0
	Short-eared owl	0	10,930	10,930	10,930	0	0
Mammals	Allen's big-eared bat	0	30,560	30,560	30,560	24	0
	Big free-tailed bat	0	30,780	30,780	30,780	24	0
	Fringed myotis	0	34,699	34,699	34,699	24	0
	Kit fox	0	30,590	30,590	30,590	24	0
	Spotted bat	0	31,559	31,559	31,559	24	0
	Townsend's big-eared bat	0	32,874	32,874	32,874	24	0
	Western red bat	0	1,224	1,224	1,224	0	0
Invertebrates	Mojave poppy bee	0	16,004	16,004	16,004	194	236
	Monarch butterfly	0	320	320	320	1	0
	Western bumble bee	0	4,905	4,905	4,905	0	1

Notes: Habitat within the entire Red Cliffs Desert Reserve was analyzed for indirect effects from the T-Bone Mesa, UDOT Application, and Southern alignments, and within a 300-foot buffer outside the ROW for the Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet Alignments.

Regular development throughout Washington County would continue to directly and indirectly adversely impact special status wildlife species. Table 3.5-14 identifies the amount of habitat for each special status wildlife species impacted under Alternative 1 in the HCP Covered Activities Area. Loss and fragmentation of habitat, potential mortality or injury of individuals, noise disturbance, and increased spread of exotic invasive species that would further degrade habitat for special status wildlife would continue because of ongoing development on lands. Permanent, adverse impacts would occur in suitable habitat for special status wildlife species.

Table 3.5-14. Acres of Direct and Indirect Impacts to Special Status Wildlife Habitat in the HCP Covered Activities Area

Taxonomic Group	Special Status Wildlife Species	Direct Impacts (acres)	Indirect Impacts (acres)
Reptiles and Amphibians	Arizona toad	0	1,178
	Common chuckwalla	0	44,905
	Desert night lizard	0	54,330
	Gila monster	0	52,489
	Sidewinder	0	52,218
	Western banded gecko	0	53,841
	Western threadsnake	0	54,270
	Zebra-tailed lizard	0	52,294
Birds	Bald eagle	0	343
	Burrowing owl	0	67,115
	Ferruginous hawk	0	29,319
	Golden eagle	0	67,493
	Short-eared owl	0	22,544
Mammals	Allen's big-eared bat	0	60,900
	Big free-tailed bat	0	65,403
	Fringed myotis	0	68,616
	Kit fox	0	53,988
	Spotted bat	0	62,332
	Townsend's big-eared bat	0	67,820
	Western red bat	0	391
Invertebrates	Mojave poppy bee	23,516	179,079
	Monarch butterfly	417	672
	Western bumble bee	3,061	13,733

Notes: Habitat analyzed includes the area within a 1-kilometer buffer of the HCP Covered Activities Area; BLM sensitive species are only analyzed on BLM-administered lands within this area.

Outside of the Red Bluff ACEC, management of proposed Zone 6 would continue to include recreational uses, grazing, and mineral exploration in specific areas. Proposed Zone 6 would not be added to the Red Cliffs Desert Reserve and the SGFO RMP management prescriptions would not be amended to include additional special status wildlife conservation measures.

Direct and Indirect Impacts from Alternative 2

Alternative 2 would result in direct and indirect adverse impacts to special status wildlife species within the Red Cliffs NCA from the Northern Corridor T-Bone Mesa Alignment. Construction of the highway would result in habitat loss within the footprint of the highway and habitat degradation to

areas that remain unpaved within the ROW. The highway would fragment habitat for special status wildlife species, preventing some individuals from using habitat on both sides of the road. Some animals may be injured or killed when attempting to cross the road. Noise from construction of the highway would disturb special status wildlife in the vicinity and potentially cause reproductive failure for species breeding nearby. Construction of the new highway would be expected to increase the spread of exotic invasive species, particularly annual grasses, that reduce the quality of foraging habitat and increase the potential for a wildfire.

Table 3.5-12 and Table 3.5-13 identify the amount of habitat for each special status wildlife species impacted by the proposed highway.

Alternatives B and C for the Red Cliffs NCA RMP Amendment are similar in that both allow for the designation of a highway ROW within the Red Cliffs NCA; however, Alternative C affords the option to allow future utility development within a designated ROW corridor. Future development would result in additional habitat degradation from ground disturbance and continued spread of exotic invasive species. Habitat for special status wildlife species within the entire highway ROW is assumed to be permanently impacted. However, future indirect impacts, such as ground-disturbing activities (e.g., scraping or trenching), habitat degradation through the spread of exotic invasive species, and construction-related disturbances could occur each time a new utility is installed.

With or without the implementation of the HCP, development on non-Federal lands throughout Washington County would result in habitat loss and degradation, potential injury or mortality of wildlife, noise disturbance, and increased spread of exotic invasive species that would further degrade habitat. Development on land most susceptible to take of desert tortoises may happen more quickly, particularly in areas of high tortoise densities where developers would benefit from the countywide ITP rather than individual ITPs. However, the ultimate effects on special status wildlife would be the same. The amount of habitat for each special status wildlife species that could be impacted is identified in Table 3.5-14.

Designation and incorporation of proposed Zone 6 into the Red Cliffs Desert Reserve would be beneficial to special status wildlife. The HCP, as supported by the SGFO RMP Amendment for Alternative 2, would protect habitat in proposed Zone 6 by fencing the eastern borders to prevent motorized (OHV) access in non-designated areas, reducing or eliminating grazing, reducing the total mileage of designated access routes, and providing additional funding for habitat restoration and fire management. These actions would protect and enhance special status wildlife habitat. The amount of new habitat for each special status wildlife species that would be protected by the designation of proposed Zone 6 is identified in Table 3.5-15.

The SGFO RMP Amendment Alternative B protects special status wildlife habitat by managing proposed Zone 6 as an exclusion area for new ROWs, closing fluid mineral leasing, closing camping, closing all lands to livestock grazing, and closing the area to target shooting. The SGFO RMP Amendment Alternative C allows the Proposed Zone 6 Analysis Area to be managed as an avoidance area for ROWs and, with stipulations or geographic restrictions, allows for fluid mineral leasing, livestock grazing, camping, and the discharge of firearms. Compared to Alternative B, Alternative C is more likely to adversely impact special status wildlife by allowing camping and target shooting, which could disturb species, degrade habitat, and increase the risk of wildfires. In addition, allowing grazing and mineral leasing has the potential to cause special status wildlife habitat loss and degradation through the spread exotic invasive species, ground disturbance, soil destruction, and other impacts to special status wildlife habitat. However, both Alternatives B and C offer greater protection to special status wildlife than Alternative A.

Table 3.5-15. Acres of Special Status Wildlife Habitat Beneficially Impacted by Designation of Proposed Zone 6

Taxonomic Group	Special Status Wildlife Species	Beneficial Impacts (acres)
Reptiles and Amphibians	Arizona toad	0
	Common chuckwalla	3,990
	Desert night lizard	3,998
	Gila monster	3,990
	Sidewinder	3,975
	Western banded gecko	4,028
	Western threadsnake	4,021
	Zebra-tailed lizard	4,013
Birds	Bald eagle	0
	Burrowing owl	4,354
	Ferruginous hawk	379
	Golden eagle	4,411
	Short-eared owl	421
Mammals	Allen's big-eared bat	4,037
	Big free-tailed bat	4,075
	Fringed myotis	4,025
	Kit fox	4,040
	Spotted bat	3,998
	Townsend's big-eared bat	4,037
	Western red bat	42
Invertebrates	Mojave poppy bee	3,099
	Monarch butterfly	15
	Western bumble bee	6

Note: Acres of beneficial impacts apply to non-ACEC lands in proposed Zone 6.

Direct and Indirect Impacts from Alternative 3

Alternative 3, the UDOT Application Alignment, would result in similar direct and indirect adverse impacts as Alternative 2, though the location within the Red Cliffs NCA and impacted acreages differ. The amount of habitat for each special status wildlife species that would be impacted by Northern Corridor Alternative C is identified in Table 3.5-12 and Table 3.5-13.

Direct and indirect impacts resulting from HCP Covered Activities, the designation of Zone 6, and the RMP amendments would be the same as described under Alternative 2 (Table 3.5-14 and Table 3.5-15).

Direct and Indirect Impacts from Alternative 4

Alternative 4, the Southern Alignment would result in similar direct and indirect adverse impacts from the proposed Northern Corridor (Southern Alignment) as Alternative 2, though the location within the Red Cliffs NCA and impacted acreages differ. Table 3.5-12 and Table 3.5-13 lists the amount of habitat for each special status wildlife species impacted.

Direct and indirect impacts resulting from HCP Covered Activities, the designation of Zone 6, and the RMP amendments would be the same as described under Alternative 2 (Table 3.5-14 and Table 3.5-15).

Direct and Indirect Impacts from Alternative 5

Alternative 5, the Red Hills Parkway Expressway, would involve modifying an existing roadway. While it is expected there would be potential indirect impacts to special status wildlife outside the ROW from construction of turn lanes and flyovers for the proposed Northern Corridor, no direct impacts are anticipated because a paved road has already been constructed and the ROW is fenced, which for the most part precludes wildlife from entering the ROW. The amount of habitat for each special status wildlife species impacted is identified in Table 3.5-12 and Table 3.5-13. These impacts from Alternative 5 would be minimal compared to Alternative 1, and are substantially less than impacts that would be expected under Alternatives 2, 3, and 4.

Direct and indirect impacts within the HCP Covered Activities Area would be the same as described under Alternative 2. Proposed Zone 6 would not be designated within the Reserve, so special status wildlife habitat would not benefit from the proposed management prescriptions identified in the proposed SGFO RMP Amendment to limit human use of this area (Table 3.5-14 and Table 3.5-15). An amendment to the Red Cliffs NCA RMP would not be necessary.

Direct and Indirect Impacts from Alternative 6

Alternative 6 would result in similar direct and indirect adverse impacts from the proposed Northern Corridor (St. George Boulevard/100 South One-way Couplet) as Alternative 5, though the location is completely outside the Red Cliffs NCA and impacted acreages differ. The amount of habitat for each special status wildlife species impacted is identified in Table 3.5-12 and Table 3.5-13.

Direct and indirect impacts within the HCP Covered Activities Area would be the same as described under Alternative 2. Proposed Zone 6 would not be designated within the Reserve so special status wildlife habitat would not benefit from the proposed management prescriptions identified in the proposed SGFO RMP Amendment to limit human use of this area (Table 3.5-14 and Table 3.5-15). An amendment to the Red Cliffs NCA RMP would not be necessary.

3.6 Endangered Species Act Section 6 Land Acquisition Grants

Section 6 of the ESA authorizes grants to states for conservation efforts on non-Federal lands through what is commonly referred to as the Cooperative Endangered Species Conservation Fund. This analysis identifies properties—hereafter referred to as Section 6 lands—that have been acquired using Section 6 grants awarded to the State of Utah. No Section 6 lands occur in proposed Zone 6, and the RMP amendments and the HCP would not affect the management of Section 6 lands. For these reasons, the analysis area for the evaluation of impacts is the Reserve boundary, and potential impacts are analyzed for the proposed Northern Corridor alternatives.

3.6.1 Affected Environment

The Cooperative Endangered Species Conservation Fund is comprised of three grant programs: Recovery Land Acquisition Grants, Habitat Conservation Planning Assistance Grants, and Habitat Conservation Planning Land Acquisition Grants. All of these programs provide an opportunity for states to participate in the conservation of threatened and endangered species with the Federal government. States awarded Section 6 grants must manage these land grants in accordance with the executed grant agreements. If compliance with the terms and conditions of the executed grant agreements for long-term conservation cannot be achieved, then the property or properties acquired through the grant or property used to match the grant funds is subject to transfer, replacement, or repayment to the United States government. For this project, transfer, replacement, or repayment would be the responsibility of the State of Utah (50 CFR 80).

The Cooperative Endangered Species Conservation Fund has been used to acquire approximately 7,516 acres of private in-holdings within Reserve Zones 1 through 5 (Map 3.6-1). The first land acquired with Section 6 grant funds occurred in 1997. The parcels that may be affected by the Northern Corridor were purchased between 2003 and 2006. These private parcels were acquired by the State through Habitat Conservation Planning Land Acquisition Grants. The purpose of these grants is to complement an existing Habitat Conservation Program, in this case, Washington County's existing HCP. All of the lands acquired have similar grant objectives, which are "to be operated by the UDWR and/or Utah Division of Parks and Recreation, Snow Canyon State Park as a wildlife preserve for the desert tortoise and other wildlife biodiversity species, in accordance with the Washington County Habitat Conservation Plan and the Desert Tortoise Recovery Plan, and for limited, controlled public access for wildlife viewing" (Smith 2020). Section 6-funded land acquisitions in Washington County for desert tortoises are ongoing.

3.6.2 Environmental Consequences

The Northern Corridor alternatives could encroach upon, fragment, or degrade the conservation value of Section 6 lands. To adequately assess potential impacts to these lands, consideration must be given to the purpose of the grant and the associated land's conservation value with respect to the agreed upon conservation purposes.

3.6.2.1 Analysis Methods and Assumptions

The large analysis area, the Reserve boundary, allows for consideration of direct impacts to the parcels themselves and indirect impacts that may result from proximity to the proposed Northern Corridor. It also accounts for how Section 6 lands work in concert to achieve long-term conservation goals of the grants and the indirect effects that may occur. Impact indicators for Section 6 lands include encroachment or proximity impacts to these lands that result in the parcel or parcels no longer complementing the County's HCP and, therefore, do not meet the long-term conservation goals of the parcels, and result in a violation of executed grant agreement terms and conditions. The degradation in conservation value of a parcel or parcels takes into consideration the potential impacts to Mojave desert tortoise and other special status wildlife, general wildlife, and wildlife viewing opportunities for the public.

Assumptions used for this analysis are consistent with Section 3.4, General Wildlife, and Section 3.5, Special Status Wildlife. Additional assumptions include the following:

- The Red Cliffs NCA RMP Amendments and the Amended HCP would have no effect to Section 6 lands within the Reserve.
- Portions of Section 6 lands within ROWs of the Northern Corridor alternatives would result in a direct loss of habitat to Mojave desert tortoise and other wildlife species.
- Portions of Section 6 lands within 508 meters of the proposed ROWs would result in indirect impacts to Mojave desert tortoise from disturbance.
- Portions of Section 6 lands within 1 kilometer of the proposed ROWs would result in indirect impacts to special status and general wildlife species because of habitat degradation.
- In the event the terms and conditions for long-term conservation set forth in the grants are not fully complied with, the property acquired through the grant and any property used as a match for these grant funds is subject to transfer, replacement, or repayment to the United States. This will be the responsibility of the State of Utah (50 CFR 80).
- Potential transfer or replacement lands are subject to negotiation between USFWS and the State of Utah. These lands have not been identified and are therefore not included in this analysis. Should transfer or replacement land(s) be warranted, the USFWS will ensure that the necessary agreements are in place before finalizing these land acquisitions, and ensure that

the land acquisition complies with all the USFWS regulations, procedures, and policies relating to the land acquisition.

3.6.2.2 Direct and Indirect Impacts from Alternatives 1 and 6

Under Alternative 1 and Alternative 6, no direct or indirect impacts to Section 6 lands would occur. Section 6 lands within the Reserve would continue to complement the County's HCP, and the terms and conditions for long-term conservation would continue to be met for all existing grant agreements.

3.6.2.3 Direct and Indirect Impacts from Alternative 2

Four Section 6 parcels are either wholly or partially within 1 kilometer of the T-Bone Mesa Alignment proposed ROW. All these parcels are within Zone 3 of the Reserve and, in total, amount to approximately 754 acres. Three parcels (identified as Parcels 1 through 3 on Map 3.6-2 and Tables 3.6-1 and 3.6-2) provide valuable, relatively continuous habitat east of Cottonwood Springs Road—which acts as a barrier to Mojave desert tortoise—by linking State-owned lands with BLM-administered lands in this core zone of the Reserve. Two of these parcels (Parcels 2 and 3) comprise approximately 671 contiguous acres. All Section 6 lands provide habitat for Mojave desert tortoise and, to varying degrees, other wildlife that aid in promoting biodiversity. Section 3.4, General Wildlife, and Section 3.5, Special Status Wildlife, provide further details on species and habitat in the area. No designated public wildlife viewing locations occur on these parcels, but the public has opportunities to view wildlife by using the Cottontail and Middleton Powerline trails through Parcels 2 and 3.

For all wildlife that may inhabit these Section 6 lands, construction of the roadway would result in habitat loss within the ROW and further habitat degradation because of fragmentation and road proximity impacts, such as noise and visual intrusion (see Sections 3.4 and 3.5 for detailed impact analysis). Table 3.6-1 summarizes the habitat loss on Section 6 lands within the road ROW, disturbance to Mojave desert tortoise (508-meter buffer), and disturbance and habitat degradation to other wildlife (1-kilometer buffer). In addition, Table 3.6-2 summarizes Section 6 lands that may be available to Mojave desert tortoise and other wildlife to the north and south of the road ROW after accounting for fragmentation from road construction and proximity impacts. The acres remaining for desert tortoise and other wildlife deducted the 508 meters and 1 kilometer, respectively, to account for indirect impacts. While Section 6 land may remain following fragmentation, the conservation value of the remaining lands may be degraded so it no longer meets the intended purpose of long-term conservation. Further assessment of each parcel's remaining conservation value is described further in this section.

Table 3.6-1. T-Bone Mesa Alignment Habitat Loss and Proximity-related Degradation on Section 6 Lands

Parcel ID	Associated County Parcel Number (as applicable)	Parcel Size (acres)	Acres within ROW	Acres within 508 Meters	Acres within 1 Kilometer
1	6102-C	60	0	0	<1
2	6100-B	651	60	315	522
3	6101	20	0	20	20
4	SG-5-2-17-2005	23	6	17	17
	Total		**66**	**352**	**559**

Note: 1 kilometer and 508 meters are measured from the 500-foot proposed ROWs.

Table 3.6-2. T-Bone Mesa Alignment Section 6 Lands Fragmentation

Parcel ID	Associated County Parcel Number (as applicable)	Parcel Size (acres)	Acres Remaining after ROW Encroachment	Acres that May Remain for Mojave Desert Tortoise [a]	Acres that May Remain for Other Wildlife Species [a]
1	6102-C	60	60 (no impacts)	60 (no impacts)	• 60 North • <1 South
2	6100-B	651	• 547 North • 16 South	• 276 North • 0 South	• 69 North • 0 South
3	6101	20	20 (no impacts)	• 0 North • 0 South	• 0 North • 0 South
4	SG-5-2-17-2005	23	• 1 North • 16 South	• 0 North • 0 South	• 0 North • 0 South

[a] Acres remaining for Mojave desert tortoise were calculated after deducting the ROW and 508 meters from ROW on each side. For other species, habitat remaining was calculated after deducting the ROW and 1 kilometer from ROW on each side.

Parcel 1 would not be directly impacted by the T-Bone Mesa Alignment. A small portion of the southeastern corner is located within 1 kilometer of the proposed ROW, which could slightly degrade habitat for wildlife species. However, these impacts are expected to be relatively minor because they would account for approximately 0.2 percent of the overall parcel size. In addition, Parcel 1 would not be fragmented by the T-Bone Mesa Alignment or divided from other Section 6 lands and would continue to provide habitat connectivity for Mojave desert tortoise and other wildlife species. Therefore, this parcel would continue to meet the long-term conservation goals identified in the grant agreement.

Approximately 9 percent of Parcel 2 would be directly impacted by road construction and conversion to a transportation ROW. More substantially, as shown in Table 3.6-2, the parcel itself would be fragmented by the road ROW, and the majority of Parcel 3 would be fragmented from the larger, remaining portion of Parcel 2 located north of the ROW. In addition, indirect impacts within Mojave desert tortoise home ranges adjacent to the road would diminish the conservation value of the parcel. Because the road would be fenced, areas on Section 6 lands located south of the road would ultimately be divided from the core area of the Reserve and would not meet the intended long-term conservation goals of the parcel. Although portions of Parcel 2 would have diminished conservation value, approximately 276 acres of the parcel would retain its conservation value for the desert tortoise and continue to complement the County's HCP. While approximately 69 acres may have diminished quality of habitat for other wildlife species, this area would still provide the habitat connectivity to other Section 6 lands and, ultimately, the core area of the Reserve. Because of its proximity to existing trails on Parcel 2, this alternative also may promote controlled public access to wildlife viewing opportunities.

As shown on Map 3.6-2, Parcel 3 is located directly between Parcel 2 and an existing subdivision that abuts the Reserve boundary. While road construction would not encroach on this parcel, it would fragment it from most of Parcel 2 and completely separate it from the bulk of the Reserve. Given its proximity to the proposed highway, the small size of the parcel, and its loss of substantive habitat connectivity, this parcel would no longer meet the long-term conservation goals of the executed grant agreement and would no longer complement the County's HCP.

Similar to Parcel 2, Parcel 4 also would be fragmented by the road ROW. The majority of the remaining parcel would be to the south of the road ROW and would be severed from the larger core area of the Reserve by the road and adjacent fencing. In addition, only 1 acre of the parcel would remain to the north of the ROW. Direct encroachment, proximity to the road, and resulting

fragmentation would severely diminish the conservation value of the parcel for the desert tortoise such that the goals of the executed grant agreement would no longer be met.

Based on this assessment, if the T-Bone Mesa Alignment were selected, a total of approximately 418 acres of Section 6 lands would be subject to transfer, replacement, or repayment to the United States. This accounts for approximately 6 percent of Section 6 lands within the Reserve. These impacts may be lessened with additional design considerations related to desert tortoise or other wildlife crossings, which may better preserve the intended function of these Section 6 lands, thereby lessening the degree to which their conservation value would be diminished. The total area subject to transfer, replacement, or repayment is based on the following parcels or portions of parcels no longer meeting the terms and conditions of the grant agreements:

- Parcel 2: 375 acres of degraded conservation value.
- Parcel 3: 20 acres of degraded conservation value.
- Parcel 4: 23 acres of degraded conservation value.

3.6.2.4 Direct and Indirect Impacts from Alternative 3

Section 6 lands identified as Parcels 2, 3, and 4 on Map 3.6-2, and as described under Alternative 2 are either wholly or partially within 1 kilometer of the Alternative 3 proposed ROW and total approximately 694 acres. The UDOT Application Alignment (Alternative 3) would generally have the same direct and indirect impacts to Parcels 2, 3, and 4 as described for the T Bone Mesa Alignment (Alternative 2), including the assessment of remaining conservation value. However, as summarized in Table 3.6-3 and Table 3.6-4, the UDOT Application Alignment would result in less direct habitat loss and potential fragmentation. As described under Alternative 2, the long-term conservation goals of Parcels 3 and 4 would be lost, resulting in a violation of the terms and conditions of the grant agreements. Similar to Alternative 2, approximately 353 acres of Parcel 2 would retain its conservation value and continue to complement the County's HCP.

Based on this assessment, if the UDOT Application Alignment were selected, a total of approximately 341 acres of Section 6 lands would be subject to transfer, replacement, or repayment to the United States. This accounts for approximately 5 percent of existing Section 6 lands within the Reserve. The total area subject to transfer, replacement, or repayment is based on the following parcels or portions of parcels no longer meeting the terms and conditions of the grant agreements:

- Parcel 2: 298 acres of degraded conservation value.
- Parcel 3: 20 acres of degraded conservation value.
- Parcel 4: 23 acres of degraded conservation value.

Table 3.6-3. UDOT Application Alignment Habitat Loss and Proximity-related Degradation on Section 6 Lands

Parcel ID	Associated County Parcel Number (as applicable)	Parcel Size (acres)	Acres within ROW	Acres within 508 Meters	Acres within 1 Kilometer
2	6100-B	651	47	251	516
3	6101	20	0	20	20
4	SG-5-2-17-2005	23	0	13	23
	Total		**47**	**284**	**559**

Note: 1 kilometer and 508 meters are measured from the 500-foot proposed ROWs.

Table 3.6-4. UDOT Application Alignment Section 6 Lands Fragmentation

Parcel ID	Associated County Parcel Number (as applicable)	Parcel Size (acres)	Acres remaining after ROW Acquisition	Acres that May Remain for Mojave Desert Tortoise [a]	Acres that May Remain for Other Wildlife Species [a]
2	6100-B	651	• 591 North • 12 South	• 353 North • 0 South	• 87 North • 0 South
3	6101	20	20 (no impacts)	• 0 North • 0 South	• 0 North • 0 South
4	SG-5-2-17-2005	23	23 (no impacts)	• 10 North • 0 South	• 0 North • 0 South

[a] Acres remaining for Mojave desert tortoise were calculated after deducting the ROW and 508 meters from ROW on each side. For other species, habitat remaining was calculated after deducting the ROW and 1 kilometer from ROW on each side.

3.6.2.5 Direct and Indirect Impacts from Alternative 4

Alternatives 3 and 4 would have similar impacts to Section 6 lands and their associated conservation value. As shown in Table 3.6-5 and Table 3.6-6, both Northern Corridor alternatives encounter the same three Section 6 parcels, but the Southern Alignment would have slightly less physical encroachment on Section 6 lands while having slightly more total acres of indirect impacts because of proximity to the road and overall fragmentation. As described under Alternative 2, the long-term conservation goals of Parcels 3 and 4 would be lost, resulting in a violation of the terms and conditions of the grant agreements. Similar to Alternative 2, approximately 339 acres of Parcel 2 would retain their conservation value and continue to complement the County's HCP.

Based on this assessment, if the Southern Alignment were selected, a total of approximately 355 acres of Section 6 lands would be subject to transfer, replacement, or repayment to the United States. This accounts for approximately 5 percent of existing Section 6 lands within the Reserve. The total area subject to transfer, replacement, or repayment is based on the following parcels or portions of parcels no longer meeting the terms and conditions of the grant agreements:

- Parcel 2: 312 acres of degraded conservation value.
- Parcel 3: 20 acres of degraded conservation value.
- Parcel 4: 23 acres of degraded conservation value.

Table 3.6-5. Southern Alignment Habitat Loss and Proximity-related Degradation on Section 6 Lands

Parcel ID	Associated County Parcel Number (as applicable)	Parcel Size (acres)	Acres within ROW	Acres within 508 Meters	Acres within 1 Kilometer
2	6100-B	651	47	263	526
3	6101	20	0	20	20
4	SG-5-2-17-2005	23	0	0	20
	Total		**47**	**283**	**566**

Note: 1 kilometer and 508 meters are measured from the 500-foot proposed ROWs.

Table 3.6-6. Southern Alignment Section 6 Lands Fragmentation

Parcel ID	Associated County Parcel Number (as applicable)	Parcel Size (acres)	Acres remaining after ROW Acquisition	Acres that May Remain for Mojave Desert Tortoise [a]	Acres that May Remain for Other Wildlife Species [a]
2	6100-B	651	• 582 North • 20 South	• 339 North • 0 South	• 76 North • 0 South
3	6101	20	20 (no impacts)	• 0 North • 0 South	• 0 North • 0 South
4	SG-5-2-17-2005	23	23 (no impacts)	• 10 North • 0 South	• 0 North • 0 South

[a] Acres remaining for Mojave desert tortoise were calculated after deducting the ROW and 508 meters from ROW on each side. For other species, habitat remaining was calculated after deducting the ROW and 1 kilometer from ROW on each side.

3.6.2.6 Direct and Indirect Impacts from Alternative 5

While two Section 6 parcels occur directly adjacent to Red Hills Parkway at its western terminus with Bluff Street (identified as Parcels 5 and 6 on Map 3.6-2), the Red Hills Parkway Expressway would not require further expansion of the road or ROW acquisition within 1 kilometer of this location. Therefore, no physical encroachment or fragmentation of Section 6 lands would occur. While increased noise could occur in the area from additional traffic volumes and speeds on the expressway, noise levels along the existing roadway are not expected to significantly change. Therefore, Mojave desert tortoise and other wildlife species that may inhabit the Section 6 parcels to the north and south of Red Hills Parkway and could be indirectly impacted by traffic noise are not expected to experience a perceptible change from existing conditions. In addition, no changes to public wildlife viewing would occur in this area. For these reasons, Parcels 5 and 6 would retain their conservation value, and the Red Hills Parkway Expressway would comply with the terms and conditions for long-term conservation set forth in the grants.

3.7 Geology, Mineral Resources, and Soils

Data relevant to geology, mineral resources, and soils was accessed through the USGS, the Utah Geological Survey, and the NRCS, an agency of the U.S. Department of Agriculture.

3.7.1 Affected Environment

3.7.1.1 Project Location and Geologic Setting

The St. George Basin is located within the transitional zone between the Basin and Range and Colorado Plateau physiographic provinces. The Basin and Range province is located to the west and characterized by north-south oriented mountain ranges with intervening broad basins produced by east-west extensional tectonics. The Colorado Plateau to the east forms a tectonically stable region overlying generally horizontal sedimentary rocks. Igneous activity is more widespread in the Basin and Range province, with comparatively minor local disruptions caused by broad uplift and igneous intrusions in the Colorado Plateau. The transitional zone between the two physiographic provinces is marked by several north-trending faults stepping from the Colorado Plateau to the Basin and Range. These faults form the southern section of the Intermountain seismic belt, a zone of increased seismicity extending from northern Arizona to western Montana. Two major faults bound the transitional zone, the Hurricane fault zone on the east and the Gunlock-Reef Reservoir-Grand Wash fault zone on the west (Biek et al. 2010).

Major topographic features in the Red Cliffs NCA include the Red Mountains to the west, the Pine Valley Mountains to the north, and Sandstone Mountain to the east. An 18-mile backbone of Navajo Sandstone deposited as sand dunes during the Jurassic Period over 175 million years ago

gives the region its name (Biek et al. 2010). The area includes multiple sandstone cliffs, canyons, and hoodoos. Toward the St. George Basin, the area transitions to broad alluvial fans with localized volcanic cones and Quaternary basalt flows. The elevation of the project area ranges from 2,900 feet to over 5,000 feet above mean sea level. Active faults are present toward the north end of the Red Cliffs NCA.

Proposed Zone 6 is situated between the White Hills and Bloomington Hill, a northwest-southeast oriented mesa that dominates the topography of the Zone 6 area. The Triassic Chinle and Moenkopi formations are exposed throughout proposed Zone 6 with pockets of Quaternary surficial deposits and basaltic lava flows. Elevation in the proposed Zone 6 area ranges from approximately 2,600 to 3,400 feet above mean sea level (Biek et al. 2010).

3.7.1.2 Bedrock and Soils

Bedrock is exposed throughout the project area, and consists of the Jurassic Age upper part of the Kayenta and the Navajo Sandstone formations. The upper part of the Kayenta Formation consists of siltstone and mudstone with interbedded fine-grained, calcareous sandstone. The Navajo Sandstone is characterized by massive cross-bedded sandstone interbedded with thin mudstone layers (Biek et al. 2010).

Bedrock in proposed Zone 6 is dominated by the Petrified Forest Member and Shinarump Conglomerate Member of the Upper Triassic Chinle Formation and the Shnabkaib Member of the Lower Triassic Moenkopi Formation. The Chinle Formation Petrified Forest Member consists of multicolored mudstone, claystone, and siltstone with minor sandstone and limestone. Medium- to coarse-grained sandstone and pebbly conglomerate characterize the Shinarump Conglomerate Member. The Shnabkaib Member of the Moenkopi Formation consists of gypsum, mudstone, and siltstone exposed in “bacon striped” ledgy slopes (Biek et al. 2010).

A soil survey conducted between 1967 and 1971 identified major soil types for the project area (Soil Conservation Service 1977). The varied soil types generally share shallow to moderate depths, low surface organic matter, and low water holding capacity. Vegetation is sparse as a result of shallow soils and steep slopes. Prominent soil types within the proposed alignments include the following (Mortensen et al. 1977, BLM 2015a):

- Badland: Nearly barren beds of actively eroding shale and shale interbedded with sandstone and gypsum.
- Eroded-land Shalet complex, warm: Stratified shale and gypsum (80 percent) and Shalet clay loam (20 percent), active erosion.
- Harrisburg fine sandy loam: Level to sloping soil found on mesas with slight erosion.
- Harrisburg-Rock land association: Interspersed areas of bare rock and rock with a thin covering of fine sand with moderate erosion.
- Junction fine sandy loam: Soil on alluvial fans and desert slopes, moderate erosion.
- Rock land: Rock outcrops (60 to 80 percent) and shallow soils over bedrock (20 to 40 percent) with gentle to steep slopes.
- Rock outcrop: Bare bedrock (mostly sandstone, limestone, or basalt) with variable slopes.
- St. George silt loam, strongly saline: Soil on alluvial fans, slight erosion.
- Stony colluvial land: Unconsolidated colluvial land covered with stone and rock fragments. Shale bedrock and shallow soils with moderate to steep slopes.
- Winkel gravelly fine sandy loam: Soil on basalt mesa tops, moderate erosion.

3.7.1.3 Mineral Resources

The SGFO RMP (BLM 1999) designated areas within the boundaries of proposed Zone 6 as open to fluid mineral development. The majority of the fluid mineral development areas were designated open with No Surface Occupancy stipulations, which prohibits the surface disturbance because of leasing activities. Portions of the Proposed Zone 6 Analysis Area were also open or open with restrictions to locatable minerals and mineral materials development (BLM 1999). No active mining claims are present within the boundaries of proposed Zone 6 (BLM 2015b). The Red Cliffs NCA was withdrawn from mineral resource development under OPLMA Section 1974 (BLM 2015b).

3.7.2 Environmental Consequences

This analysis focuses on potential increases in impacts to soils from erosion and physical and chemical property changes. Effects on mineral resources are discussed.

3.7.2.1 Analysis Methods and Assumptions

The acreage of soil disturbance and potential erosion associated with highway construction is quantified in this analysis. Qualitative analyses include the potential changes to physical and chemical properties of soil because of the construction of the Northern Corridor, potential impacts to sensitive soils and soil erosion from the designation of a utility corridor in the Red Cliffs NCA RMP Amendment, and impacts to soil and mineral resources from the creation of proposed Zone 6 as a result of the Amended HCP and the SGFO RMP Amendment.

The following assumptions apply to this analysis:

- Mineral extraction is prohibited in the Red Cliffs NCA.
- Staging areas or temporary construction easements will be within the 500-foot highway ROW disturbance area.
- Most erosion for new construction will be limited to a 100-foot buffer on either side of the highway ROW; converting undisturbed soils to a highway will increase runoff and erosion until soils are stabilized.
- Existing paved surfaces within the ROW and erosion buffer areas for Alternatives 5 and 6 are not included in the acreage of soil disturbance and potential erosion calculations.

3.7.2.2 Direct and Indirect Impacts from Alternative 1

The No Action Alternative would leave soils undisturbed and mineral leasing activities unchanged.

3.7.2.3 Direct and Indirect Impacts from Alternatives 2 through 4

Direct Impacts

Construction of Alternatives 2 through 4 would disturb sensitive soils, soil crusts, and topsoil as a result of grading and fill activities. Table 3.7-1 identifies the acres of soil disturbance by soil type, total acres of disturbance, and estimated area of erosion. The estimated area of erosion is in addition to the total acres of disturbance.

Erosion is both a short-term impact that would occur during construction when bare soil is exposed and also a long-term impact extending beyond construction until soils are stabilized. Runoff and erosion would be expected to decrease during the year following construction as vegetation becomes re-established and soils are stabilized. The potential for soil erosion is assumed to extend 100 feet beyond the ROW limits. Soils in the analysis area with the greatest potential for erosion include the fine sandy loams and fine sand soils.

The use of heavy equipment and grading and fill activities can change soil structure, infiltration, and water capacity as a result of soil compaction and changes to pH and soil nutrients. Removing topsoil

and adding fill and aggregate for highway construction removes soil organic matter and decreases the reactive carbon content of the soil. Reduced reactive carbon content adversely impacts soil stability, water infiltration and capacity, microbial activity, and nutrient availability (NRCS 2014).

Indirect Impacts

Indirect adverse impacts to sensitive soils are anticipated by the designation of a utility corridor under Red Cliffs NCA RMP Amendment Alternative C. This alternative would allow for potential future development with Alternatives 2, 3, and 4 where the highway ROW passes through the Red Cliffs NCA. Potential future impacts include the removal of topsoil because of excavation for underground utilities or structures for aboveground utilities, soil compaction because of the use of construction equipment, and additional erosion as a result of soil disturbance.

The Amended HCP and SGFO RMP Amendment would limit surface disturbance within the proposed Zone 6 boundaries, preserving sensitive soils and soil crusts. The availability of mineral resources would be adversely impacted by both SGFO RMP Amendment Alternatives B and C. SGFO RMP Amendment Alternative B would close this area to fluid mineral exploration and mineral material sales, and designate the area as a ROW exclusion area. SGFO RMP Amendment Alternative C would designate the area as a ROW avoidance area and open for fluid minerals, but development would be subject to stipulations and geographic restrictions. Under both Alternatives B and C, all BLM-administered lands within proposed Zone 6 would be recommended for withdrawal from locatable mineral entry. If the Secretary issues a Public Land Order to formally withdraw these lands in the future, subject to valid existing rights, the location of new mining claims under the Mining Law of 1872 would be forbidden. No valid existing rights would be impacted since no mining claims exist within proposed Zone 6.

3.7.2.4 Direct and Indirect Impacts from Alternatives 5 and 6

Under Alternatives 5 and 6, soil disturbance and erosion would occur as a result of improvements and modifications to existing roadways (Table 3.7-1).

Table 3.7-1. Acreage of Soil Disturbance and Soil Erosion Potential (in acres)

Soil Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 [a,c]	Alternative 6 [b,c]
Badland	0	0	0	0	4.2	1.0
Eroded-land Shalet complex	0	0	0	0	0	0.4
Harrisburg fine sandy loam	0	118.5	104.0	107.0	0	0
Harrisburg-Rock land association	0	97.4	143.4	181.7	0	0
Junction fine sandy loam	0	0	0	0	1.8	15.7
Rock land	0	8.2	0	21.4	0	0
Rock outcrop	0	0	0	17.8	1.3	0
St. George silt loam, strongly saline	0	0	0	0	0.7	14.4
Stony colluvial land	0	21.2	14.1	8.4	0.2	0
Winkel gravelly fine sandy loam	0	20.9	25.6	23.6	0.1	0
Total Acres of Disturbance	**0**	**266.3**	**287.1**	**359.8**	**8.3**	**31.5**
Acres of Soil Erosion (Outside ROW area)	0	105	114	139	75	17

[a] Includes acreage both inside and outside of Red Cliffs NCA

[b] Acreage is outside of Red Cliffs NCA

[c] Calculations exclude existing paved surfaces within the ROW and erosion buffer area

No utility corridor through the Red Cliffs NCA would be established and no indirect effects would be anticipated. Proposed Zone 6 would remain open to mineral development, leaving sensitive soils and soil crusts within the proposed Zone 6 boundaries vulnerable to potential adverse impacts that occur under existing conditions.

3.8 Paleontology

3.8.1 Affected Environment

The analysis area for paleontological resources is the alternative corridors being considered for the proposed highway ROW, potential future utility ROWs, and proposed Zone 6. The Potential Fossil Yield Classification (PFYC) is a system developed by the BLM to classify geologic formations based on their likelihood to possess paleontological resources and their sensitivity to adverse impacts. The PFYC system ranks the potential fossil yield of geologic formations in the following classes:

1) Very low potential.
2) Low potential.
3) Moderate potential.
4) High potential.
5) Very high potential.

As discussed in Section 3.7.1.2, Bedrock and Soils, most of the project area is comprised of the Jurassic Age Kayenta Formation and Navajo Sandstone. Both the Kayenta Formation and Navajo Sandstone possess scientifically important dinosaur tracks, bone beds, plant fossils, and silicified wood (BLM 2016b). However, most of the geologic formations within the Red Cliffs NCA have a very low or low potential to yield paleontological resources. Overall, about 75 percent of the Red Cliffs NCA is classified as PFYC Class 2, and 20 percent is classified as PFYC Class 1. Although a few isolated areas have moderate or high potential to yield paleontological resources within the Red Cliffs NCA, the lands within the project area near the Red Cliffs NCA's southern boundaries in Washington County are classified as mostly PFYC Class 2, with some portions classified as PFYC Class 1. The areas south of the Red Cliffs NCA within the proposed Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet Alternatives also are classified as PFYC Classes 1 and 2, with a very low or low potential to yield paleontological resources. Within the project area, 15 paleontological features have been identified as part of the Kayenta and Moenave geologic formations.

Within proposed Zone 6, 67 percent of the geologic formations are classified as PFYC Class 2, and the remaining 33 percent are classified as PFYC Class 4. The geologic formations with a low potential to yield paleontological resources mostly occur on the western side of proposed Zone 6, while the geologic formations with a high potential for paleontological resources are concentrated on the eastern side of proposed Zone 6. While about one-third of the geologic formations in proposed Zone 6 have a high potential to yield paleontological resources, no known paleontological resources previously have been identified in this area.

3.8.2 Environmental Consequences

This analysis focuses on potential impacts to paleontological resources from disturbance of geologic units, particularly those classified as PFYC Classes 3 through 5.

3.8.2.1 Analysis Methods and Assumptions

This section quantitatively analyzes the acreage of disturbance to geologic formations with high sensitivity for scientifically important fossil resources that are identified as PFYC Classes 3

through 5 within the highway ROW alternatives and a 0.25-mile buffer on either side of the ROW. This section also analyzes the impacts of the Amended HCP by quantitatively evaluating the acreage of lands identified as PFYC Classes 3 through 5 on SITLA-managed lands within proposed Zone 6 and the qualitative impacts to paleontological resources as a result of the addition of those lands to proposed Zone 6.

The following assumptions apply to this analysis:

- Construction of a road disturbs or destroys the underlying geologic formations to the depth of disturbance, makes potential fossil records unavailable for future scientific research, or both.
- Occurrences of paleontological resources are closely related to the geologic units that contain them; the probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface.
- Management actions for the Red Cliffs NCA are designed to conserve, protect, and enhance resource values, including paleontological resources of the Red Cliffs NCA.
- Management actions proposed for Zone 6 are designed to conserve, protect, and enhance the resource values of the Reserve, including paleontological resources.

3.8.2.2 Direct and Indirect Impacts from Alternatives 1, 5, and 6

No change to paleontological resources would occur, because no new ground disturbance would be proposed under Alternative 1. Construction of the Red Hills Parkway and the St. George Boulevard/100 South One-way Couplet Alternatives would include converting intersections and modifications to existing roadways. Therefore, it is unlikely that construction of these alternatives would impact potential paleontological resources that have not already been disturbed or destroyed from construction of the existing roadways. No geologic units classified as PFYC Classes 3 through 5, with a higher probability to contain scientifically important fossil resources, would be affected by the construction of these alternatives.

Although construction of the Red Hills Parkway or the St. George Boulevard/100 South One-way Couplet Alternatives would not impact more sensitive geologic units, under Alternatives 5 and 6, the SITLA-managed lands located within proposed Zone 6 would remain open to development, which would leave these lands, including lands classified as PFYC Class 4, vulnerable to potential disturbance.

3.8.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

The T-Bone Mesa, UDOT Application, and Southern Alignments of the proposed Northern Corridor would disturb geologic units within the Red Cliffs NCA classified as PFYC Classes 1 and 2. No geologic units classified as PFYC Classes 3 through 5, with a higher probability to contain scientifically important fossil resources, would be affected by the construction of these highway alternatives. Although the alignments would not impact geologic units that are classified as more sensitive and likely to contain paleontological resources, construction of the highway would preclude discovery of any potential fossil records within the highway footprint for future scientific research.

Whether the Red Cliffs NCA RMP would be amended only to accommodate a highway ROW or a highway and potential future utility ROWs, the areas potentially affected are classified as PFYC Classes 1 and 2, which have a low potential to yield paleontological resources. Again, however, although the utility corridor would not impact any lands that are most likely to contain sensitive fossil resources, the designation of a utility corridor could permit future utility development that would prevent discovery of potential fossil records within the corridor.

Designation of proposed Zone 6 as a conservation measure in the Amended HCP would add lands that are currently open to ground-disturbing development to the Reserve. Managing these lands in accordance with the Amended HCP and SGFO RMP Amendment would limit or preclude approximately 1,384 acres of SITLA-managed land that possess geologic units identified as PFYC Class 4 from development. The designation of proposed Zone 6 would protect potential unidentified fossil resources within these more sensitive geologic units located on SITLA-managed lands. However, the BLM-administered lands within proposed Zone 6 are within an ACEC that already protects them from most future development. Therefore, the addition of proposed Zone 6 to the Reserve would not change the paleontological resource management protections on BLM-administered land.

3.9 Prime and Unique Farmland

The spatial analysis for prime and unique farmland consists of the Northern Corridor alternatives located outside of the Red Cliffs NCA and the proposed Zone 6 conservation area. No farmlands occur within the Red Cliffs NCA. The Natural Resources Conservation Service web soil survey was consulted to locate soils with farmland characteristics.

3.9.1 Affected Environment

The two roadway ROW alternatives outside of the Red Cliffs NCA have soils suitable for farmland if irrigated (NRCS 2019). While proposed Zone 6 consists primarily of badlands and rock formations with very little farmland, two small parcels within the Proposed Zone 6 Analysis Area are identified as prime farmland if irrigated (NRCS 2019). Presently, these parcels identified as prime farmland if irrigated are not in agricultural production.

3.9.2 Environmental Consequences

3.9.2.1 Analysis Methods and Assumptions

This section quantitatively analyzes the acreage of Natural Resources Conservation Service-designated prime and unique farmlands within the roadway alternatives outside of the Red Cliffs NCA and within proposed Zone 6. None of the acreage evaluated is in agricultural production; however, the conversion of land with soils considered suitable for prime and unique farmland contributes to an ongoing loss of potential farmland in the nation.

The analysis assumes none of the Natural Resources Conservation Service-designated prime and unique farmland within the analysis area is irrigated.

3.9.2.2 Direct and Indirect Impacts

Under the No Action Alternative, no construction would occur that would disturb prime and unique farmland, nor would any change occur in land management that would prevent it from being used for agriculture in the future.

The proposed highway ROW associated with Alternatives 2, 3, and 4 would not affect prime or unique farmland. However, designation of proposed Zone 6 and the proposed management prescriptions for the SGFO RMP Amendment would prevent the potential future agricultural use of 53.68 acres of soil designated as prime farmland if irrigated.

Construction of Alternative 5 would impact 2.34 acres of prime farmland if irrigated, while construction of Alternative 6 would impact 26.89 acres of prime farmland if irrigated. In addition to the conversion of the prime farmland within the roadway footprint as a result of construction of Alternatives 5 and 6, the introduction of a new impervious surface may impact drainage or erosion patterns, as well as other soil properties that could indirectly affect soils on adjacent land that is designated as prime farmland.

3.10 Wetlands, Floodplains, and Waters of the U.S.

3.10.1 Affected Environment

The analysis area for potential effects to wetlands, Waters of the U.S. (WOUS), and floodplains is the Permit Area for the Amended HCP. This area was selected because it represents the boundary within which all impacts on wetlands, WOUS, and floodplains resulting from the actions analyzed in this Draft EIS would occur.

Data sources used for analysis of wetlands, WOUS, and floodplains in the Amended HCP and proposed Zone 6 include the National Hydrography Dataset (USGS 2011), National Wetlands Inventory (USFWS 2019c), and Federal Emergency Management Agency (FEMA) 100-year floodplain dataset (FEMA 2019). In addition, a formal wetland and WOUS delineation was completed to identify potential wetlands and WOUS along each Northern Corridor alternative (SWCA 2020).

The analysis area is at the junction of the Great Basin and Mojave deserts, and receives approximately 7.5 inches of rain per year (Brown 1994). Dominant plant communities include Great Basin desert scrub with big sagebrush (*Artemisia tridentata*) and saltbush species (*Atriplex spp.*), and Mojave desert scrub dominated by creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*). Both communities reflect arid environments with low annual precipitation rates.

Notable wetlands, WOUS, and floodplains within the analysis area include the Virgin River corridor, Sand Hollow Reservoir, Quail Creek Reservoir, the Santa Clara River, Gunlock Reservoir, and Harrisburg Creek. Approximately 37,700 acres of wetlands and floodplains, and 37,197,297 linear feet of streams (approximately 2 percent) in the analysis area are mapped as wetlands, WOUS, or floodplains. Most features in the analysis area are ephemeral washes, which only have flowing water during and immediately after storm events. Many WOUS features have mapped wetlands and floodplains adjacent to waterbodies, and generally occur around intermittent and perennial water sources. Map 3.10-1 depicts mapped wetlands, intermittent streams, perennial streams, waterbodies, and floodplains within the analysis area.

3.10.1.1 Northern Corridor

A formal wetland delineation was completed to identify and delineate wetlands and WOUS along each Northern Corridor alternative route. Ephemeral washes were the only features identified within the potential ROW for each alternative, and additional data can be found in the Northern Corridor Aquatic Resources Delineation Report (SWCA 2020). Perennial riverine systems, seeps, and wetlands were identified adjacent to Alternative 5, but would not be impacted by the construction of the necessary roadway improvements for this alternative. Ephemeral washes found along each alternative generally flow south, eventually flowing into the Virgin River. Wetland delineation results can be found in Map 3.10-2.

3.10.1.2 Proposed Zone 6

The Proposed Zone 6 Analysis Area contains approximately 276,870 linear feet of intermittent streams (USGS 2011), approximately 125 acres of mapped wetlands (USFWS 2019c), and 86 acres of mapped 100-year floodplains (FEMA 2019). These represent less than 1 percent of wetlands, WOUS, and floodplains in the analysis area. Within the proposed Zone 6 boundaries, three ephemeral washes have mapped 100-year floodplains. The ephemeral washes flow east-southeast toward the Santa Clara River and Virgin River. Map 3.10-3 depicts mapped wetlands, intermittent streams, perennial streams, waterbodies, and floodplains within proposed Zone 6.

3.10.2 Environmental Consequences

3.10.2.1 Analysis Methods and Assumptions

Direct impacts on wetlands, WOUS, and floodplains were analyzed quantitatively using results from a formal wetland delineation and available data sources described in Section 3.10.1. Indirect impacts were analyzed qualitatively.

The following assumptions apply to this analysis:

- Impacts to wetlands, WOUS, and floodplains within each potential Northern Corridor ROW are assumed to be permanent.
- Permanent impacts are analyzed for the full buildout of each Northern Corridor ROW alternative.
- The demand for future utility ROWs is consistent across all alternatives considered.

3.10.2.2 Direct and Indirect Impacts from Alternative 1

The No Action Alternative (Alternative 1) would result in no impacts to wetlands, WOUS, and floodplains. Under this alternative, the USFWS would not grant an ITP to Washington County for the Amended HCP. Project proponents performing non-Federal land use or land development activities would still be subject to ESA and Clean Water Act Section 404 compliance if project activities involve impacts to wetlands and WOUS. Because proposed Reserve Zone 6 would not be created, 211.3 acres of wetlands, WOUS, and floodplains would not receive additional protections.

3.10.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Northern Corridor ROW/Highway

Construction of the Northern Corridor under Alternatives 2, 3, or 4 would result in permanent loss or temporary construction impacts to floodplains and WOUS (Table 3.10-1). Indirect impacts to WOUS and floodplains may include reduction or loss of hydrological connection between WOUS features, reduction or loss of floodplain function, increased sedimentation, and potential for oil, fuel, or construction materials to be spilled into WOUS during construction. Impacts on WOUS and floodplain features can be correlated with increased flood flows, sedimentation, and decreased biological diversity within the watershed. However, the majority of WOUS and floodplains within the Red Cliffs NCA and the Reserve would not be impacted by the Northern Corridor.

Table 3.10-1. Direct Impacts to Wetlands, Waters of the United States, and Floodplains for each Northern Corridor Alternative

Federal Action	Wetland Impacts (acres)	Waters of the United States Impacts (acres)	Floodplain Impacts (acres)	Total (acres)
Alternative 1 (No Action)	0.0	0.0	0.0	**0.0**
Alternative 2	0.0	0.7	3.8	**4.5**
Alternative 3	0.0	0.7	1.5	**2.2**
Alternative 4	0.0	1.1	2.2	**3.3**
Alternative 5	0.0	0.0	1.0	**1.0**
Alternative 6	0.0	0.0	0.1	**0.1**

Impacts to WOUS and floodplains in Alternatives 2, 3, and 4 would impact 0.4 percent, 0.2 percent, and 0.3 percent of the mapped WOUS and floodplains within the Red Cliffs NCA and the Reserve, respectively. In addition, construction activities would be required to comply with Section 404 of the Clean Water Act and the Utah Stream Alteration Program. Project requirements would also include preparation of a stormwater and pollution prevention plan with the Utah Department of Water Quality and implementation of the avoidance, minimization, and mitigation

measures listed in Chapter 2 to reduce environmental impacts to WOUS and floodplains. Project design features including bridges, culverts, or avoiding WOUS and floodplains would be implemented to reduce direct and indirect impacts.

Red Cliffs National Conservation Area RMP Amendments

Red Cliffs NCA RMP Amendment Alternative B would result in the same direct and indirect impacts to WOUS and floodplains as described for the Northern Corridor. However, if Red Cliffs NCA RMP Amendment Alternative C is selected, the floodplains and WOUS within the designated ROW corridor could be impacted by future above- and belowground utility construction. These activities would result in the same type of direct and indirect impacts on WOUS and floodplains as the construction of the Northern Corridor, including the potential to permanently fill or temporarily disturb WOUS and floodplain features. These impacts would occur to the same features and in the same physical areas as those impacts quantified in Table 3.10-1 for the Northern Corridor; however, impacts from future utility construction would likely occur later in time.

St. George Field Office RMP Amendments and Washington County HCP

The creation of the proposed Reserve Zone 6 and associated SGFO RMP Amendments would provide additional protections for 211.3 acres of wetlands, WOUS, and floodplains compared to the current management of the area, and would be entirely beneficial for these resources within proposed Zone 6. The RMP amendments and limited list of covered activities from the HCP would reduce or preclude anticipated impacts on wetlands, WOUS, and floodplains from issuance of ROWs and utility construction, mineral development, livestock grazing, recreation, and land development. Impacts on these resources that would be avoided or minimized by these actions include permanent fill or loss of wetlands, WOUS, and floodplains, temporary construction impacts, loss of hydrological connectivity, loss of floodplain function, and increased sedimentation.

SGFO RMP Amendment Alternative B would be slightly more protective of the wetlands, WOUS, and floodplains in proposed Zone 6 compared to SGFO RMP Amendment Alternative C because Alternative B would completely prohibit future issuance of ROWs, fluid mineral development, livestock grazing, and camping on Federal lands in the area, compared to the restrictions placed on these activities under Alternative C.

Covered activities using take authorized through the USFWS's issuance of an ITP both inside and outside of the Reserve would still be subject to Clean Water Act Section 404 compliance, which requires avoidance and minimization measures, and permitting with the U.S. Army Corp of Engineers if impacts to WOUS are expected.

3.10.2.4 Direct and Indirect Impacts from Alternative 5

The type of direct and indirect impacts from Alternative 5 would be the same as described in Section 3.10.2.3. Alternative 5 would impact different wetlands, WOUS, and floodplains than Alternatives 2, 3, and 4. The magnitude of these impacts are presented in Table 3.10-1. Under Alternative 5, UDOT would be required to adhere to the same avoidance, minimization measures, mitigation, and regulatory requirements to reduce direct and indirect impacts as described in Section 3.10.2.3.

Because a new ROW through the Red Cliffs NCA would not be granted under this alternative, there would be no amendments to the Red Cliffs NCA RMP. Additional protections for the wetlands, WOUS, and floodplains located in proposed Reserve Zone 6 boundaries would not be implemented. Covered activities authorized through the USFWS's issuance of an ITP both inside and outside of the Reserve would still be required to comply with Section 404 of the Clean Water Act if impacts to WOUS are expected.

3.10.2.5 Direct and Indirect Impacts from Alternative 6

Alternative 6 would result in no impacts to wetlands or WOUS. A small section of this alternative is within a FEMA-mapped 100-year floodplain, and the magnitude of this impact is presented in Table 3.10-1. However, impacts on floodplains from this alternative would be minimal to non-existent because construction would occur in areas of existing urban development. Impacts on wetlands, WOUS, and floodplains in proposed Reserve Zone 6, and from the issuance of an ITP to Washington County would be the same as those described under Alternative 5.

3.11 Water Resources

3.11.1 Affected Environment

The analysis area for water resources matches the area of analysis for wetlands, floodplains, and WOUS as described in Section 3.10, and is the area identified by Washington County as the Plan Area for the Amended HCP. This area represents the boundary within which impacts on water resources would occur. Water resources considered in this analysis include surface runoff, springs and seeps, groundwater, and associated floodplains. Additional considerations in this analysis include potential for sediment from soil erosion to influence water quality. Water resources identified as WOUS are regulated by the U.S. Army Corps of Engineers, and are described in Section 3.10.

Runoff within the analysis area generally runs north to south, drains to the Virgin River, and is largely ephemeral in nature. Perennial streams are identified as WOUS, and named in Section 3.10.

Ephemeral washes in proposed Zone 6 generally run southeast toward the Virgin and Santa Clara rivers. The runoff characteristics described apply to all areas within the Plan Area for the Amended HCP as well as proposed Zone 6.

Data sources used for analysis of water resources in the Amended HCP area and proposed Zone 6 include Urban Hydrology for Small Watersheds (NRCS 1986), Web Soil Survey (NRCS 2019), and Southwest Regional Gap Analysis Project (Lowry et al. 2005).

Surface runoff potential is primarily dependent on three factors:

1) Soil type.

2) Plant cover.

3) Impervious area.

In addition to these primary factors, land topography and surface storage influence surface runoff conveyance to downstream receiving waters. The Natural Resources Conservation Service Soil Survey defines soils by hydrologic soil group and indicates runoff potential based on soil classification. Hydrologic soil group assignment is based on measured rainfall, runoff, and infiltrometer data for soil types. Assignments are made by comparing the characteristics of unclassified soil profiles with profiles of soils already placed into hydrologic soil groups. Assignments fall into the following four groups; the percentage of each group in the analysis area is listed in Table 3.11-1:

- Group A: Soils in this group have low runoff potential when thoroughly wet.
- Group B: Soils in this group have moderately low runoff potential when thoroughly wet.
- Group C: Soils in this group have moderately high runoff potential when thoroughly wet.
- Group D: Soils in this group have high runoff potential when thoroughly wet.

Table 3.11-1. Hydrologic Soil Groups with Analysis Area

Analysis Area	Hydrologic Soil Group Percentage Cover Group A	Hydrologic Soil Group Percentage Cover Group B	Hydrologic Soil Group Percentage Cover Group C	Hydrologic Soil Group Percentage Cover Group D	Hydrologic Soil Group Percentage Cover Unclassified
Proposed HCP Plan Area	7.23%	3.94%	16.90%	30.71%	41.21%
Zone 6	0.93%	2.12%	0.00%	16.25%	80.70%

In the analysis area, hydrologic soil group assignments include a mixture of sandy loams, stony colluvial land, rock lands, and rock outcroppings. Sandy loams are generally assigned to Hydrologic Soil Group A, with low runoff potential. Stony colluvial land, rock lands, and rock outcroppings are assigned to Hydrologic Soil Group D, with high runoff potential. Additional geology and soil classifications are described in Section 3.7.

Runoff is also dependent on vegetative cover type and quality (refer to Section 3.2). Hydrologic condition, as defined by the Natural Resources Conservation Service, indicates the effects of vegetative cover type and treatment on infiltration and runoff, and is generally estimated from density of plant and residue cover on sample areas. Good hydrologic condition indicates that the soil usually has a low runoff potential for that specific hydrologic soil group, cover type, and treatment.

Surface water quality is typically affected by human activities, but is also influenced by wildlife, vegetation, and soil erosion. Areas with recent wildfire burns have reduced water quality and increased sediment loading in runoff. Section 3.22 describes wildfire burn areas in more detail.

Groundwater patterns are not known within the analysis area. No known springs or seeps are identified within the analysis area.

3.11.1.1 Northern Corridor

The existing runoff potential within the Northern Corridor ROW alternatives is determined using the Modified Rational Method for hydrologic analysis. This methodology is based on Rational C values, which represent the amount of impervious area within a defined area. The Modified Rational Method is a method to determine peak discharge from drainage basin runoff. In addition, the Time of Concentration (Tc) defines the time in which runoff travels from point of surface interception to a given outfall. Existing values for proposed alternatives are presented in Table 3.11-2.

Table 3.11-2. Rational C Values, Time of Concentration, and Runoff for Northern Corridor Alternatives

Northern Corridor Alternative Route	Existing Rational C Value Area (acres) Pervious (C=0.30)	Existing Rational C Value Area (acres) Impervious (C=0.90)	Existing Rational C Value Area (acres) Composite C Value	Maximum Time of Concentration (minutes)	Existing 50-year Runoff (cubic feet per second)
Alternative 2, T-Bone Mesa Alignment	240.44	0.00	0.30	62.52	95.5
Alternative 3, UDOT Application Alignment	262.49	0.00	0.30	72.72	96.0
Alternative 4, Southern Alignment	318.22	0.00	0.30	81.24	107.9
Alternative 5, Red Hills Parkway Expressway	192.88	38.95	0.40	82.86	103.5
Alternative 6, St. George Boulevard/100 South One-way Couplet	0.00	29.20	0.90	62.34	34.8

3.11.2 Environmental Consequences

3.11.2.1 Analysis Methods and Assumptions

Direct impacts of each Federal action were analyzed quantitatively using results from a hydrologic evaluation of existing and proposed conditions from data sources including Urban Hydrology for Small Watersheds (NRCS 1986), Web Soil Survey (NRCS 2019), and topographic data. Indirect impacts were analyzed qualitatively for each Federal action. Table 3.11-3 lists direct impacts associated with each Northern Corridor alternative.

The following assumptions apply to this analysis:

- Existing runoff rates within the proposed Northern Corridor alternative ROWs are used for allowable discharge rates from the proposed condition.
- Existing and proposed runoff rates and storage volume requirements are based on the 50-year design storm.
- Proposed runoff rates are based on typical sections in the proposed roadway development standards.
- Modified rational method is used to determine storage volume and storage area required to detain runoff to existing rates.
- Stormwater detention would be located within the proposed ROW for each alternative and additional ROW would not be required.
- The stormwater detention area is based on an assumed 3-foot storage depth.

Table 3.11-3. Direct Impacts to Water Resources for each Federal Action

Northern Corridor Alternative Route	Proposed Rational C Value Area (acres) Pervious (C=0.30)	Proposed Rational C Value Area (acres) Impervious (C=0.90)	Proposed Rational C Value Area (acres) Composite C Value	Existing 50-year Runoff (cubic feet per second)	Proposed 50-year Runoff (cubic feet per second)	Additional Runoff (cubic feet per second)	Required Storage Volume (cubic feet)	Detention Area Required (acres)
Alternative 1, No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	0	0	0
Alternative 2, T-Bone Mesa Alignment	190.43	50.01	0.42	95.5	135.2	39.7	297394	2.28
Alternative 3, UDOT Application Alignment	207.89	54.60	0.42	96.0	135.9	39.9	346465	2.65
Alternative 4, Southern Alignment	252.03	66.19	0.42	107.9	152.8	44.9	445475	3.41
Alternative 5, Red Hills Parkway Expressway	192.88	38.95	0.40	103.5	103.5	0.0	0	0.00
Alternative 6, St. George Boulevard/ 100 South One-way Couplet	0.00	29.20	0.90	34.8	34.8	0.0	0	0.00

3.11.2.2 Direct and Indirect Impacts from Alternative 1

The No Action Alternative, Alternative 1, would not impact water resources.

3.11.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Northern Corridor ROW/Highway

Impacts to water resources from Alternatives 2, 3, and 4 are similar in nature but vary based on topographical impacts, on flow patterns, and overall length of alignment. All three of these alternatives would result in increased runoff from impervious surfaces, and adjusted flow patterns to accommodate collection and conveyance of additional runoff to detention facilities equipped with outlet devices that trap floatables, oils, and other impurities; this would be used to provide water quality treatment and detain outflow rates to existing conditions. It is anticipated that major drainage crossings will be conveyed across the ROW without detainment. Anticipated flow increase and required detention area to limit outflows to existing rates are listed in Table 3.11-2.

Red Cliffs National Conservation Area RMP Amendments

Red Cliffs NCA RMP Amendment Alternative B would allow the same type of direct and indirect impacts to water resources as described previously. With Red Cliffs NCA RMP Amendment Alternative C, an indirect effect is that changes in runoff conditions could potentially occur if utilities are established within the corridor in the future. Because underground utilities would have more ground disturbance than structural supports for aboveground utilities, the change in runoff conditions would be greater with potential future underground utilities, but would be a temporary impact lasting until soils are stabilized.

HCP and St. George Field Office RMP Amendments

With Alternatives 2, 3, and 4, changed circumstances within the Amended HCP would be triggered, thus creating the proposed Reserve Zone 6 boundary. Establishment of proposed Zone 6 and the management prescriptions associated with the proposed SGFO RMP Amendment would exclude many ground-disturbing activities. Consequently, water resources would remain unchanged from existing conditions and would be protected in this area from actions that could affect water resources in the future.

3.11.2.4 Direct and Indirect Impacts from Alternatives 5 and 6

Proposed alignments on existing roadways are not expected to increase runoff or change drainage patterns, except where modifications are made to the roadways, particularly at tie-ins to I-15. UDOT is required to adhere to the same avoidance, minimization measures, mitigation, and regulatory requirements to maintain existing discharges, and provide water quality treatment for any changed conditions.

These alternatives would not require amendments to the Red Cliffs NCA RMP, and no impacts to water resources would occur.

3.12 Air Quality

An Air Quality Technical Report (Appendix I) was prepared for this project and provides more detailed information on the potential air quality impacts as a result of the proposed project.

Under the Clean Air Act, EPA is responsible for establishing National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for criteria air pollutants considered harmful to the public health and the environment: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (less than 2.5 micrometers [$PM_{2.5}$] and less than 10 micrometers [PM_{10}]), sulfur dioxide (SO_2), and lead (Pb).

In addition to the NAAQS, the Clean Air Act requires EPA to regulate mobile source air toxics (MSATs). MSATs are a subset of air toxics, which include nine compounds emitted from highway vehicles, trucks, buses, and non-road equipment. Diesel particulate matter (PM) remains the dominant MSAT of concern for highway and other transportation projects. No Federal or State ambient standards exist for MSATs.

There are no Federal or State ambient concentrations or emissions standards for greenhouse gas (GHG). Carbon dioxide (CO_2) from transportation sources is the largest component of human-produced emissions in the United States (EPA 2019c). These emissions are different from criteria air pollutants because their effects in the atmosphere are global rather than local and because they remain in the atmosphere for decades to centuries, depending on the substance. Climate change affects human health and natural ecosystems through increased sea level, high temperatures, melting of glaciers, stronger storms and hurricanes, wildfires, and shifting of habitats. Scientists have warned that significant and potentially dangerous shifts in climate and weather are possible without substantial reductions in GHG emissions. They commonly have cited 2 degrees Celsius (°C)—that is, 1°C beyond warming that has already occurred—as the total amount of warming the earth can tolerate without serious and potentially irreversible climate effects (IPCC 2014).

The Utah Division of Air Quality is responsible for ensuring that the air in Utah meets Federal and State standards and rules, issuing preconstruction and operating permits to stationary sources, and collecting air quality data through monitoring stations.

The study area for the proposed Northern Corridor alternatives is located within the City of St. George and the Red Cliffs NCA in Washington County, Utah. Washington County is designated as an attainment area for all criteria pollutants. Therefore, the project is not subject to the transportation conformity regulations, and regional and project-level hot spot analyses are not required.

Construction activities have the potential to generate fugitive dust emissions, which are subject to the St. George City Code (Title 4, Chapter 9) and the Utah Administrative Code R307-205 (fugitive dust).

3.12.1 Affected Environment

According to the Western Regional Climate Center, the St. George Station is the closest weather data station to the proposed Northern Corridor. From 1893 to 2016, the average minimum and maximum temperatures were approximately 30°F and approximately 90°F, respectively. Annual average snowfall and rainfall are approximately 3 inches and 8 inches, respectively, and occurs mostly during January.

Monitoring data at nearby stations show no violations of any of the criteria air pollutants measured (i.e., NO_2, O_3, and $PM_{2.5}$).

Over the past 5 years (2015 to 2019), the air quality index within Washington County has been below the standard (good and moderate air quality index) approximately 99.9 percent of the time (BLM 2018). Pollutants of most concern and the ones that determine the air quality index within Washington County over the past 5 years are NO_2, O_3, and $PM_{2.5}$.

Class I Federal lands include areas such as national parks, designated wilderness, and national monuments that are granted special air quality protections under the Clean Air Act. Zion National Park is designated as a Class I area and is located within Washington County, approximately 20 miles east from the proposed Northern Corridor project. The highest elevation at the Zion National Park is approximately 7,000 feet, significantly higher compared to an approximate elevation of 3,000 feet for the proposed Northern Corridor alternatives.

3.12.1.1 Air Quality Emissions

The largest sources of criteria air pollutants in Utah (including the St. George area in Washington County) are on-road mobile sources for CO, point sources for nitrogen oxides (NO_x) and sulfur oxides (SO_x), area sources for PM_{10} and $PM_{2.5}$, and biogenic sources for volatile organic compounds (VOCs) (UDAQ 2018). Table 3 in the Air Quality Technical Report summarizes criteria pollutant emissions in tons per year (Appendix I). Statewide air quality emissions from on-road sources have decreased because of newer vehicle fleets statewide, and the EPA Tier II emissions standards for newer vehicles.

Construction activities can generate temporary PM emissions within the project area as a result of earthmoving and use of heavy equipment, land clearing, ground excavation, cut-and-fill operations, and the highway construction. Area sources of PM_{10} and $PM_{2.5}$ account for approximately 31 percent and 4 percent, respectively, of emissions within Washington County. The majority of the $PM_{2.5}$ emissions within the county are from secondary particulates (chemical reactions that form in the atmosphere), while PM_{10} emissions are generally caused by fugitive dust from sources such as direct emissions from construction sites, unpaved roads, or agriculture.

3.12.1.2 Mobile Source Air Toxics

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year (FHWA 2016). As shown on Figure 4 of the Air Quality Technical Report (Appendix I), Federal Highway Administration estimates that even if vehicle miles traveled (VMT) increases by 45 percent from 2010 to 2050 as forecasted based on EPA's MOVES2014a model, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

3.12.1.3 Greenhouse Gases

GHG emissions have accumulated rapidly as the world has industrialized, with concentration of atmospheric CO_2 increasing from roughly 300 parts per million (ppm) in 1900 to over 400 ppm today. According to the Intergovernmental Panel on Climate Change (2014) Fifth Assessment Report (AR5), for warming to be below 2°C, atmospheric concentrations of CO_2 would need to stabilize at a maximum of 450 ppm, requiring annual global emissions to be reduced 40 to 70 percent below 2010 levels by 2050. To build upon the AR5, the Intergovernmental Panel on Climate Change prepared a special report to assess the impacts of 1.5°C global warming above pre-industrial levels (i.e., from 1850 to 1900). Emissions would need to decline by about 45 percent from 2010 levels by 2030, reaching net zero around 2050. Human-induced warming reached approximately 1°C above pre-industrial levels in 2017, increasing at 0.2°C per decade.

Total global emissions of GHGs has increased approximately 1.3 percent from 1990 to 2017; however, from 2016 to 2017 GHG emissions decreased approximately 0.5 percent. The decline in emissions was a result of the transition of coal to natural gas, other non-fossil fuel energy sources, and other factors.

According to the National Oceanic and Atmospheric Administration Annual Greenhouse Gas Index, there has been a 43 percent increase to climate forcing (also called radiative forcing) since 1990 because of increasing atmospheric concentrations of GHGs. The CO_2 increase is accelerating — while it averaged about 1.6 ppm per year in the 1980s and 1.5 ppm per year in the 1990s, the growth rate increased to 2.3 ppm per year during the last decade (2009-2018) (NOAA 2020b).

According to Utah's Public Health Data Resource, Public Health Indicator Based Information System, GHG emissions within Utah have increased from 1980 to 2016. GHG emissions from transportation sources account for approximately 25 percent to 30 percent of the overall GHG emissions in the state. The Air Quality Technical Report (Appendix I) summarizes GHG emissions in more detail.

3.12.2 Environmental Consequences

3.12.2.1 Analysis Methods and Assumptions

The study area is in an attainment or unclassifiable area for all six criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), and sulfur dioxide (SO_2). Construction activities would be temporary, and emissions generated during construction would not affect the long-term attainment. The most current regional modeling conducted for the $PM_{2.5}$ State Implementation Plan has shown no exceedances in the state (UDAQ 2019). The State Implementation Plan also contains control measures to ensure compliance with all NAAQS for all pollutants. The regional modeling conducted for the State Implementation Plans accounts for all projects listed in the transportation plans, including the proposed Northern Corridor project. Even if emissions increase as a result of the proposed Northern Corridor project, based on regional modeling, the project is unlikely to increase concentrations to the point where an exceedance of the NAAQS would occur. In addition, current rules and regulations, such as dust control plans and EPA emission standards, help ensure no significant impacts.

Level-of-service data were used to qualitatively discuss congestion and delay, and how it could affect air quality conditions. In addition, the analysis of Northern Corridor impacts from the five proposed action alternatives and the No Action Alternative focus on MSATs and GHGs. The Federal Highway Administration's Updated Interim Guidance on Mobile Source Air Toxics Analysis in NEPA Documents (2016) was used to assess potential MSAT emissions. A Level II qualitative analysis for projects with low potential MSAT effects was completed using VMT as a proxy for emissions. Similarly, a comparison of potential GHG emissions associated with each alternative was completed based on VMT, and travel times and speeds. VMT is calculated based on the amount of travel for all vehicles. Since MSATs and pollutants that contribute to GHGs are directly emitted from vehicles, trends in emissions would be comparable to trends in VMT.

The following assumptions apply to this analysis:

- Project-level conformity is demonstrated because the area is in attainment for all criteria pollutants, and the project is included in the Transportation Improvement Program via reference.
- Average annual daily traffic is less than 140,000 to 150,000 vehicles per day.
- Truck percentages on study corridors are approximately 5 percent.

3.12.2.2 Direct and Indirect Impacts from Alternatives

Class I Areas

Federal programs (such as low-sulfur diesel and vehicle emission standards) have helped reduce mobile source emissions, which benefits the Class I areas. Emissions from the action alternatives are not likely to significantly affect these inventories because Zion National Park is located approximately 20 miles away and sits at a much higher elevation compared to the proposed Northern Corridor alternatives.

Air Quality Emissions

Traffic volumes are anticipated to increase as population increases, resulting in increased air emissions. As shown in the Traffic Analysis Memorandum (Appendix L), the T-Bone Mesa Alignment, UDOT Application Alignment, Red Hills Parkway Expressway, and St. George Boulevard/100 South One-way Couplet Alternatives would operate at Level of Service D or better conditions by 2050 for most intersections studied. However, the intersections of Sunset Boulevard/Bluff Street and Green Spring/Telegraph Street would continue to operate at Level of Service D, E, or worse conditions by 2050 under all alternatives. In addition, the intersections of St. George Boulevard/Bluff Street and Red Hills Parkway/1000 East would operate at Level of

Service F conditions under the Southern Alignment. As a result, air quality would continue to worsen at these intersections. Although air quality emissions may degrade at individual intersections, improving the level of service on roadways and at intersections within the entire traffic network equates to less congestion and delay, and better air quality conditions within the project area.

Construction

Construction activities are a source of dust and exhaust emissions resulting from earthmoving and use of heavy equipment, land clearing, ground excavation, cut-and-fill operations, and the highway construction. With the T-Bone Mesa Alignment, UDOT Application Alignment, and Southern Alignment, a major portion of dust emissions would likely be caused by construction traffic on temporary areas. Construction of a new highway alternative would be phased to limit emissions and disruptions to the surrounding communities. Per St. George City Code, preparation of a dust control plan would be required to specify best practical methods that would be used to control the generation of fugitive dust, such as watering of construction areas, maintaining equipment, and minimizing idle time.

Mobile Source Air Toxics

For each alternative in this Draft EIS, MSAT emissions would be proportional to the VMT for Washington County, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the action alternatives is slightly higher (less than 1 percent) than that for the No Action Alternative (i.e., the baseline scenario), because the additional capacity increases the efficiency of the Northern Corridor and attracts rerouted trips from elsewhere in the transportation network (Table 3.12-1).

Table 3.12-1. Washington County Vehicle Miles Traveled

Year	Scenario	Daily VMT	Increase Above No Action	Variation per St. George Boulevard/100 South One-way Couplet Alternative	Evening Peak Period (4 to 6 p.m.) VMT	Increase Above No Action	Variation per St. George Boulevard/100 South One-way Couplet Alternative
2019	Existing	4,367,738	Not Applicable	Not Applicable	1,087,122	Not Applicable	Not Applicable
2050	No Action	10,287,036	Not Applicable	Not Applicable	2,557,253	Not Applicable	Not Applicable
2050	T-Bone Mesa Alignment	10,296,900	0.10%	0.06%	2,560,121	0.11%	0.06%
2050	UDOT Application Alignment	10,295,127	0.08%	0.04%	2,560,028	0.11%	0.06%
2050	Southern Alignment	10,291,067	0.04%	0.001%	2,559,754	0.10%	0.05%
2050	Red Hills Parkway Expressway	10,311,945	0.24%	0.20%	2,563,923	0.26%	0.21%
2050	St. George Boulevard/ 100 South One-way Couplet	10,290,984	0.04%	0%	2,558,499	0.05%	0%

Source: Horrocks Engineers 2020

Because the estimated VMT under each of the alternatives are nearly the same, varying by less than 0.2 percent, it is expected that overall MSAT emissions would not differ appreciably among the various alternatives. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the design year as a result of the EPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent between 2010 and 2050 (FHWA 2016).

The new travel lanes contemplated as part of the action alternatives within the NCA (i.e., T-Bone Mesa Alignment, UDOT Application Alignment, and Southern Alignment) would have the effect of moving some traffic closer to nearby homes and businesses. The localized increases in MSAT concentrations would likely be most pronounced along the Northern Corridor T-Bone Mesa Alignment. However, the magnitude and the duration of these potential increases compared to the No Action Alternative cannot be reliably quantified as a result of incomplete or unavailable information in forecasting project-specific MSAT health impacts. Each of the action alternatives includes a new or modified interchange with an existing roadway, which also has the potential for moving some traffic closer to nearby homes, parks, schools, and businesses. The localized increases in MSAT emissions would likely be most pronounced along the new highway sections that would be built at these interchange locations. However, even if these increases do occur, they too would be reduced in the future as a result of the implementation of EPA's vehicle and fuel regulations. In sum, direct impacts under all action alternatives in the 2050 design year are expected to be reduced via lower MSAT emissions in the immediate area of the project relative to the No Action Alternative, because of the reduced VMT associated with more direct routing. In addition, the EPA's MSAT reduction programs would likely reduce MSAT emissions for all action alternatives, including the No Action Alternative. Indirect impacts would result from a potential rerouting of traffic accessing the new highway, potentially creating alternate locations for localized MSAT emissions.

Greenhouse Gases

GHG emissions from vehicles using roads are a function of distance traveled (expressed as VMT), road grade, and vehicle speed. Under all action alternatives, VMT in Washington County would increase by less than 1 percent compared to no action levels (Table 3.12-1).

CO_2 accounts for 95 percent of transportation GHG emissions in the United States. The highest levels of CO_2 and GHGs by proxy from mobile sources such as automobiles occur at stop-and-go speeds (0 to 25 miles per hour) and speeds over 55 miles per hour; the most severe emissions occur from 0 to 25 miles per hour (Barth and Boriboonsomsin 2010). Speed limits along the project roadways range between 30 miles per hour (mph) and 55 mph. Table 3.12-2 shows the current and estimated 2050 design year travel times on three existing routes connecting I-15 North of Exit 13 to West Sunset Boulevard. As shown in Table 3.12-2, travel times more than double, and indicate that average vehicle speeds would substantially decrease relative to current conditions under the No Action Alternative. Although the action alternatives would improve traffic flow and reduce stop-and-go conditions relative to the No Action Alternative, potential reductions in CO_2 emissions and GHG emissions by proxy would be somewhat mitigated if a higher percentage of vehicle traffic maintains a 55-mile-per-hour operating speed under free-flow conditions.

Table 3.12-2. Current and Estimated Travel Times

Sunset Boulevard to I-15 North of Exit 13 via:	2019 Travel Time (minutes)	2050 Travel Time (minutes)
Bluff Street and St. George Boulevard (Route A)	14	24
Red Hills Parkway and Buena Vista Boulevard (Route B)	14	25
Red Hills Parkway and Green Spring Drive (Route C)	14	40

Source: Horrocks Engineers 2020

Another factor in mitigating increases in VMT is EPA GHG emissions standards implemented in concert with national fuel economy standards. The U.S. Energy Information Administration projects that vehicle energy efficiency (and thus, GHG emissions) on a per-mile basis will improve by 55 percent by the year 2050 (EIA 2020). This improvement in vehicle emissions rates is more than sufficient to offset the increase in VMT (Table 3.12-1).

In sum, direct impacts under all action alternatives in the 2050 design year are expected to be reduced via lower GHG emissions relative to the No Action Alternative, as a result of the reduced VMT associated with more direct routing, and improved operational speeds and less stop-and-go traffic (speeds of 0 to 25 miles per hour). Indirect impacts would result from a potential rerouting of traffic accessing the new highway, potentially creating additional points of conflict and reduced speeds at alternate locations, leading to increase CO_2 emissions and GHG emissions.

3.13 Visual Resources

This analysis identifies visual resources that may be affected by the proposed Federal actions analyzed in this Draft EIS. The analysis area for the evaluation of impacts on visual resources extends 3 miles from the centerline of each proposed Northern Corridor alignment and includes the boundaries of the Red Cliffs NCA; the roadway and highway corridors along the Red Hills Parkway, St. George Boulevard, and 100 South in St. George; and proposed Zone 6. The Washington County HCP and USFWS' potential issuance of an ITP to Washington County would not impact visual resources outside of proposed Zone 6. The Northern Corridor Project Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020a) contains photographs and additional technical details regarding the analysis described in this section.

The Northern Corridor alternatives analyzed in this Draft EIS would be located on Federal and non-Federal lands. The BLM's Visual Resource Management (VRM) Program was used to identify and assess impacts to visual resources on BLM-administered lands in the Red Cliffs NCA and proposed Reserve Zone 6. Much of Alternative 5, which includes modifications to Red Hills Parkway, is outside the NCA, as is Alternative 6, which includes modifications to St. George Boulevard and 100 South. Therefore, the FHWA visual guidance methodology was used to analyze impacts resulting from Alternatives 5 and 6. Additional information regarding this analysis is available in the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020a).

The BLM assigns Visual Resource Inventory (VRI) classes, which are measures of the quality of the visual resource, and VRM classes, which are land use objectives that prescribe the amount of change allowed in the characteristic landscape, to the lands it administers. VRI Class I is reserved for and assigned to inventoried lands where a nondiscretionary land management decision was made by Congress, the President, or Secretary of the Interior that directs the BLM to preserve the natural landscape (e.g., Congressional designation of wilderness). VRI Class II represents the higher scenic values and VRI Class IV the lower scenic values (BLM 1984 and 1986a). VRI classes are based on the combination of scenic quality, visual sensitivity, and distance zones (BLM 1986a).

- Scenic Quality Rating Units (SQRU): Scenic quality is a measure of the aesthetic value of the landscape scenery based on analysis of seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. BLM *Manual 8410-1* identifies three scenic quality classes (Class A, Class B, and Class C) that a landscape may be rated based on the individual rating scores of the seven key factors.
- Sensitivity Level Rating Units: Sensitivity level rating units determine the level of concern the public would express toward modifications in the landscape. They are defined by the types of users, amount of use, public interest, adjacent land uses, special management areas, and other factors (BLM 1986a). The BLM assigns land at either a high, medium, or low sensitivity level.

- Distance Zones: Distance zones are subdivided areas of the landscape, based on the perception of scenery from viewing locations. Detail visually perceived in the landscape (or project-associated components) depends on the proximity of these features to viewers. The BLM uses three distance zones for the purposes of the VRI, which are primarily based on how landscapes are viewed. The three distance zones are foreground-middleground, background, and seldom seen. The foreground-middleground distance zone includes areas seen from highways, rivers, or other viewing locations less than 5 miles away. Areas seen beyond the foreground-middleground distance zone, but less than 15 miles away, are in the background zone. Areas not seen in the foreground-middleground or background distance zones are in the seldom seen distance zone.

Allowable uses and management actions must be planned in accordance with designated VRM classes (BLM no date b). The VRM classes are defined in Table 3.13-1 (BLM 1986a).

VRM Class I is designated to lands assigned VRI Class I and other lands where a BLM land use planning decision was made to preserve the landscape's natural character.

Table 3.13-1. BLM VRM Class Definitions

VRM Class	VRM Definition
I	The existing character of the landscape is preserved. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	The existing character of the landscape is retained. The level of change to the characteristic landscape should be low. Changes can be seen but should not attract the attention of the casual viewer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
III	The existing character of the landscape is partially retained. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	Provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements found in the predominant natural features of the characteristic landscape.

The FHWA visual assessment methodology analyzes visual impacts by identifying changes to the landscape as seen both from and toward a road. The methodology also requires descriptions of visual character and visual quality based on vividness, intactness, and unity, ranging from very low to very high. The FHWA guidance also calls for identification of landscape units (LUs) on a project-by-project basis. LUs are defined by viewsheds and landscape type, and are visually homogeneous, with only one viewshed and one landscape type.

The FHWA guidance divides the affected population into neighbors (people with views toward the road) and travelers (people with views from the road). Each category includes a variety of groups, such as residential, recreational, institutional, civic, retail, and commercial neighbors and commuting, touring, shipping, cycling, and walking travelers.

3.13.1 Affected Environment

3.13.1.1 Regional Visual Character

The proposed Federal actions analyzed in this Draft EIS are within the Mojave Basin and Range Ecosystem,[6] which is composed of alluvial fans, valleys, and scattered buttes. Vegetation includes creosote bush, Joshua tree, blackbrush, big sagebrush, and associated grasses (EPA 2019d). The desert climate is characterized by low humidity, generally clear skies, relatively warm winters, and hot summers (City of St. George 2002). Because the study area is within a designated attainment area for all criteria pollutants (Section 3.12), smog is not expected to affect visibility. The Northern Corridor alternatives analyzed in this Draft EIS are within the south-central portion of the Red Cliffs NCA, abutting the City of St. George to the south. Urban and suburban development is rapidly expanding (EPA 2019d), and directly adjoins the NCA boundary on the north side of St. George.

3.13.1.2 Northern Corridor and Red Cliffs NCA RMP Amendments

Areas within the Red Cliffs NCA and around the Red Hills Parkway comprise the primary areas where the changes in the visual landscape would occur (Map 2.2-1). A visibility analysis was completed to determine the potential visibility of the Northern Corridor alignments analyzed in the Draft EIS from points spaced 100 feet apart along each alternative center line. The resulting viewshed does not account for the screening properties of vegetation or small variations in topography or structures (Map 3.13-1a through 3.13-1e).

Red Cliffs NCA

Through OPLMA of 2009 (P.L.111- 11 at Title I, Subtitle O at sec. 1974(a)), codified at 16 U.S.C. 460www, Congress identified scenic resources as one of nine resources the Red Cliffs NCA was designated "to conserve, protect, and enhance for the benefit and enjoyment of present and future generations."

The VRI for the NCA north of St. George in the areas crossed by the Northern Corridor alternatives and potential Red Cliffs NCA RMP Amendments is identified as VRI Class II (Map 3.13-2). The Red Cliff Sandstone SQRU (Class A, the highest on a scale of A to C) comprises the majority of the analysis area except for a swath encompassing Cottonwood Springs Road in the Young Basalt Flows SQRU, which is rated Class C (Map 3.13-3). The VRI Sensitivity Rating is high and the VRI distance zones are foreground-middleground throughout the analysis area (no maps were developed for these categories because they are uniform throughout the analysis area). Table 3.13-2 depicts the breakdown of the SQRUs in the analysis area. These components are rated on a scale of 1 to 5, with 5 being highest quality; however, note that the cultural modifications component can also include negative scores.

Table 3.13-2. Scenic Quality Rating – Red Cliffs NCA Analysis Area

Scenic Quality Unit Name	Total Acres	Scenic Quality Rating	Landform	Vege-tation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modifi-cations
Red Cliff Sandstone	87,462	A	4.5	2.6	0	4.5	3.4	4	-0.2
Young Basalt Flows	66,417	C	2.6	2	0	2.3	3.1	1.8	-1.1

The Red Cliffs NCA RMP designates the VRM class in the analysis area as VRM Class III (Map 3.13-4).

[6] Ecosystems are areas of general similarity in the type, quality, and quantity of environmental resources (EPA 2019d).

As indicated by the Class A scenic quality inventoried in the VRI, the Red Cliffs NCA is a "highly scenic area" consisting of a "colorful and diverse topography" that is "reflected in the stunning visual impact of the NCA" (BLM 2015a). The NCA's scenic qualities are one of the reasons that new residents choose to move to the area. "The natural character of the NCA landscape contrasts sharply with the highly modified human environment just outside its boundaries; the proximity of this stunning landscape is often used as a selling point by local realtors." The landscapes to the NCA's east and south sides are visible from I-15 for 14 miles, extending all the way through downtown St. George. This landscape forms dramatic contrasts, with jet-black lava flows set against deep red sandstone cliffs (BLM 2015a).

The southern portion of the NCA includes Pioneer Park, a city park directly accessible from Red Hills Parkway. Pioneer Park is a 52-acre "rock climber's paradise" that offers "spectacular views of downtown, White Dome, Zion National Park and Arizona" (City of St. George 2019). Vivid red rocks form tall buttes, alcoves, hoodoos, and arches in layers of red sandstone creating serpentine cracks and rifts. The tops of these formations offer vast views in all directions. This area includes attractions such as Dixie Sugarloaf (a prominent red sandstone butte-like rock) and Pioneer Park Arch. Several trails, including the T-Bone Trail and Pioneer Rim Trail, originate here, and some continue north into the NCA; T-Bone Trail provides views of Pioneer Arch. The 5-acre Red Hills Desert Garden is directly east of Pioneer Park and includes a labyrinth of paths generally trending east-west between Red Hills Parkway and a large redrock outcrop to the north, which blocks views in this direction.

Farther east, Cottonwood Springs Road travels north from Red Hills Parkway into the NCA. Steep cliffs block views as the road gains elevation. The road passes a small industrial area and intersection, eventually flattening with the topography and narrowing. Views broaden and are punctuated by occasional buttes; the Pine Valley Mountains are visible in the distance. High sloping hills and abrupt black volcanic mounds are to the west. Vegetation consists primarily of low desert shrubs, which interject green, spiky texture onto a backdrop of red-hued soils and hills. Some locations, such as the Pioneer Hills and T-Bone trailheads, provide views to the north of the Pine Valley Mountains, which rise to heights of 10,365 feet. The T-Bone Trail ends approximately 1.8 miles north of Pioneer Park at a trailhead on Cottonwood Springs Road. The T-Bone Trail offers "views of the St. George metropolitan area to the south, a red rock fantasy land in the middle, and views of the distant Pine Valley Mountains to the north" (Washington County no date b).

Within this roadway corridor, which is rated as Class C scenic quality, several conspicuous transmission lines cross Cottonwood Springs Road approximately 1.7 miles north of Red Hills Parkway. These lines generally travel east to west and consist primarily of brown monopoles of varying heights and girths. Transmission lines, telephone lines, and fiber optic lines also travel north to south, roughly paralleling the road. An electrical substation occupying approximately 7 acres is located on the east side of Cottonwood Springs Road at this location and is directly opposite the T-Bone Trail trailhead. A smaller, approximately 1-acre substation is 0.15 mile north of the larger one. Transmission lines radiate out from this area in multiple directions and are prominent vertical intrusions on the broad landscape. The substations and power lines particularly contrast against the Pine Valley Mountains to the north. The Red Cliffs NCA RMP notes that "these intrusions into the landscape give this area an industrial feel that seems strangely out of place in a generally natural and undeveloped landscape" (BLM 2015a).

A large, white water tank is immediately adjacent to the east side of Cottonwood Springs Road approximately 0.85 mile farther north. The Middleton Powerline Trail starts just north of the water tank and travels northeast, connecting with Mill Creek Trail. A power and telephone line parallel the road as it continues north, and the road surface changes from paved to dirt after another 0.4 mile. The landscape becomes more varied, with black-sided volcanic mounds, red rock cliffs

and buttes, and distant purple mountains. Cottonwood Springs Road eventually splits into multiple dirt tracks approximately 9.0 miles north of St. George.

Green Springs and Middleton Private Lands

Green Springs is a medium-density residential area in Washington City that borders the east side of the NCA. Green Springs consists of large, new houses arranged into multiple residential estates. Residential development is currently ongoing in the northern end of Green Springs. At the time field studies were conducted to support the development of the Draft EIS in February 2020, home construction was noted in the northern end of this area. Some of the newly completed houses are occupied, with many vacant and for sale. Residential development in this area continues east, abutting the future Washington Parkway that trends south and then east, connecting to the Washington Parkway interchange, where the Grapevine Trail trailhead is located. The Grapevine Trail provides access to multiple trails to the north that travel east and west, including trails into the NCA (e.g., Mill Creek Trail and Dino Cliffs Trail). The Cottontail Trail originates at the northwest side of the Green Springs development and travels west into the NCA, connecting to the Middleton Powerline Trail. In addition, the Mustang Pass Trail leads north from Green Springs, connecting with the Middleton Powerline Trail and Ice House Trail, which climbs a steep hill that provides sweeping views to the south, east, and west. Although residential developments on the west side of Green Springs border the NCA boundary, views to the west into the NCA are blocked by high escarpments for many of these residences.

New residential construction was also noted during the field visit along Cottonwood Springs Road off Twin Lakes Drive, which is accessed from the south end of Cottonwood Springs Road. Residences in Middleton, which is slightly east of this area, also abut the NCA boundary to the north and west. New residential construction was occurring in the northern end of this area, as well as farther east between Main Street and Washington Parkway in February 2020 (Jacobs 2020a).

Red Hills Parkway

Located at the northern limits of the city of St. George, Red Hills Parkway is the primary east-west transportation route in the vicinity of the Red Cliffs NCA. The 4-lane road connects with Bluff Street to the west and North Green Spring Drive to the east, where the parkway parallels I-15. From this point, the route continues farther east as Buena Vista Boulevard, terminating at Washington Parkway. Travelers on Red Hills Parkway include commuters, shoppers, recreational users, commercial freight trucks, and tourists. Travelers also include pedestrians and cyclists on Red Hills Parkway Trail.

Two LUs were defined for the area around Red Hills Parkway to apply the FHWA methodology to Alternative 5 (Map 3.13-5). LU 1 encompasses the parkway through the undeveloped NCA on the west side of the project area, which has a rural character. LU 2 encompasses the parkway to the east, where the landscape is more urban. Both LUs contain the Red Hills Parkway Trail, a paved multi-use path that is part of the St. George City trail system, which lies entirely within or along the southern border of the Red Cliffs NCA. The trail offers views of the city to the south and distant cliffs, buttes, and mountains. The trail also provides access to a large water tank owned by the city, which provides a viewing overlook (Washington County no date a, Caldwell 2013).

Landscape Unit 1

The LU 1 viewshed alternates between views of rock cuts and broad desert expanses. Heading east from Bluff Street, Red Hills Parkway rapidly gains elevation as it cuts through red hillsides, after which it levels and provides expansive views of snow-capped mountains, buttes, and desert vegetation before descending southward through more rock cuts to Pioneer Park. The road offers dramatic views of Pioneer Park to the north and sweeping views of St. George to the south, which

is at a lower elevation, as well as distant purple hills. Because of this area's distinctive features, LU 1 exhibits high levels of natural harmony, landscape composition, vividness, cultural order, and coherence, resulting in high overall visual quality.

A residential area west of the intersection of Red Hills Parkway and Bluff Street does not have views of Red Hills Parkway as a result of distance and topography. Neighbors farther east along Red Hills Parkway include visitors to Pioneer Park, Red Hills Desert Garden, the water tank overlook, and the Red Hills Parkway Trail. Views of the parkway diminish, and are often blocked, for residents farther south, where the topography steeply descends toward the city.

Landscape Unit 2

LU 2 is characterized by broad views of the city to the south, which is at a lower elevation, and commercial and industrial uses to the north, beyond which a tall rock escarpment blocks further views. Distant mountains can be seen to the east and west. Commercial uses crowd closer to the road farther east, particularly where Red Hills Parkway meets I-15. East of I-15, Cottonwood Springs Road intersects Red Hills Parkway after passing through a large rock cut. Visual quality in LU 2 is less than LU 1 because of the presence of commercial/industrial uses, resulting in degraded coherence and order. Although some views to the south are intact, landscape composition, natural harmony, and vividness are diminished where the built environment blocks views of surrounding natural elements. Therefore, visual quality for LU 2 is moderate.

Neighbors include the employees and patrons of the commercial uses that line both the north and south sides of Red Hills Parkway but are primarily concentrated to the north.

St. George Boulevard and 100 South

St. George Boulevard and 100 South travel east to west through central St. George between Bluff Street and I-15. St. George Boulevard is the first east-to-west through-route south of Red Hills Parkway; 100 South is 2 blocks south of St. George Boulevard. Two LUs were defined for these roads for applying the FHWA methodology to Alternative 6 (Map 3.13-5). LU 3 encompasses St. George Boulevard between Bluff Street and I-15 roughly one-half block to the north and south. LU 4 similarly encompasses 100 South.

Landscape Unit 3

St. George Boulevard is a two-way, 4-lane paved road with an interchange where it meets I-15. The road is divided by a landscaped median that is narrower at the eastern end. The landscaping within the median helps soften the built environment, and light fixtures both within the median and at intersections lend a historic look, especially where backdropped against the sky. The light fixtures also add a unifying element to the corridor. Topography trends slightly downhill to the west, providing views of distant hills and buildings for westbound travelers. The landscape character is commercial, consisting primarily of motels and restaurants, with gas stations, small shopping centers, and other retail establishments facing the road. Scale, mass, materials, and architectural style of the buildings and detailing vary greatly. Structures range from multi-story brick buildings to glass-walled car dealerships, motels of various styles, and single-story utilitarian buildings, particularly at the east end of the road. Street lights, telephone poles, a few conspicuous palm trees, and commercial signs are the dominant vertical elements. A variety of landscaped shrubs and trees (deciduous and palm) line the sidewalks. Intersections and occasional parking lots provide sporadic views of the red cliffs to the north. Traffic is busy given the I-15 interchange and consists of a wide range of vehicle types.

The city has implemented efforts to visually enhance this road, paying particular attention to historic aesthetics. The City has identified a "Historic Downtown" area on the west side of St. George Boulevard that includes Ancestor Square on the northwest corner of Main Street, known as

"the commercial center of St. George." All of the buildings in Ancestor Square have been renovated and share "a compatible décor to enliven the historical sense of the old city center" (Ancestor Square 2018). These buildings are visually distinctive, such as the two-story brick Pioneer Courthouse and the two-story residential Hardy House, with gingerbread trim, white picket fence, and white balustrades. The block between Main Street and 100 East includes a row of historic-style storefronts that create visual interest, and the newly constructed Zion Bank was designed to reflect the area's historical architecture.

The landscape components in LU 3 outside the Historic Downtown are primarily visually unrelated because of the variety of commercial building types such as gas stations, chain restaurants, and franchise supply stores, and therefore exhibit low memorability. For these reasons, visual quality in LU 3 is moderate when considering both this area and the Historic Downtown.

Landscape Unit 4

100 South is a two-way, 2-lane paved road with a continuous center-turn lane and wide parking lanes paralleling both sides of the road. The road passes under I-15 without an interchange. Buildings related to education (primarily Dixie State University) face the eastern end of the road, occupying several blocks between I-15 and 700 East, west of which the landscape character becomes residential. The St. George City Cemetery occupies approximately 1.5 blocks on the north side of 100 South in this area. This manicured expanse includes several deciduous and evergreen trees, creating a park-like setting. The residences along this road are modest, rarely exceeding one story and occupying small footprints. Some of the larger homes display a historic design. The St. George Children's Museum at the intersection with Main Street is the southernmost building within the St. George Historic Downtown. The museum is a large, imposing three-story stone structure. This and the similarly designed Washington County Library System building adjacent to it visually contrast with the residential buildings, displaying a different scale, mass, materials, and architectural style. Deciduous trees and low shrubs are the primary natural elements in this LU. Telephone poles and street lights line the road but are inconspicuous. Traffic is light and comprised primarily of cars and pickup trucks.

The majority of the landscape components (the residential buildings) in LU 4 are visually interrelated, although they do not typically form striking or distinctive visual patterns. The large stone buildings add vividness, but contrast with the overall visual intactness and unity of the residential areas within LU 4. For these reasons, memorability is moderate, as is overall visual quality.

3.13.1.3 Proposed Zone 6

The analysis area for visual resources around proposed Zone 6 extends 0.5 mile outside the proposed Zone 6 boundaries to accommodate views into that area. Approximately 51 percent of proposed Zone 6 is BLM-administered land (3,471 acres). The VRI for proposed Zone 6 is identified as VRI Class III primarily on the northern and western areas, and VRI Class IV primarily for the southern and eastern areas (Map 3.13-6). The VRI identified the area contained in the proposed Zone 6 as Class C scenery (primarily the Questa-Forming Shales SQRU, with a small section on the east in the Urbanized Lowlands SQRU) and the distance zone as foreground-middleground. Visual sensitivity levels in the area range from low to high (Table 3.13-3).

Table 3.13-3. Sensitivity Level – Proposed Reserve Zone 6

Sensitivity Level	Acres
High	3,442
Medium	1,517
Low	1,854

Map 3.13-7 shows the VRI Sensitivity Level within Proposed Zone 6.

The BLM-administered land within proposed Zone 6 is designated as VRM Class III (Map 3.13-8). The remaining land is owned by SITLA (47 percent [3,225 acres]), UDOT (1 percent [70 acres]) and private owners (0.6 percent [40 acres]) (Max 2019, Kiel 2019a).

Proposed Zone 6 consists of a broad, primarily undeveloped desert landscape. A large, sweeping red-hued valley drains toward the Virgin River and is flanked by high cliffs to the north and south. Large boulders and rocks litter the cliffsides and valley floor. The ridgelines provide sweeping views in all directions of redrock cliffs, the Pine Valley Mountains, Zion National Park, and St. George. Ridgelines consist of pale yellow plateaus stained with black desert varnish and dotted with scrubby desert vegetation. Ribbons of dry washes crisscross the valley, and a handful of trails wind along the ridgelines. Residential areas abut the Zone 6 boundary immediately to the east, and a small residential area farther north has views into Zone 6. No development exists on the west and south sides of Zone 6.

Numerous social trails crisscross the valley within the Bearclaw Poppy Trail system. The Bearclaw Poppy Trail is accessible via two trailheads, one on Navajo Drive west of Bloomington and the other at Canyon View Drive farther north. Mountain bikers frequent this popular trail, which also connects to other trails traveling farther west and north. These trails create visual scars on the valley's soils, particularly where multiple trails are braided. As Navajo Drive leaves the residential area and travels farther west into Zone 6, frequent off-road use has also created visual scars among steep hills. Some camp trailers are parked along the road, which is crossed by tall transmission towers trending generally north-south. Shooting trash litters the ground at informal pullouts used for target shooting. Some wide, flat areas show evidence of partying and illegal dumping. However, the natural environment is visually diverse, with undulating hills in hues ranging from red to orange and gray, with views of distant purple mountains.

Moe's Valley rock-climbing area is farther north and west of a residential area at Curly Hollow Drive where there is ongoing residential development. A broad dirt area serves as unofficial parking for recreational use. The climbing area is visually secluded from development and is enclosed by undulating canyon walls from which large boulders have fallen. The rounded canyon walls and boulders are a pale yellow and red, and partially covered with black desert varnish. Chalk from climbing on the boulders indicates the presence of popular bouldering routes. Low, spiky pale green and silver vegetation covers the ground where rocks are absent.

Residential development to the north off Dixie Drive abuts Zone 6 and provides recreational access to the area. The Zen Trail is a very popular mountain-biking trail that travels up a tilted rock slab. Riders, sometimes comprising large groups, are frequently visible snaking along the trail. A broad, flat dirt area provides unofficial parking. The trail ascends alongside a large cleft within which climbers can be seen in the Green Valley Gap Climbing Area. The cleft offers views of the sweeping valley and distant hills to the southwest, which become more open as riders ascend. Dramatic views of the vivid red rocks of Red Cliffs NCA and purple Pine Valley Mountains are to the west, north, and east. Foreground views include rounded pale yellow sandstone punctuated with sage green scrub vegetation. On the opposite side of the cleft, a large beige water tank is partially obscured by the hill into which it was built and is clearly visible to mountain bikers on the north end of Bearclaw Poppy Trail in this area. A water pipeline originates at the water tank and follows the Bearclaw Poppy Trail east to the Gap trailhead parking lot. An electrical substation to the south of the Zen trailhead is a visual anomaly and is visible to riders descending the Zen Trail. Tall, multi-strand transmission lines are conspicuous vertical elements adjacent to the trailhead, traveling generally north to south. An existing multi-phase monopole transmission line extends south from this substation, skirting Moe's Valley to the east and crossing the Bearclaw Poppy Trail

and Navajo Drive farther south. This line is only sporadically visible from the climbing area, but is the tallest vertical element near Navajo Drive, creating an incongruous intrusion.

3.13.1.4 Key Observation Points

Key Observation Points (KOPs) are "one or a series of points on a travel route or at a use area or a potential use area, where the view of a management activity would be most revealing" (BLM 1984). "KOPs should represent either a typical view from a sensitive viewing location or the range of impacts associated with the project" (BLM no date c). Twelve KOPs for this project were selected in consultation with the BLM (Map 3.13-9), as follows:

1) T-Bone Trail looking southwest.
2) Green Springs residential area at Mustang Pass trailhead (view at dusk) looking west.
3) Red Hills Parkway multi-use path looking east.
4) Red Hills Parkway multi-use path looking north.
5) City Creek Trail looking northeast.
6) Cottontail Trail west of Green Springs residential area looking west.
7) Icehouse Trail looking southwest.
8) Pioneer Rim Trail looking east.
9) Middleton residential area, northwest end of East 1200 North Road looking northwest.
10) City Creek Trail looking east.
11) Intersection with Cottonwood Springs Road looking south.
12) Pioneer Park looking south.

Attachment 2 in the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020b) contains additional information, including photographs from each KOP and simulations prepared for each depicting expected changes resulting from the proposed Northern Corridor alternatives as analyzed under Section 3.13.2.

3.13.2 Environmental Consequences

This section describes the potential impacts on visual resources resulting from the proposed alternatives. The Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020b) contains detailed methodologies, maps, simulations, and impacts analyses, including more specifics about contrasting elements (such as form, line, color, and texture) and contrast rating factors (such as distance, angle of view) referenced in this section.

3.13.2.1 Analysis Methods and Assumptions

Analysis of the highway alternatives in the Red Cliffs NCA is based on the BLM's VRM System, which provides a framework for managing visual resources on BLM-administered lands. The BLM's visual contrast rating process is used to analyze potential visual impacts of proposed projects and activities (BLM 1986b). Per BLM *Manual 8431 – Visual Resource Contrast Rating* (BLM 1986b), "the degree to which a management activity affects the visual quality of a landscape depends on the visual contrast created between a project and the existing landscape." Outside of the NCA and proposed Zone 6, the analysis is based on the FHWA 2015 *Guidelines for the Visual Impact Assessment of Highway Projects*. As a result of the differences in the BLM and FHWA methodologies, an approach was developed to identify adverse impacts consistently between them using the results of the BLM's Visual Contrast Rating Worksheet and the FHWA's Visual Quality Evaluation Worksheet. The BLM's worksheet compares the contrast between the existing

condition and the proposed change, and the FHWA's ranks the difference in visual quality that would occur. The BLM's weak, moderate, and strong contrast levels were assigned numeric values similar to the FHWA visual quality change rankings, as shown in Table 3.13-4. These numeric rankings were used in the contrast rating worksheets included as Attachment 3 in the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020b).

Table 3.13-4. BLM and FHWA – Adverse Impact Ranking

Numerical Ranking	FHWA Visual Character Compatibility	FHWA Change to Visual Quality	BLM Visual Contrast
1	Very high	Very low	Very weak
2	High	Low	Weak
3	Moderately high	Moderately low	Moderately weak
4	Moderate	Average	Moderate
5	Moderately low	Moderately high	Moderately strong
6	Low	High	Strong
7	Very low	Very high	Very strong

Visual simulations of the potential highway alternatives after construction were prepared to help determine the level of impacts on visual resources and determine consistency with the BLM VRM class objectives. The potential Zone 6 SGFO RMP Amendments were reviewed to determine if and how the management may affect visual character and quality of lands seen by sensitive viewers.

Noise barriers could potentially be constructed for Alternatives 2 through 4, as they were determined to be feasible but not reasonable (Section 3.23). Therefore, a more detailed evaluation of noise barriers would be conducted after completion of the Final EIS under a separate study. For purposes of this visual impact analysis, noise barriers were not assumed.

3.13.2.2 Direct and Indirect Impacts from Alternative 1

Alternative 1 would result in no change to visual resources beyond existing conditions and trends. This alternative would be consistent with existing BLM VRM class objectives. No VRM changes would be required (Table 3.13-7).

Within proposed Reserve Zone 6, continuing current management of authorized (e.g., ROWs and mineral management) and casual recreational uses (e.g., target shooting, mountain biking, and OHV use) on BLM-administered and other lands may result in new visual impacts such as landscape scars in the future that could impact sensitive viewers.

3.13.2.3 Direct and Indirect Impacts from Alternative 2

Northern Corridor and Red Cliffs NCA RMP Amendment

Long-term, primarily adverse visual impacts would result from construction and operation of the Northern Corridor under Alternative 2. Road cuts and fills would alter the landscape's landform and vegetation, and the road would interject contrasting textures and colors into the landscape, creating a strong linear feature that would become a focal point depending on proximity of these features to viewers (distance zone) and angle of views (many viewpoints have a superior viewing angle). In addition, moving vehicles would introduce motion into a primarily static landscape, calling attention to the road. A bridge likely to be required on the east side of Cottonwood Springs Road would be only minimally visible to sensitive viewers. The intensity of impacts would vary based on viewing distance, angle of view, and activity, because the road may be completely or partially screened by vegetation, land formations, and viewing angle as sensitive viewers move through the landscape.

Adverse impacts to residents and visitors using trails at the north end of the Green Spring residential area would vary based on the location of their houses regarding topography, orientation, angle of view, and viewing distance. Some views of the road would be completely screened by existing houses or topography. The impact would be of a long duration, because residences are stationary and occupied for long periods of time.

A new stoplight-controlled interchange at Cottonwood Springs Road would introduce new lights and vertical elements. Visual impacts would be minor at this area, where existing substations and numerous utility structures have impeded views and diminished scenic quality. In addition, drivers on Cottonwood Springs Road would be exposed to the change for a relatively short amount of time.

The new grade-separated interchange at Red Hills Parkway would substantially change the visual character there by removing an imposing rock cut that impedes views and introducing an elevated structure and associated ramps on large fill slopes. Although the change to landform would be considerable, the impact would be neutral to adverse depending on viewpoint because drivers would be exposed to the change for a short amount of time. However, users of the City Creek trail system would experience these impacts for a longer duration.

Associated roadway lighting and vehicle lights would draw attention to the new alignment at night. This impact would particularly affect residents of the northern end of the Green Springs residential area, who would experience long view durations compared to drivers or recreationists.

Short-term construction impacts would result from views of construction equipment, dust, possible detours at the Red Hills Parkway interchange, and temporary staging areas. Construction may be phased, and views of construction activity would vary as activities move along the alignment. The biggest short-term impact would result from constructing the interchange with Red Hills Parkway, which would likely involve large machinery.

Actions to minimize visual impacts have been incorporated into design, as listed in Appendix D, Design Features of the Proposed Action and Mitigation Measures and Conditions of Approval, including highway and slope grading, paint color selection, site reclamation and revegetation, and lighting.

The new alignment would provide views of Red Cliffs NCA for travelers expected to use the proposed roadway itself and its adjacent trail. These travelers would have closer views of the tall, vivid red cliffs and Pine Valley Mountains north of the Green Springs residential area, as well as mountain views near the connection with Red Hills Parkway. These users would also experience close-up views of the substation and transmission lines near Cottonwood Springs Road.

Table 3.13-5 summarizes the visual contrast and VRM conformance for the KOPs analyzed in the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020a). Note that VRM class conformance is only assessed on BLM-administered lands.

Table 3.13-5. KOPs Analyzed for Alternative 2

KOP Number	Typical User Types Present	Visual Contrast	VRM Class Conformance
1	Recreational	Strong	Does not conform (existing VRM Class III)
2	Recreational and residential	Moderately strong	Does not apply
3	Recreational, residential, and business/commuter	Strong	Does not conform (existing VRM Class III)

Table 3.13-6 shows the number of acres affected for each VRI component in the analysis area for this alternative.

Table 3.13-6. Alternative 2 – VRI Components

VRI Unit	Level	Number of Acres Affected
Scenic Quality	Not Applicable	Not Applicable
Red Cliff Sandstone	A	243
Young Basalt Flows	C	23
Sensitivity Level	High	266
Distance Zone	Foreground-middleground	266

This highway alternative would affect the fewest sensitive viewers of the alternatives proposed through the Red Cliffs NCA, because it would be farthest from affected high-use recreational facilities and is likely to require only one bridge, which would be minimally visible from most heavily used locations. However, this alternative would adversely impact areas with high scenic quality and high sensitivity through changes to landform, vegetation, and color, and impacts to sensitive viewers, including recreational visitors, and nearby residents, and users of the highway. This alternative would be inconsistent with VRM Class III objectives in some locations where VRM Class III areas are crossed by the alignment, even though VRM Class III allows for a greater degree of change. At certain viewpoints within VRM Class III areas, the existing landscape character would be partially retained and undergo a moderate degree of change. However, this alternative would not conform to the RMP's VRM Class III objective because the highway would dominate the view of the casual observer throughout the majority of the alignment. In addition, the smooth, linear form of the new highway (which would be raised on fill and cut into the ground in many areas), coupled with lights and vehicle movement, would not repeat the basic elements found in the predominant natural features of the characteristic landscape, such as form, line, color, and texture, as required for VRM Class III areas. The simulation and description of impacts for KOP 1 in Attachments 2 and 3 of the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020a) provides an example of a location where the highway would not be consistent with VRM III objectives associated with the Red Cliffs NCA RMP.

Table 3.13-7 shows the total number of acres for each VRM class that would result under each alternative and resulting plan amendment to the Red Cliffs NCA RMP. The Red Cliffs NCA RMP Amendment would change the VRM designation of the BLM-administered lands that would be crossed by the ROW such that the VRM would be consistent with the construction of a highway. Under Red Cliffs NCA RMP Amendment Alternative B, the ROW would be managed as VRM Class IV. Therefore, implementation of this alternative would then be in conformance with amended VRM Class IV. Under Red Cliffs NCA RMP Amendment Alternative C, a new ROW corridor would be designated, managed as VRM Class IV, and open to aboveground and buried utilities. Future construction of aboveground utilities could introduce vertical components into the landscape, with indirect adverse visual impacts. Visual impacts related to belowground utilities would be primarily short term and would occur during construction and occasional maintenance.

Table 3.13-7. Red Cliffs NCA VRM Classes by Alternative

VRM Class	Entire Red Cliffs NCA (acres) [a]	Alternatives 1, 5, and 6 (acres)	Alternative 2 – T-Bone Mesa Alignment (acres)	Alternative 3 – UDOT Application Alignment (acres)	Alternative 4 – Southern Alignment (acres)
VRM Class I	19,989	19,989	19,989	19,989	19,989
VRM Class II	18,630	18,630	18,630	18,630	18,630
VRM Class III	6,205	6,205	6,106	6,095	6,138
VRM Class IV	20	20	119	130	87

Note: Assumes the full 500-foot ROW or corridor width would be amended to VRM Class IV.

SGFO RMP Amendments

Within proposed Reserve Zone 6, SGFO RMP Amendment Alternative B would restrict various activities, such as future issuance of ROWs, mining and mineral management, livestock grazing, and recreational uses, to varying degrees. These changes would be beneficial for visual resources, because ground disturbance and vertical intrusions for utility construction, mining, and mineral exploration would not be allowed, and landscape scarring from recreational activities would be reduced. SGFO RMP Amendment Alternative C would have similar but less beneficial impacts, as fewer use restrictions would be applied to these authorized and casual uses.

3.13.2.4 Direct and Indirect Impacts from Alternative 3

Long-term, primarily adverse visual impacts would occur from construction of the Northern Corridor under Alternative 3, similar to Alternative 2. However, because the UDOT Application alignment used for Alternative 3 would be located farther south than the T-Bone Mesa Alignment used for Alternative 2, this route would be more visible to some residents and trail users at the north end of the Green Springs residential area but less visible to others. In addition, the new stoplight-controlled interchange at Cottonwood Springs Road would result in slightly increased impacts to scenic quality at this area compared to Alternative 2, because it is farther south of the existing substations and numerous transmission towers, adding new vertical elements to the landscape. The elevated interchange at Red Hills Parkway would have more impacts compared to Alternative 2, as views at that location are unimpeded by existing rock cuts. The interchange would block some distant views, and its strong linear shape would contrast against the existing landforms. The movement of motor vehicles on the overpass would further draw attention to it and obscure distant mountains. The extent of this impact would vary based on viewing angle and distance. In addition, this alternative is likely to require two bridges, one on each side of Cottonwood Springs Road. However, they would be only minimally visible from sensitive viewing locations. Alternative 3 would adversely impact areas with high scenic quality and high visual sensitivity to a greater degree than Alternative 2 as a result of the additional bridges.

The new alignment would provide views of Red Cliffs NCA for travelers on the proposed roadway itself and the adjacent trail, but to a lesser degree than Alternative 2. However, the substation on Cottonwood Springs Road would be farther from view, and fewer transmission lines would be visible.

Table 3.13-8 summarizes the visual contrast changes and VRM conformance for the KOPs analyzed in the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020a). Note that VRM class conformance is only assessed on BLM-administered lands.

Table 3.13-8. KOPs Analyzed for Alternative 3

KOP Number	Typical User Types Present	Visual Contrast	VRM Class Conformance
4	Recreational, residential, and business/commuter	Strong	Does not conform (existing VRM Class III)
5	Recreational	Weak	No change – existing character remains Partially retained (VRM Class III)
6	Recreational and residential	Moderately weak	Does not apply
7	Recreational	Moderately strong	Does not apply

Table 3.13-9 shows the number of acres affected for each VRI component in the analysis area for this alternative.

Table 3.13-9. Alternative 3 – VRI Components

VRI Unit	Level	Number of Acres Affected
Scenic Quality	Not Applicable	Not Applicable
Red Cliff Sandstone	A	263
Young Basalt Flows	C	24
Sensitivity Level	High	287
Distance Zone	Foreground-middleground	287

All other visual impacts, including impacts to proposed Reserve Zone 6, and application of design features would be similar to those described for Alternative 2.

Table 3.13-7 presents the VRM changes associated with Alternative 3.

Alternative 3 would affect more sensitive viewers than Alternative 2 because of its more southern alignment and closer proximity to the Green Springs residential area and adjacent trails. In addition, this alternative would likely require two bridges, one on the east and one on the west side of Cottonwood Springs Road, which would minimally increase visual impacts.

3.13.2.5 Direct and Indirect Impacts from Alternative 4

Long-term, primarily adverse visual impacts would occur from construction of the Northern Corridor under Alternative 4, similar to Alternatives 2 and 3. However, more sensitive viewers would be affected given this alignment's proximity to additional trails, residential areas, and Pioneer Park. Similar to Alternative 3, this alternative is likely to require two bridges, one on each side of Cottonwood Springs Road, but farther south than the location of these features under Alternative 3. The bridge expected to be required on the east side of Cottonwood Springs Road would introduce a large transportation element that would be visible to residents at the north end of the Middleton residential area. This bridge would dominate the view in an area that is primarily undeveloped, contrasting with existing landform, vegetation, and color characteristics. Residents with views in this direction would experience long view durations compared to drivers or recreationists. The new interchange at Red Hills Parkway would realign the parkway through undisturbed land. The interchange and highway would introduce new transportation elements where none currently exists. These features would be viewed by more sensitive viewers than Alternatives 2 and 3, because they would be visible from several trails and Pioneer Park. The introduction of moving vehicles would draw further attention to this otherwise static landscape. Night lighting impacts would be similar to Alternative 2, with increased impacts for residents in the northern end of the Middleton residential area.

Short-term construction impacts for Alternative 4 would be the same as those described for Alternative 2. However, these impacts would likely affect residents of the northern end of the Middleton area more as a result of the nearby bridge construction.

The new alignment would provide views of Red Cliffs NCA for travelers on the proposed roadway itself and the adjacent trail, similar to Alternative 3. In addition, these travelers would have more views of distant cliffs and mountains surrounding St. George from the southeast to southwest, and possible views of the rock formations at Pioneer Park.

Table 3.13-10 summarizes the visual contrast changes and VRM conformance for the KOPs analyzed in the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020a). Note that VRM class conformance is only assessed on BLM-administered lands.

Table 3.13-10. KOPs Analyzed for Alternative 4

KOP Number	Typical User Types Present	Visual Contrast	VRM Class Conformance
8	Recreational	Strong	Does not apply
9	Recreational and residential	Strong	Does not conform (existing VRM Class III)
10	Recreational	Moderately strong	Does not conform (existing VRM Class III)
11	Recreational	Moderate	No change – existing character remains Partially retained (VRM Class III)

Alternative 4 would adversely impact areas of high scenic quality and high visual sensitivity to a greater degree than Alternative 2 and 3 as a result of the additional bridges and closer proximity of sensitive viewers, such as those at Pioneer Park and the Middleton Residential Area.

Table 3.13-11 shows the number of acres affected for each VRI component in the analysis area for this alternative.

Table 3.13-11. Alternative 4 – VRI Components

VRI Unit	Level	Number of Acres Affected
Scenic Quality	Not Applicable	Not Applicable
Red Cliff Sandstone	A	337
Young Basalt Flows	C	23
Sensitivity Level	High	360
Distance Zone	Foreground-middleground	360

All other visual impacts, including impacts to proposed Reserve Zone 6 and application of design features, would be similar to Alternative 2.

Table 3.13-7 presents the VRM changes associated with Alternative 4.

This alternative would affect more sensitive viewers than Alternatives 2 and 3 because of its southernmost alignment and closer proximity to the Green Springs and Middleton residential areas, as well as additional recreation areas both within and outside the Red Cliffs NCA.

3.13.2.6 Direct and Indirect Impacts from Alternative 5

Long-term adverse visual impacts would result from construction and operation of the Northern Corridor under Alternative 5, which would vary depending on location. The proposed structures at 200 East and 1000 East, as well as the flyovers to connect to I-15, would be visually prominent and noticeable from many viewpoints throughout St. George and areas within the Red Cliffs NCA's southern boundary. The structures at 200 East and 1000 East would be approximately 25 feet above Red Hills Parkway's existing grade. Grade differentials between the parkway and new structures would likely occur along a few hundred feet. The flyovers connecting the parkway to I-15 would likely be 30 feet high and visible mostly from I-15 and the immediate surroundings. Although the flyovers would be consistent with the existing transportation elements associated with the highway, they would hinder views of commercial establishments from I-15 and surrounding streets, and would be clearly visible from residential and commercial areas on adjacent bluffs. The structures at 200 East and 1000 East would also infringe on existing views from Red Cliffs NCA into or across the valley depending on viewpoint. The 200 East structure would dominate the view from the western portions of Pioneer Park, as well as the adjacent parking area and trailhead to the west. This interchange would also be visible from parts of the Owens Loop Trail within the Red Cliffs NCA. The structures would be much less noticeable from Red Hills Desert Garden but would be very noticeable looking toward the NCA from the water tank overlook. Users of the multi-use trail adjacent to the parkway would experience adverse impacts related to views of the new interchanges. The structures' sizes would be much more substantial

than existing infrastructure because no similar features exist at 200 East and 1000 East, thereby representing a new visual intrusion. Closing or converting various turning movements would remove the visual components of those transportation elements, resulting in a minor impact.

For the remainder of the length of Alternative 5, the primary roadway improvements include repaving and restriping the roadway, which would result in minor visual impacts on views from sensitive viewers because such actions would not change the existing landscape character or the roadway footprint. Because the roadway footprint would not change, the Red Hills Parkway multi-use trail would remain in place. The simulation created for KOP 11 in the Visual Impact Assessment Technical Report (Appendix M; Jacobs 2020a) depicts these roadway changes from a view within Pioneer Park. From this particular viewpoint, which does not include the interchanges, visual quality would remain high, and the proposed changes would be compatible with existing conditions at that location.

Night lighting impacts would be similar to existing conditions. However, lights on the new interchanges would be elevated, changing lighting conditions in those areas.

Short-term construction impacts related to views of construction equipment and activities would be concentrated primarily where the interchanges would be built.

Actions to minimize visual impacts would be incorporated on BLM-administered lands as described for Alternative 2.

Table 3.13-12 shows the number of acres affected for each VRI component in the analysis area for this alternative.

Table 3.13-12. Alternative 5 – VRI Components

VRI Unit	Level	Number of Acres Affected
Scenic Quality	Not Applicable	Not Applicable
Red Cliff Sandstone	A	24
Sensitivity Level	High	24
Distance Zone	Foreground-middleground	24

Alternative 5 would affect views from the NCA and in St. George who would see the proposed interchanges. Most of the roadway would follow the existing alignment, and the largest interchange would be located in a transportation setting within commercial and industrial areas. Although the interchanges would be visible from viewpoints within nearby BLM-administered lands, no change to the BLM VRM Class III objectives would occur because the interchanges would be within an existing transportation ROW.

3.13.2.7 Direct and Indirect Impacts from Alternative 6

Long-term adverse visual impacts in both LU 3 and LU 4 would result from converting St. George Boulevard and 100 South to one-way streets. The degree of impact would vary by location. Visual changes would result from removing the existing median on St. George Boulevard and changing the direction and amount of traffic. Removing the median would remove existing landscaping, which currently adds natural elements to the built environment and softens the man-made features. This impact would be greater where the median is wider and includes shrubs and trees. Removing the median would also remove the historic-style light fixtures that add a unifying visual element to the roadway. Landscaping and light fixtures within and adjacent to the sidewalks would remain. Impacts would occur on views from sensitive viewers, such as pedestrians, residents on 100 South, and visitors to the St. George Historic Downtown. This alternative would also increase traffic on both roads, resulting in an adverse impact to sensitive viewers, particularly residents whose views are of long duration.

Creating a split interchange between these two roadways connected by one-way ramps at I-15 would reconfigure the existing transportation elements there by continuing the existing I-15 on-ramp from St. George Boulevard to 100 South and adding a highway on-ramp south of 100 South. Land use in this area between the two roads is mostly commercial, including a large recreational vehicle parking lot, and views from these areas toward the proposed interchange currently include I-15 and a highway on-ramp. Therefore, extending the existing on-ramp would result in a minor visual change compared to existing conditions. Adding an on-ramp south of 100 South would introduce a new transportation element between I-15 and existing land uses. The new ramps would be visible to apartment residents near the southern end of the on-ramp, where it would be merging with I-15 and farther from the buildings. This eastern end of the analysis area is characterized as a transportation visual setting and would remain as such. Most impacts at the new interchange would be primarily to drivers with views of the road, whose impact would be of a short duration.

There would be no impact on existing BLM VRM designations within the Red Cliffs NCA (Table 3.13-7).

This alternative would affect fewer sensitive viewers than Alternatives 2 through 5 because no new roadway alignment would be constructed and no recreational facilities would be affected; residential viewers would be affected under all action alternatives.

3.14 Cultural Resources and Native American Concerns

This describes the potential impacts on cultural resources that may occur from the proposed Federal actions analyzed in this Draft EIS. Conservation, protection, and enhancement of cultural and historical resources (collectively referred to here as “heritage resources”) were identified as one of the purposes for the Congressional designation of the NCA, through OPLMA. The assessment of impacts to cultural resources occurs within an Area of Potential Effect (APE), which is a geographic area within which an undertaking (project) may directly or indirectly cause alterations in the character or use of historic properties. The APE for the actions analyzed in this Draft EIS are the areas within the proposed alternative alignments for the Northern Corridor, the non-Federal lands within the HCP Permit Area, and proposed Zone 6. For the T-Bone Mesa, UDOT Application, and Southern potential Northern Corridor alignments the APE is a 700-foot wide corridor. For the Red Hills Parkway Expressway alignment, the archaeological APE is the existing roadway and a 50-foot buffer on each side. For the Red Hills Parkway Expressway and one-way couplet potential alignments for the Northern Corridor, the APE for historic structures is the existing roadway and a single legal parcel adjacent to the existing roadway.

3.14.1 Affected Environment

Cultural resources can be defined as physical evidence or place of past human activity: site, object, landscape, structure; or a site, structure, landscape, object or natural feature of significance to a group of people traditionally associated with it. The NHPA sets forth government policy and procedures regarding “historic properties”—that is, districts, sites, buildings, structures, and objects included in or eligible for the NRHP.

3.14.1.1 Cultural History Overview

Southwestern Utah is transitional between the Colorado Plateau and the Basin and Range physiographic provinces. The prehistoric archaeology of Southwestern Utah results from overlap of cultural traits from these discrete regions and environments. This section summarizes the prehistory and history of southwestern Utah and draws heavily on the summary of Heritage Resources included in the 2015 Red Cliffs NCA RMP Draft EIS (BLM 2015a).

Paleo-Indian (12000 to 9000 Years Before Present [BP])

The Paleo-Indian period spans the terminal Pleistocene and earliest Holocene. Hallmarks of the Paleo-Indian period in the region are the Fluted Point and the Western Stemmed traditions (Grayson 1993). The Fluted Point tradition in the region is recognized by the distinctive Clovis point type, long considered to represent the first recognizable cultural tradition in North America. Paleo-Indian sites in southwestern Utah are limited to a few isolates of Clovis points and point fragments. As a result, little is known about the Paleo-Indian in southwestern Utah, but based on analogy with sites elsewhere in the southwestern United States, Paleo-Indian adaptations were probably characterized by relatively small groups of humans that were highly mobile with opportunistic subsistence practices, including hunting now extinct megafauna.

Archaic (9000 to 2400 BP)

As originally described by Jennings (1953) in his definition of the Desert Archaic, the Archaic period is characterized by broad spectrum hunting and gathering by mobile populations to the Holocene environment. Groundstone found in Archaic assemblages indicates the importance of plant, seed, and nut processing.

The Archaic period in southern Utah is subdivided into the Early Archaic (9000 to 6500 BP), the Middle Archaic (6500 to 4000 BP), and the Late (4000 to 2400 BP), These intervals are defined largely by diagnostic projectile point types (Geib 1996, Fairley 1989). Detailed chronologies have been established in areas of southern Utah where substantive excavations of buried Archaic components has occurred (Geib 1996).

Formative (Approximately 2400 BP to AD 1250)

The Formative period signals a replacement of the mobile hunting and gathering subsistence strategies of the Archaic to highly variable degrees of reliance on cultivated plants. The fundamental attributes that define the Formative phase are cultivation of maize and other domesticated crops, permanent habitation sites, ceramic production, and the use of bow and arrow technology. Most researchers subdivide the Formative period into five temporal phases: Basketmaker II (approximately 2400 BP to AD 400), Basketmaker III (AD 400 to 800), Pueblo I (AD 800 to 1000), Pueblo II (AD 1000 to 1150), and Pueblo III (AD 1150 to 1225) (Lyneis 1995, Fairley 1989).

The aboriginal lifeways characterizing the Formative period in southwestern Utah are referred to as the Virgin Branch of the Kayenta Anasazi (simply Virgin Anasazi), or Ancestral Puebloan. The origins of the Virgin Anasazi culture are not well understood (Fairley 1989) but include the adoption of a sedentary and horticulturally focused lifestyle with occupations focused along the Virgin and Santa Clara Rivers. Maize farming began in the Basketmaker II period, and bell-shaped storage cists and large circular pit houses in small habitation sites, along with coiled baskets, fiber and hide containers, snares, and nets, typify artifact assemblages from this phase. During the Basketmaker III period, the Ancestral Puebloan occupied pit houses, developed a greater reliance on horticulture, adopted ceramics, and began using the bow and arrow. Typical Ancestral Puebloan habitation sites of the period included one to five circular pithouses and several storage cists (Dalley and McFadden 1985).

The Pueblo period is characterized by increasing architectural complexity and formalization. Pueblo I pithouse villages became larger and were composed of semi-subterranean structures for habitation and storage (Dalley and McFadden 1985), and pit structures would ultimately be replaced by surface structures by the end of the Pueblo sequence. Ceramic production increased during Pueblo II time, and sites of this age are relatively large and common suggesting Ancestral Puebloan populations peaked during this period. Sites during this period range from large farmsteads near perennial drainages to rockshelters and open sites in uplands that were probably

used for seasonal resource procurement, leading some archaeologists to argue that subsistence strategies varied along a continuum from full-time sedentary horticulturalists to full-time mobile hunters and collectors (Lyneis 1995).

Few Ancestral Puebloan Pueblo III sites have been identified, indicating population decline in the 13th century. Researchers have identified evidence for prolonged drought throughout the West that affected prehistoric populations, including the Ancestral Puebloan (Benson et al. 2007), and catastrophic flooding and erosion along the Virgin River (Hereford et al. 1995) during this period may have been detrimental to groups emphasizing horticulture. Regardless, it appears that the Ancestral Puebloan lifestyle ceases. This is likely a result of drought conditions which forced populations into migrations or adoptions of a more mobile hunting and gathering way of life.

Late Prehistoric Period (AD 1250 to 1850)

Like most of southern and central Utah, adjacent areas of the Arizona Strip, and southern Nevada, late Prehistoric archaeological sites in the St. George Basin and surrounding mountains are a result of occupation by the Southern Paiute, a Numic language group. Our understanding of the Southern Paiute comes from both archaeological excavations of Southern Paiute sites in southwestern Utah (see summary in Roberts and Eskenazi 2008) and ethnographic studies (Kelly 1964, Steward 1938).

In southwestern Utah, Southern Paiute hunter-gatherers in extended family groups would move in a seasonal round, beginning at lower elevations like the St. George Basin and moving to progressively higher elevations as plant and animal resources became available seasonally available in the surrounding mountains. The Southern Paiute economy included collection of and processing yucca and agave and various cacti, and also cultivating corn; faunal remains indicate a focus on rabbits, but tortoise was also procured and artiodactyls were hunted.

Southern Paiute archaeological sites occur in open settings as well as rock shelters (Westfall et al. 1987), and in some cases included reoccupation of Virgin Anasazi sites; some sites show evidence for continuity of occupation from Archaic through Paiute period. Southern Paiute habitation sites include wickiup structures, with some structures producing Paiute brown-ware ceramics. Sites typically include artifact scatters composed of ceramics, chipped stone, and groundstone, with features including roasting pits and hearths. Southern Paiute sites contain distinctive projectile point types, including Cottonwood Triangular and Desert Side-notched.

Proto-Historic Period (AD 1500 to 1852)

The following discussion of the Proto-Historic and Historic periods in southwestern Utah is adapted from the BLM (2015a) as well as Alder and Brooks (1996). The transition from the Prehistoric period to the Proto-Historic period began approximately AD 1500, when Southern Paiutes in southwestern Utah were interacting with Spanish Colonial Settlements in Mexico and California indirectly through trade and exchange. The first well-documented direct contact between Southern Paiutes in southwestern Utah and Euro-Americans appears to have occurred in 1776, during the single exploratory trek of Franciscan Friars Dominguez and Escalante. The friars were followed by American fur trapper and explorer Jedediah Smith, who traveled through Washington County multiple times in 1826 and 1827. Smith reported of seeing Southern Paiute groups living along the Santa Clara River and Beaver Dam Wash and cultivating fields of corn, sunflowers, and squash. The increasing Euro-American traffic along what John C. Fremont labeled as the “Old Spanish Trail” brought inexorable change to the Southern Paiute groups in Washington County and beyond. Firearms, metal for arrowheads, and diseases including smallpox and influenza all contributed to the decimation of populations. New Mexico traders, aided by raiding Ute and Navajo parties, also captured Southern Paiute children and young women to sell in Santa Fe and the California mission

settlements. All of these factors contributed to declines in Paiute numbers and displacement of family groups from their traditional hunting and resource collection areas.

Southern Paiute archaeological sites from the Proto-Historic period are similar to Late Prehistoric sites but also contain Euro-American trade items.

Historic Period (AD 1852 to Present)

Members of The Church of Jesus Christ of Latter-day Saints were the first Euro-Americans to establish permanent settlement in Washington County. Settlement of the Southern Indian Mission in 1852 and the Santa Clara Mission in 1854 occurred as part of the creation of what is known as the Mormon Corridor between Salt Lake City, Utah, and San Bernardino, California. Church members in Washington County established agricultural communities along the Virgin River and its major tributaries, as well as along primary travel routes. These agricultural settlements were in the same areas that the Southern Paiute had previously cultivated their crops, resulting in the displacement of the native groups to less productive areas.

Between 1857 and 1861, several communities were established along the Virgin River to grow cotton; however, many of these communities were either abandoned or nearly destroyed by flooding in 1862. The City of St. George was settled in 1861 at the behest of The Church of Jesus Christ of Latter-day Saints President Brigham Young, who called for families to settle the area to grow cotton and other crops (Bradshaw 1950). The agricultural and domestic potential of St. George was limited as a result of the arid climate. As such, a waterworks system consisting of canals, ditches, and pipelines was constructed to provide water to the early residents and farmers of St. George during the late 19th and early 20th centuries. An extensive component of the larger waterworks system that crosses several of the Northern Corridor alternatives is the Cottonwood Pipeline (Baker 2004). The earliest incarnation of the pipeline was Cottonwood Canal, constructed between 1896 and 1903; however, the first segments of pipeline were wooden and constructed beginning in 1912. Pre-cast concrete and steel sections were added to the pipeline between 1936 and 1937.

Agriculture and livestock have long constituted a central part of the economy in Washington County, but mining and wine production also played a part in the second half of the 19th century as well. More recently, increasing tourism has spurred the trade and service industries.

3.14.1.2 Identification of Cultural Resources

Section 106 of the NHPA requires Federal agencies to consider the effects of Federally funded or Federally authorized undertakings that have the potential to impact historic properties and provide the State Historic Preservation Officer (SHPO), affected Tribes, and other consulting parties an opportunity to comment. The NHPA defines historic properties as any district, site, building, structure, or object that is listed in or eligible for listing in the NRHP.

To satisfy this legal requirement, heritage resources may be identified through a record search, consultations with American Indian Tribes, the SHPO, other knowledgeable parties, and through field investigations by qualified archaeologists, historians, ethnographers, or other researchers with specialized expertise. Additional information regarding agency consultation efforts can be found in Sections 4.2.2 and 4.2.3.

Northern Corridor and Red Cliffs NCA RMP Amendment

Identification of historic properties for the Northern Corridor and Red Cliffs NCA Amendment included a records search for previously documented historic properties and archaeological sites within 0.25 mile of all Northern Corridor alternatives and associated RMP Amendment alternatives under consideration in this Draft EIS. The records search was completed on January 17, 2020, using the Utah Division of State History's Preservation Pro (Preservation Pro). The results of the

record search are incorporated in a BLM Class III survey report (Tuttle et.al. 2020) and a separate historic structures reconnaissance-level survey report (Pearson and Calkins 2020) and are included in Tables 3.14-1 and 3.14-2. From March 5 through 10 and March 19 through 25, and on April 14, 2020, a BLM Class III intensive survey was conducted for the T-Bone Mesa, UDOT Application, Southern, and Red Hills Parkway Expressway potential alignments for the Northern Corridor to identify previously unidentified cultural resources within the proposed project APE (Tuttle et al. 2020). The survey included a 700-foot corridor centered along the potential Northern Corridor alignments with survey personnel spaced at intervals not exceeding the Utah SHPO standard of 15 meters. The survey coverage included all areas except very steep slopes or impenetrable brush. A historic structures reconnaissance-level survey (Pearson and Calkins 2020) was conducted for the Red Hills Parkway Expressway and one-way couplet potential alignments because they are in an urban setting. The results of the records search, Class III cultural resources inventory, and the historic structures reconnaissance-level survey are presented in Tables 3.14-1 and 3.14-2. Properties listed as eligible in Tables 3.14-1 and 3.14-2 include properties that have previously been recommended or determined eligible for the NRHP, as well as resources identified and recommended as eligible during the inventory for this project. Three previously recorded resources that could not be relocated during the field inventory are not included in the tables. Resources are categorized by age (e.g., Prehistoric and Historic archaeological resources). Multi-component resources typically contain Prehistoric and Historic components. Historic structures are differentiated from Historic archaeological sites.

Table 3.14-1. National Register Eligible Cultural Resources in Each Northern Corridor Alignment

Northern Corridor Alternative Route	Prehistoric	Multi-component	Historic	Historic Structure
T-Bone Mesa Alignment	2	1	3	0
UDOT Application Alignment	2	2	4	0
Southern Alignment	3	1	2	0
Red Hills Parkway Expressway	0	0	1	1 [a]
St. George Boulevard/100 South One-way Couplet	0	0	0	63

[a] This historic structure is site 42WS4989, which includes a water tank and associated features. The BLM SGFO recommends the site is NRHP eligible under Criteria A, B, and D.

Table 3.14-2. National Register Ineligible Cultural Resources in Each Northern Corridor Alignment

Northern Corridor Alternative Route	Prehistoric	Multi-component	Historic	Historic Structure
T-Bone Mesa Alignment	2	0	3	0
UDOT Application Alignment	3	0	5	0
Southern Alignment	0	0	2	0
Red Hills Parkway Expressway	0	2	2	5
St. George Boulevard/100 South One-way Couplet	0	0	0	70

Proposed Zone 6 and SGFO RMP Amendments

A records search for previously documented historic properties and archaeological sites within 0.25 mile of proposed Zone 6 was completed on June 26, 2019, using the Utah Division of State History's Preservation Pro (Preservation Pro). An intensive Class III survey was not conducted within proposed Zone 6 because there are no implementation-level actions to be approved as a result of this Draft EIS.

Approximately 23.8 percent (1,621 acres) of proposed Zone 6 has been previously surveyed as a result of 20 cultural resources investigations. There are 14 previously recorded historic properties within proposed Zone 6 (Table 3.14-3).

Table 3.14-3. Previously Recorded Cultural Resources in Proposed Zone 6

Resource Age	Number of Sites	Number of NRHP Eligible Sites
Prehistoric	31	13
Historic	3	1

Washington County HCP and Associated ITP

The issuance of an ITP based on the Washington County HCP is a Federal undertaking for the USFWS under Section 106 of the NHPA. The location and nature of non-Federal land management and land development activities that may require take of Mojave desert tortoise authorized under the ITP are not known at this time. Therefore, no specific impacts on cultural resources can be identified at this time. The USFWS has identified an APE that includes non-Federal lands within the permit area where take of desert tortoise is most likely to occur in Washington County. The Utah SHPO has reviewed and concurred with the APE. The USFWS initiated a Class I inventory of known historic properties in the APE and will use the inventory results to inform the Section 106 process with the Utah SHPO, Native American Tribes, Washington County and other consulting parties.

A records search was carried out for previously documented historic properties and archaeological sites in the APE as part of the Class I inventory. Requests were submitted to Utah SHPO for queries of the archaeological and built environment databases on April 22 and May 1, 2020, respectively.

Slightly more than 50 percent of the APE (42,830 acres) has been previously surveyed as a result of 526 cultural resources investigations. There are 388 previously recorded historic properties within the APE (Table 3.14-4).

Table 3.14-4. Previously Recorded Cultural Resources in the ITP APE

Resource Age	Number of Sites	Number of NRHP Eligible Sites
Prehistoric	608	309
Historic	215	59
Multi-Component	39	20
Historic Structures	0	0

To ensure NHPA compliance for cultural resources that may be impacted by non-Federal land management and land development activities that may require take of Mojave desert tortoise authorized under the ITP, the USFWS, Utah SHPO, Native American Tribes, and Washington County will collaboratively develop a Programmatic Agreement or other applicable compliance documents would be used to ensure compliance with Section 106 of the NHPA for the potential issuance of an ITP.

The Programmatic Agreement or other applicable compliance documents will identify protocols by which the USFWS will use to assess and resolve potential adverse effects to historic properties pursuant to 36 CFR 800 (the implementing regulations of Section 106 of the NHPA). On SITLA lands that may be developed using the ITP if it is issued by the USFWS, all actions would be subject to regulation(s) set forth by the State of Utah regarding the protection of cultural resources. Private and State lands within the proposed reserve would be subject to Federal regulations once they are exchanged to the BLM. Archaeological or historic resources that may be present on these lands would then be afforded greater protection than they currently have as these lands are acquired as part of the Reserve during the implementation of the HCP.

3.14.2 Environmental Consequences

This section analyzes potential impacts to cultural resources under NEPA (including cultural and historic resources pursuant to 40 CFR 1508.8) and historic properties under the NHPA (pursuant to 36 CFR 800) that could result from the construction of the roadway and proposed management actions described in Chapter 2.

3.14.2.1 Analysis Methods and Assumptions

Under Federal law, impacts to cultural resources may be determined through the application of the criteria of adverse effect as set forth by the Advisory Council on Historic Preservation in its implementing regulations, 36 CFR 800. An adverse effect under 36 CFR 800 is defined as an undertaking that may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. 36 CFR 800.5 (a)(2) identifies examples of adverse effects on historic properties; those of which that are relevant to the actions analyzed in this Draft EIS include the following:

- Physical destruction of or damage to all or part of the property.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

The law distinguishes direct and indirect effects as referring to the causality, and not the physicality, of the effect to historic properties. If the effect comes from the undertaking at the same time and place with no intervening cause, it is considered "direct" regardless of the specific type (e.g., whether it is visual, physical, or auditory). "Indirect" effects to historic properties are those cause by an undertaking that are later in time or farther removed in distance but are still reasonably foreseeable. Such adverse effects to historic properties under NHPA would constitute impacts to cultural resources under NEPA. Each alternative differs in the potential and degree of adverse effects to historic properties under Section 106 of NHPA and differs in potential for impacts to cultural resources under NEPA.

The following assumptions apply to this analysis:

- Native Americans or other traditional communities may have concerns about potential impacts on cultural resources, sacred sites, or Traditional Cultural Properties. There may be areas of importance to contemporary Native Americans that are not readily identifiable outside of those communities. These concerns would be identified and resolved through appropriate levels of consultation required by law, regulations, and agency policies.
- Compliance with the requirements of Section 106 of the NHPA would continue under all alternatives and would include efforts to identify cultural resources and evaluate these resources for NRHP eligibility. Should the identification of NRHP-listed or eligible properties occur as a result of a proposed undertaking, adverse effects to historic properties would be avoided through project design or impacts lessened to the extent possible through mitigation treatments, such as archaeological data recovery.

- All cultural resources within the boundaries of a proposed alternative alignment for Northern Corridor are presumed to be directly and permanently impacted should an alternative be implemented.

3.14.2.2 Direct and Indirect Impacts from Alternative 1

Alternative 1, No Action Alternative, would result in no effect to historic properties under Section 106 of NHPA, and no direct or indirect impact to cultural resources under NEPA. No change to cultural resources would occur because no new ground disturbance would be authorized. SITLA lands within proposed Zone 6 would be subject to Utah Code Annotated 9-8-404 prior to any potential development. Under this alternative, the USFWS would not grant an ITP to Washington County for the Amended HCP. Project proponents performing Federal land use or land development activities would still be subject to Section 106 of NHPA.

3.14.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Northern Corridor Proposed Alternative Alignment/Highway

Construction of the Northern Corridor highway associated with the potential Northern Corridor T-Bone Mesa, UDOT Application, and Southern alignments would result in adverse effects to historic properties under Section 106 of NHPA and would directly impact cultural resources under NEPA, causing permanent or long-term effects to NRHP eligible archaeological sites, through physical damage or alteration resulting in the loss of information important in history or prehistory contained within archaeological sites and historic structures within each highway alternative. Construction activities for the potential T-Bone Mesa, UDOT Application, and Southern Northern Corridor alignments could also result in temporary or short-term effects including, dust, noise and vibration that would affect archaeological resources and stockpiling of construction materials and equipment could cause surface damage to cultural resources. Of these three alternatives, the highway construction activities associated with the T-Bone Mesa and Southern alignments would each result in direct impacts to six cultural resources, with the UDOT Application Alignment would result in the most direct impacts to eight cultural resources (Table 3.14-5). For those resources eligible for the NRHP under Criterion D (likely to contain information important in history or prehistory) potential mitigation of these impacts may be possible through archaeological data recovery depending on the site type. Mitigation options designed to resolve adverse effects to the maximum extent possible would be developed as more information regarding the potential impacts becomes available.

In addition to these direct physical impacts, the potential UDOT Application and Southern alignments would result in a direct impact to a prehistoric petroglyph panel in the APE through the introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features by altering the resources setting, feeling, and association. Context and setting can be a key character defining feature for a petroglyph panel, thus there is a greater potential for direct effects with the introduction of visual or auditory elements. A potential increase in access and visitation to the site may lead to indirect impacts from vandalism.

The highway construction activities associated with the potential Northern Corridor T-Bone Mesa, UDOT Application, and Southern alignments would not result in other non-physical direct impacts to other archaeological sites eligible under NRHP Criterion D, because the introduction of visual or auditory elements would not diminish the information important in history or prehistory contained in those resources and archaeological sites are not visual and auditory receptors. Other non-physical direct impacts will not occur to historic structures within the APE for the potential Northern Corridor T-Bone Mesa, UDOT Application, and Southern alignments because these are all surface features with little or no aboveground vertical component (e.g., pipeline, cut poles from old transmission line, or low road buttress), and therefore the introduction of visual or auditory

elements will not diminish the setting, feeling or association for these resources. A potential increase in access and visitation to heritage resources may lead to indirect impacts from vandalism.

While no traditional cultural properties or sacred sites eligible for the NRHP have been identified within the APE for any alternative to date, such sites if identified could experience long-term visual effects.

Table 3.14-5. Direct Impacts to Cultural Resources in Each Alignment

Northern Corridor Alternative Route	Prehistoric	Multi-component	Historic	Historic Structure
T-Bone Mesa Alignment	2	1	3	0
UDOT Application Alignment	2	2	4	0
Southern Alignment	3	1	2	0
Red Hills Parkway Expressway	0	0	1	0
St. George Boulevard/100 South One-way Couplet	0	0	0	0

Red Cliffs NCA RMP Amendments

Alternatives B and C for the Red Cliffs NCA RMP Amendment both allow for the granting of a highway ROW within the Red Cliffs NCA. Direct and indirect adverse impacts to cultural resources under RMP Amendment Alternative B are expected to be no different than that described previously for the potential Northern Corridor T-Bone Mesa, UDOT Application, and Southern alignments. Under Red Cliffs RMP Amendment Alternative C, direct and indirect impacts to cultural resource would be greater than Red Cliffs NCA RMP Amendment Alternative B, because of the designation of a ROW corridor. Future ROW development could result in additional future ground disturbance and potentially greater direct impacts to cultural resources within the 500-foot corridor designated by Red Cliffs NCA RMP Amendment C, where the highway ROW passes through the Red Cliffs NCA.

Washington County HCP and St. George Field Office RMP Amendments

The SGFO RMP Amendment alternatives are a planning action that would change the management of the BLM-administered lands within proposed Zone 6. The SGFO RMP Amendment would modify the types of activities that are allowed or not allowed, and where those activities may occur. The precise number of cultural resources within proposed Zone 6 is not known because just under 24 percent (1,621 acres) has been surveyed for cultural resources. However, both SGFO RMP Amendment Alternatives B and C would be beneficial to cultural resources because they would increase restrictions on activities that could impact cultural resources. Alternative B would be more restrictive of future mining and mineral management, ROWs, and recreational use, and therefore would likely be more beneficial compared to Alternative C. However, both alternatives would be more beneficial for cultural resources than the No Action Alternative.

The Amended HCP and SGFO RMP Amendment would limit surface disturbance within the proposed Zone 6 boundaries, minimizing ground disturbances that could impact cultural resources and thus result in a beneficial impact to cultural resources.

The issuance of an ITP based on the Washington County HCP could result in future impacts on cultural resources from the authorization of take of Mojave desert tortoise from non-Federal activities on non-Federal lands (Table 3.14-4). While there are not specific non-Federal activities or land uses proposed at this time, the possibility of future development on lands that fall within the permit area could result in direct and indirect impacts to cultural resources. Archaeological sites could be damaged by development resulting in the loss of important data contained within the heritage resources listed in Table 3.14-4 as well as other previously unrecorded heritage

resources. Future development could also result in indirect impacts through the introduction of new visual or auditory elements that change the setting for heritage resources in a way that alter the setting in a way that diminishes the feeling or association. The USFWS, Utah SHPO, Native American Tribes, and Washington County are collaboratively developing a Programmatic Agreement or other appropriate compliance documents to address potential impacts to historic properties resulting from issuance of an ITP. The Programmatic Agreement or other appropriate compliance documents would be used to ensure compliance with Section 106 of the NHPA.

3.14.2.4 Direct and Indirect Impacts from Alternative 5

Roadway construction associated with Alternative 5, Red Hills Parkway Expressway, would occur within and adjacent to an existing roadway and could potentially result in adverse effects to two historic properties (one historic linear resource and one historic structure) (Table 3.14-5), as well as adverse impacts to cultural resources under NEPA. The Class III survey did not identify all of the features associated with the previously recorded linear archaeological site, Cottonwood Pipeline; however, previously recorded segments and features do occur within the proposed alignment and would be impacted.

Construction activities for the Red Hills Parkway Expressway Alignment could potentially cause permanent or long-term effects to one NRHP eligible resources, through physical damage or alteration resulting in the loss of information important to heritage resources contained within the historic water conveyance feature (Cottonwood Pipeline) within the roadway alternative. Construction activities could also result in temporary or short-term effects including noise and vibration that would affect archaeological resources and stockpiling of construction materials and equipment could cause surface damage to cultural resources.

The roadway construction activities associated with the Red Hills Parkway Expressway Alignment will not result in other non-physical direct impacts to cultural resources because Red Hills Parkway already exists next to these resources, and changes to the roadway configuration would not introduce new visual, auditory or atmospheric elements that diminish the character defining features of historic properties. While no traditional cultural properties or sacred sites eligible for the NRHP have been identified within the APE for any alternative to date, such sites if identified could experience long-term visual effects. The Red Hills Parkway Expressway Alignment will not result in indirect impacts on cultural resources through any foreseeable changes in land use.

Alternative 5 would not require amendments to the Red Cliffs NCA RMP, and no impacts to cultural resource would occur as a result. Proposed Zone 6 would not be created and the associated SGFO RMP Amendment alternatives would not occur. Therefore, direct and indirect impacts to cultural resources in this area would remain unchanged from current conditions. With the exception of Zone 6, impacts from the USFWS issuing an ITP to Washington County would be the same as Alternatives 2, 3, and 4.

3.14.2.5 Direct and Indirect Impacts from Alternative 6

The St. George Boulevard/100 South One-way Couplet (Alternative 6) would have no adverse effect under Section 106 of NHPA because it would not directly or indirectly alter the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (Table 3.14-5). St. George Boulevard and 100 South are both existing roadways with vehicular traffic; no cultural resources were identified in areas of new construction. There are no traditional cultural properties or sacred sites eligible for the NRHP identified within the APE. Temporary or short-term construction activities could create noise and vibration that would affect historic structures, and stockpiling construction materials and equipment could cause short-term visual or

vibration effects. None of these activities are expected to have indirect adverse effects NRHP eligible historic properties within the APE, nor be indirect impacts under NEPA.

Alternative 6 would not require amendments to the Red Cliffs NCA RMP, and no impacts to cultural resource would occur. Proposed Zone 6 would not be created and the associated SGFO RMP Amendment alternatives would not occur. Therefore, impacts to cultural resources in this area would remain unchanged from current conditions. With the exception of Zone 6, impacts from the USFWS issuing an ITP to Washington County would be the same as Alternatives 2, 3, and 4.

3.15 Recreation and Visitor Services

The analysis area for the evaluation of impacts on recreation and visitor services includes the boundaries of the Red Cliffs NCA and the Reserve, areas within the alternative Northern Corridor ROW, and proposed Zone 6. The Washington County Amended HCP and the USFWS's potential issuance of an ITP to Washington County would not impact recreation and visitor services outside of proposed Zone 6.

3.15.1 Affected Environment

3.15.1.1 Red Cliffs NCA and the Reserve

Recreation opportunities such as hiking, bird watching, rock-climbing, sightseeing, and mountain biking abound throughout the Red Cliffs NCA and the Reserve. Between October 1, 2018, and September 30, 2019 (Fiscal Year 2019), the Red Cliffs NCA had nearly 190,000 visits comprising more than 60,000 visitor days (BLM 2019b). Recreation and visitor services within the Red Cliffs NCA and the Reserve are managed collaboratively across multiple jurisdictions, including Federal, State, and local, through various plans. On BLM-administered lands, recreation and visitor services are managed by the Red Cliffs NCA RMP (BLM 2016b) consistent with the direction from OPLMA, which recognized recreation as one of the values of the Red Cliffs NCA (16 U.S.C. 460www[a] and [e]). On non-Federal lands, management of recreation and visitor services is generally dictated by the Washington County HCP (1995) and Red Cliffs Public Use Plan (PUP) (Washington County 2000).

The Red Cliffs NCA RMP designated the entire Red Cliffs NCA as the Red Cliffs Special Recreation Management Area (SRMA). An SRMA is "an administrative unit where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, or distinctiveness, especially compared to other areas used for recreation" (BLM 2014). The BLM's objectives for the Red Cliffs SRMA are to "foster a sense of awareness and stewardship in recreational participants and local community partners" and to "provide opportunities for public land users to develop an understanding and appreciation of the NCA" (BLM 2016b). The SRMA is divided into four Recreation Management Zones (RMZ). These zones are described in Table 3.15-1 and shown on Map 2.3-4.

Table 3.15-1. Red Cliffs SRMA – Recreation Management Zone Objectives

RMZ	Objectives	Recreation Activities	Experiences	Area (acres)
Rural	High-quality, sustainable, family friendly activities and education opportunities, while conserving and protecting other resource values of the Red Cliffs NCA	Car camping at Red Cliffs Recreation Area, day-use activities such as driving for pleasure, and exploring archaeological and paleontological interpretive sites	Participating in self-education activities and enjoying family and friends	1,224
Frontcountry	High-quality, sustainable, non-motorized recreation opportunities, while conserving and protecting other resource values of the Red Cliffs NCA	Hiking, biking, and horseback riding on easily accessible trails and rock-climbing close to the urban interface	Enjoying a wide variety of recreational opportunities, participating in activities close to town, exercising	15,289
Backcountry	Challenging and sustainable backcountry, non-motorized opportunities, while conserving and protecting other resource values of the Red Cliffs NCA	Hiking, biking, and horseback riding on long, challenging trails	Testing endurance, sharing challenging outdoor adventures with friends, enjoying a wide variety of outdoor environments	8,709
Primitive	Remote, adventurous, and sustainable non-motorized opportunities, while conserving and protecting other resource values of the Red Cliffs NCA	Hiking and horseback riding on rugged, challenging, and remote terrain; traditional rock-climbing	Enjoying strenuous physical exercise, risk-taking activities, and developing self-sufficiency	19,989

Note: Since 2016, the BLM has acquired private in-holdings and incorporated these parcels into the RMP as appropriate. Therefore, total acreages of each RMZ vary slightly from the 2016 RMP.

The RMP details the intended recreation setting for each of these RMZs and how to manage the physical, social, and operational components of each to achieve the prescribed outcomes-focused management objectives. Specific outcomes-focused management objectives and recreation-setting characteristics are provided for each RMZ in Appendix G of the Red Cliffs NCA Record of Decision and Approved RMP (BLM 2016b).

The Red Cliffs NCA and the Reserve are home to nearly 200 miles of non-motorized trails for activities such as hiking, biking, horseback riding, and geocaching that traverse both Federal and non-Federal lands (summarized in Table 3.15-2 and shown on Map 3.15-1). Red Hills Parkway and Cottonwood Springs Road are designated motorized trails within the Red Cliffs NCA. There are also approximately 28 miles of proposed single-track trails within the Red Cliffs NCA. Rock-climbing is allowed throughout the Primitive RMZ and at authorized locations in the Frontcountry RMZ. Red Cliffs Recreation Area, about 14 miles northeast of St. George, is the primary developed recreation facility in the Red Cliffs NCA. It contains a campground and day-use facilities. None of the Red Cliffs NCA is open to cross-country use by OHVs, and 44.5 percent is closed to OHV use. While 55.4 percent of the Red Cliffs NCA allows OHV use on routes designated for their use, all motorized vehicles are restricted to major roads except for administrative use.

Table 3.15-2. Red Cliffs NCA and Reserve Trail Network Summary (Federal and Non-Federal Lands)

Area	Trails	Miles
Red Mountain	Hellhole, Fortitude, Red Mountain, Snow Canyon Overlook, Toe	16.7
Snow Canyon	Johnson Canyon, Padre Canyon, Whiptail, Jenny's Canyon, Sand Dunes, West Canyon, Pioneer Names, Hidden Pinyon, Three Ponds, Petrified Dunes, Butterfly, Lava Flow, Gila, White Rocks, White Rocks Amphitheater, Cinder Cone	27.3
Paradise Canyon	SR 18 Trail, Chuckwalla, Halfway Wash, Beck Hill, Turtle Wall, Paradise Rim, Gap, Gecko, Scout Cave, Kestrel	16.7
City Creek	Rusty Cliffs, Red Hills, City Creek, Owen's Loop, Brook's Nature Trail, Pioneer Hills, Pioneer Rim, T-Bone	16.0
Broken Mesa	Black Knolls, Winchester, Ledges, Black Gulch, Yellow Knolls, Lange's Dugway, Alger Hollow, Broken Mesa Rim	19.2
Mill Creek	Mill Creek, Middleton Powerline, Cottontail, Mustang Pass, Ice House, Washington Hollow, Bone Wash, Elephant Arch, Sand Hill, Dino Cliffs	27.5
Grapevine	Grapevine, Church Rocks, Bracken's Loop, Coachwhip, Spanish Wash, Cottonwood Hills	14.0
Cottonwood and Red Cliffs	Cottonwood Canyon, Prospector, High Grade, Heath, Red Reef, Red Reef East, Anasazi, Mano, Metate, Silver Reef	27.4
White Reef	White Reef, Leeds Reef, Cordura, Adams, Grubstake, McMullin, Adit, Tipple	5.0
Babylon and Hurricane	Flicker, Sandstone Mountain, Red Tail, Raven, Sidewinder, Rach, Mine Shaft, Historic Babylon, Little Purgatory, Hell's Half Acre, East Reef, Virgin River, West Cinder Knoll, 600 North, East Cinder Knoll	22.0

Source: Washington County HCP Administration no date

Note:

Miles reported are the entire, formalized trail network and, in some instances, extend beyond the Red Cliffs NCA and Reserve boundaries. Within the Red Cliffs NCA, commercial special recreation permits (SRPs) are limited to 10 percent of overall visitation, and any SRPs for motorized activities are restricted to roads and primitive roads authorized for public use (BLM 2016b). While the BLM does approve SRPs within the Red Cliffs NCA, no SRPs are approved in areas that would be affected by the proposed actions (pers. com. Voyles 2020).

Within the Red Cliffs NCA, commercial SRPs are limited to 10 percent of the overall visitation, and any SRPs for motorized activities are restricted to roads and primitive roads authorized for public use (BLM 2016b). While the BLM does approve SRPs within the Red Cliffs NCA, no SRPs are approved in areas that would be affected by the proposed actions (pers. com. Voyles 2020).

Because the Red Cliffs NCA RMP was developed after the HCP and PUP, the recreation management across Federal and non-Federal lands is generally consistent. Similar to the SRMA designation, the PUP divides the Reserve into two management zones, Upland and Lowland, which guide recreation management on non-Federal lands and tier off the management prescriptions in the HCP. The Upland Zone encompasses much of Red Mountain, canyons within the Cottonwood Wilderness Area, higher elevations south of the National Forest, and Babylon/Sandstone Mountain Area (Washington County 2000). The Lowland Zone is more ecologically sensitive and, therefore, only allows hiking, biking, and horseback riding on designated trails and camping at designated campgrounds. Camping and off-trail use are allowed in the Upland Zone (Washington County 2000).

Major developed recreation facilities on non-Federal lands include Snow Canyon State Park in the western portion of the Reserve and Pioneer Park at the southern boundary of the Reserve. Snow Canyon State Park contains an array of activities that drew more than 500,000 visitors in 2019 (UDNR 2019, 2020). Recreation opportunities within the park include technical rock-climbing and hiking and a year-round campground. Pioneer Park is managed by the City of St. George and is a rock-climbing destination, with youth education programs and a variety of day-use amenities.

Although the City does not track visitor use for the park, Pioneer Park is known to have high activity levels with its easy accessibility from St. George for residents and tourists alike.

3.15.1.2 Recreation and Visitor Services in St. George Along Northern Corridor Alternatives

Within the city limits of St. George, the primary recreation areas adjacent to or near the St. George Boulevard/100 South One-way Couplet Alternative are the Town Square and the Dixie Sun Bowl. The Town Square is a prominent feature and gathering place in downtown St. George, just north of the 100 South and Main Street intersection. The Town Square hosts a wide variety of events, from art festivals to movies, and features amenities such as pavilions, a splash pad, and carousel (City of St. George no date). The Dixie Sun Bowl is a historic rodeo arena along 100 South that is managed by the City of St. George. It has housed the annual St. George Lions Dixie Round-up Rodeo and numerous other sporting events over the years (DeMille 2015). In recent years, the arena has largely been limited to hosting the annual rodeo (Reina 2020, St. George Area Chamber of Commerce no date).

3.15.1.3 Recreation and Visitor Services in Proposed Zone 6

The BLM manages recreation on BLM-administered lands in proposed Zone 6 using the SGFO RMP. The non-Federal lands in proposed Zone 6 are managed by State and local plans and ordinances. Similar to recreation within the Red Cliffs NCA, these jurisdictional agencies collaborate to provide consistent recreation management across these lands.

The SGFO RMP designates much of Washington County, including BLM-administered portions of proposed Zone 6, as an Extensive Recreation Management Area (ERMA). The SGFO ERMA emphasizes "dispersed recreation, trail development, signing, maintenance of primitive and semiprimitive characteristics, management or abatement of natural and man-made hazards, and protection of resources and sites of recreational interest" (BLM 1999). While the Washington County General Plan (2012) identifies proposed Zone 6 as Open Space on both BLM-administered and State lands, and its associated zoning ordinance (2019d) identifies the majority of the area as Open Space Conservation, neither the plan nor ordinance applies recreation management prescriptions. However, the County's RMP recognizes the need to collaborate with Federal agencies on their RMPs and emphasizes the importance of access to recreational opportunities on public lands (Washington County no date c).

The area of proposed Zone 6 has been a popular destination for recreational users for decades, with recent estimated visitor use on BLM-administered and SITLA lands totaling 82,775 annual visits (pers. com. Kiel 2019b, pers. com. Voyles 2020). Table 3.15-3 summarizes estimated proposed Zone 6 visitor use in Fiscal Year 2019 by recreational resource.

Table 3.15-3. Visitor Use in Proposed Zone 6 (Fiscal Year 2019)

Recreation Resource	Estimated Visits
Bearclaw Poppy Trail	27,000
Stucki Springs Trail	600
BLM SRP Events	4,000
Green Valley Gap Trailhead	9,000
SITLA Events	75
Moe's Valley Climbing Area	15,200
Zen Trail	8,000
Unaccounted Visitor Use [a]	18,900
Total	**82,775**

Source: pers. com. Voyles 2020

[a] Estimated at 70 percent of Bearclaw Poppy Trail visitor use

Visitors use the area for a wide array of recreational activities, with mountain biking and rock-climbing being the primary recreation use in the area (pers. com. Kiel 2019b). Within proposed Zone 6, there are approximately 122 miles of roads and trails, including approximately 50 miles of trails open to motorized OHV use, 30 miles of single-track, non-motorized trails, and 42 miles of social trails (see Map 3.15-3). Refer to Section 3.17 for additional details. Many of these routes are user-created and were developed by the passage of users or vehicles and were not specifically designed and constructed by land management agencies. On BLM-administered lands, mechanized, non-motorized recreation, such as mountain biking, is limited to existing roads and trails, except within the boundaries of the ACEC, where it is limited to designated trails (BLM 2016b). The main destinations for rock-climbing in proposed Zone 6 are Green Valley Gap and Moe's Valley, though rock-climbing is currently not limited to designated sites. These climbing areas provide bouldering, sport, top rope, and traditional rock-climbing experiences.

Recreational opportunities, such as rock-climbing and mountain biking, also draw visitors to the area for camping. Dispersed camping is allowed in undeveloped areas, unless otherwise prohibited (BLM 1999), and car camping on both Federal and non-Federal lands in proposed Zone 6 is popular. While camping is currently prohibited on SITLA lands in Green Valley Gap and Moe's Valley, camping is relatively unmanaged in the area, and recreational users are known to still use the area for camping. The proposed Zone 6 area also is widely used for target shooting, which is allowed on BLM-administered and SITLA lands unless posted otherwise. However, discharge of firearms within the St. George city limits, which overlaps the eastern portion of proposed Zone 6, is prohibited. Similar to camping in the area, current recreational target shooting is relatively unmanaged.

SRPs within proposed Zone 6 include five competitive mountain bike races, all of which occur on BLM-administered land in the Green Valley area (per. com. Kiel 2019b, per. com. Voyles 2020). All staging for these events occurs on private property. Special events also are permitted on SITLA lands, specifically at Moe's Valley climbing area (per. com. Voyles, 2020). Public motorized vehicle (OHV) use is allowed, and use of passenger vehicles, all-terrain vehicles, utility-terrain vehicles, and motorcycles are prevalent in proposed Zone 6. On BLM-administered lands, OHV use is limited to existing routes until an implementation-level travel management plan is executed; at which point, OHV use will be limited to designated routes (BLM 2016b). Currently, on non-Federal lands, OHV use is relatively unmanaged, and recreational users are known to create social trails in undesignated areas to access recreational opportunities. Refer to Section 3.17 for further details.

3.15.2 Environmental Consequences

This section analyzes how the proposed Federal actions may modify existing recreation management prescriptions and result in effects to recreational uses and availability, access to and from recreational activities and visitor services, and visitor experience.

3.15.2.1 Analysis Methods and Assumptions

Each of the proposed Federal actions may result in impacts to recreation and visitor services. Impact indicators for recreation and visitor services include consistency with the Red Cliffs NCA RMP, SGFO RMP, Red Cliffs Desert Reserve PUP, and local plans and ordinances related to recreation; length or area of recreational facilities, such as trails or parks, that would be altered, closed to use, or result in modified use; and visitor education, interpretation, and safety.

The following assumptions apply to the following analysis:

- Demand for recreational activities is expected to increase with continued population growth.
- The analysis areas contain different recreational user types or groups, and each type or group has differing recreational expectations and experiences.

- Recreation impacts resulting from the Amended HCP and ITP issuance would be limited to proposed Zone 6 and similar in nature to impacts associated with the SGFO RMP Amendment.
- Implementation-level management actions and decisions related to proposed Zone 6 would be analyzed in a separate future NEPA document.

3.15.2.2 Direct and Indirect Impacts from Alternative 1

Under Alternative 1, the existing recreation management prescriptions and recreation opportunities within the Red Cliffs NCA, the Reserve, and proposed Zone 6 would be unchanged. Recreation within the analysis area would not be impacted, and there would be no impacts to their use, availability, or access or to visitor experience. As the population in the St. George area continues to increase, the proliferation of social trails in proposed Zone 6 is likely to increase as the demand for recreational activities increases.

3.15.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Northern Corridor Alternatives

The potential ROWs for the Northern Corridor under Alternatives 2 through 4 cross the Red Cliffs SRMA and the Reserve. As shown in Table 3.15-4, within the SRMA the Northern Corridor alternatives primarily traverse the Frontcountry RMZ, which does not allow OHV use. All of the alternatives would cross the Lowland Zone of the PUP. Construction of a road within these areas could provide access to users who do not currently use the area but would use the bike path along the road, such as road cyclists. However, users of off-road, natural surfaced trails may be adversely impacted by the change to the visitor experience.

Table 3.15-4. Northern Corridor ROW within Red Cliffs SRMA Recreation Management Zones

Northern Corridor Alternative	Frontcountry RMZ	Rural RMZ	Total Acres of ROW in SRMA
T-Bone Mesa Alignment	123 acres	7 acres	**130 acres**
UDOT Application Alignment	114 acres	10 acres	**124 acres**
Southern Alignment	76 acres	25 acres	**101 acres**

Both the Rural and Frontcountry RMZs have a recreation setting that recognizes an urban interface with landscapes that are either partially or considerably modified with visible human-made infrastructure. For areas within the Rural RMZ, the user experience would not substantially change as a result of the alternatives. However, a large portion of the alternatives traverse the Frontcountry RMZ, where users would experience a more dramatic change to the recreation setting. Within the Frontcountry RMZ, there would be a more stark or obvious visual change to the natural setting as a result of constructing a new, 4-lane, paved road (refer to Section 3.13 for a detailed analysis of visual impacts). Users would also experience more frequent highway noise and, with potentially easier access to trails from the new highway, are likely to experience increased contact with people on trails and the ability to hear groups of people on a more constant basis. Depending on the user type, these changes could be perceived as degrading the user experience, because recreational users, especially non-motorized users, may expect a more natural desert setting in the Frontcountry RMZ compared to the Rural RMZ.

Impacts to recreation facilities from the alternatives are largely to the existing and proposed trail network. Other than the potential for changes in access to recreational opportunities, no existing uses or developed recreation resource would be modified or restricted. The Northern Corridor itself may provide more recreational opportunity through construction of a bike and pedestrian trail adjacent to the road, and this feature is likely to be used by those who would not use the area otherwise. As shown in Table 3.15-5 and on Map 3.15-3, the Northern Corridor would cross numerous existing designated trails within the Red Cliffs NCA and the Reserve. The majority of these impacts are within the City Creek trail network, although the Cottontail trail would be

impacted in the Mill Creek area. In addition, the Pioneer Hills trailhead is within the Alternative 4 Southern Alignment; none of the other alternatives impact trailheads.

As detailed further in Section 3.17, all alternatives would require alteration or closure of portions of the existing trails and consideration during design on how to or if to accommodate trail crossings. Potential accommodations could include grade-separated culverts under the road; incorporating a trail into the road profile for an appropriate crossing; and the use of crosswalks, road bumps, and signage. In areas where trail crossings would not be accommodated, access to users would be restricted from the roadway because of fencing for Mojave desert tortoise. Similarly, final design would need to consider trailhead impacts and the need for relocation or, if the size of parking at the trailhead would be reduced because of road encroachment, how to accommodate capacity demands.

Table 3.15-5. Existing Trails Impacted by Northern Corridor Alternatives (Miles within ROW)

Trail	Trail Type	Red Cliffs NCA or The Reserve	T-Bone Mesa Alignment	UDOT Application Alignment	Southern Alignment
Cottontail	Non-motorized, two-track	The Reserve	0.1	0.1	0.1
T-Bone	Non-motorized, two-track	Red Cliffs NCA	0.1	0.1	0.1
City Creek	Non-motorized, two-track	The Reserve	0.1	0	<0.1
Red Hills Parkway Path	Non-motorized, multi-use	The Reserve and Red Cliffs NCA	0.3	0.3	0.7
Pioneer Rim	Non-motorized, single-track	The Reserve	0	0	0.4
Pioneer Hills	Non-motorized, two-track	Red Cliffs NCA	0	0	<0.1
Cottonwood Springs Road	Motorized	Red Cliffs NCA	0.1	0.1	0.1
Red Hills Parkway	Motorized	Red Cliffs NCA	0	0	<0.1
Total	Not Applicable	Not Applicable	**0.7**	**0.6**	**1.4**

Note:

Impacts to Cottonwood Springs Road and Red Hills Parkway are only accounted for where they are designated motorized routes within the Red Cliffs NCA. Numerous social trails near Cottonwood Springs Road and Red Hills Parkway also would be impacted with the Northern Corridor ROW alignment under Alternatives 2, 3, and 4; however, these are unmanaged, user-created trails and ultimately may be subject to closure. While proposed trails are crossed by the road alignments, as summarized in Table 3.15-6, construction of these alternatives would not preclude future trail projects. Final design of the Northern Corridor would need to accommodate these future trail crossings, as appropriate.

Table 3.15-6. Proposed Trails Impacted by Northern Corridor Alternatives (Miles within ROW)

Trail Type	T-Bone Mesa Alignment	UDOT Application Alignment	Southern Alignment
Non-mechanized, single-track	0.3	0.1	0
Non-mechanized, two-track	0	0.1	<0.1
Non-motorized, single-track	0.3	1.1	0.1
Non-motorized, two-track	0.1	0.1	1.0
Total	**0.7**	**1.4**	**1.1**

During construction of the road, short-term, adverse impacts to visitor access would occur from traffic delays on Red Hills Parkway and Cottonwood Springs Road to construct new intersections.

Recreational access may be temporarily closed or limited during construction where trails or trailheads intersect road construction. A public information office will be established to communicate information to the public during construction (see Appendix D).

Red Cliffs RMP Amendments

While the BLM has aligned the Red Cliffs NCA RMP Alternative B and C with Alternatives 2, 3, and 4, the BLM could select not to amend the current RMZ boundaries and select the T-Bone Mesa, UDOT Application, and Southern alignments of the Northern Corridor. With Red Cliffs NCA RMP Amendment Alternative A, the current management of the RMZ would remain unchanged. However, if the ROW were still granted within the NCA, the recreation setting changes associated with the construction of the roadway would occur as described previously, but the BLM would not modify the RMZ boundaries or manage the areas adjacent to the Northern Corridor for the Rural RMZ objectives and visitor experience.

Alternatively, if a ROW grant is issued for the T-Bone Mesa, UDOT Application, or Southern alignments, Red Cliffs NCA RMP Amendment Alternatives B and C would amend the RMP's recreation management objectives in areas adjacent to the Northern Corridor. Both of these alternatives would modify REC-5 to manage a 600-foot-wide area along the selected Northern Corridor as part of the Rural RMZ, which allows for operational components such as paved roads where visitors "can expect a steady stream of highway auto and truck traffic" (BLM 2016b). The objectives of the BLM's recreation management in the Rural RMZ focus on family friendly activities and education opportunities. This management focus would be a shift from the BLM's current focus on non-motorized recreation opportunities in this area. As a result, the Rural RMZ would increase in size and areas managed as the Frontcountry RMZ would decrease, but there would be no change in acreage managed for the Backcountry or Primitive RMZs. Table 3.15-7 summarizes the RMZ acreages depending on the Northern Corridor alternative selected using Red Cliffs NCA RMP Alternatives B and C. Overall, the RMZ changes would constitute a narrow change to the current management direction for recreation and visitor services within the NCA and would be consistent with the recreation and visitor service objectives of the RMP.

Table 3.15-7. Red Cliffs SRMA—Change in Recreation Management Zones (Red Cliffs NCA Alternatives B and C)

Northern Corridor Alternative	Rural RMZ (acres)	Change from Existing (acres)	Frontcountry RMZ (acres)	Change from Existing (acres)
T-Bone Mesa Alignment	1,370	+146	15,143	-146
UDOT Application Alignment	1,362	+138	15,151	-138
Southern Alignment	1,316	+92	15,197	-92

While Red Cliffs NCA RMP Amendment Alternatives B and C would generally have similar impacts, the designation of a ROW corridor under Alternative C has greater potential for indirect impacts to recreation and visitor services. As discussed in relation to the Northern Corridor alternatives, visitor experience would change in areas converted from Frontcountry RMZ to Rural RMZ because of the change in management of the physical, social, and operational components. Impacts to recreation activities, setting, and user experience under Alternative B would be similar to those described under the Northern Corridor alternatives because it would not allow for future development beyond the road. With Alternative C, the ROW corridor designation may result in future impacts to recreation and further changes in the recreation setting and user experience as a result of utility ROW approvals and utility infrastructure development. Neither RMP amendment alternative would have any other changes to the BLM's management of recreation and visitor services within the NCA.

SGFO RMP Amendments and Amended HCP/ITP

Proposed Zone 6 currently functions as a backyard recreation destination for St. George residents and visitors alike, providing a relatively free-form and unmanaged experience. Implementation of either SGFO RMP Amendment Alternative B or Alternative C would restrict recreational use within proposed Zone 6, as described further in the following text. Similarly, as the Amended HCP is implemented over time, additional resources would be focused on recreation management and law enforcement, and more lands within proposed Zone 6 are expected to come under BLM management. These changes would result in more stringent management and enforcement of recreational activities and uses in the area. Ultimately, these actions would result in a reduction in availability of certain recreational activities and visitor access and a marked change in the visitor experience. The overall visitor experience would be different as uses become limited to certain areas, reduced in scope, more intensively managed or wholly excluded, and changes to this experience would be dependent on user and group type. These impacts also may be viewed as both negative and beneficial depending on the user and group type. However, with likely reductions in unmanaged access, all users and group types who seek the current unmanaged and user-directed recreational experience are expected to view the implementation-level changes to their experience as adverse.

With either alternative, no trails would be created, closed, or altered. However, both RMP amendment alternatives and the Amended HCP alternative contain an action that would reduce available trail miles by more than half, which would be most acutely felt by OHV users. This would result from changing management direction to having a neutral or positive effect on Mojave desert tortoise habitat and would focus on reducing illegal, user-created trails. Implementing these changes on BLM-administered lands would require an implementation-level plan and require future NEPA analysis. These implementation-level management actions would reduce the proliferation of social trails but also reduce available motorized (OHV) and non-motorized trails. These details would be part of the implementation-level Recreation Area Management Plan. This would have the effect of further reducing OHV use in the proposed Zone 6 area to designated roads and, with implementation of the HCP over time, areas would be fenced to prevent unauthorized off-road activity. As a result, much of proposed Zone 6 would be inaccessible to OHV users, and these users are likely to seek out experiences on public lands further west of proposed Zone 6.

Managing proposed Zone 6 for sustainability of the travel network, as described in Section 3.17, would reduce impacts to the visual setting over time. This could improve the recreation setting and provide a more predictable experience for mountain bikers and other user types in the long term because some of the user-created routes are likely used inadvertently by users who lose their way. These changes also would provide a more remote and natural feeling. However, for non-motorized trail users, closing social trails and restricting use to designated trails may result in more concentrated use on existing trails. This may degrade or diminish the overall riding and trail-user experience. Similar to OHV users, but to a lesser extent, it may displace some mountain bikers and other trail users to nearby areas with more trail miles outside of proposed Zone 6, such as near Santa Clara, to achieve an experience similar to existing conditions.

Rock-climbing at Green Valley Gap and Moe's Valley is expected to be relatively unaffected. However, with the reduction in unmanaged social trails and the potential for more formalized parking, minor changes to user access and experience could change because climbing areas are not as readily accessible via user-preferred social trails. Camping within proposed Zone 6 also would become either more limited and formalized or be eliminated. On BLM-administered lands, dispersed camping would no longer be allowed. Alternative B would close all BLM-administered lands within proposed Zone 6 to camping and campfires, while Alternative C would allow these activities in designated locations. With either alternative, camping on non-Federal lands would be

dictated by the PUP, which, depending on the sensitivity of the area, allows for some dispersed camping but trends toward limiting activity to designated campgrounds. Regardless of alternative, users would be prohibited from certain areas and would no longer have the flexibility that dispersed camping allows. The number of designated sites would be a limiting factor for users, and campsites would become first-come, first-serve or reservation-based, which would further reduce the relative unrestricted camping experience users currently enjoy.

The availability of the area for target shooting would be greatly reduced. Alternative B would close all 3,471 acres of BLM-administered lands to recreational target shooting, while Alternative C would still allow this activity on BLM-administered lands if adhering to target-type and backstop requirements. On non-Federal lands, the PUP prohibits all shooting. Adverse impacts to recreational target shooting would be more acutely felt with Alternative B. While limiting recreational target shooting would adversely affect or displace visitors who use the area for this activity because of reduced availability, other visitors, hikers, and cyclists, who make up the majority of users, would likely view this as beneficial based on a reduction in target shooting noise and the elimination of the potential for a shooting accident.

Both alternatives would restrict other recreational activities such as physical geocaches, paintball, parachuting, and unmanned aerial vehicles (e.g., drones). However, this is not anticipated to have a substantial effect to visitors because these are not primary uses of the area. Existing competitive use events that have an SRP would be unaffected by implementation of the HCP. On BLM-administered lands, Alternatives B and C would not alter how motorized SRPs are issued in the proposed Zone 6. The public lands in proposed Zone 6 are not large enough to support commercial operations for motorized tours. The only route currently authorized for commercial use is the Class B county road off Navajo Drive (Apex Mine Road). This route is used by permittees to access the BLM routes further to the west.

3.15.2.4 Direct and Indirect Impacts from Alternative 5

Similar to Alternative 1, this alternative would not have recreation or visitor services impacts as a result of the USFWS's ITP action or the BLM's actions related to the Red Cliffs NCA RMP and SGFO RMP. While the ITP would be issued, the changed circumstance requiring creation of proposed Zone 6 would not occur. Therefore, recreation would continue within proposed Zone 6 as it currently exists today.

Table 3.15-8 summarizes the existing trails within the Red Hills Parkway Expressway ROW that could be directly or indirectly impacted by construction of the Red Hills Parkway Expressway. Similar to the Northern Corridor under Alternatives 2 through 4, this alternative would require alteration or closure of portions of the existing trails and consideration during design of how to accommodate trail crossings or modifications. Potential accommodations could include grade-separated culverts under the road; incorporating a trail into the road profile for an appropriate crossing; and the use of crosswalks, road bumps, and signage. Construction impacts would be similar to those described for Alternatives 2 through 4.

Table 3.15-8. Existing Trails Impacted by Red Hills Parkway Expressway

Trail	Trail Type	Miles within ROW
Red Hills Parkway Path	Non-motorized, multi-use	0.3
Pioneer Park	Non-motorized, multi-use	<0.1
Brook's Nature Trail	Non-mechanized, single-track	<0.1
Rusty Cliffs	Non-motorized, single-track	<0.1
Owen's Loop	Non-motorized, single-track	<0.1
Total	Not Applicable	**0.3**

In addition, the Alternative 5 ROW encroaches on approximately 1.0 acre of Pioneer Park (see Map 3.15-3); however, none of the amenities, recreation opportunities, or visitor services associated with the park would be permanently impacted. User experience may change because of visual impacts related to the wider, adjacent expressway and changes to views from Dixie Rock that may be altered by the grade-separated structure at 200 East (see Section 3.13 for visual impact analysis). Long-term access to Pioneer Park would be maintained, but final design could result in access modifications such as changes to ingress and egress points. The availability of recreation opportunities at the park would remain unchanged. In addition, with its existing urban interface and location adjacent to a widely used existing road, the overall visitor experience is not expected to substantially change.

3.15.2.5 Direct and Indirect Impacts from Alternative 6

Alternative 6 would have minor impacts to recreation and visitor services. Similar to Alternative 1, this alternative would not have recreation or visitor services impacts as a result of the USFWS's ITP action or the BLM's actions related to the Red Cliffs NCA RMP and SGFO RMP. While the ITP would be issued, the changed circumstance requiring creation of proposed Zone 6 would not occur. Therefore, recreation would continue within proposed Zone 6 as it currently exists today.

Alternative 6 would include conversion of St. George Boulevard and 100 South into a one-way couplet. Recreation activities in the area, such as at the Town Square and Dixie Sun Bowl, would not be directly impacted. While the conversion to a one-way road would occur adjacent to the Dixie Sun Bowl, it would not directly impact use of the arena and is not anticipated to modify access to the facility. Traffic patterns would change in the area, and traffic along adjacent streets, such as Tabernacle Street, may increase if people avoid the one-way couplets. As a result, traffic may increase near the Town Square, but it is not expected to substantially alter the setting and visitor experience. During construction, minor delays may occur for users accessing recreation opportunities on or near the one-way couplets while the roadways are re-striped, but these impacts are expected to be short term. No trails would be impacted by this alternative.

3.16 Land and Water Conservation Fund Act Lands [Section 6(f) Properties]

This analysis identifies properties acquired or developed through grants from the LWCF Act that may be affected by the proposed Federal actions analyzed in this Draft EIS. On the State side of the program, these lands are commonly referred to as Section 6(f) properties. No LWCF lands are within proposed Zone 6, and the proposed RMP amendments would not affect the recreational use of State Section 6(f) properties or affect previous acquisitions that used the LWCF; therefore, this analysis focuses on properties crossed by the proposed Northern Corridor alternatives.

3.16.1 Affected Environment

The LWCF Act of 1965 established a funding source assisting states and Federal agencies to meet present and future outdoor recreation demands and needs. Section 6(f)(3), as codified in 36 CFR 59.3, is the cornerstone of Federal efforts that ensure Federal investments in LWCF assistance are being maintained for public outdoor recreation use. The LWCF has a Federal agency component and a State and local government component, which have different uses and requirements. For Federal land management agencies such as the BLM, the LWCF may be used to purchase private in-holdings to meet resource management objectives. For State and local governments, Federal assistance from the LWCF is allocated to a state for the planning, acquisition, and development of needed land and water public outdoor recreation projects. Once land has been purchased or developed (partially or entirely) with LWCF assistance from the State side of the LWCF program, it is considered a Section 6(f) property. No Section 6(f) property may be wholly or partially converted

to a use other than public outdoor recreation use(s) without the approval of the National Park Service. These anti-conversion requirements do not apply to the Federal side of the LWCF.

Within the Northern Corridor analysis area, Pioneer Park is the only State LWCF/Section 6(f) property (Map 3.16-1). On Red Hills Parkway just north of downtown St. George, the City of St. George developed the park—proposing a picnic shelter, amphitheater, and parking lot—using a 1989 LWCF grant award. In addition, within the Northern Corridor analysis area, approximately 69 acres of private in-holdings have been previously acquired by the BLM using LWCF.

3.16.2 Environmental Consequences

Lands acquired or developed by the BLM or State and local agencies using LWCF may be impacted as a result of constructing the Northern Corridor.

3.16.2.1 Analysis Methods and Assumptions

The State and Federal sides of the LWCF program have different impact indicators. A primary indicator for both is direct encroachment on a parcel. However, with the State side of the program, additional indicators of impacts include if the parcel defined as a Section 6(f) property—the boundaries of which are detailed in the grant application—would be wholly or partially converted to a non-conforming use. This includes if construction would terminate the public outdoor recreation use, convey a property interest for a private or non-public outdoor recreational use, or result in the loss of recreational viability of the remaining property if a partial conversion occurs. The following assumptions apply to this analysis:

- If a State LWCF/Section 6(f) property is wholly or partially converted to a non-public outdoor recreational use, land of equal value, location, and usefulness would be identified for mitigation in accordance with 36 CFR 59.
- Reasonable in-kind mitigation can be identified if a conversion of use to a State LWCF/Section 6(f) property occurs.
- Federal LWCF lands impacted would not require mitigation.

3.16.2.2 Direct and Indirect Impacts from Alternatives 1 and 6

No Federal or State LWCF lands are affected by Alternatives 1 and 6.

3.16.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 would not wholly or partially convert any State LWCF/Section 6(f) properties to non-recreational use. However, construction of the Northern Corridor would directly encroach on a number of parcels the BLM had previously used LWCF to acquire and incorporate into the NCA. Table 3.16-1 summarizes, and Map 3.16-1 displays these impacts.

Table 3.16-1. Federal LWCF Lands Impacted by the Northern Corridor

Northern Corridor Alternative	Acres Impacted
T-Bone Mesa Alignment	29
UDOT Application Alignment	7
Southern Alignment	32

3.16.2.4 Direct and Indirect Impacts from Alternative 5

Alternative 5 would have no impacts to Federal LWCF lands. As shown on Map 3.16-1, construction of the Red Hills Parkway Expressway would require ROW acquisition on approximately 0.9 acre of Pioneer Park, as defined in the State's original LWCF grant application. This would constitute a conversion of use. The acquisition would occur directly adjacent to the existing Red Hills Parkway,

and would encroach on areas not actively used for recreation. None of the outdoor recreation facilities would be affected; however, ingress and egress points to the park may require reconfiguration to facilitate the expressway and ROW requirements (see Section 3.15 for further details). For this reason, while a partial conversion of use would occur, the recreational value of Pioneer Park itself would not be terminated or diminished. If this alternative is selected, mitigation in-kind for the 0.9-acre conversion would be required and is dependent on approval from the National Park Service.

3.17 BLM Transportation and Travel Management

Travel and transportation are an integral part of virtually every activity that occurs on public lands. The BLM conducts comprehensive travel and transportation planning to determine how to manage roads, trail systems and associated areas on public land to best meet transportation needs.

At the land use planning level, the BLM is required to designate all public lands as areas open, limited, or closed to OHVs. OHVs, as defined in 43 CFR 8340.0-5, are any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, with certain exceptions. The land use planning OHV area designations guide subsequent implementation-level travel management planning for OHV use through which the BLM designates travel routes for motorized (OHV), non-motorized (e.g., mountain biking), and non-mechanized (e.g., hiking or equestrian use) modes of travel. These route designations are done outside of the land management planning process through a site-specific implementation-level travel plan.

In order to fully consider the ROW application, the BLM must also consider amending the Red Cliffs NCA RMP. If the Red Cliffs NCA RMP is amended and a ROW is granted, the BLM will then be able to meaningfully consider the integration of a Northern Corridor as part of a future travel management planning process as Congress instructed in OPLMA § 1977.

3.17.1 Affected Environment

The analysis area for BLM travel and transportation management is the proposed Zone 6 boundary and Red Cliffs NCA because the impacts associated with the potential issuance of a ROW for the Northern Corridor and potential amendments to the SGFO RMP and Red Cliffs NCA RMP are limited to the same extent. The USFWS's decisions to be made addressing the potential issuance of an ITP for Mojave desert tortoise will not impact BLM travel and transportation resources outside of the proposed Zone 6 boundary or the Red Cliffs NCA.

Both proposed Zone 6 and the Red Cliffs NCA are recognized as recreation destinations, and recreation visitors primarily drive the demand for the BLM travel and transportation network. Outside of the State highways, the dominant transportation network users are recreational. Demand for recreational access on the travel and transportation network is expected to continue to increase in the analysis area as recreational visitation increases.

3.17.1.1 Proposed Zone 6

The SGFO is currently engaged in travel management planning, including the proposed Zone 6. Until a Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in Washington County is prepared and made available to the public, areas classified as "Limited to Designated Roads and Trails" will be managed as "Limited to Existing Roads and Trails" for OHV use. Such area classifications provide the framework within which individual route designations are made as the BLM prepares the Travel and Transportation Management Plan for public lands in Washington County, as directed by OPLMA.

The SGFO RMP was amended in 2016 to modify certain existing OHV area designations (Open, Limited, or Closed) to comply with 43 CFR 8340.0-5, (f), (g), and (h), respectively; 43 CFR 8342.1 (a-d); and related agency policies.

On BLM-administered lands within proposed Zone 6, there are 0 acres managed as open to OHV use, 3,503 acres limited to existing roads and trails, and 0 acres closed to OHV use. The non-BLM-administered lands within proposed Zone 6 do not have OHV area designations but contain a network of routes created by users and land management agencies.

Route inventory and preliminary route evaluation work has been completed for the SGFO. On lands managed by the BLM, 48.4 miles of travel routes have been inventoried within the proposed Zone 6 boundary (Map 3.17-1), as follows:

- 20.4 miles of unmaintained social trails.
- 10.4 miles of trails for motorized (OHV) use.
- 17.6 miles of trails for non-motorized use (i.e., hiking and biking).

On SITLA and private lands within the proposed Zone 6 boundary, the following 74 miles of travel routes exist:

- 22 miles of unmaintained social trails.
- 39.2 miles of trails for motorized use.
- 12.8 miles of trails for non-motorized use.

3.17.1.2 Red Cliffs NCA

The Red Cliffs NCA RMP designated 24,870 acres as OHV limited to designated routes, 19,989 acres closed to OHV use, and 0 acres open to OHV use in the Red Cliffs NCA.

Route inventory and preliminary route evaluation work has been completed for the SGFO, which includes the Red Cliffs NCA. On BLM-administered lands, 190.4 miles of travel routes have been inventoried within the Red Cliffs NCA (Map 3.17-2), as follows:

- 51.2 miles of routes for non-mechanized use (i.e., hiking and equestrian).
- 22.1 miles of routes for motorized (OHV) use.
- 117.1 miles of routes for non-motorized use.

In addition, the Red Cliffs Desert Reserve PUP was adopted by the BLM in 2002. While the Red Cliffs NCA RMP replaced most of the direction contained within the PUP for the BLM-administered lands within the NCA, the PUP designated 124.4 miles of roads and routes for motorized, mechanized, and non-mechanized travel in the Red Cliffs NCA as follows:

- 51.2 miles of designated routes for non-mechanized use.
- 22.1 miles of designated routes for motorized (OHV) use.
- 51.1 miles of designated routes for non-motorized use.

3.17.2 Environmental Consequences

Impacts to the BLM travel and transportation network would result from alterations in the ability of visitors to access BLM-administered areas via motorized (OHV), non-motorized, or non-mechanized means.

3.17.2.1 Analysis Methods and Assumptions

Impacts to BLM transportation and travel management are analyzed both quantitatively and qualitatively. A quantitative indicator of impacts on this resource in the Red Cliffs NCA are the length (miles) and number of existing designated trails and routes crossed by the Northern Corridor alternatives and associated RMP amendments. Potential impacts are also analyzed qualitatively by discussing anticipated changes to visitor access or restrictions on future implementation-level travel management actions.

The following assumptions apply to this analysis:

- Actions associated with minimizing impacts to Mojave desert tortoise by limiting other resource uses would have a generally restrictive effect on future route designation.
- Route-specific implementation-level changes to designated routes would be analyzed in a future NEPA document.
- Potential alterations to visitor experience will be analyzed in the Recreation and Visual resource sections.

3.17.2.2 Direct and Indirect Impacts from Alternatives 1, 5, and 6

Under Alternatives 1, 5, and 6, the Northern Corridor would not be established within the Red Cliffs NCA, and the Red Cliffs NCA RMP and SGFO RMP would not be amended. There would be no impacts to BLM transportation or travel management resources or visitor access on BLM-administered lands within the Red Cliffs NCA or proposed Zone 6 beyond existing trends.

3.17.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Northern Corridor ROW/Highway

The nature of changes to BLM transportation or travel management resources and visitor access as a result of the Northern Corridor and Red Cliffs NCA RMP Amendments under Alternatives 2, 3, and 4 would be similar, though the location and magnitude of these changes varies by alternative. The number and length of BLM-designated trails and routes impacted by each alternative is detailed in Table 3.17-1. The length of non-designated social trails impacted by each alternative is detailed in Table 3.17-2.

Adverse impacts on BLM transportation and travel resources would result from the closure or alteration of routes or trails, which would restrict or change visitor access. Alternatives 2, 3, and 4 physically cross all or some of the following route or trail types:

- Designated motorized (OHV)
- Designated non-motorized
- Designated non-mechanized routes
- Non-designated social trails

In general, Alternative 4 would impact the most miles of BLM-designated routes and trails, while Alternative 3 would impact the fewest miles.

The alternatives would require alteration or temporary closure of portions of the existing designated trails crossed by the Northern Corridor, as well as consideration during design of how to accommodate trail crossings or modifications. Potential accommodations could include grade-separated culverts under the road, incorporating a trail into the road profile for an appropriate crossing, and the use of crosswalks, road bumps, and signage. Similarly, final design of the Northern Corridor would need to accommodate future designated trail crossings, as appropriate. Trails with significant portions overlapping the Northern Corridor could be incorporated into the

planned pedestrian and bike path adjacent to the highway. While non-motorized, unpaved designated trails could be temporarily closed throughout construction, access to primary paved roads like Cottonwood Springs Road would remain open or an alternative route would be provided. Routes or trails are not anticipated to be permanently unavailable. Additional design features listed in Appendix D would minimize interference with traffic during construction activities.

Table 3.17-1. Designated BLM Routes Impacted by the Northern Corridor

Route Name	Route Type	Length Crossed by Alternative 2 (miles)	Length Crossed by Alternative 3 (miles)	Length Crossed by Alternative 4 (miles)
Cottonwood Springs Road	Motorized	0.10	0.10	0.12
T-Bone	Non-motorized	0.13	0.10	<0.10
Pioneer Hills	Non-motorized	0	0	<0.10
Pioneer Rim	Non-motorized	0	0	<0.10
Red Hills Parkway Path	Non-motorized	0	0	<0.10
Red Hills Parkway	Motorized	0	0	<0.10
Total	Not Applicable	**0.23**	**0.20**	**0.30**

Table 3.17-2. Non-Designated Social Trails Impacted by the Northern Corridor

Route Type	Length Crossed by Alternative 2 (miles)	Length Crossed by Alternative 3 (miles)	Length Crossed by Alternative 4 (miles)
Social Trails	0.52	1.43	1.17

Construction could create short-term effects on visitor access, including restricted access or temporary closure of designated routes or trails and increased traffic from construction vehicles and equipment. During construction, roads would be kept open to traffic or a detour would be provided and maintained. Long-term effects on traffic flow and visitor access from construction would be minimal, because routes or designated trails are not anticipated to be permanently unavailable.

Alternatives 2, 3, and 4 would provide for increased visitor access through a paved bike and pedestrian trail on one or both sides of the highway, though this trail would be authorized as a component of the ROW issued to UDOT, and would not formally become a part of the BLM route network within the Red Cliffs NCA. Pedestrians or bicyclists will be able to travel along the corridor by using the trail system.

Overall adverse impacts to visitor access from establishing the Northern Corridor would be minor in temporarily closing or altering existing designated trails. The establishment of the Northern Corridor may beneficially impact visitor access by providing more opportunities to access surrounding non-motorized and motorized trails and routes.

Red Cliffs NCA RMP Amendments

Adverse impacts to visitor access could result from potential future utility development in the ROW corridor designated under the Red Cliffs NCA RMP Amendment Alternative C; Amendment Alternative B would not allow for this use. Potential future utility development could create short-term effects on visitor access during construction, including restricted access or temporary closure of routes or trails and increased traffic from construction vehicles and equipment. During construction, roads would be kept open to traffic or a detour would be provided and maintained. Facilities construction would likely affect traffic flow and visitor access in a similar way to the Northern Corridor construction.

St. George Field Office RMP Amendments and Washington County HCP

Under Alternatives 2, 3, and 4, amendments to the BLM SGFO RMP would not directly alter the management of existing trails and routes within proposed Zone 6. Under either SGFO RMP Amendment Alternative B or Amendment Alternative C, no trails would be created, closed, or altered. The potential SGFO RMP Amendments and the Revised Washington County HCP contain an action that would reduce the total trail miles within proposed Zone 6; however, decommissioning of specific trails or routes on BLM-administered lands within proposed Zone 6 would be evaluated in a future NEPA analysis. The selection of one of these alternatives would result in the reduction of available routes to 65 miles of routes available in proposed Zone 6, over time, as the HCP is implemented.

Under Amendment Alternatives B and C, travel systems would be managed with an emphasis on having a neutral or positive effect on Mojave desert tortoise habitat. Minimizing impacts to Mojave desert tortoise would have a generally restrictive effect on future trail designation, likely limiting the proliferation of user-created trails or closing existing trails, thereby reducing visitor access potential. A future reduction in visitor access is anticipated under both Amendment Alternatives B and C.

Under Alternatives 2, 3, and 4, limitations on future route and trail designations as a result of management decisions associated with Amendment Alternatives B and C and the Washington County HCP would have a generally reductive effect on visitor access. Alternatives 2, 3, and 4 would be more restrictive to visitor access in proposed Zone 6 as compared to Alternatives 1, 5, or 6.

3.18 National Conservation Area

3.18.1 Affected Environment

The analysis of impacts to NCAs focuses on those lands in the Red Cliffs NCA that would be impacted by the proposed Northern Corridor ROW and RMP amendment alternatives. Congress designates NCAs on public lands to conserve, protect, enhance, and manage public lands for the benefit and enjoyment of present and future generations. NCAs offer exceptional scientific, cultural, ecological, historical, and recreational value. The management emphasis of a given NCA is provided by Congress in the individual statute that establishes the NCA.

The designating statutory authority for the Red Cliffs NCA is 16 U.S.C. 460www. The Red Cliffs NCA includes approximately 45,000 acres of BLM-administered land. The NCA boundary generally follows the boundary of the Reserve, a multi-jurisdictional land base that has been collaboratively managed by the BLM, the State of Utah, Washington County, and local municipalities since 1996 to protect Mojave desert tortoise.

Through OPLMA of 2009 (P.L.111- 11 at Title I, Subtitle O at sec. 1974(a)) Congress defined the purposes for designation of the Red Cliffs NCA as follows:

> (1) To conserve, protect, and enhance for the benefit and enjoyment of present and future generations the ecological, scenic, wildlife, recreational, cultural, historical, natural, educational, and scientific resources of the National Conservation Area; and
>
> (2) To protect each species that is –
>
> (a) located in the National Conservation Area; and
>
> (b) listed as a threatened or endangered species on the list of threatened species or the list of endangered species published under Section 4(c)(1) of the Endangered Species Act of 1973 (16 U.S.C. 1533(c)(1))

The NCA is managed under the Red Cliffs NCA RMP (BLM 2016b). The Red Cliffs NCA RMP expands on OPLMA and identifies the mission for the BLM management of the Red Cliffs NCA "to conserve and protect the ecological, geological, cultural, and biological resources of the public lands; to assist the recovery and delisting of Federal and State-listed species; to restore native species habitats and populations; to sustain functional ecosystems that support species' resilience to climate change; and to enhance opportunities for scientific research, environmental education, sustainable recreational uses, and citizen stewardship of public lands." Land use planning goals, objectives, and management decisions in the Red Cliffs NCA RMP are consistent with the designation purposes, authorized uses, and other direction in OPLMA that relates to this NCA. Regarding authorized uses, OPLMA at Section 1974 (e)(2) specifies that "the Secretary shall only allow uses of the National Conservation Area that the Secretary determines would further a purpose described in subsection (a)." The purposes defined in subsection (a) are listed previously.

3.18.2 Environmental Consequences

BLM *Manual 6220 – National Monuments, National Conservation Areas, and Similar Designations* (BLM 2017b) directs the BLM to analyze the impacts on the NCA's objects and values to determine consistency of a proposed ROW with the NCA's objects and values, and directs the BLM to consider protection of the objects and values in the NEPA analysis. In the case of Red Cliffs NCA, the objects and values are the purposes Congress identified in OPLMA as further clarified in the Red Cliffs NCA RMP (BLM 2016b). Section 1.6 - Policy of BLM Manual 6220 describes specific direction for (C) Compatibility of Uses and (E) Rights-of-way and Transportation and Utility Corridors as follows (the lists that follow are excerpts of relevant information from Manual 6220; additional direction is contained in Manual 6220):

(C) Compatibility of Uses

(1) Site-specific activities in Monuments and NCAs will be managed in a manner that is compatible with the protection of the objects and values for which these areas were designated. Multiple uses may be allowed to the extent they are consistent with the applicable designating authority, other applicable laws, and with the applicable land use plan.

(2) Through the NEPA process, the manager with decision-making authority for a Monument or NCA will evaluate discretionary uses and will analyze whether the impacts of the proposed use in the Monument or NCA or similarly designated area are consistent with the protection of the area's objects and values. As part of this analysis, the manager will consider the severity, duration, timing, and direct and indirect and cumulative effects of the proposed use. If necessary and appropriate, the BLM may use the land use planning process to consider whether to change discretionary use authorizations.

(E) Rights-of-way and Transportation and Utility Corridors

(2) When processing a new ROW application, to the greatest extent possible, through the NEPA process the BLM will:

a. determine consistency of the ROW with the Monument or NCA's objects and values;

b. consider routing or siting the ROW outside of the Monument or NCA;

(7) To the greatest extent possible, subject to applicable law, the BLM should through land use planning and project-level processes and decisions, avoid granting new ROWs in Monuments and NCAs and similar designations. In deciding whether to approve ROWs in these components of the National Landscape Conservation System, the BLM shall consider whether ROW proposals are consistent with the authority that designated the component. Subject to applicable law, the BLM shall exercise its discretion to deny ROW applications in Monuments

and NCAs and similar designations if they are inconsistent with the component's designating authority.

(8) To the greatest extent possible, subject to applicable law, the BLM should through land use planning and project-level processes and decisions, avoid designating or authorizing use of transportation or utility corridors within Monuments and NCAs. To that end, and consistent with applicable law, when developing or revising land use plans for Monuments and NCAs, the BLM will consider:

b. not designating any new transportation or utility corridors within the Monument or NCA if the BLM determines that the corridor would be incompatible with the designating authority or the purposes for which the Monument or NCA was designated;

The assessment of impacts on the NCA's objects and values, in accordance with BLM Manual 6220, Section 1.6 (C) (2), is included in other resource sections of this Draft EIS. This includes analysis of the severity, duration, timing, and direct and indirect and cumulative effects of the potential Northern Corridor alternatives and associated amendment to the Red Cliffs NCA RMP. Table 3.18-1 provides a reference between the Red Cliffs NCA's objects and values identified in OPLMA and the corresponding Draft EIS resource sections where analysis of the potential effects of the actions analyzed in this Draft EIS can be found.

Table 3.18-1. Red Cliffs NCA Objects and Values and Corresponding Resource Sections

Objects and Values	Draft EIS Resource Section (Section Number)
Ecological	Vegetative communities including noxious weeds and invasive species (3.2); special status plants (3.3); general wildlife (3.4); special status wildlife (3.5); wetlands, floodplains, and waters of the U.S. (3.10); water resources (3.11); fire and fuels management (3.22)
Scenic	Visual resources (3.13)
Wildlife	General wildlife (3.4), special status wildlife (3.5)
Recreational	Recreation and visitor services (3.15), BLM transportation and travel management (3.17)
Cultural	Cultural resources and Native American concerns (3.14)
Historical	Cultural resources and Native American concerns (3.14)
Natural	Vegetative communities including noxious weeds and invasive species (3.2); special status plants (3.3); general wildlife (3.4); special status wildlife (3.5); geology, mineral resources, and soils (3.7); paleontology (3.8); wetlands, floodplains, and waters of the U.S. (3.10).; water resources (3.11); fire and fuels management (3.22)
Educational	Educational values are associated with all resources
Scientific	Scientific values are associated with all resources
Species protection including those identified as threatened or endangered under the ESA	Vegetative communities including noxious weeds and invasive species (3.2), special status plants (3.3), general wildlife (3.4), special status wildlife (3.5)

3.19 Areas of Critical Environmental Concern

3.19.1 Affected Environment

ACECs are defined in FLPMA Section 103(a) as "areas within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." ACECs are designated by the BLM during the land use planning process. There is no single set of prescriptions for management of

ACECs. Special management is designed specifically to protect the relevant and important values associated with each ACEC, and therefore varies from area to area.

Decisions to be made by the BLM in this Draft EIS would not affect or alter the management of ACECs managed by the SGFO outside proposed Zone 6. Therefore, the analysis area for ACECs is the proposed Zone 6 boundary.

The Red Bluff ACEC is the only ACEC to overlap the proposed Zone 6 boundary. This 6,168-acre ACEC is located southwest of St. George. The Red Bluff ACEC extends approximately 4 miles south from Boomer Hill along the White Hills. Approximately 2,345 acres of this ACEC are within the proposed Zone 6 boundary (Map 2.5-15). The 1999 SGFO RMP established the relevant and important values of the ACEC to be endangered dwarf bear-poppy and highly erodible saline soils. These two relevant and important values are at risk from off-road travel, road proliferation, human encroachment from adjacent urban areas, and pressure for land transfers to accommodate various forms of development.

3.19.2 Environmental Consequences

Impacts to ACECs result from management actions that would diminish or support the prevention of "irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards" (BLM 1988). Depending on the values of the ACEC, such management actions could include ROW designations, availability for livestock grazing, recreation management decisions, and other limitations or restrictions on occupancy or use.

3.19.2.1 Analysis Methods and Assumptions

Impacts on the Red Bluff ACEC were analyzed by assessing the potential for the reduction or increase in protection of identified relevant and important values: the endangered dwarf bear-poppy and highly erodible saline soils within proposed Zone 6. Quantification of potential impacts on the Red Bluff ACEC was completed based upon the areas of the ACEC that overlap management decisions and allocations that could protect or diminish the presence of the relevant and important values.

The following assumptions apply to this analysis:

- Management and activities outside of ACECs would not affect ACEC-relevant and important values.
- Use would be consistent with all designation decisions and other limitations or restrictions on occupancy or use.

3.19.2.2 Direct and Indirect Impacts from Alternatives 1, 5, and 6

Under Alternatives 1, 5, and 6, the BLM SGFO RMP would not be amended and proposed Zone 6 would not be established. There would be no impacts to the Red Bluff ACEC beyond existing conditions and trends.

3.19.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Under Alternatives 2, 3, and 4, amendments to the BLM SGFO RMP would occur using either SGFO RMP Amendment Alternative B or C, and proposed Zone 6 would be established. Under Alternatives 2, 3, and 4, amendments to the BLM SGFO RMP would not change the boundary of the Red Bluff ACEC nor any of the existing Land Use Plan decisions made to manage the relevant and important values of this ACEC. However, the Amendment Alternatives may alter the management of some resources within the ACEC, because the decisions would geographically overlap with the Red Bluffs ACEC. Where decisions for other resources or resource uses are more restrictive than current management, the more restrictive decisions would apply. This more restrictive

management would occur on 2,345 acres of the overall 6,168-acre ACEC that are located within proposed Zone 6, or approximately 38 percent of the ACEC.

In general, Alternatives 2, 3, and 4, would be beneficial for the Red Bluff ACEC, and result in less potential for authorized activities to negatively affect the Red Bluff ACEC and its associated values than Alternatives 1, 5, and 6. Similar types of management would apply across both SGFO RMP Amendment Alternatives B and C, and would support the protection of the dwarf bear-poppy and highly erodible saline soils in the Red Bluff ACEC. In general, these amendments would limit surface-disturbing activities and visitor use within the portion of the Red Bluff ACEC in proposed Zone 6, which reduces the distribution of potential impacts and helps avoid impacts resulting from visitor use in sensitive areas.

Management prescriptions under SGFO RMP Amendment Alternative B would be generally more protective of ACEC values as compared to Amendment Alternative C. Under Amendment Alternative B, the Red Bluff ACEC would be closed to fluid mineral leasing, managed as a ROW exclusion area, managed as unavailable to grazing, and limitations on visitor access and recreation activities would be implemented. Under Amendment Alternative C, the Red Bluff ACEC would continue to be managed as open to fluid mineral leasing subject to no surface occupancy and designated as a ROW avoidance area. Amendment Alternative C would make 1,413 acres of the Red Bluff ACEC unavailable to grazing, leaving 864 acres available for grazing. Amendment Alternative C would allow for more recreation activities and visitor use than Amendment Alternative B.

The management decisions for SGFO RMP Amendment Alternatives B and C would place limitations on surface disturbance and have a protective effect on vegetation, including the dwarf bear-poppy, and sensitive soils by limiting potential for erosion, trampling of plants, fugitive dust, and the introduction of noxious and invasive weeds. Managing Zone 6 as an exclusion area for new ROWs would offer greater protection of sensitive plants and soils, compared to managing Zone 6 as an avoidance area, because surface-disturbing activities would be precluded. Where livestock grazing is allowed under Alternative C, there would be continued potential for soil compaction and increased erosion, trampling of vegetation, and spread of noxious weeds and other invasive species through equipment and feed products, and by livestock themselves. Recreation management is less restrictive under SGFO RMP Amendment Alternative C compared to Alternative B, resulting in greater potential for crushing, trampling, damage, or removal of plants, fugitive dust, and the introduction of noxious and invasive weeds from activities such as dispersed camping, target shooting, and competitive events. See Sections 3.2, 3.3, and 3.7 for additional analysis of impacts on vegetation and soil resources under Alternatives 2, 3, and 4.

3.20 BLM Lands and Realty

The BLM Lands and Realty Program consists of two elements: land tenure and land use authorizations. The BLM Lands and Realty Program also administers land withdrawals. Refer to Section 3.7.1.3 for a discussion of impacts from proposed withdrawals in proposed Zone 6.

3.20.1 Affected Environment

3.20.1.1 Land Tenure

The BLM's land tenure program addresses changes in land ownership or land interests through purchases and donations, sales and exchanges, and withdrawals. The BLM completes these transactions when they are in the public interest and are consistent with approved land use plans.

Red Cliffs NCA

The actions analyzed in this Draft EIS will not change BLM land tenure decisions in the Red Cliffs NCA RMP. However, lands previously acquired by the BLM would be impacted by the Northern

Corridor alternatives, and the BLM's issuance of a ROW could impact future land tenure actions including acquisitions of non-Federal lands crossed by an alternative. No Federal lands within the Red Cliffs NCA are available for disposal. Subject to valid existing rights, all Federal land located in the Red Cliffs NCA is withdrawn from all forms of entry, appropriation, and disposal under the public land laws; location, entry, and patenting under the mining laws; and operation of the mineral leasing, mineral materials, and geothermal leasing laws (BLM 2016b).

Proposed Zone 6

BLM-administered lands comprise 51 percent of land ownership within proposed Zone 6, with the remaining land being owned by State agencies and private owners (Table 3.20-1). The SGFO RMP has not identified any lands within proposed Zone 6 for acquisition. Decision FW-13 in the SGFO RMP specifies that, "public lands supporting Federally listed or sensitive animal species will be retained in public ownership unless exchange or transfer will result in acquisition of better habitat for the same species or provide for suitable management by another agency or qualified organization" (BLM 1999). All BLM land tenure adjustments require site-specific environmental review including NEPA analysis and compliance with other laws including the ESA.

Table 3.20-1. Land Ownership within Red Cliffs NCA and Proposed Zone 6

Agency	Red Cliffs NCA (acres)	Proposed Zone 6 (acres)
BLM	45,181	3,471
UDNR	7,269	0
Private	2,323	46
SITLA	6,428	3,226
UDOT	0	70

3.20.1.2 Land Use Authorizations and Utility Corridors

BLM-administered lands are identified in land use plans as either exclusion, avoidance, or open to new ROWs. BLM land use plans also designate ROW corridors to minimize adverse environmental impacts and the proliferation of separate ROWs. Exclusion areas are closed for the issuance of future ROWs and land authorizations. Avoidance areas are those where ROWs and other land use authorizations are allowed only if they are compatible with the avoidance criteria presented in the approved RMP. Open areas are available for issuance of new ROWs and land use authorizations subject to site-specific review and terms and conditions.

Red Cliffs NCA Including Areas Crossed by the Northern Corridor

BLM-administered lands within the Red Cliffs NCA are currently identified as exclusion and avoidance to new ROWs (Map 2.3-1 and Table 3.20-2). The actions analyzed in this Draft EIS would not affect any of the lands that are identified as exclusion areas in the Red Cliffs NCA RMP. One existing utility corridor is within the Red Cliffs NCA (BLM 2016b).

Table 3.20-2. ROW Area Designations within Red Cliffs NCA and Proposed Zone 6

Designation	Red Cliffs NCA (acres)	Proposed Zone 6 (acres)
Open	0	859
Avoidance	6,709	2,612
Exclusion	38,502	0
ROW/Utility Corridor	20	0

There are 38 authorized existing ROWs on BLM-administered lands within the Red Cliffs NCA, with all being granted before the designation of the NCA in 2009 and prior to 1999, when the SGFO

RMP began managing the majority of public lands as avoidance areas to new ROWs. Eleven have been designated in perpetuity and include highways, water pipelines, power lines, and phone lines. Nine of the authorized existing ROWs may be impacted by the Northern Corridor (Table 3.20-3). Other existing ROWs on non-Federal lands that are not under BLM-authorization and predate the NCA designation, may also be impacted by the Northern Corridor (e.g., Cottonwood Springs Road). Although not formally authorized under a ROW grant, Cottonwood Springs Road is recognized as part of the County road system.

Table 3.20-3. Authorized Existing ROWs on BLM-administered Lands within the Red Cliffs NCA Impacted by the Northern Corridor

Existing ROW (Name/Number/Organization)	Impacted by T-Bone Mesa Alignment	Impacted by UDOT Alignment	Impacted by Southern Alignment	Impacted by Red Hills Expressway Alignment
Fiber Optic Line/UTU-080882/TDS Baja Broadband LLC	Yes	Yes	Yes	Yes
Water Pipeline/UTSL-0034813/City of St. George	Yes	Yes	No	No
Highway/UTSL-0062805/Federal Highways Administration	No	No	No	Yes
Power Line/UTU-013694/PacifiCorp	Yes	Yes	Yes	No
Power Line/UTU-071709/PacifiCorp	No	No	Yes	Yes
Underground Phone Line/UTU-047612/ Qwest	No	No	No	Yes
Underground Phone Line/UTU-084241/ Qwest	Yes	Yes	Yes	No
Power Line/UTU-013789/UAMPS	Yes	Yes	No	No
Power Line/UTU-058163/UAMPS	No	No	Yes	No
Natural Gas Pipeline/UTU-094304/ Questar	No	No	No	Yes

Proposed Zone 6

BLM-administered lands within proposed Zone 6 are currently identified as avoidance or open to new ROWs (Map 2.5-1 and Table 3.20-2). No utility corridors have been designated within proposed Zone 6. There are four authorized existing ROWs on BLM-administered land within proposed Zone 6. Two have been designated in perpetuity, one for a trail and one for an access road to a private parcel.

3.20.2 Environmental Consequences

This section describes the potential effects on BLM lands and realty within the Red Cliffs NCA and proposed Zone 6 as a result of the Northern Corridor, Red Cliffs NCA RMP Amendments, and SGFO RMP Amendments. With the exception of the specific actions related to proposed Zone 6 analyzed in detail, the USFWS's issuance of a new ITP would not affect BLM-administered lands and realty actions because all development authorized by the HCP would occur on non-Federal lands.

3.20.2.1 Analysis Methods and Assumptions

Impact indicators for BLM lands and realty include the number of acres of BLM-administered lands managed as avoidance or exclusion areas for new ROWs, the increase or decrease in areas managed as designated ROW corridors, the number of acres managed for Federal acquisition or disposal, and the number of existing land use authorizations affected by a proposed action and the nature of these impacts.

The following assumptions apply to this analysis:

- Future demand for ROWs and authorized land uses in the Red Cliffs NCA and proposed Zone 6 would be similar to past demand for such uses.
- The BLM would honor all valid, existing rights including easements and encumbrances on acquired lands until they need to be renewed or amended, unless a separate agreement is in place.

3.20.2.2 Direct and Indirect Impacts from Alternatives 1, 5, and 6

Under Alternatives 1, 5, and 6, there would be no impacts on BLM lands and realty. The BLM would not issue a ROW for the Northern Corridor across the Red Cliffs NCA, and there would be no disturbance of existing ROW authorizations on BLM-administered lands within the Red Cliffs NCA, except for Alternative 5, where an amendment to the existing Red Hills Parkway ROW would be required. No amendments would be made to the Red Cliffs NCA RMP and SGFO RMP, and current ROW open, avoidance, or exclusion areas within the Red Cliffs NCA and proposed Zone 6 would be maintained. The BLM would continue to have no lands identified for acquisition in proposed Zone 6, and lands identified for disposal in proposed Zone 6 would remain unchanged. The existing ROW authorizations on BLM-administered lands within proposed Zone 6 would not be affected.

3.20.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Existing Authorized ROWs

The ROW issued by the BLM for the Northern Corridor under Alternatives 2, 3, and 4 would cross existing ROW authorizations on BLM-administered lands within the Red Cliffs NCA (Table 3.20-2). The existing utility and highway ROWs can generally be compatible with a ROW for the Northern Corridor. However, where the Northern Corridor ROW would intersect these existing ROWs, the existing authorized uses may require modifications. These modifications may include relocating power poles and powerline alignments to cross the Northern Corridor, or relocation of or burying existing buried utilities deeper to avoid disruption from construction. Any disturbance associated with these relocations is anticipated to occur within the 500-feet-wide potential ROWs analyzed for the Northern Corridor. The BLM would review all required relocations to ensure compliance with applicable environmental laws and regulations including NEPA, NHPA, and the ESA.

Coordination with these existing ROW holders and necessary modifications in conformance with applicable laws, regulations, and existing ROW-holder-requirements would be the responsibility of UDOT required as a term and condition for any Northern Corridor ROW. UDOT would be required to provide the BLM with the executed agreement documents prior to an NTP being issued.

ROW Avoidance and Exclusion Areas and ROW Corridors

Alternatives 2, 3, and 4 would require amendments to the Red Cliffs NCA RMP and SGFO RMP. Some of the amendments would modify the existing ROW avoidance area and designated ROW corridors within the NCA and proposed Zone 6 (Maps 2.5-2 and 2.5-3). These amendments are described in detail in Sections 2.3 and 2.5.

The alternatives that would result in more areas being managed as avoidance and exclusion areas for new ROWs would decrease opportunities for new ROW authorizations and reduce the BLM's ability to meet future demands for ROWs. The BLM cannot authorize ROWs in exclusion areas. Although the BLM would accept ROW applications in avoidance areas, an authorization request in these areas may be subject to additional requirements such as resource surveys, construction and reclamation engineering, long-term monitoring, special design features, special siting requirements, timing limitations, and relocation. These restrictions on ROWs also impact the

BLM's lands and realty program by increasing the application processing time and costs, for example, to evaluate greater design, mitigation, or siting criteria.

Alternatives that would result in new ROW corridors on BLM-administered lands would increase opportunities for new ROW authorizations and improve the BLM's ability to meet future demands for ROWs. ROW corridors generally reduce conflicts between lands and realty actions and other public lands resources by co-locating utilities and other ROWs, but may increase conflicts among lands and realty authorizations and other resources in the corridors themselves. ROW corridors are generally considered opportunity areas for siting new ROWs.

In proposed Zone 6, the changes to ROW avoidance and exclusion areas also could affect the BLM's ability to reauthorize existing ROWs. ROWs that have been designated in perpetuity would not be impacted, but reauthorization of the existing trail and access road ROWs would be subject to the regulations existing at the time of renewal, and additional conditions could be applied by the authorized officer at the time of renewal. Table 3.20-4 and Table 3.20-5 identify the changes to ROW avoidance and exclusion areas and designated ROW corridors under each alternative with the Red Cliffs NCA and proposed Zone 6, respectively.

Table 3.20-4. ROW Area Designations within Red Cliffs NCA

Designation	Red Cliffs NCA: Alternatives 1, 5, 6 (acres)	Red Cliffs NCA: Alternatives 2, 3, 4 with NCA RMP Amendment Alternative B (acres)	Red Cliffs NCA: Alternative 2 with NCA Amendment Alternative C (acres)	Red Cliffs NCA: Alternative 3 with NCA Amendment Alternative C (acres)	Red Cliffs NCA: Alternative 4 with NCA Amendment Alternative C (acres)
Avoidance	6,709	6,709	6,579	6,586	6,608
Exclusion	38,502	38,502	38,502	38,502	38,502
Open	0	0	0	0	0
ROW/Utility Corridor	20	20	150	143	121

Table 3.20-5. ROW Area Designations within Proposed Zone 6

Designation	Proposed Zone 6: SGFO RMP Amendment Alternative A (acres)	Proposed Zone 6: SGFO RMP Amendment Alternative B (acres)	Proposed Zone 6: SGFO RMP Amendment Alternative C (acres)
Avoidance	2,612	0	3,471
Exclusion	0	3,471	0
Open	859	0	0
ROW/Utility Corridor	0	0	0

Land Tenure

Alternatives 2, 3, and 4 would modify the land tenure decisions for proposed Zone 6 in the SGFO RMP by identifying all non-Federal lands within proposed Zone 6 for acquisition and all Federal lands within proposed Zone 6 for retention. These land tenure adjustments could increase the BLM's ability to meet future demands for ROWs (though designating acquired lands as ROW avoidance or exclusion areas would reduce this ability) and reduce the BLM's ability to meet demands for BLM land disposals. However, these changes would be beneficial for resources that may be negatively impacted by BLM lands and realty authorizations and land disposals. Once acquired by the BLM, resources located on lands that are currently in non-Federal ownership would benefit from the protections afforded by Federal management as a part of proposed Zone 6.

3.21 Livestock Grazing

The analysis area for livestock grazing and rangeland health is the boundaries of the grazing allotments crossed by proposed Zone 6. No active grazing allotments are within the Red Cliffs NCA. The USFWS's issuance of an ITP would not impact livestock grazing outside of proposed Zone 6.

3.21.1 Affected Environment

The BLM administers two active grazing allotments located within proposed Zone 6: Curly Hollow and Box Canyon. Within proposed Zone 6, approximately 3,446 acres of BLM-administered lands are available for grazing, comprising 2,793 acres within the Curly Hollow Allotment and 653 acres within the Box Canyon Allotment (Map 3.21-1). One pasture, the Box Canyon Pasture, is located within the Box Canyon Allotment. Within the Curly Hollow Allotment, there are portions of two pastures within the proposed Zone 6 boundaries: the Holding Pasture and the River Pasture. The total permitted AUMs on both allotments is 1,428 AUMs, comprising 1,380 AUMs permitted on the Curly Hollow Allotment and 48 AUMs permitted on the Box Canyon Allotment (pers. com. Reese 2019). Currently, allotment boundary and pasture fences are the only range improvements in place for the active allotments in proposed Zone 6.

3.21.2 Environmental Consequences

3.21.2.1 Analysis Methods and Assumptions

The analysis of the potential direct and indirect impacts of the proposed actions on livestock grazing was completed by evaluating the amount of BLM-administered land that would no longer be available for grazing under each alternative, and by assessing the number of AUMs that would become unavailable for livestock grazing.

The impacts on livestock grazing differ based on which alternative for the SGFO RMP is selected. The potential issuance of a ROW for the Northern Corridor, Red Cliffs NCA RMP Amendments, and issuance of an ITP by the USFWS would not impact livestock grazing.

3.21.2.2 Direct and Indirect Impacts from Alternatives 1, 5, and 6

Under Alternatives 1, 5, and 6, the grazing allotments in proposed Zone 6 would continue to be available for livestock grazing. The changed circumstance related to the construction of the Northern Corridor across the Reserve described in the Amended HCP would not be triggered, proposed Zone 6 would not be created, and there would be no amendment to the SGFO RMP. The amount of land available for livestock grazing, permitted AUMs, and existing fencing for allotment and pasture boundaries within proposed Zone 6 would be unchanged (Table 3-21.1).

Table 3.21-1. Impacts to Livestock Grazing Between Alternatives

Alternative	Areas made Unavailable for Livestock Grazing (acres)	AUMs Lost [a]
Alternatives 1 (No Action), 5, and 6 with SGFO RMP Amendment Alternative A (No Action)	0 acres	0 AUMs
Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative B	3,446 acres	198 AUMs
Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative C	2,791 acres	198 AUMs

[a] Source: Reese 2020

3.21.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative B

Under Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative B, all BLM-administered lands that are currently available for grazing within proposed Zone 6 would be made unavailable to grazing. All 3,446 acres of BLM-administered land currently available for livestock grazing on the Curly Hollow and Box Canyon allotments within proposed Zone 6 would become unavailable (Table 3.21-1). The Holding Pasture and River Pasture also include SITLA lands within proposed Zone 6 that are managed as part of the livestock grazing allotment and are available for use by the Permittee. These lands would not be made unavailable by the SGFO RMP Amendment but would be made unavailable by the BLM if they are brought into Federal ownership in the future. The SITLA lands are accessed through adjacent BLM-administered lands that would be made unavailable by these alternatives, and therefore would be unlikely to be used for livestock grazing after the amendment.

Per an existing range-line agreement, 150 AUMs of the Curly Hollow Allotment apply solely to the Holding Pasture (pers. com. Reese 2020). The remaining 1,230 AUMs of the Curly Hollow Allotment are part of a rotation system for the remaining three pastures of the allotment, including the River Pasture (pers. com. Reese 2020). There is no specific AUM designation for the River Pasture as part of the allotment's pasture rotation system; however, the portion of the River Pasture within proposed Zone 6 is infrequently used because of a lack of desirable species and recreation pressure. Therefore, because this portion of the River Pasture is not currently used for livestock grazing, it is anticipated any grazing that could occur in this area of the River Pasture would be accommodated elsewhere in the Curly Hollow Allotment, and there would be no functional loss of AUMs from making this portion of the River Pasture unavailable to livestock grazing. A total of 198 AUMs would be lost between the 150 AUMs of the Curly Hollow Allotment's Holding Pasture and the 48 AUMs of the Box Canyon Allotment. The current existing fencing for the allotment and pasture boundaries within proposed Zone 6 could be removed after the amendment. New fencing defining the areas that would be unavailable for livestock grazing may be required within the Holding and River pastures of the Curly Hollow Allotment.

3.21.2.4 Direct and Indirect Impacts from Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative C

Under Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative C, the portions of the Box Canyon Allotment and Holding Pasture of the Curly Hollow Allotment within proposed Zone 6 would be made unavailable for livestock grazing. The River Pasture of the Curly Hollow Allotment would continue to be available for livestock grazing. This would result in 2,791 acres of BLM-administered land being made unavailable for livestock grazing on the Curly Hollow and Box Canyon allotments.

The impacts on livestock grazing in the Box Canyon Allotment and the Holding Pasture would be the same as those described for SGFO RMP Amendment Alternative B; BLM-administered lands would be made unavailable, the SITLA lands within the Holding Pasture are accessed through adjacent BLM-administered lands and would be unlikely be used for livestock grazing after the amendment, and range fencing delineating pasture and allotment boundaries could be removed. New fencing defining the areas that would be unavailable for livestock grazing may be required within the Holding Pasture.

As previously discussed, the portion of the River Pasture within proposed Zone 6 is not frequently used and does not have a designated amount of AUMs tied to it. Although the portion of the River Pasture within proposed Zone 6 would remain available to livestock grazing under these alternatives, based on actual use, it is anticipated that the portions of the River Pasture within

proposed Zone 6 would be infrequently used and livestock grazing in the River Pasture would primarily occur outside of proposed Zone 6. A total of 198 AUMs would be made unavailable between the 150 AUMs of the Curly Hollow Allotment's Holding Pasture and the 48 AUMs of the Box Canyon Allotment.

3.22 Fire and Fuels Management

The Federal Wildland Fire Management Policy (NIFC 2009) directs the BLM (as detailed in BLM Instruction Memorandum 2009-112) to achieve a balance between fire suppression to protect life, property, and resources and the use of wildland fire and other means to regulate fuels and maintain healthy ecosystems. Fire management for the Red Cliffs NCA and proposed Zone 6 is currently under the Great Basin and Mojave Desert Fire Management Units.

3.22.1 Affected Environment

Large-scale or frequent wildland fires are not part of the natural fire regime of the Mojave Desert, because desert shrublands are not fire-adapted species (Paysen et al. 2000). Historically, wildfire has been a rare occurrence because Mojave Desert ecozones do not produce enough vegetation to "carry" a fire. Warmer annual temperatures, prolonged droughts punctuated by years of above-average fall-winter precipitation, and the proliferation of invasive annual grasses are fueling an annual burn-reburn wildfire cycle in the Red Cliffs NCA, the Reserve, and other portions of the Mojave Desert. Mojave Desert species are not adapted to frequent large-scale wildfires, and do not recover quickly or successfully from the effects of fires. Conversions of native communities from desert shrublands to invasive grasslands have already occurred in areas of the NCA and the Reserve. Some of these areas have burned repeatedly—two, three, or even four times during the past 20 years (BLM 2015a).

3.22.1.1 Vegetation Condition Class

Previously, the BLM used Fire Regime Condition Class to describe the frequency and severity of wildfires by showing the departure of existing vegetation conditions from historical vegetation conditions. This classification has been changed and is now referred to as Vegetation Condition Class (VCC). The departure in vegetation conditions described by VCC reflects the influence that land management practices, wildfire, invasive plant species, and other factors have had on the natural fire regime.

VCC data was collected from LANDFIRE.gov, an online geodatabase used in partnership with the wildland fire management programs of the Department of the Interior, the U.S. Forest Service, and the Nature Conservancy. LANDFIRE data products are developed with a 30-meter grid spatial resolution raster data set using remote sensing techniques, and are designed to facilitate national- and regional-level planning and reporting. As a result of the techniques used to develop the data, they are relevant to the date that the remote sensing information was collected, and their resolution for fine-scale planning may be limited.

VCC is described by six classes of vegetation departures, ranging from Very Low to Very High. Other designations that fall outside these classes include areas of water, urban development, agriculture, and barren or sparsely vegetated. Most land within the Red Cliffs NCA and the Reserve is currently classified as Low VCC. Low VCC also is the most dominant VCC in proposed Zone 6. More than 52 percent of all Moderate to High VCC acreage in the Red Cliffs NCA and the Reserve is found within areas that have been burned by wildfire (Table 3.22-1). However, approximately 15,000 acres of burned areas are classified as Very Low, Low, or Low to Moderate VCC (Table 3.22-1). If these areas were re-evaluated today, they would likely be rated with a higher degree of departure from historic conditions (i.e., be rated a higher VCC). In addition, ongoing encroachment of annual grasses into the Red Cliffs NCA, the Reserve, and proposed Zone 6 is

likely to promote higher degrees of vegetation departure in the future. A further description of vegetation types within the Red Cliffs NCA and the Reserve, and their effect on fire frequency is presented in Section 3.2.

Table 3.22-1. Vegetation Condition Classes within the Red Cliffs Desert Reserve

Vegetation Condition Class	Red Cliffs Desert Reserve (acres)	Burned Areas in Red Cliffs Desert Reserve (acres)
I.A – Very Low	6	6
I.B – Low	51,547	14,329
II.A – Low to Moderate	5,066	812
II.B – Moderate to High	206	88
III.A – High	1,128	607
III.B – Very High	23	1
Other	4,032	70

Note: Table 3.22-1 displays VCCs for all lands within the Red Cliffs Desert Reserve, regardless of land ownership.

3.22.1.2 Fire Occurrence

The fire season for Washington County occurs between May and October. The 2005 and 2006 fire seasons were indicative of what has become the "new" fire regime in the area, demonstrating the cause-and-effect relationship between above-average fall-winter precipitation that triggers increased production of invasive annual brome grasses and uncharacteristically large wildfires during the summer months (BLM 2015a). During these 2 years, 11 fires burned in the Red Cliffs NCA and the Reserve and consumed 14,433 acres (acres that were re-burned by multiple fires are not double-counted in this total). More recently, 2012 was another severe fire season with two fires burning 4,200 acres (1,203 acres were in previously unburned areas). Recent localized analysis suggests high fire danger days are likely to increase (Rangwala 2020).

In total, 22 fires have burned 15,913 acres within the Red Cliffs NCA and the Reserve since 1976 (acres that were re-burned by multiple fires are not double-counted in this total), with over 3,808 acres burning multiple times (24 percent of all burned areas; Map 3.22-1). Five wildfires were caused by unknown ignition sources, with nine occurring as a result of natural causes and eight as a result of human ignition. No fires have burned within proposed Zone 6.

3.22.1.3 Wildfire Suppression

All fires within the Red Cliffs NCA, the Reserve, and proposed Zone 6 are targeted for full suppression (BLM 2004).

3.22.2 Environmental Consequences

3.22.2.1 Analysis Methods and Assumptions

Impact indicators for fire and fuels management include changes in area VCC classifications resulting from development of undeveloped lands. Other important considerations in assessing impacts on fire and fuels management include changes in land accessibility, changes in availability of non-natural ignition sources, and changes in suppression activities and priorities resulting from construction of new infrastructure.

The following assumptions apply to this analysis:

- The ecosystems of the Red Cliffs NCA, the Reserve, and proposed Reserve Zone 6 are not fire-resistant or resilient, and management activities would work toward fire suppression and preserving unburned areas.

- The natural fire regime of the Mojave Desert has been altered; healthy Mojave Desert native vegetation communities have long fire-return intervals and fuel small, low-intensity fires that generally are unable to spread without the presence of invasive grasses.
- The presence of nonnative, invasive vegetation species increases fire frequency, size, and intensity, and shortens the fire-return interval.
- A direct relationship exists between fuel loading and potential fire intensity, severity, size, and fire suppression costs.

3.22.2.2 Direct and Indirect Impacts from Alternatives 1, 5, and 6

Under Alternatives 1, 5, and 6, lands within the Red Cliffs NCA and the Reserve would not be developed for the construction of the Northern Corridor roadway, ROW corridors would not be designated, and current fire and fuels management and wildfire suppression practices within the Red Cliffs NCA, the Reserve, and proposed Zone 6 would be maintained. Current trends regarding wildfire frequency, ignition source, and wildfire suppression practices would be anticipated to continue for the foreseeable future.

3.22.2.3 Direct and Indirect Impacts from Alternatives 2, 3, and 4

Northern Corridor

The construction of the Northern Corridor highway in Alternatives 2, 3, and 4 would remove existing vegetation within the ROW corridor, and potentially convert large portions of these areas with Low and Low to Moderate VCCs to non-burnable developed land (Table 3.22-2). The highway would not cross any areas burned multiple times by wildfire and would cross between 41 and 50 acres of previously burned areas, depending on which Northern Corridor alternative is selected.

Table 3.22-2. Impacts to VCC by the Northern Corridor Roadway

VCC	T-Bone Mesa Alignment (acres)	UDOT Application Alignment (acres)	Southern Alignment (acres)
I.B – Low	378	408	465
II.A – Low to Moderate	10	2	0

The construction of the highway would increase land accessibility to areas within the Red Cliffs NCA and the Reserve that are currently difficult to reach by vehicle. This increased accessibility would improve response for wildfire suppression, and provide easier access for fuel evaluation and management in areas adjacent to the Northern Corridor. The roadway itself may also act as a fire break, providing a barrier to the spreading of active wildfires and the spreading of nonnative plant species.

Construction activities or vehicles traveling along the highway may potentially introduce new ignition sources to the area, increase the likelihood of fire occurrence, and reduce fire-return intervals. The areas burned by these fires may give invasive grasses and other nonnative plant species an opportunity to establish themselves in the affected area and alter the VCC of lands surrounding the highway.

The presence of the Northern Corridor may also affect the prioritization of wildfire suppression activities and associated costs in the Red Cliffs NCA and the Reserve. The construction of the highway would result in the construction of a new piece of public infrastructure that may warrant prioritization for allocation of suppression resources and protection of life and property during active wildfires. The allocation of resources to protect the Northern Corridor may reduce the resources available to protect other resources from actively spreading wildfires.

Red Cliffs NCA RMP Amendments

Red Cliffs NCA RMP Amendment Alternative B would have the same impacts as issuing the ROW for the Northern Corridor. Red Cliffs NCA RMP Amendment Alternative C would be similar to Alternative B, except future utility development in the ROW corridor would be allowed. The development of future ROWs would have some of the same impacts on fire and fuels management compared to the construction of the Northern Corridor, including potential for introduction of new ignition sources during construction, operation and maintenance of utilities, surface disturbance providing opportunities for the introduction and spread of invasive species that alter fire regimes, and addition of public infrastructure that may warrant prioritization for allocation of suppression resources during active wildfires.

St. George Field Office RMP Amendments and Washington County HCP

The amendments to the SGFO RMP in proposed Zone 6 under Alternatives 2, 3, and 4 would result in similar management of fire and fuels resources as would occur under Alternatives 1, 5, and 6.

The amendments to the SGFO RMP under Alternatives 2, 3, and 4 would also further restrict authorized and casual uses of proposed Zone 6, including utility ROWs, mining and mineral activities, and recreation including camping, campfires, and competitive events. These activities can result in increased fire ignition sources, especially recreational camping and campfires. The restrictions on these activities under Alternatives 2, 3, and 4 would reduce ignition sources and promote a natural fire regime in proposed Zone 6.

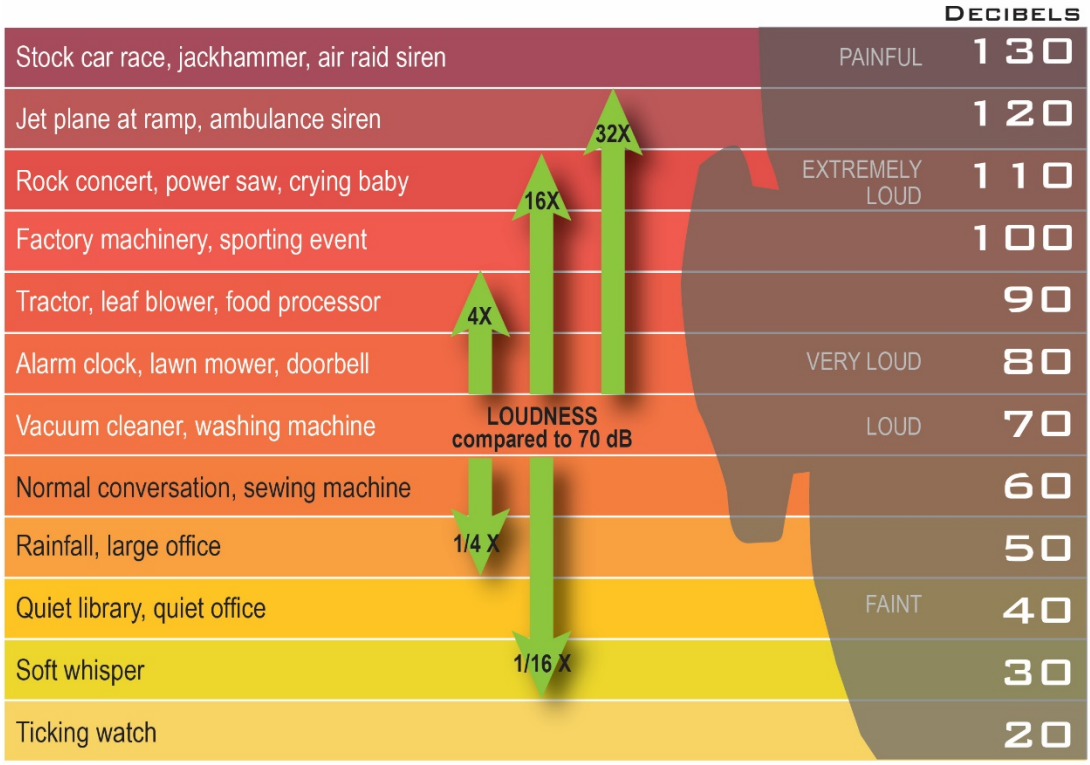
Finally, under Alternatives 2, 3, and 4, additional resources would be available to land managers to manage wildfire in the Reserve, including proposed Zone 6. These additional resources and adaptive management funding are described in Section 1.4.2.5 and would provide opportunities to support fire management of SITLA lands in proposed Zone 6 and restore fire-damaged lands.

3.23 Noise

This section discusses the fundamentals of noise, noise sensitive land uses, and ambient conditions within the project area. A Noise Technical Report was prepared for this project (Appendix K) and provides more detailed information on the potential noise impacts as a result of the proposed Northern Corridor ROW alternatives.

Sound is described as the average sound pressure level. The most common unit of measurement is the decibel. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. For the purposes of environmental studies, the A-weighted scale on a common sound level instrument is used because this scale closely approximates the range of frequencies an average human ear can detect; these noise levels are defined as A-weighted decibels (dBA). Figure 3.23-1 shows typical A-weighted noise levels.

In typical noisy environments, changes in noise of 1 to 2 decibels are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 decibels in typically noisy environments. A 3-decibel increase requires a doubling of existing sound energy, such as doubling the volume of traffic on a highway or halving of distance from a highway. In general, a 3-decibel increase in noise levels is considered barely perceptible, while a 5-decibel increase is generally readily perceptible, and a 10-decibel increase is perceived as being twice as loud.



Source: American Academy of Otolaryngology (https://www.entnet.org/content/block-out-noise); Centers for Disease Control and Prevention (https://www.cdc.gov/vitalsigns/hearingloss/infographic.html#infographic); Center for Hearing and Communication (http://chchearing.org/noise/common-environmental-noise-levels/), Hearing Sense (http://hearingsense.com.au/hearing-tests-services/ear-protection/).

Figure 3.23-1. Typical A-Weighted Noise Levels

3.23.1 Affected Environment

The noise study area was comprised of a 500-foot buffer around the proposed project and included all land uses that could potentially be impacted by future traffic noise. General land uses in the project area mostly include residential development and commercial development. Other uses include recreation, medical facilities, places of worship, schools, day care facilities, libraries, and a cemetery.

3.23.1.1 Existing Noise Levels

Field noise monitoring was conducted to collect ambient noise conditions in the study area. Up to five locations were selected for short-term (20 minutes) monitoring. Noise levels ranged from approximately 35 dBA in areas where existing noise sources (roadways) were not present up to approximately 75 dBA near existing roadways. Table 3.23-1 summarizes the field data collected at the five locations.

Table 3.23-1. Field Measurement Noise Levels

Meter Number	Location	Distance to Northern Corridor	Land Use	Field Measurement Noise Levels (Leq)	Traffic Counts – Autos (hourly)	Traffic Counts – Trucks (hourly)
M1	500 St. George Boulevard (St. George Boulevard/100 South One-way Couplet Alternative)	25 feet	Commercial	75.5	2,272	104
M2	500 East 100 South (St. George Boulevard/100 South One-way Couplet Alternative)	25 feet	Residential	72.1	996	28
M3	Pioneer Hills Park (Red Hills Parkway Expressway Alternative)	25 feet	Park	72.1	1,328	108
M4	1700 East 1200 North (T-Bone Mesa Alignment, UDOT Application Alignment, and Southern Alignment)	Not Applicable	Residential	35.5	Not Applicable	Not Applicable
M5	2200 North 990 West (T-Bone Mesa Alignment, UDOT Application Alignment, and Southern Alignment)	Not Applicable	Residential	37.9	Not Applicable	Not Applicable

Note: Leq = equivalent continuous noise level

3.23.2 Environmental Consequences

3.23.2.1 Analysis Methods and Assumptions

This qualitative noise analysis used the UDOT Noise Abatement Policy (08A2-01), revised June 15, 2017 (UDOT 2017a), and 23 CFR 772, but is not consistent with them, as described in this section and in the Noise Technical Report (Appendix K).

A qualitative analysis was determined to be the appropriate level of analysis for assessing potential noise impacts as a result of the planning level decisions to be made under this Draft EIS.

The following assumptions apply to the qualitative noise analysis:

- Noise Abatement Criteria, as defined in the following standard and policy, and summarized in Table 3.23-2, is suitable for establishing potential noise impacts:
  - Federal Highway Administration Noise Standard (23 CFR 772), Procedures for Abatement of Highway Traffic Noise and Construction Noise.
  - UDOT Noise Abatement Policy (08A2-01, June 2017).
- A substantial noise increase is considered 10 dBA above existing noise levels as defined in the UDOT Noise Abatement Policy.
- Construction activities from the proposed project would be subject to the UDOT 2017 Standard Specifications for Road and Bridge Construction (UDOT 2017b).

The qualitative analysis used field-collected ambient noise levels and estimated traffic data to determine potential noise impacts. Changes in traffic were considered between exiting volumes

and future volumes for the No Action Alternative and the Northern Corridor action alternatives where noise sensitive locations are located adjacent to the proposed alignments.

Table 3.23-2. Noise Abatement Criteria
[Hourly A-Weighted Sound Level decibels (dBA)]

Activity Category	Federal Highway Administration Criteria Leq(h)	UDOT Criteria [a] Leq(h)	Evaluation Location	Activity Description
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	66	Exterior	Residential.
C	67	66	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, recreation areas, schools, television studios, trails and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	71	Exterior	Hotels, motels, offices, restaurants and bars, and other developed lands, properties, or activities not included in Categories A through D or F.
F	Not applicable	Not applicable	Exterior	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	Not applicable	Not applicable	Exterior	Undeveloped lands that are not permitted.

Source: UDOT June 2017a

[a] Hourly A-weighted sound level in decibels reflecting a 1-dBA "approach" value below 23 CFR 772 values.

Note:

Leq(h) = equivalent continuous noise level over a 1-hour period

Noise impacts include the above-referenced categories only when development exists or has been permitted. A development is defined as being permitted when a formal building permit has been issued prior to the date the final environmental decision document is approved.

3.23.2.2 Direct and Indirect Impacts from Alternatives

Estimated 2050 future traffic along existing roadway corridors within the study area is anticipated to double compared to existing conditions, which generally results in an increase in noise levels of 3 dBA. This increase in noise levels from existing to future conditions would be perceptible. However, the change in noise levels associated with the No Action versus the action alternatives is not anticipated to be perceptible.

The most noticeable change in noise levels is anticipated near the T-Bone Mesa Alignment, UDOT Application Alignment, and Southern Alignment because these alternatives propose that a new highway would be constructed in an area where no roadway currently exists. The design details needed to model projected noise are not available and cannot be determined before first considering where to align the highway to best avoid sensitive resources such as Mojave desert tortoise or cultural resource sites, and other factors. If one of these alternatives is selected and design advances, noise modeling would be conducted. If noise modeling identifies future noise levels that substantially exceed existing conditions, or exceed UDOT Noise Abatement Criteria for the types of receptors near the T-Bone Mesa Alignment, UDOT Application Alignment, or Southern Alignment, noise barriers would be evaluated based on UDOT's feasible and reasonable criteria. For a noise barrier to be effective, it must be continuous with no gaps. If warranted, noise barriers along these alignments would be feasible to construct. However, noise barriers may not be reasonable because most receptors are distant enough from the alignment that the noise barrier would only minimally reduce the noise. A more detailed noise analysis including evaluation of noise barriers, as applicable, would be provided after completion of this Draft EIS in a separate project analysis.

The Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet Alternatives propose changes to existing roadways. Based on ambient noise levels and traffic volumes along the existing corridors of Red Hills Parkway, St. George Boulevard, and 100 South, noise levels are not likely to significantly change between the existing conditions, the No Action Alternative noise conditions in 2050, or the implementation of either of these action alternatives. Field measured noise levels along the existing corridors of Red Hills Parkway and St. George Boulevard/100 South were 72.1 dBA and 75.5 dBA at approximately 25 feet, respectively. Therefore, future noise levels are likely to exceed the Noise Abatement Criteria for all applicable categories. Most of the noise sensitive receptors are located adjacent to the proposed improvements. However, some receptors are beyond the first row of receptors. A doubling of distance results in a 3-dBA decrease in noise levels for a line source (e.g., road traffic). However, noise levels beyond the first row of receptors would likely be even lower when accounting for shielding from existing structures (i.e., buildings). Even if noise impacts are identified along the Red Hills Parkway Expressway and St. George Boulevard/100 South One-way Couplet Alternatives, noise abatement is not likely to be feasible because of the numerous driveway connections and street intersections that would require gaps in the noise barriers, rendering them ineffective. Space between receptors and the alignments for Red Hills Parkway Expressway, St. George Boulevard, and 100 South is likely to be too limited to construct and properly maintain a noise barrier within the ROW. In addition, constructing a noise barrier this close to these alternatives would result in unsafe driving conditions for motorists because their view would be limited.

Construction

Construction activities associated with the proposed project would temporarily elevate noise levels in the study area for each action alternative. Noise resulting from construction activities would depend on the equipment used, timing and duration of noise-generating activities, and proximity to noise sensitive receptors. Construction activities would be temporary and intermittent, and would mostly occur during normal daytime hours when occasional loud noises are more tolerable. None of the receptors are expected to be exposed to construction noise for a long duration; therefore, any extended disruption of normal activities is not expected.

Contractors would be required to conform to the UDOT 2017 Standard Specifications for Road and Bridge Construction (UDOT 2017b) to reduce the impact of construction noise on the surrounding community during construction. Nighttime construction is not anticipated for this proposed project.

However, if construction activities are required during nighttime hours (10 p.m. to 7 a.m.), the proposed project would adhere to the Senate Bill 177 (State of Utah 2016).

3.24 Hazardous Materials and Solid Waste

The spatial analysis for this resource is the alternative corridors being considered for the proposed Northern Corridor ROW alternatives and potential future utility ROWs, as well as proposed Zone 6. It also considers hazardous material or waste sites nearby that could potentially migrate into these corridors or proposed Zone 6. A desktop hazardous materials database search was conducted to identify information about reported releases, storage, and generation of hazardous wastes, materials, or petroleum products within or near the project study area. Datasets used include the EPA's NEPA Assist tool and Enforcement and Compliance History Online (ECHO) databases, the Utah Department of Environmental Quality interactive map, and historical land use and planning documents for the project area.

3.24.1 Affected Environment

Businesses along existing streets and roadways in St. George may use, store, or transfer solid, toxic, or hazardous waste for disposal. Examples of businesses adjacent to Red Hills Parkway include gas stations, industrial supply stores, automotive repair shops, and car dealerships. Similarly, businesses adjacent to St. George Boulevard and 100 South include gas stations, an electrical substation with oil-filled transformers, and other commercial establishments that may use or store toxic or hazardous substances.

Within the NCA and Reserve, current and previous land uses indicate a low potential for hazardous material contamination because this portion of the study area consists largely of undeveloped tracts or land previously reserved for habitat conservation. The only source of potential contamination within the Red Cliffs NCA and Reserve is the former Rocky Mountain Recycling landfill. This closed landfill is in the southern portion of the Red Cliffs NCA and Reserve. The Red Cliffs NCA is at a higher elevation than the developed communities, resulting in the project area being upgradient from known hazardous materials sites; this makes migration of contaminants into the project area highly unlikely. The proposed Zone 6 habitat conservation area has no known hazardous materials or wastes. The closest identified hazardous materials location is an underground storage tank at St. George's wastewater treatment plant approximately 1,000 feet south of the proposed Zone 6 boundary. The surface and groundwater gradient at this location is away from Zone 6 and toward the nearby Virgin River to the southwest.

3.24.2 Environmental Consequences

3.24.2.1 Analysis Methods and Assumptions

The analysis of the potential direct and indirect impacts of the proposed actions on hazardous materials included a desktop survey of known hazardous material sources, waste locations, and releases within or near the Red Cliffs NCA, the Reserve, and proposed Zone 6. A qualitative assessment of the impacts from the potential introduction of hazardous materials within the Red Cliffs NCA and the Reserve as a result of constructing and operating a new highway and the potential for permitting future utility ROWs along the highway also were analyzed.

The following assumptions apply to this analysis:

- A Phase I site assessment, which is a more detailed report identifying potential or existing environmental contamination liabilities, is not required.

- No assessment of the potential risk of hazardous materials within Mojave desert tortoise habitat on non-Federal lands throughout Washington County outside of proposed Zone 6 is required because these areas may be developed regardless of the Amended HCP.

3.24.2.2 Direct and Indirect Impacts

Under the No Action Alternative, no change would occur that would introduce new sources of hazardous or solid waste within the study area. In addition, no activities would be proposed that would result in interactions with existing sources of hazardous or solid waste that are not already occurring, such as development within Washington County.

As discussed in Section 3.24.1, the only identified waste site within the project area is the former Rocky Mountain Recycling landfill. Alternative 3, the UDOT Application Alignment, is the only highway ROW alternative that would potentially intersect with the old landfill. Final highway design within the 500-foot ROW may avoid disturbing the landfill, but if disturbance cannot be avoided, construction activities might expose toxic substances in the waste or release methane gas, which is both flammable and a GHG.

Alternatives 5 and 6 follow existing transportation routes within St. George, where businesses may use or store toxic or hazardous substances. To the extent that intersections, traffic signals, traffic lights, or other features are adjusted, or properties need to be acquired, Alternatives 5 and 6 have a higher potential for construction activities to encounter wastes or contaminated soils from past leaks or spills than Alternatives 2, 3, and 4.

Equipment used in construction of the proposed Northern Corridor also may inadvertently release oil, petroleum, or lubricants. In addition, once the Northern Corridor is operational, vehicles transporting waste products or hazardous materials may have a release from a crash or other traffic incident.

Under Red Cliffs NCA RMP Amendment Alternative C, the development of aboveground or buried utilities, such as an oil pipeline, may be permitted alongside the highway with Alternatives 2, 3, and 4. While any future applications for a utility ROW would be subject to additional environmental analysis and utility permit requirements, an alternative that provides for a utility corridor could introduce a long-term potential for an inadvertent release of oil, petroleum, or other potentially toxic or hazardous substance within the Red Cliffs NCA.

No sources of solid or hazardous materials were identified within proposed Zone 6. The Amended HCP and the management prescriptions by the SGFO RMP Amendment alternatives would further contribute to resource protections and avoidance or exclusion of activities that could potentially result in a large waste stream. Any potential development on non-Federal lands within desert tortoise habitat in Washington County may introduce a source of solid or hazardous materials; however, this would occur regardless of the Amended HCP and would not be as a result of the decision.

3.25 Human Health and Safety

3.25.1 Affected Environment

This analysis identifies potential human health and safety risks within Washington County that may be affected by the proposed Federal actions analyzed in this Draft EIS. Environmental risks that may threaten human health and safety in the study area (alternative roadway ROWs in natural and urban locations) include the potential for extreme weather conditions that affect roadway conditions and recreationist safety, uneven and dangerous topography, proximity to construction equipment, and crashes involving pedestrians and bicyclists. Construction crews, recreationists, residents, and pedestrians may be exposed to these risks depending on location.

Emergency response to health and safety incidents may be addressed by entities including City fire and police departments, City or private ambulance services, the County sheriff department, and State or Federal agency law enforcement or first responders. Response times depend on several factors, including access to the site of the emergency, traffic volumes, and road or weather conditions.

3.25.2 Environmental Consequences

This section addresses how traffic pattern changes, vehicle emission, emergency response times, and the potential for future utility ROWs within the Red Cliffs NCA may directly or indirectly affect human health and safety.

3.25.2.1 Analysis Methods and Assumptions

Impact indicators related to human health and safety for the proposed Northern Corridor alternatives include potential changes in emergency response times and in traffic patterns. The analysis of Northern Corridor impacts qualitatively discuss health and safety risks tied to access to a desert area, projected traffic congestion, and potential vehicle crashes. Indicators related to the Red Cliffs NCA RMP Amendment include potential public safety risks associated with utilities adjacent to travel corridors. This analysis qualitatively discusses safety risks to motorists if utilities are developed along the Northern Corridor.

The following assumptions apply to this analysis:

- Existing recreational trails would remain and may occur near the Northern Corridor alternative alignments, and within proposed Zone 6.
- A new highway would be a viable facility for emergency services, and enhancements to an existing roadway that enhance traffic flow or speed also would facilitate emergency services.
- Underground utilities, if permitted with Alternatives 2, 3, and 4, would be properly engineered to withstand flash flooding so that a highway, if constructed in the NCA, would not be compromised by washouts.

3.25.2.2 Direct and Indirect Impacts

Impacts to human health and safety across the Northern Corridor action alternatives include changes to traffic patterns and higher roadway speeds that may increase the potential for or severity of traffic accidents.

While emergency response times may be delayed in construction phases for all action alternatives, improved traffic flow would be expected to enhance emergency response in the long term. The Northern Corridor alternative alignments within the NCA would pose a new safety risk to recreational users, requiring consideration during the design phase to accommodate trail crossings. Alternatives 5 and 6, which modify existing traffic routes, may impede emergency services during construction, but would improve traffic flow when completed. Construction to expand Dominion Energy's 12-inch gas pipeline is underway parallel to Red Hills Parkway (Alternative 5). Construction of Alternative 5 would require additional coordination time with existing utility companies and potentially increase safety risks because inadvertent damage a natural gas line during highway construction could be a potential explosive hazard.

Alternative 6 would change St. George Boulevard and 100 South from two-way streets to one-way streets. Pedestrians and bicyclists would not have to contend with traffic moving in two directions for street crossings; however, the traffic would be expected to move faster. While St. George Boulevard is highly commercial, land uses along 100 South include several residential properties, an elementary school, and Dixie State University, which all provide sources of pedestrian and bicycle activity. Though traffic would be moving in one direction, one-way roads increase conflict points at intersections, increasing the risk of motorist and pedestrian accidents (Walker et al.

2000). The St. George Active Transportation Plan (City of St. George 2017) reports 13 crashes involving bicyclists, 10 crashes involving pedestrians on St. George Boulevard, and 7 crashes involving pedestrians near Dixie State between January 1, 2010, and September 31, 2016. Of the 228 total crashes involving bicyclists or pedestrians in St. George, 68 percent were intersection related (City of St. George 2017).

During the construction phase, Alternatives 2, 3, and 4 may impede traffic flow where the new highway would tie into existing travel routes, but would provide a viable route and access to new areas once completed; therefore, access to injured recreational users in the NCA for emergency response would be enhanced. As traffic congestion increases with the No Action Alternative, emergency response times may slow.

Red Cliffs NCA RMP Amendment Alternative C, which would open the ROW to future aboveground or buried utilities along the highway, could introduce potential future safety risks to motorists. During the utility construction phase, potential safety risks could include construction equipment entering and exiting the highway, and temporary traffic detours that could contribute to accidents.

3.26 Socioeconomics

3.26.1 Affected Environment

The primary geographic area of analysis to evaluate the potential socioeconomic effects of the proposed actions and alternatives in Washington County, Utah. This section analyzes social, cultural, and economic conditions and trends within Washington County based on the most recent data available from 2015 to 2019. This section analyzes the population's race, ethnicity, employment and income, as well as current land use, value, and existing utilities. Existing conditions summarize current land use and jurisdiction, because these are likely to affect future trends in land use and planning.

In addition, this section includes the traffic and transportation effects of the proposed actions and alternatives. The primary geographic area of analysis to evaluate the traffic and transportation effects is the transportation system within the northern City of St. George, Washington City, City of Santa Clara, and the City of Ivins metropolitan areas.

3.26.1.1 Demographics

Washington County's population, according to 2017 census data, is 165,662 and is expected to experience the highest rate of growth in the State of Utah. Currently, 5 percent of the state's total population resides in the county; by the year 2065, this percentage is projected to increase to an estimated 13 percent of the state's population. Migration is the greatest contributor to this increase, accounting for 71 percent of the population change (Census Bureau no date).

The U.S. Census Bureau considers race and ethnicity to be separate. Ethnicity describes whether a person is of Hispanic or Latino origin. "Hispanic" or "Latino" origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or ancestors. Those of Hispanic or Latino origin may identify as any race. The U.S. Census Bureau tracks people of Hispanic origin, because this is one of the fastest growing segments of the U.S. population. Table 3.26-1 shows minority and ethnicity comparisons between Washington County and the State.

Table 3.26-1. Minority and Hispanic Populations in Washington County and Utah

Geography	Percent White	Percent Minority	Percent Hispanic
Washington County	90%	10%	10%
Utah	87%	13%	14%

Source: Headwaters Economics 2020

3.26.1.2 Employment and Income

Washington County lies in the southwestern corner of Utah and is popular among tourists because of its scenic resources and warm, dry climate. Washington County is also home to Zion National Park, an international tourist destination with as many as 5 million visitors per year. Most of the population works in service-related jobs, including healthcare and social assistance, retail, utilities, accommodation, and food service. The mining industry, which includes hard rock mines as well as the harvesting of sand, gravel, building stone, and other mineral materials, has grown the most in the county, with 90 percent growth from 2001 to 2017. By comparison, education services and real estate have grown the most in the state at 50 percent each. Employment and income statistics are included in Table 3.26-2.

Table 3.26-2. Employment and Income in Washington County and Utah

Geography	Unemployment Rate	Employment Growth	Per Capita Income	Per Capita Income Growth	Bachelor's Degree [a]
Washington County	3.4	99%	$36,000	26%	28%
Utah	3.1	44%	$44,500	24%	32%

Source: U.S. Census Bureau no date

[a] Higher education attained by residents 25 years and older

3.26.1.3 Land Use and Value

Approximately 1.16 million acres, or 75 percent of the county's land, is public land administered by Federal agencies, including the BLM, the National Park Service, and the U.S. Forest Service. An island of private land is located centrally within the county, accounting for 18 percent of county land. The remaining land is owned by the State (5.6 percent) and a Native American Tribe (1.9 percent). As of 2019, 7 percent of the county has been developed, and 11 percent of undeveloped land is non-Federally owned (USGS 2019a and 2019b, Lowry et al. 2005, Washington County 2019a).

In Washington County, 81.2 percent of the housing stock is occupied by full-time residents, with 12.9 percent of homes seasonally or recreationally occupied, indicating the desirability of a place for recreation and tourism. Median home values for the county are slightly higher than for the state at $240,300, compared to $238,300 (Census Bureau no date).

The county is primarily zoned as open space and parks, making up 86.7 percent of the county. Residential and agriculture are the next highest zoned areas at 8.2 percent and 2.7 percent, respectively. Commercial zones make up 0.5 percent of the county (Washington County 2019d).

The study area for the Northern Corridor includes the Red Cliffs NCA, which is primarily undeveloped open space, two streets within the City of St. George, and an area on the north side of St. George focused on the existing Red Hills Parkway.

The portion of the study area within the City of St. George focuses on St. George Boulevard and 100 South. The entire length of St. George Boulevard is primarily zoned as commercial and includes restaurants, gas stations, strip malls, and other businesses. Lands along 100 South are zoned for a mix of mostly residential, some commercial, and educational uses, because the roadway borders the Dixie State University campus. Other land uses include a cemetery, church, an elementary school, a facility for Veterans of Foreign Wars, ballfields, and professional service businesses.

Red Hills Parkway is an existing roadway crossing through open spaces of the Red Cliffs NCA and into residential-zoned and then commercial-zoned land on the eastern portion of the alternative. Commercially zoned land along the Red Cliffs Parkway is mostly built-out and provides little new

development opportunity. Existing establishments include an electrical substation, water and power department, restaurants, and a motel.

3.26.1.4 Traffic and Transportation

The traffic and transportation effects are based on future 2050 travel demand forecasts for Washington County that were developed using the DMPO Travel Demand Model. The primary geographic area of analysis includes the transportation system within the northern City of St. George, Washington City, City of Santa Clara, and the City of Ivins metropolitan areas, hereinafter referred to as the St. George urbanized area. The traffic and transportation analysis methodology, study, intersections and roadways, and results are detailed in the Northern Corridor Highway Alternatives Development Report (Jacobs 2020b) and the Preliminary Northern Corridor Traffic Analysis Memorandum (Horrocks Engineers 2020b), included as Appendixes J and L, respectively.

3.26.2 Environmental Consequences

This section describes the direct and indirect socioeconomics effects and the traffic and transportation effects as a result of the Northern Corridor alternatives, the Red Cliffs RMP Amendment and SGFO RMP Amendment, and the Amended HCP.

3.26.2.1 Socioeconomics

Analysis Methods and Assumptions

Impact indicators for direct and indirect socioeconomic impacts related to the Northern Corridor include private land and developed properties acquired for ROW, job increases as a result of construction, and travel minutes saved compared to the No Action Alternative. Socioeconomic impact indicators for the SGFO RMP Amendment include the availability of utility corridor options. Indicators related to the HCP include population growth and the pace of development within Washington County.

The following assumptions apply to this analysis:

- The Northern Corridor action alternatives would improve traffic congestion in preparation of a growing population.
- Long-term impacts to industry are not anticipated.
- Establishing a utility corridor (with Alternatives 2, 3, and 4) would ultimately result in future use of the corridor for utilities that would benefit local populations.
- Construction associated with action alternatives would create jobs and increase expenditures.
- The proposed Zone 6 and SGFO RMP Amendment management prescriptions for greater resource protection would impact social aspects of the area and potential family income related to grazing.
- Denial of the HCP could slow or postpone development in certain areas, though the majority of development in the county would continue.
- An alternative to the HCP would be a General Conservation Plan, which would rely heavily on effective partnerships.

Direct and Indirect Impacts from Alternative 1

Under the No Action Alternative, congestion on existing roadways in the St. George area would continue to increase, extending the duration of time needed to complete some trips compared to traffic conditions today. The potential social effects may include longer travel times, increased vehicle emissions from inefficient vehicular operations, and increased traffic noise on existing

streets. Economic effects are more speculative but could include encouraging residents to shop more within their neighborhood or to shop more frequently online to avoid the time invested in travel to local stores; increased online shopping may deprive local businesses of sales and tax revenue for the local community.

Direct and Indirect Impacts from Alternatives 2, 3, and 4

Alternatives 2, 3, and 4, which include highway alignments through the Red Cliffs NCA, would provide minimal or no opportunities for additional business development in the areas that would be affected, though properties would be encumbered (see Tables 3.26-3 through 3.26-5). Relocations would not be required as a result of these impacts.

Table 3.26-3. Alternative 2 Property Impacts

Parcel ID	Land Owner	Parcel Size (acres)	Property to be Encumbered (acres)
6100-B	UDWR	524.0	51,1
6213-TR	SITLA	310.1	0.8
6600-NP-1	Private	266.8	32.2
6810-D-10	BLM	83.6	14.6
6810-D-12	Washington County	40.0	5.2
6810-D-3	SITLA	92.2	2.5
6810-D-6	BLM	22.3	12.2
6810-D-9	BLM	11.1	4.6
SG-5-2-17-141	BLM	29.5	16.6
SG-5-2-17-2003	BLM	112.7	1.1
SG-5-2-17-2005	UDWR	24.3	6.3
SG-5-2-17-300	BLM	167.6	19.1
SG-5-2-17-401	BLM	76.6	12.7
SG-5-2-18-110	BLM	417.4	40.5
SG-5-2-18-330	Municipally Owned	119.4	10.0
SG-5-2-18-410	BLM	83.6	9.7
SG-5-2-18-431	Municipally Owned	81.9	12.1
SG-6-2-13-1100	Municipally Owned	68.3	0.9
W-5-2-3-311	UDWR	52.4	8.1
Total Acres Encumbered	Not Applicable	Not Applicable	**260.1**

Table 3.26-4. Alternative 3 Property Impacts

Parcel ID	Land Owner	Parcel Size (acres)	Property to be Encumbered (acres)
6101	UDWR	19.2	0.1
6100-B	UDWR	524.0	38.4
6810-D-14	Privately Owned	40.0	0.4
6810-D-15	Privately Owned	29.5	28.2
6810-D-16	Washington County	22.7	4.1
6810-D-18	BLM	45.5	2.0
6810-D-1-A-1	Privately Owned	324.5	13.2
6810-D-3	State of Utah	92.2	14.8

Parcel ID	Land Owner	Parcel Size (acres)	Property to be Encumbered (acres)
6810-D-4	Privately Owned	144.3	33.9
6810-D-7	BLM	6.3	1.2
6810-D-8	BLM	3.1	0.6
SG-5-2-17-2000	BLM	9.1	1.3
SG-5-2-17-2003	BLM	112.7	20.7
SG-5-2-17-2004	BLM	13.0	3.3
SG-5-2-17-2007-A	BLM	47.5	10.0
SG-5-2-17-300	BLM	167.6	24.0
SG-5-2-17-301	BLM	82.4	7.8
SG-5-2-17-401	BLM	76.6	1.0
SG-5-2-18-110	BLM	417.4	52.5
SG-5-2-18-330	Municipally Owned	119.4	13.6
SG-5-2-18-431	Municipally Owned	81.9	1.6
W-5-2-3-311	UDWR	52.4	8.3
Total Acres Encumbered	Not Applicable	Not Applicable	**281.0**

Table 3.26-5. Alternative 4 Property Impacts

Parcel ID	Land Owner	Parcel Size (acres)	Property to be Encumbered (acres)
6100-B	UDWR	524.0	40.2
6810-D-11	BLM	113.3	23.3
6810-D-18	BLM	45.5	4.7
6810-D-1-A-1	Privately Owned	197.5	45.9
6810-D-3	State of Utah	92.2	14.7
6810-D-4	Privately Owned	144.3	29.3
6810-D-7	BLM	6.3	2.8
6810-D-8	BLM	3.1	1.4
SG-1743-A	BLM	25.2	0.5
SG-1743-G	BLM	6.4	1.3
SG-5-2-17-2003	BLM	112.7	20.2
SG-5-2-17-221	BLM	27.6	3.1
SG-5-2-17-230	BLM	34.2	9.1
SG-5-2-17-301	BLM	82.4	23.2
SG-5-2-18-110	BLM	417.4	6.5
SG-5-2-18-330	Municipally Owned	119.4	28.5
SG-5-2-18-431	Municipally Owned	329.0	85.4
SG-5-2-19-22	BLM	55.0	3.4
W-5-2-3-311	UDWR	52.4	8.4
Total Acres Encumbered	Not Applicable	Not Applicable	**351.8**

[a] Parcel impacted spans two land owners.

Because this area of the NCA is undeveloped, no impacts to neighborhoods or community cohesion would occur, although existing housing developments where the highway would tie into other infrastructure would experience increases in traffic and noise compared to the No Action

Alternative. No businesses are located within the proposed ROW for these alternatives. The NCA alternatives would serve as an alternative transportation route to mitigate increased traffic expected with the projected population growth (see Section 3.26.2.2 for more information on traffic and transportation).

If the ITP is denied, individual take permits could be required to develop non-Federal land with Mojave desert tortoise habitat, particularly where take may be difficult to avoid. This may slow development and limit economic opportunity. Under the ITP/HCP action, which would establish the proposed Reserve Zone 6 and more restrictive land uses through the SGFO RMP Amendment, ranchers could be impacted if livestock grazing is restricted as detailed in Section 3.21, Livestock Grazing. With Red Cliffs NCA RMP Amendment Alternative C, future utilities could be accommodated within the highway ROW; an indirect effect of added infrastructure, should it occur, is that it may induce growth to an area that might overwise not be developed. In contrast, the SGFO RMP Amendment would either establish ROW exclusion areas for proposed Zone 6 lands (SGFO RMP Amendment Alternative B) or ROW avoidance areas (SGFO RMP Amendment Alternative C). Most mineral activity in proposed Zone 6 would also be precluded, although the probability for mineral development would be low in this area even if unrestricted.

Direct and Indirect Impacts from Alternative 5

The Red Hills Parkway Expressway Alternative would widen portions of the roadway to accommodate higher traffic capacity. The Red Hills Parkway Expressway would also require an additional lane in each direction, extending most of the length of Red Hills Parkway between 200 East and 900 East to preserve most property accesses, though some access may have to be closed or relocated. In addition, the Red Hills Parkway Expressway Alternative would convert the at-grade signalized intersections at 200 East and 1000 East to grade-separated interchanges and eliminate all direct access to properties within the functional area of the interchange. Outside the NCA, adjacent properties are mostly developed leaving minimal to no opportunities for additional business development; however, the road widening proposed in this alternative would result in the need for structure relocations and property acquisitions (Table 3.26-6). Partial acquisitions are defined as portions of a parcel that would be acquired for the roadway but would still allow for current use on the property to continue. Full acquisitions are defined as entire parcels that would be purchased for the roadway. Often full acquisitions are required because access would be restricted or removed, and the current land use would not be able to continue. Full acquisitions that result from restricted or removed access often require relocation of the current property use (e.g., a business relocation or resident). Relocations are defined as a business structure or residence that would be directly impacted and would require relocation to another parcel. The full acquisitions identified in Table 3.26-3 include commercial and industrial properties that would be relocated. Access to the St. George Streets Division and Energy Department would change as a result of the alternative. In addition, two structures on the parcel would be directly impacted and would be relocated. Because of the size of the parcel, it is expected that the site would continue to be owned by the St. George Streets Divisions and Energy Department with modified use compared to how the site functions today.

Table 3.26-6. Alternative 5 Property Impacts

Parcel ID or Owner	Parcel Type	Parcel Size (acres)	Full Acquisition (acres)	Partial Acquisition (acres)	Relocations
SG-1328-A-1-N	Commercial	0.7	0.7	0	1
SG-1328-A-2-N	Commercial	1.2	1.2	0	1
SG-1328-A-3-N	Commercial	1.5	1.5	0	1
SG-1337-A-2	Vacant	1.7	0	0.1	0

Parcel ID or Owner	Parcel Type	Parcel Size (acres)	Full Acquisition (acres)	Partial Acquisition (acres)	Relocations
SG-1344	Existing Road	1.6	0	0.3	0
SG-1361-B-2-B	Existing Road	2.0	0	0.3	0
SG-1363	Existing Road	26.9	0	1.8	0
SG-1381-B	Commercial	2.1	2.1	0	2
SG-1381-D	Commercial	0.9	0.9	0	2
SG-1381-E-1	Commercial	3.5	0	0.8	0
SG-1381-N	Commercial	1.9	0	0.5	1
SG-1734-A-1-B-1	Commercial	5.5	0	0.1	0
SG-1734-A-1-B-2	Commercial	1.0	0	0.2	0
SG-1734-A-3-A	Vacant	0.6	0	0.1	0
SG-1734-A-3-B-1	Vacant	4.7	0	0.2	0
SG-1734-B	Existing Road	0.9	0	0.2	0
SG-1740-A-1-B-1	Commercial	0.3	0	0.2	0
SG-1740-A-1-B-2-A	Commercial	1.1	0	0.2	0
SG-1740-A-1-B-3-A	Commercial	0.7	0	0.3	1
SG-5-2-20-2100	Existing Road	27.5	0	8.7	0
SG-IND-P-17-A	Commercial	0.7	0	0.6	0
SG-IND-P-17-B	Commercial	3.2	0	0.8	1
SG-IND-P-18-A-1	Commercial	0.7	0	0.3	1
SG-IND-P-18-B	Commercial	1.8	0	0.3	0
Owned by St. George	Existing Curb	0.1	0.1	0	0
St. George Streets Division and Energy Department	City Utilities	45.2	0	3.7	2
Total	Not Applicable	Not Applicable	**6.5**	**19.9**	**13**

Direct and Indirect Impacts from Alternative 6

The one-way couplet alternative could result in social or economic impacts, or both, to the areas within 0.25 mile of both St. George Boulevard and 100 South. St. George Boulevard is already fully developed, and this alternative would not be expected to change the characteristics of adjacent land uses. However, the one-way couplet may impact the quality, walkability, and social aspects of downtown St. George. One-way streets typically result in higher traffic volumes and lack the traffic calming effects of two-way streets, so drivers tend to go faster than the posted speed limit. One-way streets support more vehicular traffic and discourage pedestrian and bicycle traffic thus deterring walkability in the downtown area (Riggs and Gilderbloom 2015, Walker et al. 2000). One-way streets may lower perceived pedestrian safety and business attention as speeds increase and visibility of people and buildings decrease (Baco 2009, Riggs and Gilderbloom 2015, Walker et al. 2000). Property values may change, and storefront exposure could decrease, impacting business along St. George Boulevard and 100 South (Baco 2009, Riggs and Gilderbloom 2015). It is possible that with an increase in traffic volumes the visibility to businesses on either side of St. George Boulevard could create more economic activity and lead to increased economic opportunity, particularly if traffic calming measures are implemented to help maintain the posted speed limit.

On 100 South, the one-way couplet will have more negative impacts to residents. Implementation of this alternative could lead to an increase in commercial property values along 100 South as traffic volumes increase, bringing more shoppers and visibility to the area. This, however, would

likely decrease residential property values because traffic and noise take away from the livability of the area. It is also possible that commercial and residential property values could suffer if traffic speeds are not maintained, and create a dangerous environment for pedestrian shoppers. With faster moving traffic, less driver awareness of pedestrians, and potentially higher property taxes, residential properties on 100 South may convert to business uses. In addition, the neighborhood cohesion between residents that align 100 South would be negatively impacted by the alternative. The increase in traffic volumes and the additional through lane associated with the one-way couplet would deter residents from crossing 100 South without implementation of designated pedestrian crossings and traffic calming design features.

Dixie State University, located on 100 South, initiated a Student Pedestrian Emphasis Area with the assistance of the City of St. George in 2014. This Pedestrian Emphasis Area allows certain uses and densities to support the university's growing student population and strives to provide study housing, and encourage walking and biking to campus. The one-way street conversion may impact this area with increased traffic speeds and volumes, which can negatively impact the walkability of the area without traffic calming, and safety design features along 100 South for pedestrians and bicyclists. The BLM is coordinating with the City of St. George regarding potential inconsistencies between the roadway alternatives and the land use plans, policies, and controls adopted by the City of St. George. Findings are documented in Appendix H.

Land acquisitions and relocations would be needed with the eastern portion of this alternative where St. George Boulevard and 100 South tie in with I-15. These acquisitions are limited to 100 South from 1000 East to South River Road. Table 3.26-7 shows that no full acquisitions or relocations would be needed. Partial acquisitions will not impact property access.

Table 3.26-7. Alternative 6 Property Impacts

Parcel Number or Property Description	Parcel Type	Parcel Size (acres)	Partial Acquisition (acres)
SG-1144-C-2	Commercial	3.15	0.40
SG-1730-A-1-D-2	Vacant	1.03	0.29
SG-1737-A-1	Commercial	0.61	0.17
SG-1739-A-10	Commercial	2.03	0.39
SG-1739-A-9-A-1	Commercial	2.60	0.30
Dahle Plaza Condo	Commercial	1.61	0.20
Georgetown Square	Commercial	2.39	0.36
SG-SVGC-3	Commercial	6.34	0.08
Total	Not Applicable	Not Applicable	**2.20**

3.26.2.2 Traffic and Transportation

Analysis Methods and Assumptions

Traffic and transportation effects are only related to the Northern Corridor highway alternatives. It is assumed that there are no effects to traffic and transportation directly associated with Red Cliffs NCA RMP Alternatives B or C, SGFO NCA RMP Alternatives B or C, and the Amended HCP.

Traffic analyses were performed based on standard FHWA traffic analyses methodologies using industry-accepted traffic analysis software programs. Results are presented by reporting the projected 2050 evening peak hour (highest hour volume) intersection level of service, which is a measurement of average intersection delay and travel time. Level of Service A correlates to free-flow operations with very little delay and almost no congestion while Level of Service F represents intersection failure manifest by extreme congestion with large delay, long queues, and traffic demand that exceeds the capacity of the intersection. Level of Service D is generally accepted as

the target level-of-service value for intersections in urbanized areas and was used as the threshold value in this analysis. The key intersections along the primary east-west roadways evaluated in this analysis include Bluff Street/Sunset Boulevard, Bluff Street/St. George Boulevard, Red Hills Parkway/1000 East, St. George Boulevard/1000 East, and Green Spring Drive/Telegraph Street.

Travel times were also analyzed for each alternative. Travel routes chosen were from the I-15/Washington Parkway interchange to the Bluff Street/Sunset Boulevard intersection and consisted of a combination of I-15, Red Hills Parkway, St. George Boulevard, and Bluff Street. Travel time measures the amount of time required to make the trip along the chosen route during evening peak hours in 2050.

Direct and indirect impacts to non-traffic resources such as land use, special status species, air quality, noise, and socioeconomics that could result or be expected to result from the changed traffic operations associated with each alternative are discussed in those respective sections of Chapter 3.

Direct and Indirect Impacts from No Action Alternative

Under the No Action Alternative, congestion in 2050 on roadways in the St. George urbanized area would continue to increase, extending the duration of time needed to complete some trips compared to traffic conditions today. Other than I-15, the primary roadways are all projected to have traffic volumes that exceed the capacity of the roadways in some locations resulting in several of the key intersections that would experience Level of Service E or F conditions, including Bluff Street/Sunset Boulevard, Bluff Street/St. George Boulevard, Red Hills Parkway/1000 East, and Green Spring Drive/Telegraph Street.

Indirect traffic-related impacts of the No Action Alternative would most likely be manifested through increased traffic volumes on the adjacent streets because traffic may shift to other minor local and collector routes to avoid the higher volumes, congestion, and failing intersections on the primary arterial routes studied. This could also result in new projects needing to be developed that are not currently on any local or regional long-range transportation plans to address the congestion issues that arise from the No Action Alternative. Other indirect impacts could include more challenging roadway crossings for pedestrians, more challenging operating conditions for on-the-road bicyclists, and longer route times for transit operations as a result of the higher traffic volumes and congestion levels.

Direct and Indirect Impacts from T-Bone Mesa Alignment Alternative

Under the T-Bone Mesa Alignment Alternative, operations in 2050 at the key intersections would be improved over the No Action Alternative, other than the Bluff Street/Sunset Boulevard intersection, which would be projected to operate at Level of Service F. All other key study intersections would operate at or above Level of Service D.

When compared to the No Action Alternative, travel times along Red Hills Parkway would be reduced between 10 minutes (40 percent) and 25 minutes (62.5 percent) depending on the route chosen. Travel time along St. George Boulevard would be reduced by 9 minutes (37.5 percent).

The T-Bone Mesa Alignment Alternative is projected to reduce traffic on Bluff Street by 6 percent, traffic on Red Hills Parkway by 28 percent, traffic on St. George Boulevard by 12 percent, traffic on 1000 East by 16 percent, traffic on 100 South by 0 percent, and traffic on I-15 by 8 percent from the No Action Alternative. These reductions explain why there are substantial improvements in intersection level of service and travel times. This is primarily as a result of the more direct routing of the T-Bone Mesa Alignment Alternative, which results in more traffic using this route and less traffic using the existing roadways.

Indirect traffic-related impacts of the T-Bone Mesa Alignment Alternative are considered to be negligible because most of the intersections and roadways are projected to operate at acceptable levels. Conditions for pedestrians and bicycles on the primary arterial routes studied may be slightly improved compared to the No Action Alternative as traffic on these roadways are reduced. Conditions on other minor routes and for pedestrians, bicycles, and transit buses would be consistent with the overall growth of the county and similar to existing conditions.

Direct and indirect Impacts from UDOT Application Alternative

Under the UDOT Application Alternative, operations in 2050 at the key intersections would be improved over the No Action Alternative, including the Bluff Street/Sunset Boulevard intersection which would be projected to operate at Level of Service E. The Green Spring Drive/Telegraph Street intersection would continue to operate at Level of Service E. All other key study intersections would operate at or above Level of Service D. No intersections would operate at Level of Service F.

When compared to the No Action Alternative, travel times along Red Hills Parkway would be reduced between 10 minutes (40 percent) and 24 minutes (60 percent) depending on the route chosen. Travel time along St. George Boulevard would be reduced by 8 minutes (33.3 percent).

The UDOT Application Alternative is projected to reduce traffic on Bluff Street by 5 percent, traffic on Red Hills Parkway by 41 percent, traffic on St. George Boulevard by 7 percent, traffic on 1000 East by 5 percent, traffic on 100 South by 7 percent, and traffic on I-15 by 4 percent from the No Action Alternative. These reductions explain why there are improvements in intersection level of service and travel times, though not as substantial as the T-Bone Mesa Alignment Alternative. This is primarily as a result of the somewhat less direct routing and increased length (0.8 mile) of the UDOT Application Alignment Alternative compared to the T-Bone Mesa Alignment Alternative, which results in a slight reduction of traffic using this route and a slight increase of traffic using the existing roadways. However, these are substantial improvements over the No Action Alternative.

Indirect traffic-related impacts of the UDOT Application Alternative are considered to be negligible because most of the intersections and roadways are projected to operate at acceptable levels. Conditions for pedestrians and bicycles on the primary arterial routes studied may be slightly improved compared to the No Action Alternative as traffic on these roadways are reduced. Conditions on other minor routes and for pedestrians, bicycles, and transit buses would be consistent with the overall growth of the county and similar to existing conditions.

Direct and Indirect Impacts from Southern Alignment Alternative

Under the Southern Alignment Alternative, operations in 2050 at the key intersections of Bluff Street/Sunset Boulevard, Bluff Street/St. George Boulevard, and Red Hills Parkway/1000 East would be at a Level of Service F with Level of Service E operations at the Green Spring Drive/Telegraph Street intersection, all similar to the No Action Alternative. In this regard, there is little to no improvement in operations at any of the key intersections when compared to the No Action Alternative.

When compared to the No Action Alternative, travel times along Red Hills Parkway would be reduced between 3 minutes (12 percent) and 7 minutes (17.5 percent) depending on the route chosen. Travel time along St. George Boulevard would be reduced by 3 minutes (12.5 percent).

The Southern Alignment Alternative is projected to reduce traffic on Bluff Street by 2 percent, traffic on Red Hills Parkway by 3 percent, traffic on St. George Boulevard by 1 percent, traffic on 1000 East by 0 percent, traffic on 100 South by 9 percent, and traffic on I-15 by 0 percent from the No Action Alternative. These are very minor, if any, reductions which explains why there are no improvements in intersection level of service and little improvement to travel times. This is

primarily as a result of the indirect routing and increased length (1.5 to 2.3 miles) of the Southern Alignment Alternative compared to the T-Bone Mesa Alignment Alternative and the UDOT Application Alternative, respectively, which results in much less traffic using this route and more traffic staying on existing roadways. The Southern Alignment Alternative results in very similar operating conditions on the primary roadways as the No Action Alternative.

Indirect traffic-related impacts of the Southern Alignment Alternative would be similar to those of the No Action Alternative and would be manifested through increased traffic volumes on adjacent streets because traffic may shift to other minor local and collector routes to avoid the congestion and failing intersections on the primary roadways studied. This could also result in new projects needing to be developed that are not currently on any local or regional long-range transportation plans to address the congestion issues that arise from the Southern Alignment Alternative. Other indirect impacts could include more challenging roadway crossings for pedestrians, more challenging operating conditions for on-the-road bicyclists, and longer route times for transit operations as a result of the higher traffic volumes and congestion levels.

Direct and Indirect Impacts from Red Hills Parkway Expressway Alternative

Under the Red Hills Parkway Expressway Alternative, operations in 2050 at the key intersections would be improved over the No Action Alternative, including the Bluff Street/Sunset Boulevard intersection, which would be projected to operate at Level of Service E. The Green Spring Drive/Telegraph Street intersection would continue to operate at Level of Service E. Unique to this alternative is the influence it has on 100 South, which is not significantly affected by the other alternatives. The Bluff Street/100 South intersection would operate at Level of Service C. All other key study intersections would operate at or above Level of Service D. No intersections would operate at Level of Service F.

When compared to the No Action Alternative, travel times along Red Hills Parkway Expressway Alternative would be reduced between 10 minutes (40 percent) and 24 minutes (60 percent) depending on the route chosen. Travel time along St. George Boulevard would be reduced by 10 minutes (41.7 percent).

The Red Hills Parkway Expressway Alternative is projected to reduce traffic on Bluff Street by 15 percent, traffic on St. George Boulevard by 17 percent, traffic on 1000 East by 20 percent, and traffic on 100 South by 22 percent. Traffic on I-15 would actually increase by 1 percent and increase on Red Hills Parkway by 46 percent from the No Action Alternative. These reductions on all the roadways, except I-15 and Red Hills Parkway, explain why there are improvements in intersection level of service and travel times. Even though traffic volumes are higher on Red Hills Parkway, the roadway operates better because of the higher capacity of the expressway wherein all the traffic signals are removed and converted to grade-separated interchanges, thus able to accommodate more traffic at improved level of service. This results in more traffic using this route and less traffic using the other existing roadways, but able to do so under improved operating conditions. Overall, the Red Hills Parkway Expressway Alternative performs very similar to the T-Bone Mesa Alignment Alternative, the UDOT Application Alternative, and the St. George Boulevard/100 South One-way Couplet Alternative.

Indirect traffic-related impacts of the Red Hills Parkway Expressway Alternative would mostly be confined to Red Hills Parkway itself. These are mainly associated with the functional operations and limitations of the expressway-type concept for this road wherein access to properties is limited to right-in-right-out only and the pedestrian crossings are restricted to the interchange locations. The expressway alternative eliminates all left turns, except at the interchanges, which would require traffic desiring to turn left into or out of properties to travel extra, out-of-direction distances to make U-turns at the interchanges.

The expressway would also require changes to the Red Hills Parkway roadway itself in order to function as intended. An additional lane in each direction extending most of the length between 200 East and 900 East would have to be installed to preserve most property accesses, though some access may have to be closed or relocated. This widening would also require relocation of much of the parallel multi-use, paved trail on the south side of the roadway where there may or may not be room to accommodate it. Changes to many of the public and private access driveways would also be required. In addition, the Red Hills Parkway Expressway Alternative would convert the at-grade signalized intersections at 200 East and 1000 East to grade-separated interchanges and eliminate all direct access to properties within the functional area of the interchange and the entrance and exit ramps. New flyover ramps to connect Red Hills Parkway to northbound I-15 and from southbound I-15 would also have to be constructed, eliminating all current accesses to properties between 1000 East and Highland Drive. Access to these affected properties would have to be provided via alternate routes.

The Red Hills Parkway Expressway Alternative would also close the intersections at 900 East, Industrial Road, and Highland Drive as a result of their proximity to the 1000 East interchange and I-15 flyover ramps, which would require access to these roads be accommodated via other routes with additional out-of-direction travel.

The Red Hills Parkway Expressway Alternative would restrict pedestrian crossings between 200 East and I-15 to 200 East, 1000 East, and the Pioneer Park underpass only. In addition, bicycle travel along Red Hills Parkway would be more challenging because cyclists would be contending with slightly higher speed traffic, increased traffic volumes, and would have to navigate the more dangerous conflict locations associated with the interchange entrance and exit ramps at each interchange location and I-15 flyover ramp connections.

Indirect traffic-related impacts of the Red Hills Parkway Expressway Alternative on roadways other than Red Hills Parkway itself are considered to be negligible because most of the intersections and roadways are projected to operate at acceptable levels and as currently configured. Conditions for pedestrians and bicycles on the other primary arterial routes studied may be slightly improved compared to the No Action Alternative as traffic on these roadways are reduced. Conditions on other minor routes and for pedestrians, bicycles, and transit buses would be consistent with the overall growth of the county and similar to existing conditions.

Direct and Indirect Impacts from the St. George Boulevard/100 South One-way Couplet Alternative

Under the St. George Boulevard/100 South One-way Couplet Alternative, operations in 2050 at most key intersections would be improved over the No Action Alternative, including the Bluff Street/Sunset Boulevard intersection, which is projected to operate at Level of Service E. The Green Spring Drive/Telegraph Street intersection would continue to operate at Level of Service E. All other key study intersections would operate at or above Level of Service D. No intersections would operate at Level of Service F.

When compared to the No Action Alternative, travel times along Red Hills Parkway would be reduced between 8 minutes (32 percent) and 22 minutes (55 percent) depending on the route chosen. Travel time along St. George Boulevard would be reduced by 10 minutes (41.7 percent).

The St. George Boulevard/100 South One-way Couplet Alternative is projected to reduce traffic on St. George Boulevard by 17 percent, traffic on Bluff Street by 5 percent, traffic on 1000 East by 16 percent, and traffic on I-15 by 4 percent, and increase traffic on Red Hills Parkway by 1 percent and on 100 South by 30 percent from the No Action Alternative. These reductions on all the roadways except Red Hills Parkway explain why there are improvements in intersection level of service and travel times. Unique to Alternative 6 is the influence it has on 100 South wherein traffic would be increased because of the eastbound traffic shifting onto 100 South from St.

George Boulevard. Even though traffic volumes are higher on 100 South, the roadway operates better because of the one-way concept, thus being able to accommodate more traffic at improved level of service. The overall traffic reduction on St. George Boulevard occurs because the eastbound traffic that shifts to 100 South is greater than the westbound traffic that shifts from 100 South, resulting in an overall reduction in traffic on St. George Boulevard. The slight increase in traffic on Red Hills Parkway is because more vehicles heading eastbound across the St. George urbanized area choosing to use Red Hills Parkway rather than travel the extra distance to get to 100 South because eastbound traffic on St. George Boulevard is no longer permitted with the one-way couplet. Overall, the St. George Boulevard/100 South One-way Couplet Alternative performs very similar to the Red Hills Parkway Expressway Alternative, T-Bone Mesa Alignment Alternative, and the UDOT Application Alternative.

Unique to the St. George Boulevard/100 South One-way Couplet Alternative is the one-way operation of not only St. George Boulevard, but also 100 South wherein all traffic travels in only the eastbound direction and with three travel lanes, thus accommodating more traffic at acceptable level of service. Traffic volumes on 100 South would be similar to those on St. George Boulevard, and, as such, the intersection operations and travel times along this roadway would also be similar to the St. George Boulevard results, including the Bluff Street/100 South intersection, which would operate at Level of Service C.

Indirect traffic-related impacts of the St. George Boulevard/100 South One-way Couplet Alternative would be present throughout the downtown St. George area bounded by St. George Boulevard on the north, 100 South on the south, Bluff Street on the west, and River Road on the east. These are mainly associated with the functional operations and limitations of the one-way couplet concept for this area wherein access to properties and turning movements at intersections along St. George Boulevard and 100 South are limited to right-in-right-out only. The one-way couplet would change the operations of all the intersections and driveways, wherein all left turns onto St. George Boulevard approaching from the north and all right turns approaching from the south would be eliminated. Similarly, all left turns onto 100 South approaching from the south and all right turns approaching from the north would be eliminated. These changes would require traffic desiring to make these movements to incur extra, out-of-direction travel to reach either the other half of the one-way couplet or at least the intermediary roadway of Tabernacle Street in order to proceed in the desired direction. This out-of-direction travel would increase traffic volumes on all cross-streets and on Tabernacle Street above the levels that would be present under all the other alternatives. However, the volume increases would not result in failing intersection operations at the cross-street intersections with either St. George Boulevard, 100 South, or Tabernacle Street, though it is possible that new traffic signals would need to be installed at some locations.

The one-way couplet would require changes to the St. George Boulevard and 100 South roadways themselves in order for each of the roadways to function as a one-way street. On St. George Boulevard, the raised island, planted medians, and irrigation systems would have to be removed, and the median lighting would have to be replaced or relocated to the sides of the road where there may or may not be room to accommodate it. In addition, the Diverging Diamond Interchange at I-15/St. George Boulevard would have to be reconfigured to a more conventional diamond intersection configuration. On 100 South, the center two-way-left-turn median and shoulders would have to be reconfigured with some or all of the parking currently allowed along the road being removed. In addition, a new half diamond interchange at I-15 would have to be constructed and connected to the reconfigured St. George Boulevard interchange via one-way connector ramps. Changes to the intersections on Bluff Street and River Road at St. George Boulevard and 100 South would also be required to accommodate the one-way system. There may also be other minor reconstructions to storm drain and utility systems that would be required to safely convert these streets to one-way operations.

Under the St. George Boulevard/100 South One-way Couplet Alternative, pedestrian, bicycle, and transit operations in the downtown area would also be affected. On 100 South, there are a variety of pedestrian-oriented destinations including a branch of the Washington County library, an elementary school, the Dixie Sun Bowl, the St. George City cemetery, and Dixie State University. Pedestrians accessing these facilities would be walking along and crossing a roadway with more travel lanes and higher traffic volumes than under any of the other alternatives. The pedestrian crossing signal at approximately 750 East at Dixie State University would also have to be reconfigured. Pedestrian operations along St. George Boulevard would be similar to the other alternatives. However, pedestrian activity in general throughout the downtown area would be affected by the increased traffic on all the cross-streets and Tabernacle Street as previously discussed. Bicyclists would experience many of the same impacts throughout the downtown area as pedestrians in addition to the increased out-of-direction travel required, similar to vehicles, as a result of the one-way system. Transit operations would also be affected by the increased out-of-direction travel associated with the one-way couplet, which could potentially require changes to routes, relocating bus stops, and reconfiguring or relocating the SunTran main transfer station at 100 South just west of 1000 East.

Indirect traffic-related impacts of the St. George Boulevard/100 South One-way Couplet Alternative on roadways other than St. George Boulevard, 100 South, and the downtown streets are considered to be negligible because most of the intersections and roadways are projected to operate at acceptable levels and as currently configured. Conditions for pedestrians and bicycles on the other primary arterial routes studied may be slightly improved compared to the No Action Alternative as traffic on these roadways is reduced. Conditions on other minor routes and for pedestrians, bicycles, and transit buses would be consistent with the overall growth of the county and similar to existing conditions.

3.27 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires consideration of environmental justice for low-income and minority populations that could be affected by Federal actions (*Federal Register* 1994). Environmental justice (EJ) impacts occur when minority or low-income populations are disproportionately and adversely affected because of a Federal action. Low-income is defined as one living at or below the U.S. poverty thresholds, which are updated annually by the Census Bureau. Minority groups include non-white populations such as black, Asian, Native Hawaiian, or Native American. Minorities may be a mix of white and other racial or ethnic groups.

The analysis area includes the proposed Northern Corridor ROW alternatives and land within 0.25 mile of the alignments, as well as the Proposed Zone 6 Analysis Area. Development on non-Federal lands in Washington County that overlaps Mojave desert tortoise habitat would occur with or without the HCP; consequently, the alternatives do not influence the potential to affect EJ populations and any analysis of lands subject to the HCP and EJ populations would not inform the decision.

3.27.1 Affected Environment

Washington County block group population data were compared to State of Utah data to identify EJ populations. Evaluating the potential EJ effects of projects requires specific identification of minority populations when either (1) a minority population exceeds 50 percent of the population of the affected area or (2) a minority population represents a meaningfully greater increment of the affected population than of the population of some other appropriate geographic unit as a whole. For the purposes of this analysis, 10 or more percentage points above the reference population (the State of Utah) is considered to be a meaningfully greater increment (*Federal Register* 1994).

An American Indian EJ population is considered as being present if one or more concentrated populations of American Indians are living within one or more of the geographic polygons included in the analysis. Impacted block groups were identified as those that intersected within 0.5 mile of the proposed Northern Corridor ROW/utility corridor alternatives. A total of 11 block groups were found to intersect the identified alternatives, as shown in Table 3.27-1 and Map 3.27-1.

Table 3.27-1. Environmental Justice Population Data by Block Group

Geography	Minority [a]	Native American	Low-Income
Block Group 1, Census Tract 2703, Washington County, Utah	29%	0%	75%
Block Group 2, Census Tract 2703, Washington County, Utah	25%	0%	68%
Block Group 1, Census Tract 2707, Washington County, Utah	18%	0%	37%
Block Group 4, Census Tract 2707, Washington County, Utah	18%	8%	63%
Block Group 1, Census Tract 2708.02, Washington County, Utah	13%	2%	32%
Block Group 1, Census Tract 2712, Washington County, Utah	27%	1%	28%
Block Group 2, Census Tract 2712, Washington County, Utah	26%	9%	47%
Block Group 2, Census Tract 2713, Washington County, Utah	9%	2%	39%
Block Group 1, Census Tract 2714, Washington County, Utah	15%	0%	64%
Block Group 2, Census Tract 2714, Washington County, Utah	5%	0%	71%
Block Group 1, Census Tract 2715, Washington County, Utah	13%	0%	37%
State of Utah	**13%**	**1%**	**11%**

Source: U.S. Census Bureau no date

[a] Includes Native American populations

The following conclusions have been drawn based on census data for the identified block groups in Table 3.27-1 and Map 3.27-1.

- Four of the 11 identified block groups have minority populations that are greater than 10 percent more than the state minority population.
- American Indian populations are present within the identified block groups.
- All identified block groups have higher low-income populations than the state.

Low-income, minority, and American Indian EJ populations are present within the study area. Each EJ population type was found to be present in multiple block groups analyzed, based on the criteria outlined previously.

3.27.2 Environmental Consequences

This section considers effect on EJ populations and whether such effects are disproportionate compared to non-EJ populations.

3.27.2.1 Analysis Methods and Assumptions

EJ impact indicators include the presence of minority and low-income block groups within Washington County. Block groups most likely to be impacted were analyzed for adverse impacts.

The following assumptions apply to this analysis:

- Alternatives in undeveloped areas (such as the NCA) may still disproportionately affect a protected population through impacts to cultural and other resources.
- If a highway is constructed within the Red Cliffs NCA, future development on BLM-administered land along the highway would not be allowed with the possible exception of allowing utilities ROWs; however, existing EJ populations within 0.25 mile of the highway alternatives could be indirectly affected.
- Culturally or religiously significant resources have not been identified by previously conducted investigations in proposed Zone 6, so no analysis is provided. Additional consultation and surveys would be required should resources of cultural or religious significance be identified through this environmental process; identification of these resources may warrant additional analysis regarding their effects on EJ populations.
- Proposed Zone 6 may be used by populations protected by EJ regulations.

3.27.2.2 Direct and Indirect Impacts from Alternatives 1 through 6

Implementation of any of the action alternatives under consideration would cause temporary construction impacts to local residents and businesses, including increased noise and dust, as well as changes to travel patterns. Communities as a whole would be impacted; it is not anticipated that EJ populations would be disproportionately affected by adverse impacts.

Under Alternatives 2, 3, or 4, proposed Zone 6 would be established; management of proposed Zone 6 would be addressed by the SGFO RMP Amendment, which includes proposed management prescriptions that would place some restrictions on the use of this land. The restrictions would affect all populations that recreate or participate in other types of activities in this area so EJ populations would not be disproportionately affected.

3.28 Cumulative Effects

The Council on Environmental Quality regulations implementing NEPA define cumulative effects 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" (40 CFR 1508.7).

3.28.1 Impact Assessment Methodology

Cumulative impacts are effects on the environment that result from implementing any of the alternatives analyzed in this Draft EIS in combination with other past, present, and reasonably foreseeable future actions. The cumulative effects have been analyzed only for those resources where there is a direct or indirect impact resulting from any of the proposed actions. The area analyzed for cumulative impacts varies by environmental resource and corresponds to the analysis areas described in each resource's respective Affected Environment sections throughout this chapter.

Past, present, and reasonably foreseeable future actions, other Federal actions, and non-Federal actions were obtained using readily available public sources. For all resources, the impacts of the past and present actions contribute to the current condition and are captured through the description of the affected environment for that resource. Reasonably foreseeable future actions include projects and Federal, State, and local plans, and are listed by type in Table 3.28-1.

Reasonably foreseeable future actions are projections made to predict future impacts and are not planning decisions nor set limits on future agency actions. The reasonably foreseeable actions used in this cumulative impacts analysis are projected using a 15- to 20-year planning horizon.

Table 3.28-1. Reasonably Foreseeable Future Projects or Actions

Category	Action or Project	Description	Disturbance or Description of Impacts
Transportation	Washington City Washington Parkway, Greens Springs to I-15	Connect Washington Parkway to the northern end of Green Spring Drive.	2.66 miles of roadway near the Red Cliffs Desert Reserve and Red Cliffs NCA near Washington City to be constructed in 2020.
	Washington City Long Valley Road Extension	Long Valley Road is the principle access for the future Trails Development in Long Valley, southeast of Washington City.	The road is approximately 4,877 feet in length and is proposed to be 110 feet wide.
	UDOT, Region 4 I-15, Various projects	Projects include widening I-15 MP Exit 16 to Exit 27; widening and new construction, Green Spring to I-15 Exit 13; slip ramp at Exit 10; lane widening MP 2 to 4 and MP 6 to 8; Exit 11 interchange and lane widening MP 10 to 13; new interchange at MP 23.7.	Proposed improvements along I-15 from St. George to Leeds, approximate total length of improvements is 18 to 20 miles.
	UDOT, Region 4 SR 9, Various projects	New interchanges at Telegraph, Purgatory, Sand Hollow Road, 3400 West, 2800 West; widening, I-15 to 2700 West.	Proposed improvements on SR 9 in Washington City and Hurricane City.
	UDOT, Region 4 Purgatory Road	Extend 5300 West for SR 9 to Washington Dam Road.	1.5-mile new roadway beginning in Hurricane City and ending in Washington City.
	Hurricane Various widening and new construction	DMPO 2019 – 2031: 7 new roadway construction projects; 2 roadway widening/reconstruction projects DMPO 2031 - 2040: 13 new roadway construction projects; 1 roadway reconstruction.	Projects vary in length from 0.5 to 2.2 miles. Projects vary in length from 0.5 to 6.8 miles.
	Ivins Various projects	DMPO 2019– 2030: Western North, Old Highway 91 to 400 East; City Boundary to 400 East DMPO 2031 – 2040: Red Mountain Boulevard, Old Highway 91 to Center Street.	New roadway construction from 0.5 to 1.2 miles long. New roadway construction from 1.5 miles long.
	Santa Clara and Ivins Various projects	DMPO 2019 – 2030: Red Mountain Drive, Pioneer Parkway to Western; Western Corridor North, 400 East to City Boundary DMPO 2031 – 2040: Pioneer Parkway, Lava Flow to Red Mountain Drive; Santa Clara Drive to Western Corridor Connector.	New roadway construction from 0.7 to 0.9 mile long. New roadway construction 1.5 miles long each.
	City of St. George White Dome Road	DMPO 2019 – 2030: River Road to Southern Hills Parkway	New roadway construction 1.7 miles long.

Category	Action or Project	Description	Disturbance or Description of Impacts
	City of St. George Various projects	DMPO 2031 – 2040: seven new roadway construction projects and three widening and reconstruction projects.	New roadway construction from 0.3 to 4.3 miles in length, roadway widening and reconstruction from 0.5 to 1.9 miles long.
	Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in Washington County	Completion of a Comprehensive Travel and Transportation Management Plan for BLM-administered lands in Washington County, including the BLM SGFO and Red Cliffs NCA. The BLM would designate motorized, mechanized, and non-mechanized routes.	Designation of routes would occur throughout the county. After routes are designated, OHV use would be managed as limited to designated routes, which would reduce OHV use on existing, undesignated routes.
Public Works	Utah Board of Water Resources	Lake Powell Pipeline project would deliver water from Lake Powell near Glenn Canyon Dam in Page, Arizona to Sand Hollow Reservoir near St. George, Utah.	Approximately 140 miles of underground pipeline, 5 pumping stations, and 6 hydroelectric facilities are proposed.
Development	DiVario Development master planned community	Master planned community.	730 acres proposed within the northeastern border of proposed Zone 6.
	The Trails Development	Master planned community.	605.61 acres proposed within the recently completed Brennan/BLM land exchange, 6 miles east of St. George, 1.5 miles from St. George Airport.
Recreation Tours, Events, Special Use Permits	BLM permit applications Various tours and events.	45 permit applications for activities including adventure tours, hunting, all-terrain-vehicle tours, races, film shoots, and similar, including Red Rock Rampage, Huntsman World Senior Games, Interscholastic Cycling Association High School Championship, and tri-state all-terrain-vehicle events.	St. George Field Office – Washington County (various locations). Kanab Field Office, Arizona Strip Field Office.
	Santa Clara Adventure Park	Proposed park would provide outdoor recreation and education, including a disc golf course, cross-country running track, bicycle pump track, climbing boulders, and trailhead parking and access to current and future trails in the Santa Clara River Reserve.	52.2-acre parcel near proposed Zone 6.
	BLM permit applications Shooting Range	Proposal for a long-distance rifle range to address potential conflicts with other recreational users; The BLM working with the County to relocate current proposed location.	County proposal located in Cove Wash; may infringe on the Red Bluff ACEC.

Category	Action or Project	Description	Disturbance or Description of Impacts
Grazing Transfers	BLM grazing permit transfer applications, Various transfers	Transfers of grazing permits in preparation and planning: Twin Peaks/Desert Inn Draft Environmental Assessment (2019). Trail and Gould Ranch Allotment Draft Environmental Assessment (2020).	Grazing permit transfers occur within: Township 40 South (T40S), Range 12 West (R12W) and R13W. Ranch Allotment would occur in: T41S and T42S, Range 12W.
Land and Facilities Management	City of St. George Reserve Boundary Adjustment	St. George has proposed a minor boundary adjustment to allow for construction of an access road from their Water, Power, and Streets yard.	Removal of 0.65 acre from Zone 3 of the Red Cliffs Desert Reserve in exchange for 0.65 acre (also in Zone 3), construction of access road in area of adjusted boundary.
	BLM Anasazi Valley Trailhead Improvements (DOI-BLM-UT-C030-2020-0026-EA)	Aggregate parking surface for 54 vehicles, 3 pavilions and aggregate surface trail, bicycle repair facility and other amenities (2020).	0.77-acre permanent disturbance.
Land Tenure Adjustments and Land Use Authorizations	BLM Parcel acquisitions in process	BLM parcels currently in acquisition within Red Cliffs Desert Reserve Zone 3 (2020).	One parcel, approximately 38.64 acres, T42S, R15W, Section 8 using $1.7M LWCF UTTR West Desert Land Exchange (Public Law 114-328), Up to 4,202.37 acres (surface and mineral estate) of non-Federal lands in Washington County.
	Washington County acquisitions in process	Washington County parcels currently in acquisition within Red Cliffs Desert Reserve (2020).	One parcel approximately 24 acres, T42S, R15W, Section 16.
	Various Proposed Parcel acquisitions	Proposed acquisitions within Red Cliffs Desert Reserve Zone 3.	Washington County HCP Funds, 22.2-acre parcel, T42S, R15W, Section 16 Nature Conservancy, 2.2-acre parcel, T42S, R15W, Section 16. UDNR, 2.2-acre parcel, T42S, R15W, Section 16 LWCF, approximately 15.2 acres remaining of 44.4-acre parcel, T42S, R15W, Section 16. ESA Section 6 funds, UDWR and unnamed private landowner, totaling approximately 200 acres in undisclosed location within Zone 3.

Each of the resources evaluated in this Draft EIS have the potential for cumulative effects. The analysis in the following sections is presented in the same order as the resources discussed earlier in this chapter.

3.28.1.1 Vegetative Communities, Including Noxious Weeds and Invasive Species

The HCP, which addresses development on Mojave desert tortoise habitat on non-Federal, non-Tribal land in most of Washington County involves a substantial amount of acreage that would lead to vegetation loss both with the action alternatives and No Action Alternative. The project-related effects discussed in Section 3.2, combined with any additional ground-disturbing activities within land supporting native vegetation communities, would create cumulative effects to native vegetation communities. Because development on private lands could occur under all alternatives, cumulative effects are relatively similar for each alternative. All projects described in Table 3.28-1 that require ground-disturbing activities within previously undeveloped land will adversely impact native vegetation communities as well as potentially increase the spread of noxious and invasive species. Invasive species may be transported and spread by vehicles, recreational users, grazing, and other activities. The effects of climate change and the growing threat of wildfire exasperates the cumulative effects on the increase of noxious and invasive species. The transportation and development projects listed in Table 3.28-1 will remove, destroy, or degrade native vegetation communities and soil. Soil disturbance can create conditions that allow exotic invasive weeds to become established into an area and spread the existing seedbank of exotic invasive species.

3.28.1.2 Special Status Plants

The HCP addresses a substantial amount of acreage that could be developed with both the action alternatives and No Action Alternative, as discussed in Section 3.3. Any additional ground-disturbing activities within suitable and occupied habitat, combined with project-related ground disturbance such as new ROW, will have cumulative effects on the special status plants described in Section 3.3. Because potential development on private lands could occur under all alternatives, cumulative effects are relatively similar for each alternative.

Based on the general descriptions and locations of the projects in Table 3.28-1, occupied habitat for dwarf bear-poppy, Holmgren milk-vetch, Shivwits milk-vetch, and Siler pincushion may overlap with the presumed footprints of several of the reasonably foreseeable projects, particularly the road widening and new road construction projects and the proposed shooting range adjacent to the Red Bluff ACEC within proposed Zone 6. Therefore, it is likely that several of the reasonably foreseeable projects that are planned to be constructed adjacent to occupied habitat would adversely affect one or more of the plant species. However, Federally funded projects require additional environmental analysis and typically require avoidance and minimization measures to reduce or mitigate for impacts to special status species. Critical habitat is not presumed to be adversely affected by the reasonably foreseeable projects listed in Table 3.28-1.

Suitable habitat for dwarf bear-poppy, Holmgren milk-vetch, Shivwits milk-vetch, Siler pincushion, and Gierisch mallow is modeled throughout the Mojave Desert Tortoise Analysis Area, and the reasonably foreseeable projects outlined in Table 3.28-1 also span the Mojave Desert Tortoise Analysis Area. Therefore, it is likely that most, if not all, of the reasonably foreseeable projects that would be constructed on previously undisturbed or undeveloped lands, in conjunction with the proposed Northern Corridor, are likely to result in degradation or loss of habitat and adversely affect suitable habitat for one or more of the plant species. Climate change, wildland fires, soil erosion, and recreational demand cumulatively add to the threats to and stresses on suitable habitat for special status plants.

3.28.1.3 General Wildlife

The combination of projects described in Table 3.28-1 that require ground-disturbing activities on previously undeveloped land would result in loss and degradation of habitat adversely impacting general wildlife. Cumulative threats to wildlife habitat and forage include grazing, soil erosion, fire, and transitional changes in vegetation types from climate change. Increasing recreational demand and construction activities add to animal stress from noise and the presence of humans, as well as litter and dogs that may attack wildlife. Transportation and development projects would likely also result in fragmentation of general wildlife habitat, and possibly injury or mortality of individuals. Linear projects, such as roadways, also may disrupt wildlife movement corridors although new projects are more likely to be designed with structures to allow for safe passage. Construction of the Northern Corridor with Amendments to the Red Cliffs NCA RMP, in conjunction with all other identified developments, would cumulatively impact general wildlife but likely not result in a population-level response. Approval of the Washington County HCP and Amendments to the SGFO RMP designating Zone 6 as part of the Reserve would result in the beneficial effect of protecting general wildlife habitat, offsetting and reducing the overall effect of development, especially on private lands. Therefore, to varying degrees, all alternatives would result in incremental minor cumulative impacts to general wildlife within the analysis area.

3.28.1.4 Special Status Wildlife

All alternatives, together with other reasonably foreseeable future land development and transportation projects, would contribute to the incremental loss of habitat important to special status wildlife species in the analysis area. The incremental cumulative impact of roadway improvements associated with Alternatives 5 and 6 would be negligible, but the loss of habitat with Alternatives 2, 3, and 4 could lead to a moderate adverse contribution to the cumulative impacts on special status wildlife. Most of the projects described in Table 3.28-1 require ground-disturbing activities on previously undeveloped land. These projects would adversely impact special status wildlife, most notably the Mojave desert tortoise, and lead to habitat degradation and loss. Transportation and development projects listed in Table 3.28-1 would also contribute to fragmentation of special status wildlife habitat, and possibly injury or mortality of individuals. Development on non-Federal land would cumulatively impact special status wildlife species, and further fragment and degrade habitat in the analysis area where BLM sensitive species are currently allowed to use and move through private lands from one swath of BLM-administered land to another. For invertebrates petitioned for ESA listing, development and other activities in the HCP analysis area would contribute to further habitat loss, degradation, and fragmentation. The designation of proposed Zone 6 would result in the beneficial effect of protecting special status wildlife habitat, offsetting and reducing the overall effect of this and other projects, though to varying degrees, the implementation of the proposed project combined with the ground-disturbing projects listed in Table 3.28-1 would result in incremental cumulative impacts to special status wildlife within the analysis area.

Declines in Mojave desert tortoise populations are caused by a broad array of factors that are exacerbated by the increasing urban interface with tortoise habitat in the analysis area. The ongoing and increasing demand for more outdoor recreation, roads, and homes results in more air and water pollution and greenhouse gases, less water, and more people that cumulatively add to the stressors affecting Mojave desert tortoise and its habitat. This, combined with the increasing pervasiveness of invasive nonnative grasses facilitated by increasing levels of greenhouse gas (particularly nitrous oxide), feeds extensive fires and results in habitat conversion threatening the integrity of the Reserve and ultimately accelerating the continued decline of Mojave desert tortoise. Conservation of Mojave desert tortoise requires protection of habitat and active management. The implementation of the Washington County Amended HCP, which includes

expanded protection of proposed Zone 6, continues to help offset the long-term, cumulative impacts to Mojave desert tortoise from development in the county on non-Federal lands. The combination of the Proposed Actions (HCP, Zone 6, and ROW) contribute to positive and adverse cumulative effects to Mojave desert tortoise. The USFWS will consider these cumulative actions in their jeopardy analysis.

3.28.1.5 Endangered Species Act Section 6 Land Acquisition Grants

No reasonably foreseeable actions identified in Table 3.28-1 would affect ESA Section 6 lands within the analysis area with the exception of a potential increase in Section 6 lands within the Reserve. However, as described in Section 3.28.1.4, the increase of stressors affecting Mojave desert tortoise could also result in the incremental degradation of Section 6 lands that could negatively affect their long-term conservation goals.

3.28.1.6 Geology Mineral Resources and Soils

Reasonably foreseeable construction projects described in Table 3.28-1 would contribute to ground disturbance on previously undisturbed land. Cumulative impacts because of roadway and future construction projects would include loss of topsoil, changes to soil structure and composition, and increased erosion until soils are stabilized. Northern Corridor Alternative 4 would have the greatest cumulative effect, with Alternatives 3, 2, 5, and 6 having successively fewer cumulative effects. Alternative 1 would not contribute to the cumulative effects of soil erosion or soil structure.

Development on previously undisturbed lands also limit future mineral resource development; many of the reasonably foreseeable future actions are not within minerally rich areas so the magnitude of the limitation would be minimal. The availability of mineral resources would also be restricted within the proposed Zone 6 boundaries because of SGFO RMP Amendment Alternatives B and C. The SGFO RMP would be amended as part of Northern Corridor Alternatives 2, 3, and 4; these three alternatives would have an equal cumulative effect whereas Alternatives 1, 5, and 6 would have little to no cumulative effect on mineral resource development.

3.28.1.7 Paleontology

No reasonably foreseeable actions identified in Table 3.28-1 would affect paleontological resources within the analysis area, which is predominantly limited to the highway ROW alternatives within the NCA, because paleontological resources are generally not protected outside of Federal land. These areas have low potential to have paleontological resources. On a broader scale, however, planned developments on or off Federal land have potential to contribute to an ongoing loss of potential fossil records for future scientific research.

3.28.1.8 Prime and Unique Farmland

Washington County includes approximately 91,443 acres of prime farmland and 25,552 acres of farmland of statewide importance based on soil types and Natural Resources Conservation Service designations. Some of the acreage has previously been converted to other uses and has never been in agricultural production. Some of the reasonably foreseeable actions identified in Table 3.28-1 are likely to overlap with prime and unique farmland designations, although the designation alone does not equate to a conversion of actively farmed land. The project, together with other reasonably foreseeable future actions, would contribute to a general, ongoing loss of designated prime and unique farmlands; however, at most, the Northern Corridor ROW alternatives would affect less than 27 acres of land designated as prime and unique farmland if irrigated, so the contribution of the project to cumulative effects would be negligible, particularly because none of the designated lands are in agricultural production.

3.28.1.9 Wetlands, Floodplains, and Waters of the U.S.

The reasonably foreseeable future projects in Table 3.28-1 would result in up to 31.2 miles of roadway widening and improvements, up to 16.2 miles of new roadways, and approximately 1,336 acres of new land development within the analysis area for this resource. Many of these reasonably foreseeable projects would occur in the vicinity of wetlands, WOUS, and floodplains and may impact these resources in a similar fashion to the impacts described for the Northern Corridor roadway. Individual projects would be required to comply with Section 404 of the Clean Water Act, the Utah Stream Alteration Program, and Washington County or municipal floodplain development ordinances. Construction of the Northern Corridor and amendments to the Red Cliffs NCA under Alternatives 2, 3, and 4 would impact WOUS and floodplains, therefore resulting in incremental reductions, when combined with past, present, and reasonably foreseeable future actions in the presence of these resources within Washington County. Direct and indirect impacts from the Northern Corridor under Alternatives 5 and 6 would result in minor impacts to floodplains, resulting in an incremental cumulative effect to these resources, when combined with past, present, and reasonably foreseeable future actions. BLM land acquisitions in the Red Cliffs NCA would be entirely beneficial for wetlands, WOUS, and floodplains, because these resources would be managed for long-term conservation upon acquisition by the BLM.

Overall, the impacts of the alternatives and actions analyzed in Section 3.10, in addition to past, present, and reasonably foreseeable future actions along with regional trends such as increased air temperature and changes in precipitation regimes resulting from climate change would result in the incremental loss and effect of wetlands, WOUS, and floodplains in the analysis area. However, because all actions are required to comply with Section 404 of the Clean Water Act, the Utah Stream Alteration Program, and Washington County or municipal floodplain development ordinances, the cumulative effect of these resources is not anticipated to result in substantial changes to the distribution, function, or quantity of wetlands, WOUS, and floodplains in the analysis area.

3.28.1.10 Water Resources

Reasonably foreseeable future projects or actions generally consist of transportation and private land development that could increase impervious surface and increase runoff within proposed development and at outfalls from new development. If a future project or action were to occur upstream of a proposed alternative, it could potentially increase runoff from upstream, which would need to be conveyed across the Northern Corridor ROW or detained inside the ROW. The cumulative effects would be similar for Alternatives 2 through 4. No known project or action is proposed upstream of these alternatives, and therefore cumulative impacts would be negligible. Alternatives 5 and 6 would fall on existing roadways where actions or projects could potentially occur upstream. Therefore, there is increased potential for additional runoff to be produced upstream and enter these roadways, which would potentially need to be conveyed across the roadways or detained.

Collectively, the project and other reasonably foreseeable future actions that contribute to new ground disturbance have the potential to result in short-term impacts on surface water quality until soils are stabilized through establishment of vegetation. Those projects that increase the amount impervious surface also may change existing surface flows by creating barriers to natural drainage patterns and changing outfalls. Consideration of drainage in design is required for nearly all building permits so the cumulative effects are expected to be minor.

3.28.1.11 Air Quality

Washington County is located in an attainment or unclassifiable area for all criteria pollutants. The Utah Division of Air Quality monitors pollutants within the state to ensure local air quality meets

Federal and State regulations and standards. If an area does not meet these standards, then a State Implementation Plan is prepared that assesses the cumulative impacts of all planned transportation projects and identifies control measures to reduce any potential air quality impacts. With all project alternatives, potential air quality emissions from all activities considered in Table 3.28-1 are not anticipated to cause a NAAQS exceedance of any pollutants because the County is in attainment or unclassifiable. In addition, the State and County have developed programs and controls to prevent future air quality deterioration. Therefore, cumulative air quality impacts are not anticipated.

In 2016, approximately 59 million metric tons equivalent carbon dioxide (MMT CO_2e) emissions were emitted in Utah representing approximately 1.1 percent of the national CO_2 footprint of 5.1 billion tons and approximately 0.2 percent of the global CO_2 footprint of 35.9 billion tons (Gardner 2020).

According to *The Utah Roadmap Technical Supplement* (Gardner 2020), GHG emissions are projected to increase to approximately 95 MMT CO_2e by 2050, an increase of approximately 37 percent above current emissions. However, if emission reductions from the closure of coal power plants and the increase use of electric vehicles are accounted for, GHG emissions are projected to decrease to approximately 32 MMT CO_2e by 2050, a decrease of approximately 66 percent below current emissions.

The IPCC has developed emission scenarios to project concentrations of GHGs by the year 2100. Global emissions in 2030 are tracking a global warming of about 3°C by 2100 (IPCC 2018), Additional emission reductions would be needed to reach the goal of 2°C or less. The Air Quality Technical Report (Appendix I) provides more detailed information on global GHGs.

To help address the global issue of climate change, the U.S. Department of Transportation is committed to reducing greenhouse gas emissions from vehicles traveling on highways. The U.S. Department of Transportation and EPA are working together to reduce these emissions by substantially improving vehicle efficiency standards and moving toward less-carbon-intensive fuels. On September 15, 2011, the agencies jointly published the first-ever fuel economy and greenhouse gas emissions standards for heavy-duty trucks and buses. On October 25, 2016, the agencies issued a final rule for a Phase 2 comprehensive program to reduce GHG emissions and fuel consumption from medium and heavy-duty vehicles and engines. In April 2020, the agencies issued a final Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021 – 2026 Passenger Cars and Light Trucks. This final rule amends and establishes carbon dioxide and fuel economy standards and is effective on June 29, 2020. The climate effects of the final standards as compared to the 2012 standards are extremely small – less than 1/1000th of 1°C in 2040 (NHTSA 2020). Therefore, these standards should still be sufficient to reduce vehicle emissions. Increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles, also will improve air quality and reduce carbon dioxide emissions in future years.

Finally, the construction best practices that would be implemented for this project (per the St. George City Code), would be practicable project-level measures that could help reduce greenhouse gas emissions on an incremental basis and could contribute in the long term to meaningful cumulative reduction when considered across the Federal-aid highway program.

3.28.1.12 Visual Resources

The reasonably foreseeable future projects in Table 3.28-1 that could modify the existing visual character in the visual resources analysis area include transportation improvements and private land developments. All the action alternatives analyzed in this Draft EIS would contribute to cumulative impacts on the visual landscape in the analysis area.

Alternatives 2, 3, and 4 would have the greatest contribution to the cumulative modification of visual resources in the Red Cliffs NCA and adjacent areas because these alternatives would be located within the Red Cliffs NCA in an area where the visual setting has only been partially modified. These alternatives would impact areas identified in the BLM VRI as being highly scenic and highly visually sensitive. In particular, rock cuts and fills would affect landform, vegetation would be removed, and the roadway would represent a new cultural modification and negative intrusion in the landscape. These impacts would contribute to the cumulative visual impacts in these areas resulting from the construction of the Washington Parkway from I-15 to the northern end of the Green Springs and planned improvements to Cottonwood Springs Road from Red Hills Parkway to the Northern Corridor. Other transportation and private land developments may be visible from these areas, but these actions would have a smaller contribution to the cumulative impacts on visual resources because the changes would be located farther from sensitive viewers in the NCA and Reserve and because the changes would occur in or directly adjacent to existing developed areas. The BLM's planned acquisition of non-Federal lands in the Red Cliffs NCA would have beneficial impacts on visual resources as a result of the application of limitations on development for BLM-administered lands within the Red Cliffs NCA because it would help preserve some of the existing visual setting.

Alternatives 5 and 6 would contribute to the cumulative impacts on visual resources located in LUs 1 through 4, where the existing setting currently includes visual elements associated with transportation facilities. Under Alternative 5, the new interchanges could introduce additional cultural modifications, which could further degrade scenic quality when combined with other reasonably foreseeable future actions. In these areas, the reasonably foreseeable future actions would result in additional modifications of the existing visual landscape (e.g., where the proposed interchange would be built), and increase the visual dominance of those transportation elements. The changes associated with Alternatives 5 and 6 would also contribute to the increasing visual dominance of transportation elements in LUs 1 through 4, with further impact to scenic quality under Alternative 5. However, the additional changes from all actions are not anticipated to result in substantial changes to the existing visual setting, because these areas are already characterized by a transportation setting, and changes in the location of transportation infrastructure are not anticipated.

In the Proposed Zone 6 Analysis Area, under Alternatives 2, 3, and 4, the proposed BLM RMP amendments combined with the reasonably foreseeable future actions, such as land managers focusing on the long-term conservation of the area, would cumulatively have beneficial impacts on the visual resources by limiting future cultural modifications that could degrade scenic quality. While planned residential developments adjacent to the proposed Zone 6 (such as the DiVario Development master planned community) would bring new residential development closer in view of adjacent trail users, the visual character within the proposed Zone 6 would generally be preserved for the foreseeable future.

3.28.1.13 Cultural Resources and Native American Concerns

Alternatives 2, 3, 4, and 5 in addition to other reasonably foreseeable future land development and transportation projects, would contribute to the incremental loss of cultural resources in the cultural resources analysis area. The roadway improvements associated with Alternative 6 are not anticipated to contribute to the cumulative impacts on cultural resources and the highway improvements associated with Alternatives 2, 3, and 4 would have the greatest contribution to the cumulative impacts on cultural resources. Issuance of the ITP to Washington County would be anticipated to have the same impact on cultural resources under all alternatives. These impacts could include the demolition or relocation of a significant historical resource such that its integrity and significance cannot be maintained.

The loss of integrity could be the result of the following:

- Conversion, rehabilitation, or alteration of a significant historical resource that does not conform to the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.
- Disturbance, damage, or degradation of an archaeological resource, or its setting, that is found to be an important permanent loss of, or loss of access to, a cultural resource of regional or Statewide significance.
- Disturbance of human remains.

Transportation projects such as the construction of the Washington Parkway from I-15 to Green Springs would travel through undeveloped land and have the potential to adversely affect archaeological resources. Other transportation projects, such as widening Snow Canyon Parkway and SR 18 from their intersections with Red Hills Parkway and improvements to I-15 that include new interchanges, ramps, and lane widening, also have the potential to adversely affect cultural resources. The 730-acre DiVario Development master planned community would directly abut the northeastern border of the proposed Reserve Zone 6 boundary, bringing new residential development. The construction of residences for this development would result in ground-disturbing activities and have the potential for adverse effects to archaeological resources. The completion of BLM land acquisitions of non-federal lands within the Red Cliffs NCA would have beneficial impacts on cultural resources if those resources were present on acquired parcels.

The Amended HCP and SGFO RMP Amendment for proposed Zone 6 include a potential reduction of areas available for livestock grazing, which could have a beneficial impact to cultural resources located within those management areas. Protections to general wildlife such as fencing along the eastern borders to prevent OHV access in non-designated areas and additional funding for habitat restoration may include ground-disturbing activities that result in adverse effects to cultural resources. The completion of the Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in Washington County would designate routes and identify allowable vehicle types or limitations for each route. Designating specific trails or routes on BLM-administered lands would result in a possible reduction of route proliferation and the availability of routes, reducing visitor use in those areas and potentially reducing impacts to cultural resources countywide.

Overall, the impacts of the actions analyzed in this Draft EIS in addition to past, present, and reasonably foreseeable future actions would result in the incremental loss and adverse impacts on cultural resources in the analysis area. Compliance with Federal and State cultural resource laws would help reduce the cumulative impacts on cultural resources from State and Federal actions. Where implemented for individual projects, the controlled data recovery from an archaeological resource could reduce impacts to that individual resource.

3.28.1.14 Recreation and Visitor Services

Under Alternatives 2 through 5, reasonably foreseeable future actions that may cumulatively affect recreation and visitor services in the recreation analysis area include granting special use permits for a variety of recreational tours and events throughout the SGFO, ongoing BLM travel management planning, and BLM acquisition of non-Federal lands within the Red Cliffs NCA.

BLM acquisition of non-Federal lands within the Red Cliffs NCA would be entirely beneficial for recreation and visitor services because it would help preserve the existing recreation setting. BLM approval of special use permits would not permanently impact recreation and visitor services but could temporarily limit visitor access to recreation facilities during events or tours. During special events or tours, visitor experience could be altered by the increased use and presence of people,

but these activities are subject to BLM approval and therefore are assumed to be consistent with the BLM's recreation management objectives. For these reasons, cumulative impacts to recreation and visitor services from issuance of special use permits is expected to be minor and temporary.

Travel management planning for the BLM SGFO is ongoing and would result in a change to visitor access, which could result in cumulative impacts to recreation and visitor services within proposed Zone 6 and the Red Cliffs NCA. Similar to Alternatives 2 through 4, this would limit access to designated routes and could result in the decommissioning of undesignated routes. The travel management planning, along with implementation of Alternatives 2, 3, or 4, would result in adverse cumulative effects to some recreational users by limiting existing access to recreation opportunities.

Alternative 6 could result in cumulative effects to recreation opportunities along 100 South as a result of a proposed restriping project between 700 East and Bluff Street. However, both Alternative 6 and the proposed City of St. George improvements would have minor impacts on recreation, such as opportunities at Town Square and the Dixie Sun Bowl. Any cumulative impacts would therefore be minor and recreation and visitor services on Federal lands would not be impacted.

3.28.1.15 Land and Water Conservation Fund Act Lands [Section 6(f) Properties]

Land tenure adjustments and land use authorizations would offset some of the loss from Federal LWCF impacts by incorporating private in-holdings into the NCA. No reasonably foreseeable actions identified in Table 3.28-1 would affect State LWCF lands within the analysis area.

3.28.1.16 BLM Transportation and Travel Management

Alternatives 2, 3, and 4 would contribute to the cumulative impacts on BLM transportation and travel management in the analysis area, while Alternatives 1, 5, and 6 would not impact BLM travel and transportation management. Reasonably foreseeable future actions with potential to result in cumulative impacts on BLM transportation and travel management in the analysis area for this resource under all alternatives include granting special use permits for recreational events and ongoing BLM travel management planning.

BLM permit applications for various recreational tours and events within the analysis area would not permanently add or remove trails and routes, but would likely make some trails temporarily unavailable for public use during an event and temporarily limit visitor access. Therefore, cumulative impacts to BLM transportation and travel management as a result of special use permitting would be minor and temporary.

Completion of the Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in Washington County, which is ongoing, would result in a change to visitor access within the analysis area. This implementation-level travel planning would designate routes and identify allowable vehicle types or limitations for each route. Designating specific trails or routes and not designating other existing routes on BLM-administered lands would result in a possible reduction in route proliferation and the availability of routes, reducing the opportunity for visitor access. Projected population growth may result in a change to visitor access within the analysis area if such a demand resulted in additional future trail and route designation on BLM-administered lands.

Overall, the Federal actions analyzed in this Draft EIS under Alternatives 2, 3, and 4 along with other reasonably foreseeable future actions, are anticipated to result in a reduction of route options for users and cumulative effects on visitor access in the analysis area. The actions that would have the greatest contribution to these cumulative effects are the completion of the Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in

Washington County, the management of proposed Zone 6 and the proposed SGFO RMP Amendments, and construction of the Northern Corridor through the Red Cliffs NCA.

3.28.1.17 National Conservation Area

The cumulative impacts of past and present actions, the proposed action, and reasonably foreseeable future actions on the Red Cliffs NCA's objects and values are described in other resource sections as indicated in Table 3.18-1.

3.28.1.18 Areas of Critical Environmental Concern

Alternatives 2, 3, and 4 would result in entirely beneficial effects on the Red Bluff ACEC, while Alternatives 1, 5, and 6 would not impact ACECs. Reasonably foreseeable future actions with potential to result in cumulative impacts on the Red Bluff ACEC include granting special use permits for recreational events, the potential development of a shooting range, and ongoing travel management planning.

Cumulative impacts to Red Bluff ACEC as a result of special use permitting would be minor, because SRPs may only be issued where site-specific analysis determines that the authorized activity will not adversely affect the values for which the ACEC was designated. Events would not create new surface disturbance because they would be limited to established trails. The restrictions on trail designations and reduction of route mileage within the proposed Zone 6 may further reduce impacts on the Red Bluff ACEC from events permitted through SRPs.

Washington County has applied for a Recreation and Public Purposes Act lease/patent to develop a shooting range in Cove Wash that would partially overlap with a small portion of the Red Bluff ACEC. The BLM is currently working with the County to relocate the shooting range to avoid impacting the ACEC. However, if the proposal is not relocated, issuing a Recreation and Public Purposes Act lease/patent could result in adverse impacts on the Red Bluff ACEC-relevant and important values. This impact would be counter to the beneficial impacts from the proposed Zone 6 SGFO RMP Amendments and the completion of the travel and transportation management plan.

Completion of the Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in Washington County, which is ongoing, may further prevent surface disturbance resulting from the proliferation of social trails within the Red Bluff ACEC that may otherwise occur. Travel planning would take into consideration ACEC important values when determining which routes to designate, develop, and close within the ACEC. Specific route review during travel implementation would bring more protection to those values through route closure or route mitigation at the site-specific level or through restrictions being placed on route use during implementation-level travel management planning. This action would have a synergistic beneficial impact to the ACEC along with the proposed SGFO RMP Amendments under Alternatives 2, 3, or 4.

Changes in climate could alter the habitat suitability within the Red Bluff ACEC for the dwarf bear-poppy by changing soil moisture conditions, allowing nonnative species to more easily colonize habitats, and altering fire conditions. Projected population growth could increase recreation and visitor use of the ACEC, which may result in cumulative impacts on the ACEC's relevant and important values.

3.28.1.19 BLM Lands and Realty

Alternatives 2, 3, and 4 would result in impacts on BLM lands and realty in both the Red Cliffs NCA and proposed Zone 6, including the ability to accommodate future demand for land use authorizations, impact on existing authorizations, and future land tenure adjustments. Under these alternatives, the BLM would continue to manage the areas outside of designated ROW corridors within the Red Cliffs NCA as an avoidance or exclusion area for new ROWs. The only reasonably

foreseeable future actions in Table 3.28-1 with the potential to impact BLM lands and realty in the Red Cliffs NCA and proposed Zone 6 are the BLM parcel acquisitions in the Red Cliffs NCA. The authorization of a ROW for the Northern Corridor under Alternatives 2, 3, and 4 would likely result in reduced opportunities for these types of land tenure adjustments, because some of the lands targeted for acquisition could become encumbered with a ROW for the Northern Corridor. There are no other reasonably foreseeable future actions in the BLM lands and realty analysis area that would impact lands and realty.

3.28.1.20 Livestock Grazing

Under Alternatives 1, 5, and 6 as well as Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative C, reasonably foreseeable future actions that would affect livestock grazing within the analysis area include continued public access for recreation (such as camping, mountain biking, and OHV use). Recreational activities may degrade forage vegetation as a result of trampling from pedestrian-based activities and dust deposition on vegetation from motorized activities, reducing an area's effectiveness in providing quality livestock grazing. Under Alternatives 2, 3, and 4 with SGFO RMP Amendment Alternative B, no reasonably foreseeable actions would affect grazing within the analysis area because the land within proposed Zone 6 would be made unavailable for livestock grazing by the RMP amendments analyzed in this Draft EIS. Other reasonably foreseeable future actions listed in Table 3.28-1 would not contribute to the cumulative impacts on livestock grazing in the analysis area because they would affect lands outside of proposed Zone 6.

3.28.1.21 Fire and Fuels Management

Reasonably foreseeable future actions with the potential to impact fire management are limited to projects for which there is a risk of human-caused wildfires or projects that impact fuel loading or vegetation cover type. While Alternatives 2, 3, and 4 would affect fire and fuels management in the Red Cliffs NCA as described in Section 3.22, there are no other reasonably foreseeable future actions in this area that would affect fire and fuels management in this area except the completion of the Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in Washington County. This action would likely reduce the number of social trails in the Red Cliffs NCA and is not anticipated to have a substantial impact on fire and fuels management because there are few motorized routes that are more likely to act as an ignition source compared to non-motorized routes within the Red Cliffs NCA. Climate change and associated changes in temperature and precipitation can contribute to the conditions that make wildfires more frequent and spread more rapidly within the analysis area.

While the Federal actions analyzed in the Draft EIS for Alternatives 2, 3, and 4 maintain or improve the fire and fuels management of proposed Zone 6, the proposed shooting range identified in Table 3.28-1 introduces a new human-caused ignition source to this area and the completion of the Comprehensive Travel and Transportation Management Plan for the BLM St. George Field Office in Washington County is likely to result in additional restrictions on OHV travel and reduce associated ignition risk. Overall, the land use restrictions associated with the creation of proposed Zone 6 and the completion of the travel management plan are anticipated to result in an improvement in fire and fuels management in proposed Zone 6.

3.28.1.22 Noise

The Washington Parkway project from Greens Springs to I-15 is currently under construction, and various roadway improvement projects are proposed within St. George. Traffic noise generally attenuates within approximately 500 feet of a roadway (FHWA 2011). Therefore, cumulative noise impacts are anticipated for projects located within 500 feet of the T-Bone Mesa Alignment, UDOT Application Alignment, Southern Alignment, and Red Hills Parkway Expressway Alternatives. However, cumulative noise impacts are anticipated to be minor near the T-Bone Mesa Alignment,

UDOT Application Alignment, and Southern Alignment where only a few receptors would experience a change in cumulative noise and near the St. George Boulevard/100 South One-way Couplet Alternative where noise is not likely to significantly change between existing and future conditions. Cumulative noise impacts are not anticipated under the Red Hills Parkway Expressway Alternative because none of the planned projects in Table 3.28-1 are located within 500 feet of these improvements.

3.28.1.23 Hazardous Materials and Solid Waste

The proposed Northern Corridor (regardless of action alternative) and all new roadways identified in Table 3.28-1 as a reasonably foreseeable future action have the potential to introduce a source of potentially hazardous or toxic materials, as well as solid waste. Construction equipment and most vehicles that would use the Northern Corridor are fueled by petroleum products that may be released by inadvertent leaks or spills, or as a result of vehicle collisions. Trucks hauling hazardous materials or solid waste may also be involved in collisions or other incidents that could result in inadvertent releases of their loads. Emergency response teams and highway departments deal with these issues daily and releases are contained and cleaned up to the extent practical. Incidents are expected to occur regardless of the alternative selected; failing to develop new or improve existing travel routes potentially could increase the number of releases because traffic congestion often contributes to vehicle collisions.

3.28.1.24 Human and Health Safety

The proposed recreation projects identified in Table 3.28-1 and ongoing recreation activity and interest in the area could increase the need for emergency response. The projected population growth would also increase the need for emergency response. Construction and operation of the Northern Corridor, together with other reasonably foreseeable future new and improved roadways, would temporarily change traffic patterns, and construction equipment could present a risk to drivers and potentially delay emergency services. In the long term, however, these same roadway projects provide emergency responders additional travel routes and access to new areas that could benefit public safety. The cumulative effects related to changes in air quality, noise, or the generation and transport of hazardous waste are not expected to have notable impacts to human health and safety because the adverse effects would be minor and controlled by regulatory processes.

3.28.1.25 Socioeconomics

The reasonably foreseeable actions identified in Table 3.28-1 could impact social and economic activity in the county. The Northern Corridor project, together with other construction projects identified in Table 3.28-1, may contribute to the availability of construction jobs and economic opportunity as dollars are spent locally for materials and services. Infrastructure, including a well-functioning transportation network, would accommodate a larger population and enhance socioeconomic activity throughout the community. Planned transportation projects could potentially displace existing residences and utilities and alter access to existing land use. Proposed master planned communities would provide additional housing opportunities for residents to remain in the county if desired. Housing, schools, and recreation facility demand could also increase as the population is projected to double by 2050; however, the proposed project together with other reasonably foreseeable future actions would not be expected to generate enough construction-related jobs to impact the existing supply of homes, schools, or other community services. The combined cumulative effect of climate change and changes to the overall visual landscape of Washington County could have a cumulative effect on recreational visitor demand and uses.

3.28.1.26 Environmental Justice

No reasonably foreseeable actions identified in Table 3.28-1 would disproportionately affect EJ populations within the analysis area.

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Chapter 4. Consultation and Coordination

This chapter describes efforts by the BLM and the USFWS to comply with legal requirements to involve the public in the development of the Draft EIS, and consult and coordinate with various government agencies. These efforts include the following:

- Public scoping.
- Identifying, designating, and working closely with cooperating agencies.
- Consulting with applicable Federal agencies and State, local, and Tribal governments.
- Working with State and local governments and Tribes to identify "any known inconsistencies with State or local plans, policies or programs" (43 CFR 1610.3-2(e)).

4.1 Public Involvement and Scoping

The scoping period began with the publication of the Notice of Intent in the *Federal Register* on December 5, 2019, and extended through January 6, 2020. During the scoping period, the BLM and the USFWS sought public comments to identify issues to be addressed in the Draft EIS. A public scoping meeting was held on December 17, 2019, at the Dixie Convention Center in St. George. In total, 17,258 submissions were received from the public during the scoping period.

Information about scoping meetings, comments received, comment analysis, and issue development can be found in the scoping report available on the BLM's ePlanning website.[1]

4.2 Agency Consultation and Coordination

4.2.1 Endangered Species Act Section 7 Consultation

Section 7(a)(2) of the ESA requires that each Federal agency ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. If an action agency determines a proposed action may affect listed species or designated critical habitat, consultation between that agency and the USFWS is required under Section 7 of the ESA.

As part of ongoing communications and coordination among Federal agencies and the non-Federal applicants, the BLM, the USFWS, UDOT, and Washington County have been sharing information and meeting to discuss the potential impacts of the actions on threatened and endangered species and designated critical habitats. The USFWS, as co-lead and potential issuer of the ITP, reviewed internal documents that preceded publication of the Draft EIS, including UDOT's ROW application and POD and Washington County's early drafts of the HCP. Information received from the USFWS, including recommended conservation measures, has been incorporated into the Draft EIS and proposed actions as a result of these conversations.

The BLM will complete a formal consultation with the USFWS under Section 7 of the ESA regarding the potential impacts of the BLM's Federal actions for the ROW application and potential RMP amendments. The USFWS will conduct an intra-agency Section 7 consultation regarding the potential effects of issuing an ITP to Washington County. The BLM and USFWS will not sign RODs until the formal Section 7 consultation is complete.

[1] https://go.usa.gov/xw8TX

4.2.2 National Historic Preservation Act Section 106 Consultation

The potential issuance of a ROW and amendments to the RMPs by the BLM, and issuance of an ITP by the USFWS are Federal undertakings and are therefore subject to Section 106 of the NHPA. Section 106 through its implementing regulations (36 CFR 800) defines Federal undertakings as any project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval. The regulations require Federal agencies to consider the effects of their undertakings that have the potential to impact historic properties including any district, site, building, structure, or object that is listed on or eligible for listing on the NRHP and provide the SHPO, affected tribes, and other consulting parties an opportunity to comment.

The BLM and the USFWS notified the public that they would coordinate their public consultation obligations under the NHPA (54 U.S.C. 306108) through this NEPA process, as provided for in 36 CFR 800.2(d)(3) as a component of the Notice of Intent to prepare an EIS (84 *Federal Register* 66692-66694). The BLM and the USFWS each independently initiated the Section 106 process by establishing the undertaking (pursuant to 36 CFR 800.3.a), identifying and consulting with interested parties, identifying points in the process to seek input from the public, and notifying the public of proposed actions.

Currently, the BLM and the USFWS are each independently consulting with the Utah SHPO and American Indian Tribes (Table 4.2-1) regarding efforts to identify cultural resources and evaluate them for NRHP eligibility (36 CFR 800.4), and assessing effects of the project on historic properties by applying the criteria of adverse effect (36 CFR 800.5). The BLM and the USFWS will continue consultation to identify processes to resolve any adverse effects to historic properties (36 CFR 800.6), including development of an archaeological treatment plan when potential adverse effects have been determined, and potentially a programmatic agreement or other applicable compliance documents to resolve future but presently unknown effects of the USFWS's issuance of an ITP to Washington County. The American Indian Tribes and agencies participating in the BLM's Section 106 consultation will have the opportunity to participate in the development of a Memorandum of Understanding and Historic Properties Treatment Plan, which will be completed prior to the BLM issuing a ROD.

Because four of the proposed Northern Corridor alternatives involve lands owned either by SITLA or the UDWR, the BLM has consulted with representatives of both State agencies. They have agreed that the BLM will serve as the lead agency for consultations to satisfy the requirements of Section 106 of the NHPA and State agency compliance requirements under Utah Code Annotated 9-8-404. The BLM has identified other interested parties for this Section 106 process.

4.2.3 American Indian Tribal Consultation and Coordination

Federal law requires the BLM and the USFWS to consult with American Indian Tribes during the planning and NEPA process. In December 2019, the BLM initiated government-to-government consultations with 14 American Indian Tribes and Bands that claim affiliation to southwestern Utah, requesting information about sacred sites or places of traditional cultural importance (refer to Table 4.2-1). On December 30, 2019, the Hopi Tribe responded to this initial consultation, stating concerns that the proposed Northern Corridor would adversely impact cultural and natural resources that are significant to the Tribe. The BLM presented information on the proposed Northern Corridor highway and the two RMP amendments at the February 10, 2020 Tribal Council meeting of the Paiute Indian Tribe of Utah. Tribal consultations will be ongoing throughout this planning and NEPA process.

The USFWS initiated government-to-government consultations in April 2020 with 17 American Indian Tribes and Bands and associated Tribal historic preservation offices that claim affiliation to southwestern Utah, requesting information about sacred sites or places of traditional cultural importance (Table 4.2-1). The Hopi Tribe responded to the USFWS with concerns regarding impacts on cultural and natural resources significant to the Tribe.

Tribal consultations will be ongoing throughout this planning and NEPA process.

Table 4.2-1. American Indian Tribes Invited to Participate in Government-to-Government Consultation

Navajo Nation [a]	Cedar Band of Paiutes
Paiute Indian Tribe of Utah	San Juan Southern Paiute Tribe
Indian Peaks Band of Paiutes	Koosharem Band of Paiutes
Las Vegas Paiute Tribe	Kanosh Band of Paiutes
Moapa Band of Paiute Indians	Chemehuevi Indian Tribe
Shivwits Band of Paiutes	Pueblo of Zuni [a]
Kaibab Band of Paiute Indians	The Hopi Tribe [a]

[a] The USFWS also sent letters to the Hopi Cultural Preservation Office, Navajo Nation Heritage and Historic Preservation Department, and Zuni Heritage and Historic Preservation Office.

4.2.4 Cooperating Agencies

Federal regulations direct the BLM and USFWS to invite eligible Federal agencies, State and local governments, and Federally recognized American Indian Tribes to participate as cooperating agencies when drafting the Draft EIS. The groups listed in Table 4.2-2 were invited to participate as cooperating agencies in the preparation of the Draft EIS.

The BLM and USFWS are communicating regularly with the cooperating agencies to review development of alternatives and the analysis contained in the Draft EIS. This process has included cooperating agency workshops, meetings, and conference calls completed on January 28, April 10, and April 29, 2020. During these workshops, the BLM and the USFWS worked with the cooperating agencies to review the following:

- Issues raised during scoping.
- Alternatives developed for consideration in the Draft EIS.
- Preliminary portions of the Draft EIS.

Table 4.2-2. Invited Cooperating Agencies

Agencies Invited to be Cooperating Agencies	Accepted (Yes/No)
U.S. Army Corps of Engineers	No
State of Utah – Public Lands Policy Coordinating Office	Yes
Washington City	Yes
Dixie Metropolitan Planning Organization	Yes
City of St. George	Yes
City of Ivins	Yes
Santa Clara City	Yes
City of Hurricane	Yes

4.3 Distribution of the Draft EIS

An administrative Draft EIS was prepared by the BLM and the USFWS and distributed to the cooperating agencies for review. The BLM and the USFWS made changes to the Draft EIS in

response to the comments received from the cooperating agencies during the review period. After the comments on the administrative Draft EIS were addressed, the BLM and the USFWS provided notice regarding Draft EIS publication, and distributed the document to the agencies and organizations that expressed an interest in the planning process, including the cooperating agencies and American Indian Tribal governments. A notice that the document was available for review was also posted on the BLM's ePlanning website and in the *Federal Register*. A complete mailing and distribution list for the Draft EIS is available in the Administrative Record.

4.4 Relationship to Other Policies, Plans, and Programs

The BLM and the USFWS recognize the importance of State, Tribal, and local plans. The BLM and the USFWS have developed the Draft EIS and Draft RMP amendments to be consistent with or complementary to the management actions in State, Tribal, and local plans and policies to the maximum extent possible, consistent with FLPMA, OPLMA, and other applicable laws and regulations governing the administration of public lands.

To support the development of the Draft EIS and Draft RMP amendments, the BLM and the USFWS conducted a detailed review of relevant State and County plans to evaluate the consistency of these plans with the alternatives presented in the Draft EIS. The results of this review and coordination with local governments related to this subject can be found in Appendix H, Inconsistencies Between the Northern Corridor Project and the Land Use Plans, Policies, and Controls of Washington County and the City of St. George.

4.5 List of Preparers

This Draft EIS was prepared by an interdisciplinary team of staff from the BLM and the USFWS, with assistance from Jacobs Engineering Group Inc. (Jacobs), SWCA Environmental Consultants (SWCA), and Horrocks Engineers. A list of the names and roles and responsibilities of the preparers is provided in Table 4.5-1.

Table 4.5-1. List of Preparers

Name	Agency	Role and Responsibility
Bahr, Quincy	BLM	State Office Planning Liaison, NEPA Document Review
Blocker, Matt	BLM	Noise, Recreation, NEPA Document Review
Cleek, Katherine	BLM	Cultural Resources and Native American Concerns
Corry, Dave (retired)	BLM	Water Resources, Wetlands, Waters of the U.S., Floodplains
Cox, Rody	BLM	Geology, Mineral Resources, Soil Resources
Ferris-Rowley, Dawna	BLM	Red Cliffs NCA Manager, Cultural Resources, NEPA Document Review
Glenn, Evan	BLM	BLM Travel and Transportation Management
Goff, Callie	BLM	NEPA Document Review
Kellam, John	BLM	Biological Resources, NEPA Document Review
Kiel, Dave (retired)	BLM	Visual Resources, Recreation, BLM Travel and Transportation Management, NEPA Document Review
Mohsen, Ahmed	BLM	District Manager
Peterson, Randy	BLM	Acting District Manager
Peterson, Shawn	BLM	Fire and Fuels Management
Reese, Ryan	BLM	Livestock Grazing, Noxious Weeds and Invasive Species, Vegetation, Hazardous Materials and Solid Waste, NEPA Document Review
Rigtrup, Keith	BLM	St. George Field Manager, NEPA Document Review
Roe, Aaron	BLM	Biological Resources
Root, Stephanie	BLM	Biological Resources, NEPA Document Review

Name	Agency	Role and Responsibility
Suhr-Pierce, Julie	BLM	Socioeconomics, Environmental Justice, NEPA Document Review
Tibbetts, Gloria	BLM	Project Manager, District Planning and Environmental Coordinator
Trujillo, Stephanie	BLM	Lands and Realty, NEPA Document Review
Vernon, Erik	BLM	Air Quality
Voyles, Kyle	BLM	Paleontology, Visual Resources, Recreation and NEPA Document Review
White, Alicia	BLM	Geographic Information Systems
USFWS Utah Field Office	USFWS	ESA Section 6 Lands, NEPA Document Review Threatened and Endangered Species, Biological Resources, Cultural Resources
USFWS Regional Office	USFWS	ESA Section 6 Lands, NEPA Document Review Threatened and Endangered Species, Biological Resources, Cultural Resources
Adams, Rachel	Jacobs	Geology, Mineral Resources, Soils
Bushey, Sabra	Jacobs	Prime and Unique Farmland, Livestock, Paleontology, Hazardous Materials and Solid Waste
Defend, Beth	Jacobs	Project Management Support and NEPA Document Development
Fellows, Angie	Jacobs	Project Management Support and NEPA Document Development; Highway Alternative Development and Screening
Jordao, Emilie	Jacobs	Geographic Information Systems
Markham, Loretta	Jacobs	Project Manager
Mayer, James	Jacobs	Cultural Resources and Native American Concerns
Montgomery, Matt	Jacobs	BLM Lands and Realty, Fire and Fuels Management
Nicholson, Kay	Jacobs	Special Status Animal Species, Wildlife Resources
Palmer, Bruce	Jacobs	Threatened and Endangered Wildlife Species, Mojave Desert Tortoise, Special Status Wildlife
Price, Chris	Jacobs	Water Resources
Ragusa, Dana	Jacobs	Air Quality, Noise
Ramos, Brian	Jacobs	Cultural Resources and Native American Concerns
Rude, Becky	Jacobs	Endangered Species Act Section 6 Lands, Recreation Resources, Land and Water Conservation Fund Lands/ Section 6(f)
Seguin, Misha	Jacobs	Vegetative Communities including Noxious Weeds and Invasive Species, Special Status Plants
Steinholtz, Patti	Jacobs	Visual Resources
Tracy, Jessica	Jacobs	Socioeconomics, Hazardous Materials and Solid Waste, Human Health and Safety, Environmental Justice
Casper, Elliott	SWCA	Wetlands, Waters of U.S., Riparian Areas, Floodplains
Cyphers, Laren	SWCA	Areas of Critical Environmental Concern, BLM Transportation and Travel Management
Persing, Reid	SWCA	BLM RMP Alternatives Development, Project Management Support and NEPA Document Development
Rauhe, Kevin	SWCA	National Conservation Area, NEPA Document Development
Stutz, Allen	SWCA	Geographic Information Systems
Albrecht, Shaun	Horrocks	Highway Design
Cabell, Lee	Horrocks	Highway Design, Project Management Support
Heaps, Michael	Horrocks	Traffic Analysis
Mortimer, Macey	Horrocks	Public Involvement

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