

Mesa Verde National Park
Colorado

National Park Service
US Department of the Interior



Mesa Top Loop Roads Improvement Environmental Assessment

May 2020



Estimated Lead Agency Total Costs
Associated with Developing and
Producing this EA
\$81,000

Public Comment

We invite you to comment on this EA during the 30-day public review period. You may do so by providing comments through the National Park Service's (NPS) Planning, Environment, and Public Comment (PEPC) website for the park at: <http://parkplanning.nps.gov/MEVE>.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Comments will not be accepted by fax, by e-mail, or in any other way than those specified above. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted.

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Acronyms and Abbreviations

3R	Resurface, restore, and rehabilitate
ABA	Architectural Barriers Act
CFR	Code of Federal Regulations
EA	Environmental Assessment
ESA	Endangered Species Act
FHWA	Federal Highway Administration
Mesa Verde NP or park	Mesa Verde National Park
NPS	National Park Service
NRHP	National Register of Historic Places
SHPO	State Historic Preservation Office
USFWS	US Fish and Wildlife Service
VRC	Visitor and Research Center

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

The National Park Service (NPS), in cooperation with the Federal Highway Administration (FHWA), is proposing several improvements to ensure that visitor overlooks, parking lots, and roads at Mesa Verde National Park (Mesa Verde NP or park) continue to provide visitors safe, reliable access and a broad range of recreational opportunities.

The range of alternatives evaluated in this environmental assessment (EA) includes a no-action alternative (alternative A), and two action alternatives (alternatives B and C).

NEED FOR THE PROPOSAL

The project is needed to address Architectural Barriers Act (ABA) accessibility, safety, operational, and recreational issues for four high visitor-use areas: the Visitor and Research Center (VRC) Intersection, Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads. The park receives nearly 600,000 annual visitors primarily at the VRC and the Cliff Palace Loop, Mesa Top Loop, and Sun Temple Loop roads, since many of the popular park destinations and points of interest are accessed by these roads. Issues addressed include:

- All park visitors must enter the park and travel through the VRC intersection. This four-way intersection is off-set (the roads do not intersect at 90-degree angles) and in-coming traffic from US Highway 160 does not stop. The off-sets and existing signs are confusing for visitors and have led to numerous near-collisions of vehicles.
- The Cliff Palace Loop, Mesa Top Loop, and Sun Temple Loop roads have reached the end of their serviceable life cycle. These roads were last resurfaced in 1998. Since then, the road base has been damaged by years of use, as well as water infiltration, resulting in pavement that is settling, cracking, and breaking apart. Informal vehicle pullouts have been created resulting in resource impacts. The traction course has worn away, making these roads slick when it rains or snows. Years of patching and applying overlays have created steep and uneven shoulders. Road super elevations and geometry are also out of specification to accommodate modern vehicles and speeds. Super elevations are the tilting of the roadway to help offset centrifugal forces that develop as the vehicle goes around a curve.
- Bicycling is permitted on the Mesa Top Loop and Sun Temple Loop roads, but cyclists must share the same lanes as vehicles, and the existing shoulders are narrow, steep, and uneven, limiting bicycling to experienced riders.
- Ramps, sidewalks, curbs and overlooks at popular park attractions do not currently provide access for visitors of all physical abilities, including those with limited mobility.

PROJECT AREA

Mesa Verde NP, located in southwestern Colorado, encompasses 52,485 acres. The park lies entirely within Montezuma County and is located near the towns of Mancos and Dolores, and the city of Cortez. The park is easily accessible from US Highway 160, from the Durango area, 35 miles to the east, and the city of Cortez, 9 miles to the west (Figure 1).

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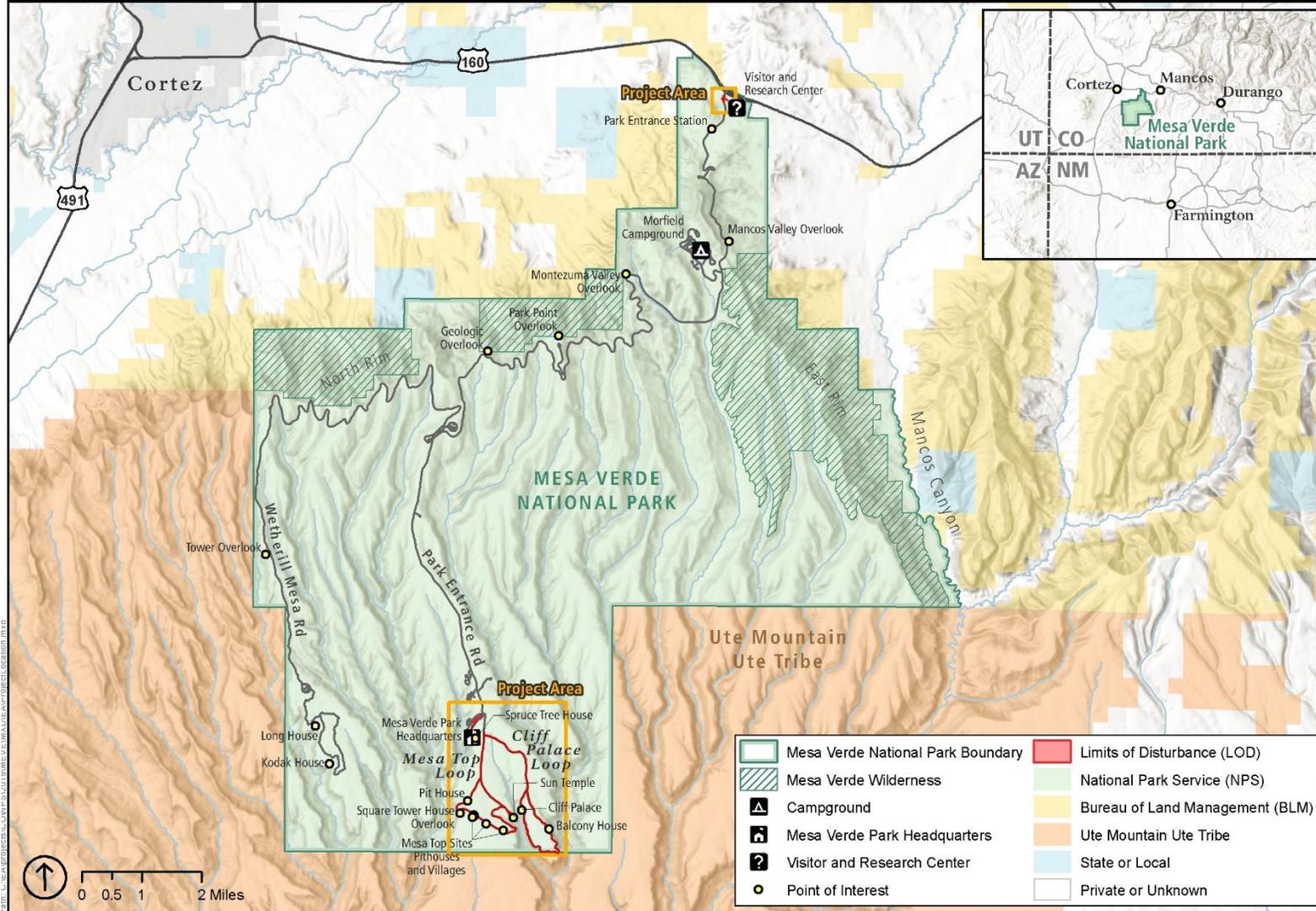


Figure 1. Vicinity Map and Project Area

The project area consists of two separate areas, the VRC intersection and Chapin Mesa loop roads area (Figure 1). The Chapin Mesa loop roads area includes the Mesa Top Loop Road, Cliff Palace Loop Road, Sun Temple Loop Road, the Park Headquarters infield parking lot, an existing disturbed 1.1-acre area northwest of the Headquarters four-way intersection, and the Chapin Mesa Material Storage Yard (Figure 1). Mesa Top Loop Road is 4.7 miles. Approximately 0.8 mile of this road allows for two-way traffic; the remainder is a one-way loop. Cliff Palace Loop Road is 4.1 miles with approximately 1.5 miles of two-way road and a 2.6-mile one-way loop. Sun Temple Loop Road is 0.4 miles long; this road has 0.1 mile of two-way travel with a 0.3-mile one-way loop. Numerous overlooks with parking lots, restrooms, picnic areas, shade structures, and sidewalks are accessed from the loop roads.

ISSUES AND RESOURCE TOPICS DISMISSED FROM DETAILED ANALYSIS

Issues and resource topics are described below with the reason(s) that further analysis was not warranted.

Wildlife. Wildlife habitat in the project area consists of piñon-juniper woodland and semi-desert grassland in the Chapin Mesa loop roads area. The habitat within the VRC intersection project area has been previously disturbed, and although it has been partially restored, this is an area of maintained landscape and does not contain high-quality habitat. Construction activities would occur within existing disturbed areas (e.g., roadbeds), and in habitat directly adjacent, which are presently affected by human-caused noise and vehicles, rather than in portions of continuous, undisturbed habitat. Wildlife that inhabit these areas are likely habituated to this noise and activity, but the increased noise and activity related to the proposed construction would, nonetheless, cause wildlife to avoid the project area during the daylight hours when construction is actively taking place. Such displacement would occur daily throughout the approximately 12-month construction period. However, displaced wildlife would be able to occupy other portions of their home ranges until construction activities cease. There would also be a permanent loss of 7.9 to 8.8 acres of piñon-juniper woodland and semi-desert grassland habitat located adjacent to the existing Mesa Top Loop, Chapin Mesa Loop, and Sun Temple Loop roads in the Chapin Mesa loop roads area, but approximately 3,000 acres of this kind of habitat would continue to be available nearby for use by displaced wildlife. To comply with the Migratory Bird Treaty Act, vegetation removal would occur outside the migratory bird nesting season (March 1 through September 1) to avoid impacts to nesting birds known to occur in the project area. If construction activities cannot occur outside the bird nesting season, surveys would be conducted by a qualified biologist prior to scheduled activity to determine if active nests are present within 164-foot (50 meters) of the construction area. Any nesting locations found during surveys would be barricaded (e.g., plastic fencing) to eliminate construction impacts on nests. Vegetation containing nests would not be removed until the nest is deemed inactive. The above impacts could adversely affect individual wildlife and migratory birds, but would not affect species at the population level.

Mexican Spotted Owl. Listed in 1993 by the US Fish and Wildlife Service (USFWS) as a threatened species, the Mexican subspecies of the spotted owl (*Strix occidentalis lucida*) is a resident of old-growth or mature forests that possess complex structural components, such as uneven-aged stands, high canopy closure, multi-storied levels, and high tree density (NPS 2015). There is no designated critical habitat within the park, but the Chapin Mesa loop roads project area is located within a proposed Protected Activity Center for Mexican spotted owls and, therefore, contains suitable habitat for the species. Within the park, Mexican spotted owl habitat is in sandstone canyons and side canyons with Gambel oak (*Quercus gambelii*) thickets and stands of piñon-juniper woodland and Douglas fir (*Pseudotsuga menziesii*). Surveys have been conducted in Mexican spotted owl habitat throughout the park for the past several decades. A small breeding population was present in the park in the 1990s. In 2004 and 2005, surveys revealed that Mexican spotted owls were present, but no breeding activity was observed. Since 2008, most of the survey effort has occurred within the canyons of Chapin Mesa. One Mexican spotted

owl pair was heard calling during the 2008-2019 survey period; however, daytime follow-up surveys could not verify the record.

There would be no direct impacts to Mexican spotted owl canyon-nesting structure and habitat and no impacts to foraging habitat within the canyon and canyon bottoms. There would be a loss of approximately 6.7 to 7.4 acres of piñon-juniper woodland habitat located adjacent to the existing Mesa Top Loop, Chapin Mesa Loop, and Sun Temple Loop roads. Although Mexican spotted owls spend some time foraging on mesa tops, they typically spend a majority of their time below the canyon rim (Willey and van Riper III 2007); therefore, impacts to Mexican spotted owl foraging habitat would be minimal, as this is not the species' preferred foraging location. As noted under "Resource Protection Measures" below, the National Park Service would continue to survey for Mexican spotted owls according to the *USFWS Section 7 Mexican Spotted Owl Survey Protocol* each year during the implementation of the Mesa Top Loop Roads Project in areas affected by the project. If owls are detected, all work within 1,640 feet (500 meters) of an active nest would cease, and the National Park Service would immediately re-initiate Section 7 consultation with the USFWS to ensure measures would be taken to protect the owls.

Section 7 Endangered Species Act (ESA). Pursuant to section 7 of the ESA, the National Park Service concludes that alternative B and C *may affect, not likely to adversely affect* the Mexican spotted owl due to adverse impacts from improvement activities associated with Mesa Top Loop, Sun Temple Loop, and Cliff Palace Loop roads.

Cultural Landscapes and Historic Districts. The Park Entrance Road Corridor Cultural Landscape used engineering combined with landscape architectural design to make large scenic areas accessible to the visiting public without unduly marring landscape scenery or natural systems. This Cultural Landscape is divided into three components: the Entrance Area (4 acres), which includes the proposed area for the roundabout; the Entrance Road (1,230 acres); and Ruins Loop Roads (44 acres), which includes Cliff Palace Loop, Mesa Top Loop, and Sun Temple Loop roads (NPS 2019a, NPS 2019b, and Shapins 2012). There would be a visual change from a four-way intersection to a roundabout; however, the four-way intersection is not a contributing resource to the cultural landscape and its alteration would not diminish the historic integrity of the area.

The Chapin Mesa Loop Roads Historic District consists of the Cliff Palace Loop, Mesa Top Loop and Sun Temple Loop roads located on Chapin Mesa and overlaps with the Ruins Loop Roads component of the Park Entrance Road Corridor Cultural Landscape. Some of the character defining traits of the historic district include the integration of the overlooks and alignment of the road into the natural landscape; the craftsmanship and materials represented in the different stone masonry structures, including the culvert headwalls, retaining walls, steps, and drop inlets; and use of rustic design elements.

Under the action alternatives, the road widening and removal of adjacent vegetation through the piñon-juniper woodlands would change the viewshed along these sections of roads. A feeling of enclosure while driving through the piñon-juniper woodlands and then a sudden reveal of the open expanses along the canyon rim are a historic characteristic of the road. Even with the two-lane sections of road being up to 3 feet wider from 17 feet to 20 feet wide to a consistent 20-foot width under alternative B, this characteristic would be maintained because the slight increase in road width would likely not be noticeable since the road is already 20 feet wide in places. Under alternative C, the pavement would be expanded up to an additional 8 to 11 feet in width from 17 feet to 20 feet wide to a consistent 28-foot width along the two-way sections of Mesa Top Loop (0.8 mile) and Sun Temple Loop (0.1 mile). The viewshed along the Sun Temple Loop road was altered by a previous stand-replacing wildland fire. While the piñon-juniper forest would still border the Mesa Top Loop road under alternatives B and C, the additional widening of the pavement under alternative C would likely be noticeable diminishing the historic integrity of setting and feeling by enlarging the viewshed.

Small-scale landscape elements, such as pipe rail fencing, chain-link fencing, and wood retaining walls would be removed. Their removal would also have beneficial effects to the historic district and cultural landscape from removal of non-contributing elements. New small-scale landscape elements, such as two-rail wood fences, rustic-styled signs, a rustic-styled shade structure at Balcony House, ABA accessibility improvements (e.g., ABA signs, curb cuts, sidewalk ramps), new colored concrete sidewalks, and an ABA accessible ramp to Sun Point Overlook would be added. All of these new elements would be designed to be compatible with the natural and historic surroundings and meet the Secretary of Interior's Standards and in consultation with the State Historic Preservation Office (SHPO) (see appendix A), and therefore, would not adversely affect the historic district or the overlapping cultural landscape.

Implementation of either of the action alternatives would result in beneficial and adverse impacts to the historic district and cultural landscape. However, the historic district and cultural landscapes would still convey their historic associations with the history of conservation at Mesa Verde NP, the NPS Mission 66 Program, and the Depression-era Civilian Conservation Corps. The Chapin Mesa Loop Roads Historic District and the Entrance Road Corridor Cultural Landscape would still be eligible for listing on the National Register of Historic Places (NRHP).

CHAPTER 2: ALTERNATIVES

Three alternatives, two action and a no action, are carried forward for evaluation in this EA. This chapter also describes other alternatives that were initially considered but dismissed from detailed analysis and presents mitigation measures for the action alternatives.

DESCRIPTION OF THE ALTERNATIVES

Alternative A: No-Action Alternative

Loop Roads. Under alternative A, Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads would remain in their current condition. The roads would remain paved with asphalt with varying lane widths of approximately 15 feet to 17 feet along the one-way sections and 17 feet to 20 feet along the two-way sections. Grading and super elevation issues would not be repaired. The existing 12 informal pullouts would remain.

Under the no-action alternative, failing sections would continue to be patched, as needed. Patching would involve crack sealing and patching potholes with hot or cold asphalt patching materials. If an area or section larger than a pothole failed, the asphalt in the area or section would be saw cut, the asphalt removed, the existing base recompact and resurfaced with hot mix asphalt. Shoulders and ditches would continue to be maintained by grading. Asphalt millings would continue to be place along the edge of the road to build up the shoulder where needed. The millings are a gravel-like material created from recycling asphalt. Drainage systems would be repaired as needed to prevent localized erosion, and culverts would continue to be cleaned by high pressure water flushing. The water used for this cleaning would be from the park's domestic water supply.

Sidewalks and Overlooks. The asphalt sidewalks and curbs bordering the road and parking lots at overlooks and sheltered archeological site locations would remain in their current condition and would be patched or repaired with hot or cold asphalt patching materials as needed. Asphalt pavement at the overlooks would remain in place. New accessible ramps would not be installed (Figure 2).

Headquarters Infield Parking and Trails/Sidewalks. The gravel parking lot at the infield would continue to be used by park and concessioner staff and not converted to a public parking area. The existing trails and sidewalks would remain; however, no new trails or sidewalks would be constructed.

Entrance Intersection. The existing off-set four-way intersection at the park entrance, VRC, and water treatment plant access road would remain in its current configuration.

Shade Structure at Balcony House. The existing structure above Balcony House, built in 1988, is constructed of juniper log uprights and vigas supporting a shed roof and approximately 52-feet long and 8-feet wide and curves slightly with the sidewalk (Figure 3). Because the existing sidewalk at Balcony House would remain in its current condition, the existing juniper shade structure would not be removed and would remain in place in its current condition.

Construction Zones. The existing area maintained is approximately 22 acres and no new construction zones would be needed under the no-action alternative.



Figure 2. Existing Concrete Curb and Asphalt Sidewalk above Balcony House



Figure 3. Shade Structure at Balcony House

Staging Areas. Staging areas would not be needed under the no-action alternative.

Revegetation. The park would continue to treat non-native vegetation along the loop roads and other locations within the park in accordance with the park's approved non-native plant management procedures.

Alternative B: 3R Only Alternative

A 3R (resurfacing, restoration, and rehabilitation) project typically involves pavement improvement work (short of full-depth replacement) and targeted safety improvements. Alternative B would represent a 3R project involving Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads. This project also includes improvements to the intersection at the park entrance.

Loop Roads. Under alternative B, the current lanes of the Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads (Figure 4) would be widened to a consistent width to meet standards identified in *Park Road Standards* (NPS 1984); one-way sections would be 13-foot wide (11-foot wide lane with 2-foot-wide paved shoulders), and two-way sections would be 20-foot wide (two 9-foot wide lanes with 1-foot wide paved shoulders). The super elevations would be reconstructed to road standards as well. All worn and failing road surfaces, including associated parking lots, would be repaired. Repairs would include resurfacing roads, replacement or repair of failing drainage systems and reducing the height and unevenness of the shoulders. All resurfacing would be accomplished by recycled overlaying processes, which would level and smooth road defects. The recycled overlay process is a method of removing and reusing the existing asphalt surface. It involves grinding off the top 2 to 6 inches of the existing asphalt surface and mixing the crushed asphalt with an asphalt recycling agent and placing it back down as the base layer. Two additional asphalt applications, called lifts, would be applied over the top of the roads. After resurfacing, lane markings would be replaced. Work on the drainage systems and shoulders would continue as described for the alternative A in addition to modification of drainage systems (i.e. repair or replacement of damaged or deteriorated culverts); replacement would be in-kind and would entail excavation of up to three feet to the bottom of the culvert and the shoulders would be reconstructed and regraded as necessary.

Existing informal pullouts would be either formalized and paved in asphalt or eliminated and revegetated. There are currently 12 informal pull outs along the Mesa Top Loop and Cliff Palace Loop roads. Six of these pullouts would be formalized and six pullouts would be eliminated, resulting in the restoration of approximately 0.07 acre. The pullouts retained were determined necessary due to law enforcement and other park operational requirements.

Where the road would be widened or realigned, it would be done along the side that would minimize impacts to cultural resources. This was done through a design process of overlaying the archeological site boundaries and then aligning the road right or left to avoid adjacent sites and minimizing cut and fill activities to the sites intersected or bisected by the existing road.

Sidewalks and Overlooks. Existing asphalt sidewalks along Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads would be replaced with colored concrete sidewalks, curbs, and ABA ramps. These new concrete sidewalks, curbs, and ramps would be constructed in the existing locations, no new development would occur. Existing asphalt pavement at the overlooks would also be replaced with colored concrete pavement. A new accessible ramp would be constructed at Sun Point Overlook on Mesa Top Loop Road adjacent to the existing sidewalk. The ramp would be approximately 40-foot long by 5-foot wide and paved with asphalt. The location would be in an area free of archeological resources or sensitive plant species.

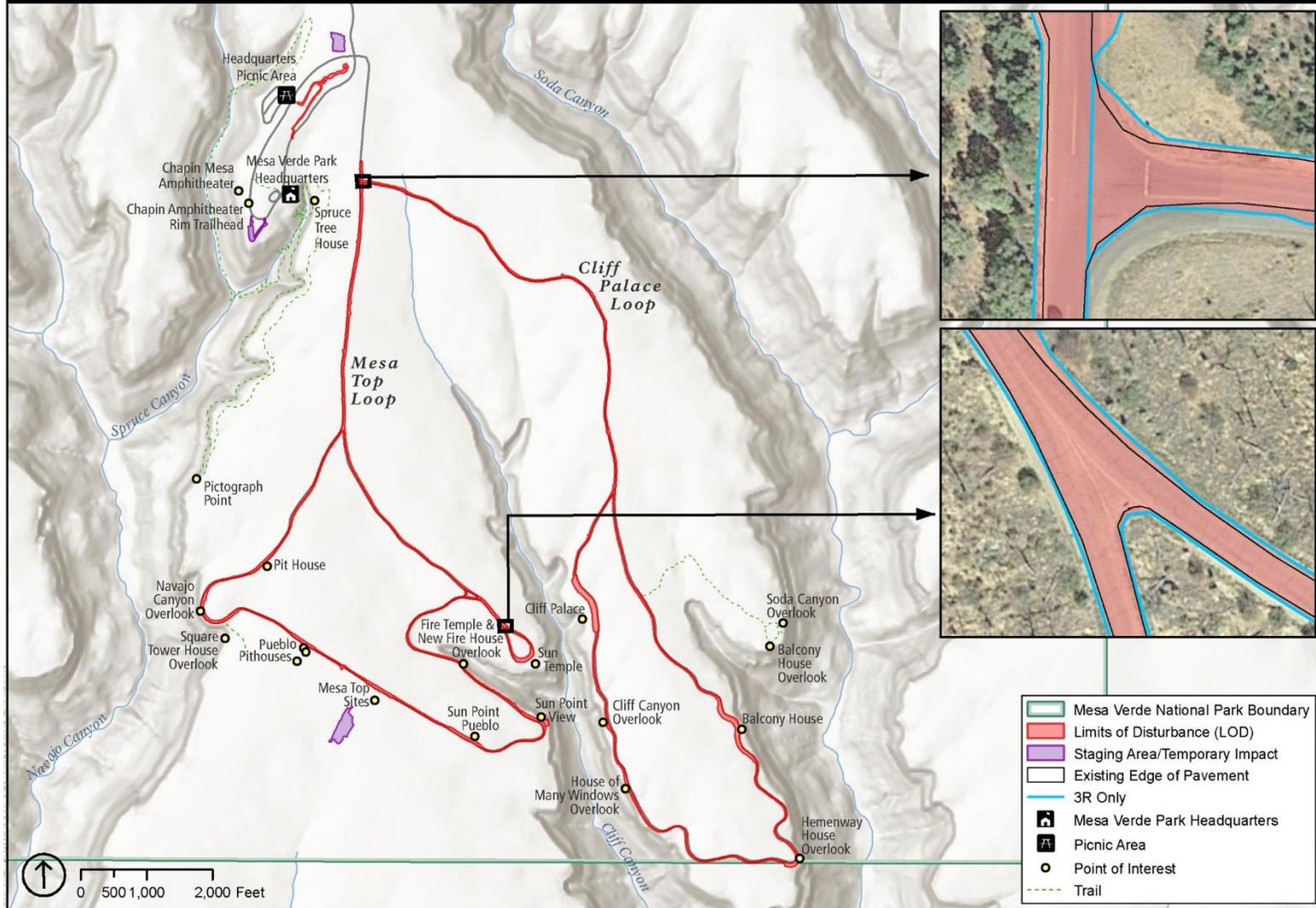


Figure 4. Alternative B – 3R Only

Headquarters Infield Parking and Trails/Sidewalks. The previously developed portion of the infield (a gravel parking lot used by park and concessioner staff) on the Headquarters Loop Road would be converted to a parking area that would be open to the public and accommodate approximately 60 vehicles to serve as overflow parking during periods of high visitation (Figure 5). Excess millings from the asphalt removed from the existing loop roads would be used to create the parking area at the infield. Concrete wheel stops would be placed to delineate the parking area and indicate angled parking. This parking area would not expand the footprint of the existing developed area (0.7 acre). The south end of the infield is assigned for concessionaire use only, and the public would not be allowed in this area.

There is an existing deteriorated asphalt trail (an old road) approximately 850-feet long by 10-feet wide on the eastern side of the infield parking lot. This old road would be resurfaced with hardened aggregate into a 5-foot wide accessible trail. A new trail would be constructed connecting this existing trail to the concrete sidewalk north of Spruce Tree Terrace (Figure 5). The new wheelchair-accessible trail would be a hardened aggregate trail approximately 160-feet long by 5-feet wide. At the end of the new trail section, a sidewalk of natural gray concrete, 25-feet long by 5-feet wide, would be constructed parallel to Headquarters Loop Road to connect to the existing concrete sidewalk north of Spruce Tree Terrace. The construction corridors for these routes would be 9-feet wide, within which vegetation would be removed and tree limbs overhanging this corridor would be limbed to a height of 9 feet. After construction, the area adjacent to the trail and sidewalk would be revegetated. A new fence, approximately 160 linear feet of round rail fencing, would be installed on the downhill side and approximately 1-foot from the new trail to discourage visitors from creating social trails through the native vegetation. The fence would consist of 6-inch diameter posts spaced 10 feet apart, with 4-inch diameter rails. Posts would be buried 18 to 24 inches into the ground.

Signage would be installed, as appropriate, to direct visitors from the infield parking lot to the Headquarters Area and from the Headquarters Loop Road to the infield parking lot. Signs would be installed on U-channel steel posts that would be driven into the ground or on 4-inch wooden posts installed approximately 18 inches in the ground. Sign and fence posts would be installed outside of any archeological site boundary.

Entrance Intersection. The existing off-set four-way intersection at the park entrance, VRC, and water treatment plant access road would be improved with a roundabout (Figure 6). The roundabout would have one-lane and would be 160 feet in diameter with a low center island that would allow for the passage of large vehicles, such as semi-trucks and trailers, recreation vehicles and trailers, and buses. Drivers would yield to the traffic already in the roundabout, then enter the intersection and exit at the desired road. There would be four entry/exit points, including the park entrance, the park exit to US Highway 160, the VRC, and water treatment plant access road.

Shade Structure at Balcony House. The existing juniper shade structure would be removed during construction of the sidewalk, and a new shade structure would be constructed. Because the new structure would be within the Chapin Mesa Loop Roads Historic District, the new structure(s) would be designed so that the materials and massing would be compatible with the historic setting. The new structure would have similar dimensions as the existing structure, but may use different materials.

Construction Zones. The construction zones or limits of disturbance would be approximately 30.5 acres. Construction zones would be identified and fenced with construction fencing or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone, as defined by the construction zone fencing.

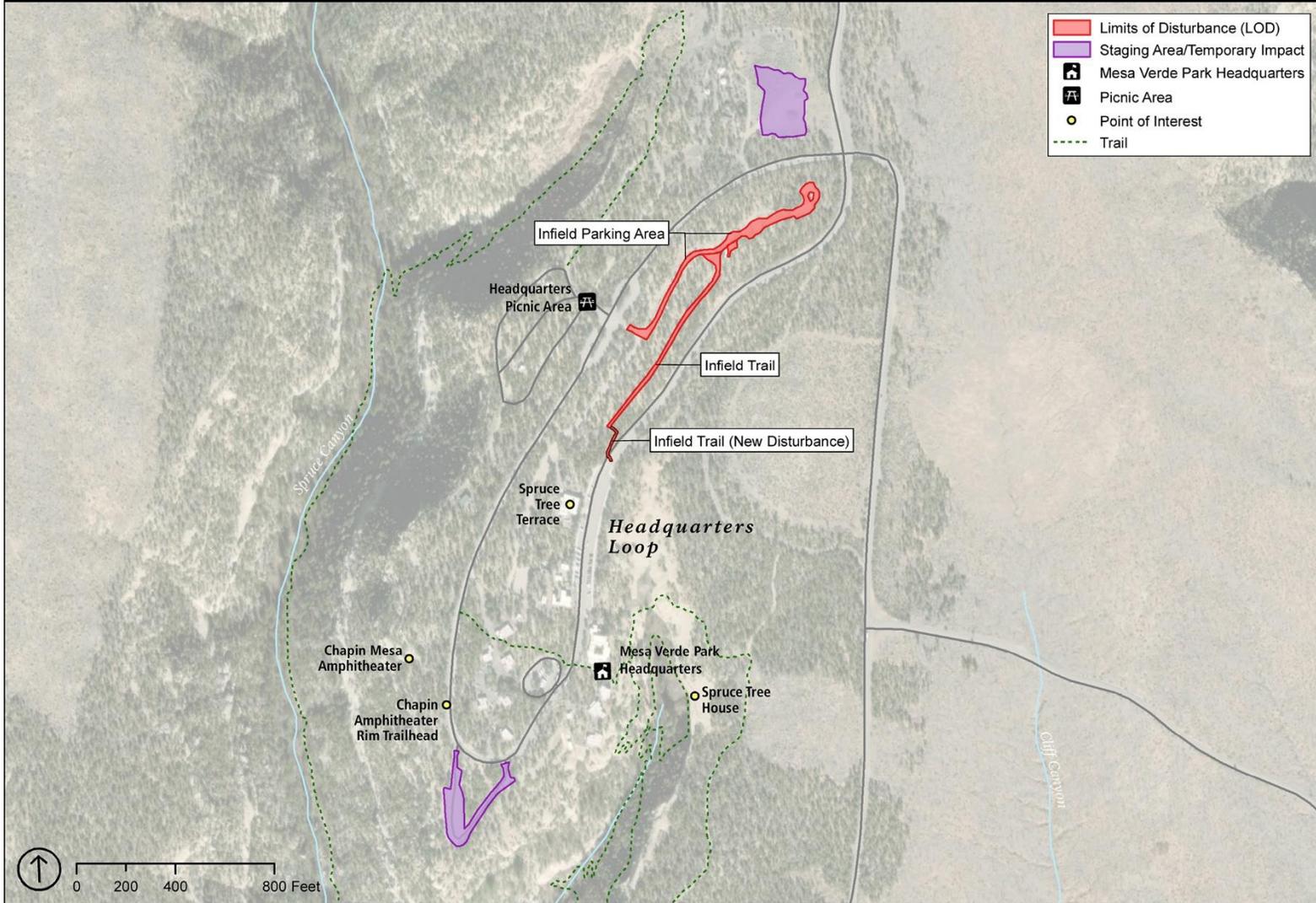


Figure 5. Infield at the Headquarters Loop

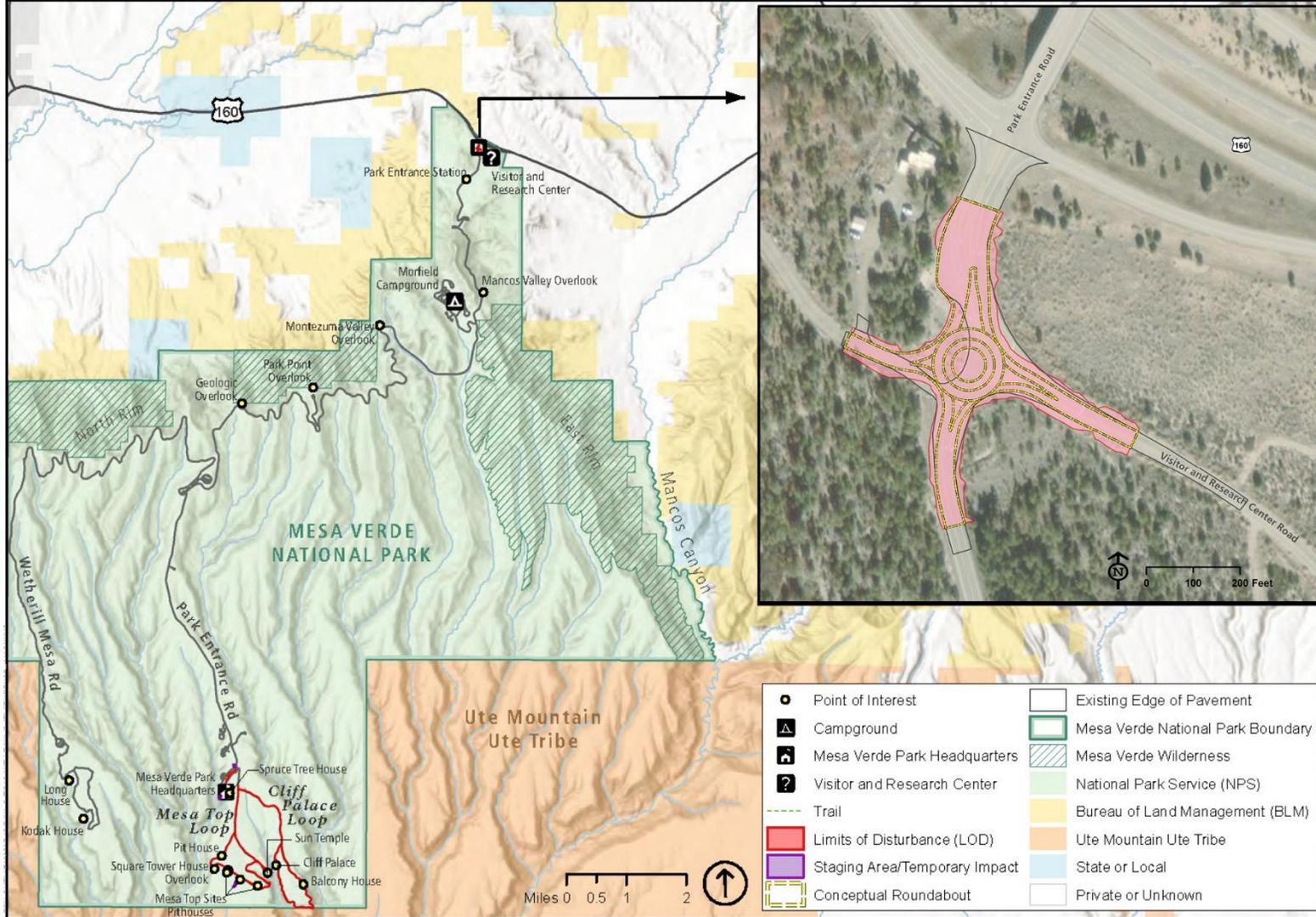


Figure 6. Entrance Roundabout

Construction Timing, Equipment, Deliveries. Construction would occur on a daily basis for about 12 months; work would be restricted to day light hours. Construction of the project would likely require use of the following types of construction equipment: excavators, dozers, graders, pavers, and rollers. At least one of each piece of equipment would be needed for the project and would be stored at a staging site when not in use. Truck deliveries/transport to and from staging areas would occur during construction as well; this would increase the quantity of truck deliveries throughout the construction duration, plus additional vehicular traffic would be generated from construction workers accessing the site daily.

Staging Areas. Three potential staging areas could be used during construction. These include the overflow parking lot in the Headquarters Loop Road, a previously disturbed 1.1-acre area northwest of the Headquarters four-way intersection, and in the Chapin Mesa Material Storage Yard (see Figures 4 and 5). Staging areas would be confined to previously disturbed areas. Staging may also take place within the footprint of the roads. The staging area for the roundabout would be within the construction zone.

Revegetation. Prior to construction, park staff would collect seeds from wildland plant populations in the park, salvage native plants from within the project area, and salvage biological crust from within the project area. Seeds would be collected from native plants, including narrowleaf beardtongue, hairy golden aster (*Heterotheca villosa*), coyote tobacco (*Nicotiana attenuata*), sulphur buckwheat (*Eriogonum umbellatum*), redroot buckwheat (*Eriogonum racmosum*), tailcup lupine (*Lupinus caudata*), and Bigelow's tansyaster (*Machaeranthera bigelovii*). Plants that would be salvaged from the project area include hairy golden aster, narrowleaf beardtongue, sulphur buckwheat, banana yucca (*Yucca baccata*), Indian ricegrass (*Achnatherum hymenoides*), Utah juniper (*Juniperus osteosperma*), prickly pear cactus (*Opuntia* spp.), and rock goldenrod (*Petradoria pumila*). Biological crust would be salvaged from the project area once soils are completely dry following spring snowmelt.

Following construction, areas that were temporarily disturbed during construction would be recontoured and revegetated. Salvaged soils would be placed back on disturbed soil in late fall when soil moisture is present and before snowfall. Revegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plants using native species. Disturbed areas would be reseeded, and larger areas of disturbance (such as informal pullouts) would be seeded and planted with salvaged or nursery grown plant materials. Plantings would help to establish mature plants and accelerate plant community development and ecological restoration of the disturbed area. Plant material would include seeds collected from wildland populations in the park prior to construction, seeds from seed increase fields, plants salvaged from the project area prior to construction activities, and locally purchased genetically appropriate seeds and nursery-grown plants. The park would treat for non-native species in the areas from the road shoulder to approximately 15 feet from the edge-of-pavement for approximately 9 linear miles of road. The treated areas would be monitored and managed to prevent colonization by non-native species.

To compensate for the losses of Chapin Mesa milkvetch habitat from this project, the National Park Service would restore two acres of highly degraded habitat that currently consists of an abandoned helipad and leach field that are within an area of high-density Chapin Mesa milkvetch habitat. These two areas would total approximately 2.1 acres. The concrete helibase would be excavated, and the concrete debris and existing structures would be removed from the site. The gravel at the helibase and leach field would be excavated and removed from site as needed, and soil would be tilled as necessary in some locations of the leach field. Once the infrastructure is removed, the sites would be seeded using a combination of harvested and purchased seeds. Seedlings of target species, including Chapin Mesa milkvetch (*Astragalus schmolliae*), Fort Wingate milkvetch (*Astragalus wingatanus*), straight bladderpod (*Physaria rectipes*), and narrowleaf beardtongue (*Penstemon linearoides*), would also be planted. The seedlings of these target species would be grown in nurseries from seed that would then be planted on the

site. The park would control invasive non-native plants at these mitigation sites for an additional three years as described in “Resource Protection Measures” below.

Alternative C: 3R Plus Bike Lane Alternative (NPS Preferred Alternative)

Loop Roads. Alternative C would be the same as alternative B, but this alternative would include the addition of bike lanes. Approximately 0.8 mile of Mesa Top Loop Road and 0.1 mile of Sun Temple Loop Road of the two-way section of roadway would be widened to accommodate a 4-foot wide bike lane on both sides of this portion of the roads (8 feet of additional width for approximately 4,224 feet on Mesa Top Loop Road and 528 feet on Sun Temple Road). A bike lane would be striped along the one-way sections of these loop roads; however, widening of the road would not be required in the one-way sections. Figure 7 highlights the portions of Mesa Top Loop and Sun Temple Loop roads that would be widened for the bike lanes.

Sidewalks and Overlooks. Changes to sidewalks and overlooks would be the same as described for alternative B.

Headquarters Infield Parking and Trails/Sidewalks. Changes to the Headquarters infield parking and trail would be the same as described for alternative B.

Entrance Intersection. Changes to the entrance intersection would be the same as described for alternative B.

Shade Structure at Balcony House. Changes to the shade structure at Balcony House would be the same as described for alternative B.

Construction Zones. Construction zones or limits of disturbance would be approximately 31.4 acres and would be established as described for alternative B.

Construction Timing, Equipment, Deliveries. Construction timing, equipment, deliveries would be the same as described for alternative B.

Staging Areas. Staging areas would be the same as those described for alternative B.

Revegetation. Revegetation and restoration would be conducted as described for alternative B.

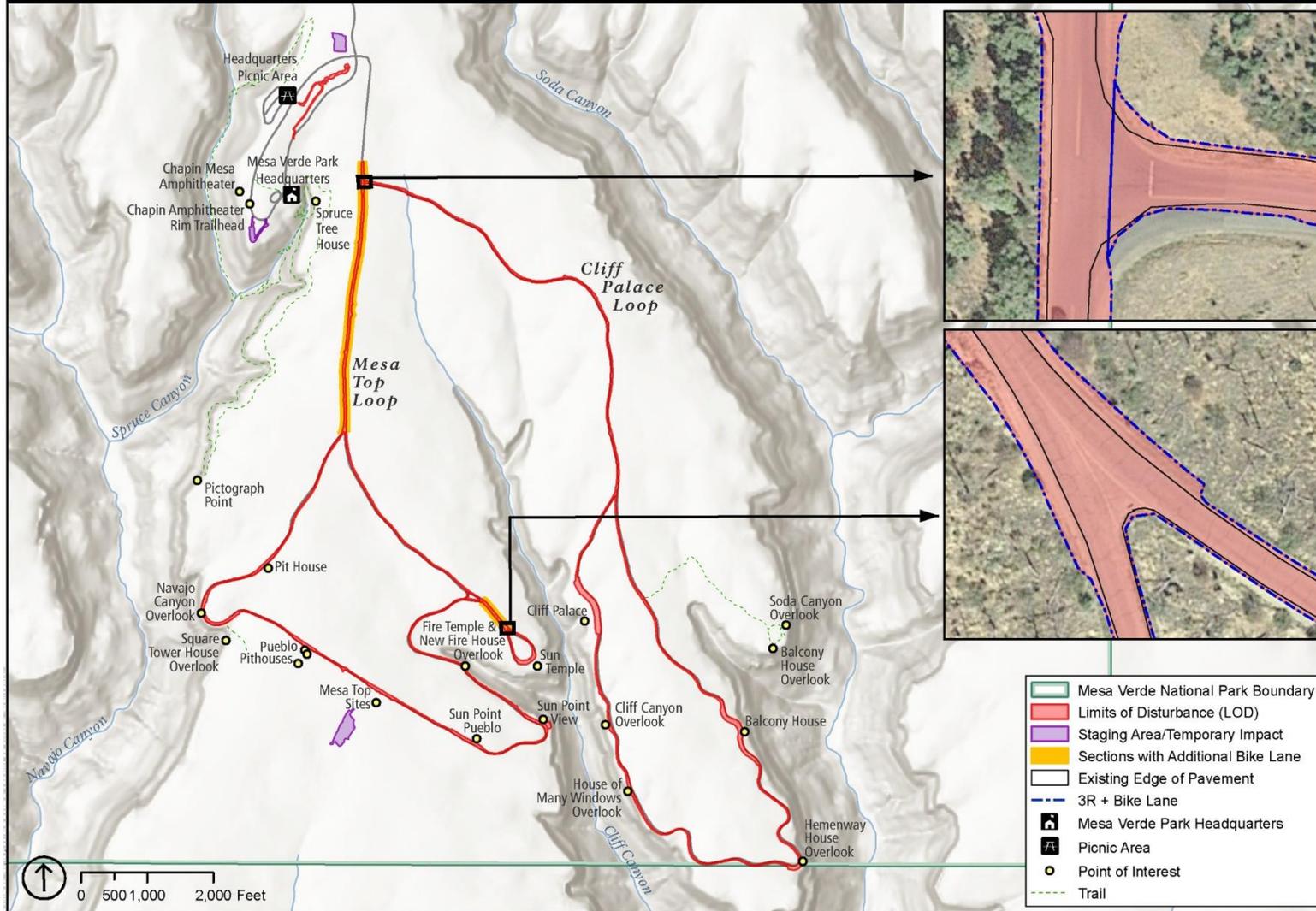


Figure 7. Alternative C – 3R Plus Bike Lane

RESOURCE PROTECTION MEASURES

To minimize impacts related to the action alternatives, the National Park Service would implement mitigation and avoidance measures. Mitigation and avoidance measures would include, but would not be limited to, the items listed below.

- Staging and stockpiling areas would be restored to pre-construction conditions following construction. Equipment and materials would be removed at the end of construction and the surface regraded, but these areas would remain unvegetated following their use for construction.
- To minimize the area of ground disturbance, construction area limits would be clearly defined, fenced, flagged, and delineated. No disturbance would occur beyond these limits other than protection measures for erosion/sediment control.
- Fugitive dust generated by construction activities would be controlled by spraying water from the park's domestic water supply on the construction site, as necessary.
- A soil and erosion control plan would be developed and implemented, as mandated in state permits for Colorado Department of Public Health and Environment. Erosion control measures such as sediment traps, erosion check structures, filters, and/or prevention of rutting soils when wet would be considered to minimize soil loss and impacts to water quality.
- A spill prevention and response plan would be prepared for the staging areas and construction zones to reduce risks to the environment of equipment fuel leaks or spills. Temporary berms would be constructed to contain fuel sites. The goal of the plan is to minimize the potential for a spill, contain any spillage to the smallest area possible, and to protect environmentally sensitive areas, including springs.
- No imported topsoil or hay bales would be used during revegetation to avoid introduction of non-native invasive plant species or inappropriate genetic stock of native plant species. Additionally, construction vehicles and equipment would be washed prior to use to remove possible non-native invasive plant seeds from the vehicle.
- Following revegetation, restored areas would be monitored and managed to prevent colonization by non-native invasive species. The treatment of non-native plant species for the park has been analyzed previously under a separate NEPA process in a programmatic categorical exclusion (3.3 E2) and controls common non-native species within the park, including musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), cutleaf vipergrass (*Scorzonera laciniata*), cheatgrass (*Bromus tectorum*), and smooth brome (*Bromus inermis*). In addition to the roadside areas disturbed from construction activities, larger areas adjacent to the project area would continue to be treated to reduce the potential for recruitment of non-native species in newly restored areas, especially in semi-desert grassland habitats where abundance of non-native species is high.
- The National Park Service would re-initiate Section 7 consultation with the USFWS immediately if Chapin Mesa milkvetch, a candidate species, becomes a proposed, threatened, or endangered species prior to or during project activities.
- As resources allow, the National Park Service would continue to collect additional data and perform research on Chapin Mesa milkvetch. As proposed by the Colorado Natural Heritage Society, the National Park Service would collect plants from within the limits of disturbance to conduct population studies, which would further scientific knowledge on this species.
- Vegetation removal would occur outside the migratory bird nesting season (March 1 through September 1) during the implementation of the Mesa Top Loop Roads Project. If construction activities cannot occur outside the bird nesting season, surveys would be conducted by a qualified

biologist prior to scheduled activity to determine if active nests are present within 164-foot (50 meters) of the construction area. Any nesting locations found during surveys would be barricaded (e.g., plastic fencing) to eliminate construction impacts on nests. Vegetation containing nests would not be removed until the nest is deemed inactive.

- The National Park Service would continue to survey for Mexican spotted owls, according to the USFWS Section 7 Mexican Spotted Owl Survey Protocol, each year during the implementation of the Mesa Top Loop Roads Project in areas affected by the project. If owls are detected, all work within 1,640 feet (500 meters) of an active nest would cease, and the National Park Service would immediately re-initiate Section 7 consultation with the USFWS. The National Park Service would also re-initiate consultation if new information reveals that the project may affect the Mexican spotted owl in a manner or to an extent not considered in the Biological Assessment prepared in January 2020.
- Construction workers and their supervisors would be informed about special-status species. Contract provisions would require the cessation of construction activities if newly identified species were encountered in the project area or if a special-status wildlife species is found within the project area; park staff would then re-evaluate the project activities. This would allow modification of the contract for any protection measures determined necessary to protect the discovery.
- During construction, park staff would monitor for the presence of solution rills. A solution rill is a natural depression in the sandstone found in the park. Solution rills are formed when acidic rain dissolves the calcium carbonate that holds sandstone together. The depressions deepen as small grooves develop along the paths that the water follows into the depressions. Eventually a flower pattern can result, as the ridges between the grooves grow upward from the deposition of minerals along them. Archeologists have speculated that these rills held a special importance for the Ancestral Puebloans. Solution rills would be avoided.
- The rock containing the trace fossil specimen along Mesa Top Loop Road would be removed during construction to avoid damage during construction and placed back in its original location to retain context for potential interpretation after construction is completed.
- If previously unknown archeological resources are discovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources are identified and documented and an appropriate mitigation strategy developed, if necessary, in accordance with pertinent laws and regulations, including the stipulations of the 2008 Programmatic Agreement Among the NPS (US Department of the Interior), the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.
- In the event that human remains are discovered during construction activities, all work on the project would stop and as required by law, the coroner would be notified first. An NPS Intermountain Region Archeologist would also be contacted immediately. All provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.
- The National Park Service is preparing a programmatic agreement in consultation with the Colorado SHPO. The programmatic agreement includes stipulations that serve as avoidance, minimization, and mitigation measures for potential adverse effects to historic properties (see Appendix A).
- The National Park Service would ensure that contractors and subcontractors are informed of the penalties for illegally collecting artifacts and biological or geological specimens, or intentionally damaging paleontological materials, archeological sites, historic properties, or natural resources outside the limited of disturbance. Contractors and subcontractors would also be instructed on

procedures to follow in case previously unknown paleontological or archeological resources are uncovered during construction.

- The National Park Service would post information at visitor centers and on the park website to inform visitors of when and where construction activities would occur. Visitors would also be restricted from construction areas for their safety.

ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED ANALYSIS

The following alternatives were considered for project implementation but were dismissed from further analysis for the reasons provided below. These included suggestions obtained from the public during civic engagement as well as from the project team.

- **Create a bike path that leaves the roadway in the two-way areas or create a separate bike lane:** Development of a separated bike path away from the road would be duplication with other action alternatives carried forward that would be less environmentally damaging and less expensive. The entire Mesa Top area is rich with natural and cultural resources and creating a new separate trail could result in potentially increased environmental effects that other alternatives avoid. Routing of a separate bike path may be able to avoid cultural resources but could have more impacts to natural resources. In addition, construction of a bike lane attached to an existing road system allows for fewer construction impacts through a smaller construction footprint, reduces costs by allowing construction to occur simultaneously, and uses similar construction techniques. Therefore, this alternative was dismissed.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

SCENARIO FOR CUMULATIVE IMPACT ANALYSIS

The Council on Environmental Quality (CEQ) regulations that implement the National Environmental Policy Act (NEPA) require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined 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 other actions” (40 Code of Federal Regulations [CFR] 1508.7).

Cumulative impacts are considered for the no-action alternative and the action alternatives, by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Table 1 shows the projects considered in the cumulative impact analysis.

Table 1. Cumulative Project List

Project	Project Description	Status
Spruce Tree House Arch Stabilization	The recommended primary treatments for the stabilization include rock bolting, scaling, rock stabilization, and altering drainage. To conduct the treatments, a heavy crane would be moved to the site on the access trail along the north and east sides of the arch. The trail would need to be widened (was also widened and improved in the past) and improved.	Past and future
Formalize Curbside Parking along Headquarters Loop	The curbside parking along Headquarters Loop would be formalized in the near future by painting striping for parking spaces. The need for additional overflow parking is related to the potential re-opening of Spruce Tree House and the potential bike lane, as dwell time would likely increase.	Future
Entrance Road Repair along Point Lookout	In the winter of 2018, there was a large rockfall at Point Lookout that damaged a retaining wall. Water infiltration is also creating large cracks. Actions would occur between mile marker 1 and 3.0 and include wall repairs, removing pavement, re-compacting the fill, repaving the road, and rock scaling on the slope.	Future
Paths to Mesa Verde Bike Path	Montezuma County plans to construct a bike path from Mancos to Cortez. It has not yet been decided how the county bike lane would tie into the park; however, the proposed path would likely enter the park from US Highway 160 and connect to the Visitor Center at the park entrance. Funding and timing of this project is unknown at this point.	Future
Mesa Top Comfort Station #167	The interior of the 1959 comfort station would be converted to a water cistern and a vault toilet would be installed adjacent to it. The comfort station was built on top of an archeological site, and the building itself is a contributing element to the historic district.	Future

Project	Project Description	Status
Headquarters Comfort Station #247	In 2018, the park constructed a comfort station adjacent to the park Headquarters Loop Road parking area to provide additional visitor restroom facilities.	Past
Wildland Fire Facility	A wildland fire facility would be constructed in the Civilian Conservation Corps area of Chapin Mesa, which is part of a historic district and cultural landscape.	Future
Fire Fuel Reduction	The park uses hazardous fuels reduction methods to reduce and remove natural vegetation to lessen the possibility of catastrophic fire. Activities include widening crown spacing by thinning tree densities, removing dead and downed trees, and pile burning.	Past and future

PIÑON-JUNIPER WOODLANDS AND DESERT GRASSLAND

Mesa Verde NP is located within a larger physiographic feature, the south sloping Mesa Verde cuesta (a ridge with a gentle slope on one side and a steep slope on the other) that covers 113,115 acres. The vegetation in this area is distinct within the arid southwest because of its relative abundance of water (up to 20 inches of annual precipitation), a long growing season, a diverse geological substrate, and subsequent soils and topographic variety. Baseline conditions in the project area were determined using park maps showing vegetation cover. The habitat adjacent to the park entrance intersection has been previously disturbed, and although it has been partially restored, this is an area of maintained landscape and does not contain high-quality habitat. For these reasons, the vegetation discussion focuses on the Chapin Mesa loop roads area.

Piñon-Juniper Woodlands. Piñon-juniper woodland vegetation is a dominant vegetation cover in Mesa Verde NP and in the project area, encompassing approximately 14,262 acres within the park. In the project area, piñon-juniper woodlands occur adjacent to all three loop roads, the roads at the VRC intersection, and within the infield. These woodlands occur primarily on gently sloping terrain evenly distributed throughout the lower elevation areas in the southern and northern reaches of the park, but they also occur on rocky canyon slopes. Piñon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominate the piñon-juniper type. The *Juniperus* species dominates lower elevation/xeric sites, and piñon pine dominates at higher elevation/mesic sites.

Piñon-juniper stands within the park can be classified into two major types: 1) piñon-juniper old growth woodlands, which are rare in the southwest; and 2) piñon-juniper shrublands that consist of sporadic piñon and juniper and a dense shrub layer dominated by serviceberry (*Amelanchier utahensis*), along with Gambel oak, and other shrubs (also referred to as mountain shrub/piñon-juniper ecotonal areas). The herbaceous layer, when present, can include muttongrass (*Poa fendleriana*), dwarf lousewort (*Pedicularis centranthera*), and sharpleaf twinpod (*Physaria acutifolia*). Over half of the park's piñon-juniper woodlands have been burned by stand-replacing wildfires since 1989. Recovery of pinon-juniper woodlands from these wildfires is expected to take centuries. In addition, recent droughts have caused high tree mortality rates (32% of pinon and 9% of juniper; Floyd-Hanna et al 2009) reducing the resiliency of the pinon-juniper community. Several species are dependent on pinon-juniper woodlands including the pinyon jay, a species of conservation concern experiencing significant long-term, range wide population declines (Somershoe et al. 2020). Chapin Mesa milkvetch (*Astragalus schmolliae*), a park sensitive species and a candidate for listing under the Endangered Species Act, has higher recruitment and reproductive vigor in intact, old-growth pinon-juniper woodlands at MVNP

(Rondeau 2019) thus piñon-juniper woodlands are important for the conservation of this species. Protecting the remaining live old growth piñon and juniper trees is a vegetation management priority for the park, as preserving this habitat type also protects other natural resources of value.

Semi-Desert Grassland. The grassland community, which occurs adjacent to all three loop roads in the project area, was previously a piñon-juniper community that is now degraded as a result of stand-replacing wildfires. These areas are now dominated by grasses due to the invasion of cheatgrass and the establishment of western wheatgrass (*Pascopyrum smithii*). The grassland community is in an early seral stage with a trajectory that is expected to succeed into piñon-juniper woodland. Due to degradation from non-native, invasive plants, recovery to the expected piñon-juniper woodlands is uncertain and may take a century to reach this seral stage. Shrub species common in post-burn grassland communities include antelope bitterbrush (*Purshia tridentata*) and rubber rabbitbrush (*Ericameria nauseosa*). Non-native species, including musk thistle, Canada thistle, and cheatgrass are of vegetation management concern in the recently burned piñon-juniper woodland cover types. These and other weed species tend to flourish immediately after fires, but some may decline in density years after recovery through successional competition. Semi-desert grassland habitat encompasses approximately 7,053 acres in the park.

Roads act as dispersal corridors for non-native species (Fowler et al. 2008). Vehicles, pedestrians, and maintenance equipment transport seeds of non-native species long distances, and dispersal can be facilitated by road features, such as culverts (Mortensen et al. 2009). Non-native plants are currently present within the habitats adjacent to the loop roads. For example, the semi-desert grassland habitat within the project area is the result of a series of wildfires over the past several decades, and this habitat is dominated by herbaceous weedy species. Park staff treat for non-native plant species in accordance with the park's approved non-native plant management procedures, which continues to reduce competition by controlling target weeds and reducing non-native seed sources. Treatments for certain non-native species are not always effective or feasible to conduct, thus, some non-native species continue to compete with and displace native plants, altering the community composition and dynamics. Within the Chapin Mesa roads loop area, cheatgrass and smooth brome negatively dominate disturbed areas and alter community composition and dynamics; however, control of musk and Canada thistle has been more successful, resulting in less competition and displacement from these species in disturbed areas.

The vegetation adjacent to Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads has been trampled by vehicles leaving the paved roadway, resulting in bare soils along the roadway. Visitors also travel off designated trails or walk beyond the asphalt of overlooks creating areas where vegetation is trampled and then may die. Operation and maintenance activities, such as snow plowing, mowing, and fuel reduction, also continue to result in vegetation disturbance, as these actions can lead to trampling of plants and deposition of pollutants from vehicle emissions and fluids within vegetation habitats.

Piñon-Juniper Woodlands and Semi-Desert Grassland Habitat Impacts Assessment

Impacts of Alternative A: No-Action Alternative

Under alternative A, the current roads, parking lots, trails, sidewalks, and overlooks would remain unchanged and visitor and park activities would remain the same as current conditions. Therefore, while existing impacts on piñon-juniper woodlands and semi-desert grassland habitat would continue, there would be no new impacts to these vegetation communities within the project area.

Cumulative Impacts. There would be no new direct or indirect impacts; therefore, there would be no cumulative impacts on piñon-juniper woodlands and semi-desert grassland habitat.

Conclusion. Alternative A would not contribute to direct, indirect or cumulative impacts on piñon-juniper woodlands and semi-desert grassland habitat.

Impacts of Alternative B: 3R Only Alternative

Table 2. Area of Vegetation Cover Types Impacted by the Mesa Top Loop Roads Project

Habitat	Alternative B Direct Impacts (acres)	Alternative C Direct Impacts (acres)
Piñon-Juniper Woodlands	6.7	7.4
Semi-Desert Grassland	1.2	1.4
Total	7.9	8.8

Alternative B would disturb a total of 7.9 acres of piñon-juniper woodlands and semi-desert grassland habitat outside of the existing road prism. Within the 7.9 acres, piñon-juniper woodlands and semi-desert grassland would be removed to complete construction activities. The entire 7.9 acres would be revegetated following construction, but removal of established piñon-juniper vegetation and revegetating with native species would represent a change in vegetation structure, as described below.

Specifically, alternative B would remove approximately 6.7 acres of piñon-juniper woodlands habitat composed of 4.7 acres of old growth piñon-juniper woodlands and 2 acres of pinon-juniper shrublands. Though this area would be revegetated with native piñon-juniper woodland plants, it could take hundreds of years for the revegetated area to succeed to the intact old growth piñon-juniper habitat that was removed. Although piñon-juniper woodlands habitat in general is one of the more abundant habitats in the park, representing approximately 27% of the habitat within park, there is little remaining intact old growth piñon-juniper woodland, as a large portion has been lost to wildfire. Alternative B would result in a reduction in acreage of intact piñon-juniper woodlands habitat; approximately 0.12% of the old growth piñon-juniper woodlands and 0.02% of the pinon-juniper shrublands. This would not represent a population-level impact to piñon-juniper woodlands.

Alternative B would also remove approximately 1.2 acres of semi-desert grassland habitat; this habitat grows in areas where piñon-juniper woodlands have been burned in stand-replacing wildfires. This 1.2-acre area would be revegetated with native pinon-juniper woodland plants to help aid the recovery of the semi-desert grassland seral stage to the climax piñon-juniper woodland community. The loss of this habitat under alternative B would represent approximately 0.02% of the available semi-desert grassland habitat within the park.

Indirect impacts, such as competition with native species and related alteration of community processes and dynamics, would continue to occur from the spread of non-native species despite treatment efforts for these species. The establishment of non-native species in disturbed areas would result in adverse impacts on native vegetation communities. However, the treatment for non-native species would reduce competition with native species by reducing the amount of non-native plants and seed sources and, therefore, it's anticipated that the efforts to revegetate areas disturbed by construction with native species, as described above, would be successful.

Cumulative Impacts. Past and pending projects presented in Table 1 that would have an effect on piñon-juniper woodland and semi-desert grassland habitat are those that require removal of or disturbance on this vegetation—construction of Headquarters Comfort Station #247, conversion of the Mesa Top Comfort Station #167 into a water cistern and construction of vault toilets, the Spruce Tree House arch stabilization, the entrance road repair along Point Lookout, the Paths to Mesa Verde Bike Path project, construction of the wildland fire facility, and fire fuels reduction. The new comfort station constructed at the Headquarters Loop in 2018 resulted in a permanent loss of approximately 0.1 acre of piñon-juniper habitat. The conversion of the Mesa Top Comfort Station #167 could result in the permanent loss of approximately 0.15 acre of piñon-juniper habitat. Similarly, the proposed construction of a wildland fire facility could result in a permanent loss (1 to 1.5 acres) of semi-desert grassland habitat. The Spruce Tree House arch stabilization would require the use of large equipment requiring the widening of the existing trail that would be used for construction access, resulting in the permanent loss of up to 0.25 acre of old growth piñon-juniper woodlands habitat. The Paths to Mesa Verde Bike Path would require permanent loss of vegetation as well, although the path would likely connect US Highway 160 to the VRC and habitat in this area has been previously disturbed and is of lower quality. The entrance road repair near Point Lookout would involve a variety of construction work that could result in direct impacts to approximately 7.6 acres of vegetation removal, including piñon-juniper woodland (2.6 acres), semi-desert grassland (0.04 acre), Gambel oak shrubland (2.7 acres), and Mancos shale vegetation (2.2 acres). The impacts from vegetation loss from these construction projects would be long-term, lasting as long as the infrastructure is in existence, and adverse.

All construction activities would implement best management practices to reduce the amount of vegetation removed, restore the habitat to the extent possible following construction, and monitor and manage for non-native species. Fire fuels reduction methods would have adverse impacts on piñon-juniper habitat from cutting and hauling fuel and burning slash piles and from the potential spread of non-native plants. However, this management method would also have the beneficial effect of reducing the potential for wildfire, which can adversely affect vegetation communities, especially piñon-juniper woodlands. These beneficial impacts would be long-term, working to reduce the severity of wildfires and protecting natural habitats. Collectively, these actions have had and would continue to have both long-term adverse and beneficial cumulative impacts on vegetation. The past and reasonably foreseeable future projects, in combination with the impacts of alternative B, would result in continued adverse and beneficial impacts on piñon-juniper woodlands and semi-desert grassland. Overall, the incremental impacts of alternative B would not make a substantial contribution to the impacts on vegetation that are already occurring.

Conclusion. Alternative B would result in the loss of 6.7 acres of piñon-juniper woodland habitat and, though this acreage would be revegetated, it would require several hundred years for 4.7 acres to succeed to the old growth piñon-juniper habitat that was removed and decades for the 2 acres of pinon-juniper shrubland to recover. Alternative B would result in the loss of 1.2 acres of semi-desert grassland habitat and, though this acreage would be revegetated, it would take several years to succeed to the semi-desert grassland that was removed. However, the overall impacts on these vegetation communities of Mesa Verde NP would be small when considering the amount of area that would be affected when compared to the amount of each community present in the park (0.12% of old growth piñon-juniper woodland, 0.02% of piñon-juniper shrubland, and 0.02% of semi-desert grassland). Alternative B would not affect the stability of piñon-juniper woodlands or semi-desert grasslands within the park or have population-level impacts to these affected vegetation communities.

Impacts of Alternative C: 3R Plus Bike Lane Alternative

Alternative C would have the same impacts on piñon-juniper woodland and semi-desert grassland habitat as alternative B, except alternative C would have additional impacts from widening the two-way portions of Mesa Top Loop and Sun Temple Loop roads to form bike lanes. Alternative C would directly impact 7.4 acres of piñon-juniper woodland habitat (5.4 acres or 0.13% of old growth piñon juniper woodland and 2 acres or 0.02% of piñon-juniper shrubland) and 1.4 acres of semi-desert grassland habitat, for a total of 8.8 acres of impacts. The duration of these impacts would be the same as described under alternative C.

Cumulative Impacts. As discussed under alternative B, those past and future projects that would have an effect on piñon-juniper woodland and semi-desert grassland habitat are those that require removal of and disturbance on this vegetation as listed and described under alternative B above. Collectively, actions from these projects have had and would continue to have both adverse and beneficial cumulative impacts on vegetation. The past and reasonably foreseeable future projects, in combination with the impacts of alternative C, would result in continued adverse and beneficial impacts on piñon-juniper woodlands and semi-desert grassland. Overall, the incremental impacts of alternative C would not make a substantial contribution to the impacts on vegetation that are already occurring.

Conclusion. Alternative C would have the same types of impacts on piñon-juniper woodland habitat and semi-desert grassland as alternative B, with a slight increase in habitat loss due to the addition of a bike lane on the two-way portions of Mesa Top Loop and Sun Temple Loop roads. Alternative C would affect approximately 8.8 acres including 5.4 acres of old growth piñon-juniper woodland and 2 acres of piñon-juniper shrubland habitat, and 1.4 acres of semi-desert grassland habitat (representing 0.13%, 0.02%, and 0.02% of the available habitat within the park, respectively). As with alternative B, the impacts from alternative C would not result in population-level effects for either of the affected habitat types in the project area, and the impacts would affect a small portion of each habitat compared to the extent of the habitats available in the park. Alternative C would not affect the stability of piñon-juniper woodlands or semi-desert grasslands within the park.

CHAPIN MESA MILKVETCH AND CLIFF PALACE MILKVETCH

Chapin Mesa Milkvetch. Chapin Mesa milkvetch (*Astragalus schmolliae*) is a flowering herb, endemic to a small part of the Mesa Verde cuesta of southwest Colorado at elevations of 6,500 to 7,500 feet. The range of Chapin Mesa milkvetch, which is suspected to be about 4,000 acres mostly on Chapin Mesa, with about half of its habitat (2,012 acres) within Mesa Verde NP and the other half within Ute Mountain Ute Tribal Park (USFWS 2016). Chapin Mesa milkvetch is also found on Chapin Mesa Spur and Park Mesa, but these populations are small and peripheral, comprising just under 60 acres. Chapin Mesa milkvetch is a candidate for listing under the ESA.

Chapin Mesa milkvetch grows to approximately 12- to 24-inches tall with compound leaves and creamy white flowers (Figure 8). The plant develops a deep taproot that grows 16 inches or more (USFWS 2016). Chapin Mesa milkvetch preferred habitat is the partially shaded understory of intact old-growth piñon-juniper woodland canopy with deep, loess soils on Chapin Mesa (Rondeau et al. 2016). Associated groundcover and shrub species in intact piñon-juniper woodland is very sparse, but the associated species are important for attracting pollinators. Recently burned piñon-juniper woodlands created open habitat conditions consisting of full sun with no tree canopy and a high density of competitive groundcover species, mostly grasses, many of which are non-native species. Non-native grasses, especially cheatgrass, dominate the burned area.

Chapin Mesa milkvetch is a long-lived perennial that emerges in late March from a winter dormancy period. Plants may not sprout every year; rainfall and available moisture are suspected to play a role in

emergence. Winter precipitation is the best indicator of plant emergence density (Rondeau 2017). Plants start blooming mid- to late-April and continue through early-June. Chapin Mesa milkvetch is reliant on cross-pollination fertilization to produce viable seed. Primary pollinators are many species of bees, although lepidopterans have also been observed on flowers of Chapin Mesa milkvetch. Seeds are ripe with pods drying and opening by late June. Leaf and stem senescence start in late summer or early fall. Seedling survival is significantly higher in intact, unburned areas than in burned areas (Rondeau et al. 2016). Seedling emergence coincides with spring rains beginning in May through June (Rondeau et al. 2016), which does not occur every year. The life span of the species is unknown, but plants may be at least 5 to 10 years old before plants begin to reproduce. Large multi-stemmed individuals may be at least a couple decades old.

Intact piñon-juniper woodlands provide higher quality habitat for Chapin Mesa milkvetch than recently burned areas. The canopy cover of the intact woodlands moderates soil temperatures and retains snow cover, two important aspects for the success of Chapin Mesa milkvetch (MVNP 2018). Further, burned areas are susceptible to colonization by non-native plant species, such as cheatgrass, that compete with Chapin Mesa milkvetch and reduces native plant seedling establishment and plant vigor (MVNP 2018). Chapin Mesa milkvetch is stable within the intact piñon-juniper woodland habitat in Mesa Verde NP, but this species is declining within the recently burned habitat in the park (Rondeau 2019), indicating that the effects of a warming climate and recent wildfires are driving the population dynamics of the species.

Of the 2,012 acres of occupied Chapin Mesa milkvetch habitat at Mesa Verde NP, 762 acres (37.8%) have been recently burned and converted to weedy grasslands. Although initially responding positively to recent burned conditions, the population has shown a decrease over the long-term in burned areas when compared to unburned areas where the piñon-juniper habitat is more stable. A 2019 repeat survey of 197 transects found a significant difference in density of Chapin Mesa milkvetch, with higher density in intact piñon-juniper habitat than in recently burned areas (Rondeau 2019). The stability of the remaining intact piñon-juniper woodlands and winter snowfall, both important components of Chapin Mesa milkvetch habitat, are vulnerable to the impacts from climate change and wildfires (Monahan and Fisichelli 2014, IPPC 2014).

Although Chapin Mesa milkvetch seed can be induced to germinate in a controlled environment with light scarification (Rondeau, personal communication), the success of restoring this plant to disturbed soils in natural conditions is unknown. Revegetation may be successful in establishing a suite of native plants typically found in its habitat that may attract pollinators or compete with non-native invasive plants.

Current park maintenance and visitor activities affect Chapin Mesa milkvetch within the project area through trampling, spread of invasive species, deposition of dust, impervious surface runoff and erosion, vehicle exhaust, creation of heat islands, and earlier snowmelt. These effects can negatively affect these species over a longer period of time by affecting growth, making plants more susceptible to environmental stress, and altering the amount of available water, pollination and seed dispersal.



**Figure 8. Chapin Mesa Milkvetch
(*Astragalus schmolliae*)**



**Figure 9. Cliff Palace Milkvetch
(*Astragalus deterior*)**

Cliff Palace Milkvetch. Cliff Palace milkvetch (*Astragalus deterior*) is a park sensitive species that is listed as a globally and state imperiled plant species by the Colorado Natural Heritage Program (CNHP 1997). Cliff Palace milkvetch is an endemic species found on the Mesa Verde cuesta within Mesa Verde NP and Ute Mountain Ute tribal lands.

Cliff Palace milkvetch is a low-growing perennial herb, typically just 0.2 to 1.2-inches tall (Figure 9). The cream-colored flowers with purple markings bud in May and the fruits mature and open in June. Cliff Palace milkvetch is found exclusively on poorly developed, young, loose, sandy soils produced from erosion activities of wind or from run-off filling cracks with loose sandy soils (Moore 2008). This species grows in sand-filled depressions of flat rimrocks, on cliffs, and on adjacent sandy talus habitats. It can also be found on edges of mesas and in cracks and depressions in shallow soil in the piñon-juniper zone (NatureServe 2019). The seed bank is important for Cliff Palace milkvetch as recruitment is dependent on spring moisture and the species is short-lived (Moore 2008). Most plants survive less than one year, but older plants contribute the most to reproductive effort and the seed bank (Moore 2008). Seedlings are especially vulnerable to mortality in burned areas; Cliff Palace milkvetch is not a good competitor and does not fare well following fires when competition can be high (Moore 2008).

Mesa Verde NP conducts periodic surveys for Cliff Palace milkvetch and has mapped eight occurrences covering 265 acres of occupied habitat throughout the park; however, additional occurrences are likely, as not all suitable habitat within the park has been completely surveyed. The full population of the species within the park is unknown. Plants are affected by visitor trampling (NatureServe 2019), winter droughts, fires (Moore 2008), and warming temperatures. Within the project area, Cliff Palace milkvetch are affected by the same park and visitor activities as described for Chapin Mesa milkvetch.

Chapin Mesa Milkvetch and Cliff Palace Milkvetch Impacts Assessment

Impacts are analyzed for the life of the road, which is estimated to be 20 years. Habitat for Chapin Mesa milkvetch and Cliff Palace milkvetch is not present at the park entrance; therefore, the improvement of the current VRC intersection would not have an impact on special-status plant species and is not discussed in this analysis.

Impacts of Alternative A: No-Action Alternative

Under alternative A, visitor and park activities would remain the same as current conditions, existing impacts on of Chapin Mesa milkvetch and Cliff Palace milkvetch plants would continue. No new impacts on Chapin Mesa milkvetch or Cliff Palace milkvetch would occur and milkvetch communities within the park would remain unchanged.

Cumulative Impacts. Under alternative A, there would be no direct or indirect impacts; therefore, there would be no cumulative impacts on Chapin Mesa milkvetch or Cliff Palace milkvetch.

Conclusion. Alternative A would not contribute to direct, indirect or cumulative impacts on Chapin Mesa milkvetch and Cliff Palace milkvetch.

Impacts of Alternative B: 3R Only Alternative

Chapin Mesa Milkvetch. Chapin Mesa milkvetch habitat within the park is estimated to be 2,012 acres. Construction activities under alternative B would impact approximately 7.9 acres or 0.39% of the park’s Chapin Mesa milkvetch habitat. Table 3 presents the amount of Chapin Mesa milkvetch habitat that would be affected by alternative B.

Table 3. Area of Chapin Mesa Milkvetch Habitat Impacted by the Mesa Top Loop Roads Project

Impacts	Alternative B	Alternative C
Total Direct Impacts	7.9 acres 0.39% of total habitat	8.8 acres 0.44% of total habitat
Direct Impacts Intact Habitat	6.7 acres 0.33% of total habitat	7.4 acres 0.37% of total habitat
Direct Impacts Burned Habitat	1.2 acres 0.06% of total habitat	1.4 acres 0.07% of total habitat

Within the 7.9 acres, construction activities would result in plant mortality from vegetation removal, and defoliation and tissue loss from trampling. Vegetation removal and habitat loss would result in permanent adverse impacts on Chapin Mesa milkvetch. Some individual plants would also be temporarily affected by defoliation and tissue loss, but it is anticipated these plants would recover within a year. Chapin Mesa milkvetch is a long-lived perennial and plants outside of the direct zone of disturbance would be expected to survive and to emerge the following spring under the proper environmental conditions.

Disturbed areas would be revegetated with Chapin Mesa milkvetch following construction; however, the restoration of the species in an uncontrolled environment is unknown and due to construction-related soil compaction, soil productivity and, hence, plant vigor would be reduced in these disturbed areas. Similarly, though park staff would treat the revegetated areas and adjacent areas for non-native species, herbaceous weed species would still compete with Chapin Mesa milkvetch, resulting in reduced reproductive effort and seedling recruitment (Rondeau 2019), and lower plant vigor. For these reasons,

revegetation may only provide slight beneficial impacts for Chapin Mesa milkvetch and the Chapin Mesa milkvetch might not recover within the 7.9-acre area of impact.

During revegetation efforts, the park would also restore 2.1 acres of previously disturbed Chapin Mesa milkvetch habitat. This restoration effort would increase the amount of habitat supporting Chapin Mesa milkvetch by 2.1 acres. While the restoration of the species in previously disturbed areas is unknown, it is anticipated that the number of Chapin Mesa milkvetch plants would increase in the restored areas to help contribute to the population and better connect existing patches of Chapin Mesa milkvetch. Non-native species would likely become established within the restored areas; however, with treatment for non-native species and recruitment from surrounding plants in key areas of Chapin Mesa milkvetch habitat, this restoration would result in permanent beneficial impacts for Chapin Mesa milkvetch.

Existing indirect impacts on milkvetch habitats would continue under alternative B, including impervious surface runoff, erosion, effects from heat islands, and pollution from visitor and park vehicles.

Cliff Palace Milkvetch. The known Cliff Palace milkvetch habitat within the park is currently estimated to be 265 acres. The impacts from alternative B would be similar to those described for Chapin Mesa milkvetch in terms of plant mortality from vegetation removal and defoliation and tissue loss from trampling, though these impacts would occur within 2.6 acres of Cliff Palace milkvetch habitat. This represents approximately 1.0% of the known habitat within the park.

Trampling and erosion effects from construction activities, as well as visitor activities, affect the Cliff Palace milkvetch differently than Chapin Mesa milkvetch due to their ecology and life history. This species would be more susceptible to effects from trampling and erosion due to the soils in which and location where they grow. In addition, impacts from non-native species on Cliff Palace milkvetch would be detrimental, as this species is not a good competitor. Following construction, disturbed areas would be revegetated, and Cliff Palace milkvetch plants would be reintroduced in appropriate habitat from seeds that were collected and propagated prior to disturbance. Although park staff would continue to treat roadside areas for non-native species, Cliff Palace milkvetch is not a good competitor and may not fare well in areas of higher competition. For these reasons, revegetation may only provide slight beneficial impacts for Cliff Palace milkvetch and the Cliff Palace milkvetch might not recover within the 2.6-acre area of impact.

Existing indirect impacts, such as impervious surface runoff, erosion, effects from heat islands, pollution from visitor and park vehicles, and fragmentation would continue to occur.

Cumulative Impacts. Past and pending projects presented in Table 1 that would have an effect on these special-status species are those that require removal of Chapin Mesa milkvetch or Cliff Palace milkvetch or disturbance of these species' habitat—the new comfort station constructed at the Headquarters Loop in 2018 resulted in disturbance and mortality of individual Chapin Mesa milkvetch plants and a permanent habitat loss of approximately 0.1 acre. The conversion of the Mesa Top Comfort Station #167 could result in disturbance and mortality of individual Chapin Mesa milkvetch plants and the permanent loss of approximately 0.15 acres of habitat. The Spruce Tree House arch stabilization would require the use of large equipment and therefore the trail would need to be widened, resulting in the loss of up to 0.25 acres habitat and disturbance to Chapin Mesa milkvetch plants. The construction of the wildland fire facility could result in disturbance and mortality of individual Chapin Mesa milkvetch plants and the permanent loss of 1.0 to 1.5 acres of semi-desert grasslands habitat. The impacts from habitat and plant loss from these projects would be long-term, lasting as long as the comfort station and widened trail are in existence. Fire fuels reduction methods within special-status species habitat would have adverse impacts on individual plants from cutting and hauling fuel, burning slash piles, and from the potential spread of non-native plants. However, this management method would have the beneficial effect of reducing the

potential for wildfire, which can adversely affect both Chapin Mesa milkvetch and Cliff Palace milkvetch. These beneficial impacts would be long-term, working to reduce the severity of wildfires and protecting natural habitats. The past and reasonably foreseeable future projects, in combination with the impacts of alternative B, would result in permanent adverse impacts on these special-status plant species from construction and fire fuels reduction activities; however, fire fuels reduction would also prevent potentially devastating wildfires. Overall, the incremental impacts of alternative B would not make a substantial contribution to the impacts on Chapin Mesa milkvetch or Cliff Palace milkvetch that are already occurring.

Conclusion. Actions under alternative B would result in impacts on the special-status plant species Chapin Mesa milkvetch and Cliff Palace milkvetch from loss of plants and habitat, damage to plants, soil compaction, and competition from non-native species. Approximately 7.9 acres of Chapin Mesa milkvetch habitat and 2.6 acres of Cliff Palace milkvetch habitat would be directly affected, representing approximately 0.4% and 1.0%, respectively, of these species' known populations within the park. Mitigation measures would limit the area impacted and control erosion. Following construction, disturbed areas would be revegetated with native species, including these two species of milkvetch, and the newly vegetated and adjacent areas would be treated to control for non-native plant species; this revegetation effort may not benefit either Chapin Mesa milkvetch or Cliff Palace milkvetch within the 7.9-acre and 2.6-acre areas of impact respectively. Impacts on the park's Chapin Mesa milkvetch habitat would be further mitigated by the restoration of 2.1 acres of previously developed areas within key Chapin Mesa milkvetch habitat. Even though alternative B would result in adverse impacts on milkvetch, it would not represent population-level impacts on or affect the stability of either species within the park.

Section 7 Endangered Species Act (ESA). Pursuant to section 7 of the ESA, the National Park Service concludes that alternative B *may affect, likely to adversely affect* the Chapin Mesa milkvetch due to adverse impacts from improvement activities associated with Mesa Top Loop, Sun Temple Loop, and Cliff Palace Loop roads.

Impacts of Alternative C: 3R Plus Bike Lane Alternative

Alternative C would widen approximately 0.8 mile of Mesa Top Loop Road and 0.1 mile of Sun Temple Loop Road to accommodate bike lanes on both sides of the two-way traffic portion of the roads. Alternative C would not have any additional impacts on Cliff Palace milkvetch, as this species has not been documented in the portions of the project area where the bike lanes are proposed. Therefore, the impacts on Cliff Palace milkvetch would be the same as those described for alternative B.

The widening of Mesa Top Loop and Sun Temple Loop roads would represent an additional 0.9 acre of direct impacts (Table 3) for a total of 8.8 acres, representing approximately 0.44% of the Chapin Mesa milkvetch habitat within the park. The types of direct and indirect impacts would be the same as described under alternative B, including loss of plants and habitat resulting in permanent impacts and damage to individual plants resulting in temporary impacts. Ongoing indirect impacts from construction, including reduced soil productivity and competition from non-native species as described for alternative B, would adversely affect Chapin Mesa milkvetch.

Similar to alternative B, alternative C would restore 2.1 acres of key Chapin Mesa milkvetch habitat within the park, increasing the amount of habitat supporting Chapin Mesa milkvetch and the number of Chapin Mesa milkvetch plants in the restored areas to help contribute to the population.

Cumulative Impacts. Past and future projects that would require removal of Chapin Mesa milkvetch or Cliff Palace milkvetch, and disturbance of these species' habitat were discussed under alternative B. The past and reasonably foreseeable future projects, in combination with the impacts of alternative C, would

result in permanent adverse impacts on these special-status plant species from construction and fire fuels reduction activities; however, fire fuels reduction would also prevent devastating wildfires. Overall, the incremental impacts of Alternative C would not make a substantial contribution to the impacts on Chapin Mesa milkvetch or Cliff Palace milkvetch that are already occurring.

Conclusion. Alternative C would have the same impacts on Chapin Mesa and Cliff Palace milkvetch as alternative B. However, alternative C would impact a larger area of Chapin Mesa milkvetch habitat (8.8 acres of direct impacts) due to widening of the two-way portions of Mesa Top Loop and Sun Temple Loop roads for the addition of bike lanes. However, mitigation measures would reduce the overall impacts by limiting the area impacted, controlling erosion, and restoring 2.1 acres of previously disturbed areas within key Chapin Mesa milkvetch habitat. Alternative C would not result in population-level impacts on Chapin Mesa milkvetch or Cliff Palace milkvetch or affect the stability of either species within the park.

Section 7 ESA. Pursuant to section 7 of the ESA, the National Park Service concludes that alternative C *may affect, likely to adversely affect* the Chapin Mesa milkvetch due to adverse impacts from improvement activities associated with Mesa Top Loop, Sun Temple Loop, and Cliff Palace Loop roads and the addition of bike lanes along Mesa Top Loop and Sun Temple Loop roads.

ARCHEOLOGICAL RESOURCES

Congress established Mesa Verde National Park in 1906 with the stated purpose to “provide specifically for the preservation from injury or spoliation of the ruins and other works and relics of prehistoric or primitive man within said park.” These same resources were the basis for listing Mesa Verde National Park on the National Register of Historic Places in 1966. In 1978, the worldwide value of the park’s archeological resources was further recognized when the park was selected as one of the seven original United Nations World Heritage Sites.

The prehistoric sites consist of mounds of fallen rubble and earth from small and large villages, soil and water control devices, work areas, rock alignments of uncertain function, scatters of pottery sherds and lithic fragments, campsites, and cliff dwellings. It is estimated that Mesa Verde National Park has over 4,700 archaeological sites. The archeological sites contribute to the significance of this NRHP property and World Heritage Site because they expand our understanding of chronology, settlement patterns, and prehistoric use of the landscape in the vicinity of these important cliff dwellings of the Ancestral Pueblo people. Individually they are each eligible for nomination to the NRHP under Criterion D, Information Potential (NPS 2019d). The archeological sites along the Mesa Top Loop, Sun Temple Loop, and Cliff Palace Loop roads are important contributing properties to the Mesa Verde National Park Archeological District (5MV4341), for their role in developing an understanding of the cultural sequence of the Ancestral Pueblo people, and as “a landmark of cultural preservation in the United States” (Wyatt 1976).

Mesa Verde NP archeologists conducted a survey of the Mesa Top Loop and Sun Temple Loops road corridors between July 17 and September 19, 2017 for the Mesa Top Loop Road project. The total survey area covered 106 acres. A proposed bike lane along the spur road to Sun Temple was added to the project in 2018, which added 11 acres to the previously surveyed area. This additional area was surveyed and documented between August 29 and 31, 2018. A total of eight prehistoric sites would be impacted by the project.

Mesa Verde NP archeologists conducted an archeological survey along Cliff Palace Loop Road between May 31, 2018 and September 6, 2018 to assess cultural resources that might be impacted by resurfacing the road. The survey area covered 114 acres. Four prehistoric sites would be directly or indirectly affected by the project.

The original construction of roads resulted in disturbance to a total of 0.55 acre within the same 12 archeological sites on Mesa Top, Sun Temple and Cliff Palace Loop roads. These archeological sites were bisected or impacted by initial road construction and previous improvements, which destroyed portions of these archeological sites.

No archeological resources have been identified within the VRC intersection or the Headquarters Loop Road infield project areas (NPS 2019c).

Archeological Resources Impacts Assessment

Impacts of Alternative A: No-Action Alternative

Under alternative A, the current roads at the park would remain unchanged and operations and maintenance activities would continue. There would be no new impacts on archeological resources.

Cumulative Impacts. Under alternative A, there would be no direct or indirect impacts; therefore, there would be no cumulative impacts on archeological resources.

Conclusion. Alternative A would not contribute to direct, indirect or cumulative impacts on archeological resources.

Impacts of Alternative B: 3R Only Alternative

Implementation of alternative B would result in an additional 0.27 acres of disturbance to the 12 previously disturbed archeological prehistoric sites within the Mesa Top Loop, Sun Temple Loop, and Cliff Palace Loop road corridors. Within the 0.27-acre area of disturbance, construction activities, could subject the 12 sites to additional subsurface and surficial damage, including physical destruction, displacement from their context, or exposure from erosion of features and artifacts comprising the sites. However, under an approved Archeological Testing Plan (MVNP 2019), all of the 12 potentially affected archeological sites were tested and limited data recovery was done to minimize the loss of information potential contained within the sites. Three sites have been identified for additional testing and data recovery due to findings of the initial testing. Further, archeological monitoring during construction and data recovery for inadvertent discoveries would be conducted to ensure additional artifacts and information/data are not inadvertently lost.

Cumulative Impacts. The past and pending projects presented in Table 1 that could have an effect on archeological resources include those that would require ground disturbance, and, therefore, potentially impact archeological resources. Only the conversion of Mesa Top Loop Comfort Station #167 into a water cistern and the construction of vault toilets, and fire fuel reduction project are within the geographic analysis area for the project. Surface disturbance from conversion of the Comfort Station into a water cistern and fire fuels reduction would potentially result in direct impacts on archeological sites, if present, by damaging, destroying, or displacing artifacts and features; by removing artifacts from their context; or by causing new or additional erosion. The Comfort Station was constructed on top of a portion of an archeological site. Construction equipment and excavation needed for the conversion could crush subsurface artifacts and displace surface artifacts and features. There are archeological sites along Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads and roadside fuel reduction activities could impact these sites by dragging branches and logs across them, possibly displacing surface artifacts and features. Collectively, these actions have had, and could continue to have, long-term (permanent loss) and short-term (project duration) adverse cumulative impacts on archeological resources. These past and reasonably foreseeable future projects, in combination with the impacts of alternative B, would result in permanent adverse impacts on archeological sites; however, fire fuels reduction would also prevent

potentially devastating wildfires. Overall, the incremental impacts of alternative B would not make a substantial contribution to the impacts on archeological resources.

Conclusion. Implementation of alternative B would result in an additional 0.27 acres of disturbance to the 12 previously disturbed archeological prehistoric sites within the project limits of disturbance on the Mesa Top, Sun Temple, and Cliff Palace Loops. However, though alternative B could diminish the data potential of the 12 sites, data collection through testing and mitigation would ensure that the individual sites would continue to be eligible for nomination to the NRHP under Criterion D, Information Potential (NPS 2019d), and would continue to serve as important contributing properties to the Mesa Verde National Park Archeological District (5MV4341).

Impacts of Alternative C: 3R Plus Bike Lane Alternative

Implementation of alternative C would result in the same adverse impacts to the 12 previously disturbed archeological sites as described under alternative B for Cliff Palace, Mesa Top, and Sun Temple Loop Roads, but with additional impacts to eight of the sites along Mesa Top Loop and Sun Temple Loop roads from widening approximately 0.9 miles of these roads to accommodate a bike lane. Because of the bike lane, alternative C would result in an addition of approximately 0.09 acre of increased ground disturbance compared to alternative B, for a total of 0.36 additional acres of ground disturbance.

Cumulative Impacts. The cumulative impacts on archeological sites would be similar to those described under alternative B; however, alternative C would contribute a slightly greater, direct, impacts to the overall cumulative impacts of past and pending projects due to the slightly larger area (an additional 0.09 acre) of ground disturbance. The past and reasonably foreseeable future projects, in combination with the impacts of alternative C, would result in permanent adverse impacts on archeological sites from construction projects and fire fuels reduction activities; however, fire fuels reduction would also prevent potentially devastating wildfires. Overall, the incremental impacts of alternative C would not make a substantial contribution to the impacts on archeological resources.

Conclusion. Implementation of alternative C would result in a total of an additional 0.36 acres of disturbance to the 12 previously disturbed archeological prehistoric sites within the project limits of disturbance on the Mesa Top, Sun Temple, and Cliff Palace Loops. However, though alternative C could diminish the data potential of the 12 sites, data collection through testing and mitigation would ensure that the individual sites would continue to be eligible for nomination to the NRHP under Criterion D, Information Potential (NPS 2019d), and would continue to serve as important contributing properties to the Mesa Verde National Park Archeological District (5MV4341).

CHAPTER 4: CONSULTATION AND COORDINATION

The following Native American tribes, agencies, and organizations were contacted and were invited to participate in the planning process:

- Bureau of Land Management, Tres Rios Field Office
- US Fish and Wildlife Service
- US Environmental Protection Agency, Region 8
- Bureau of Indian Affairs, Ute Mountain Ute Agency
- Natural Resources Conservation Service, Colorado Field Office
- San Juan National Forest
- Native American Consultation
 - All Pueblo Council of Governors
 - Hopi Tribe of Arizona
 - Jicarilla Apache Nation
 - Kewa Pueblo
 - Mescalero Apache Tribe
 - Navajo Nation
 - Ohkay Owingeh
 - Pueblo of Acoma
 - Pueblo of Cochiti
 - Pueblo of Isleta
 - Pueblo of Jemez
 - Pueblo of Laguna
 - Pueblo of Nambe
 - Pueblo of Picuris
 - Pueblo of Pojoaque
 - Pueblo of San Felipe
 - Pueblo of San Ildefonso
 - Pueblo of Sandia
 - Pueblo of Santa Ana
 - Pueblo of Santa Clara
 - Pueblo of Taos
 - Pueblo of Tesuque
 - Pueblo of Zia
 - Pueblo of Zuni

- Southern Ute Indian Tribe
- Ute Mountain Ute Tribe
- Ysleta del Sur Pueblo
- Colorado General Assembly
- Montezuma County
- City of Cortez
- City of Durango
- Town of Dolores
- Town of Mancos
- Colorado Department of Transportation, Region 5
- Colorado Parks and Wildlife
- Colorado State Land Board, Southwest District
- Colorado State University
- Cortez Area Chamber of Commerce
- Durango Chamber of Commerce
- Mancos Valley Chamber of Commerce
- Mesa Verde Foundation
- Montezuma County Planning Department
- Southwest Colorado Cycling Association

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APPENDIX A

Draft Programmatic Agreement

**PROGRAMMATIC AGREEMENT
BETWEEN
MESA VERDE NATIONAL PARK
AND
THE COLORADO STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE RESURFACING, RESTORATION, AND REHABILITATION (3R)
OF THE LOOP ROADS
MESA VERDE NATIONAL PARK
MONTEZUMA COUNTY, COLORADO**

WHEREAS, Mesa Verde National Park (MVNP) is a unit of the National Park Service (NPS) within Region 7 – Upper Colorado Basin, Montezuma County, Colorado, and charged to meet the directives of the NPS Organic Act of 1916 (PL 64-235, 39 Stat. 535) to “conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations,” as it applies to the park units; and

WHEREAS, in collaboration with the Federal Highway Administration (FHWA), MVNP plans to resurface, restore, and rehabilitate (3R) the Mesa Top Loop, Cliff Palace Loop, and Sun Temple Loop roads located on Chapin Mesa; improve physical accessibility at adjacent overlooks, sidewalks and parking areas; replace the current Visitor and Research Center intersection; and potentially widen the two-way sections of Mesa Top Loop and Sun Temple Loop to accommodate a bike lane (Undertaking); and

WHEREAS, MVNP has determined that this project constitutes an undertaking subject to review under Section 106 of the National Historic Preservation Act (NHPA), as amended, 54 USC 306108 (formerly 16 USC § 470f), and Protection of Historic Properties, its implementing regulations, 36 CFR Part 800, herein referred to as Section 106; and

WHEREAS, MVNP has defined the Undertaking’s Area of Potential Effect (APE) as described in Attachment A and the APE encompasses all direct, indirect, and cumulative effects of the Undertaking; and

WHEREAS, MVNP has determined that the Undertaking may adversely affect properties listed in, or eligible for listing in, the National Register of Historic Places (NRHP) (see Attachment B) and the NPS has consulted with the SHPO pursuant to 36 CFR Part 800.14(b)(1)(ii); and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1), MVNP notified the Advisory Council on Historic Preservation (ACHP) of its adverse effect determination on November 26, 2018 with specified documentation, and the ACHP has chosen not to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

WHEREAS, in a letter dated November 19, 2018, MVNP initiated consultation regarding the Undertaking with the twenty-six (26) Native American tribes that are affiliated or associated with MVNP (see Attachment C). The Hopi Tribe of Arizona requested formal government-to-government consultation; and

NOW, THEREFORE, MVNP and the SHPO agree that should MVNP proceed with the Undertaking, MVNP will ensure that the following stipulations are implemented in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

I. HISTORIC DISTRICT/CULTURAL LANDSCAPES

- A. MVNP will continue consultation with the SHPO regarding the Undertaking's proposed landscape design elements, including fences, barriers, signage, overlooks, sidewalks, curbing, drainage, accessibility improvements, buildings, structures, and re-vegetation.
 - 1. As preliminary plans for the landscape design elements become available, MVNP will submit them to the SHPO with a request for concurrence that the plans meet the Secretary of the Interior's Standards for the Treatment of Historic Properties (Standards).
 - 2. The SHPO will have thirty (30) calendar days to provide concurrence, or to recommend revisions necessary to make the plans consistent with the Standards.
 - 3. If MVNP does not receive a response from the SHPO dated within thirty (30) calendar days of the submittal, then MVNP can assume SHPO concurrence.
 - 4. Official correspondence may take place via e-mail.
- B. If MNVP and the SHPO determine that proposed landscape design elements will result in unavoidable adverse effects to historic properties, MVNP shall consult with the SHPO to determine whether an amendment to this Programmatic Agreement (PA) is warranted to identify additional measures that will be carried out to minimize or mitigate any new or intensified adverse effects.

II. TREATMENT OF ARCHEOLOGICAL RESOURCES

- A. MVNP shall ensure that all archeological work performed by MVNP or on its behalf pursuant to this PA shall be accomplished by or under the direct supervision of a qualified archeologist. A "qualified archeologist" is a person who meets the Anthropologist/Archeologist standards outlined in NPS-28, Appendix E.
- B. The NPS has identified 12 sites within the APE that would potentially be disturbed by the Undertaking because their site boundaries are truncated by the current Loop Roads, or they have features directly adjacent to the roads. Archeological resources will be treated according to the testing plan, *Archeological Testing Plan: Cliff Palace Loop, Mesa Top Loop, and Sun Temple Loop Roads and Construct Bike Lane on Mesa Top Loop Road, Mesa Verde National Park, Montezuma County, Colorado, PEPC 70883, HS 75208, August 2019* by T. Hovezak. The SHPO accepted the testing plan in a letter dated September 10, 2019. The treatments include:
 - 1. A qualified archeologist will recover surface artifacts within the anticipated area of direct impacts.

2. Following the recovery of surface artifacts, a qualified archeologist will conduct 2-inch bucket auger testing to identify subsurface features and deposits. Where cultural deposits are encountered based on the results of the auger testing, a qualified archeologist will conduct controlled excavations in 1-square meter units. These test units will provide critical information about the features that would be impacted by construction.
 3. A qualified archeologist will collect all artifacts and samples encountered during testing and future data recovery operations. Collections will be processed and temporarily stored at Park Division of Research and Resource Management facilities and held until decisions are made regarding the need for formal data recovery. Collections will eventually be permanently housed at the MVNP curation facility.
- C. Upon completion of the testing, MVNP will develop a research design and data recovery plan to mitigate for adverse effects. The data recovery plan shall include the following elements:
1. Information on the archeological property or properties where data recovery is to be carried out, and the context in which such properties are eligible for the NRHP;
 2. Information on any property, properties, or portions of properties that will be destroyed without data recovery;
 3. Discussion of the research questions to be addressed through the data recovery with an explanation/justification of their relevance and importance;
 4. Description of the recovery methods to be used, with an explanation of their pertinence to the research questions; and
 5. Information on arrangements for any regular progress reports or meetings to keep the SHPO and other consulting parties up to date on the course of the work. The plan should contain the expected timetable for excavation, analysis and preparation of the final report.
- D. MVNP will submit the research design and data recovery plan to the SHPO for a thirty (30) calendar day review and concurrence that the plan will sufficiently mitigate adverse effects. If MVNP does not receive a response from the SHPO dated within thirty (30) calendar days of the submittal, then MVNP can assume SHPO concurrence.
- E. The National Park Service would ensure that contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties. Contractors and subcontractors would also be instructed on procedures to follow in case previously unknown paleontological or archeological resources are uncovered during construction.
- F. Known archeological sites in the APE will be flagged and avoided during construction and restoration.
- G. MVNP shall ensure that a qualified archeological monitor will be present during ground disturbing activities that have the potential to affect cultural resources. A qualified archeologist will prepare a monitoring report that MVNP shall submit to the SHPO for the record.

III. POST REVIEW DISCOVERIES

- A. If previously unidentified or unanticipated effects to historic properties are discovered during the Undertaking, that do not involve human remains, the contractor shall immediately halt all activity within a one hundred (100)-foot radius of the discovery. Construction will cease at the site of discovery until MVNP has fulfilled the requirements of 36 CFR 800.13, including consultation with ACHP, SHPO, and interested Native American tribes.
- B. If human remains are inadvertently discovered, MVNP shall comply with the stipulations of the *General Agreement between Aztec Ruins National Monument, Chaco Culture National Historical Park, Mesa Verde National Park, and Tribes*.

IV. MONITORING AND REPORTING

Each year, by July 14, following the execution of this PA until it expires or is terminated, MVNP shall provide all parties to this PA a summary report detailing work undertaken pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in MVNP's efforts to carry out the terms of this PA.

V. DISPUTE RESOLUTION

Should any signatory to this PA object at any time to any actions proposed or the manner in which the terms of this PA are implemented, MVNP shall consult with such party to resolve the objection. If MVNP determines that such objection cannot be resolved, MVNP will:

- A. Forward all documentation relevant to the dispute, including MVNP's proposed resolution, to the ACHP. The ACHP shall provide MVNP with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, MVNP shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories and concurring parties, and provide them with a copy of this written response. MVNP will then proceed according to its final decision.
- B. If the ACHP does not provide its advice regarding the dispute within the thirty (30)-day time period, MVNP may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, MVNP shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories to the PA and provide them and the ACHP with a copy of such written response.
- C. MVNP's responsibility to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

VI. AMENDMENT

This PA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP.

VII. TERMINATION

If any signatory determines that the terms of this PA will not or cannot be carried out, that party shall immediately consult with the other signatories and concurring parties to seek an amendment in accordance with Stipulation VI of this PA. If within thirty (30) days an amendment cannot be reached, any signatory may terminate the PA upon written notification to the other signatories and concurring parties.

Once the PA is terminated, and prior to work continuing on the Undertaking, the NPS must either (a) execute another PA pursuant to 36 CFR Part 800.6, or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR Part 800.7. The NPS shall notify the signatories as to the course of action it will pursue.

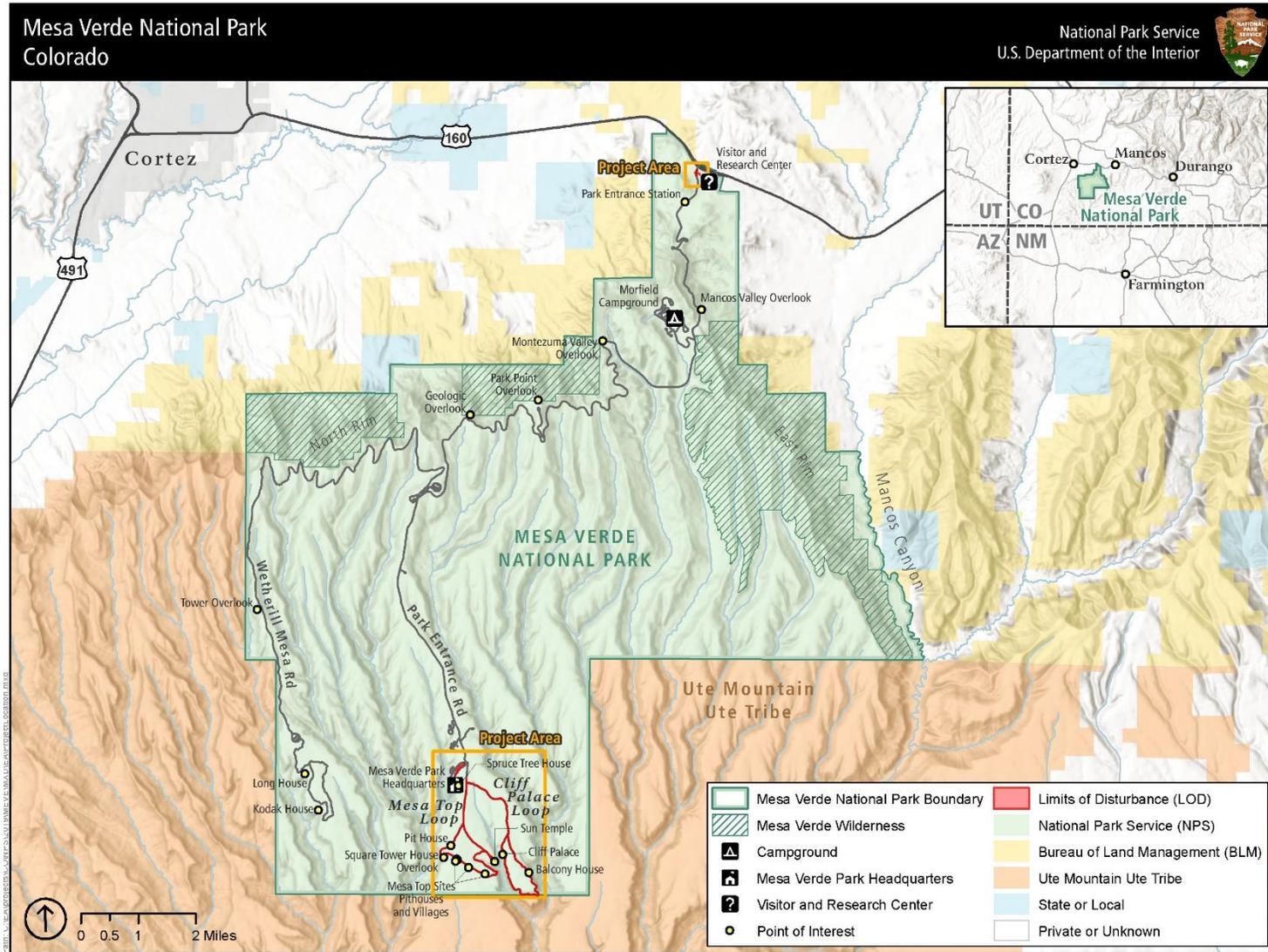
VIII. DURATION OF AGREEMENT

This PA will expire if its terms are not carried out within five (5) years from the date of its execution. Prior to such time, the signatories may consult and agree in writing to an extension for carrying out the terms of the PA in accordance with Stipulation VII above.

Execution of this PA by the NPS and the SHPO and implementation of its terms are evidence that the NPS has taken into account the effects of the Project on historic properties, and that the NPS has satisfied its Section 106 responsibilities for the Undertakings covered by this PA.

Upon the completion of all stipulations to this PA, the NPS shall circulate to the SHPO a signed memorandum documenting that the NPS has fulfilled all its responsibilities under this PA.

Attachment A – Location and Area of Potential Effect Maps

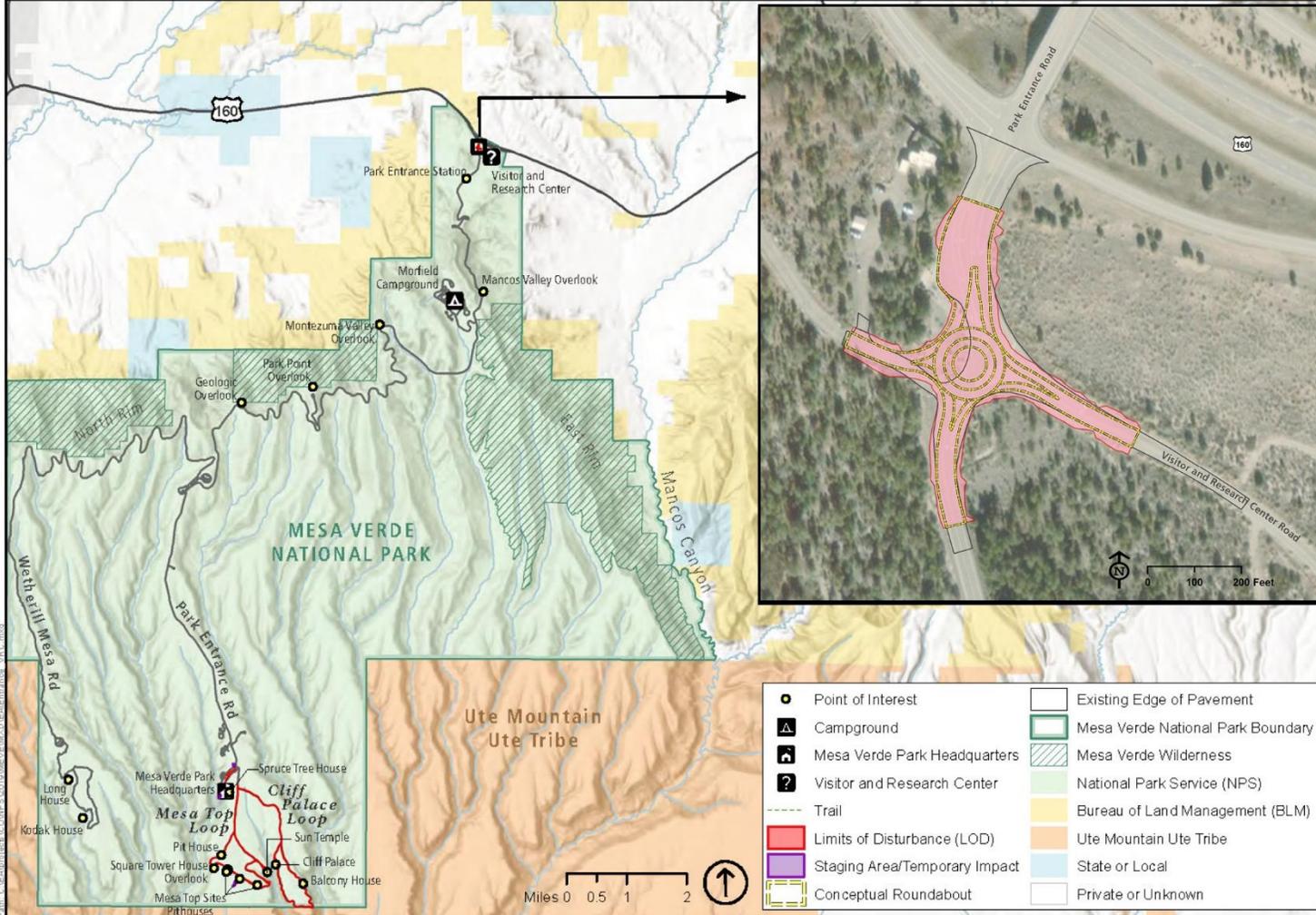


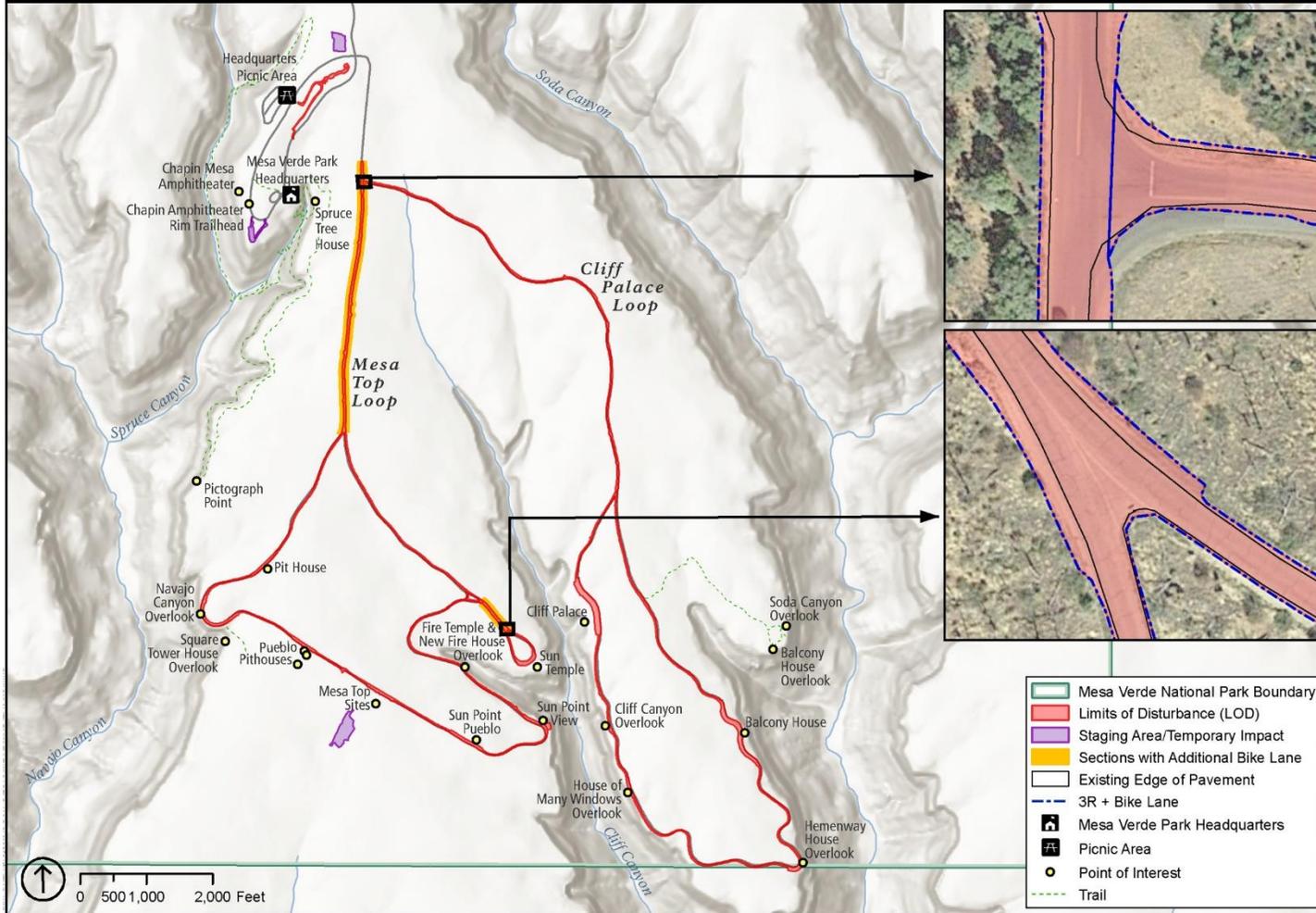
Draft May 2020

PA Resurfacing, Restoration, and Rehabilitation (3R) of the Loop Roads

Mesa Verde National Park
Colorado

National Park Service
U.S. Department of the Interior





Attachment B – Assessment of Effect Table

This attachment provides a brief description of the historic properties within the area of potential effect for the proposed project, and an assessment of the potential effects to those properties. Proposed treatments to avoid, minimize or mitigate any potential adverse effects are also provided for each property.

SHPO ID #	Resource Type	Name/Description	NRHP Status	Treatment
5MT23457	Historic District	Chapin Mesa Loop Roads Historic District	Eligible A, C	New landscape elements will be designed to meet the Secretary of the Interior's Standards for the Treatment of Historic Properties. Continue consultation with the SHPO regarding proposed landscape design elements. If new elements will result in unavoidable adverse effects to historic properties, identify additional measures to avoid, minimize or mitigate any new or intensified adverse effects.
5MT23529	Cultural Landscape	Entrance Road Corridor Cultural Landscape	Eligible A, C	None
5MT23530	Cultural Landscape	Headquarters Loop Cultural Landscape	Eligible A, C	None
5MT4341	Archaeological District	Mesa Verde National Park Archaeological District	Listed, Criterion D	See treatments for individual sites.
5MV122	Archaeological Site	Pueblo II habitation with evidence of several surface rooms visible as single vertical sandstone slabs and a roomblock of horizontally coursed masonry	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.

SHPO ID #	Resource Type	Name/Description	NRHP Status	Treatment
5MV184	Archaeological Site	Pueblo I habitation consisting of a small, shallow house mound and refuse scatter	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.
5MV187	Archaeological Site	Pueblo I - a dispersed scatter of ceramic and lithic artifacts and two small features visible as vertical native sandstone slabs characteristic of early pit features	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.
5MV213	Archaeological Site	Single unit habitation dating to either the Pueblo I or Pueblo II periods	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.
5MV218	Archaeological Site	Hamlet or multiple household habitation dating to the Pueblo I	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.
5MV221	Archaeological Site	Large early Pueblo habitation consisting of at least one house mound and an extensive scatter of artifacts	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.
5MV222	Archaeological Site	Pueblo I – Pueblo II habitation with surface evidence of a low rubble mound and artifact scatter	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.

SHPO ID #	Resource Type	Name/Description	NRHP Status	Treatment
5MV239	Archaeological Site	Pueblo II habitation with surface indications consisting of a low, L or J shaped rubble mound	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing
5MV256	Archaeological Site	Multiple unit habitation dating to the Pueblo II period	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing
5MV308	Archaeological Site	A large multi-unit habitation dating to the Pueblo I and Pueblo II periods	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing
5MV310	Archaeological Site	Multi-unit habitation dating to the Pueblo I period	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing
5MV90	Archaeological Site	Basketmaker III habitation consisting of a small surface structure, midden, and pit structure depression	Eligible D, contributor to 5MT4341	Surface artifact collection and bucket auger testing. Controlled excavations may be necessary if one or more stratigraphic anomalies are detected during auger testing.

Attachment C – List of Associated and Affiliated Tribes

Hopi Tribe of Arizona
Jircarilla Apache Nation
Kewa Pueblo
Mescalero Apache Tribe
Navajo Nation
Ohkay Owingeh
Pueblo of Acoma
Pueblo of Cochiti
Pueblo of Isleta
Pueblo of Jemez
Pueblo of Laguna
Pueblo of Nambe
Pueblo of Picuris
Pueblo of Pojoaque
Pueblo of San Felipe
Pueblo of San Ildefonso
Pueblo of Sandia
Pueblo of Santa Ana
Pueblo of Santa Clara
Pueblo of Taos
Pueblo of Tesque
Pueblo of Zia
Pueblo of Zuni
Southern Ute Indian Tribe
Ute Mountain Ute Tribe
Ysleta del Sur

**Programmatic Agreement Between Mesa Verde National Park
and the Colorado State Historic Preservation Officer
Regarding the Resurfacing, Restoration, and Rehabilitation (3R) of the Loop Roads
Mesa Verde National Park
Montezuma County, Colorado**

SIGNATORY:

Mesa Verde National Park

_____ Date _____

Cliff Spencer, Superintendent

**Programmatic Agreement Between Mesa Verde National Park
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Regarding the Resurfacing, Restoration, and Rehabilitation (3R) of the Loop Roads
Mesa Verde National Park
Montezuma County, Colorado**

SIGNATORY:

Colorado State Historic Preservation Officer

_____ Date _____

Steve Turner, Colorado State Historic Preservation Officer

**Programmatic Agreement Between Mesa Verde National Park
and the Colorado State Historic Preservation Officer
Regarding the Resurfacing, Restoration, and Rehabilitation (3R) of the Loop Roads
Mesa Verde National Park
Montezuma County, Colorado**

CONCURRING PARTY:

Hopi Tribe of Arizona

_____ Date _____

Stewart B. Koyiyumptewa, Program Manager, Hopi Cultural Preservation Office.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under US administration.

MEVE 307/165301

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