Hermit's Peak and Calf Canyon Fires Recovery Project

Environmental Assessment
Purpose & Need and Proposed Actions

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Abbreviations and Acronyms

ATV	All-terrain Vehicle
CNF	Carson National Forest
CO_2	Carbon Dioxide
EA	Environmental Assessment
EAD	Emergency Authority Determination
EMU	Ecological Management Units
ERU	Ecological Response Unit
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GPS	Global Positioning System
HPCC	Hermit's Peak and Calf Canyon
IIJA	Infrastructure Investment and Jobs Act
MRA	Minimum Requirements Analysis
MSO	Mexican Spotted Owl
NEPA	National Environmental Policy Act
NFS	National Forest System
NM	New Mexico
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environmental Department
RAVG	Rapid Assessment of Vegetation Condition
REV	Riparian Existing Vegetation
RMAP	Regional Riparian Mapping Project
SFNF	Santa Fe National Forest
TMO	Trail Management Objectives
USFS	United States Forest Service
UTV	Utility Terrain Vehicle
WCF	Watershed Condition Framework

1 PURPOSE AND NEED FOR ACTION

1.1 Introduction

During the spring and summer of 2022, the Hermit's Peak and Calf Canyon (HPCC) fires burned over 340,000 acres between early April and late summer in the southern Sangre de Cristo Mountains in San Miguel, Mora, and Taos Counties, New Mexico. The footprint of the fire comprises portions of the Pecos/Las Vegas Ranger District of the Santa Fe National Forest (SFNF) and the Camino Real Ranger District of the Carson National Forest (CNF) in northern New Mexico.

The fire changed conditions across the landscape. Vegetation in moderate and high severity burn areas was immediately affected. As a result of the fire there is an increase in dead and downed, dead, and standing, coarse woody debris, and live fire-stressed trees. These conditions increase risks of insect and disease outbreak, create hazards for forest visitors and local communities, and increase debris travelling through watersheds to downstream communities. The fire and post-fire flooding have also impacted the safety and sustainability of infrastructure across the landscape including fences, roads, bridges, trails, recreation residences, and developed recreation sites.

1.2 Project Location

The project comprises approximately 167,840 acres of National Forest System (NFS) land within the Pecos/Las Vegas Ranger District of the SFNF (Figure 1). Approximately 80 percent of these lands are within the HPCC fires boundary. The additional lands within the project comprise 33,085 acres which include unburned lands that can have heavy post-fire flooding impacts, continued risk of insect and disease outbreaks, and high fire risk. Private lands are not included except where there is a known easement and identified infrastructure (e.g., bridges and trails) that were impacted by the fire or post-fire flooding.

The project area includes several designated areas and management areas: 74,515 acres of the designated Pecos Wilderness, 1,900 acres of recommended wilderness (1,000 acres for Grace Tract and 900 for Enchanted Lakes), and 27,780 acres of Inventoried Roadless Area (all or portions of Bear Mountain, Enchanted Lakes, Falls, Gallinas, Grace Tract, Grass Mountain, Jacks Creek, Lost Lake, Maestas, Pecos Wild and Scenic River, Sparks Creek, Valle Del Toro, Wesner Spring, Willow Creek). A portion of the Pecos Wild and Scenic River and three eligible Wild and Scenic Rivers (Bear Creek, Beaver Creek, Rio Valdez) also run through the project area.

1.3 Background

Since HPCC fires in 2022, the Forest Service has conducted joint response and recovery operations to address immediate needs from the disaster as possible future events. This work is conducted as part of the State of New Mexico unified recovery objectives, organized through seven Lines of Effort for Recovery: Community Outreach, Drinking Water, Economic Recovery, Health and Social Services, Historical and Cultural Resources, Housing Recovery, and Watershed Mitigation.

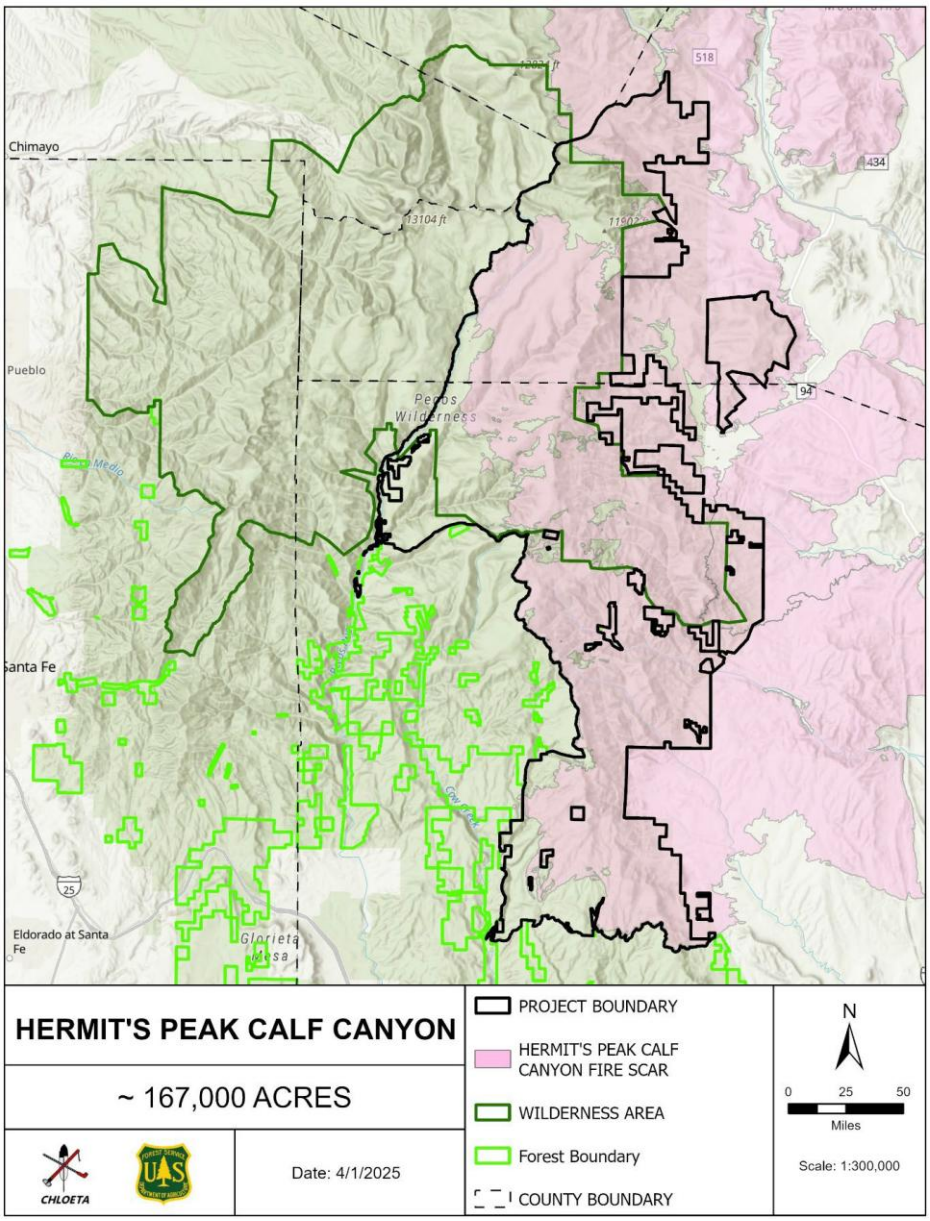

Figure 1: Project area of the Hermit's Peak and Calf Canyon Fire Recovery imposed over the existing burn scar and Santa Fe National Forest boundary

Post-fire ecological recovery and flood response efforts have been ongoing throughout the burn scar. On National Forest System lands, on-the-ground work consists of aerial seeding, mulching, road maintenance and reconstruction, tree planting, bridge removal, range fence construction, and hazard tree abatement along roads. These immediate needs were covered by various authorities, including National Environmental Policy Act (NEPA) analyses and decisions. These include the Federal Emergency Management Agency's (FEMA's) The State of New Mexico Watershed Resiliency and Post-Wildfire Treatment Projects (2022), El Porvenir Campground Low Water Crossing Project (2022), Hermit Peak Calf Canyon Phase 1 Reforestation (2023), El Porvenir Bridge Replacement and Beaver Creek Restoration Project (2023), Hermit's Peak Calf Canyon Phase 2 Reforestation (2024), Invasive Plant Control for the Santa Fe National Forest (2017), and the Northern New Mexico Riparian, Aquatic, and Wetland Restoration Project (2021).

To date, most work has been focused on immediate, short-term needs. As we look into future long-term recovery, the use of other authorities is needed to conduct the remaining restoration work.

In Section 40807 of the Infrastructure Investment and Jobs Act of 2021 (IIJA) (Public Law 117-58 Nov. 15, 2021), the Secretary of Agriculture may determine if an emergency occurs on National Forest System land for which immediate action is necessary to achieve relief from hazards threatening human health and safety or mitigation of threats to natural resources. These emergency actions include but are not limited to; the salvage of dead or dying trees, the reforestation or replanting of fire-impacted areas, the removal of hazardous trees near roads and trails, the removal of hazardous fuels, harvest of trees to control insects and disease, and restoration of water sources and infrastructure.

In December 2022, the Forest Service sent a Decision Memorandum to the Department of Agriculture Secretary Tom Vilsack defining an emergency for post-fire recovery areas, stating:

> "**Post-Fire Recovery Areas**. An emergency situation as defined in IIJA section 40807 exists in certain areas that experienced high intensity wildfire in Fiscal Year 2022, including National Forest System lands in: (1) New Mexico (Catron, Colfax, Grant, Lincoln, Los Alamos, Mora, San Miguel, Sandoval, Sierra, Socorro, Taos, and Valencia counties), (2) Arizona (Coconino and Yavapai counties), and (3) California (Alpine, Amador, Butte, El Dorado, Humboldt, Kern, Lassen, Madera, Mariposa, Plumas, Shasta, Santa Barbara, Siskiyou, Tehama, Trinity, and Tulare counties).
>
> Immediate implementation of emergency actions is necessary to provide relief from threats to public health and safety and/or to mitigate threats to natural resources on National Forest System land or adjacent land (including Tribal reservation and trust lands). The health and safety of communities, including Tribal communities, in these counties is threatened by falling trees, obstructed emergency evacuation routes, flooding, landslides, reburns, and lost infrastructure caused by wildfire and post-fire floods. The Chief of the Forest Service shall monitor and reassess this situation and recommend to the Secretary the need to include additional areas affected by wildfires or natural disasters or remove areas where this designation is no longer needed."

In January 2023, Department of Agriculture Secretary Tom Vilsack announced expanded efforts to reduce wildfire risk and recover areas that experienced high intensity wildfire in 2022, including Taos, San Miguel, and Mora Counties.

Under the authorities provided in the IIJA, the Santa Fe National Forest is using the Emergency Authority Determination (EAD) for the Hermit's Peak and Calf Canyon Fires Recovery Project under the Bipartisan Infrastructure Act section 40807 (USDA, 2023). Under EAD, the project is not subject to objection under the pre-decisional administrative review process (36 CFR 218).

1.4 Purpose and Need

The purpose of this Environmental Assessment (EA) is to address issues associated with the HPCC fires burned area, comprising a total of 167,840-acres, and adjacent 33,085 acres of unburned lands that can have heavy post-fire flooding, continued risk of insect and disease outbreaks, and high fire risk. The need is to make the area safer and provide ecological recovery after HPCC fires.

Changes to the upland vegetation are one of the most obvious on the landscape. In areas that burned with moderate to high burn severity, the presence of dead and dying trees, either downed or standing on the landscape, poses a current and urgent safety risk to forest users. These trees also add debris to water flow, impacting downstream communities. In addition, over time these trees could impair natural revegetation or replanting, cause an increase in insect and disease outbreaks, which would harm remaining living vegetation, and could contribute to future fire risk in the area. For these reasons, there is a need to remove the accumulation of dead and dying vegetation within the HPCC fires boundary.

Some of the trees still have economic and cultural value (e.g., fuelwood). Fuelwood is important culturally and providing this forest product is directed in the 2022 Santa Fe National Forest Land Management Plan (Forest Plan) (USDA, 2022). Making wood products available to the public will therefore provide economic and cultural support to the local community. Secondly, a lot of the work can provide economic support to the community either directly through contracts or grants and agreements, or indirectly in the form of increased revenue within the local community.

Existing carbon stocks on the Forest (Black et al., 2022) were impacted by HPCC fires to an undetermined (quantitative) extent. In areas of moderate and high fire severity, variably sized patches of standing live vegetation changed carbon pools to standing dead or downed woody debris and released carbon dioxide (CO_2) to the atmosphere in the process. Also, within these areas, some degree of soil and belowground carbon was consumed depending on burn severity and flame residence times. In areas of low burn severity, there was a marginal increase in standing dead tree carbon through individual or small patches of tree mortality, but little impact to soil or belowground carbon pools, which are typically the most stable pools for carbon storage. In order to increase carbon sequestration within moderately to severely burned areas and recover Forest carbon stocks, restoration actions and treatments including replanting are needed to create a healthy and resilient landscape.

Riparian, aquatic, groundwater dependent and wetland systems, and adjacent uplands in the

HPCC fires area have been impacted by fire and post-fire effects. Post-fire effects include increased flooding, erosion, sedimentation and downcutting of stream channels alter water flow and lessen the connection between the stream and its floodplain. High intensity wildfire can alter or damage physical, chemical, and biological soil properties; widespread soil erosion, ash and sediment deposition have resulted in water quality changes throughout and downstream of the burn area; changes in the geomorphology of stream ecosystems have resulted in loss of aquatic habitat, reduced riparian vegetation and increased temperatures. These detrimental effects and impacts to riparian and aquatic systems may be further worsened or hastened by short-term weather events and long-term climatic conditions, which increases the urgency and need for restoration actions on the landscape.

Prior to HPCC fires, the project area was popular with recreational users who frequented Gallinas Canyon for its developed campgrounds, picnic sites, fishing, and horseback riding opportunities; hiked on trails within and outside of the Pecos Wilderness, along with myriad other uses. The fire and post-fire flooding and erosion impacted developed recreation infrastructure throughout the project area. Consequently, there is a need to provide safe and restored recreational infrastructure through repair, reconstruction, or decommissioning.

Twenty-two National Forest System trails pass through the project area, representing a total of approximately 190 miles. Approximately 74 percent (140 miles) of the trail miles occur in the Pecos Wilderness. Approximately 60 miles of trail is located within unburned areas of the project, approximately 65 miles of trail is located within areas modeled as having unchanged to low burn severity, approximately 35 miles of trail is located within moderate burn severity areas, and approximately 30 miles of trail pass through high severity burn areas. Based on initial assessments, the severity of impacts experienced by trails correlates with burn severity. Portions of trails may be unsafe, impassable, or heavily impacted by hazard trees, dead and downed trees, overgrowth of vegetation, and erosion.

Nearly 400 miles of National Forest System roads, 17 bridges, and numerous culverts have been affected or may still be impacted. Increased and sediment/ash-laden runoff and significant debris flows resulting from HPCC fires have and continue to impact the forest transportation network, particularly within and downstream of moderate and high severity burn areas where partial or complete loss of canopy cover and protective vegetative ground cover have rendered soils hydrophobic (water repellant). In these locations and others subject to post-fire flooding and erosion, the road prism itself has been impacted, limiting access or losing access to areas within the project boundary. In many situations, increased flows accompanying sediment and debris have exceeded or may exceed the capacity of stream and drainage crossings, causing culverts, bridges, and other drainage structures to fail directly impacting watershed health, riparian, aquatic, and wetland areas. There is a need for sustainable access and to restore safe access for all Forest users within the project area.

Sixteen allotments within the project area were impacted by HPCC fires, which opened the landscape and resulted in new foraging opportunities. These changes in landscape and foraging opportunities are dynamic, creating present and future needs for livestock management facilities, like fencing, corrals, and water improvements. Some cattleguards were damaged by the

equipment used during fire suppression activities because they were not rated for the equipment loads and others were filled in with sediment because of erosion and flooding. Corrals and water developments were constructed of wood and therefore damaged or destroyed in the fires.

1.5 Existing and Desired Conditions

Existing and desired conditions in the project area will be presented in Chapter 3 of the EA. Desired conditions for each resource analyzed in the EA are incorporated by reference from the Forest Plan (USDA, 2022). The extent to which each alternative would facilitate movement toward the desired conditions will be analyzed in Chapter 3 of the EA. It is the intent for this project to work in coordination with other programs and projects to move towards Forest Plan desired conditions and objectives.

1.6 Forest Plan Direction

The proposed action was reviewed for consistency under the direction of the Forest Plan (USDA, 2022). This plan was revised in July of 2022 and is based on the best available science to provide management direction of the SFNF. As part of the analysis, the purpose and need and proposed action were reviewed to determine consistency with the forest-wide goals and objectives, as well as the specific standards and guidelines for affected Designated and Management Areas. As documented in the project record, no inconsistencies between the proposal and pertinent standards and guidelines were identified.

1.7 Decision to be Made

The Forest Service's responsible official will decide whether to implement the proposed action, in part or in whole, or to take no action at all. It is anticipated that the District Ranger for the Pecos/Las Vegas Ranger District of the Santa Fe National Forest will sign the decision. If the proposed action is approved, it would be implemented as described in Chapter 2.

1.8 Public Involvement

1.8.1 Scoping

The Forest Service began a 30-day public scoping comment period on September 9, 2024, which involved the following:

- A scoping letter, which included the project's purpose and need, proposed action, and methods for public input, signed on September 6, 2024, mailed to approximately 161 interested parties such as agencies, organizations, permittees, and interested stakeholders.
- The scoping letter and accompanying maps and documents posted on the project website, https://www.fs.usda.gov/r03/santafe/projects/66857.
- Project status updated on the schedule of proposed actions at the project website.
- Public meetings in Las Vegas, NM on September 18, 2024; Mora, NM on September 19, 2024, and virtually on September 26, 2024.
- Additional meetings with government, community, and other groups and organizations have also been made available and SFNF staff attended to give a presentation and answer questions upon their request.

The Forest Service received a total of 39 submissions during the comment period. Scoping comments can be found in the project's public comment reading room at https://cara.fs2c.usda.gov/Public/ReadingRoom?Project=66857.

1.9 Issues

The Forest Service reviewed all comments and identified substantive ones (those that provide relevant and new information with sufficient detail). Non-substantive comments were not discussed because the commenters did not provide information pertinent to the project or because they contained opinions or vague questions.

1.9.1 Issue Identification

Resources in the project area that could potentially be affected by the project will be thoroughly analyzed in the EA and are summarized in Table 1-1. Resources that are either not present or are present but not impacted to a degree warranting detailed analysis were also considered.

1.9.2 Issues Identified for Analysis

Table 1-1 lists the resources identified by the Forest Service Interdisciplinary team that are present in the project area and have the potential to be affected by the Proposed Action.

Table 1-1: Issues Identified for Analysis

Resource	Issue Statement
Watershed	What steps will be put into place to effectively mitigate flooding risks in the project area, particularly considering the increased susceptibility to flooding in burned areas, while promoting sustainable road and infrastructure designs?
Fuels and Wildfire Behavior	What timing for vegetation treatments will be most effective in reducing the impact of bark beetle infestations? How can prescribed burning or other fuel reduction methods be strategically employed in the project area to reduce the risk of future fires, promote ecological recovery, and protect community safety?
Transportation	What temporary infrastructure, such as bridges, is needed to restore access and support recovery efforts in areas impacted within the project area? Which roads need to be widened to provide safe and effective access for emergency personnel and vehicles during recovery efforts in the project area? Should temporary motorized vehicle access be allowed in wilderness areas within the project area to assist in recovery efforts, and how can this access be managed to minimize environmental disruption?

Resource	Issue Statement
Range	How can the fencing and cattle guards damaged in the project area be repaired or replaced to support livestock management and recovery efforts, while ensuring wildlife-friendly designs? Which gates should be reduced or removed to improve access for recovery efforts while preventing livestock from entering designated areas within the project area? What is the condition of the land post-fire, and which areas are most capable of recovery and in need of targeted restoration or management efforts? Is the implementation of virtual fencing a viable option for managing livestock and allotment boundaries within the project area, and how could it support recovery efforts? How can fencing be utilized around allotment boundaries to prevent trespassing and address improper land use in the aftermath of the fire?
Recreation	How can recreational opportunities be maintained or restored within the project area, and what considerations should be made to balance public access with ecological restoration?
Forestry	What reforestation strategies are most appropriate for areas within the project area, and how can they support long-term recovery and forest health? How can forest products, such as fuelwood and latillas, be made available for local use in the project area in a way that supports recovery while ensuring forest regeneration? How can hazard trees (dead or dying trees with less than a 20% live crown ratio) be effectively managed to reduce safety risks to people and infrastructure (roads, trails, powerlines, fences, campgrounds, structures, and acequias)?
Cultural Resources	How would the project directly affect cultural sites? And are there indirect impacts to cultural setting due to noise and visual impacts of project facilities? How would the project affect Native American traditional cultural and religious concerns?
Socioeconomics	How would restoration activities affect the ability of federally recognized tribes to access firewood, plants for traditional/cultural purposes, and the protection of watersheds?

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Alternative A, No Action Alternative

A no action alternative must be analyzed if a project has been identified as an emergency action responding to an emergency situation as defined in the Bipartisan Infrastructure Investment and Jobs Act, section 40807(b)(3)(c)(B). Within the HPCC fires boundary, the current condition of dead and standing, dead and down, and other coarse woody debris would remain, with increases in the amount of dead and down and coarse woody debris over time as dead and standing trees fall. Personal fuelwood permits would authorize removal of dead and down material where it is accessible along authorized National Forest System routes. Any slash left from wood cutting would remain in place. No additional watershed restoration work, recreation site improvements, trail improvements, range improvements, re-construction or construction of roads would occur. No range infrastructure improvements or treatments would occur in the Pecos Wilderness or any Inventoried Roadless Areas or within the project area.

Commented [AO1]: The No-Action Alternative would leave acequia diversions and conveyance systems exposed to erosion and sedimentation, perpetuating risks to downstream agricultural communities. The Environmental Analysis should acknowledge the disproportionate adverse effects of inaction on acequia communities. This baseline should underscore the urgency of coordinated watershed and acequia restoration under Alternative B.

2.2 Alternative B, Proposed Action

The SFNF is proposing a suite of activities to restore the landscape affected by HPCC fires. Five project categories will be covered by the EA and analyzed in the effects analysis. Project-specific design criteria (to be in Appendix A of EA) and an implementation guide (to be in Appendix B of EA) will be the basis for implementation consistent with this environmental analysis.

Some proposed actions for recreation work (e.g., most of Section 2.2.2, Watershed, Riparian, Aquatic, Wetland and Adjacent Upland Area; and Section 2.2.3.1 Restoration of National Forest System Trails) are similar to and were analyzed in the Northern New Mexico Riparian, Aquatic, and Wetland Restoration Project EA (2020 Riparian EA). As such, for the analysis of proposed actions that are shared between the Riparian EA and this project, we will tier to the Riparian EA effects analysis. Therefore, the effects analysis of the proposed actions below will be limited to what is unique to this project.

Flexible Toolbox Approach

The flexible toolbox approach is a strategy that allows predetermined treatments to be aligned before they are implemented with current conditions on the ground. Currently comprehensive information about the conditions found across every acre in the landscape is incomplete, however sufficient data is available to make informed decisions about what kinds of treatments work for certain conditions and what kind of protections need to be in place to prevent significant impacts to resources. For example, on the ground assessment may determine that a portion of a trail is unsustainable and would benefit from rerouting. The location of the trail reroute will be determined considering this project's design features (to be in Appendix A of EA) as well as applicable law, regulation, and policy. For example, any reroute will only be included through endangered species habitat if those project design features can be met. However, a reroute outside of endangered species habitat would not need to follow the same design criteria or mitigation measures to protect the species. While this example is for endangered species, similar processes would occur for all applicable resources. This flexibility allows for the ability to adjust to site-specific conditions and adapt to changes in environmental conditions.

Several considerations will be used to identify areas for treatment and then a set of treatments tools and associated design features would be applied to treat those areas (see Table 2-1). Specific treatments would vary based on the conditions on the ground, the type of vegetation expected to be present and could be further modified if threatened or endangered species habitat were present, for example. The identification of site-specific locations will be determined by post-fire field reconnaissance, remotely sensed imagery, geographic information systems (GIS) data; and collaboration with impacted partners, including San Miguel and Mora Counties and New Mexico Department of Transportation (NMDOT). Estimates would include the spatial extent of a project, and any modifications needed based on specific factors as well as any monitoring requirements (to be in Appendix A of EA). If during field reviews or during implementation, effects differ from what was predicted, changes to design criteria can be made. This is to be sure that the right treatment occurs on the right acre as discussed in the EA.

The flexible toolbox approach has the following characteristics:

- Gives the ability to obtain more detailed site-specific information
- Adapts to changes in environmental conditions
- Uses expected conditions to make an informed decision about what types of treatments would work best in those conditions
- Encourages application of the appropriate tool based on site conditions at the time of implementation
- Uses site-specific landscape features and current site conditions during implementation to guide selection of specific treatments or tools to move areas toward desired conditions and put the right treatment in the right place
- Gives resource specialists flexibility to increase diversity across the landscape by varying the extent, type, amount, sequence, or intensity of treatments

The flexible toolbox approach is used for the following:

- Identifies resources that warrant special consideration and requires design criteria applicable to a given project category or resource of concern. These include at-risk species and cultural resources.
- Estimates the number of acres of each type of treatment proposed in the proposed action. Proposed treatments are analyzed at the higher end of intensity in order to analyze the maximum potential effects from these treatments.
- Prescribes appropriate treatments during implementation. Pre-implementation surveys will determine site-specific habitat types and current conditions. Selection criteria for these types will be used to prescribe the appropriate treatments.

Table 2-1 lists the considerations used in the Flexible Toolbox Approach for Aquatics and Watershed Restoration Activities. When activities are proposed, the considerations listed in Table 2-1 would be used to help determine which activities would receive a higher priority for implementation.

Table 2-1: Considerations used in the Flexible Toolbox Approach for Aquatics and

Watershed Restoration Activities

Consideration	Description
Watershed condition framework (WCF) and priority watersheds	Areas or activities in existing watershed restoration action plans can increase opportunities to move watersheds into a higher condition class. Maintaining or improving watershed condition where feasible should be taken into consideration. Projects in WCF priority watersheds should be considered.
Projects that improve impaired waters	Projects that improve water quality in NMED total maximum daily load (water quality improvement plan) or Clean Water Act Section 303(d)-listed streams
Vegetation restoration in the area	Incorporating aquatic and watershed restoration in an area with other restoration treatments whenever possible is one way to create efficiencies with heavy equipment and personnel.
Partner interest	Projects that already have partners or interested partners, particularly if funding is available, should be considered, as long as conditions warrant it.
Presence of at-risk species	The presence of these species and improving their habitat could increase the prioritization of a project over a site that had none.
Riparian habitats	The Regional Riparian Mapping Project (RMAP) and Riparian Existing Vegetation (REV) datasets, as well as other applicable riparian datasets that are developed, can identify riparian habitats that potentially do not meet desired conditions.
Wet meadows, wetlands, and similar habitats	These habitat types store water in upper watersheds and maintain baseflow to other aquatic habitats. They also cool water and can provide for lower stream water temperatures. Maintaining and improving these areas can have great beneficial impacts downstream.
Upper watershed versus lower	Restoration in upper portions of watersheds can have beneficial impacts downstream, such as reducing sedimentation, maintaining baseflow, and cooling stream temperatures. They will have a larger range of beneficial impacts than projects lower in a watershed.

Commented [AO2]: The Flexible Toolbox should include acequias as priority restoration features under "Projects that improve impaired waters." The Environmental Analysis should identify acequia diversions as hydrologically significant points within the watershed condition framework. Coordination with acequia commissions can help target riparian and upland treatments that directly reduce sedimentation and protect water quality.

Consideration	Description
Issues that are new or easily treated or could quickly spread	Newer issues have not yet caused that much damage; restoring these are more cost and time effective and prevents more degradation. Projects such as these are simple, when compared with larger or more widespread issues. In addition, new infestations of noxious weeds or aquatic invasive plants are easier to treat early rather than after they spread.
Process versus form-based projects	Projects that enhance site conditions, but do not restore the processes that create habitat or site conditions are considered form based. These types of projects can require more maintenance than projects that restore the processes that create and maintain habitat. Projects that restore processes may be more of a priority than those that address a specific issue rather than the larger problem.

2.2.1 Forestry

Within the footprint of HPCC fires, around 45,075 acres have been identified for forest restoration treatments. Treatment areas are preliminarily identified using the road system which provides access for treatments. It is expected that multiple treatments may occur in the same area.

Types of Treatments Proposed

1. Hazard tree abatement around improvements
2. Hazard tree abatement for watershed protection
3. Removal of hazardous fuels and harvest of trees to control insects or disease

Treatments to mitigate future fuel loading, insect and disease hazards and providing wood products will be focused in frequent fire ecological response units (ERUs).

Treatments will be determined based on the burn severity and proximity to improvements. Rapid Assessment of Vegetation Condition (RAVG) data was gathered remotely and requires field verification to accurately determine burn severity on the vegetation. Low burn severity has less than 25 percent canopy loss, moderate burn severity has between 25 to 75 percent canopy loss, and high burn severity has 75 to 100 percent canopy loss (Guay, 2011).

Areas with moderate to high burn severity can be expected to have treatments during the initial phase. Areas with low burn severity may be relatively unchanged, can be expected to have treatments during the next phase, and are intended to reduce the risk of future severe wildfires while providing wood products to the public.

Vegetation Treatment Techniques

Mechanical Felling: Ground-based equipment, such as a feller buncher or processor to fell trees and used on slopes less than 40 percent. On limited occasions where slopes greater than 40 percent are treated, tractor end-lining would be used.

Hand Falling: Hand fell with a chainsaw. May occur on all slopes, but primarily on slopes greater than 40 percent.

Skidding: Ground-based equipment such as rubber-tire tractors or dozers used to move material to a landing. The material removed will be suspended on the lead end to minimize impacts to the soil.

Slash Management

Slash: The treetops, limbs, and other woody material that remains on the ground after cutting vegetation. The amount of slash depends on the size and quantity of cut trees. Removing slash is important because, if left on the ground, it can be a fire hazard, impede grass and forb regeneration, and makes tree planting more difficult. The type of slash treatments will depend on the: type of vegetation treatment; quantity of slash created; quantity of existing fuel before treatment; location of the slash; and access for removing slash. For this project, the following techniques, or a combination of several techniques, may be used to address slash created from mechanical and hand thinning. The techniques address the rearrangement of the slash and does not address prescribed burning within a treatment area. To reduce the threat of wildfire from excess slash accumulations created from the treatments specific to removing hazardous fuels and harvest of trees to control insects or disease, no more than 1,000 acres of slash may be generated and remain on the ground within the project area at any period. Thinning will not continue until slash is removed or sufficiently mitigated. The status of slash on the ground must be approved by Forest fuels and fire personnel for adequacy prior to additional thinning operations.

Lop and Scatter: A hand method of removing top and branches of felled trees to keep slash low, generally 12 to 24 inches from the ground, to increase rate of decomposition and reduce fire hazard.

Mastication: The rearrangement of vegetation or fuels into small chunks. Masticators are typically low ground pressure tracked or wheeled equipment with either a forward mounted drum-like attachment or a drum or rotary attached to the boom.

Chipping: This is generally a roadside slash management technique but could be implemented away from a road. Existing surface fuels, thinning and pruning residue, and cut brush would be pulled to the road and chipped into small pieces using a chipper. Chipping residue could be distributed back into the treatment unit, utilized for biomass, or utilized as a cover to reduce the risk of invasive plant establishment at landings and roads.

*Whole Tree Skidding**:*** This is a style of mechanical treatment wherein whole trees are cut, and the entire tree (top, branches, and bole) is skidded or yarded to a landing for processing. The slash can be returned to the forest or hauled away.

Biochar Production and Application: Mobile incinerators can be used to generate biochar from woody biomass (slash) created through vegetation management activities. They work best in easily accessed areas with smaller amounts of target fuels or near developed areas where smoke may be an issue. The availability of mobile incinerators is currently limited but could be more widely available in the future, and, while a tool in the toolbox to reduce slash generated from treatments, the use of mobile incinerators under this decision will be focused on the production of biochar. Use of these types of units can reduce heat impacts to soils by concentrating burning activities in a single location. Biochar, a by-product produced by some mobile incinerators (i.e., charboss, kiln), would be produced from slash generated during forest management activities. Biochar could be used as a soil amendment in areas where access for mobile incinerators is acceptable. Some potential areas could be, but are not limited to, where forest operations are concentrated (i.e., landings, processing sites, skid trails), areas of high burn severity that have been observed to have limited recovery potential, areas where restoration of soil productivity is an objective, and other sites impacted by forest management activities. Biochar spread at an operational level across the landscape will require a spreader pulled by a forwarder or some other equipment to pull a spreader or attach it to. Broadcast burning, pile burning and large-scale mobile incinerator operations for a means of significantly reducing activity fuels will require a separate NEPA decision to account for these fuel reduction activities.

2.2.1.1 Hazard Tree Abatement Around Improvements

Hazard trees are either dead trees or dying trees where the tree's height and proximity to an improvement poses a hazard to the improvement if it fell. Improvements are roads, trails, powerlines, fences, campgrounds, structures, and acequias. Dying trees are defined as trees that possess 20 percent or less live crown ratio.[1] Hazard trees present safety threats to both people using the improvements and to the improvements themselves. Felled trees will be removed and utilized as personal or commercial products. Slash treatments may be done mechanically or by hand using the following methods: lop and scatter, mastication, chipping, or mobile incinerator.

Hazard tree abatement will occur on approximately 2,785 acres as identified:

- Areas with high and moderate burn severity according to RAVG data https://burnseverity.cr.usgs.gov/ravg/background-products-applications.
- Areas within 100 feet of National Forest System (NFS) roads (not including unauthorized or undetermined NFS roads), new and existing fences, new and existing range improvements, powerlines, acequias, springs, and trails.
- Previous hazard tree abatement NEPA (Hazard Tree CE, 3200 acres), areas where trees were planted, and Designated Wilderness areas are excluded from treatment.
- Areas on slopes greater than 40 percent will include fall/leave/lop and scatter. Mechanical felling and skidding will be prohibited on slopes greater than 40 percent. On slopes less than 40 percent, mechanical operations will be permitted.

Commented [AO3]: Site-specific coordination with local acequia associations prior to mechanical operations near ditches. Heavy machinery and vegetation removal within as designated distance (in feet) of acequias should be minimized, and any necessary work should employ low-impact methods to prevent bank destabilization and sediment delivery.

[1] Hood et al. (2010) showed that trees suffering more than an 80% crown loss from fire had approximately 80% probability of mortality within 5 years.

2.2.1.2 *Hazard Tree Abatement for Watershed Protection*

Watershed protection treatments will focus on mitigating the increased risk of heavy accumulations of woody material due to moderate or high burn severity. Felled trees will be removed and utilized as personnel or commercial products. Slash treatments may be done mechanically or by hand using the following methods: lop and scatter, mastication, chipping, or mobile incinerator.

Watershed protection treatments will occur on approximately 22,160 acres as identified:

- Areas with high and moderate burn severity according to RAVG data https://burnseverity.cr.usgs.gov/ravg/background-products-applications
- Areas within ¼ mile from system roads (Maintenance Level 2, 3, and 4 roads, see Figure 6), as these are areas where access for these treatments is feasible.
- Previous hazard tree abatement NEPA (Hazard Tree CE, 3200 acres), areas where trees were planted, and Designated Wilderness areas are excluded from treatment.
- Areas on slopes greater than 40 percent will include fall/leave/lop and scatter. Mechanical felling and skidding will be prohibited on slopes greater than 40 percent. On slopes less than 40 percent, mechanical operations will be permitted.

2.2.1.3 *Removal of hazardous fuels and harvest of trees to control insects or disease*

Within the project area there are approximately 17,580 acres that have been identified as unburned, unchanged or having low burn severity with standing live trees. Although these areas did not suffer intense effects from HPCC fires, vegetation treatments are needed to maintain their resiliency and health by removing hazardous fuels and harvesting trees to control insects and disease. Treatments are expected to occur in Mixed Conifer–Frequent Fire, Spruce Fir, Ponderosa Pine, and Mixed Conifer with Aspen ERUs. All treatments will be designed to move existing conditions towards ERU specific desired conditions from the 2022 Forest Plan (USDA, 2022). Products from treatments could be used for personal-use, free use, and commercial wood products.

These treatments are estimated to occur on approximately 17,580 acres and are identified as:

- Areas with unburned, unchanged and low burn severity according to RAVG data. https://burnseverity.cr.usgs.gov/ravg/background-products-applications
- Within ¼ mile from system roads (Maintenance Level 2, 3, and 4 roads, see Figure 6), as these are areas where access for these treatments is feasible.
- Identify treatment areas that will aid in developing defensible space to potential wildfire focusing treatment in Frequent Fire ERUs.
- Previous hazard tree abatement NEPA (Hazard Tree CE, 3200 acres), areas where trees were planted, and Designated Wilderness areas are excluded from treatment.
- Areas on slopes greater than 40 percent will include fall/leave/lop and scatter. Mechanical felling and skidding will be prohibited on slopes greater than 40 percent. On slopes less than 40 percent, mechanical operations will be permitted.

Commented [AO4]: Treatments near streams that feed acequia diversions should incorporate sediment barriers and debris-catch structures upstream of headgates. The Environmental Analysis should clarify how felled-wood removal will prevent increased turbidity in acequia supply channels. Include acequia systems as monitoring points for watershed-protection effectiveness.

Commented [AO5]: When thinning in unburned or low-severity areas, retain vegetative buffers along acequia corridors. NMAA recommends that thinning residues be chipped or removed rather than piled near irrigation ditches to prevent nutrient leaching and erosion during monsoon storms.

Slash treatments may be done mechanically or by hand using the following methods: lop and scatter, mastication, chipping, or mobile incinerator.

Comply with Table C.3. from the U.S. Fish and Wildlife Service's Mexican Spotted Owl (MSO) Recovery Plan (First Revision, September 2012) as indicated in project design features (to be in Appendix A of EA). As consistent with the revised recovery plan for the MSO and the Southwestern Region MSO Habitat Management Strategy and the 2022 Forest Plan, forest stand structural conditions are to be sampled (common stand exams) prior to treatments. If sampled stands are meeting recovery plan recommendations for Southern Rocky Mountains EMU forested recovery habitat, the Forest will work toward treating stands to maintain recommended basal area, percent diameter class and species composition. Stands that currently meet recovery nesting/roosting habitat would not be degraded or may not be treated at all.

To reduce the threat of wildfire from excess slash accumulations created from the treatments specific to removing hazardous fuels and harvest of trees to control insects or disease, no more than 1,000 acres of slash may be generated and remain on the ground within the project area at any period. Thinning will not continue until slash is removed or sufficiently mitigated. The status of slash on the ground must be approved by Forest fuels and fire personnel for adequacy prior to additional thinning operations.

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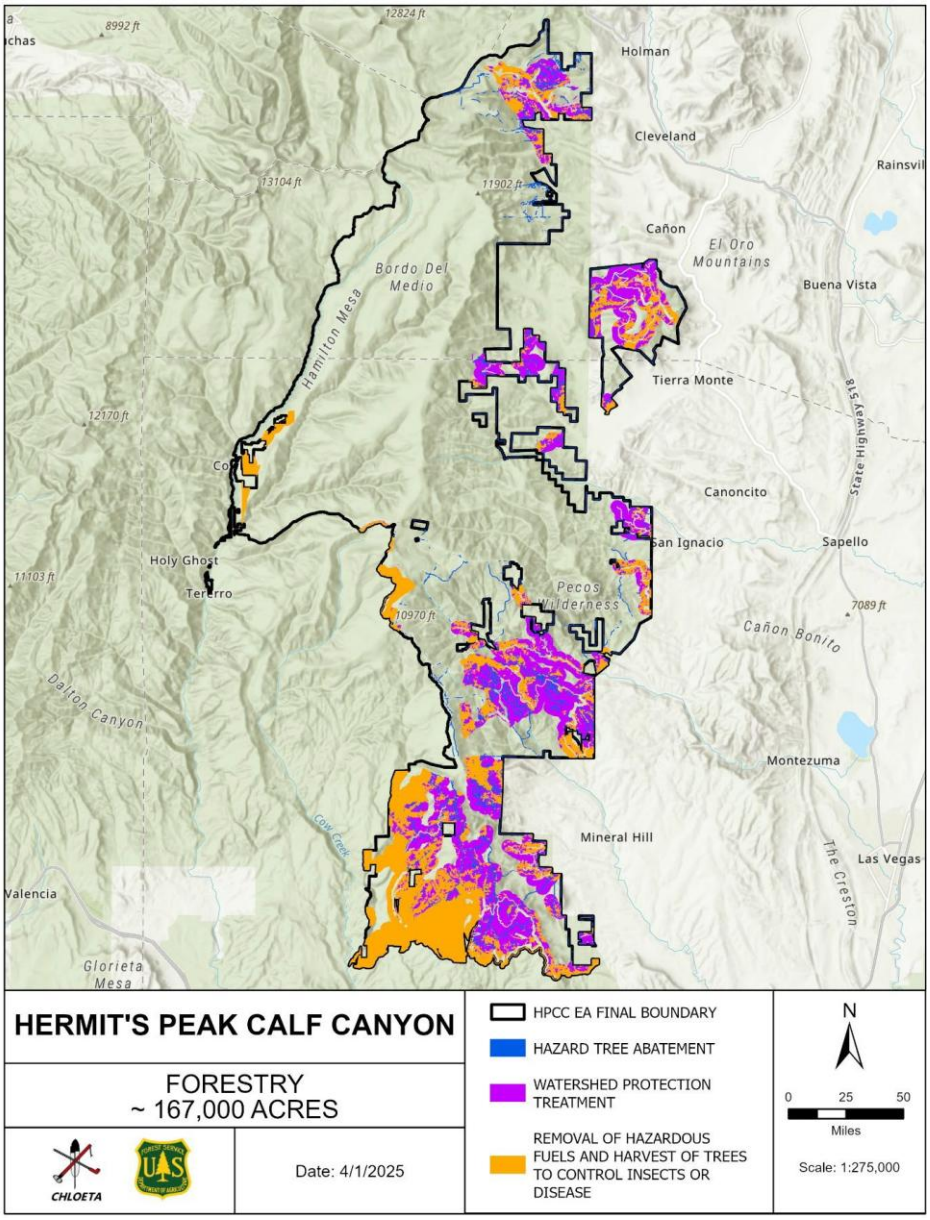

Figure 2: Hermit's Peak Calf Canyon Forestry

2.2.2 Watershed, Riparian, Aquatic, Wetland and Adjacent Upland Areas

Multiple watershed-related project activities are included and identified below. Project actions may be used alone or in combination to address post HPCC fires recovery needs.

Post-Wildfire Watershed Resiliency, Recovery and Stabilization Actions

1. Aquatic organism passages
2. Instream, side-channel, and floodplain projects
3. Riparian vegetation treatments
4. Road and trail erosion control, relocation, and decommissioning
5. Groundwater-dependent and groundwater-recharge ecosystem treatments

The potential project locations include a 100-foot buffer around riparian vegetation, perennial and intermittent streams, seeps, and springs and a 15-foot buffer around ephemeral streams. There may be instances, however, when certain activities could occur outside of these areas.

Four project types could potentially occur outside of the area defined above:

- Tree removal for large wood collection for stream enhancement
- Upland wells and trick tanks for livestock watering
- Road and trail erosion control, relocation, and decommissioning
- Staging of projects

Adjacent uplands that contribute to increased runoff, erosion and sedimentation, or areas that when treated would contribute to effectiveness of these activities will be considered when determining where projects will be implemented. Materials from adjacent uplands (i.e., rock, trees, woody debris) could be harvested and used to implement project actions. Equipment to implement project activities may include, but are not limited to, chainsaws, pruning shears, winch machinery, feller bunchers, slash-busters, excavators, bulldozers, dump trucks, and front-end loaders.

2.2.2.1 Aquatic Organism Passages

Aquatic organism passage projects include activities to improve aquatic organism movement as well as constructing or improving barriers that are now ineffective from post fire conditions. These projects can be accomplished using the following activities:

- Completely removing culverts, bridges, or other obstructions
- Replacing improperly sized culverts or bridges with properly sized culverts and bridges
- Replacing a damaged culvert or bridge
- Replacing culverts or bridges with culverts or bridges designed for aquatic passage and stabilization appropriate post-fire conditions
- Resetting a culvert that was improperly installed post-fire or damaged from post-fire impacts
- Stabilizing and providing passage overhead cuts
- Constructing, improving, or maintaining non-native fish passage barriers

Commented [AO6]: Acequias that have culverts that are damaged and/or need upsizing have been reported through the HPCC Claims process.

Commented [AO7]: Bridge and culvert replacements should also address acequia crossings. Where acequia diversions share stream channels, design aquatic-passage structures to maintain irrigation diversion function. Consultation with contractors who are familiar with acequias and/or NMAA technical staff should precede installation.

Projects to improve aquatic organism passages may be implemented to improve locations where passage has been partially blocked or eliminated because of HPCC fires. Enhancement of existing natural fish passage barriers may be implemented to exclude undesired and non-native aquatic species from specific areas where risk to native species has increased from post-fire impacts. Fish passage barriers are structures installed in stream channels to prevent the upstream migration of non-native fish that are detrimental to native species. Structures are generally constructed of a concrete wall for upstream and downstream erosion protection or may involve augmentation of an existing natural geologic barrier with natural or man-made materials. Equipment such as excavators, bulldozers, dump trucks, and front-end loaders may be used to implement aquatic organism passage projects.

2.2.2.2 Instream, Side-Channel, and Floodplain Projects

There are several actions that can be used for instream, side-channel, and floodplain projects where functions were impacted by HPCC fires directly and since the fire, including, but not limited to: installing structures to reduce erosion and stabilize head cuts; placing large wood, boulders, and engineered logjams; various range improvements that can assist with livestock distribution and watering; projects focused on restoring stream channels, streambanks, and floodplains to move toward the 2022 Forest Plan desired conditions; and reducing recreation impacts (further discussed in Section 2.2.3). These actions (e.g., installing or removing structures, channel reconstruction, and revegetation) may involve using heavy equipment.

Erosion control structures, head cut, and grade stabilization: These projects reduce post-fire erosion and sedimentation and may increase floodplain connectivity, infiltration, and riparian vegetation. Structure types may include rock check dams, filter weirs, media lunas, straw bale filter dams, sheet piling dams, log and boulder cross vanes, Zuni bowls, log step downs, rock plugs, rolling dips, water bars, out-sloping, drainage pipes, lead-off ditches, boardwalks, corduroy, one-rock dams, plug and pond structures, sod plugs, log mats, and rock/log rundown.

Wood, boulder, and gravel placement: These projects involve placing woody debris structures, large wood, boulders, and gravel in stream channels and adjacent floodplains in a manner that mimics natural conditions and locations. Tree removal to provide the sources for woody debris structures and large wood projects will happen in both bottomlands and uplands.

Engineered logjams: Engineered logjams are structures designed to redirect flow and change scour and deposition patterns in stream channels. To a practical extent, they are patterned after stable natural logjams and can be either unanchored or anchored in place. Engineered logjams create a low-velocity downstream zone that allows sediment to settle out. Scour holes develop next to the logjam, providing valuable fish and wildlife habitat while also redirecting flow and providing stability to a streambank or downstream gravel bar.

Riparian, aquatic and wetland range and wildlife improvement projects: Impacts from livestock and wildlife grazing can be mitigated with structures that help manage distribution, grazing pressure and balance use of riparian, aquatic, and wetland areas, promoting natural recovery post-fire. Fences exclude or defer riparian grazing and herbivory and protect aquatic restoration projects. Walkways provide controlled access for livestock to cross streams and pass through riparian areas. Upland (off-channel) pasture watering improvements such as trick tanks, upland

Commented [AO8]: The New Mexico Acequia Association (NMAA) supports post-fire streambank stabilization but requests that acequia systems be explicitly integrated into streambank-restoration design. Many acequia intakes and conveyance ditches originate along degraded streambanks impacted by debris flow and channel incision. Restoration activities such as bank shaping, soil reinforcement, and vegetative stabilization

Commented [AO9]: Prioritize erosion-control and grade-stabilization structures above acequia intakes. NMAA recommends incorporating one-rock dams, log vanes, and willow plantings to trap sediment and protect headgates. Post-implementation monitoring should include acequia turbidity and sediment deposition metrics.

wells, and stock tanks reduce livestock use in riparian areas and stream channels while also providing water sources for wildlife.

Beaver habitat restoration: These projects support post-fire restoration of beaver habitats through willow and other deciduous vegetation planting, noncommercial conifer thinning, and installing in-channel structures to encourage beavers to build dams in incised channels and across floodplain surfaces.

Streambank restoration: These projects would restore streambanks that have been altered from post-fire runoff, debris flow, or erosion. For example, streambank restoration could include bank shaping and other soil reinforcements as necessary to support riparian vegetation.

Legacy structure removal: Removal of structures that are detrimental to aquatic habitat or water quality. These structures are ineffective now because of post-fire conditions. Examples of such structures include but are not limited to; rock and gabion grade controls, such as riprap; log weirs; boulder steps; ineffective fish barriers.

Channel reconstruction or relocation: Earthwork around channels to change the flow of water and riparian vegetation to stabilize the soil and improve water quality are activities that need planned and implemented together. Channel restoration, reconstruction, or relocation adjusts or creates a water course of altered stream channels in a manner that mimics natural gradient, bank-full width, and sinuosity. Principal elements of design are gradient, entrenchment, bank-full width, sinuosity, and substrate. For wetlands, restoration may include, but would not be limited to, plugging gullies with fill material.

Off- and side-channel habitat restoration: Off-channel and side-channel habitat restoration reconnect and restore relic (natural) side channels by removing manufactured fill and plugs, thereby preventing their connection with the main channel. New off-channel habitat, e.g., digging ponds, may be constructed, where appropriate and necessary. Floodplain and wetland restoration sets back or removes existing berms, dikes, and levees to reconnect stream channels with floodplains and wetlands with water sources. Other restored ecological functions include overland flow during floods, dissipation of flood energy, increased water storage to augment low flows, sediment and debris deposition, growth of riparian vegetation, nutrient cycling, and development of side channels.

2.2.2.3 Riparian Vegetation Treatments

Riparian vegetation planting: Riparian vegetation planting to stabilize the soil may include, but would not be limited to, planting of native, locally sourced (where possible) riparian grasses, shrubs, and trees to restore native vegetation that was impacted during or after the fire. These activities may also include building temporary fences, to protect and enhance existing or planted riparian vegetation until it becomes well established.

Conifer and nonnative invasive plant removal: As appropriate to the vegetation desired conditions for riparian areas, meadows, wetlands, and their adjacent uplands, conduct non-commercial mechanical thinning of conifers encroaching into riparian areas as well as non-native

Commented [AO10]: NMAA supports streambank-restoration activities aimed at stabilizing channels impacted by post-fire runoff and erosion. However, because many acequia intakes and diversion structures are directly connected to these same streambanks, the EA should explicitly recognize acequia corridors as priority restoration sites.
NMAA recommends that streambank-restoration designs and implementation plans include the following:
• Mapping and prioritization of acequia diversion points and headgates to ensure they are included in bank-stabilization zones;
• Use of bioengineering techniques—such as willow staking, brush mattresses, and live fascines—that reinforce banks naturally while maintaining acequia access for maintenance and limpieza;
• Avoidance of riprap or hard-armoring materials that may ...

Commented [AO11]: NMAA agrees that ineffective or failing grade-control structures should be removed but urges the Forest Service to verify that legacy features with acequia utility are not inadvertently eliminated. In several tributaries, historic rock or log structures serve dual functions—providing aquatic habitat complexity while stabilizing acequia diversion flows. Prior to removal, the agency should:
• Consult with local acequia commissions and the New Mexico Office of the State Engineer to identify structures tied to water-righted diversions; ...

Commented [AO12]: Channel reconstruction and relocation must explicitly assess impacts to existing acequia intakes, diversion dams, and legal points of diversion. Because many acequias are hydrologically connected to streams proposed for realignment, NMAA requests that:
• Hydrologic and geomorphic modeling include acequia diversion points to prevent unintended dewatering or redirection of supply flows;
• Any proposed gradient or sinuosity adjustment maintain the hydraulic head required for acequia diversion; ...

Commented [AO13]: NMAA supports reconnecting floodplains and side channels as part of holistic watershed recovery but emphasizes the need to consider downstream acequia hydrology. Creating or reopening side channels can alter flow distribution and sediment routing that directly affect acequia diversions. To ensure compatibility, the Forest Service should:
• Model changes in baseflow and flood routing at known acequia diversion sites before excavation or berm removal;
• Install sediment-settling or grade-stabilization structures ...

Commented [AO14]: NMAA supports the restoration of riparian vegetation to stabilize soils, improve water quality, and reestablish ecological function in post-fire landscapes. Because many acequia diversions and conveyance systems are directly tied to riparian corridors, this restoration activity is vital for protecting both hydrologic and cultural resources. To ensure that riparian-vegetation treatments fully support acequia recovery and resilience, NMAA recommends the following measures:
• Prioritize revegetation upstream and adjacent to acequia ...

Commented [AO15]: Re-vegetation plans should favor native species that reinforce acequia banks and shade irrigation waters. Coordinate plantings with parciantes to ensure species do not obstruct maintenance (limpieza). Avoid herbicide use near ditches.

vegetation removal. These actions will help restore the composition and structure of desired riparian species, thereby improving ground cover and water infiltration into soils.

2.2.2.4 Road and Trail Erosion Control, Relocation, and Decommissioning

Road and trail relocation: Road and trail relocations include relocating all or portions of a National Forest System Road or Trail to a hydrologically preferred location, such as a ridgetop, while also decommissioning the route in the undesired location, such as up the stream channel. These projects would be needed to address roads and trails that are negatively impacting riparian, aquatic and wetland resources post-fire, hydrologically disconnecting them from stream networks, and could be combined with decommissioning the road or trail.

Erosion Control: Erosion control measures for roads and trails may include relocation as described above, installing structures, or otherwise altering the route to control the flow of water to remove it from the travel way as soon as possible. Erosion control structures may include, but would not be limited to, rolling dips, water bars, out-sloping, drainage pipes, lead-off ditches, boardwalks, and corduroy.

Decommissioning: Decommissioning all or portions of roads or trails may be necessary to reduce or minimize adverse impacts for various natural resources. Road and trail decommissioning is defined as activities that result in the stabilization and restoration of travel routes to a more natural state (36 CFR 212.1, FSM 7705), where restoration includes disconnecting the route from the hydrologic network. The Forest Service Manual 7712.11 identifies five levels of treatments for decommissioning that can achieve the intent of the definition, as follows: blocking the entrance; revegetating and water barring; removing fills and culverts; establishing drainage-ways and removing unstable road shoulders; implementing full obliteration recontouring and restoring natural slopes.

2.2.2.5 Groundwater-Dependent and Groundwater-Recharge Ecosystems

Restoration of seeps and springs: Restore seeps and springs to their desired conditions. Examples of project activities include altering channels to restore sinuosity, installing channel structures to elevate the base level, planting native plants, removing old infrastructure, redirecting water flows to original or sustainable flow paths, installing fencing, and redesigning or replacing spring development to allow for flows into spring associated ecosystems. Springs supporting riparian areas can occur across the landscape, in the uplands, in the bottomlands, and on the sides of cliffs. The desired condition is often to maintain a spring's functional characteristics that are like their historical condition, which represents ecological integrity. These conditions may be different for each spring, and discussing this with a group of specialists will inform the most appropriate pathway to reach desired conditions.

Commented [AO16]: When relocating roads or trails, ensure acequia access routes remain open for maintenance vehicles and hand crews. Stabilize decommissioned paths crossing acequias with rock armoring and reseeding. Require notice to acequia associations before any temporary access restriction.

Commented [AO17]: The New Mexico Acequia Association (NMAA) supports erosion-control actions that protect watersheds but emphasizes that many forest roads and trails drain toward acequia corridors and irrigated valley floors. To prevent secondary sedimentation impacts, NMAA recommends that:
• All erosion-control designs include mapping of downstream acequia crossings and diversions so that runoff energy and sediment are intercepted before reaching ditches;
• Rolling dips, drainage pipes, and lead-off ditches discharge to vegetated filter strips or sediment basins, not directly toward acequia embankments;
• When out-sloping or regrading roads near acequias, project engineers consult with local acequia commissioners and mayordomos to confirm safe flow dispersion away from irrigation infrastructure; and
• Monitoring sites be co-located with acequia headgates to evaluate post-construction turbidity and sediment delivery.
These measures will ensure that erosion-control improvements simultaneously stabilize upland travelways and safeguard acequia water quality, soil integrity, and long-term operational health.

Commented [AO18]: The NMAA recognizes the ecological value of road and trail decommissioning but requests careful evaluation where routes provide access for acequia maintenance, emergency diversion repair, or seasonal limpieza. Before a route is fully obliterated or recontoured, the Forest Service should:
• Inventory and classify any road or trail that serves as a traditional or functional acequia access path;
• Engage local acequia commissioners and parciantes to determine whether controlled access must be retained for ditch cleaning, debris removal, or headgate inspection;
• Incorporate drivable or walk-in maintenance easements into decommissioning designs where access is essential; and
• Apply revegetation and drainage treatments that prevent future gully formation leading toward acequia embankments.
NMAA further recommends that decommissioned routes adjacent to irrigation systems include erosion-resistant cross-slopes and native grass seeding to prevent renewed sediment delivery. These steps will allow the agency to meet ecological restoration goals without compromising acequia functionality or community stewardship responsibilities.

Commented [AO19]: Springs historically feeding acequias must be cataloged and protected. Restoration designs should maintain flow continuity to downstream ditches. Include acequia users in spring restoration prioritization.

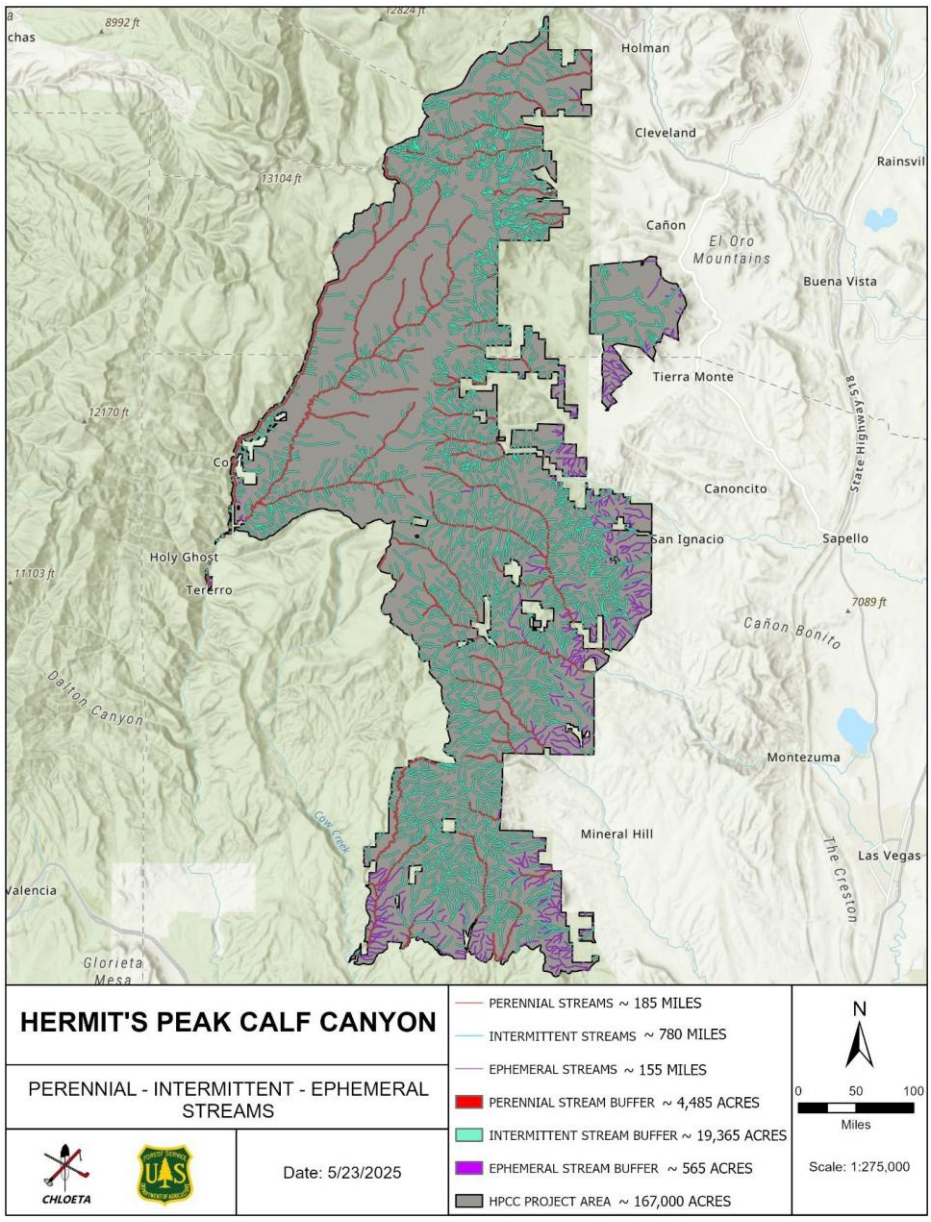

Figure 3: Hermit's Peak Calf Canyon Streams

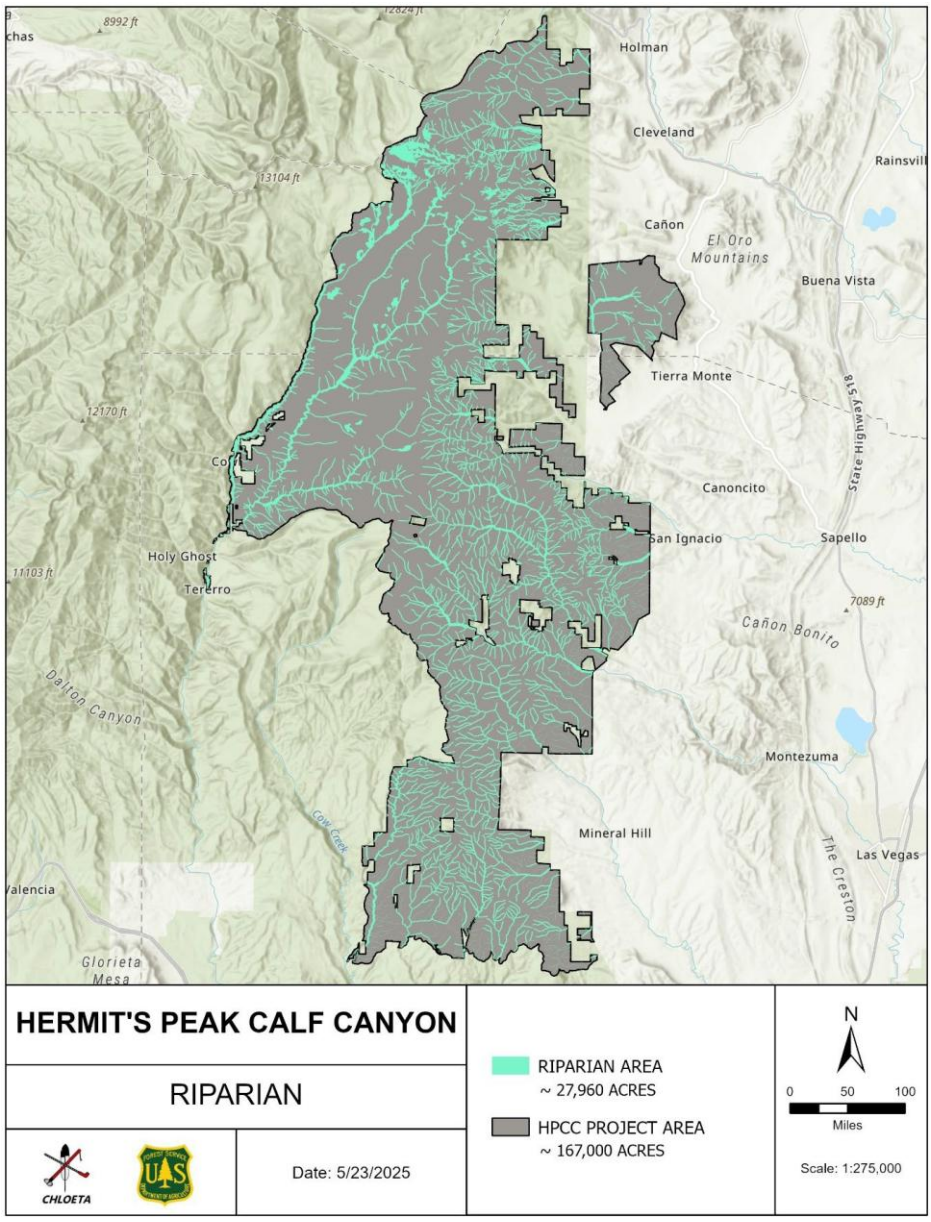

Figure 4: Hermit's Peak Calf Canyon Riparian

2.2.3 Recreation

To restore the recreation infrastructure through repair, reconstruction, or decommissioning, two project actions are proposed:

Recreation Restoration Actions

1. Restoration of National Forest System Trails
2. Restoration of Developed Recreation Infrastructure

2.2.3.1 Restoration of National Forest System Trails

Damaged system trails or trail segments would be restored through repairing, reconstructing, maintaining, relocating or re-routing, or decommissioning. All proposed actions would meet the trail management objectives (TMOs) identified for that trail and would follow specifications and guidance in the Forest Service Trails Management Handbook (FSH 2309.19) and the most current version of the Trail Maintenance and Construction Notebook (USDA, 2007). Recovery actions would be designed for sustainable trails that include the following physical characteristics:

- Requires only light seasonal maintenance.
- Has moderate trail grades less than 7 percent, is routed across sloping terrain, and, where soils and local rainfall patterns allow, may have short steeper segments (less than 40 ft [13 m]) with up to a 15-percent grade.
- Located, to the extent possible, on stable soils that are not easily eroded and with features that can withstand use with minimal erosion or damage to the trail tread. Designed to anticipate the effects of the type of severe weather events, wildfires, and other natural disasters most likely to occur in a given area.
- The trail follows the contour of the hillside and does not disrupt the flow of water down the hillside or has reversals in grade (a.k.a. undulation) that forces water to drain off the tread without constructed drainage structures.

Ongoing trail assessments will determine the specific activities needed to restore system trails within approximately 4,575 acres and may include:

- Repairing, reconstructing, and maintaining trail segments within an eight-foot corridor from the centerline of the trail tread by using one or more of following actions:
    - Brushing, removing, or trimming vegetation, removing hazard trees and downed logs
    - Repairing or reconstructing trail tread to restore proper width, drainage, stabilization, slope, and surface condition. This could also include existing and new features such as check dams, waterbars, grade reversals or undulations, stairways, retaining walls, and fords
- Repairing and replacing fire or flood damaged structures that support the trail system, including signs, bridges, turnpikes, and culverts. Installing new structures in a location where existing conditions are no longer suitable.

Commented [AO20]: Many trails parallel or intersect acequias. NMAA requests that reroute designs incorporate erosion-resistant crossings and avoid ditch compaction. Coordination with acequia commissioners is necessary when trail maintenance affects ditch banks or lateral access paths.

- Restoration efforts of system trails would seek to reestablish equivalent recreation opportunities where safety and sustainability can be achieved. Where restoration efforts are not feasible, system trails may be decommissioned.
- User-created trails, not designated as system trails, may be decommissioned, or closed and blocked with vegetation where they intersect with system trails, to prevent unexpected natural or cultural resource damage, as well as preserve a coherent and usable trail system.
- Relocating or rerouting a trail or trail segments could be proposed when assessments determine the trail or segment of trail is not sustainable, therefore lacking some or all the physical characteristics described above. Re-routes would seek to reestablish an equivalent system trail in an area close to the existing trail, in a sustainable location.

In general, all trail work in the Wilderness would be completed with hand tools. However, the SFNF may seek approval for the use of chainsaws in Wilderness to clear down trees in areas of heavy and frequent downfall that are impeding access to trails. A Minimum Requirements Analysis (MRA) must be utilized when considering nonconforming or prohibited uses in designated wilderness. Therefore, chainsaw use in the Wilderness would not be authorized unless it is determined consistent with the Wilderness Act and would maintain or improve Wilderness character, as documented by completing a MRA and approved by a Regional Forester.

2.2.3.2 Restoration of Developed Recreation Infrastructure

There are 14 developed recreation sites within the project area: three day-use sites (Baker Flats, Big Pine, Oak Flats), eight trailheads (Elk Mountain, Burro Basin, El Porvenir/Hermits Peak, Rito Chavez, Lone Pine Mesa, Lost Lake, Sparks, Walker Flats), and three campgrounds (El Porvenir, E.V. Long, Johnson Mesa,). All sites were directly affected by HPCC fires or post-fire flooding and erosion and are vulnerable to future post-fire impacts. To ensure their safety and sustainability and reduce potential effects to the watershed, all sites will be assessed for site-specific needs to guide restoration actions, which could include repairing, reconstructing, replacing, relocating, removing, or decommissioning remaining infrastructure. Examples of infrastructure may include, but would not be limited to: bathrooms, picnic tables, fire rings, trash receptacles, and campsites within a campground. Restoration efforts would seek to reestablish equivalent recreation opportunities where safety and sustainability can be achieved. Where restoration efforts are not feasible, infrastructure may be decommissioned. New floodplain analysis will also be used to guide these efforts. In response to this analysis, the type of use for some sites may need to be changed (e.g., from overnight camping to day use).

Commented [AO21]: Campground and picnic-area repairs should identify any nearby acequia channels. Storm-water controls such as bio-swales should prevent runoff into acequias. Public signage can educate visitors about acequia importance and discourage dumping or washing near ditches.

Each existing recreation site plus a 100-foot buffer around the site delineates the area for the restoration activities, which comprises approximately 150 acres for all 14 developed recreation sites. Restoring campsites could occur in up to 135 acres located adjacent to existing campgrounds. For example, campsites at E.V. Long Campground that present a risk to human safety due to their location in the flood plain and are susceptible to post-fire flooding, may be re-located to the El Porvenir Campground.

Restoration activities are likely to include ground disturbing activities with mechanized equipment. In general, actions would seek to minimize removing vegetation to the greatest extent

possible. However, restorating individual campsites is expected to result in higher amounts of vegetation removal to accommodate the actual campsite footprint and vehicle access to the site.

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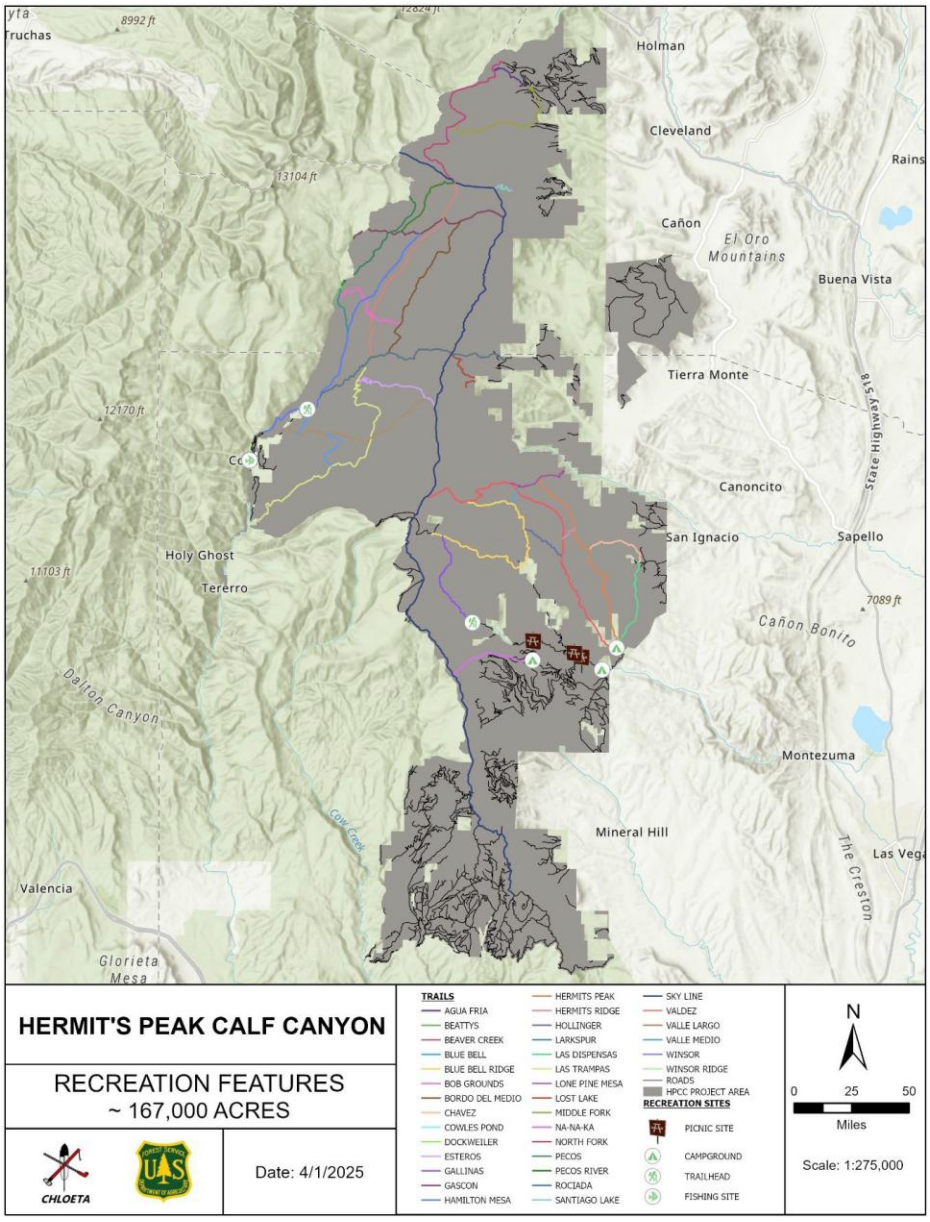

Figure 5: Hermit's Peak Calf Canyon Recreation Features

2.2.4 Transportation

To restore access and the transportation infrastructure within the project boundary, the following project actions are proposed:

Transportation Actions

1. Replacing and Repairing Bridges
2. Road and Drainage Improvements, Stabilization, or Relocation
3. Road Maintenance

2.2.4.1 Replacing and Repairing Bridges

There are a total of 17 bridges within the project boundary, the majority cross the Gallinas River along National Forest System Road 263 in Gallinas Canyon. Since the summer of 2022, these bridges have been and continue to be impacted by subsequent flooding and debris flows from monsoon events resulting in significant damage and deficiencies. The bridges have exceeded their design life and significant repairs or replacement is needed. National Forest System Road 263 provides the only access to Gallinas Canyon, which is currently unreliable, especially during heavy rains. One bridge was completely buried by debris flows and the Gallinas River's course has altered. Many of these bridges are within the floodplain of the 100-year storm event and do not meet current design standards. A hydrologic and hydraulic analysis and a structure analysis of the bridges within the Gallinas Canyon corridor will be used to identify appropriate crossing structures, including bridges, armored or hardened low water crossings, box culverts, vented fords, or unvented fords, ensuring that Forest Service design guidelines are met. Safety and sustainability of access within this corridor will be evaluated as specific project tasks are developed. Repairing and replacing bridges will include work within the stream channel and floodplain areas adjacent to the structures.

Commented [AO22]: Bridge replacements in Gallinas Canyon must preserve acequia diversion points downstream. Include acequia representatives in hydrologic design reviews to confirm that crossing structures do not redirect flow or increase sediment delivery into ditches.

2.2.4.2 Road and Drainage Improvements, Stabilization, or Relocation

There are approximately 400 miles of National Forest System roads within the project area. For those segments that require restoration because of the fire or post-fire effects, activities to restore and improve the infrastructure and to minimize the negative effects of roads on natural resources include the following:

- Replacing or relocating drainage crossing structures
- Relocating roads or road segments to hydrologically disconnect the road from a stream, including relocating a road out of the floodplain
- Installing sediment reduction or diversion features upstream from roads that connect to drainages
- Armoring or hardening road surfaces, shoulders, ditches, and drainage structures to reduce impacts from increased flows and erosive forces
- Installing erosion control features such as grade dips, rolling dips, water bars, and lead-off ditches
- Stabilizing head cuts directly upstream or downstream of a road
- Maintaining roadside ditches and outlet ditches and connected basins not otherwise covered under activities in section 2.2.2 where debris flow has accumulated and poses a risk to roadway infrastructure
    - Placing cleaned out material at approved disposal sites within the project area

Commented [AO23]: Road drainage outfalls should be mapped relative to acequia systems. Install sediment traps or vegetated filter strips at discharge points. When relocating roads, maintain legal acequia access easements.

- Rock blasting where necessary for road relocation
- Maintaining roads to remove surface deformations and ensure a free draining surface
- Hardening roads where there have been impacts from post-fire flooding and debris flows
- Widening to provide safe passage and roadside parking
- Surfacing roads with gravel of native surface material
- Removing vegetation to provide safe sight distance

Additionally, to facilitate hazard tree abatement and hazardous fuels treatments, as described above, improvements to existing roads could be required to accommodate expected loads, including but not limited to curve widening, new turnouts, and new turnarounds.

Relocating road segments would be further analyzed to assess the viability of a new route. This will include site specific data such as: amount of disturbance caused by the fire and post-fire events, amount of disturbance caused by re-routing, viability of other options in stabilizing the drainage or crossing, and length of time for drainage to stabilize. Because bedrock occurs close to the soil surface in much of the project area, it is possible that rock blasting may be needed to relocate some road segments. To remove the rock by blasting, holes drilled into the rock are packed with explosives to direct the force of the blast into the rock. The process of drilling, blasting, and excavating is repeated in the smallest possible area until sufficient bedrock is removed to allow for road construction.

2.2.4.3 Road Maintenance

Roads will be maintained in accordance with their designated maintenance level. Road maintenance operations may occur more frequently due to the increased flows from post-fire runoff. The traveled way, shoulders, roadside, drainage features, and structures will be maintained for protection of the infrastructure. This may include armoring of drainage features to reduce post-fire erosion and sedimentation. Surfacing placement with proper moisture and compaction to harden the road surface will be implemented in areas where post-fire runoff has impacted the traveled way. Surfacing will be replaced, and drainage will be maintained to keep features functional and to prevent unacceptable resource damage. High-clearance vehicle roads will be maintained for use by high-clearance vehicles. Protection of natural resources is the primary focus for maintenance of these roads.

Commented [AO24]: Maintenance grading must avoid side-casting material into acequia corridors. Operator training on acequia-awareness and signage identifying irrigation crossings would be recommended.

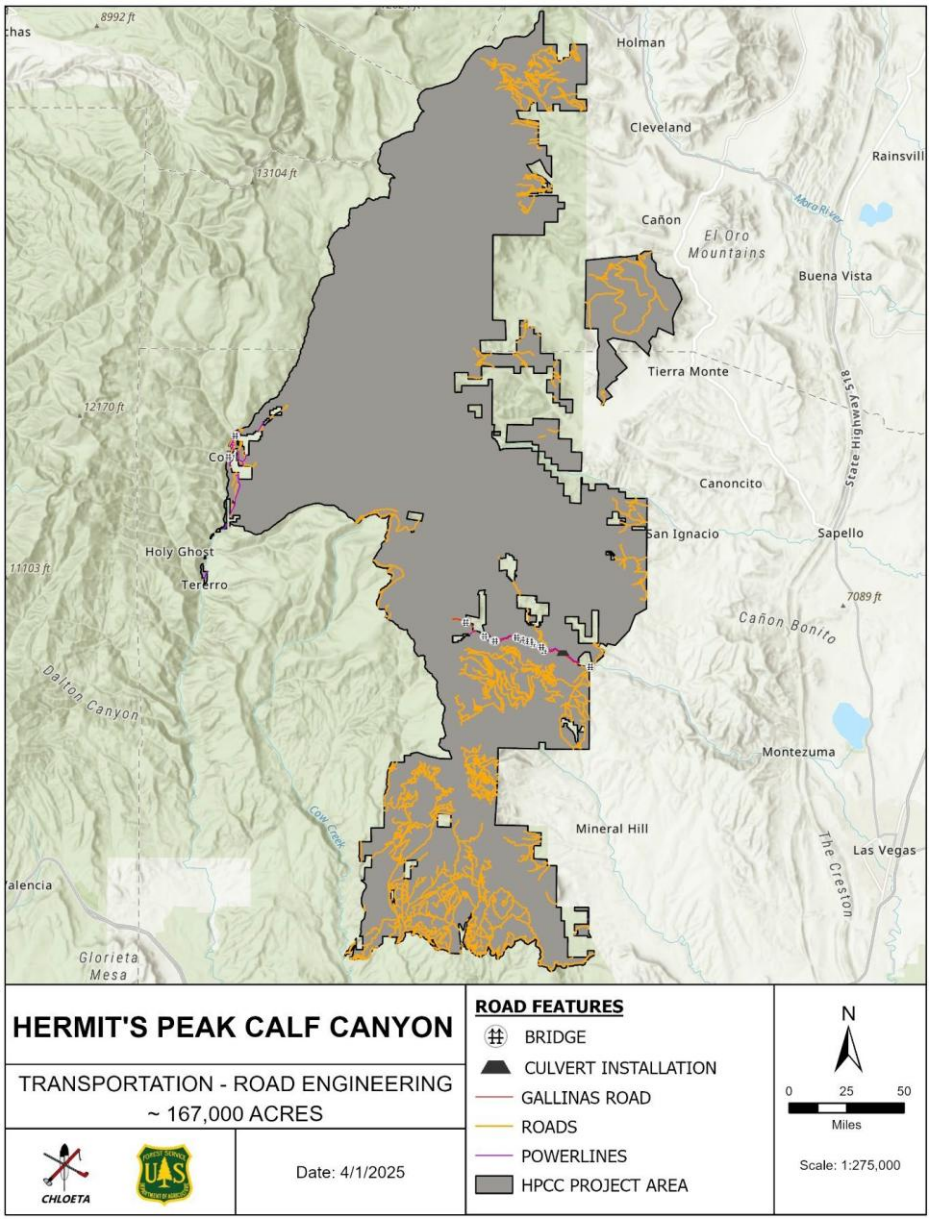

Figure 6: Hermit's Peak Calf Canyon Transportation – Road Engineering

2.2.5 Range

Present and future proposed actions for livestock management facilities across the landscape include:

Range Actions

1. Reconstructing Existing Fences
2. Virtual Fencing (Base Stations)
3. Cattle Guards
4. Corral Construction
5. Water Developments

2.2.5.1 Reconstructing Existing Fences

Based on preliminary GIS analysis, approximately 200 miles of fence were burned or damaged during the HPCC fires. The extent of the damage to fences is highly variable across the project area. Where fences require reconstruction, they would be reconstructed as barbed wire fence or with barbless wires on the top and bottom. Steel fence posts would be used, with corner and line bracing using treated wood H-braces or diagonal steel braces. Braces would be placed in concrete and would require up to four, 24- to 36-inch-deep holes with an approximate diameter of 8 to 12 inches per corner brace. Pivot posts, also known as deadman posts, of treated wood or steel, would be used in areas of slope or directional changes and would be buried to a depth of 24 to 36 inches. The number of pivot posts needed would be based on topography and site-specific conditions. In drainages and other water channels, fences would be constructed with steel pipe and would employ a breakaway section of fence to minimize damage to the fence during flood events. These structures would require setting steel posts in concrete 24 to 36 inches deep. An all-terrain vehicle (ATV) or utility terrain vehicle (UTV) could be used to unspool fence wire. Posts would be pounded into the ground using a steel post driver or pneumatic hammer.

A corridor approximately 5 feet on each side of the fence would be cleared to allow for allotment preparation, pasture fence construction, and future fence maintenance. A corridor approximately 10 feet on the side of Forest Service lands would be cleared to allow for boundary fence preparation, fence construction, and future fence maintenance. No roads would be constructed; however, the fence corridor would be made drivable by ATVs and would be accessible during construction by foot, livestock, ATV, UTV, or small tracked vehicle (i.e., skid steer or Bobcat) on slopes less than 40 percent.

Fence corridor entrance locations visible from NFS roads would be disguised with brush or trees to prevent other forest users from unauthorized access to the fence corridor. The fence corridor would be cleared of snags, and in some cases, trees that threaten the integrity of the fence. Vegetation (e.g., larger vegetation like trees and shrubs, not grasses or forbs) within 66 feet of the centerline (or 2 chain total width for hazard trees) may be felled by hand or using heavy equipment. Refer to section 2.2.1.1 for hazard tree abatement along fences.

Within the Pecos Wilderness, adjacent recommended wilderness areas (Grace Tract & Enchanted Lake), and inventoried roadless areas, wood pole construction will be used in highly visible areas, like around trail crossings. In other areas, standard barbed wire fence will be used. A walk-through gate will be installed at system trail crossings, typically less than 8 feet wide, and may

Commented [AO25]: Fence realignment should respect acequia easements and allow maintenance access. Consult acequia commissions prior to post setting within 50 ft of ditches.

be built of wood or steel. Access for fence work will be by foot and livestock. Any vegetation clearing will be done using crosscut saws. If approved through a MRA, helicopter drops and chainsaws may be included. Downed boles and residual slash will be scattered on site and left in the largest possible pieces. The immediate fence corridor will be accessible by foot or horse after the project is complete to facilitate future maintenance access.

The SFNF will be seeking approval for the following activities in the Pecos Wilderness: installation of virtual fencing base stations, fence extensions, and use of chainsaws in the wilderness for clearing fence lines and trails so that livestock can use these historical corridors to move from one pasture to another as specified in the Allotment Management Plan. There is an immediate need for the proper management of range cattle and for the safety of visitors on trails in the Pecos Wilderness. The actions are listed in Section 2.1, in the range proposals below, but will not be authorized unless they have been analyzed through an MRA and a Regional Forester has approved these activities in the wilderness.

No action would be authorized unless it was determined it would maintain or improve wilderness character, as documented in a project-specific analysis or by completing an MRA. The MRA is designed to help wilderness managers comply with the Wilderness Act and make appropriate and defensible wilderness decisions by identifying, analyzing, and recommending management actions that are the minimum necessary for wilderness administration. Wilderness areas would continue to be managed according to the Wilderness Act to preserve wilderness character (the combination of biophysical, experiential, and symbolic qualities that distinguish wilderness from all other lands). New fences may be necessary for range management in areas where HPCC fires burned forest stands that had previously functioned as natural barriers to livestock movement due to their density and relative lack of productive forage. In these areas, early seral vegetation, such as grasses, forbs, Gambel oak, and aspen, now predominate and new fences may be required to effectively manage livestock distribution, timing, and intensity. Approximately 30 miles of potential new fence construction has been identified within the project area based on the need to improve grazing distribution and protect sensitive ecological areas such as riparian zones and watersheds. Up to 5 miles of new fence construction is within the Pecos Wilderness. Additional new fences may be needed as assessments are completed, additional post-fire effects are analyzed, and as conditions continue to change across the landscape. All fence lines will be considered as part of the implementation guide to ensure that the effects are within the bounds of the analysis.

2.2.5.2 Virtual Fencing (Base Stations)

Virtual fencing is a new technology through which livestock movement and the timing of livestock grazing can be managed without physical fences, minimizing the need for fence construction and maintenance. Currently in a test phase on two allotments on the SFNF, virtual fencing uses global positioning systems (GPS) equipped cattle collars and solar-powered base stations and may replace pasture division and enclosure fences on NFS lands. Boundary fences would still be required since private cattle not equipped with GPS collars could not be excluded using virtual fencing.

Virtual fencing base stations would measure approximately 4 feet by 4 feet and consist of an aluminum box to house electronics equipment and batteries and a solar panel. Base stations

Commented [AO26]: Base-station placement should avoid acequia right-of-way corridors and not block access for limpieza or repairs. Coordinate with mayordomos to identify suitable upland locations.

would be installed on the ground surface and would require minimal site preparation, such as leveling, using hand tools. Base stations would be anchored to ground surface using steel anchor stakes driven into the ground approximately 24 to 36 inches deep. Small fence enclosures measuring up to approximately 100 feet by 100 feet could be installed to protect the base stations from ungulate damage where necessary. Access to base station locations would be via existing county roads, NFS roads, NFS trails. No new roads would be created.

2.2.5.3 Cattle Guards

Common cattleguards are usually 6 to 8 feet wide and up to 16 feet long. They are transported by flatbed truck or truck with trailer. The base design of a cattle guard can vary from a prefabricated metal box of which the unit is a whole to a cattleguard grate that is placed upon poured concrete. Grate height will be set at road level and compacted. Generally, cattle guards are needed as pasture or allotment fence lines cross any road feature. The Forest has identified several cattle guard locations and will continue to evaluate range infrastructure needs. Excavation by backhoe is the most common method for installation and will generally impact an area of 40 feet by 20 feet. The dimensions of excavation will be to the size of the cattleguard and no more than four feet deep. Wildlife escape ramps would be installed to avoid entrapment. Cattle guard installation would be coordinated with local resource specialists and site-specific needs would be determined at that time.

Commented [AO27]: Cattle-guard excavation can alter hydrology near acequia crossings; install drainage features to prevent redirection of flow into ditches.

2.2.5.4 Corral Construction

Corrals will be made of steel pipe poles placed in concrete at a depth of 24 to 36 inches. An estimated number of poles would be around 16 to 24 depending on site specific needs. The corral size would generally be no larger than 32 feet by 32 feet. Corral uprights will be placed in ground at a depth of 24 to 36 inches and set in concrete. A top pipe rail will be welded across the top of the poles to prevent wildlife entrapment within pipes. Pipe rails will be welded in between the pipe below as well as either sucker rod, or wire cattle panel to fill in the spaces. Equipment used will likely include tractors or skid steers for auguring holes for the poles. Gas powered welders and generators, as well as power tools will be necessary. All welding activities on NFS lands will be allowed only when no fire restrictions are in place and qualified fire personnel clear the activity. Permittees or volunteers and crews who assist with this action will be required to have water and tools available during welding activities. Wing fences that extend out from cattle guards may also be installed and will be constructed as standard fence identified in fence maintenance Section 2.1. These fences would not extend beyond 500 feet from corral location.

Commented [AO28]: Corrals must not be located in flood-prone areas feeding acequia diversions. Require setbacks and vegetative buffers to prevent manure runoff.

2.2.5.5 Water Developments

Water developments may include developed springs, roadside tanks, or trick tanks. There may be installation of guzzlers, boss tanks, spring developments with associated piping and enclosure fencing. Fencing enclosures would be no larger than 1 acre to protect sensitive riparian resources. Water pipelines would facilitate wildlife water within the enclosure and livestock water outside of the enclosure.

Commented [AO29]: New tanks or pipelines sourcing from springs tied to acequias require joint planning with acequia officials to ensure water allocations and flow rights are maintained.

Water pipelines will be installed below ground at a depth of 18 to 24 inches where possible and connect from existing pipelines to livestock drinkers. Pipelines will be installed using means such as a bulldozer to rip a trench and simultaneously place the pipeline within the trench, or using equipment such as a backhoe, mini excavator, or trencher to dig a trench and later lay the

pipe by hand. Heavy machinery will also be used to fill the trench with soil after the pipe has been laid if needed. Disturbance areas for new pipelines are usually 10 feet wide and as linear as the project. Storage tanks will not require much ground disturbance, but limited hand trenching may be required to tap into existing pipelines. Wildlife escape ramps would be installed within livestock drinkers to avoid entrapment (USDA, 2022). All new developments would incorporate design and BMPs from General Technical Report–405 (Gurrieri, 2020).

Existing water developments will also be repaired when encountered. Removing damaged troughs and above ground pipes would occur. Repair may include minimal trenching to repair burnt water lines. Snags, which could threaten any water feature or associated infrastructure, would be felled and left on site as downed wood.

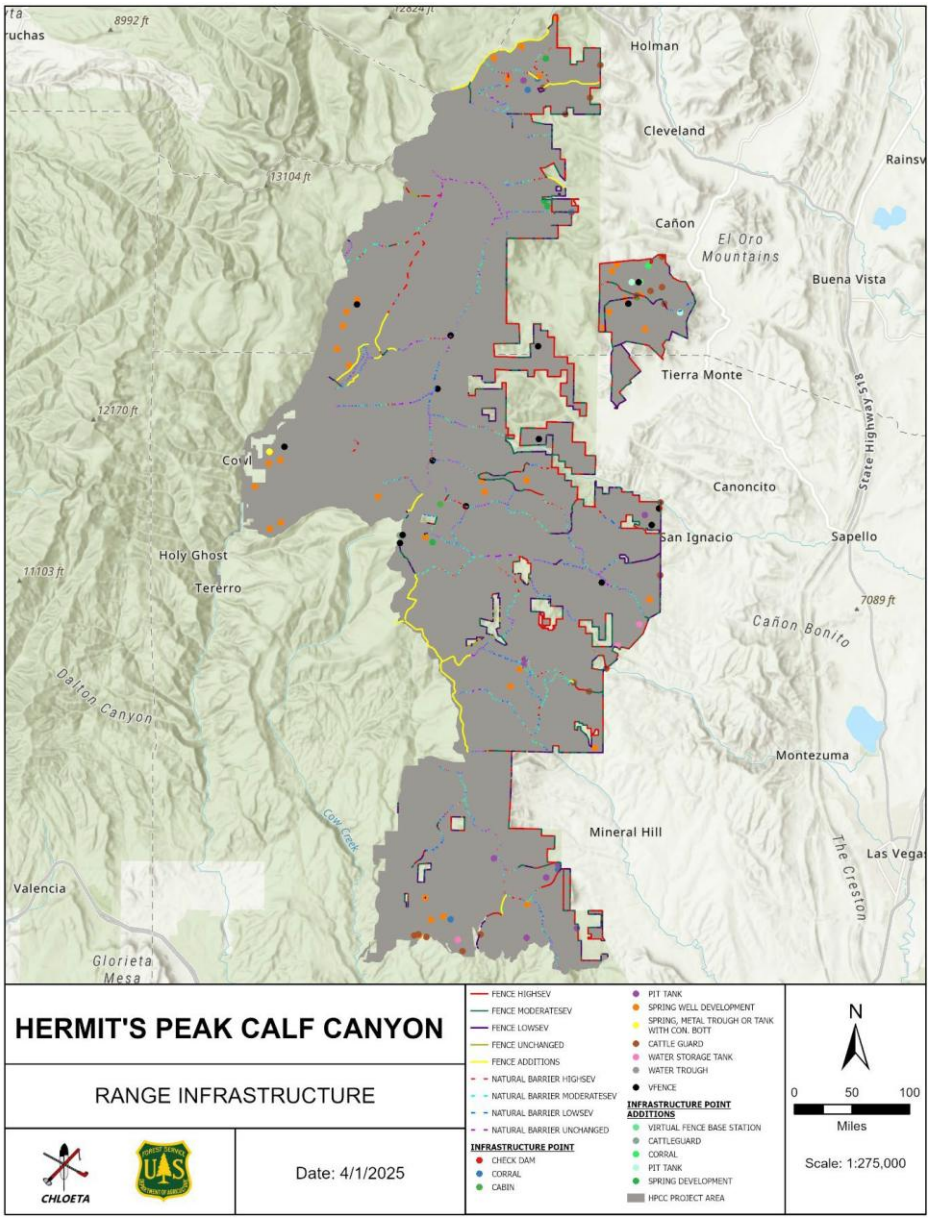

Figure 7: Hermit's Peak Calf Canyon Range Infrastructure

2.3 Alternatives Considered but Eliminated

In accordance with NEPA, the Forest Service considered a range of potential alternatives during preliminary screening. The EA carries forward alternative A (no action) and alternative B (proposed action) for detailed analysis. While other conceptual alternatives were identified early in the planning process, only alternative B was determined to meet the purpose and need for addressing post-fire conditions and long-term recovery within the HPCC fires area.

Other alternatives were eliminated from detailed analysis for the following reasons:

- Feasibility constraints: Some concepts required resources (e.g., workforce capacity, funding, equipment, or access) beyond what is currently available under federal or partner agency authorities.
- Failure to meet project objectives: Several alternatives did not sufficiently address the post-fire restoration needs, such as reestablishing native vegetation, stabilizing soils, or maintaining watershed function.
- Environmental or regulatory concerns: Options involving intensive ground disturbance or chemical treatments were dismissed due to the potential for adverse effects on federally listed species, water quality, or cultural sites.
- Redundancy or minimal variation: Some alternatives were substantially similar in approach to alternative B, offering no meaningful difference in environmental outcomes or public benefits that would warrant detailed analysis.

The no action alternative (alternative A) is included in the EA as a baseline for evaluating the environmental effects of the proposed action, as required by NEPA. Under the no action alternative, no coordinated restoration or recovery actions would occur beyond those already planned or underway.

Commented [AO30]: Clarify whether acequia-specific restoration alternatives (e.g., direct funding or cooperative agreements) were evaluated. If excluded, provide rationale. NMAA urges inclusion of a future programmatic alternative dedicated to acequia repair and resilience.

Commented [AO31]: The New Mexico Acequia Association appreciates the Forest Service's commitment to watershed recovery. We urge that acequias be formally integrated as both hydrologic infrastructure and cultural heritage systems throughout implementation. Long-term acequia health requires technical assistance, cost-share support, and consistent communication with commissioners, mayordomos, and parciantes. Doing so will align federal recovery with community-based stewardship that has sustained New Mexico's watersheds for generations.

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