Final Environmental Assessment

Deschutes County Hazardous Fuels Reduction Project

HMGP-5195-13

Deschutes County, Oregon

July 2021

FEMA

Federal Emergency Management Agency

Region X
Department of Homeland Security
130 – 228th Street SW
Bothell, WA 98021

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Acronyms and Abbreviations

BLM	Bureau of Land Management
BMP	best management practice
CEC	Central Electric Cooperative
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COFCA	Central Oregon Fire Chief's Association
CTWS	Confederated Tribes of Warm Springs
dB	decibels
DBH	diameter at breast height
DHS	U.S. Department of Homeland Security
DPS	Distinct Population Segment
EA	environmental assessment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FMAG	Fire Mitigation Assistance Grant
FONSI	finding of no significant impact
HMGP	Hazard Mitigation Grant Program
HOA	Homeowner's Association
MBTA	Migratory Bird Treaty Act
MCR	Mid-Columbia River
NAAQS	National Ambient Air Quality Standards
NCSO	Northern California Southern Oregon
NEPA	National Environmental Policy Act

NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OAR	Oregon Administrative Rules
ODFW	Oregon Department of Fish and Wildlife
ODF	Oregon Department of Forestry
OEM	Oregon Office of Emergency Management
PacifiCorp	Pacific Power
RCRA	Resource Conservation and Recovery Act
RECOA	Ridge at Eagle Crest Owner's Association
SHPO	Oregon State Historic Preservation Office
U.S.C.	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WUI	wildland-urban interface

Glossary

Hazardous Fuels Reduction: Includes thinning vegetation, removing ladder fuels, reducing flammable vegetative materials, and replacing flammable vegetation with fire-resilient vegetation for the protection of life and property. Vegetation may include excess fuels or flammable vegetation.

Ladder Fuels: Includes shrubs, small trees, down wood or brush, and low limbs that may provide a route for a fire to climb from ground fuels up into the forest canopy.

Limbing: Removal of tree limbs to reduce fuel loads and ladder fuels.

Loam: Well-drained soils composed of sand, silt, and clay in relatively even proportions.

Slash: Vegetative debris created by hazardous fuels reduction and other forest management activities.

Suppression: Response to wildland fire that results in the curtailment of fire spread and elimination of all identified threats from the fire; wildland fire suppression requires a variety of unique tactics to successfully curtail fires.

Thinning: Removal of some trees, branches, or shrubs from a forest stand.

Wildfire: Any uncontrolled fire that spreads through vegetative fuels such as forests, shrubs, or grasslands, exposing and possibly consuming structures.

Wildland-Urban Interface: the geographical area where buildings and structures and other human development meet or intermingle with wildland or vegetative fuels (U.S. Department of Agriculture [USDA] and U.S. Department of Interior 2001).

SECTION 1. Introduction

In January 2019, Deschutes County applied to the Federal Emergency Management Agency (FEMA) through the Oregon Office of Emergency Management (OEM) for a wildfire mitigation grant under FEMA's Hazard Mitigation Grant Program (HMGP). OEM is the direct recipient of the grant, and Deschutes County is the subrecipient. Deschutes County proposes to perform hazardous fuels reduction work across three project areas—a Deschutes County-owned parcel, and in the communities of the Ridge at Eagle Crest (Eagle Crest), and Odin Falls; encompassing about 1,620 acres (Proposed Action).

The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Under the HMGP, federal funds pay 75 percent of the project cost, and the remaining 25 percent is obtained from nonfederal funding sources. The HMGP funds were made available via a Fire Mitigation Assistance Grant (FMAG) declaration made by FEMA in 2017, which was related to the Milli Fire for projects that reduce the risk of future wildfires.

The Proposed Action targets three treatment areas. **Table 1.1** lists the treatment areas that comprise the project area and the latitude/longitude coordinates for each. The project vicinity and project areas are shown in **Figures 1-1 and 1-2**.

Table 1.1. Latitude/Longitude Coordinates of the Treatment Areas

Project Area	Latitude	Longitude
Deschutes County Parcel	44.2843	–121.139
Eagle Crest	22.2687	–121.288
Odin Falls	44.3377	–121.263

Fuels reduction work would include thinning and pruning trees, primarily smaller western juniper (*Juniperus occidentalis*) and ponderosa pine (*Pinus ponderosa*), and mowing/masticating/cutting brush and ground vegetation to space fuels both vertically and horizontally. Contractors would use chainsaws, brush cutters, chippers, pickups, and wheeled skid steers with associated tools such as mowers, masticators, and buckets.

This environmental assessment (EA) was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), U.S. Department of Homeland Security (DHS) Instruction 023-01-001, and FEMA Instruction 108-01-1, NEPA implementing procedures. FEMA is required to consider potential environmental impacts before funding or approving actions and projects. The purpose of this EA is to analyze the potential environmental impacts of the proposed action. FEMA used the findings in this EA to determine whether to prepare an environmental impact statement or to issue a finding of no significant impact (FONSI).

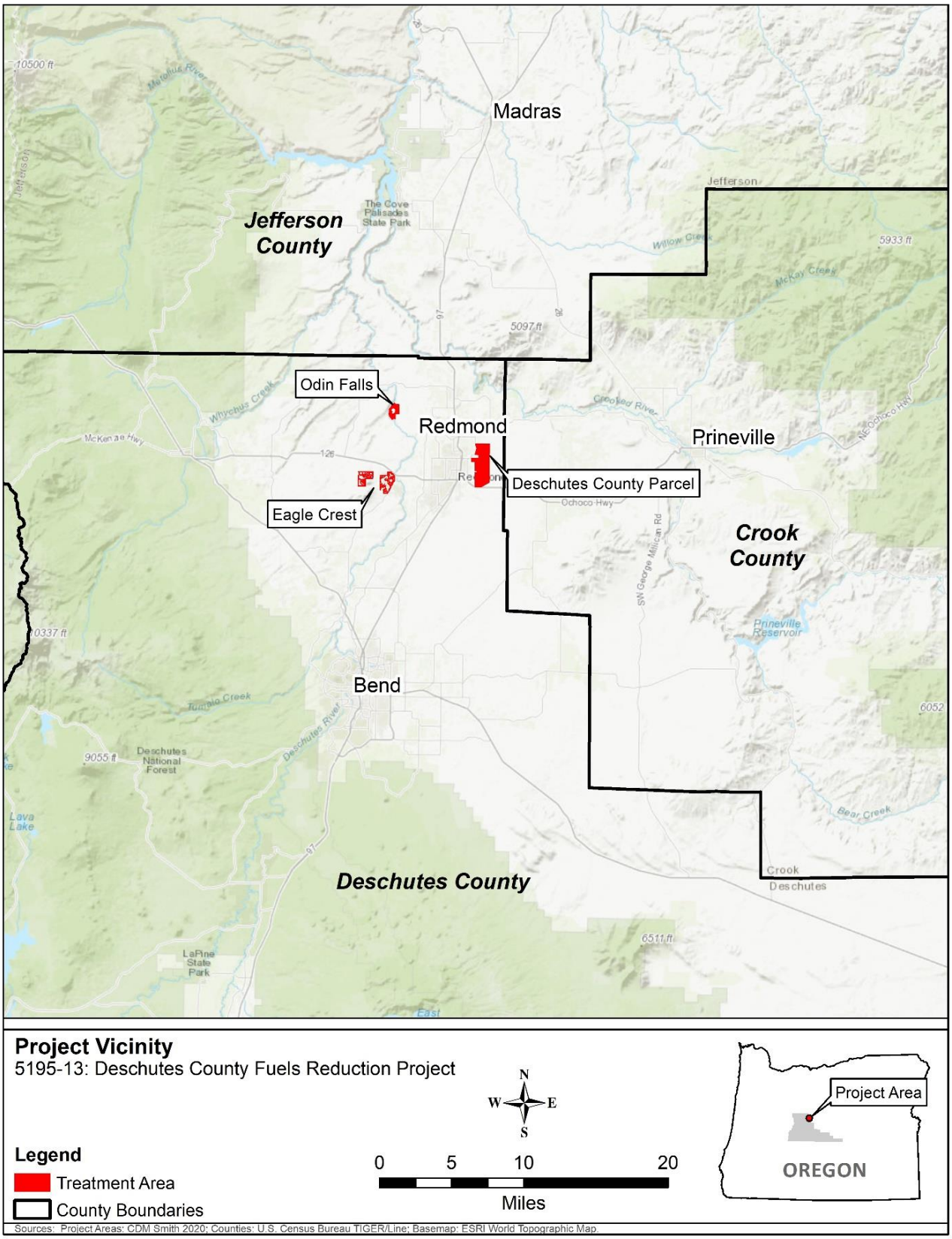

Figure 1-1. Treatment Vicinity

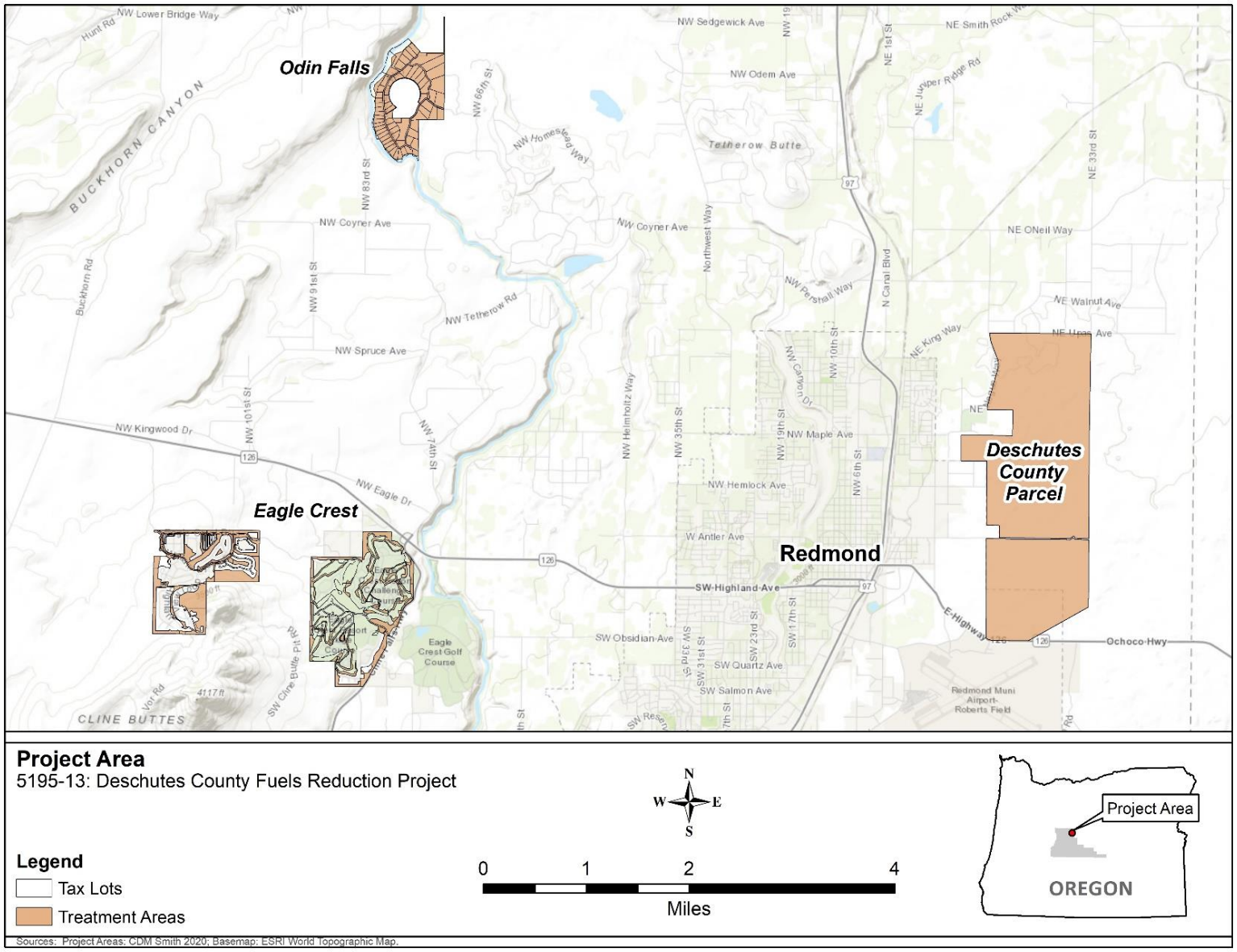

Figure 1-2. Treatment Areas

SECTION 2. Purpose and Need

FEMA's HMGP provides funds to eligible state and local governments, federally recognized tribal governments, and nonprofit organizations to help implement long-term hazard mitigation measures after a presidential major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property resulting from natural disasters and to enable risk mitigation measures to be implemented during the recovery from a declared disaster. Specifically, the purpose of the proposed Deschutes County hazardous fuels reduction project is to protect life, reduce the likelihood of fire damage to property, and augment completed and ongoing defensible space work in the target communities.

According to data from the National Interagency Fire Center, the average wildfire size in the United States has increased from less than 40 acres in the 1980s and early 1990s to more than 120 acres in 2017 and 2018. According to the Deschutes County Natural Hazards Mitigation Plan, the County ranked wildland fire as one of the greatest natural threats to residents and visitors (Deschutes County 2015). In the past 10 years, approximately 98,594 acres in the County were burned by human- or nature-caused fires (Oregon Department of Forestry and U.S. Forest Service 2020). Recent wildfires that occurred within the treatment areas are presented in **Table 2.1**. Although the last few years have been relatively mild fire seasons in Deschutes County, the wildfire risk remains high. **Figure 2-1** depicts the County's overall wildfire risk. As shown on the figure, the three treatment areas have a medium to high wildfire risk (Oregon Department of Forestry and U.S. Forest Service 2020).

Table 2.1. Recent Wildfires in Deschutes County

Year	Name	Acres	Extent of Damage
2010	Rooster Rock Fire	6,037	1 structure lost
2012	Pole Creek Fire	26,795	N/A
2014	Two Bulls Fire	6,908	26 structures threatened*
2017	Milli Fire	24,079	2,754 structures threatened*

** When structures are threatened, residents must evacuate.*

In addition to characterizing wildfire risks and prioritizing mitigation since 2001 (when the entire County was declared a wildfire hazard zone), the County has increasingly required new construction in wildland-urban interface (WUI) zones to incorporate ignition-resistant building materials and defensible space in accordance with the Oregon Forestland-Urban Interface Act of 1997 (Senate Bill 360) standards. Legislated in 2007, new destination resort developments are required to meet the Firewise USA® National Firewise Communities Program standards. And since 2011, those areas in the County with no fire protection service are required to meet Senate Bill 360 standards. These current requirements do not fully address wildfire vulnerabilities in developments in the WUI because there are many existing developments and structures in high risk areas that pre-date these standards. Odin Falls and The Ridge at Eagle Crest began development in 1980 and 1996, respectively. In addition, ignition-resistant construction and defensible space provide some protection for individual structures but may not reduce

community-wide hazards until they can be implemented on the majority of the structures in an area.

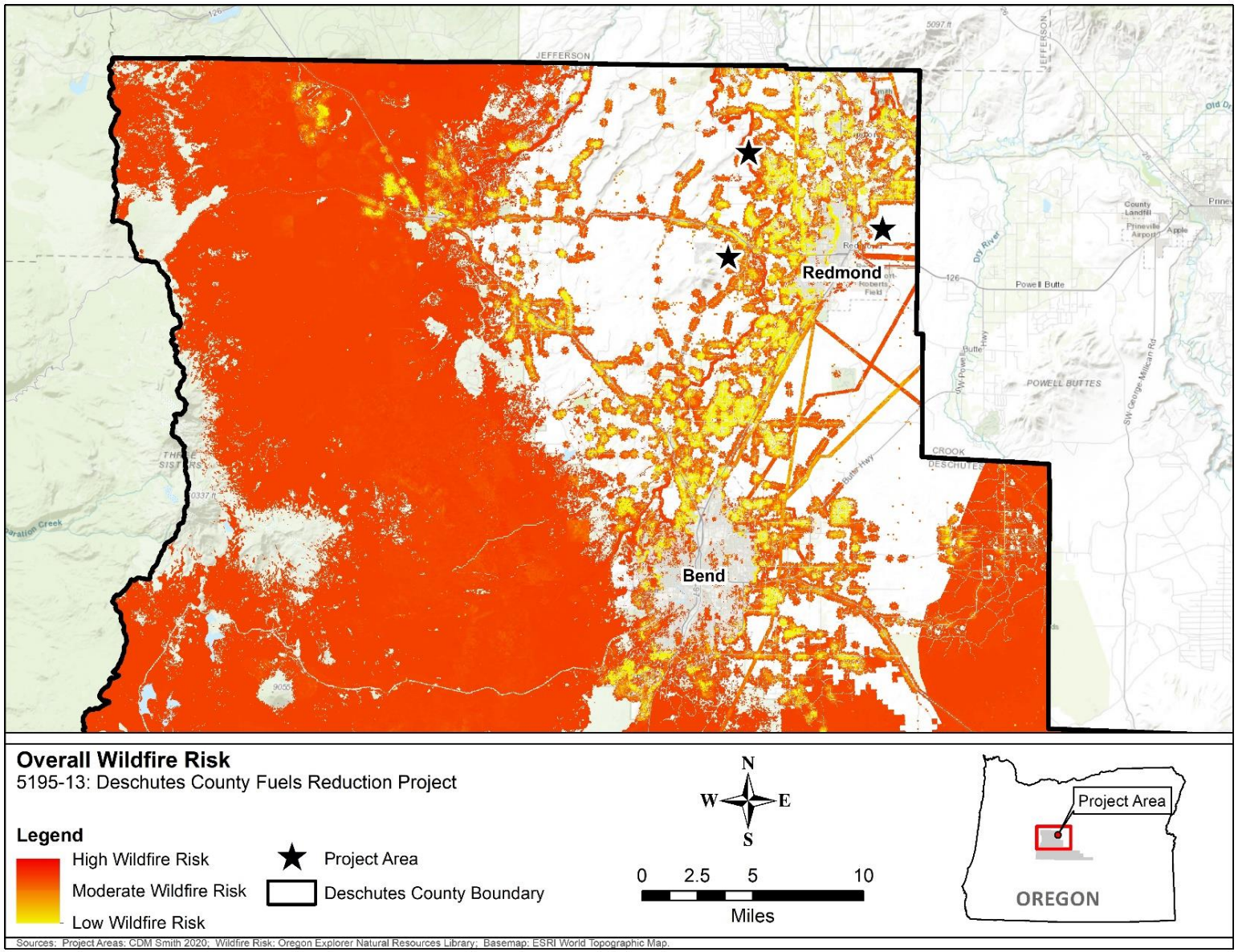

Figure 2-1. Wildfire Risk Map

SECTION 3. Alternatives

This section describes the no action alternative, the proposed action, and alternatives that were considered but dismissed.

3.1. No Action Alternative

The no action alternative is included to describe potential future conditions if no additional action is taken to reduce wildfire hazards. Under this alternative, no FEMA-funded fuels reduction work would be conducted in the three treatment areas identified in the County. Deschutes County, the Ridge at Eagle Crest Owners' Association (RECOA) and Odin Falls homeowner's association (HOA) would continue to sponsor some wildfire hazard reduction efforts, as would some at-risk property owners on their own initiative. These efforts would include defensible space and selective treatment of common areas. The County would also continue to implement the provisions of the Wildfire Hazard Mitigation Section of the Oregon Residential Specialty Code, which requires installation of Class A or B roofing on new construction (Deschutes County Code 15.04.085). The Central Oregon Fire Chief's Association (COFCA), Community Wildfire Protection Plans – Project Wildfire, and other local groups would continue their fire prevention efforts and activities focused on hazardous fuels treatment strategies. However, existing conditions, including wildfire hazards, would largely remain high, threatening residents and businesses in the treatment area vicinities with the associated potential for loss of life and property.

Under the no action alternative, current wildfire hazards would not be substantially reduced in and near the project areas, and the probability of loss of life and property in the event of a wildfire would remain high.

3.2. Proposed Action

The proposed action would reduce hazardous fuels on up to 1,620 acres in the WUI in Deschutes County, comprised primarily of a mixture of western juniper, bitterbrush (*Purshia tridentata*), sagebrush (*Artemisia* spp.), rabbit brush (*Ericameria nauseosa*), a mixture of native bunchgrasses and nonnative cheatgrass (*Bromus tectorum*), and ponderosa pine. The work would be conducted on public and private property in three treatment areas: Deschutes County Parcel, Eagle Crest (East Ridge and West Ridge), and Odin Falls (**Figure 1-2**). The proposed action would achieve the project purpose by reducing the vertical and horizontal continuity of fuels—reducing fire behavior to a lower intensity burn, which would allow fire crews to safely manage and more easily control a wildfire. The project would reduce hazardous fuels by thinning and pruning trees and mowing, masticating, or cutting brush. While some untreated areas would remain between treatment areas and structures in some areas, hazardous fuels reduction in the treatment areas may contribute to containment, ultimately reducing the risks to people living near the treatment areas, businesses, transportation corridors, the Redmond Municipal airport, and utility infrastructure.

There are five principles of creating and maintaining fire-resilient forests (Fitzgerald and Bennett 2013):

- Reduce surface fuels
- Increase the height to the base of tree crowns
- Increase spacing between tree crowns
- Keep larger trees of more fire-resilient species
- Promote fire-resilient forests at the landscape level

Crown fires are much less likely to occur if trees are widely spaced, generally with crowns spaced more than one dominant tree crown width apart. Factors that tend to increase the required crown spacing include steep slopes, locations with high winds, and the presence of species such as juniper with dense, compact foliage. Tree spacing does not have to be even. Small patches of trees can be left at tighter spacing, benefiting some wildlife (Fitzgerald and Bennett 2013). The key is to reduce surface and ladder fuels and create openings.

3.2.1. Treatment Methods

The proposed action would include thinning trees, pruning remaining trees, and reducing brush and other ground and ladder fuels. Proposed fuel reduction measures would include removal of understory vegetation, including trees less than 12 inches in diameter at breast height (DBH). Primarily western juniper and some Ponderosa pine would be removed. Smaller trees would be removed first, thinning the stand from below, to achieve a maximum spacing of 18 feet between crowns to limit crown-to-crown fire spread. Larger trees, equal to or greater than 12 inches DBH that do not pose a safety issue or have an insect or disease infestation would be retained. Retained trees would be pruned to a maximum height of 8 feet, with limbing heights varying from 4 to 8 feet. Flammable brush (bitterbrush, sagebrush, rabbitbrush) would be cut to a height of approximately 4 inches. Vegetation that is cut would either be chipped, masticated, or piled to be burned. However, because of the high level of risk associated with burning, pile burning would be limited and would only be used at the Eagle Crest treatment area.

Contractors would use chainsaws to fell or trim trees, chippers to chip cut material, and pickups and wheeled skid steers with associated tools such as mowers, masticators, and buckets. No tracked equipment would be used, and debris would not be dragged across the surface; rather, it would be moved by hand or with small, wheeled vehicles. When a masticator is used, debris would be dispersed around the grinding location and left in place. Debris that is not masticated on-site would be carried out of the treatment areas and placed in trucks to be taken off-site for chipping and processing (with the exception of some burn piles at Eagle Crest West Ridge). Equipment would be limited to chainsaws and hand tools in locations where the slopes are greater than 20 percent. Disposal by burning is described further in **Section 3.2.2**. To minimize potential ground disturbance on the Deschutes County Parcel, equipment use would be limited to when the ground is either frozen or snow covered, and vehicles would be limited to existing access roads.

3.2.2. Treatment Locations

Unique features of each proposed treatment area are described below (locations of each treatment area are shown in **Figure 1-2**).

Figure 3-1. Representative Conditions for Deschutes County Parcel Treatment Area

Deschutes County Parcel: Located roughly one mile east of the City of Redmond, the proposed treatment area encompasses approximately 1,800 acres and the proposed action would treat up to 975 acres within the larger parcel area. The proposed treatment area is fairly uniform in vegetation and is relatively flat, with an average slope of less than 10 percent. **Figure 3-1** depicts vegetation representative of the Deschutes County Parcel treatment area, which includes western juniper with abundant small trees, limbs reaching to the ground, and brush. The parcel is unused range land and is undeveloped with an extensive network of dirt roads. There are no streams or lakes within the treatment area. Work on the Deschutes County Parcel will be done when the ground is either frozen or snow covered.

Eagle Crest: Located approximately four miles west of the City of Redmond, the proposed treatment area consists of two residential development areas—East Ridge and West Ridge. The two areas are connected by a road easement through United States Bureau of Land Management (BLM) property. The proposed treatment area for the two developments totals approximately 338 acres. This is comprised of about 132 acres of common areas and 13 acres in high terrain adjacent to BLM property in West Ridge (**Figure 3-2**) and about 193 acres of common areas and around the golf course in East Ridge (**Figure 3-3**). The Eagle Crest treatment areas are on the slopes of the Cline Buttes, with varying slopes up to 50 percent. **Figure 3-5** depicts typical vegetation in the Eagle Crest treatment areas, including western juniper with abundant small trees, limbs reaching to the ground, and brush. There are several ephemeral drainages within the treatment area and the Eagle Crest community is within approximately 0.2 miles of the Deschutes River. Eagle Crest West Ridge contains a constructed self-contained, water feature consisting of a short stream and several ponds. The County would implement fuels treatment work in coordination with RECOA.

Odin Falls: Located about six miles northwest of the City of Redmond, the proposed treatment area consists of one housing development surrounded by BLM lands, greenspace and active, irrigated agricultural land. The total treatment area is approximately 289 acres, consisting of private parcels and approximately 14 acres of common lands managed by a homeowner's association (HOA) (**Figure 3-4**). The treatment area is relatively flat with an average slope of less than 20 percent. **Figure 3-6** depicts typical vegetation in the Odin Falls treatment area, which includes western juniper with abundant small trees, limbs reaching to the ground, and brush. There are no streams or lakes within the treatment area, although it does border the Deschutes River.

3.2.3. Burning and Smoke Management

Disposal of cut material from approximately 13 acres along the southeastern boundary of the Eagle Crest West Ridge treatment area may require burning. Slash piles would measure no more than 7 by 7 by 6 feet with a maximum limit of 30 piles per acre, resulting in an estimated 200 tons of burning. Pile burning is not proposed on the Deschutes County Parcel or at Odin Falls.

Proposed pile burning at the Eagle Crest treatment area would be conducted in compliance with state and local regulations. Before burning, Deschutes County would check with Redmond Fire and Rescue on burning restrictions. Pile burning would occur when conditions are wet or rainy with little to no wind, during daylight hours, and when air quality conditions permit. Clearing and burning activities at the Eagle Crest treatment area would be conducted outside of the fire season (June to October) to minimize the potential to contribute to fire risk. Burning activities would be restricted to dates allowed by Redmond Fire and Rescue and contractors must immediately contact Redmond Fire and Rescue if any burning activities escape the project area. Personnel overseeing the burns would adhere to all Oregon Department of Forestry (ODF)-fire suppression gear and requirements, as described in the Oregon Forest Practices Act Oregon Administrative Rules (OAR) 629-043-0040.

3.2.5. Project Duration

The proposed action would take approximately five months to implement, starting in May of the implementation year, and is subject to seasonal restrictions such as snowpack and the duration of the fire season. The project is expected to begin as early as the spring of 2021, depending on the timing of available FEMA funding, and could take up to three years to complete the three treatment areas.

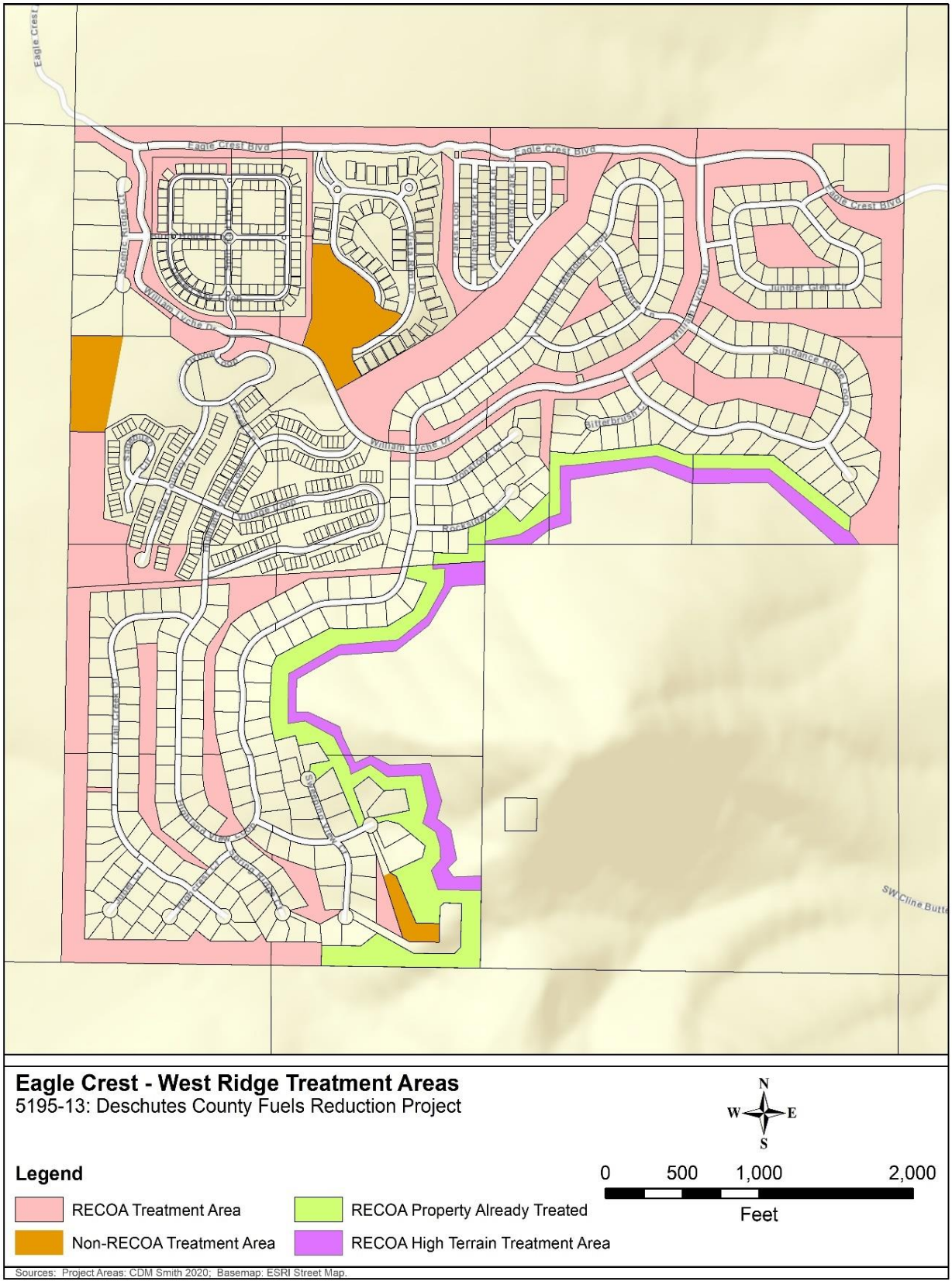

Figure 3-2. West Ridge at Eagle Crest RECOA Properties

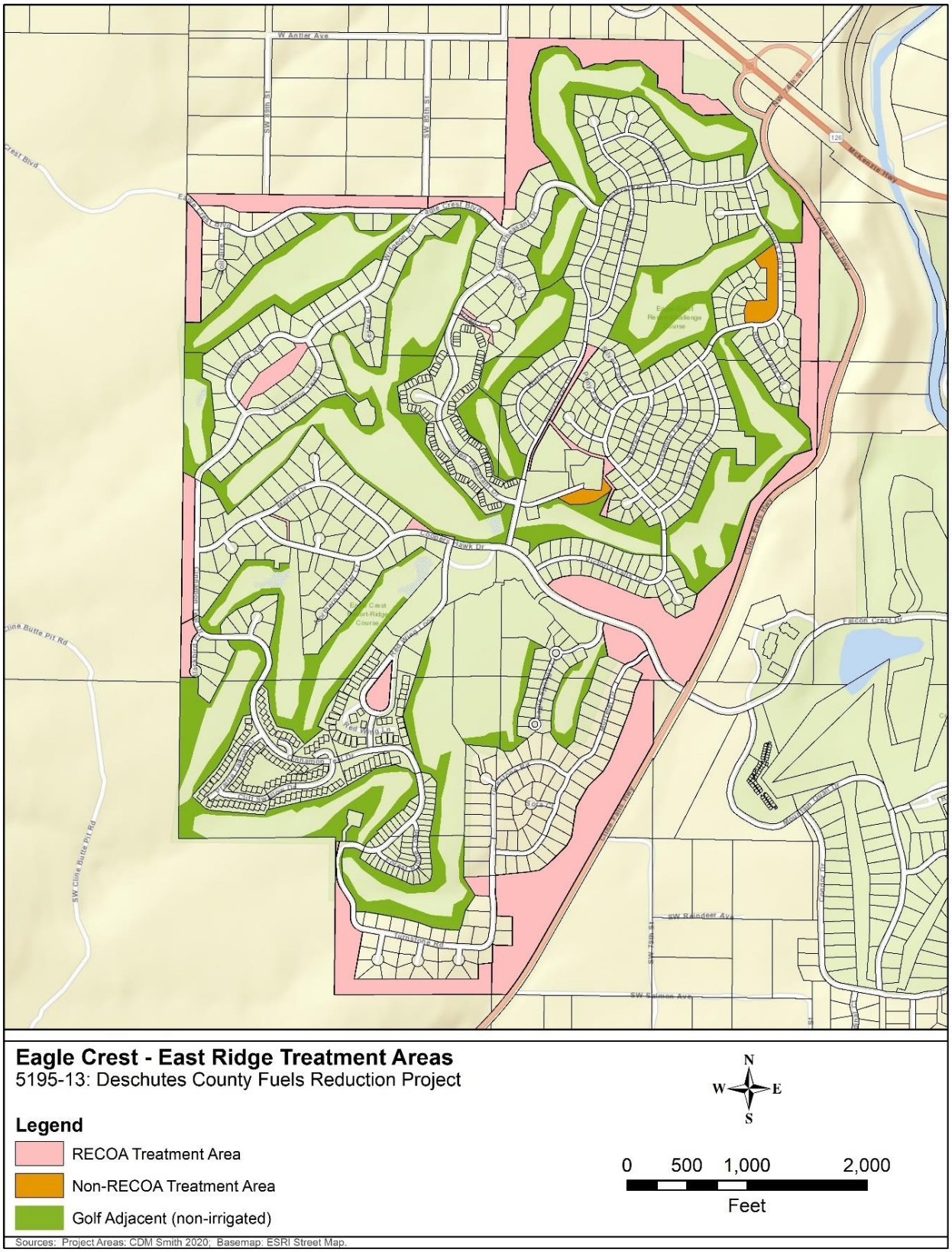

Figure 3-3. East Ridge at Eagle Crest RECOA Commons and Golf Course-Adjacent Areas

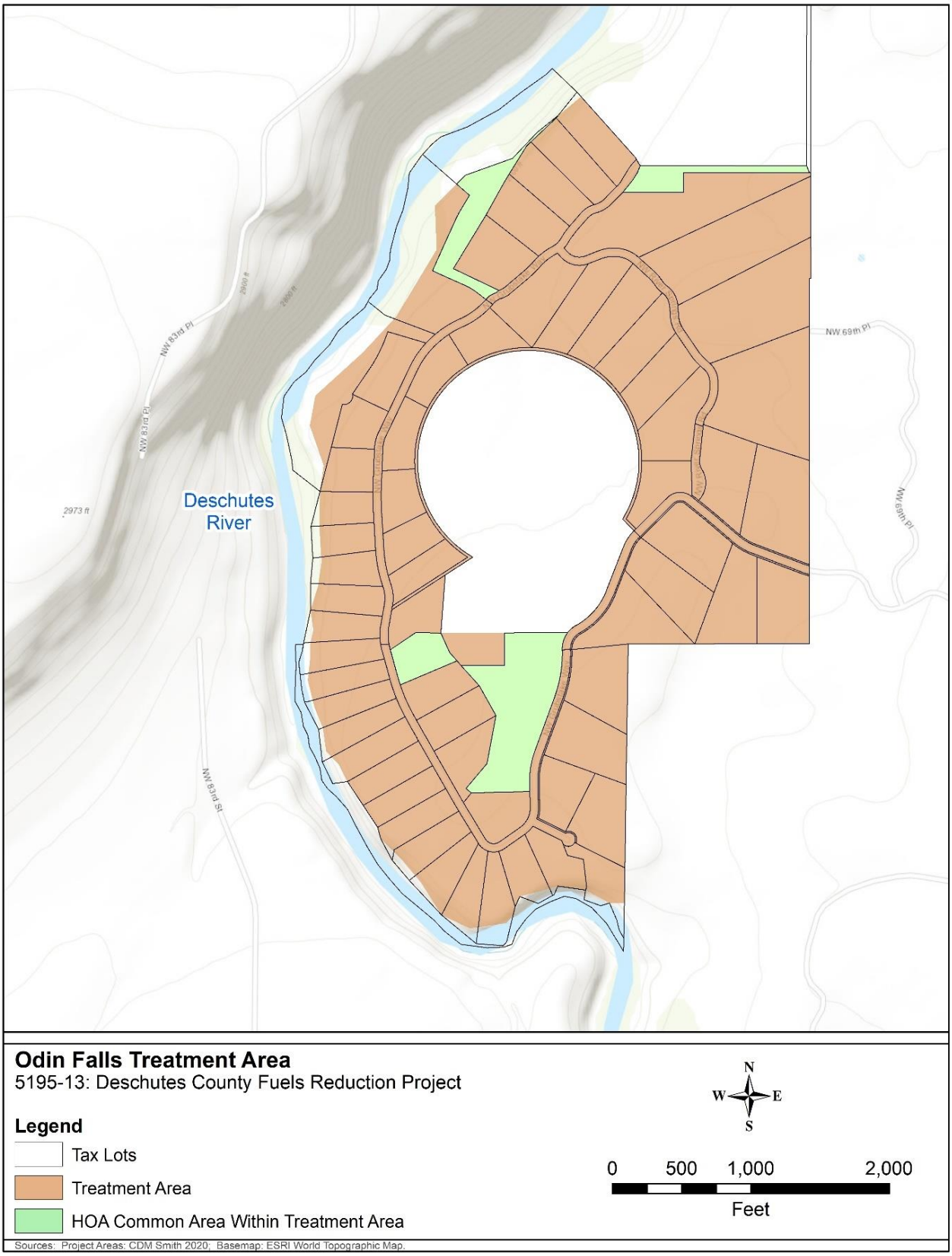

Figure 3-4. Odin Falls Treatment Area and Homeowner's Association Common Areas

Figure 3-5. Representative Conditions for Eagle Crest Treatment Area

Figure 3-6. Representative Conditions for Odin Falls Treatment Area

3.2.4. Maintenance Activities

Follow-up maintenance is not part of the proposed federal grant funding; however, it is a requirement of the grant award and may be considered an effect of the proposed action. The treatment areas experience low rainfall and limited soil productivity; therefore, regrowth of vegetation is expected to be slow and would not trigger the need for additional fuel reduction treatment for at least 10 years. The remaining on-site trees would need maintenance (e.g., trimming) after approximately 20 years. The County would provide a maintenance agreement for its parcel and secure agreements from RECOA, the Odin Falls HOA and participating property owners; who would each be responsible for the associated costs and provision of any needed annual maintenance. Maintenance may include removal of shrubs, removing dead material, and limbing trees.

3.3. Additional Action Alternatives Considered and Dismissed

An alternative to the proposed action would be prescribed burning in the three treatment areas, which might reduce fuel loads. This action would include limited fuel reduction and treat a smaller number of acres as the proposed project. Prescribed burning is not feasible in residential neighborhoods such as Eagle Crest or Odin Falls.

This alternative would help to reduce the severity and consequences of wildfire spread in the WUI in the long term. However, this alternative was dismissed from further consideration because prescribed burning is less effective in areas with heavy fuel loads, such as dense underbrush, because these loads increase the risk that the fire would escape. The proposed treatment areas in the Deschutes County Parcel contain heavy fuel loads consisting of western juniper and ponderosa pine with a dense understory of shrubs and grasses that make this alternative riskier than the proposed action. In addition, extensive requirements for fire crews, equipment, and aircraft would be required to ensure the prescribed fire is contained. The close proximity of structures to the treatment parcels increases the risk of an escaped prescribed burn. Smoke impacts on human health would occur because of the close proximity of many residences in the City of Redmond near the Deschutes County Parcel. Furthermore, this alternative would not treat the same number of acres as the proposed action, as prescribed burning could only be performed on the Deschutes County Parcel.

An additional alternative to the proposed action would be to install ignition-resistant construction materials on structures in and near the treatment areas. Under this alternative, residences in the Eagle Crest and Odin Falls treatment areas would be retrofitted with ignition-resistant materials such as siding and roofs. There are no structures within the Deschutes County Parcel; therefore, to achieve a similar reduction in wildfire hazards, structures and residences in the City of Redmond would need to be retrofitted. This alternative would help to reduce the severity and consequences of wildfire in targeted neighborhoods. However, decentralized actions on individual structures may be less effective in reducing the overall wildfire hazard risk in the target areas. Actions on individual structures are difficult to implement across a sufficient number to achieve a widespread reduction in hazards and this alternative would be very costly. Therefore, an ignition-resistant construction measures alternative would not meet the purpose and need for the project.

SECTION 4. Affected Environment, Potential Impacts, and Mitigation

This section describes the environment potentially affected by the alternatives, evaluates potential environmental impacts, and recommends measures to avoid or reduce those impacts. When possible, quantitative information is provided to establish potential impacts. Potential impacts are evaluated qualitatively based on the criteria listed in **Table 4.1**. The study area generally includes the treatment areas and access and staging areas needed for the proposed action. If the study area for a particular resource category is different from the treatment area, the differences will be described in the appropriate subsection.

Table 4.1. Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/Negligible	The resource area would not be affected, or changes or benefits would be either nondetectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, although the changes would be small and localized. Impacts or benefits would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional-scale impacts/benefits. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes would be readily measurable and would have substantial consequences on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

4.1. Resources Not Affected and Not Considered Further

The resources identified in **Table 4.2** would not be affected by either the no action alternative or the proposed action because they do not exist in the treatment areas or the alternatives would have no effect on the resource. These resources were removed from further consideration in this EA.

Table 4.2. Resources Eliminated from Further Consideration

Resource Topic	Reason for Elimination
Geology	Hazardous fuels reduction are surface-level activities that would not affect geology.
Sole Source Aquifers	According to the U.S. Environmental Protection Agency's (EPA) sole source aquifer map (EPA 2020a), there are no sole source aquifers designated in Deschutes County; therefore, the alternatives would have no effect on sole source aquifers.

Resource Topic	Reason for Elimination
Coastal Resources	The treatment areas are not located in the Coastal Zone Boundary designated by the State of Oregon (Oregon Coastal Program 2020) or within a Coastal Barrier Resources Unit (U.S. Fish and Wildlife Services [USFWS] 2019).
Land Use and Zoning	This proposed action would not change existing land uses and is consistent with the current zoning. The alternatives would have no effect on land use and zoning.

4.2. Soils, Farmland Soils, and Topography

Topography in Deschutes County varies from mountainous terrain in the west along the Cascade Crest to broad lava plains in the high desert prairie in the east and south. The Deschutes River drains through the central part of the County, after originating in the Cascades.

There are 11 soil map units in the treatment areas (NRCS 2020). Most soil map units are sandy loams and Deschutes-Stukel complex with the occasional rock outcrop. The Deschutes County Parcel and Odin Falls treatment areas are characterized by slopes measuring less than 20 percent. Eagle Crest treatment areas are characterized by moderate to steep slopes (greater than 20 percent). Steeper slopes tend to have thinner soil layers that are primarily composed of rock fragments, as organic matter erodes down the slope (Williams 2018).

The Farmland Protection Policy Act requires federal agencies to minimize the unnecessary conversion of farmland into nonagricultural uses. According to the Natural Resources Conservation Service (NRCS) (2020), the treatment areas are approximately 95.9 percent farmland of statewide importance or prime farmland, with a large portion falling within the Deschutes County Parcel treatment area.

No Action Alternative

Under the no action alternative, the County, HOAs, at-risk homeowners, and other local groups may still implement wildfire mitigation activities within the treatment areas, including longer-term vegetation maintenance. These activities would result in negligible soil disturbance and have no effect on topography. However, in the event of a major wildfire, there would be a substantial loss of vegetation. Loss of vegetation may result in higher soil temperatures, increased evaporation, and reduced soil moisture. High-intensity wildfires can alter the physical and chemical properties and the moisture, temperature, and biotic characteristics of soils (USFS 2005).

Heat from wildfires can cause soils, including farmland soils, to form hydrophobic layers that repel water, resulting in decreased stormwater infiltration. Hydrophobicity occurs when plants burn in wildfires, releasing a gas into the soil that cools and solidifies into a waxy, water-repelling substance that coats soil particles. Large-pored soils, such as sandy or coarse-textured soils, are more vulnerable to becoming hydrophobic because they transmit heat more easily than heavily textured soils such as clays (USFS 2005). The sandy loams, which make up most of the soil types in the project areas, would have a higher proportion of sand to silt and clay particles and, thus, would be moderately susceptible to the formation of hydrophobic conditions following a severe fire. Following a severe wildfire, the resulting soil conditions could lead to decreased agricultural potential until the soils are able to recover. In drier portions of the treatment areas, the accumulation of organic matter that facilitates soil formation is relatively slow and may take years (USFS 2005).

Under the no action alternative, there would be no effect on topography. In the absence of a wildfire, the no action alternative would have negligible effects on soils. Farmland soils would not be converted by occasional hazardous fuels reduction treatments. In the event of a wildfire, there could be minor to moderate adverse impacts on soils, depending on the intensity and scale of a wildfire.

Proposed Action

Under the proposed action, there would be no effect on topography. Hazardous fuels work would be conducted with ground crews using chainsaws, chippers, pickups, wheeled skid steers with associated tools such as mowers, masticators, and buckets. No tracked vehicles would be used and debris would not be dragged across the surface, but rather moved by hand or with small, wheeled vehicles. Root balls would not be disturbed during project implementation, and some shrubs and trees would be retained. Work on the Deschutes County Parcel will be done during the winter when the ground is either frozen or snow covered, which would reduce soil disturbance. Pile burning which may be needed in the Eagle Crest West Ridge treatment area would not have harmful effects on the underlying soil, as piles would be small and would burn quickly. Thus, the risk of erosion and soil compaction from the proposed action would be short-term and negligible.

Hazardous fuels reduction activities would not convert farmland soils to nonagricultural uses, nor would they prevent the future use of the soils for farmland purposes. The proposed action would likely have minor long-term beneficial effects on soils and farmland soils by reducing the risk of soil damage from wildfires.

4.3. Visual Quality and Aesthetics

Because hazardous fuels reduction activities alter vegetation, they have the potential to affect visual quality. The analysis of visual quality is a qualitative analysis that considers the visual context of the treatment areas, potential for changes in character and contrast, assessment of whether the treatment areas include any places or features designated for protection, the number of people who can view the site and their activities, and the extent to which those activities are related to the aesthetic qualities of the area.

The Odin Falls treatment area is adjacent to the middle Deschutes River, which is a designated Wild and Scenic River (described further in **Section 4.6**). The Deschutes River is valued for providing year-round recreational opportunities, including fishing, boating, and rafting. Topography in the surrounding area is relatively flat. The river canyon is at an elevation of approximately 2,600 feet and the adjacent Odin Falls treatment area is approximately 2,700 feet. The river channel is lined with riparian vegetation, becoming sparse and characterized as sagebrush as one moves upland into the Odin Falls treatment area. Several homes are present along the river canyon rim and may potentially be visible from the river. There is a strip of land held in common ownership by the HOA between the existing homes and the Deschutes River.

The City of Redmond and the residential neighborhoods of Eagle Crest and Odin Falls would benefit from the hazardous fuels reduction treatments. Hazardous fuels treatment work would occur in strategic locations within the treatment areas, such as close to structures and in common areas managed by the HOAs.

No Action Alternative

Under the no action alternative, limited ongoing wildfire hazard reduction activities would not result in perceptible changes in the appearance and visual quality of the treatment areas overall. However, areas that are treated with wildfire mitigation measures by the County, HOAs or property owners on their own initiative would undergo a slight visual change, which could be perceived as cleaner and safer on a localized scale. However, a major wildfire would be more likely to spread through the area under the no action alternative, which could have a minor to moderate adverse impact on the visual quality in the treatment areas, depending on the extent of the fire damage.

Proposed Action

Properties that are located near the hazardous fuels reduction treatments would undergo a visual change from the vegetation management activity, which could be perceived as a cleaner and safer landscape. Hazardous fuels reduction activities close to roads could be seen by people using the transportation network. However, owing to the remote location and flat terrain, most of the changes would only be perceived by a few people.

Work in the Eagle Crest treatment area would primarily be perceived by golfers and residents of those communities, while changes in the Deschutes County Parcel would be perceived by persons using the county lands for recreation.

Work in the Odin Falls treatment area would primarily be perceived by recreational users along the Deschutes River and residents of the community. Because the river canyon is lower in elevation than the Odin Falls treatment area, hazardous fuels reduction activities would be less visible from the Deschutes River and even work on the canyon side slopes may be somewhat screened from viewers on the river by the riparian vegetation that would not be affected. Work would not be conducted within 100 feet of the water (**Section 3.2.4**), which would preserve the denser riparian vegetation that is most visible to recreationists on the water.

It is unlikely that any of the treatment areas would be visible from major highways or arterials or from viewpoints within the City of Redmond. Approximately 1,620 acres across the three treatment areas would be treated, leaving portions of the treatment areas unchanged. Thus, hazardous fuels activities would have negligible to minor, short-term effects on visual quality and aesthetics.

In the long term, the risk of wildfire spread through the treatment areas would be reduced, which would have a minor long-term beneficial effect on visual quality and aesthetics by reducing the chance that vegetation and structures are burned.

4.4. Air Quality and Climate

The Clean Air Act, amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for six pollutants harmful to human and environmental health, including ozone, particulate matter, nitrogen dioxide, carbon monoxide, sulfur dioxide, and lead (EPA 2016). According to the EPA's Green Book (2020b), Deschutes County is currently in attainment status for all criteria pollutants.

Air quality is negatively affected by everyday activities, such as vehicle use, and major events, such as wildfires. Wildfire smoke is composed of carbon dioxide, water vapor, particulate matter, carbon monoxide, nitrogen oxides, organic chemicals such as hydrocarbons, and trace minerals, which all affect air quality (EPA et al. 2019). Air quality can also be affected by fugitive dust, which is considered a component of particulate matter. Fugitive dust is released into the air by wind or human activities and can have human and environmental health impacts (California EPA Air Resources Board 2007).

The treatment areas are in the Blue Mountain Ecoregion within the Deschutes River Valley, which has a marine-influenced climate and is not as arid as the botanically similar regions (Thorson et al. 2003). Temperatures in the City of Redmond, which is located approximately 1 mile west of the Deschutes County Parcel treatment area, 4 miles east of the Eagle Crest treatment area, and 6 miles southeast of the Odin Falls treatment area, range from an average low of 21 degrees Fahrenheit in December to an average high of 86 degrees Fahrenheit in July (U.S. Climate Data 2020). The City of Redmond receives an average of 8 inches of rain annually (U.S. Climate Data 2020). Most of the precipitation occurs in the fall, winter, and spring. Summer precipitation is very low, which increases the risk of wildfire spread. Climate data are presented from the City of Redmond because it is the nearest weather reporting station to the treatment areas.

"Climate change" refers to changes in the Earth's climate caused by a general warming of the atmosphere. Its primary cause is emissions of greenhouse gases, including carbon dioxide and methane. Climate change is capable of affecting species distribution, temperature fluctuations, and weather patterns. The CEQ's *Final NEPA Guidance on Consideration of Greenhouse Gas Emissions and the Effects on Climate Change* (CEQ 2016) suggested that quantitative analysis should be done if an action would release more than 25,000 metric tons of greenhouse gases per year.

Estimates indicate that average annual temperatures in the Pacific Northwest region will increase by 2 degrees Fahrenheit by the 2020s, 3.2 degrees Fahrenheit by the 2040s, and 5.3 degrees Fahrenheit by the 2080s (USFWS 2011). Warmer temperatures would decrease mountain snowpack, resulting in higher winter and lower summer stream flows (USFWS 2011). Earlier spring snowmelt and higher temperatures also increase the risk of wildfires in the region. North American wildfires have increased in intensity and frequency over the past 50 years (USFWS 2011).

No Action Alternative

Limited ongoing wildfire hazard reduction activities by the County, HOAs or at-risk property owners on their own initiative, or other local groups would have negligible, short-term impacts on air quality from vehicle and equipment use. However, under this alternative, the risk of wildfire spread would remain high. Wildfire smoke can deteriorate air quality and expose vulnerable populations, such as the young and elderly, to harmful pollutants (EPA et al. 2019). Particulate matter, specifically, can have many harmful effects, including eye and respiratory tract irritation, reduced lung function, asthma, and heart failure (EPA et al. 2019). An ongoing study in Montana is finding that prolonged exposure to wildfire smoke can result in long-term health effects even several years after exposure (Houghton 2020). In addition to particulate

matter in smoke, a fire in residential areas produces a variety of other toxins when buildings and their contents burn.

Smoke from major wildfires can affect air quality over large areas, impacting people far from the fire, even several states away. Additionally, major wildfires can emit high levels of greenhouse gases into the atmosphere, thus contributing to climate change, which exacerbates the risk of wildfires. In the event of a wildfire, the no action alternative could have a minor to major impact on air quality and regional climate, depending on the intensity and scale of the wildfire.

Proposed Action

The proposed action would have negligible, short-term impacts on air quality from equipment and vehicle use. Contractors would use chainsaws, chippers, pickups, wheeled skid steers with associated tools such as mowers, masticators, and buckets during implementation of the proposed action. Vehicle use on dirt roadways, such as those in some of the treatment areas, can contribute to fugitive dust while gas-powered equipment can produce particulate matter. The vegetation debris would be hand carried out of some of the treatment areas and placed in trucks to be taken off-site for chipping and processing. Vehicles would also be used to transport crews to the treatment areas. Thus, ground disturbance would be negligible, limiting the release of fugitive dust. Masticators would be used in areas to grind up small trees and shrubs in place, which can produce dust when large chips impact the ground. Vehicles and equipment running times would be kept to the minimum extent possible. Pile burning at the Eagle Crest West Ridge treatment area would be conducted in compliance with state and local regulations, as described in **Section 3.2.3**. Work on the Deschutes County Parcel will be done during the winter when the ground is either frozen or snow covered, which would also reduce fugitive dust. Therefore, the proposed action would have minor, short-term air quality impacts from vehicle and equipment use, pile burning, and activities contributing to the release of fugitive dust.

By reducing the risk of wildfire spread, hazardous fuels reduction activities would have minor, long-term beneficial effects on air quality and climate change.

4.5. Surface Waters and Water Quality

The Clean Water Act of 1977, as amended, establishes requirements for states and tribes to identify and prioritize waterbodies that do not meet water quality standards.

The Deschutes County Parcel and Odin Falls treatment areas are located in the Odin Falls-Deschutes River Watershed. The Odin Falls treatment area is adjacent to a reach of the Deschutes River in this watershed, which is impaired for aquatic life because of abnormal flow, acidity, and unsafe temperatures (EPA 2020c). The Eagle Crest treatment area is located within the Cline Falls-Deschutes River Watershed. No waterbodies in the Cline Falls-Deschutes River Watershed are impaired (EPA 2020c).

The Deschutes River runs along the western and southern border of the Odin Falls treatment area and is a large, perennial river (**Figure 4-1**). A few non-fish-bearing intermittent and ephemeral streams intersect the Eagle Crest treatment area (**Figure 4-2**). There are no waterbodies in the Deschutes County Parcel treatment area (**Figure 4-3**). The water features in **Figure 4-1** are primarily irrigation canals and the water features in **Figure 4-2** are primarily intermittent washes and draws that are dry for most of the year.

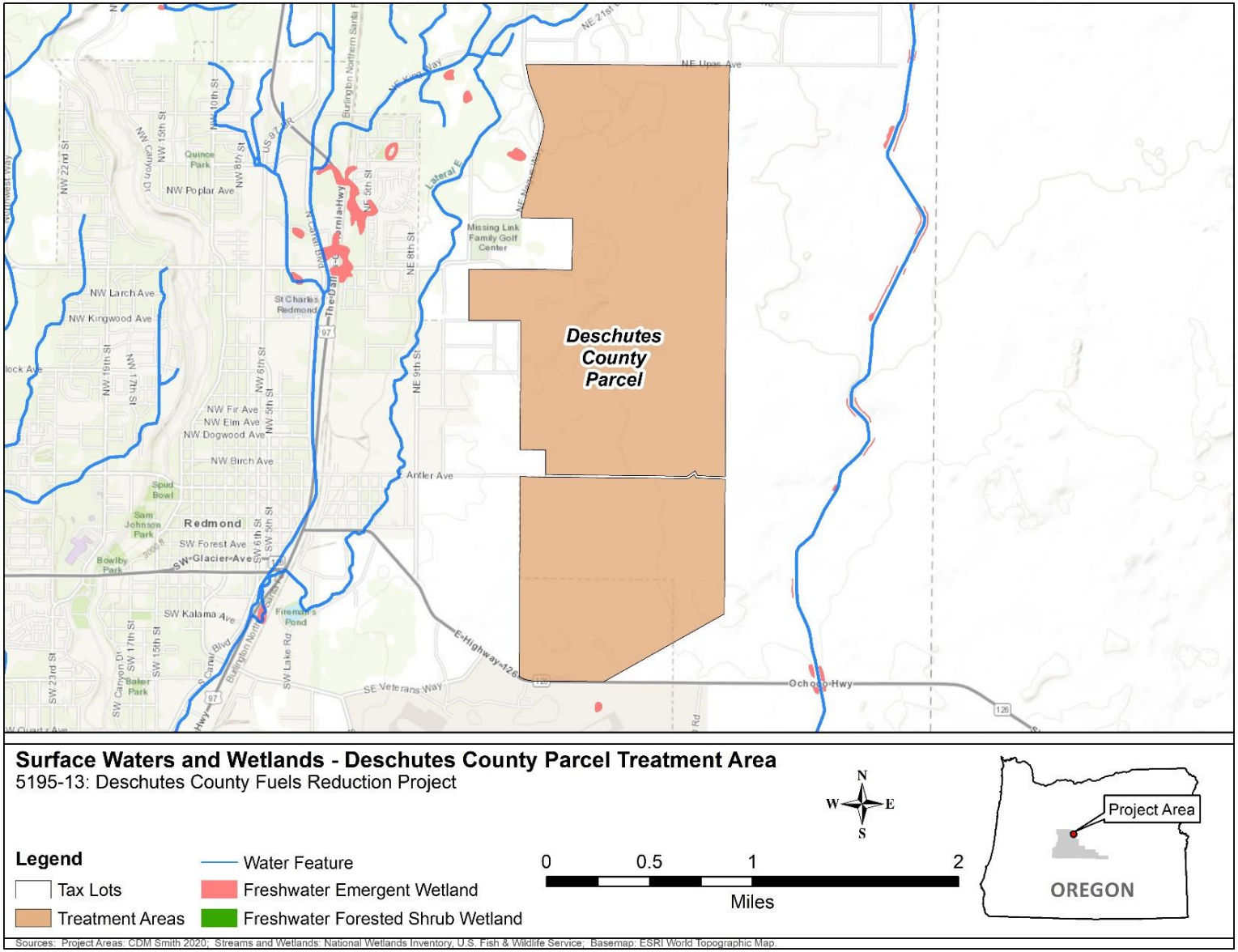

Figure 4-1. Deschutes County Parcel Surface Waters and Wetlands

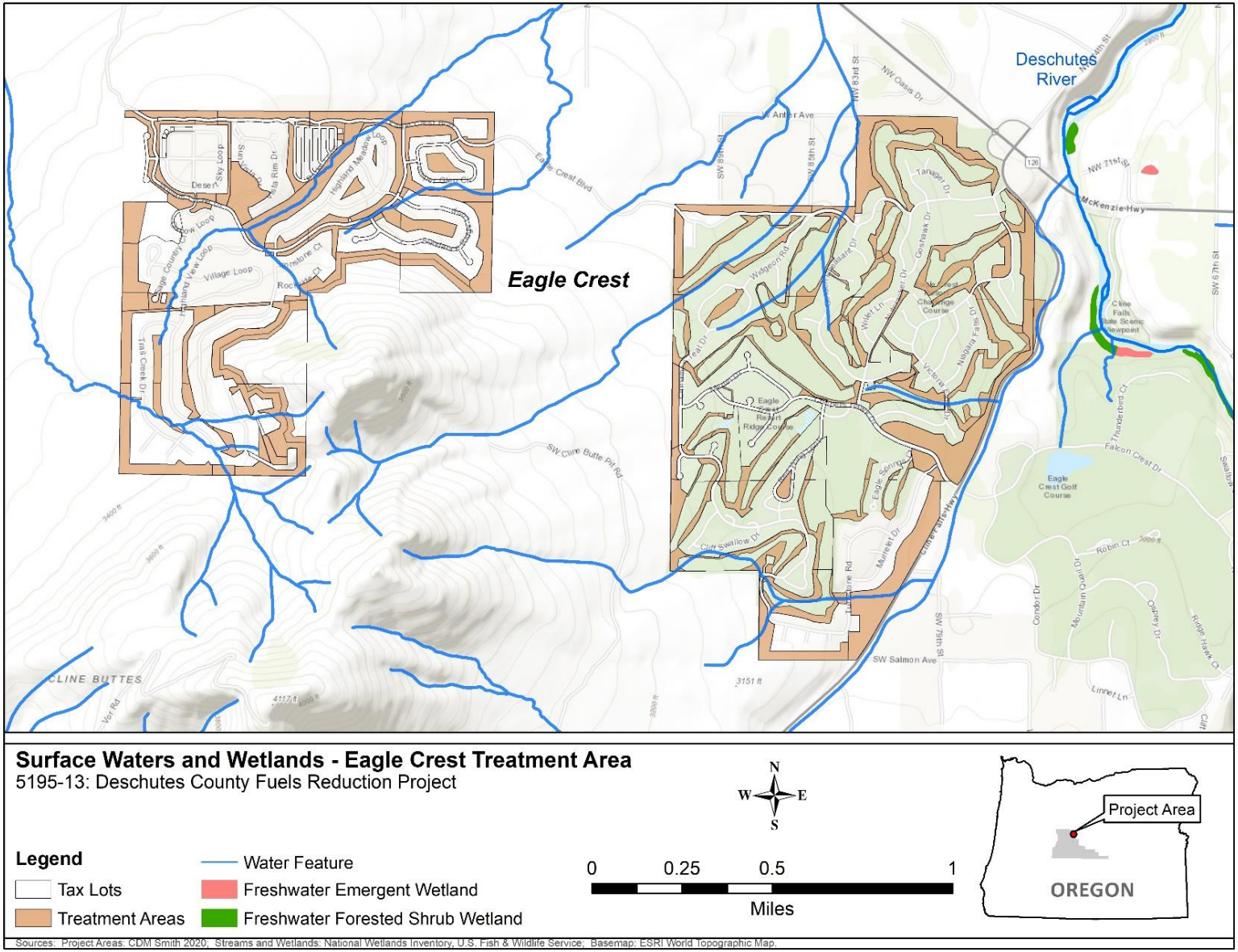

Figure 4-2. Eagle Crest Treatment Area Surface Waters and Wetlands

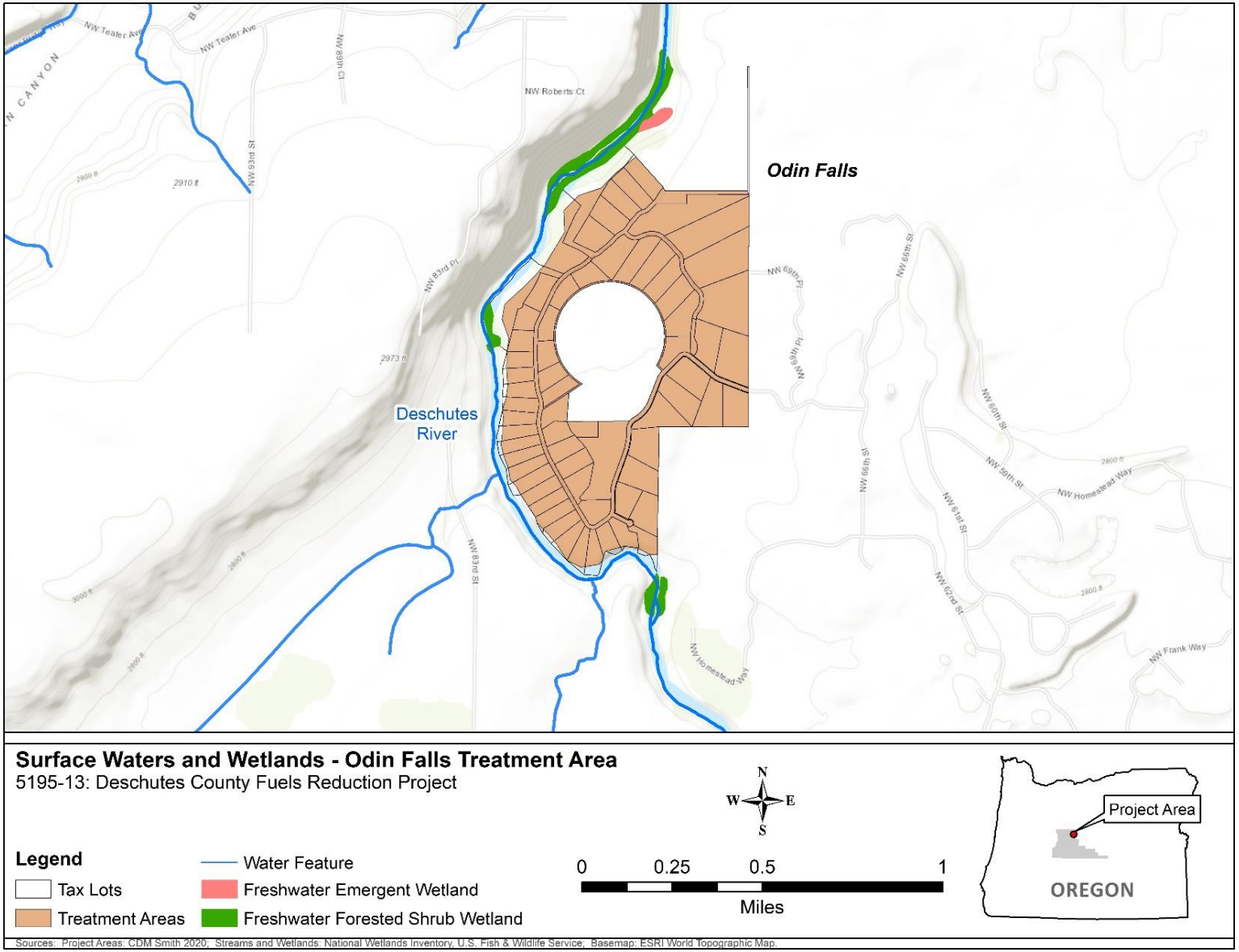

Figure 4-3. Odin Falls Treatment Area Surface Waters and Wetlands

No Action Alternative

Under the no action alternative, limited ongoing wildfire hazard reduction activities would be conducted by the County, HOAs, property owners on their own initiative, or local groups. Because there are few waterbodies in or near the treatment areas, the potential impacts from individual actions would be expected to be small in scale and impacts on surface waters and water quality would be negligible in the absence of a wildfire. Under the no action alternative, the risk of wildfire spread would not be substantially reduced. If a wildfire occurs and spreads, the loss of vegetation would impact surface water quality through increased soil erosion and sedimentation. There may be increased temperatures from the loss of shade along riparian zones outside of the treatment areas. Additionally, intense lasting heat from major wildfires can cause soils to form hydrophobic layers, as described in **Section 4.2**, which would decrease infiltration of stormwater and aquifer recharge while increasing runoff, erosion, sedimentation, and stream discharges. The no action alternative could have a minor to major impacts on surface waters and water quality, depending on the scale and intensity of a wildfire.

Proposed Action

The proposed action would not require in-water work. Hazardous fuels reduction activities could affect water quality because they involve the removal of vegetation. The use of ground crews and wheeled equipment rather than tracked equipment and the operation of vehicles and chippers on existing roads would result in negligible soil disturbance and mobilization of fine sediments that could affect water quality. Some vegetation would be retained according to the treatment specifications (**Section 3.2.1**), helping to prevent substantial erosion from vegetation removal and root balls would not be disturbed. A 100-foot no work buffer from any known streams or waterbodies would be maintained to help retain some stream shade and filter surface water runoff. Herbicides would not be used to manage vegetation. Burning at Eagle Crest West Ridge would be conducted in compliance with state and local regulations, as described in **Section 3.2.3**. Thus, impacts on water resources from project implementation would be short term and negligible.

The proposed action would reduce the risk of wildfire spread in the treatment vicinity, and thus would reduce the risk of impacts associated with wildfires on water resources as described in the no action alternative. Therefore, the proposed action would have minor, long-term beneficial effects on waterbodies in and near the treatment areas.

4.6. Wild and Scenic Rivers

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 United States Code [U.S.C.] 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreation values in a free-flowing condition for the enjoyment of present and future generations. Rivers may be designated for the National Wild and Scenic Rivers System by Congress or, if certain requirements are met, by the Secretary of the Interior. Each river is administered by either a federal or state agency. The Oregon Scenic Waterway Act was established in 1970 and rivers can be added to the system by the governor, legislature, or by citizens. The Oregon scenic waterway program promotes cooperative protection and wise use of rivers in the system by all federal, state, and local agencies, individual property owners, and recreation users.

The National Park Service oversees the Wild and Scenic Rivers program in cooperation with other federal agencies and states. In Oregon, both the U.S. Forest Service (USFS) and the BLM have key roles in managing designated rivers that flow through and near their lands. The Oregon State Parks and Recreation Department manages the State Scenic Waterway program.

Several segments of the Deschutes River are designated as a National Wild and Scenic River and a State Scenic waterway, including the 19-mile segment from Odin Falls to the upper end of Lake Billy Chinook (16 U.S.C. 1274(a)(73)(D)), which carries a scenic designation. The Odin Falls treatment area is adjacent to this segment of designated Wild and Scenic River and portions of the proposed treatment area fall within the management zone of the river. The Middle Deschutes Wild and Scenic River is managed primarily by BLM. The Deschutes River was designated as a wild and scenic river for the outstandingly remarkable values of culture, fish, geology, recreation, scenery, wildlife, hydrology, and botany/ecology. The river offers exceptional scenic quality owing to the rugged natural character of the canyons, scenic vistas, limited visual intrusions, and scenic diversity. These river corridors offer a diversity of year-round recreational opportunities, including fishing, hiking, camping, and wildlife and nature observation (National Wild and Scenic Rivers System 2020). Neither of the other treatment areas are proximate to any other designated segments.

No Action Alternative

The land closest to the Deschutes River at Odin Falls is owned in common by the HOA at Odin Falls. Under the no action alternative, limited wildfire hazard reduction activities would be conducted by the County, property owners on their own initiative, or local groups. It is unlikely that the HOA would conduct work on the common lands. Therefore, any potential effect on the visual character of the lands above the river would be set back to areas closer to the existing houses along the canyon rim and, thus, be less visible to recreationists on the river. In the absence of a major wildfire, the no action alternative would not reduce the risk of spread of a major wildfire, which could damage vegetation outside of the proposed treatment areas, including vegetation surrounding the Deschutes River. The no action alternative would have a minor to moderate impact on wild and scenic rivers depending on the scale and intensity of a wildfire.

Proposed Action

The proposed action at the Odin Falls treatment area would extend to the river's edge; however, work would not be conducted within 100 feet of the ordinary high water mark (**Section 3.2.4**), which would preserve the denser riparian vegetation that is most visible to recreationists on the water. Because the existing tree canopy is relatively sparse, the fuel reduction work would likely remove more shrubs than trees in this area, which would create a negligible visual impact. Project implementation activities, including ground crews working along the canyon rim, would be visible to recreationists for a short time at the Odin Falls treatment area. Because this segment of the designated river runs through a landscape that is developed with residential and agricultural uses, the project implementation activities would not be out of character for the context of the river setting. The project would not affect other wild and scenic values, including cultural resources, fish, geology, recreation, wildlife, or hydrology; as detailed in the respective sections of this EA. Potential impacts on the wild and scenic river would be short-term,

temporary, and negligible. Informal review with BLM was conducted in December 2020, and comments were provided to the draft EA on February 5, 2021, concurring with these findings.

The proposed action would reduce the risk of wildfire spread through the area, which in turn would reduce the potential for damage to vegetation and scenic quality along the Deschutes River. Therefore, the proposed action would have negligible, long-term, beneficial effect on wild and scenic river values.

4.7. Wetlands

Executive Order (EO) 11990, Protection of Wetlands requires federal agencies to consider alternatives to work in wetlands and limits potential impacts on wetlands if there are no practicable alternatives. FEMA regulation 44 CFR Part 9, Floodplain Management and Protection of Wetlands sets forth the policy, procedures, and responsibilities to implement and enforce EO 11990 and prohibits FEMA from funding activities in a wetland unless no practicable alternatives are available.

According to the United States Fish and Wildlife Service (USFWS) National Wetland Inventory maps, no wetlands are present within the treatment areas. The nearest wetland features to the Deschutes County Parcel, Eagle Crest, and Odin Falls treatment areas are 270 feet west, 832 feet east, and 132 feet west, respectively (**Figures 4-1, 4-2, and 4-3**). The wetland feature near the Deschutes County Parcel is located near agricultural land and is partially drained/ditched and temporarily floods. The wetlands near the Eagle Crest and Odin Falls treatment areas are associated with the Deschutes River.

No Action Alternative

In the absence of a major wildfire, the no action alternative would have no effect on wetlands. There are no wetlands within the proposed treatment areas. However, this alternative would not substantially reduce the risk of wildfire spread through the treatment areas, which could destroy or deteriorate vegetation in wetlands near the treatment areas. Destruction of vegetation in nearby wetlands would damage habitat for wildlife and lessen the effectiveness of wetlands to filter pollutants and maintain water quality. Therefore, the no action alternative would have a minor to moderate impact on wetlands, depending on the scale and intensity of a wildfire.

Proposed Action

Under the proposed action, although wetlands are near the treatment areas, there would be no impact on wetlands because there are no wetlands present directly within the treatment areas.

The proposed action would reduce the risk that a major wildfire would spread through the treatment areas and damage nearby wetland vegetation; therefore, there would be minor, long-term benefits on nearby wetlands.

4.8. Floodplains

EO 11988, Floodplain Management requires federal agencies to avoid, to the extent possible, short- and long-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is

a practicable alternative. FEMA regulations (44 CFR Part 9.7) use the 1-percent annual chance flood as the minimal area for floodplain impact evaluation.

Based on FEMA Flood Insurance Rate Map panels 41017C0325E, 41017C0300E, and 41017C0300E, effective September 28, 2007, none of the proposed treatment areas fall within the 1-percent floodplain.

No Action Alternative

In the absence of a major wildfire, the no action alternative would not affect floodplains, as the treatment areas are not located within floodplains. However, this alternative does not meaningfully reduce the risk of wildfire spread, which could damage or eliminate existing vegetation beyond the treatment areas, depending on the scale and intensity of a wildfire. If a wildfire were to occur, vegetation could be destroyed over large areas, which could lead to increased stormwater runoff following precipitation events. Loss of vegetation would adversely affect natural floodplain functions outside of the treatment areas by contributing to increased stormwater runoff and sedimentation. The additional sedimentation in the long term could lead to an increase in the base flood elevation and thus greater flood hazard risks to improved property in the affected floodplain. Therefore, the no action alternative could have minor to moderate adverse effects on floodplains in surrounding areas, depending on the intensity and scale of a wildfire.

Proposed Action

There are no floodplains within the proposed treatment areas; therefore, the proposed action would have no impact on floodplains. The proposed action would reduce the risk of wildfire spread and the potential for damage to vegetation that could lead to increased stormwater runoff and sedimentation from burned areas; therefore, there would be minor, long-term beneficial effects on floodplains in surrounding areas.

4.9. Vegetation

The proposed treatment areas are located in the Blue Mountains Ecoregion of central and eastern Oregon. Specifically, the treatment areas are within the Deschutes River Valley, which is characterized by broad intermountain sagebrush-grassland (EPA et al. 2003). Predominant vegetation includes sagebrush, bitterbrush, rabbitbrush, native bunchgrasses, and cheatgrass. Western juniper is also common and grows on shallow, rocky soils. Ponderosa pine, black hawthorn (*Crataegus douglasii*), and white alder (*Alnus rhombifolia*) may occur in riparian areas. Common vegetation conditions are shown in **Figure 3-1** through **Figure 3-3**.

Biological soil crusts may occur within areas of the Deschutes County Parcel treatment area that are not already disturbed by recreational or grazing uses. Biological soil crusts consist of mosses, lichens, and cyanobacteria that grow within or adhere to the surface of the soil. They are an important part of arid and semi-arid ecosystems because they provide soil stabilization, nutrient cycling, and resist annual grass invasions in dry areas of the sagebrush steppe ecosystem (U.S. Geological Survey 2015). Recreational activity is likely to be more prevalent in portions of the Deschutes County Parcel that are closer to the City of Redmond and more dispersed farther away from the urban center. Higher levels of human use and activity would be correlated with a lower potential for intact biological soil crusts to be present. Biological soil crusts are also less likely to

occur in the Eagle Crest and Odin Falls treatment areas because of the existing residential development and levels of activity in the neighborhoods.

Invasive Species

EO 13112 requires federal agencies to prevent the introduction of invasive species and provide for their control to minimize the economic, ecological, and human health impacts that invasive species cause. Invasive plant species, such as nonnative cheatgrass and Himalayan blackberry (*Rubus armeniacus*), are present in the County, especially along streams and roads. Bark beetles are present and may be a concern throughout the treatment areas.

No Action Alternative

In the absence of a major wildfire, there would be minor impacts on vegetation or from invasive species. Some fuels reduction treatments may still be implemented in the treatment areas by the County, at-risk homeowners, HOAs, or other local groups, which would remove some vegetation in disparate locations and result in minor impacts on vegetation. However, the risk of wildfire spread would remain high under this alternative. The presence of junipers, a highly flammable species, could increase the intensity of wildfires that burn within the project area and therefore increase the damage to sagebrush and other native vegetation species, as well as biological crusts that may occur in the Deschutes County treatment area. Depending on the intensity and scale of a wildfire, there could be partial or complete loss of vegetation in and around the treatment areas. In addition, a major wildfire could result in changes to the soil characteristics, as described in **Section 4.2**, that would prevent or delay regrowth of forest vegetation for many years following the fire. In the event of vegetation loss from a wildfire, nonnative or invasive species, especially invasive grasses, might be expected to become established over larger areas. Under the no action alternative, there could be minor to major adverse impacts on vegetation, depending on the intensity and scale of a wildfire.

Proposed Action

The proposed action would primarily remove western juniper, which is a highly flammable species due to its evergreen foliage, flammable volatile oils, and tendency to have dry or dead wood (OregonLive 2014). Reducing shrub density would help reduce the ability of a fire to climb into the crowns of the remaining juniper and other trees. By removing western juniper, the proposed action would create a more fire-resilient vegetation community by providing openings for sagebrush to become established and reducing the intensity of wildfires that occur in the project area. Thus, the proposed action would have a minor beneficial effect on existing vegetation communities and biological crusts.

The use of equipment, such as masticators, would disturb the ground and increase the risk of invasive species spread and damage to areas of biological crust, if present. However, the risk of damage would be reduced by moving debris by hand and with small wheeled vehicles, avoiding the use of tracked equipment, and using hand tools to fell or trim trees. Work in the Deschutes County Parcel treatment area would occur when the ground is frozen or snow covered and vehicles would be limited to access roads. Thus, there would be a minor impact to biological crusts and spread of invasive plant or animal species spread within the treatment areas.

Burning at the Eagle Crest treatment area would be conducted in accordance with the measures in **Section 3.2.3**, including burning outside of the fire season and when conditions are wet or

rainy with little or no wind (to minimize the risk of fire spread and associated vegetation damage). Burn piles would be positioned to avoid harming any retained trees. Thus, burning would have a negligible, short-term impact on vegetation.

In the long term, the proposed action would have minor beneficial effects because the risk of wildfire spread and associated vegetation damage and invasive species spread would be reduced.

4.10. Fish and Wildlife

The proposed treatment areas are located within the Blue Mountain Ecoregion, which extends from Oregon into Idaho and Washington, and includes a diverse network of mountain ranges, valleys, and plateaus (EPA et al. 2003). The treatment areas are generally located close to structures and infrastructure, so habitat in the treatment areas may be fragmented, especially in the Eagle Crest and Odin Falls treatment areas. Examples of common mammals, reptiles, and amphibians in Deschutes County include coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), raccoon (*Procyon lotor*), garter snake (*Thamnophis* sp.), and bullfrog (*Lithobates catesbeianus*).

The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703–711), provides protection for migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions, except under the terms of a valid permit issued pursuant to federal regulations. All native birds are protected by the MBTA and existing habitat in the treatment areas have the potential to support a variety of native bird species. Several migratory bird species could occur in the treatment areas, including species such as Brewer's sparrow (*Spizella breweri*), greentailed towhee (*Pipilo chlorurus*), lesser yellowlegs (*Tringa flavipes*), pinyon jay (*Gymnorhinus cyanocephalus*), and willow flycatcyer (*Empidonax traillii*) (USFWS 2020a). The nesting season for migratory birds is generally March through July, depending on the species.

The Bald and Golden Eagle Protection Act of 1940 prohibits the take, possession, sale, or other harmful action of any bald or golden eagle, alive or dead, including any part, nest, or egg (16 U.S.C. 668(a)). Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are not expected to nest in the treatment areas because of the proximity of developed lands; although, they would occasionally pass through while foraging. In addition, large trees and rocky cliffs preferred for nesting are not present in the treatment areas.

The Deschutes River, which runs along the western and southern border of the Odin Falls treatment area, is a large, perennial, fish-bearing stream containing fish such as brown trout (*Salmo trutta*) and steelhead (*Oncorhynchus mykiss*) (ODF 2009; National Wild and Scenic Rivers 2020). Salmonid habitat ends approximately 20 miles north of this treatment area (downstream), so Essential Fish Habitat (EFH) would not be present, as discussed in **Section 4.11**. A few non-fish-bearing, intermittent and ephemeral streams intersect the Eagle Crest treatment area (ODF 2009). There are no waterbodies in the Deschutes County Parcel treatment area. Waterbodies are shown in **Figures 4-1** through **4-3**.

No Action Alternative

In the absence of a major wildfire, the no action alternative would have a negligible effect on common fish and wildlife species in the treatment areas. Fuels reduction implemented by the County, at-risk property owners on their own initiative, HOAs, or other local groups would

remove some vegetation and habitat. However, impacts on fish and wildlife would be negligible because of the limited extent and nature of the hazardous fuels treatment. Similarly, impacts on migratory birds would be negligible even if work were performed during the nesting season. However, a major wildfire would be more likely to spread under the no action alternative and could result in the destruction of terrestrial and aquatic habitat, depending on the scale and intensity of the fire. Therefore, the no action alternative would result in minor to moderate impacts on fish and wildlife and their habitats.

Proposed Action

The proposed action has the potential to impact common wildlife species and associated habitats occurring within the treatment areas because of the removal of brush and individual trees. Additionally, noise and smoke impacts related to vegetation removal activities could disturb wildlife and cause individuals to move from their preferred areas or temporarily change their behavior. Because of the proximity of development, the bird and mammal species expected in the treatment areas are those that are commonly found in fragmented grassland and forested habitats. Burning for the project would be conducted per the conditions described in **Section 3.2.3**. Therefore, impacts on common wildlife species would be minor and short term.

There would be no in-water work or herbicide use as part of the proposed action. 100-foot riparian buffers would be implemented around known streams, including the Deschutes River, providing protection for fish species and resulting in no short-term effects on fish species.

Vegetation clearing associated with hazardous fuels reduction could affect migratory birds if work were to occur during the nesting season, generally between March and July. The disturbances in the treatment areas could result in inadvertent nest destruction, birds abandoning nesting activities, and their displacement from preferred foraging areas. Ground-nesting and shrub-nesting birds would be impacted to a greater extent than birds that nest in the upper canopy of trees. Thus, if vegetation clearing during the nesting season cannot be avoided, these small-scale vegetation management activities would have minor localized and temporary impacts on migratory birds.

If vegetation removal during the nesting season (March 15 to July 31) cannot be avoided, the project would still be subject to the prohibitions of the Migratory Bird Treaty Act. The County would be responsible for determining if active nests are present (prior to clearing), obtaining and complying with any necessary permits from the USFWS, and documenting this on each project area treatment plan. USFWS allows empty or abandoned nests to be removed and destroyed without a permit as long as they are not taken into possession.

The proposed action would likely have a negligible effect on bald and golden eagles and their habitat because hazardous fuels reduction treatments would primarily take place near development where eagles are unlikely to occur. Additionally, the proposed action would primarily target small trees (less than 12-inches DBH) and brush, which do not provide nesting or perching support for eagles.

In the long term, there would be minor beneficial effects on fish, wildlife, migratory birds, and eagles because the risk of wildfire spread; associated widespread vegetation loss (including ecologically sensitive vegetation) would be reduced.

4.11. Threatened and Endangered Species and Critical Habitat

The Endangered Species Act (ESA) of 1973 gives USFWS and the National Marine Fisheries Service authority for the protection of threatened and endangered species. This protection includes a prohibition on direct take (e.g., killing, harassing) and indirect take (e.g., destruction of habitat).

The ESA defines the action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02). Therefore, the action area where effects on listed species must be evaluated may be larger than the treatment areas where project activities would occur. The action area to be used for analysis is the greatest identified extent of potential impacts outside of the Project Area, which was set at 0.25 miles because of noise generated by gas-powered hand tools (chainsaws).

The USFWS Information for Planning and Consultation was used to identify proposed, threatened, and endangered species in the action area. In addition, information available from StreamNet, a cooperative information management and data dissemination tool focused on fisheries and aquatic data in the Columbia River basin and the Pacific Northwest, was used to identify potential fish species that could occur in the action area. All listed species that may be near the action area are shown in **Table 4.3** (USFWS 2020a; StreamNet 2020) and are briefly discussed below. A no effect memo was completed for the project and is available upon request.

Table 4.3. Federally Listed Species in the Treatment Areas

Common Name	Scientific Name	Status
Fish		
Middle Columbia River (MCR) steelhead	*Oncorhynchus mykiss*	Non-essential Population
Bull trout	*Salvelinus confluentus*	Threatened
Mammals		
Northern California Southern Oregon (NCSO) Distinct Population Segment (DPS) Fisher	*Pekania pennanti*	Proposed
Gray Wolf	*Canis lupus*	Threatened

Sources: USFWS 2020a; StreamNet 2020

Mid-Columbia River (MCR) steelhead: While MCR steelhead were historically found in the upper Deschutes River, they have since been blocked from access because of the Pelton Round Butte Hydroelectric Project at river mile 100 (Reregulating Dam). In preparation for reintroduction above these barrier dams, the Round Butte Hatchery steelhead were included as part of the MCR steelhead (71 CFR 834) in January 2005. In January 2013, a Final Rule (78 CFR 2893) was issued that this reintroduction was classified as a non-essential experimental population, with the provision to expire 12 years after the effective date of the ruling (January 2025). Mid-Columbia steelhead designated critical habitat ends approximately 26 miles (linear) north (downstream) of the Odin Falls treatment area and extends downstream of that point.

Bull trout: Bull trout require cold water (less than 59 to 64 degrees Fahrenheit), unblocked migratory corridors, clean gravel for spawning and rearing, and stable stream flows. Bull trout are found in the Lower and Middle Deschutes River. The species is considered extinct in the

upper Deschutes River (Oregon Department of Fish and Wildlife [ODFW] 2005). The species may occur as far upstream as the Odin Falls treatment area, but it is generally considered to be restricted to areas downstream of Big Falls. Designated critical habitat ends approximately 5 miles north (downstream) of the Odin Falls treatment area and extends to the lower reaches of the Deschutes River.

Essential Fish Habitat: The Magnuson-Stevens Fisheries Conservation and Management Act (16 U.S.C. 1801 et seq.) designates EFH for certain commercially managed marine and anadromous fish species and is intended to protect the habitat of commercially managed fish species, including anadromous fish species, from being lost because of disturbance and degradation. The National Oceanic and Atmospheric Administration's designated EFH ends at Round Butte Dam, approximately 20 miles north of the nearest treatment area (Odin Falls), so EFH would not be present.

Northern California Southern Oregon (NCSO) Distinct Population Segment (DPS) Fisher: Typical habitat utilized by fisher are low- and mid-elevation coniferous and mixed conifer forests. Preferred forest stands are areas that are contiguous, complex, and predominantly (greater than 50 percent) mature. Denning occurs in areas where there are cavities in large trees or snags. While the treatment areas occur within historical fisher range, the nearest known populations are in the southern Cascade Mountains around Medford, Oregon, more than 100 miles southwest of Redmond, Oregon. Suitable habitat for fisher is not present in the treatment areas. Critical habitat has not been designated for this species.

Gray Wolf: The treatment areas are located within the known range of gray wolves. However, the nearest documented pack activity area is the Rogue pack area, which is on the east slope of the Cascade Mountains, north of Klamath Lake and East of Roseburg. It is likely that most of the pack activity would continue to occur in and around the Rogue wolf pack area, which is at least 90 miles away from the action area. Furthermore, any Rogue pack gray wolves that may range into the action area, would have already become accustomed to anthropogenic activities. The nearest designated critical habitat for gray wolves occurs in northeastern Minnesota (USFWS 2020b).

No Action Alternative

In the absence of a major wildfire, the no action alternative would have no effect on listed species and their habitats. Fuels reduction treatments implemented by the County, at-risk property owners on their own initiative, HOAs, or local groups, would remove some vegetation in disparate locations. These treatments may not be as prescriptive as the proposed action nor include conservation measures to avoid or minimize impacts on listed species that may be present. For example, if work were conducted on the Odin Falls common area land and impacted riparian vegetation along the Deschutes River, there could be a negligible impact on bull trout. However, it is unlikely that bull trout would be present in this area. A major wildfire would be more likely to spread under the no action alternative, which could have minor to major impacts on listed species and their habitats, depending on the scale and intensity of a fire.

Proposed Action

This proposed action would not conduct any in-water work. The project would also establish a 100-foot no-work buffer from standing water. This would maintain existing conditions that

provide limited shade and allow for existing vegetation to act as filtration for surface water runoff. Because of the proposed methods for the work (upland vegetation thinning), and the use of a 100-foot no-work buffer around waterbodies, the proposed action would have no effect on the non-essential population of MCR steelhead and no effect on bull trout. Neither species has designated critical habitat within the treatment areas. The distance between the nearest treatment area and designated EFH is approximately 20 miles, which would result in no adverse effect to EFH.

The habitat available within the action area is mostly high desert shrub and sagebrush habitat, which is unsuitable for fisher. Because of the existing habitat conditions within the treatment areas, close proximity to rural neighborhoods, and lack of designated critical habitat, the proposed action would have no effect on fisher.

The proposed action would have no effect on gray wolf or their habitat because of the distance from known activity areas to the treatment areas, the proximity of the project sites to rural residential homes, and the adaptability of the species to a variety of habitats.

4.12. Cultural Resources

This section provides an overview of potential environmental effects on cultural resources, including historic properties. Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470f), requires that activities using federal funds undergo a review process to consider potential effects on historic properties that are listed in or may be eligible for listing in the National Register of Historic Places (NRHP). Cultural resources include prehistoric or historic archeology sites; historic standing structures; historic districts; objects; artifacts; cultural properties of historic or traditional significance, referred to as Traditional Cultural Properties that may have religious or cultural significance to federally recognized Indian tribes; or other physical evidence of human activity considered to be important to culture, subculture, or community for scientific, traditional, religious, or other reasons. Pursuant to 36 CFR 800.4(a)(1), an Area of Potential Effects was defined to include the areas within which the undertaking may directly or indirectly affect cultural resources (the treatment areas).

Historical Context: The project areas lie near the boundary of the Plateau and Northern Great Basin culture areas. Project lands are within the territory of the Tenino, now represented by the Confederated Tribes of Warm Springs (CTWS). The CTWS is comprised of peoples from many tribes, speaking different languages. The Tenino territory lies within a semi-arid basin, whose major hydrological features were the John Day and Deschutes Rivers. Villages consisted of 2 to 20 houses, with populations ranging from about 30 to 400 people. Many groups occupied a main settlement consisting of a permanent winter village and a major fishing locality. Secondary or tertiary sites were also common but were not usually occupied for long periods (Hunn and French 1998).

European encroachment and spread of diseases (e.g., smallpox) decimated lifeways and populations of Warm Springs groups during the early 19th century and into the 20th century (Boyd 1990). Mounting pressures from settlers, cataclysmic loss of population from diseases and growing tensions resulted in the signing of a treaty for the creation of the Warm Springs Reservation in 1855, although this was not ratified by Congress until 1859 (resulting in significant loss of territory) (Zucker et al. 1987). In 1937, the three major divisions within the

Warm Springs Reservation (Pauite, Tenino, and Wasco Chinook) organized as the Confederated Tribes of Warm Springs (Zucker et al. 1987).

The first European Americans near the project area were trappers employed by the Hudson Bay Company who moved through central Oregon in the 1820s and 1830s. Settlement in Deschutes County was slow to commence due to the rugged terrain of the Ochoco Mountains. During the 1860s, gold was discovered in the region, which encouraged the building of wagon roads and increased settlement (Hanson 2018). During the mid-nineteenth century, the Homestead Act of 1862 and the establishment of more maintained wagon roads, drew farmers, cattle ranchers, and sheep herders to central Oregon (Hanson 2018), especially around Bend, which provided one of the few areas where wagon trains could efficiently ford the Deschutes River (Brogan 1964; McArthur and McArthur 2003). The population of central Oregon increased steadily during the 1870s and 1880s as ranchers moved their cattle herds to the sage flats of the high desert. The City of Redmond was officially incorporated in 1910 and named after early settlers Frank and Josephine Redmond. By 1907, the Central Oregon Canal was constructed, diverting water from the Deschutes River. Newly irrigated lands continued to be the major impetus for settlement around Redmond and central Oregon in general, through the 1910s and 1920s (Central Oregon Irrigation District 2020).

Prior Surveys: No portion of the Deschutes County Parcel treatment area was previously surveyed. However, large tracts directly east of the treatment area were surveyed several years ago by the Oregon Military Department. This work, completed by Oetting in 2015, resulted in identification of many precontact and historic sites and isolates. Most precontact sites were small. Oetting also completed a comprehensive review of previous archaeological work in the area (mainly excavation work), concluding that precontact sites on the flats between Redmond and Powell Butte lacked stratified or subsurface components or features. His rationale is based on the area's geomorphic history and is likely accurate for much of the high lava plains east of Redmond and Bend.

BLM surveyed the Eagle Crest East Ridge area prior to development, when the land was BLM-owned. BLM personnel identified a multicomponent site and an irrigation feature and ditch, which are in or partially in the proposed Eagle Crest East Ridge treatment area. Several small historic sites (dumps) and some type of modern feature were also identified in the development, but not in the current Eagle Crest East Ridge treatment areas. NRHP eligibility recommendations are somewhat vague, as BLM recommended only the multicomponent site eligible, with the remaining resources not eligible. The Oregon State Historic Preservation Office (SHPO) lists each of these resources designated unevaluated/important. The multicomponent site was recommended eligible, but then the land was transferred out of federal ownership and developed. Much of the site was destroyed by roads and houses. The Eagle Crest West Ridge development was not previously surveyed.

No portion of the Odin Falls treatment area was surveyed prior to the proposed action for cultural resources. The treatment area is on the first and second terraces above the Deschutes River, which forms the treatment area's western margin. This location indicates a relatively high likelihood that precontact sites are present across the treatment area. A single precontact archaeological site is documented at the extreme southern end of the treatment area and was recorded during a large-scale survey of the Deschutes River in the late 1980s.

Existing Conditions: A random sample survey was conducted on the Deschutes County Parcel treatment area in November 2020. Five historic sites, one multicomponent site, and six precontact isolates were identified on the Deschutes County Parcel, which is highly disturbed. A field survey for the Eagle Crest and Odin Falls treatment areas was completed in October 2020; no sites were identified in the Eagle Crest treatment area and one pre-contact site and three precontact isolates were identified in the Odin Falls treatment area. Only the multicomponent site at the Deschutes County Parcel and the precontact site at Odin Falls were determined to be significant.

On July 23, 2020, consultation was initiated with Tribes about the proposed action to solicit comments and request any additional information about cultural resources that may be impacted. The following Tribes were contacted: Burns Paiute Tribe, Confederated Tribes of the Grand Ronde, Confederated Tribes of the Warm Springs, Cow Creek Band of the Umpqua Indian Tribe, Klamath Tribe. The Klamath and Grand Ronde Tribes each responded indicating the area was outside of their ancestral lands. In August 2020, the Warm Springs Tribe provided comments on the survey methodology for the Deschutes County parcel and visited the site with FEMA and the County.

Barring additional information from the SHPO or Tribes, based on the nature of the proposed action and the sites, and avoidance and minimization measures, FEMA has determined that the proposed action would result in no adverse effects to historic properties. On December 11, 2020 the cultural resources report was sent to the Tribes for their review. FEMA has not received any responses as of the date of this final EA. Consultation with these findings was initiated with the SHPO and a response from the SHPO has not been received as of the date of this final EA. Appendix A contains all agency and tribal correspondence. The cultural resources survey report may be available upon request for further information about the prehistoric and historic context of the treatment areas.

No Action Alternative

Under the no action alternative, the County, property owners, or HOAs other local groups may implement wildfire mitigation activities, which could disturb the ground or alter the appearance of structures, potentially affecting cultural resources that may be present in the treatment areas. Because there were few resources identified in the Eagle Crest and Odin Falls, the potential for direct impacts from these activities would be negligible. Under the no action alternative, the County may also continue some hazardous fuels reduction activities on the Deschutes County Parcel without the implementation of the avoidance and minimization measures associated with the proposed action. Thus, there would be the potential for direct disturbance of cultural resources. Despite the potential for some scattered wildfire mitigation activities to occur, the risk of wildfire spread would remain high. A wildfire could have minor to moderate adverse impacts on archeological resources or historic structures in the treatment area vicinity depending on the scale and intensity of the fire.

Proposed Action

The proposed action would avoid and minimize potential impacts to cultural resources by implementing the following measures:

- Hazardous fuels work would be conducted with ground crews using hand tools.
- No tracked vehicles would be used.
- Debris would not be dragged across the surface but rather moved by hand or with small, wheeled vehicles.
- On the Deschutes County Parcel, the work would be conducted when the ground is snow covered or frozen.
- The two precontact archaeological sites will have a 20-meter buffer placed around the site boundary, and while work can occur within the buffered site boundary, this work will be done by hand, without mechanical equipment of any type. Surface disturbance within these buffered site areas will be avoided; vegetation can be cut but not pulled out by the roots, and raking is not to occur.

Thus, it is unlikely that any archaeological resources in the treatment areas would be impacted by project activities. The proposed action would not alter any structures. Therefore, the proposed action would result in No Adverse Effect on Historic Properties. In the event that any archeological resources are discovered during project implementation, work would immediately cease, the area would be secured, and the County would notify the SHPO and FEMA for further evaluation.

4.13. Environmental Justice

Environmental justice is defined by EO 12898 (59 Federal Register 7629) and CEQ guidance (1997). Under EO 12898, demographic information is used to determine whether minority or low-income populations are present in the areas potentially affected by the range of project alternatives. If so, a determination must be made whether implementation of the alternatives may cause disproportionately high and adverse human health or environmental impacts on those populations.

This environmental justice analysis is focused at the local (i.e., census block group) level. The local area included in this analysis is where project-related impacts would occur, potentially causing an adverse and disproportionately high effect on neighboring minority and low-income populations. Minority or low-income census block groups are defined as meeting either or both of the following criteria:

- Census block group contains 50 percent or more minority persons or 25 percent or more low-income persons.
- Percentage of minority or low-income persons in any census block group is more than 10 percent greater than the average of the surrounding county.

The treatment areas are within three census block groups tracts in Deschutes County, Oregon. The Deschutes County Parcel treatment area is within Census Block Group 7002, the Eagle Crest treatment area is within Census Block Group 6001, and the Odin Falls treatment area is located within Block Group 7003. **Table 4.4** depicts the percentage of minority and low-income population for these census block groups and the county for comparison.

Table 4.4. Environmental Justice Demographics

Census Block Group and Treatment Area	Percent Minority Population	
Census Block Group: 7002 Deschutes County Parcel	14	35
Census Block Group: 6001 Eagle Crest	4	27
Census Block Group: 7003 Odin Falls	0	19
Deschutes County	12.5	10.8

Source: EPA 2019, U.S. Census Bureau 2018

Minority Populations

CEQ (1997) defines the term "minority" as persons from any of the following groups: Black, Asian or Pacific Islander, American Indian or Alaskan Native, and Hispanic. According to EPA's Environmental Justice Screening and Mapping Tool (EPA 2019) and the U.S. Census Bureau's American Community Survey 5-Year Estimates 2014–2018 (U.S. Census Bureau 2018), the minority population in the census block group encompassing the Deschutes County Parcel treatment area is 14.0 percent, the census block group containing the Eagle Crest treatment area is 4.0 percent, and the census tract encompassing the Odin Falls treatment area is 0.0 percent, as compared to Deschutes County with a 12.5 percent minority population. These census block groups do not contain a minority population because they do not meet the criteria listed above.

Low-Income Populations

Residents of areas with a high percentage of people living below the federal poverty level may be considered low-income populations. As shown in **Table 4.4**, the low-income populations in the census block groups encompassing the treatment areas are 35 percent for the Deschutes County Parcel, 27 percent for Eagle Crest, and 19 percent for Odin Falls, as compared to Deschutes County with 10.8 percent (EPA 2019, U.S. Census Bureau 2018). The census block groups containing the Deschutes County Parcel and Eagle Crest treatment areas are considered to contain low-income populations, with the low-income population greater than 25 percent in each. Although the Deschutes County Parcel does not have any residents within its boundaries, the data for the census block group is likely reflecting the status of the population of northeast Redmond, which would represent the population closest to the parcel. Residents of northeast Redmond would be most likely to use the county parcel for recreation and to be affected by actions on the parcel due to their proximity.

The per capita income for those within the Eagle Crest treatment area is higher than that of the county, indicating that the larger census block group is reflecting data on low-income populations that may not fully represent the project area. In addition, many of the homes within the Eagle Crest golf course community are valued higher than the average home value for the county. It is unlikely that the Eagle Crest neighborhood would be considered a low-income population.

Census Block Group 7003, which encompasses the Odin Falls treatment area, is not considered a low-income population because it does not meet the criteria listed above.

No Action Alternative

Under the no action alternative, some scattered fuels reduction work may be implemented by the county, at-risk property owners, HOAs, or local groups over time, reducing the overall risk of wildfire spread; however, the work would spread out spatially and temporally and would likely not disproportionately impact environmental justice communities. Under this alternative, the risk of wildfire spread would remain high. In the event of a wildfire, the population within the census block groups, including low-income populations, may experience adverse health impacts (such as those described in **Section 4.17**) or damage or loss of property and assets. Low income populations could be disproportionately and adversely affected by a wildfire because of their limited resources to recover from losses. Therefore, minor to moderate impacts may occur on low-income populations in the project vicinity, depending on the scale, intensity, and location of a fire.

Proposed Action

The proposed action would implement hazardous fuels treatment to reduce the risk of wildfire spread in the treatment areas. Temporary and localized impacts from the proposed action, such as noise, would impact those proximate to the work location, including low-income residents. However, these effects would not disproportionately impact low-income residents, as these short-term effects would affect all residents near project activities. In addition, the most likely low income population proximate to the proposed treatment areas would be residents of northeast Redmond. The proposed project activities would be more than 0.25 miles from the nearest residents in northeast Redmond, which would prevent adverse, short-term effects of the proposed work such as noise. The benefits of reduced risk of wildfire spread would be applicable to the entire population of the treatment areas, including low-income populations. Therefore, no disproportionately high and adverse impacts on low-income populations would result from the proposed action.

4.14. Hazardous Materials

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, and the Toxic Substances Control Act. The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA), which was further amended by the Hazardous and Solid Waste amendments, defines hazardous wastes. In general, both hazardous materials and waste include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or to the environment when released or otherwise improperly managed.

Hazardous materials may be encountered in the course of a project or they may be generated by the project activities. To determine whether any hazardous waste facilities exist in the vicinity or upgradient of the proposed treatment areas or whether there is a known and documented environmental issue or concern that could affect the proposed treatment areas, a search for Superfund sites, toxic release inventory sites, water dischargers (i.e., municipal and industrial wastewater treatment facilities), hazardous facilities or sites, and multiactivity sites was

conducted using EPA's NEPA Assist website (EPA 2020d). According to the database, there are several hazardous materials dischargers or producers present within 1 mile of the Deschutes County Parcel treatment area, but none are within or directly adjacent to the treatment area. No hazardous materials sites exist within 1 mile of the Eagle Crest and Odin Falls treatment areas. While many of the listed RCRA sites do not report what hazardous materials and waste are present, some descriptions that were listed included fats and oils refining and blending and all other petroleum and coal products.

No Action Alternative

Under the no action alternative, existing conditions would not substantially change. The County, at-risk property owners, HOAs or local groups may implement some fuels reduction work within the treatment areas, which would pose a negligible threat of release of hazardous materials from equipment and potentially localized and negligible site contamination from leaks or spills. However, the risk of wildfire spread would not be effectively reduced under this alternative. In the event of a major wildfire, fire-retardant materials could be applied to burning areas. Fire retardants are generally considered to be nontoxic, but there may be risks to small mammals and other wildlife from concentrated exposures (Modovsky 2007). However, exposures would likely be short term because the application "footprint" of these chemicals is limited in terms of foraging areas and species habitat for any individual animal, and the ingredients generally degrade in the environment (Modovsky 2007). Therefore, the potential for adverse effects is likely to be negligible. Wildfire damage in residential areas also directly releases hazardous materials into the air, soil, and water as plastics burn and materials that are otherwise safely stored are damaged and released (CalRecycle 2020). Although the residential densities in the treatment areas are generally low, a wildfire in the area could burn into the City of Redmond. Therefore, the potential for a wildfire in or near the treatment areas to produce hazardous materials from burning homes would be minor to major, depending on the scale and intensity of the fire.

Proposed Action

No hazardous materials sites are present in or directly adjacent to the treatment areas, so there would be no impact on hazardous sites from project implementation. The proposed actions would include the use of mechanical equipment such as chainsaws, chippers, and vehicles, which would pose the threat of leaks and spills. The short-term duration of the use of equipment at any individual treatment area and the use of equipment in good condition would reduce any potential effect to an insignificant level. All equipment and project activities would adhere to local regulations to reduce the risk of hazardous leaks and spills. Any spills during implementation would be immediately contained and cleaned. Thus, there would be a negligible contamination threat from vehicle and equipment use.

4.15. Noise

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are considered noise. Noise events that occur during the night (10 p.m. to 7 a.m.) are more annoying than those that occur during normal waking hours (7 a.m. to 10 p.m.). Assessment of noise impacts includes the proximity of the proposed action to sensitive receptors. A sensitive receptor is defined as an area of frequent human use that would benefit from a lowered noise level. Typical sensitive receptors include residences, schools, churches, hospitals, nursing homes, and

libraries. Sensitive receptors near the treatment areas consist of residences, including those that would receive treatment. Any noise-generating activities in proximity to residences could have the potential to adversely affect these receptors.

The Deschutes County Parcel treatment area is vacant land near the edge of the City of Redmond with no sensitive receptors nearby. The Eagle Crest and Odin Falls treatment areas are rural communities in the WUI. Typical noise events in the treatment areas are presently associated with climatic conditions (e.g., wind, rain), light traffic noises from nearby roadways, and other intermittent residential conditions (e.g., lawnmowers, leaf blowers).

No Action Alternative

Under the no action alternative, some fuels reduction work may be conducted by at-risk property owners, the County, HOAs, and local groups over time. The tools and equipment used for these activities would be similar to those already in use for general landscape maintenance around rural residences, including chainsaws and small chippers. Therefore, there would be negligible change in existing noise levels that could affect sensitive receptors in the treatment areas.

Proposed Action

Under the proposed action, noise would be generated by the operation of equipment, such as masticators, chippers, and chainsaws. The loudest equipment likely to be used would be chainsaws and woodchippers, which can produce noise levels up to 85 decibels (dB) and 88 dB, respectively, when perceived from approximately 50 feet away (Federal Highway Administration 2017).

The implementation of the proposed action would increase noise levels within the immediate vicinity of the work for the duration of the work. However, increases in noise levels would be minor and of short duration at any one location, and all work would occur during normal waking hours. Vehicle and equipment runtimes would be kept to a minimum. No long-term noise impacts would occur.

4.16. Transportation

Access into the Deschutes County Parcel treatment area is available through an extensive network of dirt roads spurring from paved roads in the City of Redmond, such as Hemlock Avenue, Antler Avenue, and Negus Way, and Highway 97. The primary roadway providing access to the Eagle Crest East Ridge treatment area is Cline Falls Road off of Highway 126, with secondary access provided by the network of paved roads. Eagle Crest Boulevard provides primary access to the Eagle Crest West Ridge treatment area, with secondary access provided by a network of paved roads extending throughout the residential area. The Odin Falls treatment area can be accessed from 66th Street and Grubstake Way from Helmholtz Way and Highway 126. Portions of many of these roadways are narrow and provide limited access for residents, visitors, and firefighters in the event of a fire.

No Action Alternative

Under the no action alternative, some hazardous fuels work may be implemented by the County, at-risk property owners, HOAs, or local groups over time. This limited activity would be spread out spatially and temporally; thus, transportation in the treatment areas would not be directly

affected. However, the potential for a major wildfire to spread through the treatment areas would remain high. Wildfire may encroach upon roadways and wildfire smoke may inhibit the ability to see roadways clearly. In recent years, fires close to highways 97 and 126 in northern Oregon have required the closure of segments of these major transportation corridors because of reduced visibility from smoke. Furthermore, with limited emergency vehicle and evacuation route access, the spread of wildfire could increase risks for residents and firefighters.

Proposed Action

Under the proposed action, crews would access treatment areas from existing roads and driveways. Work on each treatment area would require a small number of vehicles for a short duration. Work on the larger Deschutes County Parcel treatment area may involve more crews and take longer to complete than the other treatment areas, but the vehicles and equipment would be primarily on off-road areas within the parcel and would not be on public streets. There may be negligible, localized, short-term impacts on transportation and traffic from vehicles staging on roadsides in residential areas. Out of the 3-year project duration, work in the treatment areas would occur three separate times in 5-month intervals, breaking for migratory bird and fire seasons, for approximately 15 months total. The work may require several crews to be working at any given time and would require vehicle staging at several points along roadsides in the road network; however, each treatment area is widely separated from the others and they do not share road networks. No road closures would be expected. No heavy tracked equipment would be used; therefore, no damage to unpaved road surfaces is expected. Pile burning at the Eagle Crest treatment area has the potential to obstruct visibility on roadways by generating smoke. However, the area where pile burning would be used is relatively small, and the piles would be small and burned in compliance with state and local regulations. Personnel overseeing the burns would adhere to all ODF-fire suppression gear and requirements in the Oregon Forest Practices Act OAR 629-043-0040. Thus, there would be no effects on transportation from pile burning.

In the long term, the proposed action would reduce the risk of wildfire spread, which would reduce potential impacts of wildfire smoke and damage to transportation infrastructure from a major wildfire.

4.17. Utilities

The Deschutes County Parcel treatment area is undeveloped and does not have utilities. The Eagle Crest and Odin Falls treatment areas are provided electric power via main overhead power lines by Pacific Power (PacifiCorp) and the Central Electric Cooperative (CEC) and natural gas from Cascade Natural Gas (Oregon Department of Energy n.d.). The electrical distribution lines to residences in both Eagle Crest and Odin Falls are mostly underground. Most rural residences are expected to get water from on-site wells and wastewater would be treated by on-site septic systems. Odin Falls has a private community wide water system (Avion) that provides service to most residents, others have wells. Eagle Crest water and sewer utilities are provided through a community-wide system from Oregon Water Utilities - Cline Butte Inc.

No Action Alternative

Although some scattered fuels reduction work may be implemented by the County, at-risk property owners, HOAs or local groups under the no action alternative, the risk of wildfire spread would remain high. Electrical services provided via overhead power lines would continue

to be at risk of damage from wildfires. Water wells could be physically damaged by wildfires or experience microbial contamination as a result of pressure loss during a fire (Montana Department of Environmental Quality 2012). Ash, sediment, and debris from wildfires may contaminate uncovered wells or storage tanks. Intense heat from wildfires could adversely impact water system components on the surface and underground. If intense heat modifies the chemical properties of water system components, such as melting plastic water pipes, chemicals might leach into the water, causing contamination (Pitzer and Beeman 2019). In addition to chemicals leaching into the water system from affected system components, wildfires can result in changes to source-water chemistry that could alter drinking water treatment for municipal water suppliers (U.S. Geological Survey n.d.). Damage to drinking water utilities from wildfires may include difficulty reaching the drinking water utility during or after the fire because of road closures, fire hazards, or debris in the road, as well as the water utility losing power as a result of the wildfire, long-term reduction in source water quality, short-term contamination of drinking water sources, need for additional water sampling, loss of source water, and water demand in excess of water production (The Cadmus Group, Inc. 2013). Most of the functional components of a septic system are usually several feet belowground and therefore are typically resistant to fire damage. However, it is possible that firefighting activities, such as digging fire breaks, may damage septic systems (Montana Department of Environmental Quality 2012). Thus, impacts on private and public utilities could be minor to major, depending on the intensity and scale of a wildfire.

Proposed Action

The proposed action would not directly affect utilities. Some of the proposed tree thinning and limbing could provide protection to overhead power lines and reduce the potential for powerlines to spark a fire; however, tree trimming to protect power lines is not the focus of this project. In the long term, the proposed action would reduce the risk of damage to public and private utilities from wildfire spread. Therefore, the proposed action could have minor, long-term beneficial effects on utilities.

4.18. Public Health and Safety

As described in **Section 2**, Deschutes County has a history of wildfires and wildfire smoke can exacerbate respiratory health issues, such as asthma and chronic obstructive pulmonary disease. Wildfire smoke may contribute to respiratory infections and cardiovascular concerns (Reid et al. 2016).

Communities within or near the three treatment areas have a medium to high wildfire risk because residences are interspersed with large tracts of vegetated land and wildfires can spread directly from vegetation to structures.

Emergency medical services are provided by Redmond Fire and Rescue, a fire district that provides fire and rescue response to the City of Redmond and the surrounding rural area (Redmond Fire and Rescue 2017). The Deschutes County Sheriff's Office provides patrols and search and rescue services to areas outside of the City of Redmond, including the majority of the three treatment areas. The Redmond Police Department provides services to the southernmost portion of the Deschutes County Parcel treatment area, located just inside of the City of Redmond.

No Action Alternative

Although some fuels reduction work would be implemented by the County, at-risk property owners, HOAs or other local groups over time, current conditions would not substantively change, and the risk of wildfire spread would remain high. In the event of a wildfire, there is an increased risk to public health and safety and to services provided to protect public safety, such as firefighters. Wildfires can generate substantial amounts of particulate matter, which can affect the health of people breathing smoke-laden air. This is a particular concern for vulnerable populations, such as the youth and elderly, as described in **Section 4.4**. Wildfires can generate substantial amounts of carbon monoxide, which can pose a health concern for frontline firefighters. In addition, fires that are burning residences can release toxic materials into the air, soils, and water, posing health risks to populations both during the fire and later during cleanup and recovery (CalRecycle 2020).

Heavy rain conditions following wildfires can contribute to sediment and debris in nearby waterways, which can affect downstream water quality and damage structures, roads, and utilities critical to the safety and well-being of citizens. Under the no action alternative, there could be minor to major impacts on public health and safety depending on the scale and intensity of the fire.

Proposed Action

Under the proposed action, the reduction of hazardous fuels would help to reduce the spread of wildfire in the treatment areas. This would create a safer environment for firefighters and allow them to more easily control the spread of a wildfire. These activities would not prevent wildfires but could contribute to containment, reducing the intensity and frequency of wildfires, which would ultimately reduce the risks for people living in and near the treatment areas. In addition, when wildfires are controlled more quickly, a smaller area may be burned, and less sediment and debris may be transported downstream during future precipitation events that could potentially affect water quality. The proposed action could reduce the probability that emergency services would be focused on firefighting and would allow emergency responders to remain available to respond to other emergencies throughout the county. Therefore, the proposed action would have a moderate long-term beneficial effect on public health and safety.

4.19. Summary of Effects and Mitigation

Table 4.5 provides a summary of the potential environmental effects from implementation of the proposed action, any required agency coordination efforts or permits, and any applicable proposed mitigation or best management practices (BMPs).

Table 4.5. Summary of Impacts and Mitigation

Affected Resource Area	Impacts	Agency Coordination or Permits	Mitigation/BMPs
Soils, Farmland Soils, and Topography	Negligible, short-term impact on soils and no short-term effect on farmland soils; minor, long-term benefit on soils, including farmland soils, by reducing the risk of wildfire spread. No effect on topography.	N/A	• No tracked vehicles would be used, and debris would not be dragged across the surface but rather moved by hand or with small, wheeled vehicles. • Root balls would not be disturbed during project implementation and some shrubs and trees would be retained. • In locations where slopes are greater than 20 percent, equipment would be limited to chainsaws and hand tools. • Any ground disturbed by mechanical equipment would be covered with chipped material or native grass seed. • To minimize potential ground disturbance on the Deschutes County Parcel, Work in the Deschutes County Parcel treatment area would occur when the ground is frozen or snow covered and vehicles would be limited to existing access roads.
Visual Quality and Aesthetics	Negligible to minor short-term effects; minor, long-term beneficial effects from reducing the risk of wildfire spread.	N/A	• Work would not be conducted within 100 feet of the water.
Air Quality and Climate	Minor, short-term impacts from vehicle and equipment use, pile burning, and activities contributing to the release of fugitive dust; minor, long-term beneficial effect by reducing the risk of wildfire spread.	Redmond Fire and Rescue	• Vehicles and equipment running times would be kept to the minimum extent possible. • Pile burning would be conducted in compliance with state and local regulations, as described in **Section 3.2.3**. • To reduce fugitive dust, work on the Deschutes County Parcel will be done during the winter when the ground is frozen or snow covered.
Surface Waters and Water Quality	Negligible short-term impact; minor long-term beneficial effect by reducing the risk of wildfire spread and associated vegetation loss and sedimentation effects.	N/A	• Work would not be conducted within 100 feet of the water. • Herbicides would not be used to manage vegetation • Any ground disturbed by mechanical equipment would be covered with chipped material or native grass seed.

Affected Resource Area	Impacts	Agency Coordination or Permits	Mitigation/BMPs
Wild and Scenic Rivers	Short-term, temporary, and negligible; no impact to other wild and scenic values including cultural resources, fish, geologic structures, recreation, wildlife, or hydrology.	USFWS, Bureau of Land Management, National Parks Service, Section 7(a)	• Work would not be conducted within 100 feet of the water.
Wetlands	No effect on wetlands from implementation; minor long-term beneficial effect by reducing the risk of wildfire spread and associated vegetation loss.	N/A	N/A
Floodplains	No effect; however, there would be minor, long-term beneficial effects on floodplains in surrounding areas from the reduced risk of wildfire spread.	N/A	N/A
Vegetation	Impact individual plant species, primarily western juniper; beneficial effect on existing vegetation communities; minor impact from invasive species spread and on biological crusts from ground disturbance; negligible short-term impact from burning; minor long-term beneficial effects by reducing the risk of wildfire spread and vegetation loss.	N/A	• Ground disturbance would be minimized by moving debris by hand and with wheeled vehicles, avoiding the use of tracked equipment, and using hand tools to fell or trim trees in areas with steep slopes. • Work in the Deschutes County Parcel treatment area would occur when the ground is frozen or snow covered and vehicles would be limited to existing access roads. • Burning would be conducted in accordance with the measures described in **Section 3.2.3.** • Burn piles would be positioned to avoid harming any retained trees.
Fish and Wildlife	Minor short-term impact on wildlife and migratory birds from vegetation removal; negligible short-term impact on eagles; no short-term effect on fish species. Minor long-term beneficial effect by reducing the risk of wildfire spread and vegetation loss.	N/A	• Work would not be conducted within 100 feet of the water. • Burning would be conducted in accordance with the measures described in **Section 3.2.3.** • If vegetation removal during the nesting season (March 15 to July 31) cannot be avoided, the County would be responsible for determining if active nests are present prior to clearing and obtaining and complying with any necessary permits from the USFWS.

Affected Resource Area	Impacts	Agency Coordination or Permits	Mitigation/BMPs
Threatened and Endangered Species	The project would have no effect on MCR steelhead, bull trout, NCSO DPS fisher, or gray wolf.	N/A	• Work would not be conducted within 100 feet of the water.
Cultural Resources	No Adverse Effect on Historic Properties	SHPO	• Hazardous fuels work would be conducted with ground crews and wheeled equipment, and no tracked vehicles would be used. • Debris would not be dragged across the surface but rather moved by hand or with small, wheeled vehicles. • Work in the Deschutes County Parcel treatment area would occur when the ground is frozen or snow covered and vehicles would be limited to existing access roads. • The two precontact archaeological sites will have a 20-meter buffer placed around the site boundary, and while work can occur within the buffered site boundary, this work will be done by hand, without mechanical equipment of any type. Surface disturbance within these buffered site areas will be avoided; vegetation can be cut but not pulled out by the roots, and raking is not to occur. • In the event that any archeological resources are discovered during project implementation, work would immediately cease, the area would be secured, and the County would notify the SHPO and FEMA for further evaluation.
Environmental Justice	No disproportionately high and adverse impacts on low-income populations.	N/A	N/A
Hazardous Materials	Negligible contamination threat from vehicle and equipment use.	N/A	• Equipment would be kept in good condition. • Any spills or leaks from equipment would be contained and cleaned up immediately. • All equipment and project activities would adhere to local regulations to reduce the risk of hazardous leaks and spills.

Affected Resource Area	Impacts	Agency Coordination or Permits	Mitigation/BMPs
Noise	Minor temporary impacts from increased noise in the immediate vicinity of the work; no long-term noise impacts.	N/A	• Noise-producing equipment use would occur during less-sensitive, waking hours (7 a.m. to 10 p.m.). • Vehicle and equipment runtimes would be kept to a minimum.
Transportation	Minor short-term impact from vehicle staging on roadsides. Minor long-term beneficial effect by reducing the risk of wildfire spread.	N/A	• To minimize potential for smoke generated from pile burning at Eagle Crest to obstruct visibility on roadways, piles would be small and burned in compliance with state and local regulations, as described in **Section 3.2.3.**
Utilities	No short-term impact: minor long-term beneficial effects by reducing the risk of wildfire spread.	N/A	N/A
Public Health and Safety	No short-term impact: moderate long-term beneficial effects by reducing the risk of wildfire spread.	N/A	N/A

SECTION 5. Cumulative Impacts

This section addresses the potential cumulative impacts associated with the implementation of the proposed action. Cumulative impacts can be defined as the impacts of a proposed action when combined with impacts of past, present, or reasonably foreseeable future actions undertaken by any agency or person. CEQ's regulations for implementing NEPA require an assessment of cumulative effects during the decision-making process for federal projects. Cumulative impacts can result from individually minor but collectively significant actions.

Defensible space was completed around some of the structures adjacent to some of the Odin Falls and Eagle Crest treatment areas. In Eagle Crest West Ridge, RECOA has recently completed some fuels reduction on about 18 acres along the southeast perimeter of the development, shown in **Figure 3-2** (the proposed action would extend that fuels reduction work). The Deschutes County Ordinance 8.24.010 created Project Wildfire, which aims to facilitate, educate, inform, and maximize community efforts to effectively plan for and mitigate fires. Project Wildfire facilitates the implementation of Community Wildfire Protection Plans, coordinates and implements projects to reduce hazardous fuels in the WUI with grant funding, and recycles woody biomass from fuels reduction projects (Project Wildfire 2020). Through Project Wildfire, Deschutes County has partnered with the FireFree program, which is an educational effort to empower residents to prepare their home for wildfire threats (FireFree 2020). Deschutes County would continue to encourage maintenance of defensible space on an annual basis through the FireFree and Project Wildfire efforts.

Deschutes County Forest Use Zones F1 and F2 contain fire siting standards for dwellings and structures and fire safety design standards for roads. In addition to these requirements, future development in all zones may be subject to conditional use approvals. To receive approval for a conditional use, the site must be determined to be suitable for the proposed use based on natural hazards, among other factors (Deschutes County Code 18.128.015 (A(3)). With the adoption of the entirety of Deschutes County as a Wildfire Hazard Zone, Deschutes County implements the provisions of the Wildfire Hazard Mitigation Section of the Oregon Residential Specialty Code which requires installation of Class A or B roofing on new construction to reduce the risk of structure ignition (Deschutes County Code 15.04.085).

The Oregon Forestland-Urban Interface Fire Protection Act of 1997 encourages and initiates aid to help homeowners in areas of wildfire risk to complete fuels reduction on their properties. Once a fuels reduction project is complete, homeowners return a certification form to ODF. There is no fine for not complying with the Act; however, homeowners could risk being fined if a wildfire passes through their property and fuels reduction measures were not implemented.

There is the potential for these various wildfire mitigation efforts to combine potential effects with the proposed action with respect to effects on soils, visual quality and aesthetics, air quality and climate, surface waters and water quality, wetlands, vegetation, fish and wildlife, hazardous materials, noise, and transportation. However, it is unlikely that there would be significant cumulative impacts because, in most cases, there would be temporal and spatial separation between activities. These activities would result in long-term cumulative beneficial effects and

would complement the proposed action by reducing the risk of wildfire spread in the treatment areas and vicinity.

SECTION 6. Agency Coordination, Public Involvement, and Permits

This section provides a summary of the agency coordination efforts and public involvement process for the proposed Deschutes County Hazardous Fuels Reduction project. In addition, an overview of the permits that would be required under the proposed action is included.

6.1. Agency Coordination

Consultation with the Burns Paiute Tribe, Confederated Tribes of the Grand Ronde, Confederated Tribes of Warm Springs, Cow Creek Band of Umpqua Tribe of Indians, and Klamath Tribes was initiated on July 22, 2020. The Klamath and Grand Ronde Tribes each responded indicating the area was outside of their ancestral lands. On December 11, 2020, the cultural resources report was sent to the Tribes and the SHPO for their review. FEMA has not received any responses as of the date of this final EA. FEMA conducted an informal coordination with BLM regarding the wild and scenic river adjacent to Odin Falls and BLM concurred in February 2021 that impacts on the values of the wild and scenic river would be unlikely. Appendix A provides a copy of all agency and tribal correspondence.

6.2. Public Participation

In accordance with NEPA, the draft EA was released to the public, resource agencies and Tribes for a 30-day public review and comment period., The draft EA was available on FEMA's website at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/region/10 and Deschutes County's website at: www.deschutes.org/2019HMGP. Hard copies of the draft EA were available at a County office at 61150 SE 27th Street, in Bend, Oregon, 97702. Comments on the draft EA could be submitted to FEMA-R10-EHP-Comments@fema.dhs.gov or mailed to FEMA's regional office at 130 228th Street SW in Bothell, Washington 98021. The comment period for the draft EA extended from December 20, 2020 through January 22, 2021. A notice of the draft EA's availability was published in the *Bulletin* newspaper on December 20 and 27, 2020 (Appendix B). The notice was emailed to the following state agencies: Oregon Department of Environmental Quality, ODFW, Oregon Department of Forestry, Oregon Department of Land Conservation and Development, Oregon Department of State Lands, OEM, Oregon Parks and Recreation Department, and Oregon Watershed Enhancement Board. The notice was emailed to the following federal agencies: U.S. Department of the Interior, BLM, National Marine Fisheries Service, USDA, EPA, U.S. Geological Survey, U.S. Army Corps of Engineers, and USFWS. Finally, the notice was emailed to the above listed Tribes. The only substantive comments received were from BLM and these were incorporated into this final EA. This EA reflects the evaluation and assessment of the federal government, the decision-maker for the federal action.

6.3 Permits

Deschutes County would be responsible for obtaining any necessary local, state, or federal permits needed to conduct the proposed work. A burn permit may be required for work at Eagle Crest.

SECTION 7. List of Preparers

The following is a list of preparers who contributed to the development of the Deschutes County Hazardous Fuels Reduction EA for FEMA. The individuals listed below had principal roles in the preparation of this document. Many others, including senior managers, administrative support personnel, and technical staff, contributed and their efforts were no less important to the development of this EA.

Preparers	Experience and Expertise	Role in Preparation
Argiroff, Emma[1]	Environmental Planner	NEPA Documentation
Ellis, Dave[2]	Senior Archaeologist	Cultural Resources
Lawson, Laura[1]	Environmental Planner	NEPA Documentation
Office, Terichael[1]	Environmental Planner, Water Resources Engineer	NEPA Documentation
North, Michelle[2]	Archaeologist	Cultural Resources
Shepard, Brian[1]	GIS Specialist	GIS
Solimano, Paul[2]	Senior Archaeologist	Cultural Resources
Stenberg, Kate PhD[1]	PhD, Senior Biologist, Senior Planner	Project Manager, Technical Review

[1] CDM Smith
[2] Willamette Cultural Resource Associates

Federal Emergency Management Agency

Reviewers	Role in Preparation
Fisher, Philip	NHPA/Consultations
Kilner, Science	Technical Review and Approval
Parr, Jeffrey	ESA/BA

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