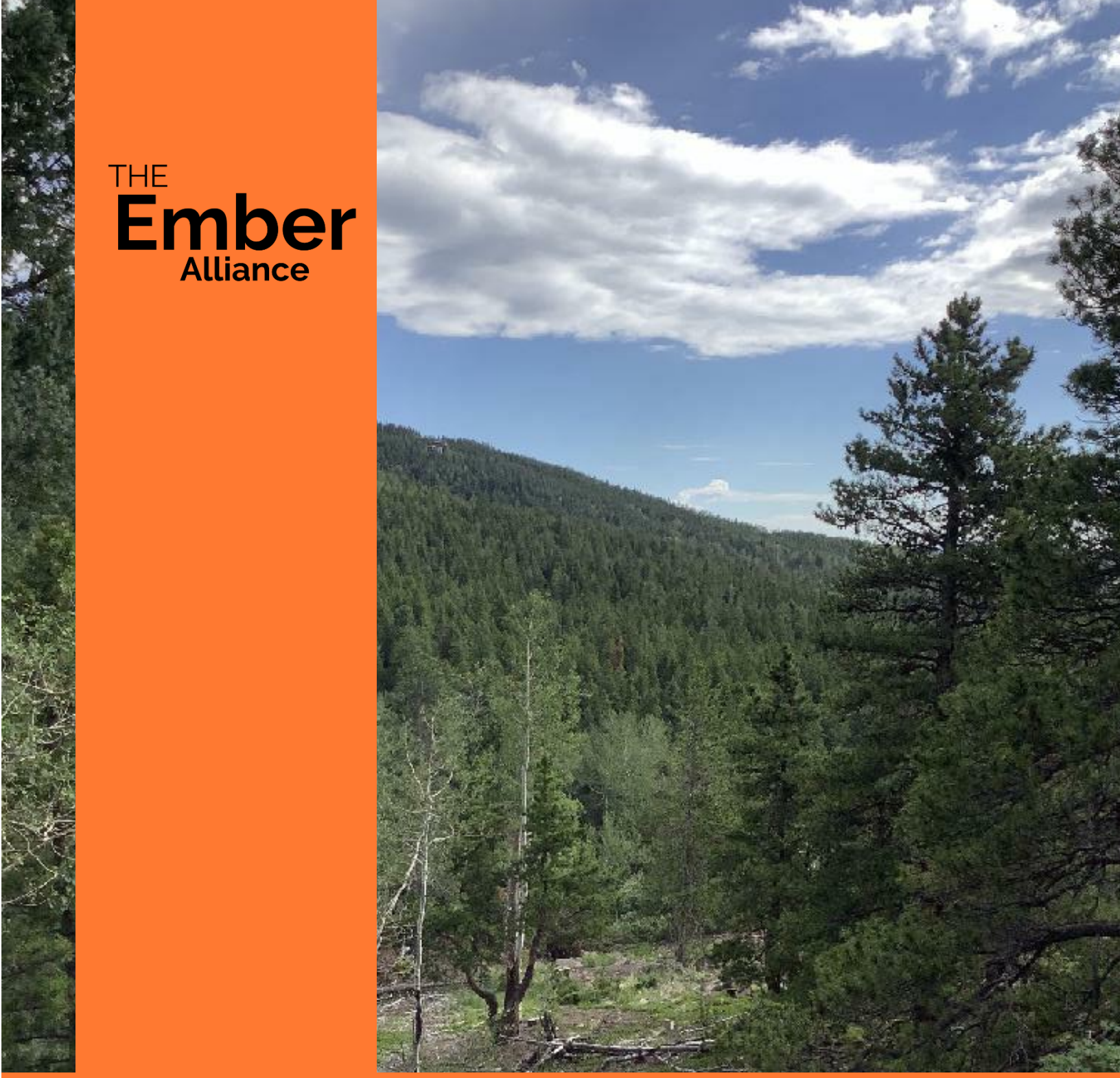
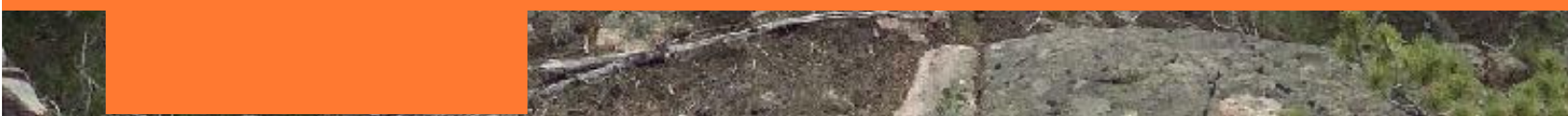
THE Ember Alliance



Shadow Mountain Bike Park Wildfire Mitigation Hazard Plan



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1. Introduction

1.a. Site Visit

Staff at The Ember Alliance completed a site visit on September 20 and 21, 2023. A seasonal forestry crew walked the property assessing and delineating planned areas for mitigation and management. The visit also evaluated Shadow Mountain Drive between Highway 73 and the property, following the assessment guidelines in the Colorado State Forest Service (CSFS) Fuelbreak Guidelines document.

1.b. Management Area Maps and Desired Future Conditions

Eight management areas were delineated, along with descriptions of desired future conditions (DFCs) for each management area. These management areas and DFCs cover all the essential areas to treat to achieve SMBP's goals for general wildfire mitigation and user safety.

To define the DFCs, management objectives were first identified. This site is intended to be a recreational area within Jefferson County, so to be consistent with other recreational areas in Jefferson County, the management objectives for this site were defined as the same ones that

Jefferson County Open Space uses in the 2022 Forest Health Plan. Ten objectives were identified, as follows:

1. Reduce risk of catastrophic wildfire
2. Reduce forest densities and canopy cover
3. Increase the presence, size, and diversity of forest openings
4. Restore and maintain a mosaic of ecosystems and vegetation cover across the landscape
5. Promote fine scale heterogeneity in tree spatial patterns
6. Protect and enhance old-growth features
7. Where appropriate, reestablish the use of prescribed fire as a management tool
8. Promote long-term ecosystem resilience to natural disturbance
9. Assist with ecosystem adaptation to climate change
10. Create aesthetically pleasing forest stands

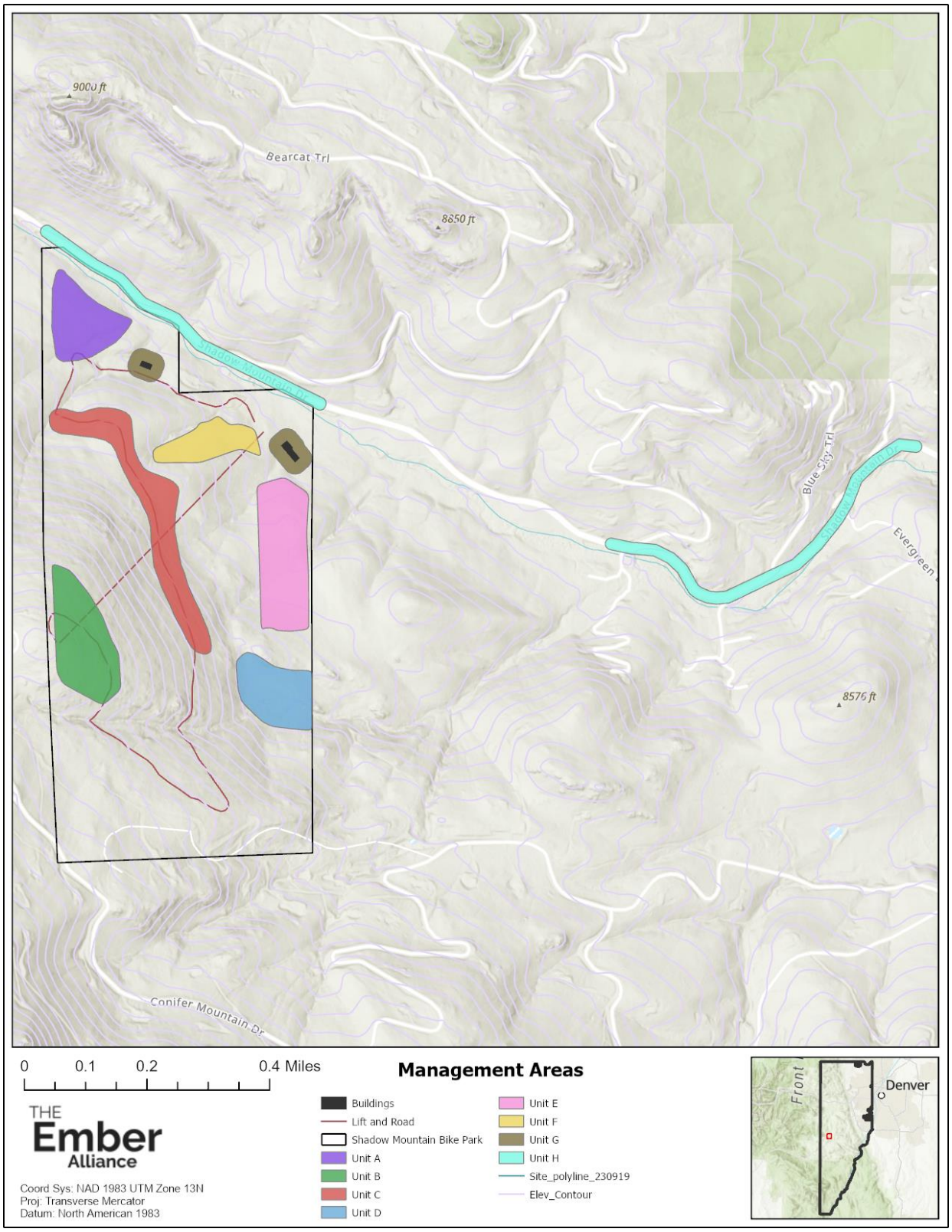

Figure 1. All Management Areas.

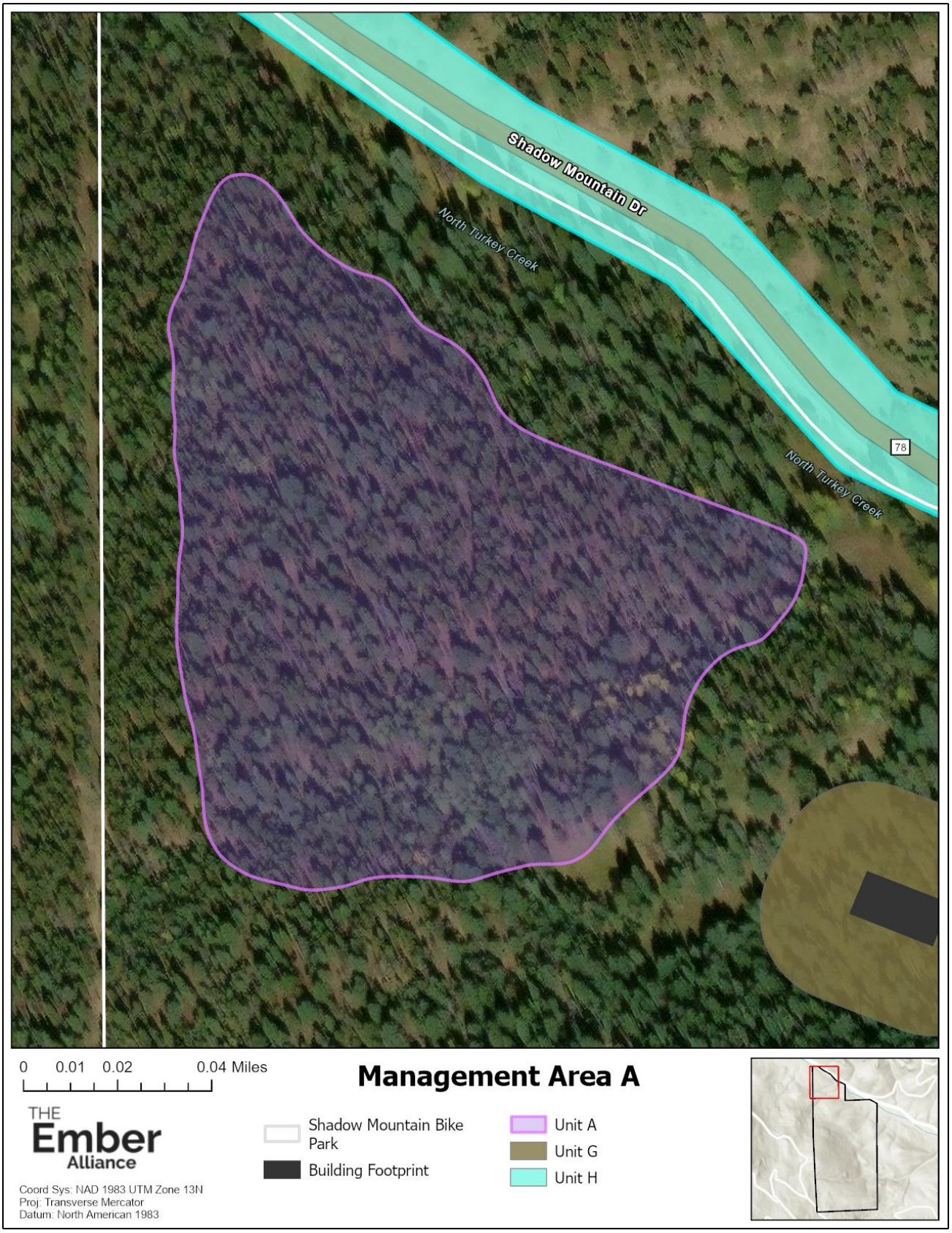

Figure 2. Management Area A.

Management Area A

Approximately 7.5 acres of mixed conifer and ponderosa pine forest.

Desired Future Conditions

Uneven-aged mixed conifer stands with occasional established ponderosa pine. Minimal ladder fuels are present, trees grouped with spacing between groups. Ponderosas have a wide spacing around their canopy. Occasional standing dead trees are retained as habitat trees.

Management Objectives Achieved: 1, 2, 3, 5, 6, 9, 10

Treatment

In Area A, all trees (excluding aspen) with a diameter at breast height (DBH) of 6 inches or under should be removed. All juniper and gamble oak should be removed. Occasional standing dead trees can be retained where they pose no risk to bikers.

Approximately 15-20% of trees with a DBH greater than 6 inches should be removed with an intent to isolate canopy groups. Retain all trees with a DBH greater than 20 inches, and favor removing smaller trees when possible. Favor retaining ponderosa pine to support climate adaptation within this ecosystem.

Limb (prune) all the remaining trees up to 10 feet from the ground. Work east as much as possible to preserve structures while maintaining a transition zone around the nearby private property/homes. Thin conifers as close as possible to the road and retain any aspen and willows near the river to support erosion control and stream health.

This area is best suited for selective hand thinning and chipping for slash management.

Treatment Return Interval

Evaluate the need for small diameter tree thinning and ladder fuel removal every 5 years. Treatment re-entry needed to maintain forest health and historic conditions is estimated to be 8 to 23 years following the treatment. Regeneration can be dense and contribute to increased fire risk and intensity and should be actively managed and mitigated.

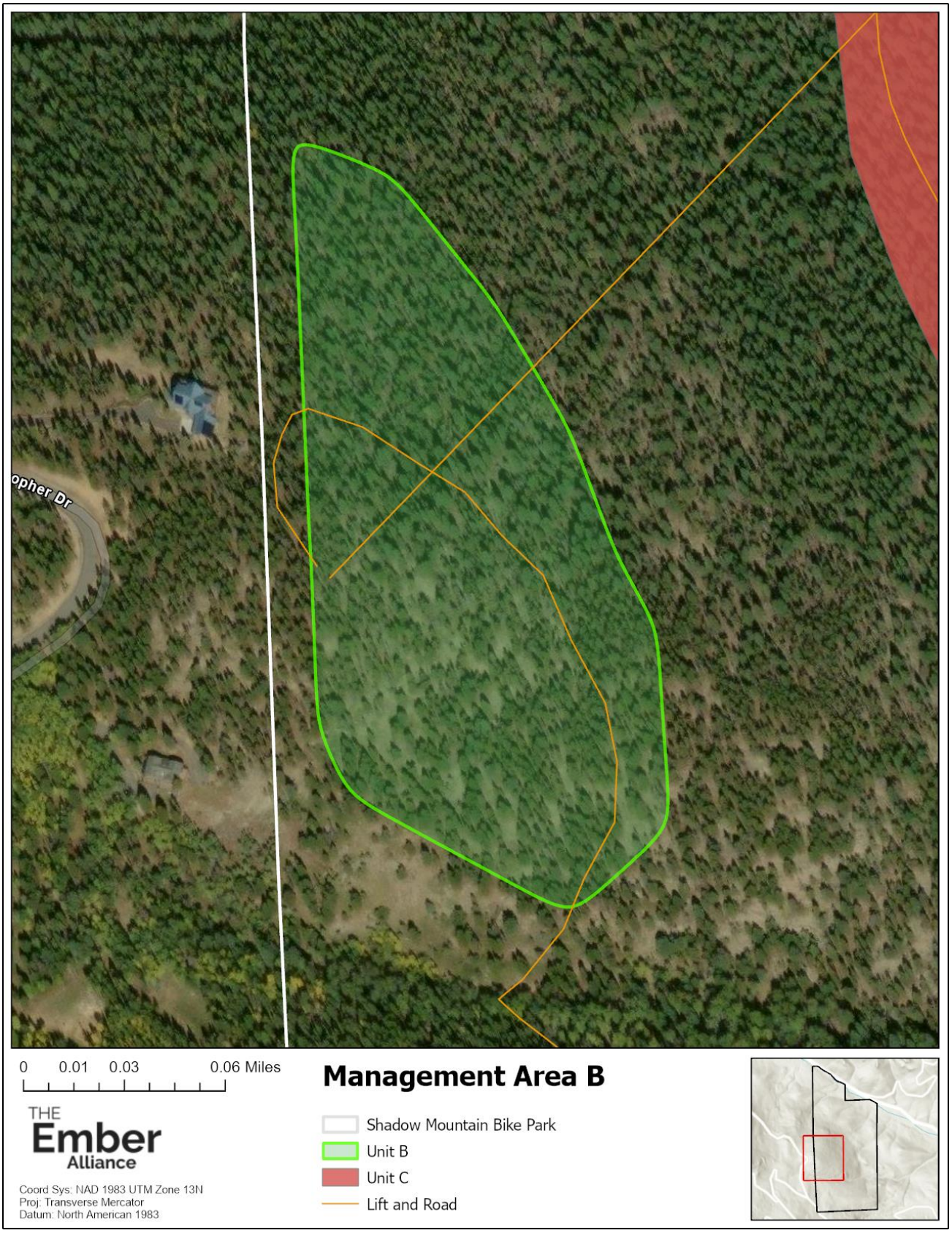

Figure 3. Management Area B.

Management Area B

Approximately 10.5 acres of mixed conifer and spruce-fir forest.

Desired Future Conditions

An uneven-aged mixed conifer/spruce-fir forest with groupings of trees. Conifer forests are maintained and moderately thinned to remove the most hazardous fuels but promote health and vigor of the remaining trees. Minimal ladder fuels are present, and there is enough open space to provide a view/outlook of the surrounding landscape. Trees in this area are in a stand that surrounds the "outlook" area. Trees are retained and managed to provide a visual buffer between the residences and the chairlift. Occasional standing dead trees are retained as habitat trees.

Management Objectives Achieved: 1, 2, 3, 5, 6, 7, 8, 10

Treatment

In Area B, all trees with a diameter at breast height (DBH) of 6 inches or under should be removed. All juniper and gamble oak should be removed. Occasional standing dead trees are retained where they pose no risk to bikers.

All trees with a DBH greater than 6 inches should be removed with the intent to isolate canopy groups. Retain all trees with a DBH greater than 20 inches, and favor removing smaller trees when possible.

Limb all the remaining trees up to 10 feet from the ground. Remove shrubs and ladder fuels under the trees. Maintain a transition zone to the private property.

This area is best suited for mechanical thinning and pile building for slash management.

Treatment Return Interval

Evaluate the need for small tree thinning and ladder fuel removal every 5 years. Treatment re-entry needed to maintain forest health and historic conditions is estimated to be 8 to 23 years following the treatment. Tree regeneration can be dense and contribute to increased fire risk and intensity and should be actively managed and mitigated.

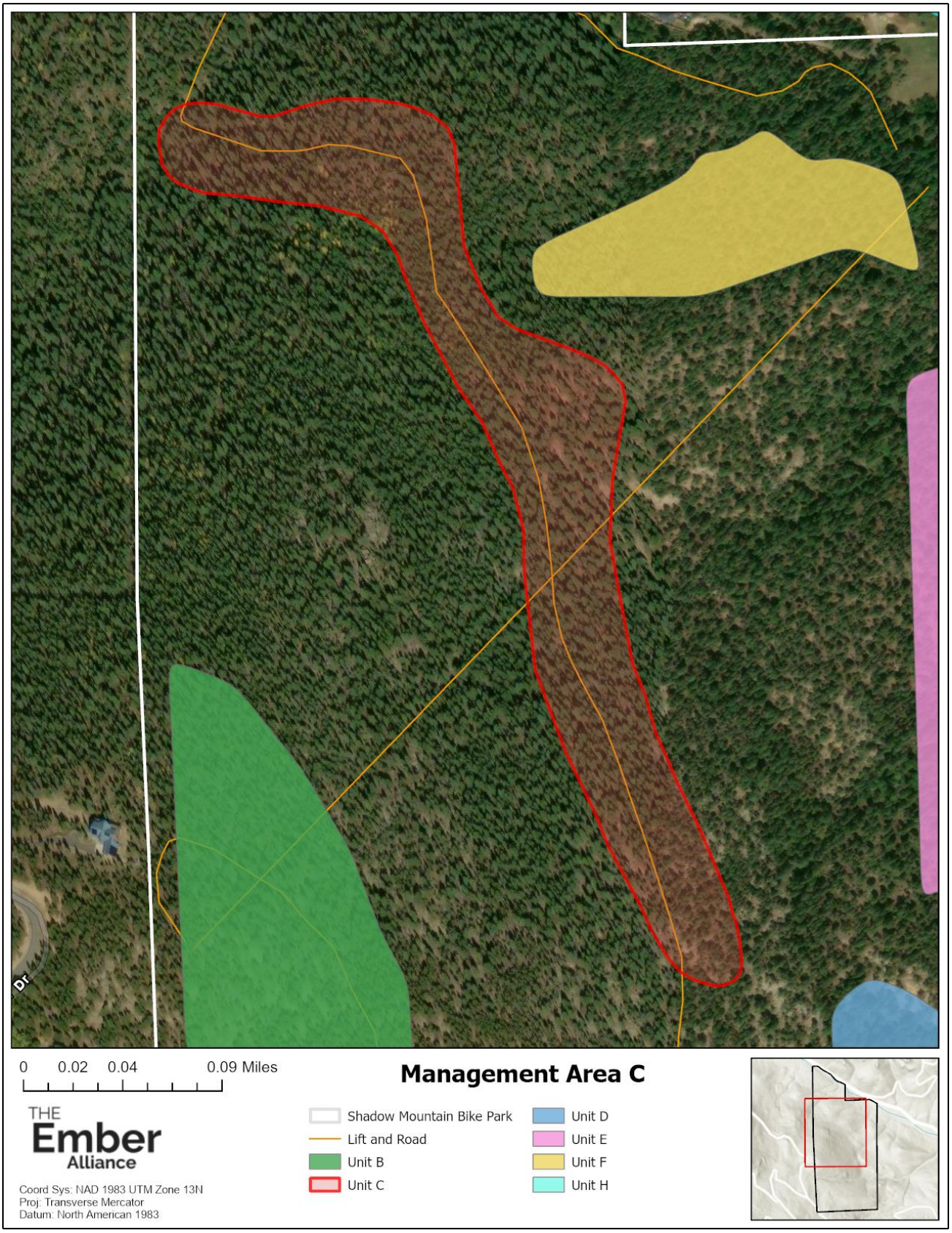

Figure 4. Management Area C.

Management Area C

Approximately 14 acres of mixed conifer, spruce-fir, and ponderosa pine forest.

Desired Future Conditions

A fuel break along the maintenance road/base of the steep slope of the mixed conifer forest. Minimal ladder fuels are present, with wide spacing between tree crowns/groupings of tree crowns. Standing dead trees are not retained.

Management Objectives Achieved: 1, 2, 3, 5, 6, 8, 10

Treatment

In Area C, all trees (excluding aspen) with a diameter at breast height (DBH) of 6 inches or under should be removed. All juniper and gamble oak should be removed.

Approximately 15-20% of trees with a DBH greater than 6 inches should be removed with an intent to isolate canopy groups. Retain all trees with a DBH greater than 20 inches, and favor removing smaller trees when possible.

Limb all the remaining trees up to 10 feet from the ground. Remove ladder fuels/shrube under the trees.

This area is best suited for selective hand thinning and chipping for slash management.

Treatment Return Interval

Evaluate the need for small tree thinning and ladder fuel removal every 5 years. Treatment re-entry needed to maintain forest health and historic conditions is estimated to be 8 to 23 years following the treatment. Tree regeneration can be dense and contribute to increased fire risk and intensity and should be actively managed and mitigated.

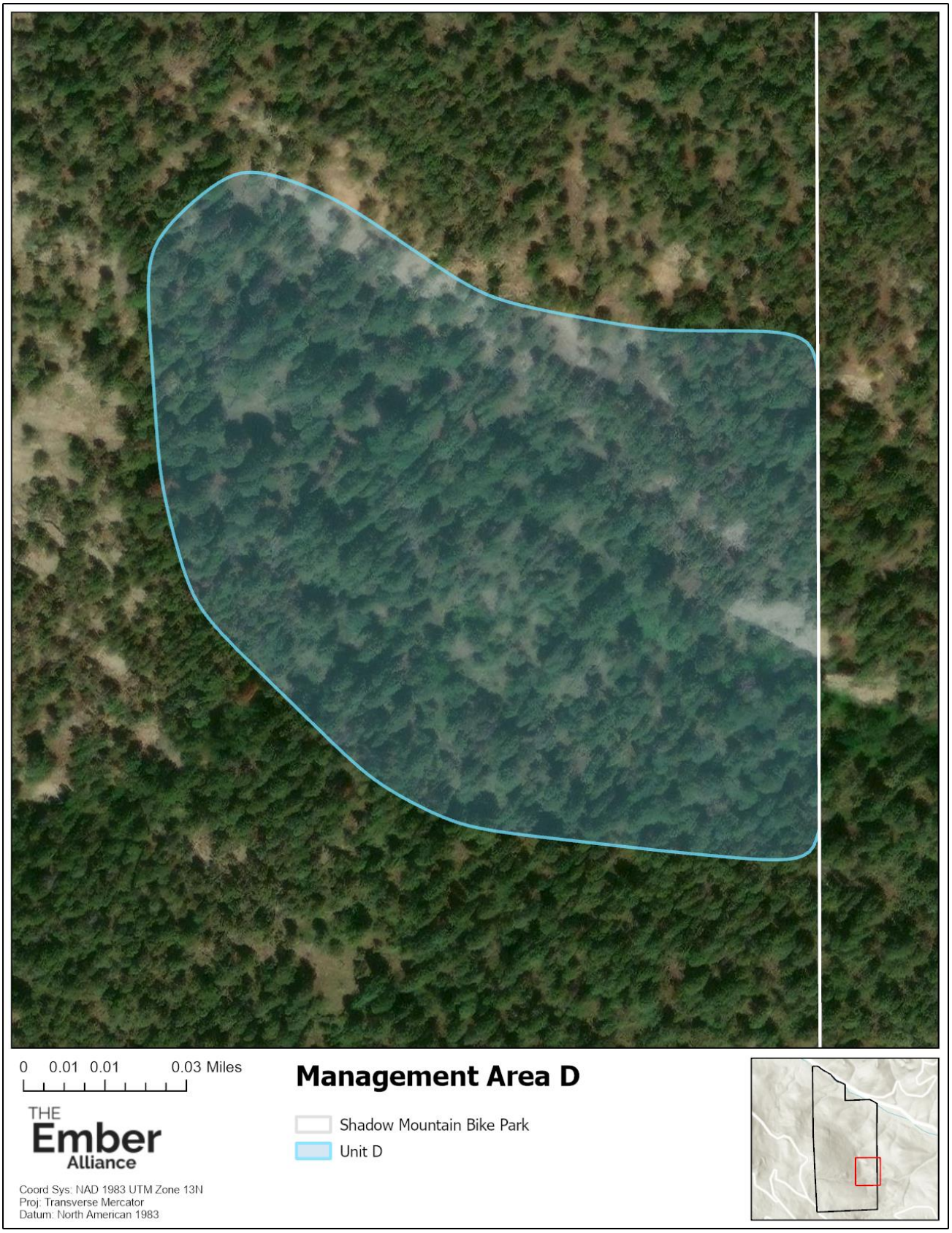

Figure 5. Management Area D.

Management Area D

Approximately 7.5 acres of lodgepole pine forest with some fir.

Desired Future Conditions

Mosaic stands of lodgepole pine. Each stand is even-aged but there is age diversity between the stands. Patch cuts mimic historic fire in this forest type, which would replace entire stands with each fire event. To protect the aesthetic and habitat value of the lodgepole pine area, smaller patch cuts are completed, rather than larger cuts.

Management Objectives Achieved: 1, 2, 3, 4, 5, 6, 8, 9, 10

Treatment

In Area D, patch cut in 3-acre sections, focusing along the west flank until the lodgepole stand gets too steep to cut. Patch cuts remove all sizes and species of trees except aspen, which are retained. Occasional standing dead trees may be retained, if present. The steepness of the site may limit the work that a crew can complete.

This area is best suited for hand crew cutting and pile building/burning for slash management.

Treatment Return Interval

After the initial 3-acre patch cut is completed, that stand is permitted to regenerate without thinning for at least 75 years (the lower end of their historic fire return interval). A second or third entry for patch cuts in other sections of this management area can be completed in the decades following the initial cut. Age diversity between the patch cuts is important as it creates habitat diversity and a mosaic landscape that is more resilient to wildfire. Stands should not frequently reach an average age beyond 300 years, which is the upper end of their fire return interval.

If the land managers have the resources, additional 3- to 6-acre patch cuts can be completed with the same objectives and DFCs in the southwest corner of the property. The north-facing hillside on the very south side of the property can be treated for additional fuels mitigation and habitat diversity.

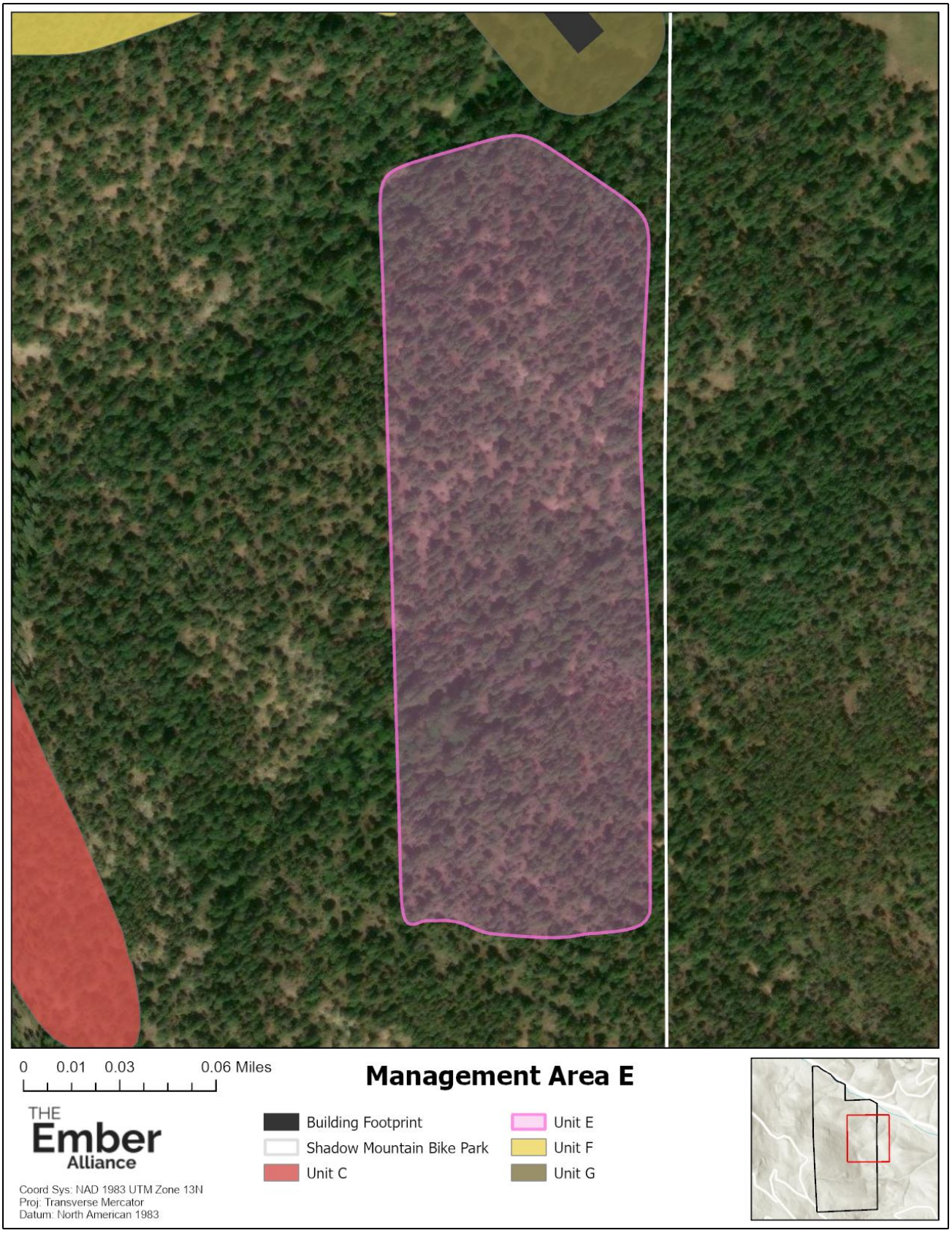

Figure 6. Management Area E.

Management Area E

Approximately 12 acres of mixed conifer forest with aspen.

Desired Future Conditions

An uneven-aged mixed conifer forest with increasingly large aspen stands. Conifer forests are maintained and moderately thinned to remove the most hazardous fuels but promote health and vigor of the remaining trees. Aspen is favored and allowed to grow freely, becoming old growth in time. Small forest openings are present between aspen and conifer, and between groupings of conifers. Minimal ladder fuels are present in the coniferous areas and occasional standing dead trees are retained as habitat trees.

Management Objectives Achieved: 1, 2, 3, 4, 5, 6, 8, 9, 10

Treatment

In Area E, all trees (excluding aspen) with a diameter at breast height (DBH) of 6 inches or under should be removed. All juniper and gamble oak should be removed. Occasional standing dead trees are retained where they pose no risk to bikers.

Approximately 15-20% of trees with a DBH greater than 6 inches should be removed with an intent to isolate canopy groups, cutting smaller trees when possible.

Limb all the remaining trees up to 10 feet from the ground. Remove shrubs and ladder fuels under trees.

This area is best suited for selective hand thinning and pile building/burning for slash management.

Treatment Return Interval

Evaluate the need for small tree thinning and ladder fuel removal every 5 years. Treatment re-entry needed to maintain forest health and historic conditions is estimated to be 8 to 23 years following the treatment. Tree regeneration can be dense and contribute to increased fire risk and intensity and should be actively managed and mitigated.

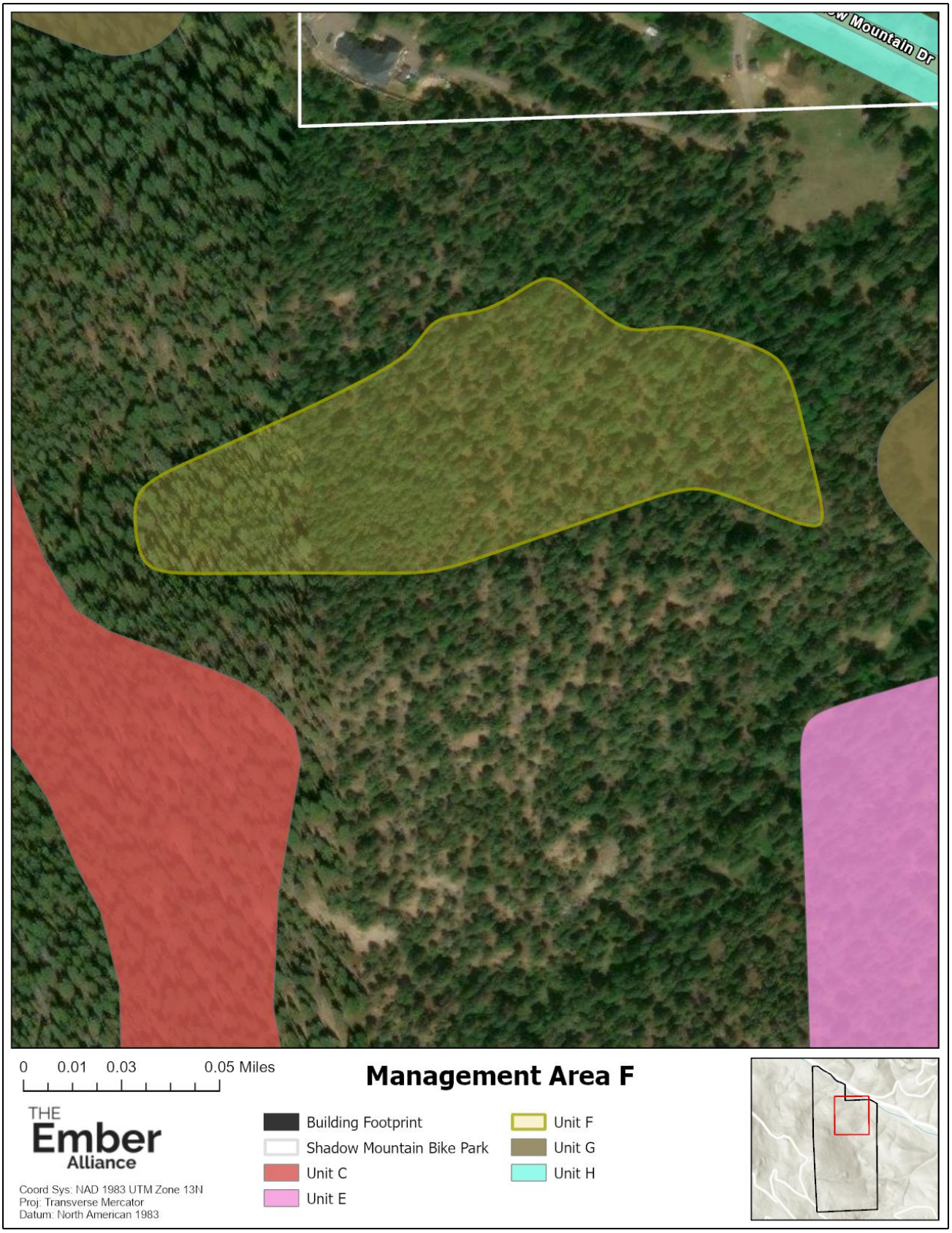

Figure 7. Management Area F.

Management Area F

Approximately 5 acres of mixed conifer forest with aspen.

Desired Future Conditions

An uneven-aged mixed conifer forest with increasingly large aspen stands. Conifer forests are maintained and thinned to remove the most hazardous fuels but promote health and vigor of the remaining trees. Aspen is favored and allowed to grow freely, becoming old growth in time. Small forest openings are present between aspen and conifer, and between groupings of conifers. Minimal ladder fuels are present in the coniferous areas and occasional standing dead trees are retained as habitat trees.

Management Objectives Achieved: 1, 2, 3, 4, 5, 6, 8, 9, 10

Treatment

In Area F, all trees (excluding aspen) with a diameter at breast height (DBH) of 6 inches or under should be removed. All juniper and gamble oak should be removed.

Approximately 15-20% of trees with a DBH greater than 6 inches should be removed with an intent to isolate canopy groups. Retain all trees with a DBH greater than 20 inches, and favor removing smaller trees when possible.

Limb all the remaining trees up to 10 feet from the ground. This area is very dense with lots of saplings. Maintain a transition zone around the nearby private property/homes.

This area is best suited for selective hand thinning and chipping and/or pile building for slash management.

Treatment Return Interval

Evaluate the need for small tree thinning and ladder fuel removal every 5 years. Treatment re-entry needed to maintain forest health and historic conditions is estimated to be 8 to 23 years following the treatment. Tree regeneration can be dense and contribute to increased fire risk and intensity and should be actively managed and mitigated.

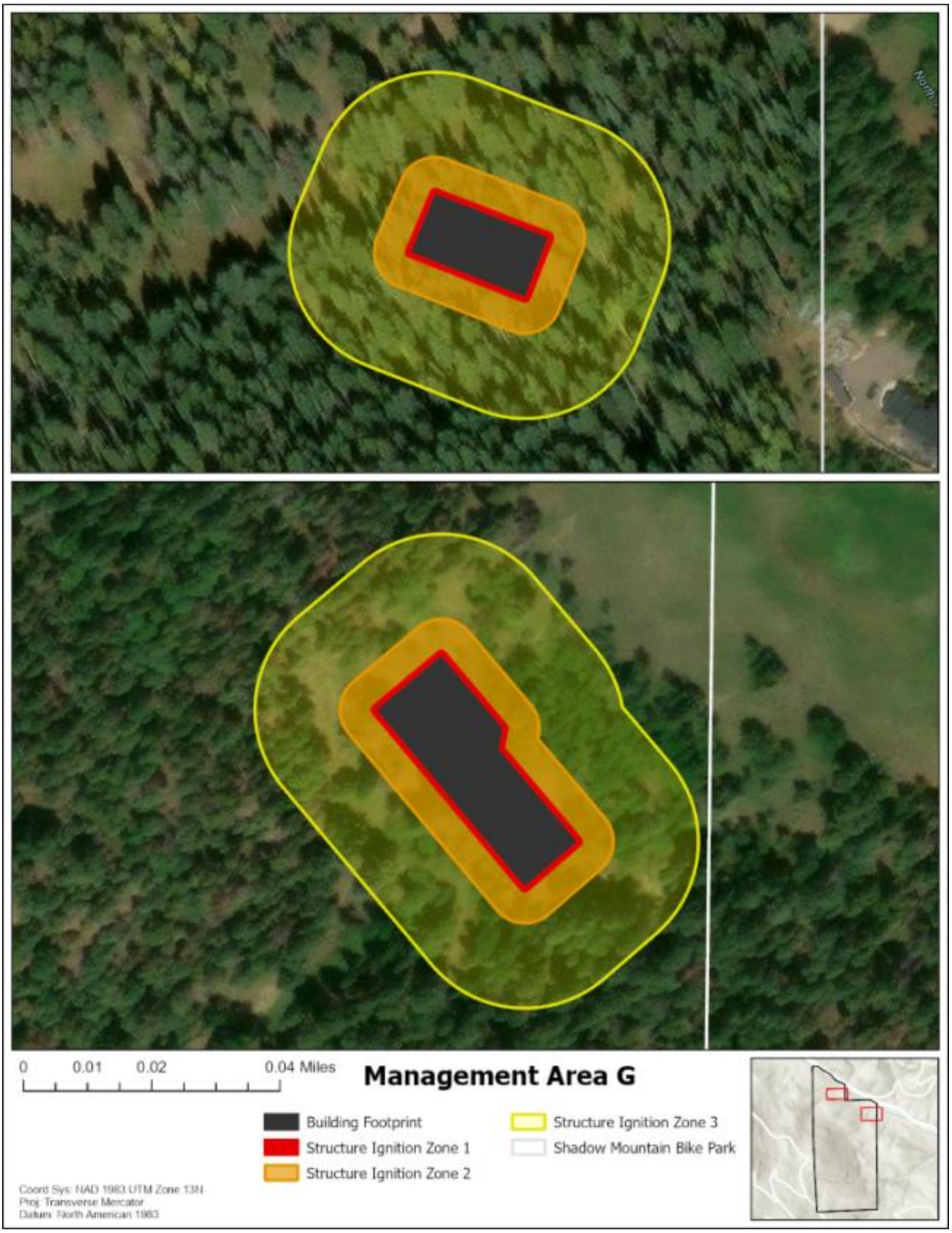

Figure 8. Management Area G.

Management Area G

Approximately 3.5 acres of mixed conifer forest with aspen.

Desired Future Conditions

Structures have home hardening measures taken to be ignition resistant. No vegetation within 5 feet of the structures. Minimal, potentially irrigated vegetation within 30 feet of the structures. Minimal vegetation with wide spacing and no ladder fuels within 100 feet of the structure.

Management Objectives Achieved: 1, 2, 3, 4, 5, 10

Treatment

Zone 1: From 0-5 feet from the edge of the buildings, install concrete, gravel, or another non-flammable groundcover.

Zone 2: From 5-30 feet, there should be no more than 20 trees total left within this zone around the maintenance facility and no more than 30 around the lodge (assuming an average tree crown spread of 30 feet). We recommend aiming for approximately half that number to err on the side of caution, leaving no more than 10 and 15 trees, respectively. If there are aspens, those should be selected to remain over any other species. All trees should have a minimum of 10 feet of spacing between the crowns. If trees are planted following the building construction, include the anticipated crown diameter in this plan. Remove any dead, dying, or diseased trees.

Mow all grasses regularly to keep the height no more than 4 inches. Irrigation is recommended but not necessary, due to water constraints and the desire for a natural aesthetic.

All remaining trees should be limbed (pruned) to a height of 10 feet. This means the distance from the ground to the bottom of the lowest part of the lowest hanging branch.

All juniper and gamble oak should be removed. Any other remaining shrubs, such as mountain mahogany or chokecherry, can remain if they are not under trees or tree canopies. Shrubs should be isolated and not be allowed to grow in groups or continuous clusters.

Zone 3: From 30-100 feet from the end of the structures, there should be no more than 36 trees total left within this zone around the maintenance facility and no more than 48 around the lodge (assuming an average tree crown spread of 30 feet). We recommend aiming for approximately half that number to err on the side of caution, leaving no more than 18 and 24 trees, respectively. If there are aspens, those should be selected to remain over any other species. All trees should have a minimum of 10 feet of spacing between the crowns. Remove any dead, dying, or diseased trees.

The remaining trees should be limbed to a height of 10 feet. This means the distance from the ground to the bottom of the lowest part of the lowest hanging branch. Remove any shrubs that are under tree canopies.

This area is suitable for mechanical or hand thinning. Any and all slash, woody debris, or other flammable material should be removed entirely from these zones. They can be hauled off site or masticated and spread outside the zones.

Treatment Return Interval

Annual maintenance of each of these areas is required.

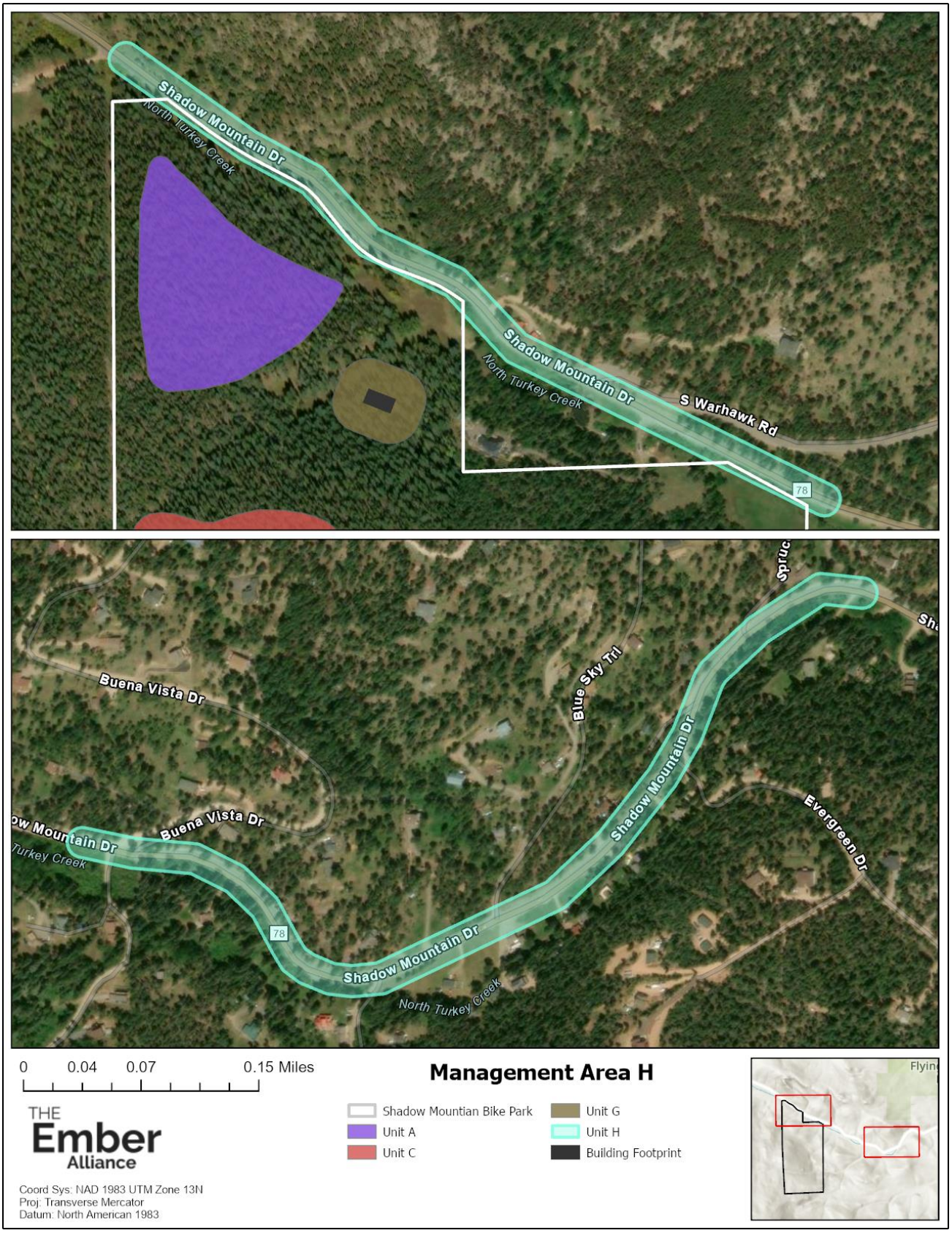

Figure 9. Management Area H.

Management Area H

Approximately 1.25 miles of road. The crowning potential in this area ranges from 3-9, designating it as an area in need of treatment and mitigation.

Desired Future Conditions

The road has space to either side of the lanes that is open enough to keep the flame length down to 8 feet or less. Evacuating residents and incoming firefighters have adequate space to drive and turn around engines without endangering their passengers.

Crowning potential, when assessed to the same CSFS Fuelbreak Guideline standards, should be a 3 or below following the treatment.

Management Objectives Achieved: 1, 2, 3, 4, 5, 6, 8,

Treatment

In Area H, remove all trees (excluding aspen) within 15 feet of the side of the road, where possible. Beyond that, thin trees according to the CSFS Fuelbreak Guidelines document along the identified portions of Shadow Mountain Drive. This involves creating 10 feet of space between crowns and removing ladder fuels under and between the trees. Favor retaining larger and older trees, as well as retaining aspen or other riparian species, where they are present. The slope from the roadways is generally between 20-40%, indicating that an ideal fuelbreak distance from the edge of the road would be 110-130 feet. This distance likely crosses into private land and is therefore not accessible. The treatment recommendation is that the fuelbreak is mitigated as far from the road as is feasible using the county-owned land and right-of-way easements.

This area is best suited for selective hand thinning and/or use of a roadside masticator head and chipping for slash management.

Treatment Return Interval

Tree regeneration in opened stands such as initial fuelbreak cuts can be dense and contribute to increased fire risk and intensity. This should be actively managed and mitigated over time through follow up treatments. Evaluate the need for thinning, regeneration removal, and ladder fuel removal every 3 years. This is a shorter evaluation time than other management areas due to the life safety aspect of this treatment.

All Remaining Areas

No action recommended for the remaining forest areas. We recommend that they be monitored for forest health and that the mitigation plan be revisited in approximately 15 years.

Citation: The Ember Alliance. 2023. *Shadow Mountain Bike Park Wildfire Mitigation Hazard Plan*. Fort Collins, CO.

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