



September 18, 2026

Gillian Rossi
Parks & Recreation Director
City of Manitou Springs
606 Manitou Avenue
Manitou Springs, CO 80829

RE: Bill Bauers Open Space Planning

Ms. Rossi:

This report is submitted to provide an environmental assessment of the Bill Bauers Open Space in Manitou Springs to accommodate future trail development. This report conforms to the City of Manitou Springs Environmental Impact Assessment requirements.

The property, located south of U.S. Highway 24 in Manitou Springs, was visited by me and Sheila Webber of Blue Mountain Environmental Consulting and Jason Chambers of Archaetype Solutions on August 10, 2026.

Feel free to contact me with any questions you may have.

Sincerely,
Matt Tobler

Natural Resource Specialist, Certified Ecologist
Blue Mountain Environmental Consulting, LLC

ENVIRONMENTAL IMPACT ASSESSMENT



Bill Bauers Open Space August 2026

Prepared by:



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INTRODUCTION

Project Background

Bill Bauers Open Space was purchased by the City of Manitou Springs in 2023 to connect the open space parcel to Bill Bauers Park. The goal of this Natural Resources Assessment report is to characterize the overall site and assess the property for future trail development. This report is in accordance with City of Manitou Springs standards.

This Environmental Impact Assessment provides a summary of the findings of field work conducted on August 10, 2026, including potential aquatic resources, sensitive species habitat, cultural/historic resources and hazardous (wildfire) areas. Maps are provided in Appendix A and site photographs are provided in Appendix B.

Site Description

Bill Bauers Open Space is 8 acres located in Manitou Springs just south of U.S. Highway 24; it is accessible from Crystal Hills Boulevard and from Mountain View Road. The property is bounded by residential property to the west, south and east and by U.S. Highway 24 to the north. A Vicinity map is provided in Appendix A.

There is no formal access to the site; the site is undeveloped except for an abandoned parking lot on the northwest side of the park.

Methods

Desktop Review

Online data resources were reviewed to assist in the evaluation of potential natural biological resources within the property. The data review included:

- U.S. Fish and Wildlife Service National Wetlands Inventory (NWI)
- FEMA Flood Insurance Rate Maps
- USDA Natural Resources Conservation Service (NRCS) Web Soil Survey
- U.S. Fish and Wildlife Service Information, Planning, and Conservation System (IPaC)
- Colorado Natural Heritage Program's Colorado Conservation Data Explorer (CODEX)
- Colorado Parks and Wildlife (CPW) Species Activity Map data
- Colorado Office of Archaeology and Historic Preservation
- Colorado State Forest Service Colorado Forest Atlas

Site Assessment

Field surveys conducted on site included habitat assessment, aquatic resource delineation and overall site characterization. Site assessments were conducted by Matt Tobler, Certified Ecologist, and Sheila Webber, Ornithologist, of Blue Mountain Environmental Consulting and Jason Chambers, Principal Archaeologist, on August 10, 2026.

FINDINGS

The elements of this Natural Resources Assessment are summarized in this section in the order listed in Bill Bauers Open Space - Environmental Impact Assessment Scope. Site maps are provided in Appendix A; site photos are provided in Appendix B. Photo points are indicated on the maps in Appendix A.

Potential Aquatic Resources

Desktop Review

Mapping by the National Wetlands Inventory (U.S. Fish and Wildlife Service, 2026) indicates that there are no wetlands on the property. According to the FEMA Flood Map Service Center (U.S. Department of Homeland Security, 2026), the property is located on FEMA map panel 08041C0707G (Appendix A), which indicates that the property is in an area of minimal flood hazard. Soils on the property are not hydric soils (Natural Resources Conservation Service, 2026).

Table 1. Soils occurring on the site.

SOIL NAME	DESCRIPTION	HYDRIC	ACRES	%
Connerton-Rock outcrop complex, 8 to 90 percent slopes	Alluvium derived from sandstone that occurs on alluvial fans and hills	No	7.9	100
TOTAL			7.9	100

Site Assessment

An ephemeral/intermittent drainage extends from south to north along the length of the property and may connect to Sutherland Creek at some point. The drainage lacks sufficient duration of inundation to develop hydric soils or be dominated by hydrophytic vegetation with the exception of several small pockets, perhaps less than 10 square feet or less, where water ponds after precipitation supporting hydrophytic vegetation and along the western bank of the drainage where there is a potential wetland that is approximately 0.021 acres. One small slope wetland was observed to the west of the drainage on adjacent property. The remainder of the property is upland. A wetlands map is provided in Appendix A.

Sensitive Species Habitat

Desktop Review

A desktop assessment of land-cover types on the property was conducted using data from the Southwest Regional Gap Analysis Project (SWReGAP) Land-cover Legend Description Database (USGS National Gap Analysis Program, 2005). Land-cover types result from topographic, edaphic or cultural influences. The types described below are representative communities that may vary on the property. A Land Cover Map is provided in Appendix A. (Note that land-cover distribution was determined through spatial analysis techniques by SWReGAP.)

Southern Rocky Mountain Pinyon-Juniper Woodland: This southern Rocky Mountain ecological system occurs on dry mountains and foothills in southern Colorado, in mountains and plateaus of northern New Mexico and Arizona, and extends out onto limestone breaks in the Great Plains. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. Pinyon pine (*Pinus edulis*) and/or one-seeded juniper (*Juniperus monosperma*) dominate the tree canopy. Rocky Mountain juniper (*Juniperus scopulorum*) may codominate or replace one-seeded juniper at higher elevations. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species include big sagebrush (*Artemisia tridentata*), mountain mahogany (*Cercocarpus montanus*), Gambel oak (*Quercus gambelii*), Scribner needlegrass (*Achnatherum scribneri*), blue grama (*Bouteloua gracilis*), Arizona fescue (*Festuca arizonica*) or James' galleta (*Pleuraphis jamesii*).

Rocky Mountain Gambel Oak-Mixed Montane Shrubland: This ecological system occurs in the mountains, plateaus and foothills in the southern Rocky Mountains and Colorado Plateau including the Uinta and Wasatch ranges and the Mogollon Rim. These shrublands are most commonly found along dry foothills, lower mountain slopes and at the edge of the western Great Plains from approximately 6,560 to 9,515 feet in elevation and are often situated above pinyon-juniper woodlands. Substrates are variable and include soil types ranging from calcareous, heavy, fine-grained loams to sandy loams, gravelly loams, clay loams, deep alluvial sand or coarse gravel. The vegetation is typically dominated by Gambel oak (*Quercus gambelii*) alone or codominant with Saskatoon serviceberry (*Amelanchier alnifolia*), Utah serviceberry (*Amelanchier utahensis*), big sagebrush (*Artemisia tridentata*), mountain mahogany (*Cercocarpus montanus*), chokecherry (*Prunus virginiana*), Stansbury cliffbush (*Purshia stansburiana*), antelope bitterbrush (*Purshia tridentata*), New Mexico locust (*Robinia neomexicana*), mountain snowberry (*Symphoricarpos oreophilus*) or roundleaf snowberry (*Symphoricarpos rotundifolius*). There may be inclusions of other mesic montane shrublands with Gambel oak absent or as a relatively minor component. This ecological system intergrades with the lower montane-foothills shrubland system and shares many of the same site characteristics. Density and cover of Gambel oak and serviceberry often increase after fire.

Developed, Medium-High Intensity: Includes areas with a mixture of constructed materials and vegetation and highly developed areas where people reside or work in high numbers. Impervious surface accounts for 50-100 percent of the total cover.

A desktop assessment of potential wildlife habitat was conducted using Colorado's Conservation Data Explorer (Colorado Natural Heritage Program, 2026) and the Information for Planning and Consultation from the U.S. Fish and Wildlife Service (2026). Species of federal or state significance with the potential to occur on the Property are described below.

The purpose of the Endangered Species Act (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future.

Four species protected under the ESA could potentially occur on the Property. Mexican spotted owl (*Strix occidentalis lucida*) is listed as threatened under the ESA, and the U.S. Fish and Wildlife Service has determined that there is critical habitat on or within one mile of the Property. Preble's meadow jumping mouse (*Zapus hudsonius preblei*) is listed as endangered under the ESA and as critically imperiled by the State of Colorado. Tricolored bat (*Perimyotis subflavus*) is proposed endangered under the ESA. Monarch butterfly (*Danaus plexippus*) is listed as proposed threatened under the ESA, and Suckley's cuckoo bumble bee (*Bombus suckleyi*) is proposed endangered. Critical habitat has not been designated for these two insect species.

Colorado is home to approximately 500 native vertebrate species including 124 mammals, 240 breeding birds, 53 reptiles, 17 amphibians and 53 fish. Of these vertebrate species, 106 are considered to be species of greatest conservation need and 76 are considered to be species of greatest information need, according to the 2025 State Wildlife Action Plan (SWAP; Colorado Parks and Wildlife, 2025). Species are ranked in tiers; each species' ranking is based on how healthy its populations are, how critical Colorado populations are to the entire species' survival, how susceptible it is to existing and potential specific threats and how much it would benefit from plausible conservation actions. Tier 1 species require conservation interventions most urgently.



Figure 1. Woodhouse's blue jay observed on the property during the site visit.

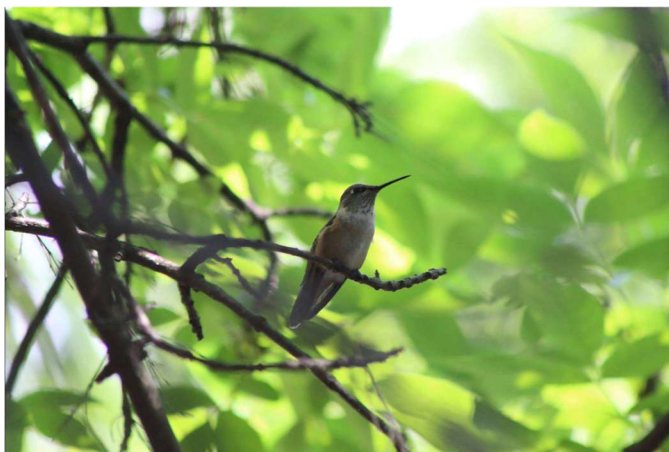


Figure 2. Calliope hummingbird observed on the property during the site visit.

Tier 2 species are in less danger, but still in need of active conservation. Another subset, ‘Species of Greatest Information Need’ (SGIN), is where the critical need/action is more information.

Northern leopard frog (*Lithobates pipiens*) is a SWAP Tier 1 species and has been documented as occurring on or within one mile of the Property. Of the 12 species of reptile that could potentially occur on the property, Hernandez short-horned lizard (*Phrynosoma hernandesi*) is a SWAP Tier 2 species and western rattlesnake (*Crotalus oreganus*) is a SGIN.

Golden eagle (*Aquila chrysaetos*) is documented as occurring on or within one mile of the Property and is a SWAP Tier 1 species. It is also protected under the Bald and Golden Eagle Protection Act of 1940. Prairie falcon (*Falco mexicanus*), black rosy-finch (*Leucosticte atrata*), brown-capped rosy-finch (*Leucosticte australis*) are SWAP Tier 1 species that could occur on the property.

SWAP Tier 2 bird species that could potentially occur on the Property are burrowing owl (*Athene cunicularia*), lark bunting (*Calamospiza melanocorys*), northern harrier (*Circus hudsonius*), Virginia’s warbler (*Leiothlypis virginiae*), rufous hummingbird (*Selasphorus rufus*) and Grace’s warbler (*Setophaga graciae*). SGIN birds that may occur on the Property Lewis’s woodpecker (*Melanerpes lewis*) and band-tailed pigeon (*Patagioenas fasciata*). Broad-tailed hummingbird (*Selasphorus platycercus*) is a federal species of concern).

Eleven species of bat could potentially occur on the Property. Five are SWAP Tier 1 species, five are SWAP Tier 2 species and one, pale lump-nosed bat (*Corynorhinus townsendii*), is a state species of concern.

SWAP Tier 1 insect species that could occur on the Property are Morrison’s bumble bee (*Bombus morrisoni*), American bumble bee (*Bombus pensylvanicus*) and western bumble bee (*Bombus occidentalis*). SWAP Tier 2 species are golden northern bumble bee (*Bombus fervidus*) and Lusk’s pine moth (*Coloradia luskii*).

According to Colorado Parks and Wildlife Species Activity Mapping (SAM) data (Colorado Natural Heritage Program, 2026), the Property falls within high-priority habitat for mule deer (*Odocoileus hemionus*), including concentration area, resident population area, winter concentration area and overall, summer and winter range. There is documented occurrence of mule deer on or within one mile of the Property. The Property also falls within overall range and human conflict area for mountain lion (*Puma concolor*) and within fall concentration, human conflict area, summer concentration area and overall range for black bear (*Ursus americanus*).

The Colorado SWAP includes 195 species of plants of which 64 are Tier 1, 69 are Tier 2 and 62 are SGIN. The Front Range Milkvetch (*Astragalus sparsiflorus*), a Tier 1 species, has been documented as occurring on or within one mile of the property. Other significant species that could potentially occur on the property include dwarf milkweed (*Asclepias uncialis*), a Tier 1 species, and Wahatoya Creek larkspur (*Delphinium robustum*), a SGIN.

Table 2. Species of concern that could potentially occur on the property.

SPECIES	STATUS	
	COLORADO	FEDERAL
Mammals		
Big brown bat (<i>Eptesicus fuscus</i>)	Tier 2	
Black bear (<i>Ursus americanus</i>)	High-priority habitat	
Eastern red bat (<i>Lasiurus borealis</i>)	Tier 2	
Little brown myotis (<i>Myotis lucifugus</i>)	Tier 1	
Long-eared myotis (<i>Myotis evotis</i>)	Tier 1	
Long-legged myotis (<i>Myotis volans</i>)	Tier 1	
Mountain lion (<i>Puma concolor</i>)	High-priority habitat	
Mule deer (<i>Odocoileus hemionus</i>)	High-priority habitat	
Northern hoary bat (<i>Lasiurus cinereus</i>)	Tier 1	
Pale lump-nosed bat (<i>Corynorhinus townsendii pallescens</i>)	Tier 2 Species of concern	
Preble's meadow jumping mouse (<i>Zapus hudsonius preblei</i>)	Critically imperiled	Endangered
Silver-haired bat (<i>Lasionycteris noctivagans</i>)	Tier 2	
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Tier 2	
Tricolored bat (<i>Perimyotis subflavus</i>)		Proposed endangered
Western small-footed myotis (<i>Myotis ciliolabrum</i>)	Tier 1	
Birds		
Band-tailed pigeon (<i>Patagioenas fasciata</i>)	SGIN	
Black rosy-finch (<i>Leucosticte atrata</i>)	Tier 1	
Broad-tailed hummingbird (<i>Selasphorus platycercus</i>)		Species of concern
Brown-capped rosy-finch (<i>Leucosticte australis</i>)	Tier 1	
Burrowing owl (<i>Athene cunicularia</i>)	Tier 2	
Golden eagle (<i>Aquila chrysaetos</i>)	Tier 1	Protected
Grace's warbler (<i>Setophaga graciae</i>)	Tier 2	
Lark bunting (<i>Calamospiza melanocorys</i>)	Tier 2	
Lewis's woodpecker (<i>Melanerpes lewis</i>)	SGIN	
Mexican spotted owl (<i>Strix occidentalis lucida</i>)		Threatened
Northern harrier (<i>Circus hudsonius</i>)	Tier 2	
Prairie falcon (<i>Falco mexicanus</i>)	Tier 1	
Rufous hummingbird (<i>Selasphorus rufus</i>)	Tier 2	
Virginia's warbler (<i>Leiothlypis virginiae</i>)	Tier 2	
Amphibians and Reptiles		
Northern leopard frog (<i>Lithobates pipiens</i>)	Tier 1	
Hernandez short-horned lizard (<i>Phrynosoma hernandesi</i>)	Tier 2	
Western rattlesnake (<i>Crotalus oreganus</i>)	SGIN	
Insects		
American bumble bee (<i>Bombus pensylvanicus</i>)	Tier 1	
Golden northern bumble bee (<i>Bombus fervidus</i>)	Tier 2	
Lusk's pine moth (<i>Coloradia luskii</i>)	Tier 2	
Monarch butterfly (<i>Danaus plexippus</i>)		Proposed threatened
Morrison's bumble bee (<i>Bombus morrisoni</i>)	Tier 1	
Suckley's cuckoo bumble bee (<i>Bombus suckleyi</i>)		Proposed endangered
Western bumble bee (<i>Bombus occidentalis</i>)	Tier 1	

SPECIES	STATUS	
	COLORADO	FEDERAL
Plants		
Dwarf milkweed (<i>Asclepias uncialis</i>)	Tier 1	
Front Range Milkvetch (<i>Astragalus sparsiflorus</i>)	Tier 1	
Wahatoya Creek larkspur (<i>Delphinium robustum</i>)	SGIN	

Site Assessment

The property is important habitat in the midst of a highly developed area, supporting a rich diversity of animals and plants. As noted in the desktop review, the property is within high-priority habitat for mule deer and black bear. A mule deer with her fawn were observed during the site visit and many piles of older and fresh bear scat were also observed. It appeared that a bear got into a neighborhood resident's trash can and dragged trash onto the property looking for food to eat.

Thirty-two bird species were observed during the site visit. Three hummingbird species are species of conservation concern: the rufous (*Selasphorus rufus*) is a SWAP Tier 2 species, the broad-tailed (*Selasphorus platycercus*) is a Bird of Conservation Concern (BCC) throughout its range in the continental U.S. and Alaska (U.S. Fish and Wildlife Service, 2026) and the calliope is on the Partners in Flight Yellow Watch List. The 2016 Landbird Conservation Plan (Rosenberg et. al, 2019) identified 86 species as species of highest conservation concern at the continental scale, known as the Partners in Flight Watch List. Yellow Watch List species are likely to go extinct without significant conservation action (Cornell Lab of Ornithology, 2026). Many more bird species could be expected to use habitat on the property either year-round or for migration. The feather of a great horned owl (*Bubo virginianus*) was also observed on the Property.

Insects were observed using the water trickling through the drainage and nectaring on flowering plants. Bees and butterflies were of particular note; Hunt's bumble bee (*Bombus huntii*), cabbage



Figure 3. Tree cavities observed on the property during the site visit.

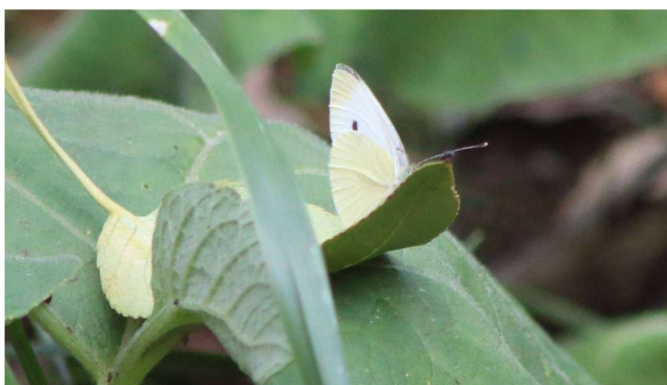


Figure 4. Small white butterfly observed on the property during the site visit.

white (*Pieris rapae*), two-tailed swallowtail (*Papilio multicaudata*) and woodland skipper (*Ochlodes sylvanoides*) were identified on the Property. Many other insect species were observed but were not identified.

Table 3. Bird species identified during the site visit August 10, 2026.

COMMON NAME (SCIENTIFIC NAME)	
American crow (<i>Corvus brachyrhynchos</i>)	House finch (<i>Haemorhous mexicanus</i>)
American goldfinch (<i>Spinus tristis</i>)	Lesser goldfinch (<i>Spinus paltria</i>)
American robin (<i>Turdus migratorius</i>)	Mourning dove (<i>Zenaida macroura</i>)
Black-billed magpie (<i>Pica hudsonia</i>)	Northern flicker (<i>Colaptes auratus</i>)
Black-capped chickadee (<i>Poecile atricapillus</i>)	Northern house wren (<i>Troglodytes aedon</i>)
Blue grosbeak (<i>Passerina caerulea</i>)	Red crossbill (<i>Loxia curvirostra</i>)
Blue jay (<i>Cyanocitta cristata</i>)	Red-breasted nuthatch (<i>Sitta canadensis</i>)
Blue-gray gnatcatcher (<i>Poliophtila caerulea</i>)	Red-tailed hawk (<i>Buteo jamaicensis</i>)
Broad-tailed hummingbird (<i>Selasphorus phatycercus</i>)	Rufous hummingbird (<i>Selasphorus rufus</i>)
Bushtit (<i>Psaltiriparus minimus</i>)	Spotted towhee (<i>Pipilo maculatus</i>)
Calliope hummingbird (<i>Selasphorus calliope</i>)	Turkey vulture (<i>Cathartes aura</i>)
Chipping sparrow (<i>Spizella passerine</i>)	Western flycatcher (<i>Empidonax difficilis</i>)
Common raven (<i>Corvus corax</i>)	Western kingbird (<i>Tyrannus verticalis</i>)
Cooper's hawk (<i>Astur cooperii</i>)	Western tanager (<i>Piranga ludoviciana</i>)
Downy woodpecker (<i>Dryobates pubescens</i>)	White-breasted nuthatch (<i>Sitta carolinensis</i>)
Eurasian collared-dove (<i>Streptopelia decaocto</i>)	Woodhouse's scrub-jay (<i>Aphelocoma woodhouseii</i>)

A western terrestrial garter snake (*Thamnophis elegans*) was observed during the site visit, indicating good habitat for reptiles.

Vegetation on the property was a mix of native and non-native species. Most of the tree species observed were native to the area. Trees of various ages, with many older trees, provide good cover for birds and other species. Shrub species provide mid-story cover and food sources for wildlife. Some of the forb species observed are listed as noxious weeds in Colorado. The State of Colorado categorizes noxious weeds in three tiers: List A (requires mandatory eradication



Figure 5. Stemless four-nerved daisy observed on the property during the site visit.

from all lands within the state to prevent it from becoming a larger problem), List B (invasive plants with discrete, statewide distributions that must be managed to stop their continued spread) and List C (species are widespread and well-established throughout the state, making statewide eradication impractical; educational resources are available to support local management efforts). Plant species observed on the property are listed in Table 4. A Noxious Weed Map is provided in Appendix A.

A special feature of the Property is the rock outcrop on the eastern edge. This rock outcrop may provide roosting places for bats and cover and nest sites for birds. A cave in the rock outcrop was noted but not investigated due to the possibility of being inhabited by a resident bear.

Table 4. Plant species identified on the Property during the site visit August 10, 2026.

SPECIES	NATIVE/ INTRODUCED	COLORADO STATUS
Trees		
Apple (<i>Malus</i> sp.)	I	
Chokecherry (<i>Prunus virginiana</i>)	N	
Crack willow (<i>Salix fragilis</i>)	I	
Green ash (<i>Fraxinus pennsylvanica</i>)	N	
Narrow-leaf cottonwood (<i>Populus angustifolia</i>)	N	
Peach-leaf willow (<i>Salix amygdaloides</i>)	N	
Pinyon pine (<i>Pinus Edulis</i>)	N	
Plains cottonwood (<i>Populus deltoides</i>)	N	
Rocky Mountain juniper (<i>Juniperus scopulorum</i>)	N	
Russian olive (<i>Elaeagnus angustifolia</i>)	I	Noxious weed (List B)
Shrubs		
Fringed sagebrush (<i>Artemisia frigida</i>)	N	
Gambel oak (<i>Quercus gambelii</i>)	N	
Great Plains yucca (<i>Yucca glauca</i>)	N	
Mountain mahogany (<i>Cercocarpus montanus</i>)	N	
Nanking cherry (<i>Prunus tomentosa</i>)	I	
Plains pricklypear (<i>Opuntia polyacantha</i>)	N	
Rock-spiraea (<i>Holodiscus discolor</i>)	N	
Three-leaf sumac (<i>Rhus trilobata</i>)	N	
Western Poison Ivy (<i>Toxicodendron rydbergii</i>)	N	
Western Snowberry (<i>Symphoricarpos occidentalis</i>)	N	
Forbs		
Bigelow's beggarticks (<i>Bidens bigelovii</i>)	N	
Broom snakeweed (<i>Gutierrezia sarothrae</i>)	N	
Canada thistle (<i>Cirsium arvense</i>)	I	Noxious weed (List B)
Common burdock (<i>Arctium minus</i>)	I	Noxious weed (List C)
Common mullein (<i>Verbascum thapsus</i>)	I	Noxious weed (List C)
Curlycup gumweed (<i>Grindelia squarrosa</i>)	N	
Curly dock (<i>Rumex crispus</i>)	I	
Dalmatian toadflax (<i>Linaria dalmatica</i>)	I	Noxious weed (List B)

SPECIES	NATIVE/ INTRODUCED	COLORADO STATUS
Donkeytail spurge (<i>Euphorbia morganianum</i>)	N	
Dotted gayfeather (<i>Liatris punctata</i>)	N	
Eastern catmint (<i>Nepeta racemosa</i>)	N	
Flixweed ** (<i>Descurainia sophia</i>)	I	
Greater plantain (<i>Plantago major</i>)	N	
Hairy false golden aster (<i>Heterotheca villosa</i>)	N	
Heartleaf arnica (<i>Arnica cordifolia</i>)	N	
Horseweed (<i>Conyza canadensis</i>)	N	
Houndstongue (<i>Cynoglossum officinale</i>)	I	Noxious weed (List B)
Missouri goldenrod (<i>Solidago missouriensis</i>)	N	
Myrtle spurge (<i>Euphorbia myrsinites</i>)	I	Noxious weed (List A)
Nodding onion (<i>Allium cernuum</i>)	N	
Pussytoes (<i>Antennaria</i> sp.)	N	
Ragweed (<i>Ambrosia</i> sp.)	N	
Spreading fleabane (<i>Erigeron divergens</i>)	N	
Stemless four-nerved Daisy (<i>Tetraneuris acaulis</i>)	N	
Virginia creeper (<i>Parthenocissus quinquefolia</i>)	N	
Yellow salsify (<i>Tragopogon dubius</i>)	N	
Yellow toadflax (<i>Linaria vulgaris</i>)	I	Noxious weed (List C)
Grasses		
Buffalograss (<i>Bouteloua dactyloides</i>)	N	
Canada wild rye (<i>Elymus canadensis</i>)	N	
Cheatgrass ** (<i>Bromus tectorum</i>)	I	Noxious weed (List C)
Crested wheatgrass (<i>Agropyron cristatum</i>)	I	
Kentucky bluegrass (<i>Poa pratensis</i>)	N	
Little bluestem (<i>Schizachyrium scoparium</i>)	N	
Roughleaf ricegrass (<i>Oryzopsis asperifolia</i>)	N	
Smooth brome (<i>Bromus inermis</i>)	I	
Tufted hairgrass (<i>Deschampsia cespitosa</i>)	N	

Cultural and Historic Resources

Desktop Review

A desktop assessment of cultural resources was conducted and included a review of records from the Colorado Office of Archaeology and Historic Preservation on July 27, 2026. No previous cultural resource surveys were conducted within the project area. In the region, 12 previous cultural resource surveys were conducted within 1/2 mile of the project area, documenting 71 previously reported cultural resources. These resources include mostly historic-period buildings and structures associated with the City of Manitou Springs, as well as the Keithley Pines Historic Cabins historic district (5EP.334) and a single paleontological resource (5EP.5881).

Table 5. Cultural resources previously reported within one-half mile of the property.

RESOURCE NUMBER	DESCRIPTION	RESOURCE TYPE	STATE OR NATIONAL REGISTER ELIGIBLE?	WITHIN A PROJECT AREA?
5EP.334	Keithley Pines Historic Cabins	Historic District	--	No
5EP.5881		Paleontology	--	No

Site Assessment

A site assessment of cultural resources on the property included a pedestrian survey with 15-meter transects, including a visual inspection of exposed soil profiles and/or erosional exposures. No collection of artifacts was permitted.

No cultural resources were observed in the project area. The project area contains a dynamic ephemeral arroyo; modern trash was observed at-surface as well as mixed with and buried in sediments several inches deep. Low-ground-surface visibility due to heavy vegetation at time of survey made identification of prehistoric artifacts and/or features unlikely. The unstable, erosive environment and loose, friable sediments make intact (pre)historic cultural remains unlikely. Subsurface potential is limited due to the dynamics presented above, and therefore intact buried cultural deposits are unlikely.

The Limited-Results Cultural Resource Survey Form is provided in Appendix C.

Wildfire Hazard

Wildfires spread as the requirements for combustion, including heat, fuel and oxygen, are met. In practical application, wildfire intensity increases with increased slope and fuel load. The principal means of mitigating wildfire risk is through forest management and fuels mitigation. There are three types of fire that can affect features and structures on or near a property: crown fire, surface fire and ember showers. Crown fire is characterized by fast moving tree-to-tree ignition and represents the most intense form of wildfire. Crown fire affects structures through radiant, conductive or convective heat. Surface fires remain on the ground where they burn surface litter, downed fuels and herbaceous fuels and woody shrubs. Grasses, shrubs, wooden walls, discarded combustible materials and downed forest fuels are all surface fire hazards. Ember showers, or fire brands, can travel ignited for up to 12 miles and account for the greatest proportion of structure ignitions. Embers accumulate where horizontal and vertical surfaces meet and ignite combustible materials at junctions between walls, decks, roofs and the ground.

The majority of wildfires are human-caused. Human access to areas has been shown to strongly correlate with human-caused ignitions. A three-decade nationwide analysis of U.S. Forest Service lands found wildfire-ignition density was highest within 50 meters of roads (Aplet et al., 2026). Roughly 85–90 percent of U.S. wildfires are human-caused overall, dominated by equipment use, debris burning, powerlines and arson. Based on U.S. government wildfire records from 1992–

2012, researchers found that more than 84 percent of government-recorded wildfires were started by people (Balch et al., 2017).

Desktop Review

The Colorado Forest Atlas web portal (Colorado State Forest Service, 2026) provides a suite of interactive mapping applications about Colorado's forest conditions. Data provided on the portal includes fire intensity and burn probability derived at a 20-meter resolution. Fire intensity and burn probability maps for the property are provided in Appendix A.

Fire intensity identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist. The scale consists of four (4) classes where the order of magnitude between classes is ten-fold. The minimum class (class 1) represents lowest wildfire intensities and the maximum class (class 4) represents the highest wildfire intensities.

The property is not within a fire intensity classification area. However, adjacent land to the east of the property is primarily classified as low intensity (class 2). Classifications near the property fall into three classes with the following descriptions:

Lowest Intensity: Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.

Low: Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.

Moderate: Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.

Burn probability is the annual probability of any location burning due to a wildfire. The classifications are based on models that calculate the number of times that a cell (20-meter area) was burned and the number of iterations used to run the models. Burn probability on the property ranges from lowest to moderate probability. Burn probability is not appropriate for site-specific analysis. It does, however, provide context for a site within regional, county or local protection mitigation or prevention planning.

Site Assessment

The property is situated in a ravine which is narrow and moderately steep on the southern end and opens up to broad swale on the northern end. The topography would contribute to increased fire behavior, particularly on the southern portion of the property. An ephemeral/intermittent drainage extends along the length of the property that supports deciduous vegetation which can limit fire behavior. Adjacent side slopes are dominated by pinon juniper communities.

Determination of Fire Intensity Classification and Code Requirements

The Colorado Wildfire Resiliency Code outlines the evaluation and determination of fire intensity classification (Section 304.2) based on site-specific conditions and supporting technical analysis. According to the code, “the fire intensity classification and associated requirements shall be based on a review of the vegetative fuels on the parcel and within 300 feet of the parcel boundary, topography, local weather patterns, and fire behavior modeling data.” Based on existing conditions, fire intensity is classified as low, moderate or high.

Wildfires occur when there is sufficient heat, fuel and oxygen to sustain combustion. Fuels may be characterized in terms of fuel load (tons per acre), bulk density, fuel particle size, heat content and moisture of extinction. There are a variety of fuel models that can be used to describe site conditions. For this assessment, based on visual observations during the site visit, the property can be classified into three fuel types according to the Standard Fire Behavior Fuel Models by Scott and Burgan (2005). Field observations were integrated with other spatial information within a geographic information system to produce the surface fuel map provided in Appendix A.

Surface fuel types on the property and within 300 feet of the boundary:

Nonburnable (24.5 acres): This fuel type (NB1) contains insufficient wildland fuel to carry wildland fire under any condition. It includes urban or suburban development such as houses, roads and irrigated lawns.

Shrub (19.8 acres): This fuel type (SH1) includes the pinyon juniper and Gambel oak uplands on the property. There is shrub cover on at least 50 percent of the site; grass may be present. There is a low shrub fuel load, fuelbed depth is about 1 foot. Spread rate is very low; flame length is very low.

Timber-Understory (1.4 acres): This fuel type (TU1) includes areas of deciduous trees along the ephemeral drainage on the property. There is grass or shrubs mixed with litter from the forest canopy. Fuelbed is low load of grass and/or shrub with litter. Spread rate is low; flame length is low.

SITE CONSTRAINTS AND OPPORTUNITIES

Constraints

The development of a recreational trail through the 8-acre open space is constrained by several factors. The geography of the property is long and narrow, which increases the likelihood of edge effects, and the addition of a trail increases those effects even further. Edges are zones where two different environments meet, and conditions near them differ measurably from the interior. For example, edges favor generalist and disturbance-tolerant species — weeds, pests — which arrive from the surrounding neighborhood and outcompete interior specialists. Invasives typically colonize from edges inward, and in a narrow area they can reach every point quickly. More edge means more places where people, dogs, litter, light and noise enter the property. There is loss of interior, protected habitat. Species that need quiet, shaded, undisturbed core habitat (many birds, small mammals, amphibians) find none. A high ratio of edge also increases the likelihood of wildlife conflict. On a long, narrow property, every alignment choice puts the trail in direct contact with otherwise unfragmented habitat.

Steep slopes increase erosive forces of water and will also constrain alignment of a trail. Sustainable grade limits may force the trail into long, meandering traverses and switchbacks thereby requiring lateral room within a narrow property. Construction may be more costly in steep areas. There is poor access for equipment from the south of the property.

Trail development may be unpopular with neighbors who do not want public access so close to their backyards. Soil disturbance will accelerate noxious weed dispersal. The potential for wildfire ignition increases with recreational development.

Opportunities

Opportunities for public engagement exist with or without trail development. Public education does not depend on building a trail — a trail changes how people experience a site, but education can happen with or without physical access improvements. Guided hikes can be provided periodically without trail construction and interpretative signage can be used to engage the general public on a variety of issues including native biodiversity, invasive species management, wildfire mitigation and management activities. There can be staff-led volunteer opportunities to help with management activities and residents can be encouraged to participate in citizen science activities such as bird counts. School groups could be accommodated and lesson plans built around the site's actual ecology (edge effects, fragmentation, urban wildlife). Digital interpretation can be used to accommodate people with mobility issues. QR-code signage, a website with trail-camera highlights and seasonal wildlife calendars can communicate wildlife use to thousands of people without creating site disturbances.

Preserving a small natural area without trail development maximally supports native plants, birds, pollinators and small mammals in landscapes dominated by suburban development. Urban natural areas provide breeding sites, refugia and connectivity with larger habitat areas in the region

including Garden of the Gods Park to the north and Red Rock Canyon Open Space to the south. Undeveloped areas also protect water quality by reducing erosion and sedimentation and providing groundwater infiltration.

RECOMMENDATIONS

No Trail

Construction of a trail through Bill Bauers Open Space is not recommended for the following reasons:

- Fragmentation will degrade habitat value for mammals and birds and promote expansion of noxious weed populations.
- Trail construction can increase soil erosion and sedimentation degrading water quality.
- Trail development could increase the potential for wildfire ignitions.
- Remove trash and litter from the site biannually.
- Potential for wildlife conflicts exist; recent signs of bear were observed in numerous places.

Habitat loss and fragmentation are known to be the primary cause of ecosystem degradation and biodiversity loss (Wilson et al., 2016). Habitat fragmentation reduces the overall habitat in area, increases habitat edges and increases habitat isolation through reduced connectivity (Haddad et al., 2015a).

Numerous habitat fragmentation experiments across varying ecosystems have shown that fragmentation consistently degrades ecosystems, reducing species persistence, species richness, nutrient retention, trophic dynamics and, in more isolated habitats, movement of species (Haddad et al., 2015b).

Management Without Trail Construction

The following are recommended actions for management of the property without the construction of a trail:

- Manage noxious weeds – See the Weed Management Plan section of this report.
- Provide information about the Colorado State Wildlife Service Defensible Space guidelines on the Manitou Springs website.
- Provide bear-proof trash receptacles for the neighborhood, if possible. Provide guidance to residents to not leave trash bins on the street overnight.
- Remove trash and litter from the site biannually.
- Conduct periodic nature walks with a City naturalist to provide access to the site without creating permanent changes.

Management With Trail Construction

If the trail is to be built, the following are recommended actions to mitigate the impacts of construction:

- Engage in construction activities outside of bird breeding and nesting season, which occurs April 1 through August 15.
- Align the trail to limit impacts to wetlands.
- Minimize cut banks to help with weed control and erosion.
- Include signage at access to the trail that includes notices of weed information, prohibition of camping, prohibition of fire, prohibition of littering and bear safety information.
- Close the trail seasonally in the spring when deer have fawns and consider additional closures in the fall, when bears are in hyperphagia.
- Provide bear-proof trash receptacles for the neighborhood, if possible. Provide guidance to residents to not leave trash bins on the street overnight.
- Remove trash and litter biannually.
- Consult trail construction guidelines from a recognized authority, for example the “Trail Maintenance and Construction Notebook” from the U.S. Forest Service (Helmandollar-Powell et al., 2025).
- Consider shortening the trail to limit disturbance, perhaps confine to the area near the community park on the southwest end where social trails already descend onto the open space area. A properly constructed trail will limit erosion, provide access, discourage dispersed use and provide access for periodic clean-ups.

Wildfire

Education

Regardless of whether or not a trail is ultimately built, provide wildfire education for the community.

- The town's website can host wildfire preparedness materials that help residents understand the risks of living where developed areas meet wildland, and what proactive steps they can take to reduce those risks.
- The site should link to the Colorado State Forest Service “Live Wildfire Ready” site (<https://csfs.colostate.edu/live-wildfire-ready/>) that provides standards for defensible space and home hardening, giving homeowners clear, actionable guidance on creating defensible space around structures and retrofitting homes with fire-resistant materials.
- The website should display current red-flag warnings so residents receive timely notice of elevated fire danger conditions.

Community Wildfire Protection Plan

Ensure the city’s Community Wildfire Protection Plan (CWPP) is up to date. The plan should be made readily available to the public on the city website, alongside the educational resources described above. The plan should ensure that residents, landowners, and community organizations can understand identified risks, stay informed about planned mitigation projects and participate in ongoing implementation. Enforcement measures such as preventing unauthorized urban camping

and prohibiting open fires during dangerous conditions, can also help reduce wildfire risk to people and property.

Wildfire Mitigation

Wildfire mitigation within the property will depend upon overarching site goals. If the primary goal is to preserve and protect wildlife habitat, then fire mitigation activities should not occur. However, if public safety is a higher priority, then a constructed trail could be used for mitigation activities. Dead and down trees should be removed. The canopy should be selectively thinned and residual trees should be limbed to separate horizontal and vertical fuel profiles. Juniper trees and shrubs should be removed as well as shrubs that grow below the dripline of residual trees. However, if wildlife habitat is important, leave strategically located undergrowth to provide nesting habitat for birds and maintain shaded areas that harbor moist microclimates. Strategic thinning of coniferous trees, especially when they occur on the perimeter of private property would also be a priority. Deciduous trees and shrubs should be encouraged where there is sufficient moisture to support these species. It should be noted that fire mitigation activities are likely to diminish wildlife habitat value for most species.

WEED MANAGEMENT PLAN

Overview

A survey of weed species was conducted at Bill Bauers Open Space on August 10, 2026. The mapping effort included interviews with city staff and field delineation. Fine mapping included all roads, trails, developed areas and most habitat areas. All current species listed by the Colorado Noxious Weed Act were included in the survey. A weed map is provided in Appendix A.

Target Weeds of Concern

The Colorado Department of Agriculture identifies three tiers of noxious weed species, each with different goals for treatment.

List A Species: *If you find it, eradicate it.* Species on this list are newly arrived, uncommon and potentially dangerous plants that require mandatory eradication from all lands within the state to prevent it from becoming a larger problem. The management goal for List A species is their complete elimination to protect the economic and environmental health of Colorado.

List B Species: *Help stop the spread.* These are invasive plants with discrete, statewide distributions that must be managed to stop their continued spread, either through eradication, containment, or suppression, with the specific strategy varying by location and determined by the Colorado Commissioner in consultation with local governments. These are non-native plants already established in Colorado that have the potential to cause significant ecological damage, and their spread is a priority for the state.

List C Species: *Widely distributed.* The species are widespread and well-established throughout the state, making statewide eradication impractical. The Colorado Department of Agriculture provides educational, research, and biological control resources to support local management efforts.

An additional invasive species to consider for management is crack willow (*Salix fragilis*). Crack willow can form large, thick canopies alongside water courses. Crack willow is commonly introduced to help reduce erosion stabilize banks and but has taken over many natural riparian or riverside habitats in Colorado (Alaback, 2026). Native peachleaf willow is intolerant of shade, so the dense canopy created by crack willow can lead to further losses of native willow. Control crack willow now before it out competes native species.

Inventory

A field survey of the site was conducted to map noxious weed populations in accordance with North American Invasive Plant Mapping Standards and included documentation of species,

location, infestation size and percent cover. Weed points were collected with a mobile device equipped with ESRI Field Maps.

Table 6. Weed species identified on the Property during the site visit August 10, 2026.

STATUS	PRIORITY	LIFEFORM
List A		
Myrtle spurge (<i>Euphorbia myrsinites</i>)	High	Forb
List B		
Canada thistle (<i>Cirsium arvense</i>)	Medium	Forb
Dalmatian toadflax (<i>Linaria dalmatica</i>)	High	Forb
Houndstongue (<i>Cynoglossum officinale</i>)	Medium	Forb
Russian olive (<i>Elaeagnus angustifolia</i>)	High	Tree
List C		
Cheatgrass (<i>Bromus tectorum</i>)	Low	Grass
Common burdock (<i>Arctium minus</i>)	Medium	Forb
Common mullein (<i>Verbascum thapsus</i>)	Low	Forb
Yellow toadflax (<i>Linaria vulgaris</i>)	High	Forb

Integrated Weed Management Techniques

Optimal weed suppression results can be attained by employing a variety of management techniques that focus on prevention, education, monitoring and control.

Prevention

The most effective way to control noxious weeds is to prevent their initial establishment. Once noxious weeds become established, their control is costly and time consuming.

To prevent weed establishment:

- Limit disturbance to the landscape
- Inspect shoes, clothing and equipment for weed seeds before entering and leaving the property
- If the property is accessible, require dogs to be leashed and require users to remain on trails
- Eliminate social trails

Education

Weed management is a complex and evolving field of study that requires knowledge and understanding so that weed control methods can be used in the most effective means possible. It is also important to educate the public about weeds so that they understand the necessity of their control and will support prevention efforts. An educated public will be able to more effectively control weeds on their own property.

Monitoring

Monitoring helps to detect initial weed infestations before they get out of control and also helps to determine if the current methods of control are effective.

Control

Weed control measures should be conducted in compliance with the Colorado Noxious Weed Act (C.R.S. §35-5.5-115) and the current rules pertaining to the administration and enforcement of the Colorado Noxious Weed Act. The eradication of introduced plant species using minimal to no pesticides will allow for good water quality and minimal wildlife disruption. Integrated noxious weed management recommendations that include mechanical, cultural, chemical and biological control methods for observed species are provided in Appendix D.

In general, the highest priorities for treatment are the least abundant and most noxious species . Priority species should include myrtle spurge and Russian olive.

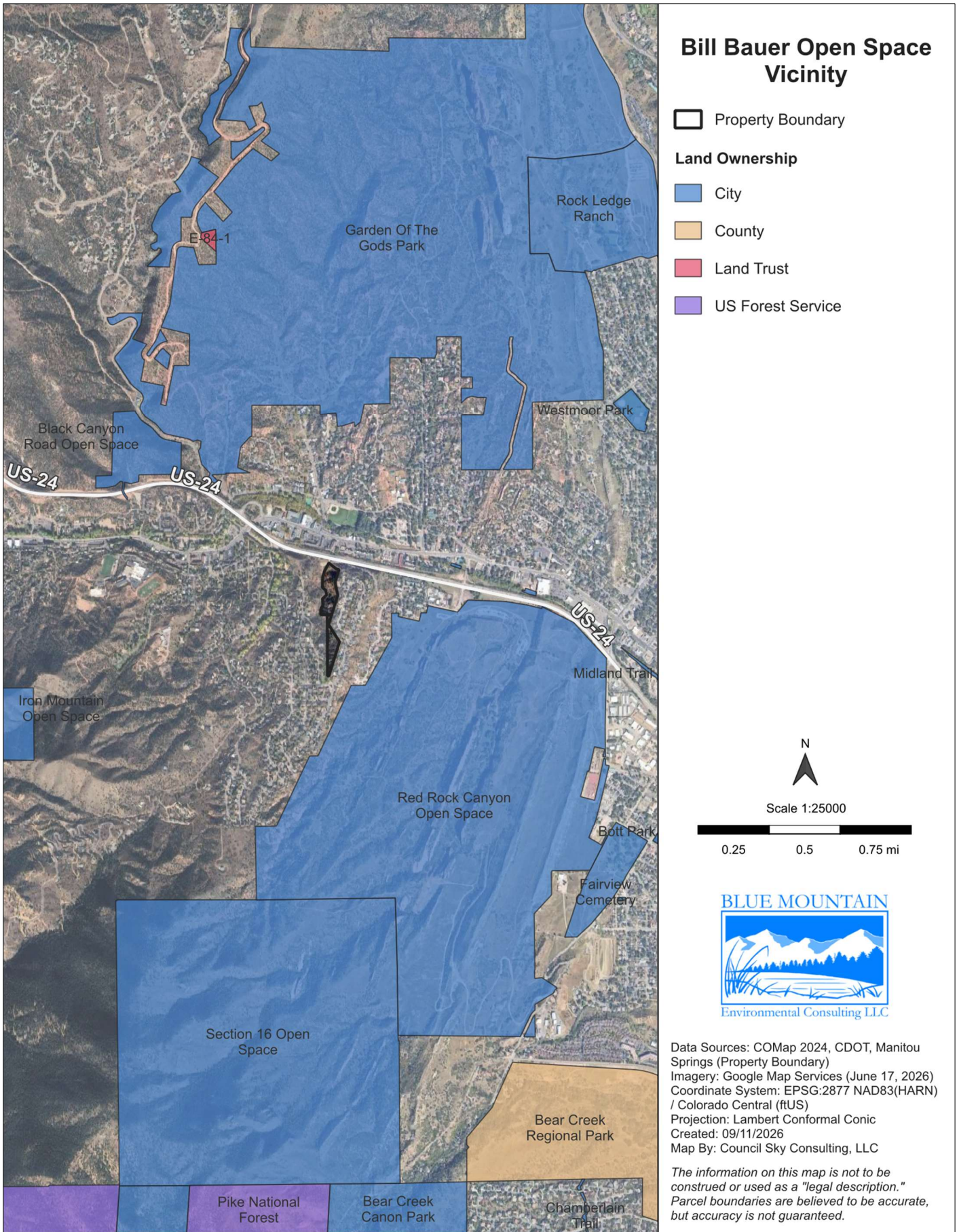
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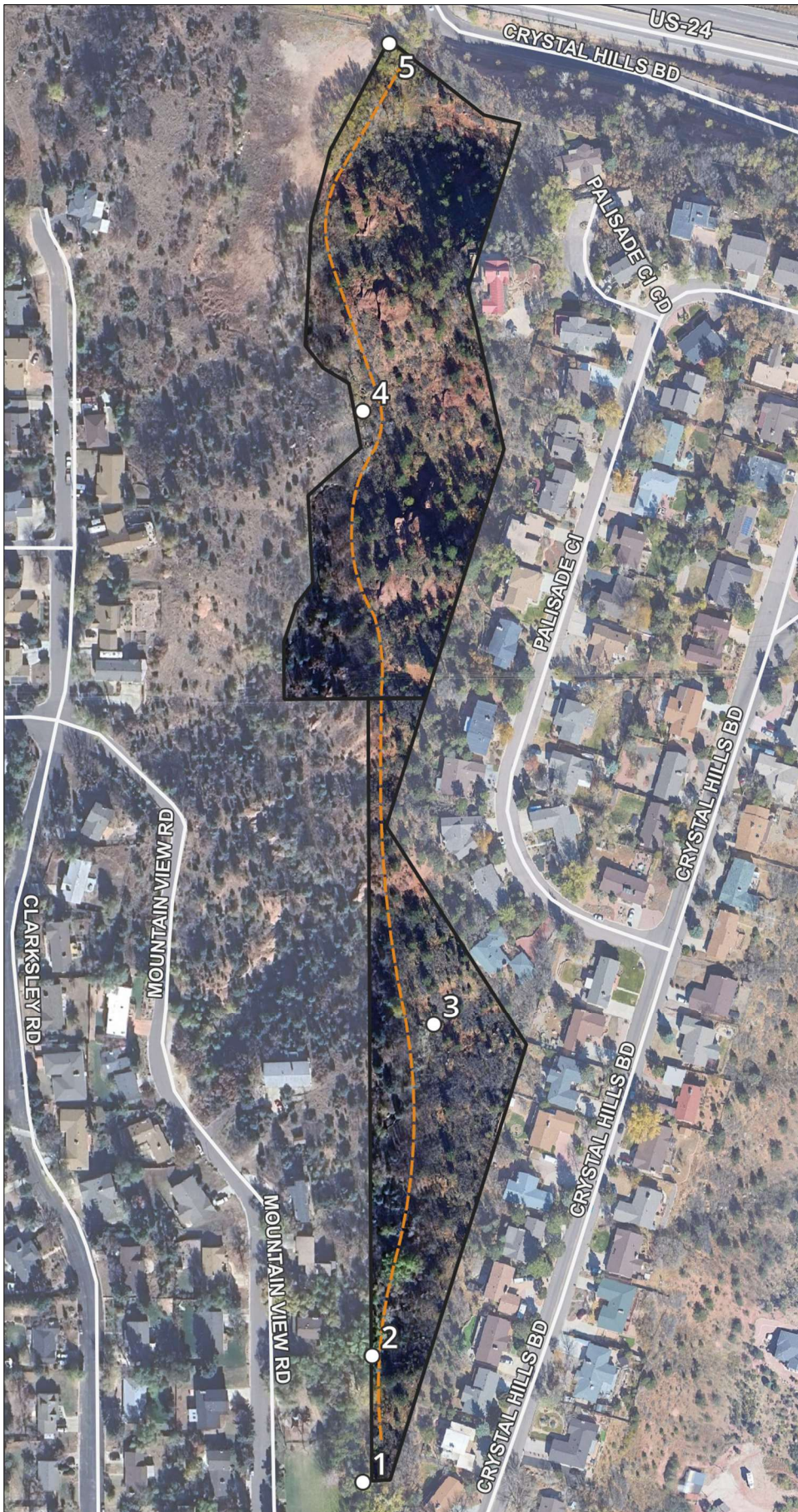
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APPENDIX A: PROJECT MAPS

Vicinity Map

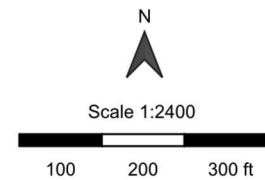


Reference and Photo Points Map



Bill Bauers Open Space Reference and Photo Points

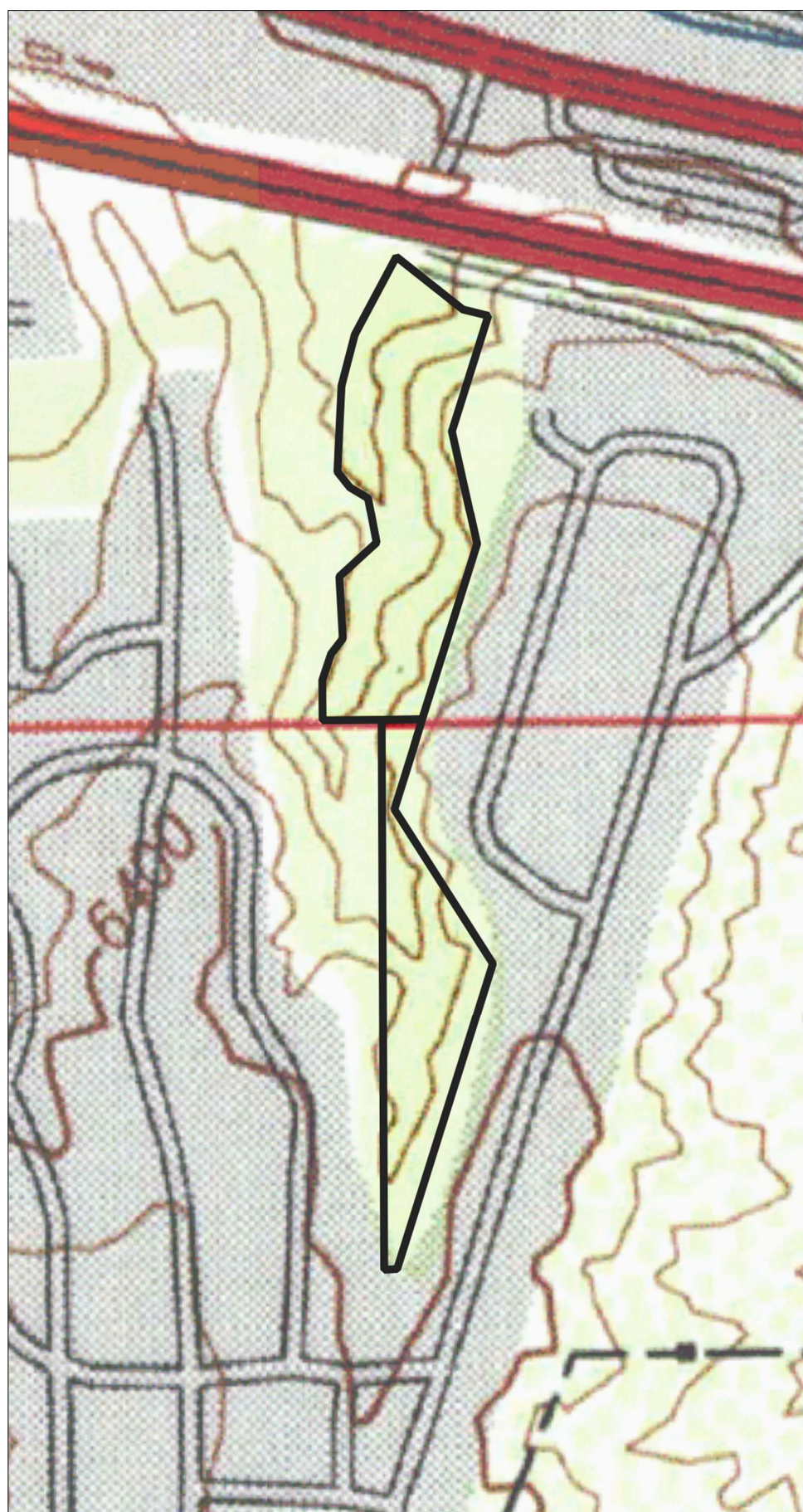
-  Property Boundary
-  Photo Point
-  Proposed Trail



Data Sources: Manitou Springs, BMEC, CDOT
 Imagery: Google Map Services (June 17, 2026)
 Coordinate System: EPSG:2877 NAD83(HARN)
 / Colorado Central (ftUS)
 Projection: Lambert Conformal Conic
 Created: 09/22/2026
 Map By: Council Sky Consulting, LLC

The information on this map is not to be construed or used as a "legal description." Parcel boundaries are believed to be accurate, but accuracy is not guaranteed.

Topographic Map



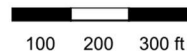
Bill Bauer Open Space Topography

 Property Boundary

Contour Interval = 40 feet



Scale 1:3400



BLUE MOUNTAIN



Environmental Consulting LLC

Data Sources: USGS, Manitou Springs (Property Boundary)
Coordinate System: EPSG:2877 NAD83(HARN) / Colorado Central (ftUS)
Projection: Transverse Mercator
Created: 08/25/2026
Map By: Council Sky Consulting, LLC

The information on this map is not to be construed or used as a "legal description." Parcel boundaries are believed to be accurate, but accuracy is not guaranteed.

FEMA Flood Map

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRMI PANEL LAYOUT

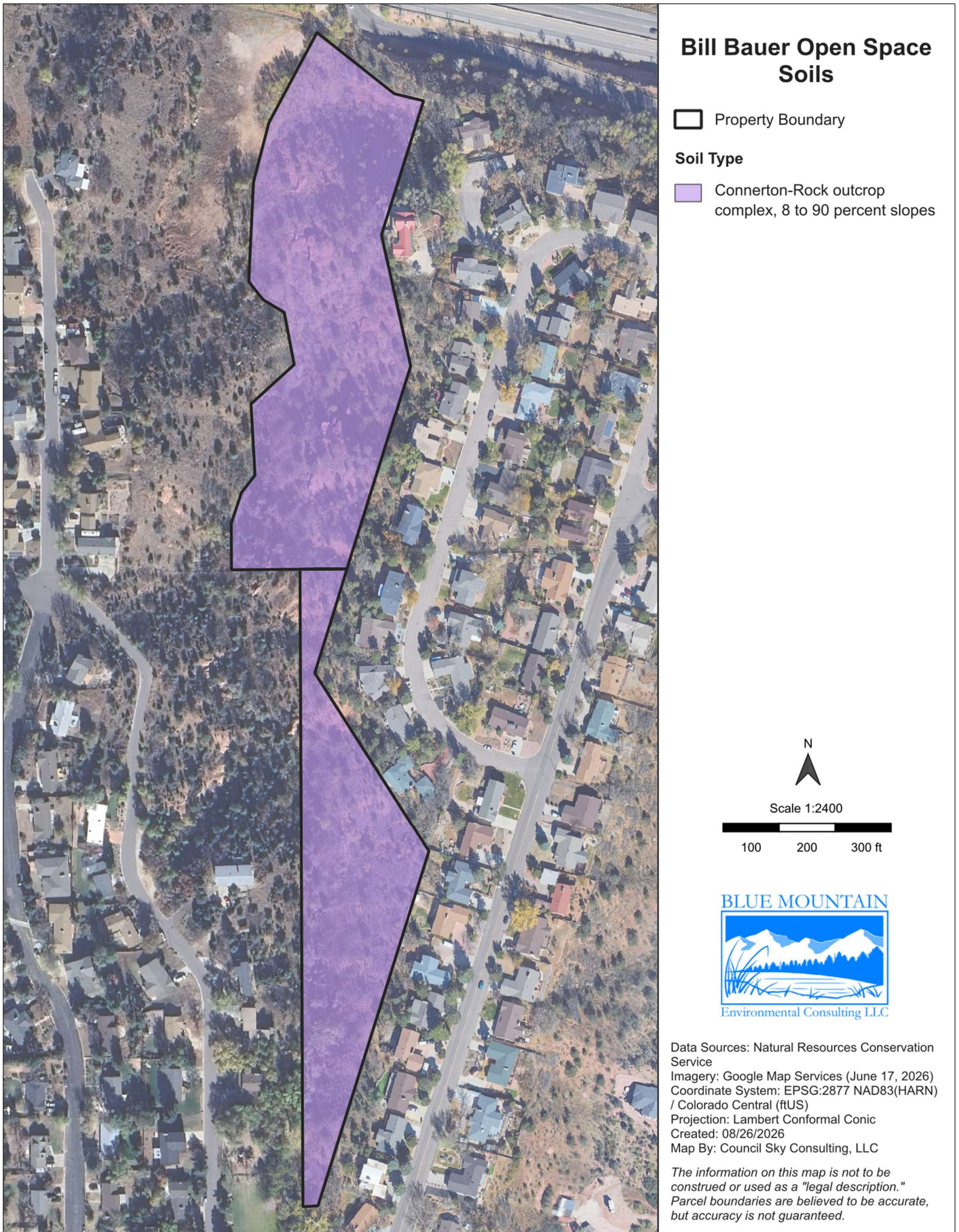
SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone A, X, A50
	With BFE or Depth Zone AE, AO, AH, VE, AR
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions: 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee. See Notes, Zone X
	Area with Flood Risk due to Levee Zone D
OTHER AREAS	Area of Minimal Flood Hazard Zone X
	Effective LOMRs
GENERAL STRUCTURES	Area of Undetermined Flood Hazard Zone D
	Channel, Culvert, or Storm Sewer
OTHER FEATURES	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation
MAP PANELS	Coastal Transect
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	Digital Data Available
	No Digital Data Available
	Unmapped

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

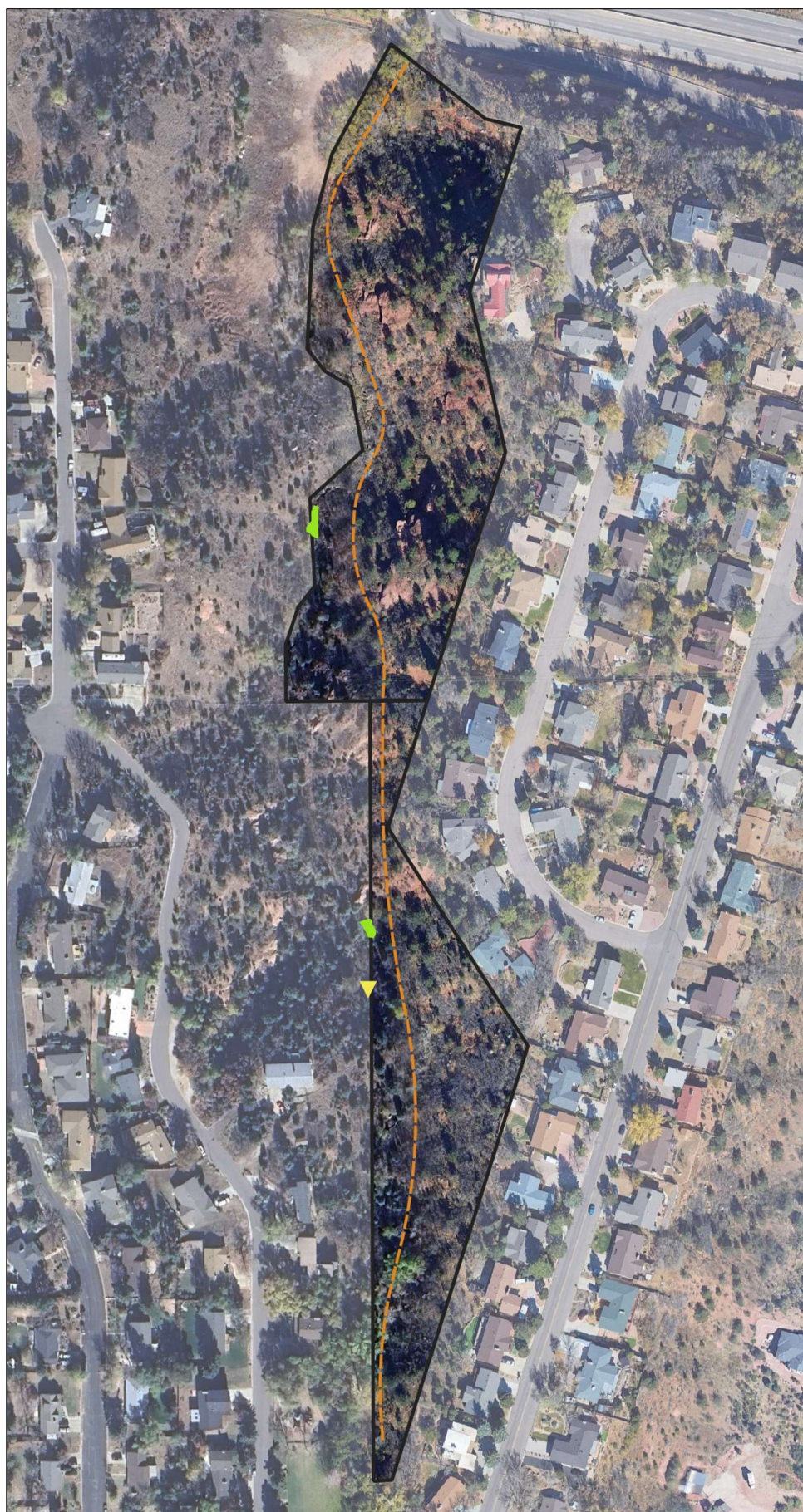
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/25/2026 at 5:16 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRMI panel number, and FIRMI effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Soils Map



Wetlands Map



Bill Bauer Open Space Wetlands

-  Property Boundary
-  Potential Wetland (0.021 acres)
-  Wetland Off Property
-  Proposed Trail



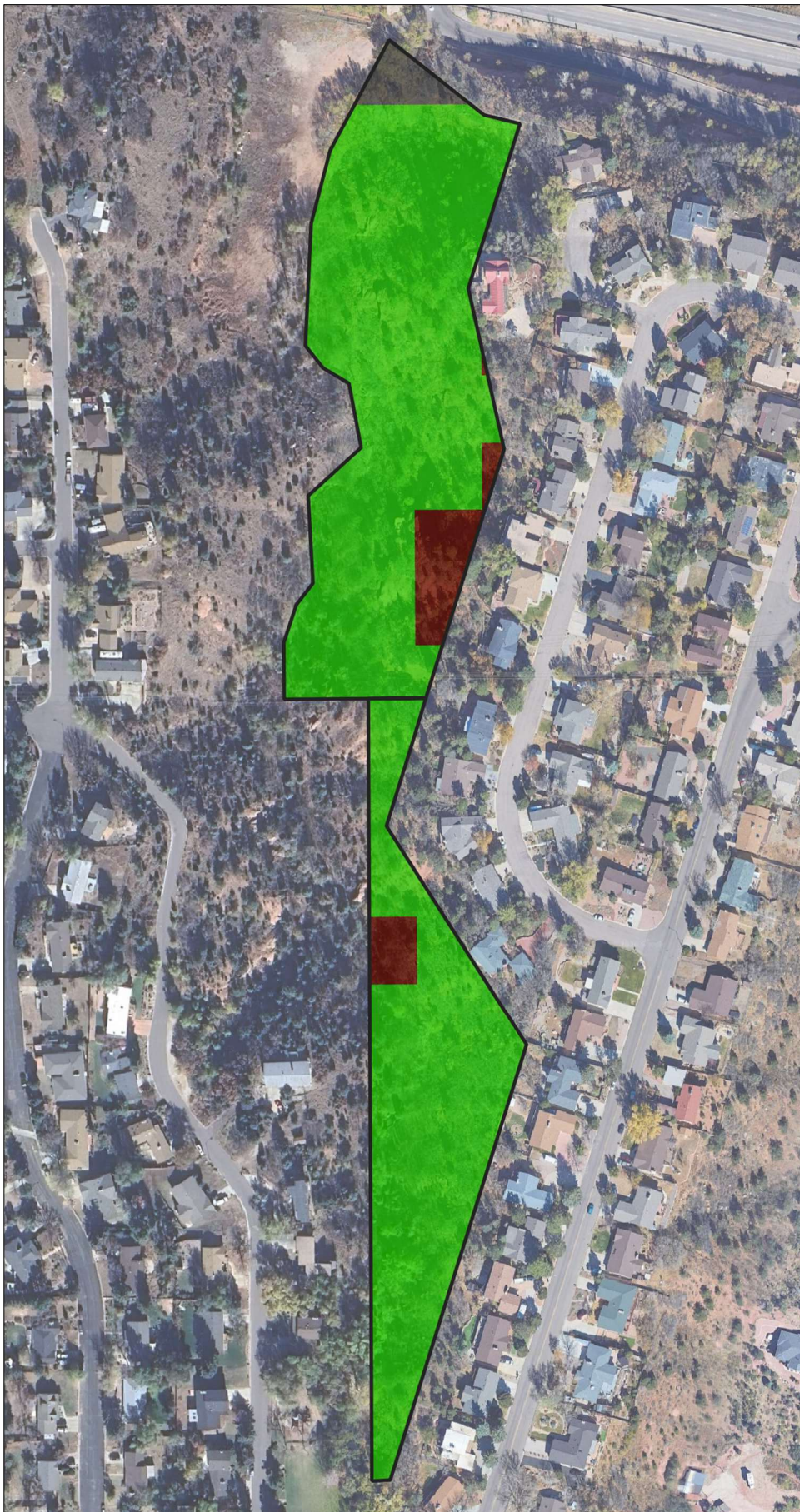
Scale 1:2400



Data Sources: BMEC, Manitou Springs (Property Boundary)
 Imagery: Google Map Services (June 17, 2026)
 Coordinate System: EPSG:2877 NAD83(HARN) / Colorado Central (ftUS)
 Projection: Lambert Conformal Conic
 Created: 09/04/2026
 Map By: Council Sky Consulting, LLC

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Land Cover Map



Bill Bauers Open Space Land Cover

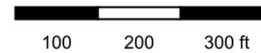
Property Boundary

Land Cover Type

- Southern Rocky Mountain Pinyon-Juniper Woodland
- Rocky Mountain Gambel Oak-Mixed Montane Shrubland
- Developed, Medium - High Intensity



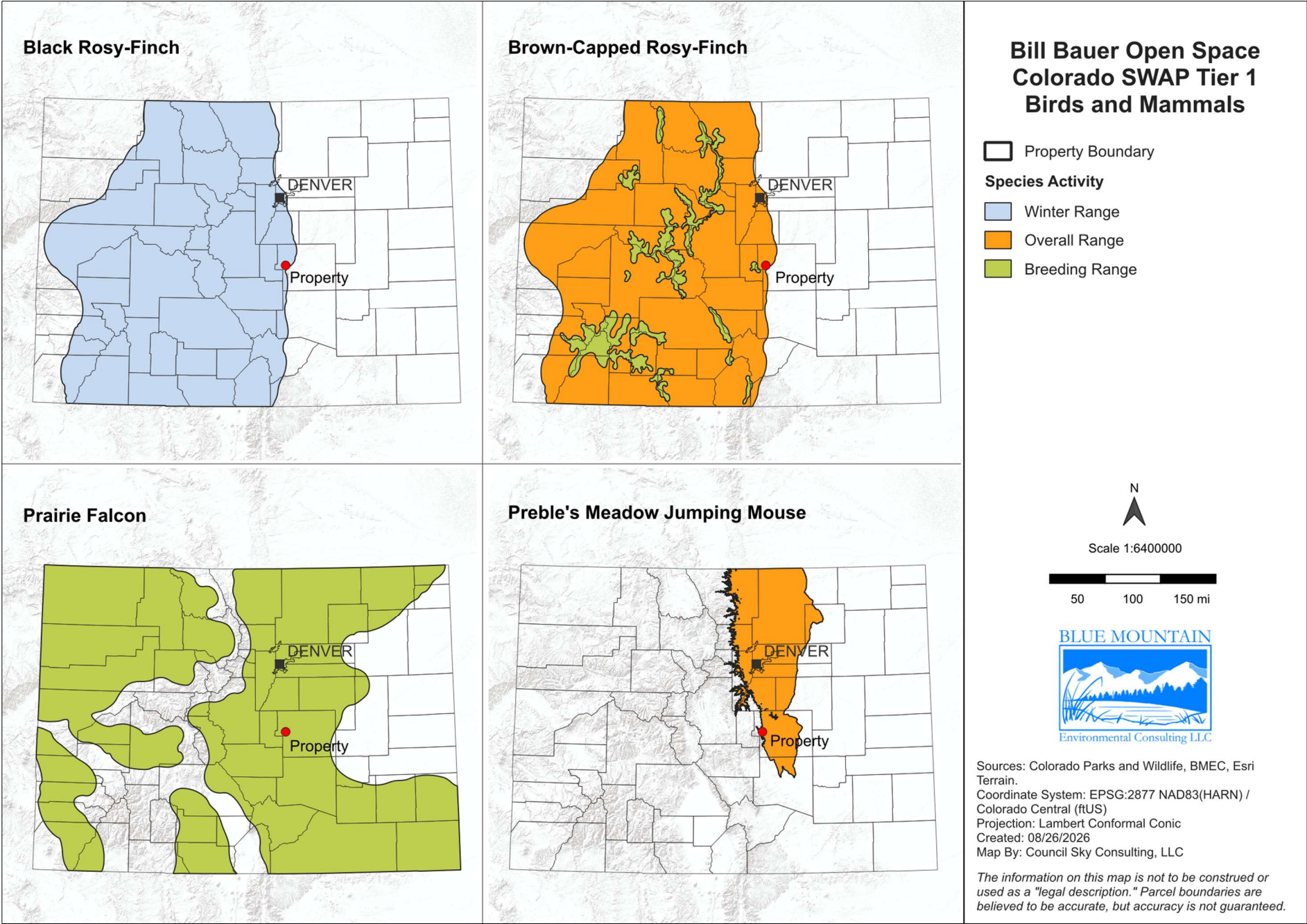
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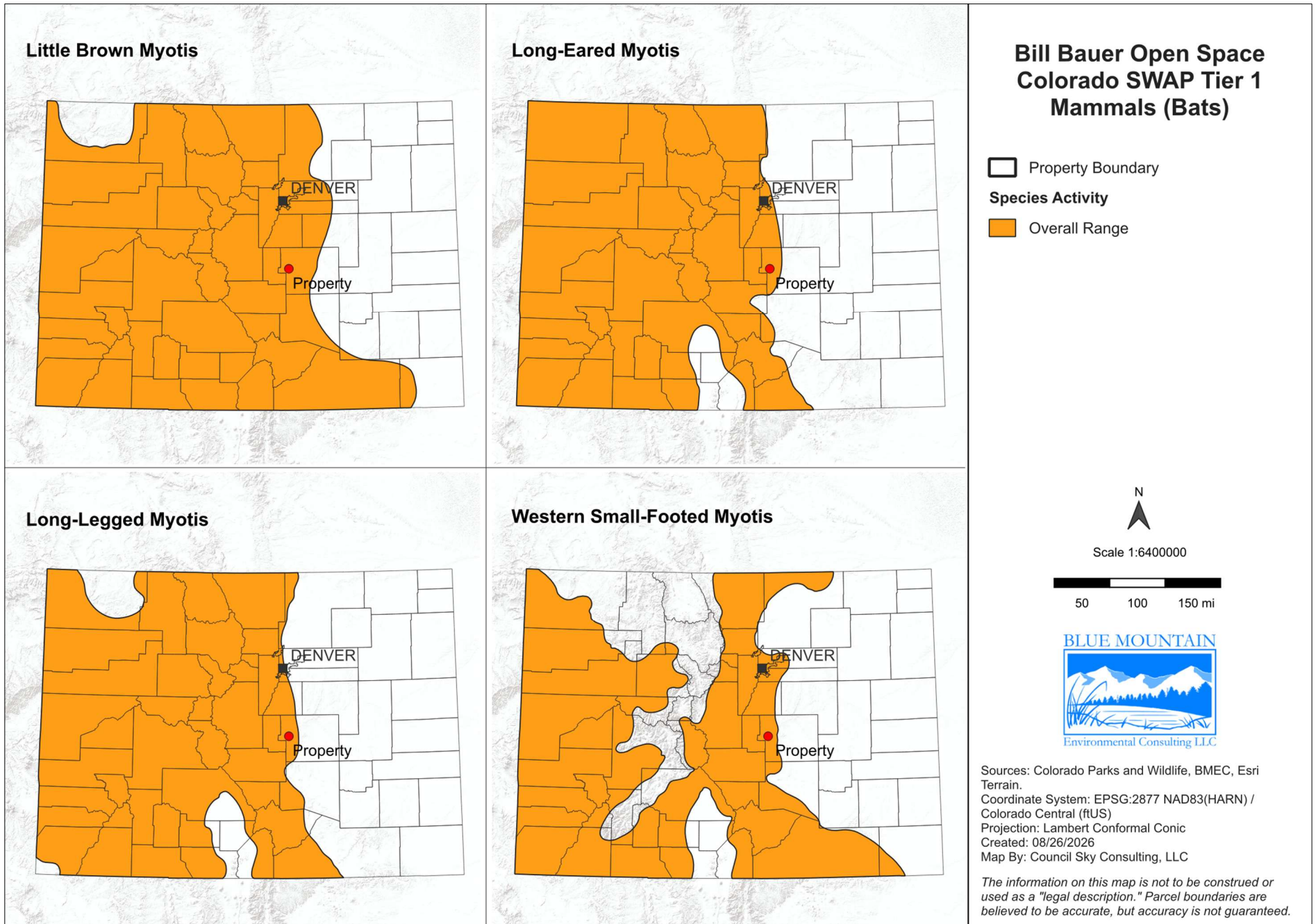
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/ Colorado Central (ftUS)
Projection: Lambert Conformal Conic
Created: 09/04/2026
Map By: Council Sky Consulting, LLC

The information on this map is not to be construed or used as a "legal description." Parcel boundaries are believed to be accurate, but accuracy is not guaranteed.

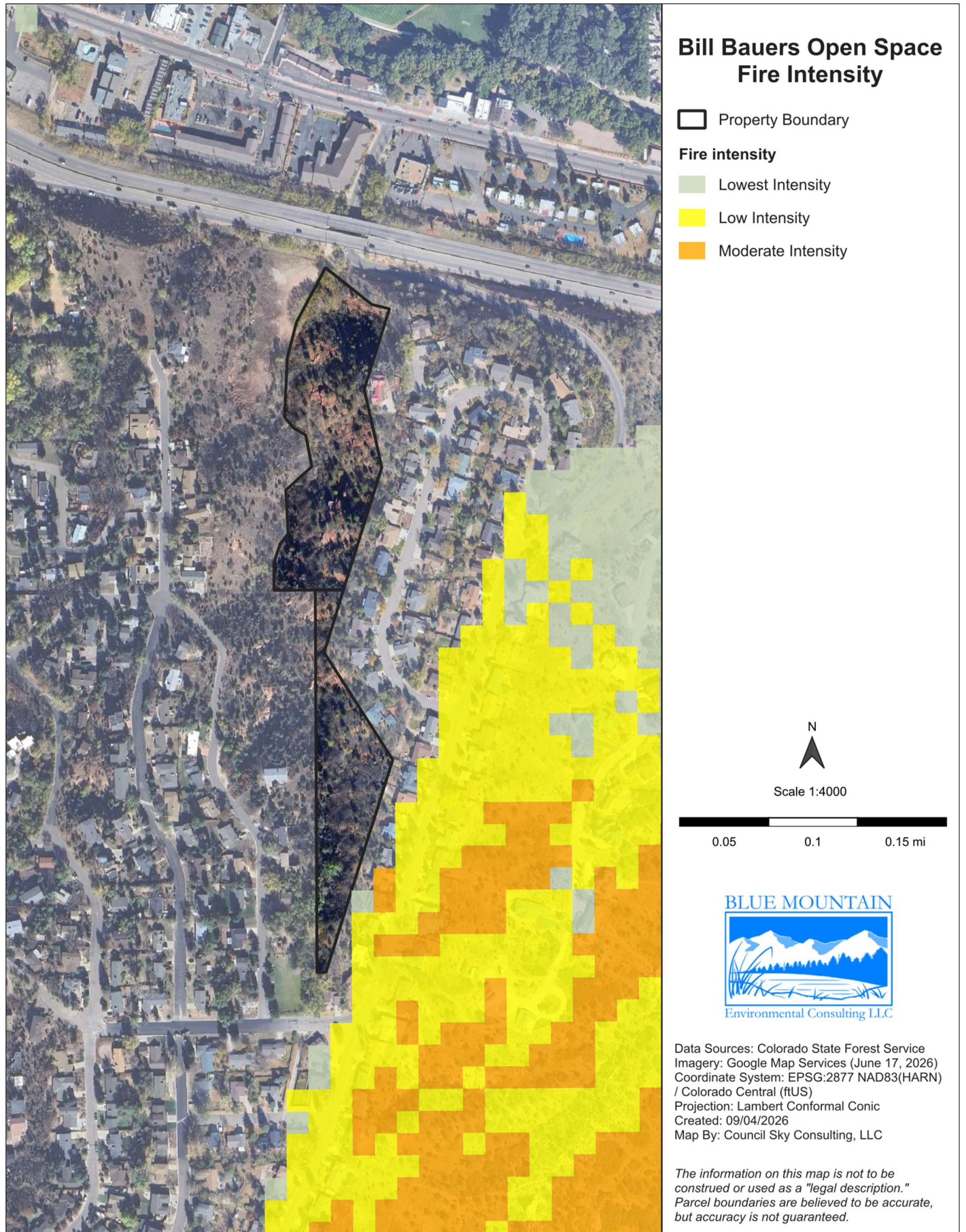
Sensitive Species Habitat Map (1 of 2)



Sensitive Species Habitat Map (2 of 2)



Fire Intensity Map



Burn Probability Map

Bill Bauers Open Space Burn Probability

 Property Boundary

Burn Probability

 Lowest

 Low

 Moderate



Scale 1:4000

0.05 0.1 0.15 mi

BLUE MOUNTAIN



Environmental Consulting LLC

Data Sources: Colorado State Forest Service
Imagery: Google Map Services (June 17, 2026)
Coordinate System: EPSG:2877 NAD83(HARN)
/ Colorado Central (ftUS)
Projection: Lambert Conformal Conic
Created: 09/04/2026
Map By: Council Sky Consulting, LLC

The information on this map is not to be construed or used as a "legal description." Parcel boundaries are believed to be accurate, but accuracy is not guaranteed.

Surface Fuels Map

Bill Bauers Open Space Surface Fuels

 Property Boundary

Surface Fuel Class

 NB1 - Urban or suburban development (24.5 acres)

 SH1 - Low shrub fuel load (19.8 acres)

 TU1 - Fuelbed is low load of grass and/or shrub with litter (1.4 acres)



Scale 1:3000



100 200 300 ft



Data Sources: BMEC, Manitou Springs (Property Boundary)

Imagery: Google Map Services (June 17, 2026)

Coordinate System: EPSG:2877 NAD83(HARN) / Colorado Central (ftUS)

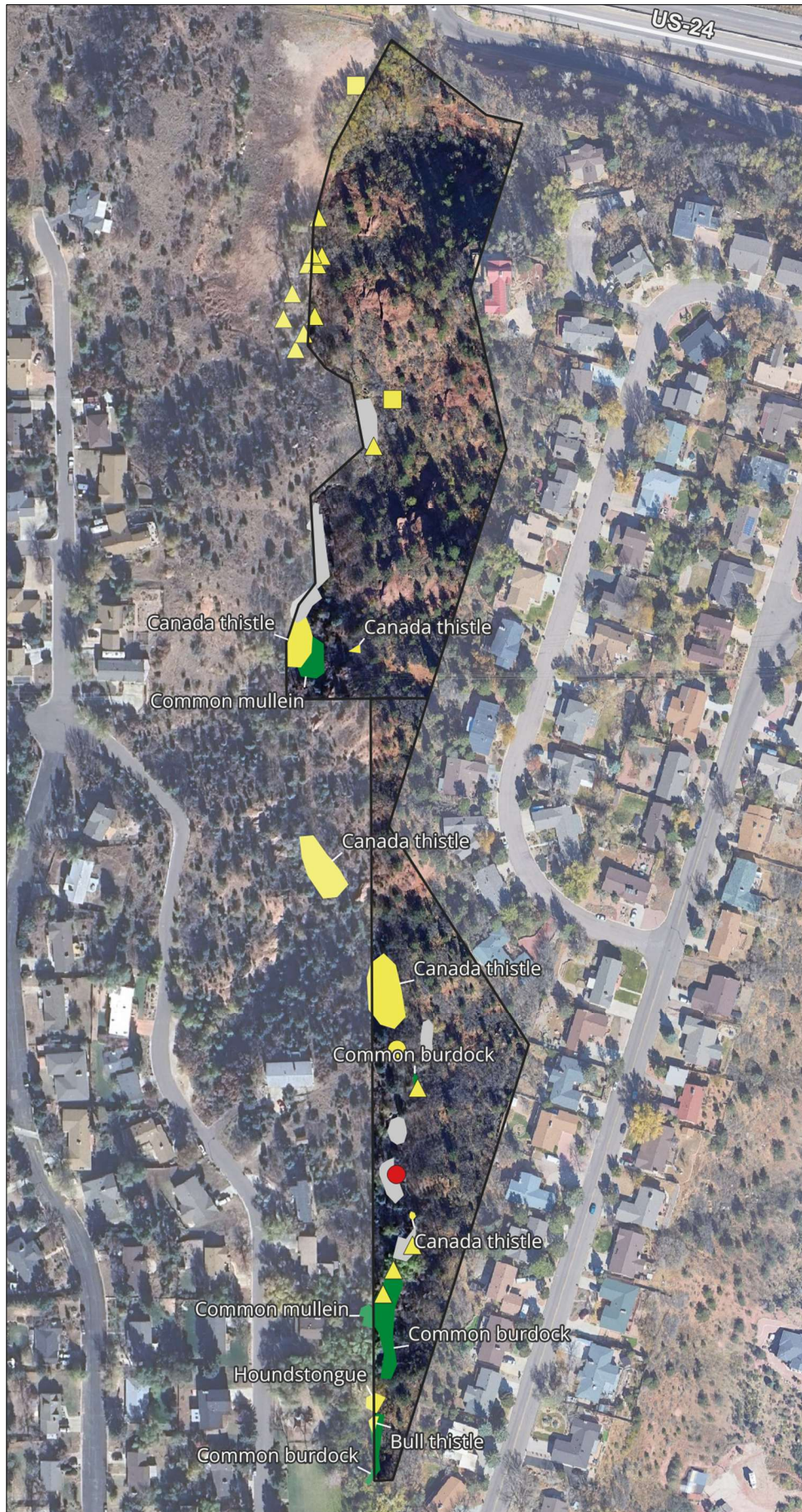
Projection: Lambert Conformal Conic

Created: 09/14/2026

Map By: Council Sky Consulting, LLC

The information on this map is not to be construed or used as a "legal description." Parcel boundaries are believed to be accurate, but accuracy is not guaranteed.

Weeds Map



Bill Bauer Open Space Weeds

Property Boundary

Noxious Weed Points

- Myrtle Spurge (List A)
- Dalmatian Toadflax (List B)
- Houndstongue (List B)
- Russian Olive (List B)

Noxious Weed Areas

- List B Species
- List C Species
- Mixed Weed Species



Scale 1:2400



Data Sources: BMEC, Manitou Springs (Property Boundary)

Imagery: Google Map Services (June 17, 2026)

Coordinate System: EPSG:2877 NAD83(HARN) / Colorado Central (ftUS)

Projection: Lambert Conformal Conic
Created: 08/25/2026

Map By: Council Sky Consulting, LLC

The information on this map is not to be construed or used as a "legal description." Parcel boundaries are believed to be accurate, but accuracy is not guaranteed.

APPENDIX B: SITE PHOTOGRAPHS

Map Number:	
1	
Photo Direction:	
North	
Looking north at the top of the drainage.	

Map Number:	
2	
Photo Direction:	
North	
Looking north at a rocky ephemeral channel.	

Map Number:	
2	
Photo Direction:	
South	
Looking south at a rocky ephemeral channel.	

Map Number:	
3	
Photo Direction:	
North	
Looking north.	

Map Number:	
3	
Photo Direction:	
East	
Looking east at Gambel oak habitat.	

Map Number:	
3	
Photo Direction:	
South	
Looking south at a green ash tree.	

Map Number:	
3	
Photo Direction:	
West	
Looking west.	

Map Number:	
4	
Photo Direction:	
North	
Looking north into Gambel oak habitat.	

Map Number:	
4	
Photo Direction:	
East	
Looking east. Note the rock outcrop in the top-center of the photo.	

Map Number:	
4	
Photo Direction:	
South	
Looking south. Note the power pole.	

Map Number:	
4	
Photo Direction:	
West	
Looking west at a rocky slope and pinyon juniper habitat.	

Map Number:	
5	
Photo Direction:	
Southeast	
Looking southeast. Note the fence for orientation.	

Map Number:	
5	
Photo Direction:	
South	
Looking south.	

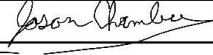
APPENDIX C: CULTURAL RESOURCE FORM

History Colorado- Office of Archaeology and Historic Preservation
COLORADO CULTURAL RESOURCE SURVEY
LIMITED-RESULTS CULTURAL RESOURCE SURVEY FORM
(Page 1 of 3)

OAHP 1420
Revised 9/98

This form (#1420) is for small scale limited results projects - block surveys less than 160 acres with linear surveys under four miles. Additionally, there should be no sites and a maximum of four Isolated Finds. This form must be typed.

I. IDENTIFICATION

1. Report Title (include County): A Cultural Resource Survey of the Bill Bauers Open Space, City of Manitou Springs, El Paso County, Colorado
2. Date of Field Work: August 10, 2026
3. Form completed by: J. Chambers Date: 8/22/2026
4. Survey Organization/Agency: Archatype Solutions, LLC
Principal Investigator: Jason Chambers, MA, RPA, MNRS, GISP
Principal Investigator's Signature: 
Other Crew: M. Tobler, S. Webber
Address: 3738 Logan Dr., Loveland, CO 80538
5. Lead Agency / Land Owner: City of Manitou Springs, Colorado
Contact: Gillian Rossi - Parks & Recreation Director, City of Manitou Springs
Address: 606 Manitou Springs, CO 80829
6. Client: City of Manitou Springs, CO
7. Permit Type and Number: _____
8. Report / Contract Number: _____
9. Comments: Archatype Solutions, LLC Survey & Test Excavation Permit #87103

II. DESCRIPTION OF UNDERTAKING / PROJECT

10. Type of Undertaking: Pedestrian trail construction
11. Size of Undertaking (acres): ~8 Size of Project (if different) 0.39 linear miles
12. Nature of the Anticipated Disturbance: Trail work - minimal ground disturbance
13. Comments: Existing social trail formalized, stabilized, widened

(Page 2 of 3)

Please attach a photocopy of USGS Quad. clearly showing the project location. The Quad. should be clearly labeled with the Prime Meridian, Township, Range, Section(s), Quad. map name, size, and date. Please do not reduce or enlarge the photocopy.

15. Legal Location: Quad. Map: Manitou Springs, CO Date(s): 1994 (rev.2001)

NOTE: Only generalized subdivision ("quarter quarters") within each section is needed

Township:____ Range:____ Sec.:____ 1/4s _____;

16. Total number of acres surveyed: 8

IV. ENVIRONMENT

Current Land Use: Open space

19. Flora: Montane riparian and sagebrush steppe uplands

21. Ground Visibility: Locally variable, 0-90%

22. Comments: North-facing arroyo consists of heavily-forested riparian drainage w/ visibility 0-10%, and steeply-sloped and scarcely-vegetated upland margins w/ visibility 40-90%.

23. Location of File Search: OAHP/History Colorado (S-1954) Date: 7/27/2026

No previous cultural resource surveys were conducted within the project area.

In the general region: _____

Twelve previous cultural resource surveys were conducted within 1/2 mile of project area, documenting seventy-one (71) previously reported cultural resources within 1/2 mile of the project area; these resources include mostly historic-period archaeological resources, a single Paleontological resource (SEP.5881), and the Keithley Pines Historic Cabins historic district (SEP.334).

Limited-Results Archaeological Survey Form (Page 3 of 3)

III. LITERATURE REVIEW (continued)

25. Known Cultural Resources - In the project area: _____
No previously reported cultural resources are known within the project area.

In the general region (summarize): _____

Twelve previous cultural resource surveys documented seventy-one (71) previously reported cultural resources; including mostly historic-period buildings, bridges, and structures in downtown Manitou Springs, a single Paleontological resource (5EP.5881), and multiple contributing resource components of the Keithly Log Cabin Development District (Keithley Pines Historic Cabins) historic district (5EP.334).

26. Expected Results: Historic-period artifacts associated with rapid development of the
Front Range urban corridor.

VI. STATEMENT OF OBJECTIVES

27. To identify impacts to cultural resources as part of an environmental assessment for
the Bill Bauer Open Space property(ies) in advance of proposed trail development.

VII. FIELD METHODS

28. Definitions: Site Locations preserving evidence of prior human occupation patterns that can provide information
relevant to context or themes identified in the Arkansas River Valley (Zier & Kalasz 1999)

IF Limited information beyond mere presence; frequently transportable artifacts representing a single activity.

29. Describe Survey Method: Pedestrian survey with 15m transects, including visual inspection of exposed
soil profiles and/or erosional exposures. No collection of artifacts permitted.

VIII. RESULTS

30. List IFs if applicable. Indicate IF locations on the map completed for Part III.

A. Smithsonian Number:	<u>N/A</u>	Description:	<u>N/A</u>
B. Smithsonian Number:	_____	Description:	_____
C. Smithsonian Number:	_____	Description:	_____
D. Smithsonian Number:	_____	Description:	_____

31. Using your professional knowledge of the region, why are there none or very limited cultural remains in the project area? Is there subsurface potential?

The project area is a dynamic, highly-erosive arroyo environment; modern trash was observed at-surface as well as buried in sediments several inches deep. Low ground surface visibility due to heavy vegetation at time of survey (August) made identification of prehistoric artifacts and/or features unlikely; the unstable, erosive environment and loose, friable sediments make intact (pre)historic cultural remains unlikely. Subsurface potential is limited, and intact buried cultural deposits unlikely.

APPENDIX D: NOXIOUS WEEDS

Myrtle Spurge



Euphorbia myrsinites is a perennial forb which can grow to 4 to 6 inches in height and spread up to 18 inches. Myrtle spurge has yellow green flower like bracts that appear in the early spring and trailing stems of fleshy blue-green alternate leaves. This plant contains a milky white latex in its stems that can irritate the skin; it reproduces solely by seed. Livestock and wildlife generally avoid myrtle spurge and large infestations diminish rangeland value. Myrtle spurge is not a particularly aggressive invader and is not typically found in agricultural areas because it does

not tolerate frequent cultivation. This plant prefers dry to moist, well drained soils and will tolerate partial shade to full sunlight. Myrtle spurge is native to Eurasia and is common throughout Colorado particularly near residential areas where it has escaped cultivation as an ornamental species. Because this species is not yet widespread in Colorado, it should be a priority for immediate eradication where found.¹

Biological control: None

Mechanical control: Small populations can be dug or hand pulled depending on the size of the infestation.¹

Cultural control: Prevent the establishment of new populations by minimizing disturbance and maintaining a healthy community of native perennials.¹

Chemical control: Several chemicals can be used to control myrtle spurge dependent on timing of application. For spring seedling to flowering, 2,4D (Hardball, various) or 2,4D + Dicamba (various); for mature plants in the fall, Glyphosate.²

Integrated management: Myrtle spurge can be controlled by eliminating seed sources and a combination of mechanical and cultural practices. Hand pulling may be cost effective for small populations.

¹ Colorado Natural Areas Program (CNAP). 2000. *Creating an Integrated Weed Management Plan: A Handbook for Owners and Managers of Lands with Natural Values*. Colorado Natural Areas Program, Colorado State Parks, Colorado Department of Natural Resources; and Division of Plant Industry, Colorado Department of Agriculture. Denver, Colorado. 349 pages.

² Jefferson County. (2025). *Myrtle spurge*. Invasive Species Management.

<https://www.jeffco.us/DocumentCenter/View/1626/Information-Sheet-on-Myrtle-Spurge-PDF?bidId=>

Canada Thistle



Cirsium arvense is an exotic perennial forb that can spread by seed but is more of a problem due to its ability to spread rapidly from vigorous rhizomes that can extend 15 feet from the parent plant and 6-15 feet deep.³ It is an erect plant that can grow up to 5 feet tall. Flowers are small, ranging from white to deep purple. Leaves are usually deeply incised with spiny margins. Infestations often begin on disturbed sites such as ditches, overgrazed pastures, or waste areas.³ Canada thistle is a problem weed in riparian areas, but is also found in upland sites. Seeds are able to germinate within 8 to 10 days of pollination. Canada thistle begins growth as a rosette from mid-April to May. It flowers in June, but produces seed sparingly, relying on its extensive root system for spread. Seeds can remain viable in the soil for up to 22 years.³ The key to managing this thistle is to stress the plant, forcing it to use its

stored root nutrients.

Biological control: The weevil *Ceutorhynchus litura* is currently being used in Colorado as a biocontrol agent, and another biocontrol insect, *Urophora cardui*, has also been used.³ Biological controls alone are not effective and must be used in conjunction with other strategies such as cultural and chemical practices.

Mechanical control: Mowing decreases plant vigor and seed set. However, mowing may not be viable given the plant's dispersal in riparian areas. Hand pulling is effective to control small populations but is not practical for large populations due to the deep and extensive network of underground rhizomes. When seed heads are encountered they should be clipped well below the apex, bagged, and disposed of in a dumpster. Mowing is effective only if conducted at one-month intervals over several growing seasons or used with chemical practices.³

Chemical control: Herbicides should be used only per label directions, and caution should be taken since the weed occurs near water where many chemicals can harm aquatic life. Herbicides should be applied by licensed commercial applicators. Picloram, aminopyralid, clopyralid, aminocyclopyrachlor + chlorsulfuron, dicamba, and chlorsulfuron are effective in pastures, natural areas, and non-crop settings.³ Re-treatment for 1-3 years is common.

Cultural control: Increase competition with native perennial grasses and alfalfa. Keep moisture at optimum levels to favor grass or alfalfa growth.³

Integrated management: Control efforts should target plants in high-quality areas first. Management strategies should be adjusted to reflect weather conditions. For example, drought stress reduces the effectiveness of most herbicides but increases the effectiveness of mechanical controls. It takes at least two years of control to determine if a method is effective.

³ Beck KG. (2013). *Canada Thistle*. Colorado State University Extension [Internet]. <https://extension.colostate.edu/topic-areas/natural-resources/canada-thistle-3-108/>

Dalmatian Toadflax



Linaria dalmatica is an exotic perennial forb that easily invades natural ecosystems, thereby displacing native vegetation. It has yellow flowers with an orange lip. The leaves are heart-shaped and clasp the stem. Dalmatian toadflax germinates from mid-March to May, and flowers from May to June and given sufficient moisture, can continue flowering into the fall. By initiating early top growth from underground roots (which can reach a depth of 6 feet or more), it effectively competes with native plants for light, soil moisture, and other nutrients. It spreads efficiently from seed as well as from root buds that can travel underground up to 10 feet. In wet years, these plants reproduce abundantly from seed. However, since seedling root development is slow, this represents a life stage vulnerable to control. All toadflax species are difficult to control; it is recommended to integrate as many management strategies as possible.⁴

Biological control: Several biocontrol agents have been used to control toadflax but the success of these agents has not been sufficient. A defoliating moth (*Calophasia lunula*), an ovary-feeding beetle (*Brachypterolus pulicarius*) and two seed capsule-feeding weevils (*Gymnaetron antirrhini* and *G. netum*) have been used in the U.S. and Canada. These flower- and seed-feeding beetles should help decrease seed production. *Mecinus janthinus*, a stem-boring weevil, and a root-boring moth, *Eteobalea intermediella*, were also released in Canada and the U.S. to control all species of toadflax. These species help to control shoots and seed production as well as decrease root vigor, but research is lacking.⁴

Mechanical control: Disturbance promotes the invasion of toadflax and it may be necessary for plant establishment. Mowing combined with spraying was not found to be effective.⁴

Chemical control: Tordon 22K at 2 pints/acre sprayed at the time of flowering or in the fall has proven successful in Colorado. Spraying as well as planting native perennial grasses is more effective than spraying alone.⁴

Cultural control: There is very little research supporting cultural controls being effective against this weed in Colorado.

Integrated management: Successful management requires integrating as many control tactics as possible. Control can be obtained by pulling or killing the plants with herbicide before seed production begins. This process must be repeated every year for at least 10 years to completely remove a stand. Competitive perennial grasses and forbs should be planted to utilize water and nutrients that would otherwise be readily available to toadflax.

⁴ Beck KG. (2014). *Biology and Management of the Toadflaxes*. Colorado State University Extension [Internet]. [cited 2021 Oct 22]. <https://extension.colostate.edu/topic-areas/natural-resources/biology-and-management-of-the-toadflaxes-3-114>

Houndstongue



Cynoglossum officinale is a biennial that grows 1 to 4 feet tall and reproduces solely by seed. Leaves are alternate, 1 to 12 inches long, 1 to 3 inches wide, pointed at the tip and covered with soft white hairs. The fruit is composed of 4 prickly nutlets each about 1/3-inch-long that readily stick to anything close. Houndstongue forms a rosette the first year and a flowerstalk the second year. A single plant can produce up to 2,000 seeds that can remain viable for 2 to 3 years (DiTomaso et al. 2013).⁵ The flowers are reddish-purple, 5-petaled, and slightly drooping. This plant is an early successional species typically found in pastures, along roadsides, and in disturbed areas. Houndstongue contains pyrrolizidine alkaloids which are liver toxins in all livestock.⁵

Biological control: Canada has released biological controls, a root weevil and a root flea beetle, but the United States has not approved them yet for release. The U.S. is researching several other insects as a control, but none are as effective as the root weevil. Powdery mildew (*Golovinomyces cynoglossi*) has some effect but has an effect on other plants as well.⁵

Mechanical control: Digging, pulling and cutting can be effective if the root crown is severed. In fall or early spring, cut young rosettes below the crown. Clipping or mowing second-year plants close to the ground can be effective to reduce seed production. It's recommended to repeat mechanical control methods frequently to have successful management.⁵

Cultural control: Minimize disturbance and maintain healthy native communities. Houndstongue requires areas with more than 10% bare ground for establishment. Plant native perennial grasses and forbs. It is not recommended for grazing due to the toxicity of the plant.

Chemical control: There are several chemical controls that have an effect on houndstongue such as 2, 4-D, aminocyclopyrachlor + chlorsulfuron (Perspective), aminopyralid + metsulfuron (Opensight), glyphosate (Roundup, Accord XRT II, and others), Chlorsulfuron (Telar), Imazapic (Plateau), Imazapyr (Arsenal, Habitat, Stalker, Chopper, Polaris), and Metsulfuron (Escort).⁵

Integrated management: Maintain a community of native perennials, treat first year plants with herbicides and mow bolted plants before seed set where possible.

⁵ DiTomaso, J. M., G. B. Kyser et al. (2013). *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.

Russian Olive



Elaeagnus angustifolia is a fast-growing tree, normally reaching heights of 10 to 25 feet. Trunks and branches are armed with 1-to 2-inch woody thorns. Leaves are narrow, 2 to 3 inches long and covered with minute scales which give the foliage a distinctive silvery appearance. Scales are usually more abundant on the underside of the leaf. Flowers are yellow and arranged in clusters. Fruits are shaped like small olives, are silvery when immature or brown at maturity. Russian olive was imported from Europe and is common as a landscape plant. Once Russian olive is allowed to become established in unwanted areas, it is difficult to control and almost impossible to eradicate because of its habit of forming root shoots and suckers. Efforts at control have included mowing of seedlings and sprouts, cutting or girdling of stems, burning and herbicide application.

Biological control: None

Mechanical control: Girdle at stump height during the growing season with two concentric chainsaw cuts that are approximately 1 inch deep. The cuts should be separated by approximately two inches. Allow the tree to slowly starve while still standing. This process should take 3 to 4 weeks; all leaves should turn brown before the tree is cut to the ground and removed. Once the tree is removed treat the stump with the chemicals listed below. Treat any new shoots or sprouts with the chemicals listed below. Remove sprouts once they have died. Repeat process as necessary.

Chemical control: Multiple chemical controls are available and use is dependent on timing and growth form.⁶

Cultural control: Prevent planting as an ornamental.

⁶ Jefferson County. (2025). *Russian olive*. Invasive Species Management.
<https://www.jeffco.us/DocumentCenter/View/1403/Information-Sheet-on-Russian-Olive-PDF?bidId=>

Cheatgrass



Bromus tectorum is an exotic winter annual grass that is one of the most widely distributed weeds in the western U.S. Cheatgrass has been shown to significantly alter the fire regime of ecosystems.⁷ It is an erect-stemmed, annual grass that grows 8-25 inches tall. The flowering part of the grass is generally nodding with slender, straight awns. It germinates in the fall or early spring and sets seed from May to June. Cheatgrass flourishes in moderately to highly disturbed upland sites such as roadways, overgrazed areas, and waste sites. It initiates early spring growth and aggressively uses deep soil resources. Seeds are dispersed by animals and people who transport seeds in fur, socks, boots, muddy tires, etc. Because seeds remain viable for up to five years, control measures that reduce seed are most effective.

Biological control: Intense grazing can reduce seed production by 90%. Cattle find cheatgrass highly palatable in early spring before seed set occurs. Once seed set occurs, plants drop in palatability and quality. Where infestations are large and dense, prescribed spring grazing repeated for 3 to 5 years by livestock can be effective and indeed may be the only option in areas where it is difficult or impractical to implement other prescriptions.⁸

Mechanical control: Mechanical control efforts are not recommended unless they are followed by an aggressive revegetation and chemical control program. When mechanical control is used, it should be done in early spring before seed heads are fully developed (early to mid-May) and repeated for at least 5 years. For small infestations, hand-pull weeds. For larger infestations, mow before seed set, repeating every 2 to 3 weeks until flowering is complete.⁹

Chemical control: Chemical controls are dependent on timing and stage of growth.¹⁰

Cultural control: Due to the broad distribution of this plant, tilling and seeding operations are not practical. Prescribed burns in areas with mixed shrub and grasses during late spring to early summer have been used with some success, but burning is most effective when used in combination with chemical methods and rigorous reseeding of native perennials (USFS 2014).

Integrated management: Lasting control of cheatgrass requires a combination of chemical and mechanical control, reseeding with native perennials and proper livestock management where land is grazed. This method keeps plants under stress, reducing their ability to spread.

⁷ D'Antonio, C.M., P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. *Annual Review of Ecology and Systematics* 23:63-87.

⁸ Shoderbek D. (2015). *How to beat the 'cheat.'* Livestock & Range Colorado State University Extension. <https://rangemanagement.extension.colostate.edu/land-and-livestock/invasive-plants/how-to-beat-the-cheat/>

⁹ United States Forest Service (USFS). (2014). *Field Guide for Managing Cheatgrass in the Southwest*. 1-12.

¹⁰ Jefferson County. (2025). *Cheatgrass*. Invasive Species Management. <https://www.jeffco.us/DocumentCenter/View/1229/Information-Sheet-on-Cheatgrass-PDF?bidId=>

Common Burdock



Arctium minus is a biennial forb commonly found in riparian areas that have moist, fertile soils with high nitrogen content. The hooked spines of the flower head give rise to the idea of Velcro; the prickly burs readily stick to clothing or animals. Germination primarily occurs in early spring; flowering and seed production occur from July to September. Seeds are mature by September and are shed continuously throughout autumn, winter and spring. Plants are highly branched and may grow up to seven feet in height or more. Leaves of the rosette stage are large, simple and usually heart-shaped. Due to its biennial nature, burdock is confined to areas that are not severely disturbed on an annual basis.

Biological control: None.

Mechanical control: Tilling can kill the plants in the first-year rosette stage. Mowing or cutting will eliminate seed production.

Mow after bolting and before flowering.

Chemical control: Burdock can be controlled with 2,4-D, picloram or dicamba. Herbicides are most effective when applied to first-year rosettes.

Cultural control: Minimize disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

Integrated management: Management must include the elimination of seed production and the depletion of the seed bank. Combine herbicide or tillage treatment of rosettes with removal of seed heads from any plants that have bolted. Prevent dispersal of burs.

Common Mullein



Verbascum thapsus is a biennial forb that can easily be identified by its yellow flowers grouped in a "corn cob" shaped flowering raceme. The leaves are light green and densely woolly. Mature plants have a single, erect stem that can grow 6 to 8 feet in height. Seeds germinate in the early spring, forming a rosette that continues to grow into late autumn and over winter. A tall stem topped with the flowering raceme is produced the following spring. Common mullein can be hard to control due its prolific seed production. The seeds can germinate after lying dormant for several decades. Mullein is easily outcompeted in areas with a densely vegetated ground cover but readily grows in disturbed sites, such as areas that have high human activity or an abundance of bare ground. Mullein prefers dry coarse-textured soils, and is common throughout Colorado in pastures, meadows, waste areas, and along river bottoms.

Biological control: The European curculionid (*Gymnetron tetrum*) feeds on the seeds and has some success in reducing seed production,¹¹ though there is little recent research on the subject.

Mechanical control: Mullein plants have shallow tap roots and are easily hand-pulled. They should be pulled as soon as they are large enough to grasp but before they produce seeds. Mullein stems can be cut or mowed to prevent flower and seed production, but stems must be cut below the root crown or rosettes will re-bolt.¹ We recommend planting native perennials after mechanical control because mullein favors bare soil.

Chemical control: Chemical control depends on timing of application.¹²

Cultural control: Minimize disturbance and seed dispersal, eliminate seed production and maintain healthy native communities. Mullein is often an early invader of burned areas.

Integrated management: Management efforts must include the elimination of seed production and the depletion of the seed bank. Combine herbicide or mechanical removal of rosettes with removal of seed heads from any plants that have bolted as well as reseeding bare areas with native perennials.

¹¹ Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds: *Verbascum thapsus* and *V. blatteria*. *Can. J. Plant Science* 58:401-413.

¹² Jefferson County. (2025). *Common mullein*. Invasive Species Management. <https://www.jeffco.us/DocumentCenter/View/1246/Information-Sheet-on-Common-Mullein-PDF?bidId=>

Yellow Toadflax



Linaria vulgaris is a perennial forb, 1 to 2 feet tall. It emerges in spring, around mid-April, depending on temperature; a few seedlings may emerge in the fall. It can be identified by its 1-inch-long yellow flowers with bearded, orange throats that give it its common name of butter and eggs. Yellow toadflax has pale green, narrow leaves that are pointed at both ends. A similar species, dalmatian toadflax, has leaves that are shorter, wider and have a broader base. Yellow toadflax was introduced to the United States from Eurasia as an ornamental in the mid-1800s. It establishes quickly in open sites, forming colonies through creeping root systems. The extensive roots systems make control of the plant difficult.

Biological control: One species, *Calophasis lunula*, may be available for biological control of yellow toadflax. The larvae of *C. lunula* feed on the leaves and flowers, severely damaging the plant.

Mechanical control: Pulling toadflax by hand can be an effective method of control; however, it must be repeated as long as there are viable seeds in the soil (up to 10 years). Mowing yellow toadflax will not kill the plant but will reduce the current years' growth and seed dispersal. Burning is not recommended; the deep root systems protect the plant from fire.

Chemical control: Yellow toadflax is hard to control with herbicides. Due to the high genetic variability of toadflax, the effectiveness of herbicides is highly variable. Chemicals should be applied during flowering, when carbohydrate reserves in the root of plants are at their lowest.

Cultural control: Intensive cultivation techniques are recommended for control on agricultural land. Minimum-till cultivation practices have contributed to the resurgence of yellow toadflax populations by failing to damage the root system of plants.

Integrated management: Limit the vegetative spread of colonies (pull, cut or spray) and destroy seedlings that emerge from the soil every year. To discourage other infestations, maintain a cover of native perennial plants.