

# ECOLOGICAL RESTORATION PLAN

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Haymeadow Tract E Open Space Dedication  
Town of Eagle, Colorado



*prepared for:*

**ABRIKA PROPERTIES, LLC**

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## 1.0 INTRODUCTION

Abrika Properties, LLC is constructing a residential development on the 660-acre Haymeadow property in the Town of Eagle, located in Sections 2, 3, 4, 9, 10, and 11 of Township 5 South and Range 84 West in Eagle County, Colorado (Figures 1 & 2).

As Haymeadow is developed in phases, large tracts of open space will be dedicated to the Town of Eagle (Figure 3). As shown on the PUD Plan (Figure 3), a 32.733-acre parcel known as Tract E will be dedicated to the Town for a recreation/future school site when the Phase I development is constructed. Portions of the Tract E open space dedication and the location of a proposed trailhead were previously identified as being low quality, weed-dominated habitats in the Vegetation Assessment Report prepared by Heather Houston of Birch Ecology for Western Ecological Resource in July, 2006. Due to the poor conditions documented in the Vegetation Assessment, the March 25, 2014 Final Haymeadow PUD-ADA requires the developer to submit a plan to control the noxious and undesirable weeds and reclaim these highly disturbed habitats.

Tract E will be dedicated to the Town as a part of the Phase I development; however the trailhead project area will be a part of a future open space dedication. The specific design and use of this trailhead area are not yet determined, and it contains an existing residence that may be re-purposed. Given that no earth disturbance is planned until future phases are developed, the weeds in the trailhead area will be treated in accordance with the Integrated Weed Management Plan, but no additional revegetation is planned at this time. It should be noted that the area around the home does have established native vegetation without the extensive areas of bare ground that are present on Tract E.

This report provides a detailed plan to eliminate stands of existing weedy vegetation, and re-establish a desirable native plant community in the weed-dominated portion of the Tract E Open Space Dedication. This report tiers to the Haymeadow Integrated Weed Management Plan for prepared by Birch Ecology in September 2018, which includes detailed specifications for controlling and eliminating noxious weeds and other undesirable species. A recommended schedule and outline of weed management activities is provided in this report, in addition to specifications for site preparation, seeding, mulching, and maintenance of the Tract E restoration area. Specific recommendations on weed management in the Trailhead project area are included in Section 8.0. Section 10.0 contains the Monitoring Plan; Section 11.0 defines the Success Criteria; and Section 12.0 discusses Ongoing Stewardship of the site.

Please note, all Figures are in Section 13.0; Tables are in Section 14.0; and Photos are in Section 15.0. Appendix A includes the State of Colorado's Noxious Weed List.

## 2.0 ENVIRONMENTAL SETTING

The 660-acre, irregularly shaped Haymeadow property is located in the Brush Creek Valley. The property is bounded by Brush Creek Road to the south, by undeveloped agricultural property and the Eagle Pool & Ice Rink to the west, by U.S. Bureau of Land Management (BLM) lands to the north, and by agricultural lands on the Adam's Rib property to the east. Elevations of the Haymeadow property range from a high of approximately 6,954 feet on the ridge in the

northeastern corner to a low of approximately 6,658 feet along Brush Creek Road at the southern boundary.

The Haymeadow property encompasses a broad, gently sloping valley bottom north of Brush Creek and portions of the steep, south-facing gypsum hills along the northern property boundary. Brush Creek is located just south of the project site across Brush Creek Road. Portions of the historic channel of Brush Creek are located on the Haymeadow property just north of the road, and are used to convey irrigation water.

The project site has an agricultural land use history. For more than 100 years, it has been flood irrigated and used for hay production and livestock grazing. Most of the native vegetation has been replaced by introduced agricultural grasses and forbs in hayfields dissected by an extensive network of irrigation laterals (Photo 1). The laterals are fed by four irrigation ditches, all diversions from Brush Creek. These include the Love and White Ditch, the Mathews Ditch, the Wilkinson Ditch, and the Hernage Ditch (Figure 2). Over time, changed irrigation practices, including the termination of irrigation in some areas, has resulted in the conversion of grassy hayfields to weed-dominated habitats with low vegetation cover (Photo 2). In addition, these areas have been disturbed by ground squirrels and elk grazing, which further reduced vegetation cover and contributed to topsoil erosion.

### **3.0 EXISTING CONDITION**

#### **3.1 Tract E Open Space Dedication**

Tract E, the 32.73-acre open space parcel in the western portion of the Haymeadow property, will be dedicated to the Town of Eagle for a recreation and future school site. As described above, changed irrigation practices in this area, coupled with wildlife disturbances, have resulted in an extremely disturbed, poorly vegetated habitat that supports large areas of state-listed noxious weeds and other non-native species (Photo 2). In particular, there are dense stands of the noxious weeds Russian knapweed (*Acroptilon repens*), musk thistle (*Carduus nutans ssp. macrolepis*) and plumeless thistle (*Carduus acanthoides*) (Photos 3 & 4). Large areas between these stands support little vegetation other than the noxious weed Russian thistle (*Salsola iberica*) (Photo 5). Other problematic weeds in this area include white top (*Cardaria draba*), tumble mustard (*Sisymbrium altissimum*), Canada thistle (*Cirsium arvense*), curly dock (*Rumex crispus*), flixweed (*Descurainia sophia*), and a small amount of burdock (*Arctium minus*) (Photo 6). Most of these plants are listed as noxious by the State of Colorado. A few grasses are sparsely represented, primarily the native Basin wildrye (*Elymus cinereus*) and the reclamation grass crested wheatgrass (*Agropyron cristatum*), a non-native. The irrigation laterals that cross this parcel are also dominated by non-native grasses, specifically reed canarygrass (*Phalaris arundinacea*) and smooth brome (*Bromus inermis*) (Photo 7). Along the toe of the slope between the hayfield and the gypsum hills to the north, the noxious weed cheatgrass (*Bromus tectorum*) is also present, but does not cover large areas (Photo 8). There are several native shrub species that occur primarily along the toe of the slope, including Parry's rabbitbrush (*Chrysothamnus parryi*), four-wing saltbush (*Atriplex canescens*), winterfat (*Krascheninnikovia lanata*), and basin big sagebrush (*Artemisia tridentata ssp. tridentata*) (Photos 9 & 10). Table 1 lists the vascular plant species observed in the disturbed, weed dominated areas of the Haymeadow project site in August 2018.

### 3.2 Trailhead Project Area

A second area of concern is located around an existing, unoccupied residence that will be a part of the future open space dedication to the Town of Eagle. As illustrated by the Site Plan (Figure 3), a trailhead and parking area are planned in this location. Weeds are common in the disturbed habitat around the house, as identified in the 2006 Vegetation Assessment. In the area just east of the house and driveway, the noxious weed purple mustard (*Chorispora tenella*) is common within a stand of Basin wildrye and rabbitbrush (Photo 10). Near the house, the gravel driveway supports a dense stand of kochia (*Kochia scoparia*) (Photo 11). Behind the house on the north side, there is a dense stand of flixweed (*Descurainia sophia*) (Photo 12). In moister soil near the Love & White Ditch, which is just south of the house, there are stands of Russian knapweed and white top. Both yellow and white sweet clover (*Melilotus officinalis*; *M. albus*) are sparsely represented along the side of the gravel driveway. Although they are not listed as noxious, these species are aggressive invaders of disturbed habitats that have the potential to become problematic at Haymeadow, and should be eradicated.

## 4.0 PRE-PROJECT WEED MANAGEMENT

As described above in Section 3.0, noxious weeds and other undesirable species are abundant in the Tract E open space parcel. As per the PUD requirements established by the Town of Eagle in 2014, the noxious and undesirable weeds will be controlled or eradicated using Integrated Weed Management techniques.

Integrated Weed Management differs from traditional weed management in that it uses an ecological approach to address the ultimate causes of weed infestation, and considers the biological and ecological characteristics of individual weeds to determine effective means of control. One important objective of Integrated Weed Management is to use a combination of techniques to reduce the need for chemical herbicides over the long-term. However, herbicides are still an important management tool and will be necessary for effective weed management at Haymeadow.

Table 2 is a summary of the State of Colorado List A, B, and C noxious weeds and other problematic introduced plants known to occur in the Tract E restoration area at Haymeadow. The Haymeadow Integrated Weed Management Plan provides a detailed discussion of the ecology of these species and provides recommendations for ongoing management throughout the Haymeadow project site. This Ecological Restoration Plan specifically focuses on the management activities needed to eliminate the existing weedy vegetation and weedy seed bank from the Tract E restoration area in preparation for the restoration seeding.

### 4.1 Weed Management Timeline

Table 3 presents a generalized timeline for treating the existing stands of noxious and undesirable weeds, and for depleting the soil seed bank on the Tract E open space dedication prior to the restoration seeding.

As summarized in the Table, the initial treatments can occur as early as September 2018. Most of the weeds in the Tract E open space are either annuals or biennials, which have already set seed. There is no value in treating these plants that are in seed. However, stands of Russian knapweed (*Acroptilon repens*), a perennial, and the first-year rosettes of the biennials musk thistle and plumeless thistle (*Carduus nutans* ssp. *macrolepis*; *C. acanthoides*) could be treated

with herbicide in the fall of 2018. Fall is a beneficial time to spray perennial weeds since more of the herbicide will be translocated to the belowground parts, increasing its effectiveness.

In the spring of 2019, weed management should begin in March or April, depending on spring weather conditions. It is likely that herbicide will be used for this initial treatment, because the soil will likely be too wet with spring moisture, and therefore unsuitable for tilling. The early spring treatments will be focused on eradicating species of mustards, including flixweed (*Descurainia sophia*), tumble mustard (*Sisymbrium altissimum*), whitetop (*Cardaria draba*), and purple mustard (*Chorispora tenella*). In addition, dense areas of cheatgrass can be sprayed at this time with a non-selective herbicide such as Roundup. Early spring is a good time to spray cheatgrass in this fashion, since the desirable native grasses are still dormant and will not be damaged by the non-selective herbicide. No pre-emergent herbicides will be used on the site, since they are not compatible with the restoration seeding.

After approximately three weeks, when the plants from the initial herbicide treatment have died, a first round of tilling can be completed to kill any seedlings, and also to induce seed germination from the soil seed bank. It is important that tilling be timed properly, to prevent seed formation of any weeds in the restoration area.

A few weeks after the first tilling, depending upon precipitation patterns, additional weed seed should germinate. The new green growth can then be sprayed again, or tilled again. This process should be completed several times during the summer to deplete the soil seed bank. The duration of the cycles will be dependent upon weather conditions. It is important that none of the weeds are permitted to set seed, and perennial weeds should not be permitted to recover between treatments to effectively deplete the belowground reserves.

By late August, a final herbicide treatment should be completed. Russian knapweed, sweet clover, and any thistles can be effectively treated with Milestone herbicide or another product specified by a Licensed Commercial Pesticide Applicator. After 2-3 weeks when the plants have died, the site can be tilled to prepare for seeding in mid- to late September.

## **5.0 SITE PREPARATION**

### **5.1 Seedbed Preparation**

A firm seedbed is essential for the successful establishment of plants. A firm seedbed is one that allows a person's foot to sink no deeper than one-half inch. This ensures close contact between the seed and soil particles and will help retain soil moisture near the surface. Final seedbed preparation should be completed by scarifying (raking or harrowing) the topsoil prior to seeding to create a firm seedbed. Scarifying should occur no more than 24 hours before seeding is to occur. Soils should not be worked when wet to avoid compaction.

### **5.2 Application of Soil Amendments**

Granular soil amendments including fertilizer and mycorrhizae should be evenly applied across the Tract E restoration area. A broadcast seeder or fertilizer spreader should be used to ensure an even application. The restoration area should then be raked or harrowed to thoroughly incorporate the amendments into the upper few inches of topsoil prior to seeding.

### **5.2.1 Fertilizer Specifications and Rate**

The project site is heavily used by elk and there are areas with significant amounts of elk manure on the soil surface. This manure will be tilled into the soil prior to seeding and will provide a source of fertilizer. For best results, the soil samples should be collected during the 2019 growing season and submitted for laboratory analysis to determine the nutrient content. Based on this analysis, a site-specific fertilizer recommendation will be provided. It is likely that triple superphosphate will be used, which is available in a granular form (0-45-0).

### **5.2.2 Mycorrhizae Specifications and Rate**

Mycorrhizae improve the ability of plants to extract nutrients and water from soil. MycoApply Endo granular mycorrhizae will be uniformly applied at a rate of 20 pounds per acre.

## **6.0 NATIVE SEEDING**

### **6.1 Seed Mix and Application Rates**

Seeding should be conducted as soon as practicable following completion of final seedbed preparation. Table 4 contains a native seed mix for the Tract E restoration area. This seed mix corresponds to a PLS seeding rate of approximately 105 seeds per square foot for drill seeding. A high seeding rate has been specified since elk are known to heavily use the Haymeadow project site, and they will likely graze in the restoration area. In addition, a higher seeding rate will help to more rapidly establish desirable vegetation to limit areas of bare ground and compete with weeds. The seed mix contains one native shrub, Basin big sagebrush (*Artemisia tridentata* var. *tridentata*), and ten species of native grasses. Forbs are being withheld from the initial seed mix due to the need for weed control, which will be highest in the first 1-2 growing seasons. In the future, when the necessity for weed control has been reduced, the restoration area should be overseeded with desirable native forbs to create a more diverse plant community with higher ecological value. A recommended species list for this overseeding is included in Table 5.

In addition, to the native grasses of Table 4, QuickGuard Triticale, a sterile cover crop, will be added to the seed mixture at a rate of six pounds per acre to improve vegetation cover during drought conditions that may limit germination of the native seed mix, and to compete with early-colonizing weeds.

### **6.2 Seed Sources**

Using a high-quality native mix will reduce the potential for additional weeds to be introduced to the site. The project ecologist should assist with identification of appropriate seed sources for the native seeding. The seed test information should be reviewed by the project ecologist for approval prior to ordering. Commercially purchased seed should contain no prohibited or restricted noxious weed seeds and no more than 0.5 percent by weight of other weed seeds. Seed may contain up to 0.5 percent of "other crop" seed by weight.

### **6.3 Seeding Method**

Seeding should be conducted no more than 24 hours following completion of final seedbed preparation. Both drill seeding and broadcast seeding methods can be used during the restoration; however drill seeding is the preferred method when equipment access is feasible. Drill seeding should be performed perpendicular to the slope; seed should be placed in direct

contact with the soil at an average depth of 0.5 inch, covered with soil, and firmed to eliminate air pockets around the seeds. For drill seeding applications, small seeds should be packaged separately to allow for separate application. Small seeds should be planted no deeper than 0.25 inch or should be broadcast. Where broadcast seeding is used, the rates listed in Table 4 should be doubled, to achieve a final seeding rate of 210 seeds per square foot. Please note, hydroseeding methods are not recommended.

## **6.4 Hydromulch**

Mulching will be used to maximize moisture retention, reduce wind and water erosion, and improve the chances for revegetation success. Within 24 hours following seeding, hydromulch should be applied to all seeded areas. EcoMatrix spray-on mulch blanket should be applied at a rate of 3,000 pounds per acre.

## **7.0 MAINTENANCE**

### **7.1 Weed Management**

Weed management will be critical for the success of this project, particularly during the first growing season. It will be important to anticipate project needs and schedule an early spring herbicide application well in advance, to ensure a contractor is available. The primary focus during the initial treatment will be the early season mustards known to occur in the area: flixweed, whitetop, tumble mustard, and purple mustard. By late spring to early summer, thistles, knapweed, burdock, Russian thistle, and sweet clover will be actively growing and should be treated before they are permitted to set seed. However it is important to note that chemical herbicide treatments should be delayed until grasses are at the "3 tiller stage," since young grass seedlings are susceptible to broadleaf herbicides. Whenever possible, spot-spraying methods should be used to minimize the amount of chemicals applied to the site. Detailed information on the long term-management of Tract E and the other open space parcels is contained in the Haymeadow Integrated Weed Management Plan (Birch Ecology, 2018).

### **7.2 Overseeding**

Elk damage, ground squirrels, and disturbances created by weed management activities could result in areas that lack the desired cover of native vegetation. It is anticipated that overseeding may be required in some areas, and is part of the planned restoration activities to ensure the desired cover is achieved.

## **8.0 TRAILHEAD PROJECT AREA**

As described above, Tract E will be dedicated to the Town as a part of the Phase I development; however the trailhead project area will be a part of a future open space dedication. The specific design and use of this trailhead area are not yet determined, and it contains an existing residence that may be re-purposed. Given that no earth disturbance is planned until future phases are developed, the weeds in the trailhead area will be treated in accordance with the Integrated Weed Management Plan, but no additional revegetation is planned at this time. It should be noted that the area around the home does have established native vegetation without the extensive areas of bare ground that are present on Tract E. Table 6 summarizes the recommended weed management actions for the Trailhead project area during the 2019

growing season, and additional guidance is provided by the Haymeadow Integrated Weed Management Plan.

## **9.0 NOTES ON CHEMICAL WEED CONTROL**

A Licensed Commercial Pesticide Applicator should provide specifications for the tank mixes and rates to be used during chemical weed control at Haymeadow. The comments regarding herbicides provided in this document are based on personal observations or recommendations included in the sources cited in Section 15.0.

Herbicides with residual soil activity should be used sparingly, and pre-emergents should not be used since they will interfere with the restoration seeding. Pre-emergent herbicides that kill germinating seedlings can persist in the soil and may conflict with restoration activities by killing the desirable native seed. Therefore the use of pre-emergent herbicides at Haymeadow is not recommended unless they become necessary to control species such as cheatgrass, once the restoration seeding is well-established following several growing seasons.

As the restoration matures, weed abundance will decline and the need for chemical herbicides will also decline. With proper management, mechanical and cultural controls can be the primary weed control methods, as discussed in the Haymeadow Integrated Weed Management Plan (Birch Ecology, 2018).

## **10.0 MONITORING**

### **10.1 Monitoring Plan**

At the end of the 2019 growing season, an As-Built Assessment letter will be submitted to the Town to document the restoration and weed management activities completed on Tract E. At the end of the 2020 and 2021 growing seasons, annual reviews would be conducted and a brief monitoring letters would be provided to document the ongoing maintenance and enhancement activities, discuss the condition of the restoration area, evaluate the progress toward achieving the Success Criteria, and provide recommendations. We are proposing a qualitative monitoring program with visual estimates of plant cover and weed abundance, rather than collecting detailed vegetation cover data along quantitative vegetation monitoring transects.

### **10.2 Monitoring Review**

Monitoring reports shall be peer reviewed by a third party approved by the Town or reviewed and approved by the Open Space Manager. All costs associated with the third-party peer review shall be paid by the Developer. Prior to the acceptance of dedicated land on behalf of the town, the land shall be inspected per the success criteria provided herein. If the success criteria do not pass final inspection, a punch list will be provided so that the Developer will meet the respective criteria.

## **11.0 SUCCESS CRITERIA**

The following Success Criteria are performance standards designed to measure the initial progress of the restoration site during the first two growing seasons, 2020 and 2021. The criteria

are designed to measure a standard that would be reasonably achievable during the first two years of a non-irrigated dryland restoration site in Eagle, Colorado.

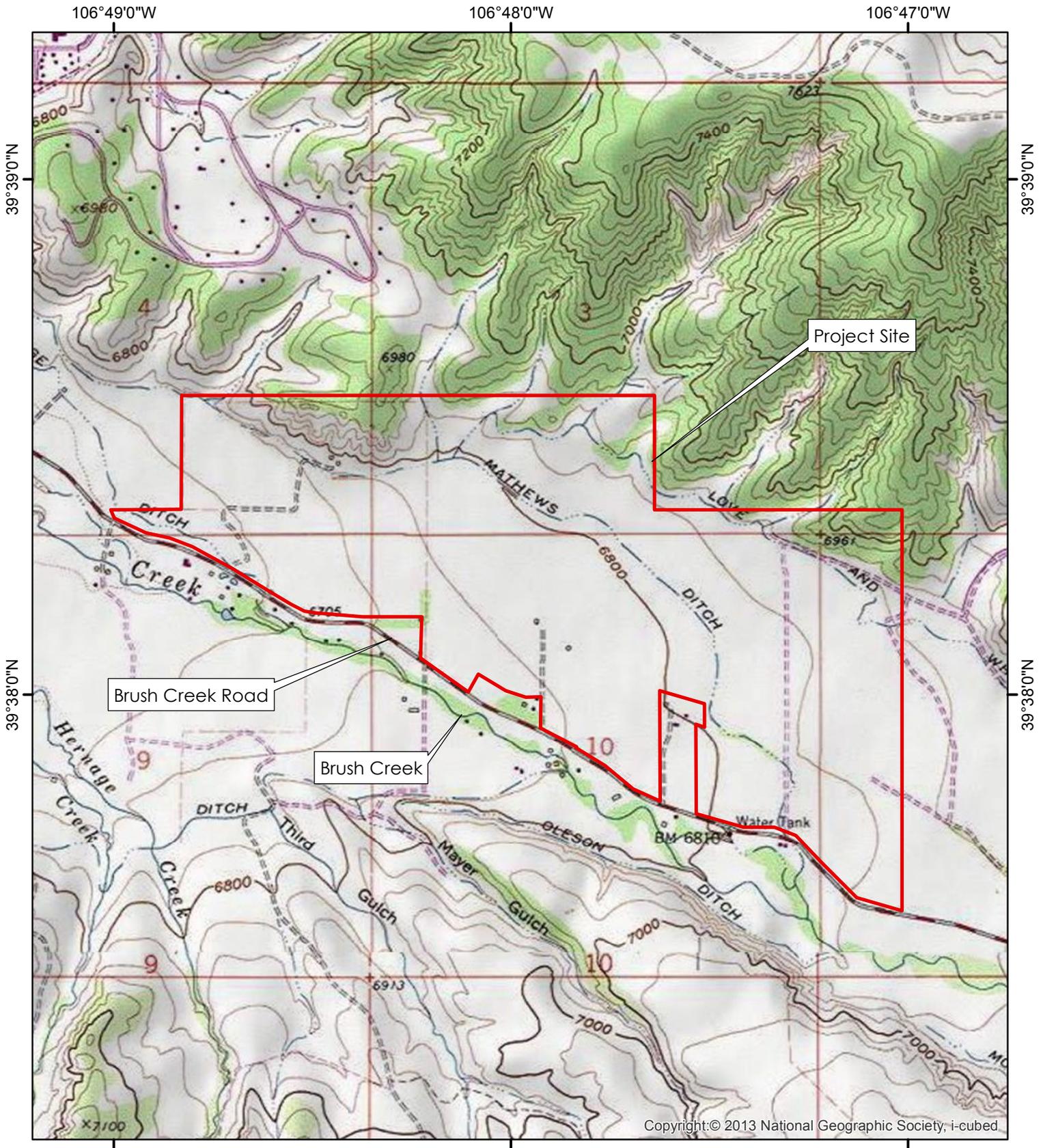
**The Tract E restoration will be considered successful when the following criteria are achieved:**

- 1) There are no State of Colorado List A Noxious Weeds present in the restoration area.
- 2) There are no areas greater than 100 square feet which are dominated by State of Colorado List B and List C Noxious Weeds. Quackgrass (*Elytrigia repens*) will be excluded from this requirement, since it is abundant in the wetlands and irrigated areas of Haymeadow as well as the surrounding properties, and cannot be effectively eradicated. However due to the dry conditions on Tract E, quackgrass is not expected to become established in the restoration area.
- 3) The absolute cover of noxious weeds in the restoration area is less than 10%.
- 4) The seed mix has germinated across the site, producing an even, initial grass cover. There are no bare areas larger than 25 square feet which have not been overseeded by the end of the 2020 growing season.
- 5) There is no detrimental erosion within the restoration area. Any unstable or actively eroding areas have been stabilized with fabric, hydromulch, or other appropriate measures.
- 6) There are no areas greater than 100 square feet which are dominated by kochia (*Kochia scoparia*) or Russian thistle (*Salsola iberica*). These problematic weeds are no longer on the State of Colorado's Noxious Weed List but will be managed as such.

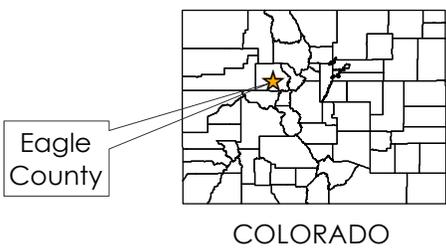
## **12.0 ONGOING STEWARDSHIP**

After the 2021 growing season, Aбрика Properties will manage the weeds in accordance with these Success Criteria until the Town of Eagle and/or School District take over maintenance as per the Annexation and Development Agreement.

**13.0 FIGURES**



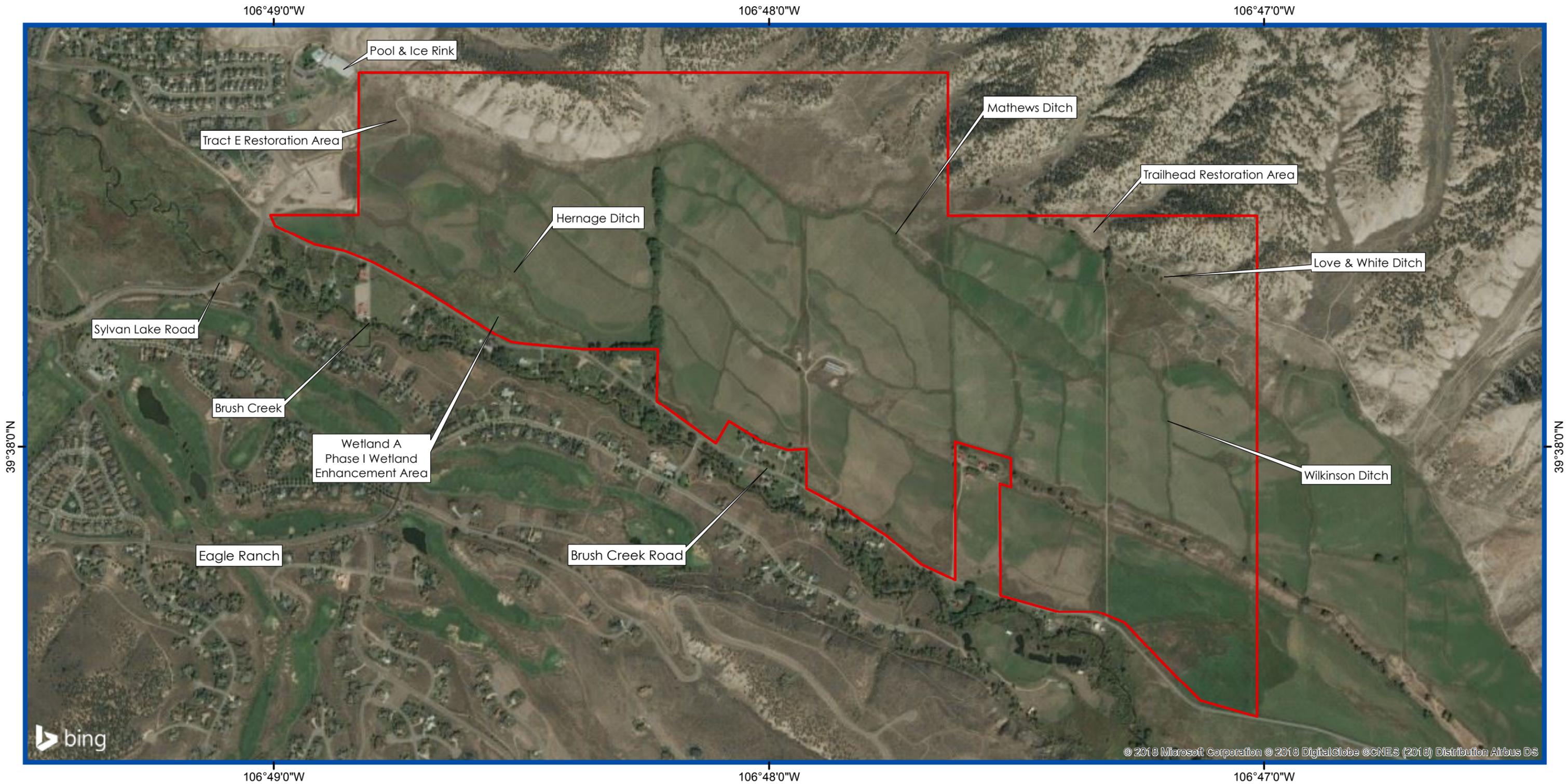
BASE: USGS 7.5' Eagle Quadrangle, Colorado



**Figure 1. Project Location Map Haymeadow**



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**LEGEND**  
 Haymeadow Property

**Figure 2. Aerial Photograph  
 Haymeadow  
 Eagle County, CO**

N  
  
 1:14,000  
 Date: September 2018

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**LAND USE SUMMARY**

Parcel	Acreage	MF Units	SF/Duplex	Total
A1	41.7	146 (64%)	82 (36%)	228
A2	46.4	86 (45%)	103 (55%)	189
B	61.0	48 (23%)	161 (77%)	209
C	47.1	64 (40%)	97 (60%)	161
D	58.6	0 (0%)	50 (100%)	50
<b>Subtotal:</b>	<b>254.8</b>	<b>344 (41%)</b>	<b>493 (59%)</b>	<b>837</b>

	Tract	Acreage	Use
T.O.E Recreation/ School	E	32.733	
Community Park	F	20.501	Recreation Open Space
Fire Station	G	1.675	Fire Station
<b>Subtotal:</b>		<b>54.83</b>	

Road ROW 15 Ac.

Development Parcels	254.8 Ac.
Tracts	54.83 Ac.
ROW	15.00 Ac.
Open Space	335.37 Ac.
<b>Total:</b>	<b>660.00 Ac.</b>

- Multi-Family
- Single Family / Duplex Lots

Figure 3. Haymeadow PUD Development Plan

## **14.0 TABLES**

**TABLE 1**  
**Vascular Plant Species List**  
**Haymeadow Tract E and Trailhead**  
**Ecological Restoration Areas**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Family</b>	<b>Origin*</b>
<b>Shrubs</b>			
<i>Artemisia tridentata</i> var. <i>tridentata</i>	Big sagebrush	Asteraceae	N
<i>Atriplex canescens</i>	Fourwing saltbush	Chenopodiaceae	N
<i>Chrysothamnus parryi</i>	Parry's rabbitbrush	Asteraceae	N
<i>Krascheninnikovia lanata</i>	Winterfat	Chenopodiaceae	N
<b>Perennial Graminoids</b>			
<i>Agropyron cristatum</i>	Crested wheatgrass	Poaceae	I
<i>Bromus inermis</i>	Smooth brome	Poaceae	I
<i>Elymus cinereus</i> ( <i>Leymus</i> )	Basin wild rye	Poaceae	N
<i>Phalaris arundinacea</i>	Reed Canarygrass	Poaceae	I
<b>Perennial Forbs</b>			
<i>Acroptilon repens</i>	Russian knapweed	Asteraceae	I+
<i>Cardaria draba</i>	White top	Brassicaceae	I+
<i>Cirsium arvense</i>	Canada thistle	Asteraceae	I+
<i>Medicago sativa</i>	Alfalfa	Fabaceae	I
<i>Rumex crispus</i>	Curly dock	Polygonaceae	I
<i>Solidago canadensis</i>	Canada goldenrod	Asteraceae	N
<b>Annual/Biennial Graminoids</b>			
<i>Bromus tectorum</i>	Cheatgrass	Poaceae	I+
<b>Annual/Biennial Forbs</b>			
<i>Arctium minus</i>	Common burdock	Asteraceae	I+
<i>Carduus acanthoides</i>	Plumeless thistle	Asteraceae	I+
<i>Carduus nutans</i> ssp. <i>macrolepis</i>	Musk thistle	Asteraceae	I+
<i>Chorispora tenella</i>	Purple mustard	Brassicaceae	I
<i>Descurainia sophia</i>	Flixweed	Brassicaceae	I
<i>Kochia scoparia</i>	Kochia	Chenopodiaceae	I
<i>Melilotus albus</i>	White sweet clover	Fabaceae	I
<i>Melilotus officinalis</i>	Yellow sweet clover	Fabaceae	I
<i>Salsola australis</i> ( <i>S. iberica</i> )	Russian thistle	Chenopodiaceae	I
<i>Sisymbrium altissimum</i>	Tumble mustard	Brassicaceae	I

\* Origin: N = Native; I = Introduced; I+ = Colorado State-Listed Noxious Weed

**TABLE 2**  
**State-Listed Noxious and Troublesome Weeds**  
**Haymeadow Tract E and Trailhead**  
**Ecological Restoration Areas**

Scientific Name	Common Name	Colorado Noxious Weed Status
<b>Perennial Forbs</b>		
<i>Acroptilon repens</i>	Russian knapweed	List B
<i>Cardaria draba</i>	White top	List B
<i>Cirsium arvense</i>	Canada thistle	List B
<i>Rumex crispus</i>	Curly dock	---
<b>Annual/Biennial Graminoids</b>		
<i>Bromus tectorum</i>	Cheatgrass	List C
<b>Annual/Biennial Forbs</b>		
<i>Arctium minus</i>	Common burdock	List C
<i>Carduus acanthoides</i>	Plumeless thistle	List B
<i>Carduus nutans</i> <i>ssp. macrolepis</i>	Musk thistle	List B
<i>Chorispورا tenella</i>	Purple mustard	---
<i>Descurainia sophia</i>	Flixweed	---
<i>Kochia scoparia</i>	Kochia	---
<i>Melilotus albus</i>	White sweet clover	
<i>Melilotus officinalis</i>	Yellow sweet clover	
<i>Salsola australis</i> ( <i>S. iberica</i> )	Russian thistle	---
<i>Sisymbrium altissimum</i>	Tumble mustard	---



**TABLE 3**  
**Restoration Timeline**  
**Haymeadow Tract E Ecological Restoration Area**

- FALL 2018**     Late September
- Spray dense stands of Russian Knapweed with herbicide, since it is a perennial.
  - Spot spray first-year rosettes of Musk Thistle and Plumeless Thistle.
  - Spot spray Canada thistle.
  - Milestone is recommended for this treatment since it is effective for all four of these species.

- SPRING 2019**     Early March
- Contact herbicide applicator and get on schedule.
- Early to Mid-April
- Spray early season mustards with herbicide.
  - Focus on whitetop, flixweed, tumble mustard, and purple mustard.
  - Ensure the treatment is early enough to prevent seed set.
  - Several herbicides are effective for mustards, but Roundup may be a good option since it does not have any residual soil activity.
  - Spray dense areas of Cheatgrass near the toe of the Gypsum hills with Roundup or another non-selective herbicide.
  - Desirable grasses should still be dormant and would not be affected.
- Early May
- Allow several weeks for herbicide to take effect.
  - Soil across the restoration area should be tilled to kill young seedlings that may have germinated since the first treatment, and to induce seed germination from the soil seed bank.

- SUMMER 2019**     Early June
- Collect soil samples and submit for agronomic testing.
  - Depending on summer precipitation patterns, additional seedlings will have germinated a few weeks after tilling.
  - These seedlings should be tilled again to kill them and induce more germination.

**TABLE 3**  
**Restoration Timeline**  
**Haymeadow Tract E Ecological Restoration Area**

- SUMMER 2019**     July
- Depending on precipitation patterns, additional seedlings should have germinated following tilling.
  - These seedlings should be tilled in again.
  - If stands of perennial weeds (specifically Russian knapweed) are present, they can be sprayed with herbicide.
- Early August
- Spray any remaining weeds with herbicide.
- FALL 2019**     Mid to Late September
- Till restoration site to prepare for seeding.
  - Prepare the seedbed with a rake or harrow.
  - Spread soil amendments (mycorrhizae and fertilizer).
  - Rake or harrow to incorporate soil amendments.
  - Drill seed with the mix of Table 4.
  - Hydromulch with EcoMatrix spray-on blanket.
- SPRING 2020**     Late April
- Inspect site to check for germination of desirable grasses and weeds.
  - Identify areas that need weed control.
- SUMMER 2020**     Early Summer
- Wait until grasses are at the 3-tiller stage before scheduling any herbicide treatments.
  - Focus on spot-spraying to the extent possible, if herbicide is used.
  - Refer to the Integrated Weed Management Plan for recommended techniques.
  - Weed density will dictate which treatments are feasible.
  - Evaluate initial cover and determine what areas, if any, should be re-seeded or overseeded.

**TABLE 3**  
**Restoration Timeline**  
**Haymeadow Tract E Ecological Restoration Area**

**FALL 2020**

Early Fall

- If necessary, treat perennial weeds and first-year rosettes with herbicide in the fall, when effectiveness is increased.
- Focus on spot spraying to minimize the amount of chemicals used.
- Complete overseeding in areas that lack the desired initial cover of grasses.

**2021**

- Continue to monitor site and be prepared to adapt management techniques to respond to the changing conditions of a new restoration site.
- Evaluate grass cover and weed abundance to determine when forbs can be effectively overseeded into the restoration area. Refer to the recommended species in Table 5.



**TABLE 4**  
**Restoration Seed Mix**  
**Haymeadow Tract E**  
**Ecological Restoration Area**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Origin*</b>	<b>PLS Seeding Rate (Lbs/Ac)*</b>
<b>Shrubs</b>			
<i>Artemisia tridentata</i> <i>var. tridentata</i>	Big sagebrush	N	.25
<b>Total Shrubs</b>			<b>.25</b>
<b>Perennial Grasses</b>			
<i>Elymus elymoides</i>	Squirrel tail	N	2
<i>Elymus trachycaulus</i>	Slender wheatgrass	N	4
<i>Koeleria macrantha</i>	Junegrass	N	0.125
<i>Oryzopsis hymenoides</i>	Indian ricegrass	N	4
<i>Leymus cinereus</i>	Basin wildrye	N	4
<i>Pascopyrum smithii</i>	Western wheatgrass	N	5
<i>Poa fendleriana</i>	Muttongrass	N	0.125
<i>Poa secunda</i>	Sandberg bluegrass	N	0.25
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	N	2
<i>Hesperostipa comata</i>	Needle-and-thread grass	N	2
<b>Total Perennial Grasses</b>			<b>23.5</b>
<b>GRAND TOTAL</b>			<b>23.75</b>

\* Corresponds to a seeding rate of ~105 seeds per square foot.

**TABLE 5**  
**Recommended Native Forbs for Overseeding**  
**Haymeadow Tract E Ecological Restoration Area**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Family</b>
<b>Perennial Forbs</b>		
<i>Achillea millefolium</i>	Yarrow	Asteraceae
<i>Artemisia frigida</i>	Fringed sage	Asteraceae
<i>Erysimum capitatum</i>	Western wallflower	Brassicaceae
<i>Hedysarum boreale</i>	Utah sweetvetch	Fabaceae
<i>Ipomopsis aggregata</i>	Scarlet gilia	Polemoniaceae
<i>Lupinus argenteus</i>	Silvery lupine	Fabaceae
<i>Oenothera caespitosa</i>	Tufted evening primrose	Onagraceae`
<i>Oxytropis lambertii</i>	Purple locoweed	Fabaceae
<i>Penstemon strictus</i>	Rocky Mountain penstemon	Scrophulariaceae
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	Malvaceae

**TABLE 6**  
**Weed Management Timeline**  
**Haymeadow Trailhead Ecological Restoration Area**

**SPRING 2019**

Early March

- Contact herbicide applicator and get on schedule.

Early to Mid-April

- Spray early season mustards with herbicide.
- Focus on whitetop, flixweed, tumble mustard, and purple mustard.
- Ensure the treatment is early enough to prevent seed set.
- A Licensed Commercial Pesticide Applicator can provide specific herbicide recommendations.

Early May

- Spot spray yellow and white sweet clover rosettes.
- Spray kochia seedlings in gravel driveway.

**SUMMER 2019**

Early August

- Check site to ensure there are no weeds setting seed.
- If necessary, cut, pull, or spot spray any weeds that could set seed before fall.

**FALL 2019**

Early Fall

- If necessary, treat perennial weeds and first-year rosettes with herbicide in the fall, when effectiveness is increased.
- Focus on spot spraying to minimize the amount of chemicals used.

**2020**

- Continue to monitor the site and implement methods from the Haymeadow Integrated Weed Management Plan.

## 15.0 PHOTOS



**Photo 1.** The irrigated portion of the Haymeadow property is dominated by introduced grasses including smooth brome. (8/27/18).



**Photo 2.** Areas of Tract E which are no longer irrigated are highly disturbed, have low vegetation cover, and are dominated by weeds. (8/27/18).



**Photo 3.** Russian knapweed and thistles grow in the foreground with green, irrigated hayfields in the background. (8/27/18).



**Photo 4.** Large stand of musk thistle and plumeless thistle on Tract E. (8/27/18).



**Photo 5.** Russian thistle covers large areas of Tract E where little else is growing. (8/27/18).



**Photo 6.** The noxious weed whitetop grows in a disturbed area of Tract E. This stand is in fruit. (8/27/18).



**Photo 7.** The irrigation laterals are lined by reed canarygrass and smooth brome. (8/27/18).



**Photo 8.** Stand of cheatgrass near the toe of the slope at the northern edge of Tract E. (8/27/18).



**Photo 9.** Rabbitbrush grows with the noxious weed Russian knapweed. (8/27/18).



**Photo 10.** Purple mustard is common between the bunches of Basin wildrye, a native grass. Purple mustard blooms early in the spring. (8/27/18).



**Photo 11.** Kochia grows in the gravel driveway near the old house. (8/27/18).



**Photo 12.** Flixweed forms a dense stand at the base of the hillside behind the house. (8/27/18).

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**APPENDIX A. STATE OF COLORADO NOXIOUS WEED LIST**

## COLORADO DEPARTMENT OF AGRICULTURE NOXIOUS WEED LIST

### List A species

List A species in Colorado that are designated by the Commissioner for eradication.

### List B species

List B weed species are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to stop the continued spread of these species.

### List C species

List C weed species are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species.

### Watch List species

Watch List weed species that have been determined to pose a potential threat to the agricultural productivity and environmental values of the lands of the state. The Watch List is intended to serve advisory and educational purposes only. Its purpose is to encourage the identification and reporting of these species to the Commissioner in order to facilitate the collection of information to assist the Commissioner in determining which species should be designated as noxious weeds.

### List A Species



African rue  
*Peganum harmala*



Bohemian knotweed  
*Polygonum x bohemicum*



Camelthorn  
*Alhagi pseudalhagi*



Common crupina  
*Crupina vulgaris*

## List A Species



Cypress spurge  
*Euphorbia cyparissias*



Dyer's woad  
*Isatis tinctoria*



Elongated mustard  
*Brassica elongata*



Flowering rush  
*Butomus umbellatus*



Giant knotweed  
*Polygonum sachalinense*



Giant reed  
*Arundo donax*



Giant salvinia  
*Salvinia molesta*



Hairy willow-herb  
*Epilobium hirsutum*



Hydrilla  
*Hydrilla verticillata*



Japanese knotweed  
*Polygonum cuspidatum*



Meadow knapweed  
*Centaurea pratensis*



Mediterranean sage  
*Salvia aethiopsis*



Medusahead  
*Taeniatherum caput-medusae*



Myrtle spurge  
*Euphorbia myrsinites*



Orange hawkweed  
*Hieracium aurantiacum*



Parrotfeather  
*Myriophyllum aquaticum*

## List A Species



Purple loosestrife  
*Lythrum salicaria*



Rush skeletonweed  
*Chondrilla juncea*



Squarrose knapweed  
*Centaurea virgata*



Tansy ragwort  
*Senecio jacobaea*



Yellow starthistle  
*Centaurea solstitialis*

## List B Species



[Absinth wormwood](#)  
*Artemisia absinthium*



[Black henbane](#)  
*Hyoscyamus niger*



[Bouncingbet](#)  
*Saponaria officinalis*



[Bull thistle](#)  
*Cirsium vulgare*



[Canada thistle](#)  
*Cirsium arvense*



[Chinese clematis](#)  
*Clematis orientalis*



[Common tansy](#)  
*Tanacetum vulgare*



[Common teasel](#)  
*Dipsacus fullonum*



[Corn chamomile](#)  
*Anthemis arvensis*



[Cutleaf teasel](#)  
*Dipsacus laciniatus*



[Dalmatian toadflax](#)  
*Linaria dalmatica & genistifolia*



[Dame's rocket](#)  
*Hesperis matronalis*



[Diffuse knapweed](#)  
*Centaurea diffusa*



[Eurasian watermilfoil](#)  
*Myriophyllum spicatum*



[Hoary cress](#)  
*Cardaria draba*



[Houndstongue](#)  
*Cynoglossum officinale*

## List B Species



Hybrid knapweed  
*Centaurea x*  
*psammogena*



Hybrid toadflax  
*Linaria vulgaris x Linaria*  
*dalmatica*



Jointed goatgrass  
*Aegilops cylindrica*



Leafy spurge  
*Euphorbia esula*



Mayweed chamomile  
*Anthemis cotula*



Moth mullein  
*Verbascum blattaria*



Musk thistle  
*Carduus nutans*



Oxeye daisy  
*Chrysanthemum*  
*leucanthemum*



Perennial pepperweed  
*Lepidium latifolium*



Plumeless thistle  
*Carduus acanthoides*



Russian knapweed  
*Acroptilon repens*



Russian-olive  
*Elaeagnus angustifolia*



Salt cedar  
*Tamarix chinensis, T.*  
*parviflora, and*  
*T. ramosissima*



Scentless chamomile  
*Matricaria perforata*



Scotch thistle  
*Onopordum*  
*acanthium*



Spotted knapweed  
*Centaurea maculosa*

## List B Species



Sulfur cinquefoil  
*Potentilla recta*



Wild caraway  
*Carum carvi*



Yellow nutsedge  
*Cyperus esculentus*



Yellow toadflax  
*Linaria vulgaris*

**List C Species**



[Bulbous bluegrass](#)  
*Poa bulbosa*



[Chicory](#)  
*Cichorium intybus*



[Common burdock](#)  
*Arctium minus*



[Common mullein](#)  
*Verbascum thapsus*



[Common St. Johnswort](#)  
*Hypericum perforatum*



[Downy brome](#)  
*Bromus tectorum*



[Field bindweed](#)  
*Convolvulus arvensis*



[Halogeton](#)  
*Halogeton glomeratus*



[Johnsongrass](#)  
*Sorghum halepense*



[Perennial sowthistle](#)  
*Sonchus arvensis*



[Poison hemlock](#)  
*Conium maculatum*



[Puncturevine](#)  
*Tribulus terrestris*



[Quackgrass](#)  
*Elytrigia repens*



[Redstem filaree](#)  
*Erodium cicutarium*



[Velvetleaf](#)  
*Abutilon theophrasti*



[Wild-proso millet](#)  
*Panicum miliaceum*

## Watch List Species



Asian mustard  
*Brassica tournefortii*



Baby's breath  
*Gypsophila paniculata*



Bathurst burr /  
Spiny cocklebur  
*Xanthium spinosum*



Brazilian elodea  
*Egeria densa*



Common bugloss  
*Anchusa officinalis*



Common reed  
*Phragmites australis*



Garlic mustard  
*Alliaria petiolata*



Garden loosestrife  
*Lysimachia vulgaris*



Himalayan blackberry  
*Rubus armeniacus*



Hoary alyssum  
*Berteroa incana*



Japanese blood grass/  
Cogongrass  
*Imperata cylindrical*



Meadow hawkweed  
*Hieracium  
caespitosum*



Onionweed  
*Asphodelus fistulosus*



Purple pampasgrass  
*Cortideria jubata*



Scotch broom  
*Cytisus scoparius*



Sericea lespedeza  
*Lespedeza cuneata*

## Watch List Species



Swainsonpea  
*Sphaerophysa salsula*



Syrian beancaper  
*Zygophyllum fabago*



Water hyacinth  
*Eichhornia crassipes*



Water lettuce  
*Pistia stratiotes*



White bryony  
*Bryonia alba*



Woolly distaff thistle  
*Carthamus lanatus*



Yellow flag iris  
*Iris pseudacorus*



Yellow floatingheart  
*Nymphoides peltata*