WETLAND ENHANCEMENT PLAN

Haymeadow Phase I
Town of Eagle, Colorado



prepared for:

ABRIKA PROPERTIES, LLC
8250 Southwest 27th Avenue, Ocala, FL 34476

&

PYLMAN & ASSOCIATES
137 Main Street, Suite 107W, Edwards, CO 81632

prepared by:

BIRCH ECOLOGY, LLC
429 Main Street, Lyons, CO 80540

BIRCH ECOLOGY

REVISED APRIL 2019

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1.0 INTRODUCTION

Abrika Properties, LLC is constructing a residential development on the 660-acre Haymeadow property, located in the Town of Eagle in Sections 2, 3, 4, 9, 10, and 11 of Township 5 South and Range 84 West in Eagle County, Colorado, (Figures 1 & 2). The PUD Development Plan Drawing is illustrated by Figure 3. As shown by the Figure, Haymeadow will feature large tracts of open space, natural areas and parks covering more than 335 acres.

The March 25, 2014 Final Haymeadow PUD-ADA Section 9.9 requires the developer to submit to the Town a wetland restoration and enhancement plan for the property. The plan is to include a schedule of when various wetland areas will be treated as the development of the property proceeds.

In accordance with these requirements, this Wetland Enhancement Plan describes the existing condition of the wetlands on the Haymeadow property; provides a plan to restore and enhance the large wetland adjacent to the Phase I project area; and identifies the wetlands to be restored in future phases. Section 5.0 contains a Maintenance and Monitoring Plan; Section 6.0 identifies the Success Criteria; and Section 7.0 discusses Ongoing Stewardship of the site. Please note, all Figures are in Section 9.0; Tables are in Section 10.0; and Photos are in Section 11.0.

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. 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).

3.0 EXISITNG CONDITION OF HAYMEADOW WETLANDS

To aid in project planning, wetlands on the Haymeadow project site were delineated by Heather Houston of Birch Ecology (formerly of Western Ecological Resource) (Figure 4). A total

of five wetland areas were identified, covering a combined area of 13.06 acres. The largest of these is Wetland A, which totals approximately 11.43 acres. This wetland is located just north of Brush Creek Road and south of the Phase I project area. Wetland A is the focus of the Phase I Wetland Enhancement Plan contained in this report, as illustrated by Figure 5.

The eastern portion of Wetland A is located in a natural swale that is likely a historic channel of Brush Creek. The western portion is in a pasture influenced by irrigation water. Several irrigation laterals and the Hernage Ditch flow through the wetland. Wetland A has multiple water sources including irrigation diversions, irrigation tailwater, high groundwater, seepage from earthen irrigation laterals, and a small volume of stormwater runoff.

Wetland A is a large herbaceous wetland, and woody plants are sparsely represented (Photos 1-4). There are a few stands of sandbar willow *(Salix exigua)* shrubs and 3-4 large, mature narrowleaf cottonwood *(Populus angustifloia)* trees on the northern edge of Wetland A (Figure 5). A few small Russian olive trees are present (Photo 5), but these State-listed noxious weeds are to be eradicated in accordance with the Haymeadow Integrated Weed Management Plan (Birch Ecology, 2018). In addition, Wetland A supports widely scattered Woods' rose *(Rosa woodsii)* and golden currant *(Ribes aureum)* shrubs. In the shallow water, the introduced perennial reed canarygrass *(Phalaris arundinacea)* is abundant and forms large stands. Other common plants in this habitat include Nebraska sedge *(Carex nebrascensis)*, broadleaf cattails *(Typha latifolia)*, woolly sedge *(Carex lanuginosa)*, meadow foxtail *(Alopecurus pratensis)*, hardstem bulrush *(Scirpus acutus)*, creeping spikerush *(Eleocharis palustris)*, and the aquatic forbs water cress *(Nasturtium officinale)* and pink water speedwell *(Veronica catenata)* (Photo 6). In the muddy saturated soil habitat, reed canarygrass grows with a number of native wetland graminoids as well as agricultural grasses. Some of the most abundant native species include Nebraska sedge, clustered field sedge *(Carex praegracilis)*, Baltic rush *(Juncus arcticus ssp. ater)*, smooth horsetail *(Hippochaete laevigata)*, field horsetail *(Equisetum arvense)*, arrowgrass *(Triglochin maritimum)*, and foxtail barley *(Hordeum jubatum)*. In addition, the introduced agricultural grasses Kentucky bluegrass *(Poa pratensis)*, meadow fescue *(Festuca pratensis)*, timothy *(Phleum pratense)*, tall fescue *(Festuca arundinacea)*, and quackgrass *(Elytrigia repens)*, a noxious weed, are common in the saturated soil habitat. Common forbs in this zone include New Mexico and white checkermallow *(Sidalcea neomexicana; S. candida)*, marsh sow thistle *(Sonchus arvensis ssp. uglinosus)*, water parsnip *(Sium suave)*, Canada thistle *(Cirsium arvense)*, yellow sweet clover *(Melilotus officinalis)*, and common plantain *(Plantago major)*. Information on controlling quackgrass, sowthistle, Canada thistle, and yellow sweet clover is contained in the Integrated Weed Management Plan. Table 1 lists the vascular plant species observed on the Haymeadow project site during the wetland delineation.

4.0 WETLAND ENHANCEMENT PLAN

In accordance with the Haymeadow PUD-ADA, the following Wetland Enhancement Plan will be implemented for the Phase I development. Subsequent phases of the restoration to be completed with future development phases are identified in Section 8.0.

The wetlands within the Haymeadow development will be enhanced to increase their functions and values. As described above, the Haymeadow wetlands currently lack the expected cover and diversity of woody plants, and this limits their habitat quality. By increasing the cover of trees and shrubs, the structural diversity and wildlife habitat value of these wetlands will be improved. These enhancements will be presented to the U.S. Army Corps of Engineers as a part

of the Pre-Construction Notification (Wetland Permit Application) for Haymeadow. With Corps approval, the wetland enhancements could be included in the wetland mitigation plan for impacts created by construction of the Sylvan Lake Road Roundabout.

4.1 Planting Plan

The Planting Plan for the Phase I Wetland Enhancement is illustrated by Figure 5, Sheets 1-4. This plan will include nursery grown trees and shrubs; willow cuttings form local populations; and eradication of Russian olive *(Elaeagnus angustifolia)* trees, a state-listed noxious weed.

4.1.1 Nursery-Grown Trees and Shrubs

A total of 20 nursery-grown narrowleaf cottonwood *(Populus angustifolia)* trees and 100 shrubs of seven native species will be planted at the margins of the Wetland A in the Phase I wetland restoration area (Table 2). The shrub plantings will include river birch *(Betula occidentalis)*, choke cherry *(Prunus virginiana var. melanocarpa)*, golden currant *(Ribes aureum)*, Woods' rose *(Rosa woodsii)*, sandbar willow *(Salix exigua)* and silver buffaloberry *(Shepherdia argentea)*, which are all known to occur along Brush Creek in the Eagle area.

4.1.2 Willow Cuttings

In order to establish willow stands that contain the local ecotypes and species, 500 willow cuttings will be collected from local populations and planted in the wetland enhancement area. These will likely include sandbar willow, whiplash willow *(Salix lasiandra ssp. caudata)*, Bebb willow *(Salix bebbiana)*, and mountain willow *(Salix monticola)*. The willows will be field-located and therefore are not illustrated on Figure 5.

4.2 Planting Specifications

Please note, the Planting Plan illustrated by Figure 5 is a conceptual illustration. The specific planting locations for will be determined in the field by the project ecologist based on the topography and expected soil moisture. The planting locations for willow cuttings will also be field located, and are not illustrated by Figure 5.

4.2.1 Nursery-Grown Trees and Shrubs

Planting Details. Planting details for the nursery-grown trees and shrubs are illustrated on Figure 5, Sheet 4.

Soil Amendments. No fertilizer or soil amendments will be required with the exception of MycoApply Endo granular mycorrhizae. The mycorrhizae should be mixed with the native backfill soil at a rate of 2 oz per 5-gallon shrub and 3 oz per 2-inch tree.

Initial Watering. A water truck shall be available to water-in the nursery-grown trees and shrubs at the time of planting. The root balls should be thoroughly saturated. As shown by the planting detail on Figure 5, Sheet 4, a 2-4" high soil ring should be constructed to create a water basin that will facilitate watering.

Mulch. Weed-free, shredded wood mulch should be placed in a 2-3 inch layer to cover the planting hole to the edges of the watering basin.

Staking. All nursery-grown trees shall be staked with T-posts and strapped for wind protection. Nylon straps should be used around the trunk and the wire must not wrap around the trunk. 3 T-posts should be used per tree to add stability for the elk protection fencing.

4.2.2 Willow Cuttings

The willow cutting detail is illustrated by Figure 5, Sheet 4. Willows will be cut in the early spring prior to bud burst, or leafing out. Willows will be harvested from healthy local populations and will be planted within 24 hours of harvesting. Willows that are not planted within the same day they are cut will be soaked overnight and planted the next day. Plantings will be grouped in masses in appropriate saturated soil habitat at the margins of the wetlands. Planting locations will be determined in the field by the project ecologist.

4.3 Elk Protection

Elk are common in the Brush Creek Valley, and on the Haymeadow property. In order to protect the cottonwood trees planted in the restoration area, it is recommended that small enclosures be constructed around the trees to reduce elk browsing damage. A six-foot-high cylinder of made of welded wire has been shown to be effective for protecting individual trees. The wire mesh should be stabilized with the three metal T-Posts used for tree staking. Using a heavier gauge wire will provide better protection since the structure will be more rigid. An example of this design is provided on the planting detail sheet (Figure 5, Sheet 4).

4.4 Russian Olive Eradication

Existing Russian olive trees in the wetland enhancement area will be eradicated using the cut-stump method as described in the Haymeadow Integrated Weed Management Plan. Using this technique, the trees are cut off near the base and concentrated herbicide is immediately applied to the cut surface. This method is effective at killing the root system and preventing excessive re-sprouting. This will enhance the habitat of the restoration area because Russian olive is a state-listed noxious weed that is an aggressive invader of wetlands and riparian habitats.

5.0 MAINTENANCE AND MONITORING

5.1 Maintenance

5.2.1 Irrigation

The containerized trees and shrubs will require periodic supplemental watering during the first one or two growing seasons, depending upon soil conditions and the precise planting locations. It is expected that supplemental watering will be required at least 1-2 times per week during the first growing season, but the project ecologist will check the health of the trees and can make recommendations.

5.2.2 Weed Management

The Integrated Weed Management Plan for the Haymeadow Phase I Open Space Dedication includes descriptions and specific recommendations for eliminating the noxious weed species found in the Haymeadow wetlands. However due to the abundance and aggressiveness of quackgrass *(Elytrigia repens)*, eradication this species is not recommended. Intensive management actions would be required, with a low probability of long-term success.

5.2 Monitoring

5.2.1 Monitoring Plan

The Wetland Enhancement Area should be regularly monitored to ensure the health of the planted trees, shrubs and willow stakes. As specified in the Open Space Management Plan, the trees and shrubs should be inspected several times per growing season to check for pests and diseases. During the first few growing seasons, monitoring should be more frequent to ensure the new plantings are receiving the proper amount of water. As described above, supplemental irrigation will be needed for the first 1-2 years. Regular monitoring will allow for adjustments to the frequency and amount of supplemental irrigation, to ensure the plants successfully establish at the site.

In addition, the area should be monitored for the presence of state-listed noxious weeds and other undesirable, aggressive plants. It is likely that Russian olive control will be an ongoing requirement. Small trees can be hand-pulled when the soil is moist, but trees even 1-2 feet tall can have a deep taproot that makes pulling difficult. If hand-pulling is not an option, a weed wrench or the cut-stump method for herbicide application should be used. For additional information, refer to the Haymeadow Integrated Weed Management Plan prepared by Birch Ecology.

If the wetland enhancements are a part of a U.S. Army Corps of Engineers wetland mitigation requirement, formal monitoring reports will be submitted on an annual basis, in accordance with Corps regulations.

5.2.2 Monitoring Reports

At the end of the first growing season in the fall of 2020, an As-Built Assessment and first-year monitoring letter will be submitted to the Town. The letter will document the plantings and weed management activities completed in the restoration area and any required maintenance activities completed during the first growing season. The report will include an evaluation of the health and initial establishment rate of the willow cuttings and the nursery-grown trees and shrubs. The site will also be evaluated in accordance with the Success Criteria outlined below. Another annual review and accompanying letter report would be provided to the Town at the end of the 2021 growing season to document the survival rate for the wetland enhancement plantings and achievement of the other success criteria. A final assessment would be provided two years following planting, in the spring of 2022.

5.2.3 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.

6.0 SUCCESS CRITERIA

The following Success Criteria are performance standards designed to measure the initial establishment of the wetland enhancement during the first two growing seasons, 2020 and 2021. Accordingly, the Success Criteria are geared towards measuring the two-year survival rate for the wetland enhancement plantings.

The Phase I Wetland Enhancement Plan 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 and cannot be effectively eradicated from the area.

3) Excluding quackgrass, the absolute cover of noxious weeds in the restoration area is less than 5%.

4) Existing Russian olive *(Elaeagnus angustifolia)* trees have been eliminated.

5) The survivorship of nursery-grown cottonwood trees is at least 90% two years after planting.

6) The survivorship of nursery-grown shrubs is at least 90% two years after planting.

7) The initial establishment rate of willow cuttings is at least 90% two years after planting.

8) 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.

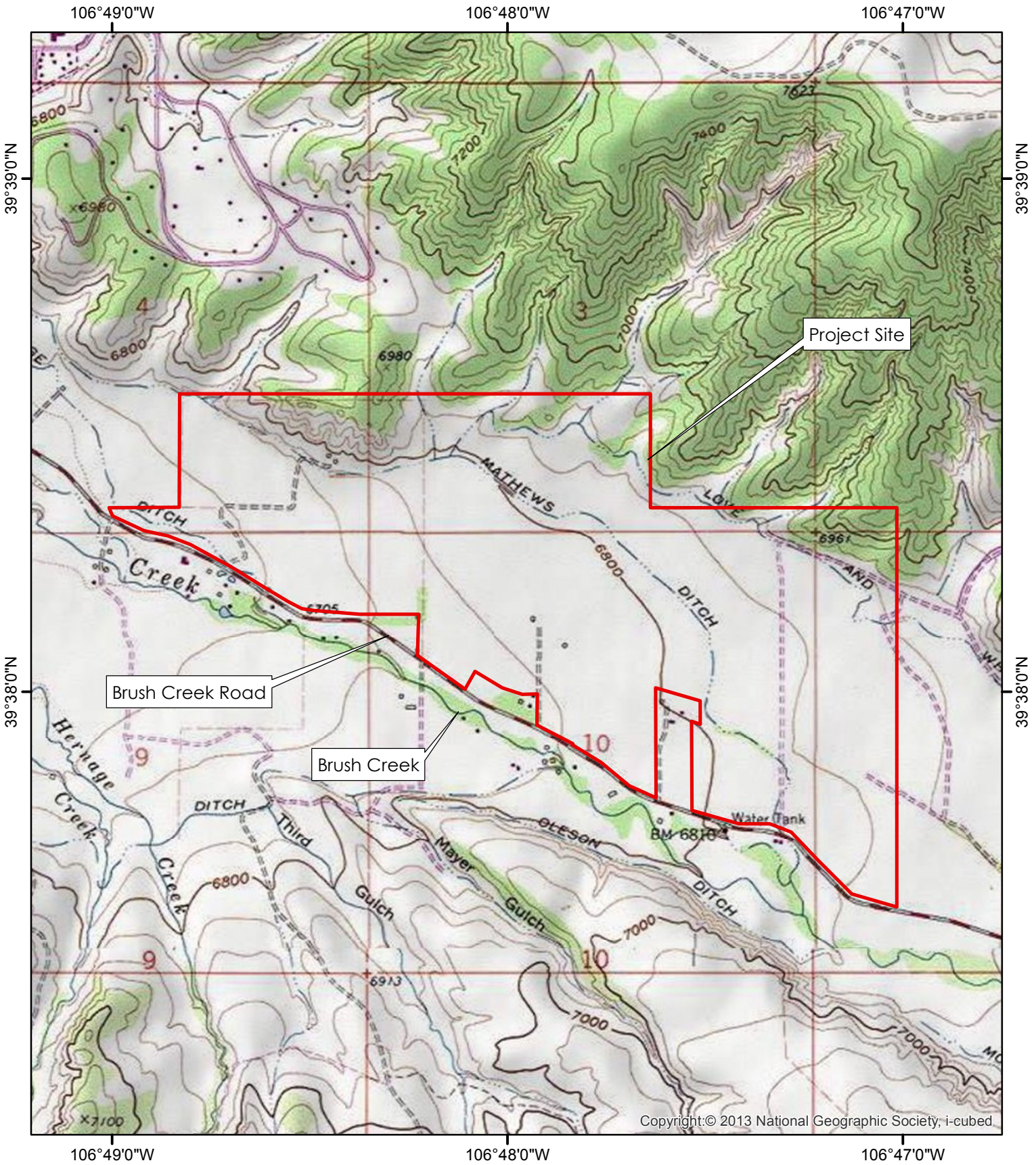
7.0 ONGOING STEWARDSHIP

After the Success Criteria are achieved, the wetland enhancement area will be maintained by the Haymeadow Metropolitan District and noxious weed management will continue in accordance with the Integrated Weed Management Plan.

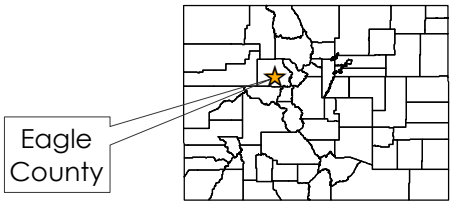
8.0 FUTURE PHASES

Figure 4 illustrates the future phases of the Haymeadow Wetland Enhancement Plan. When Phase II is developed, the area adjacent to Wetland B will be enhanced with native trees and shrubs in a similar manner as the Wetland A Phase I enhancement detailed in this report. Wetlands A and B comprise approximately 97.6% of the total wetland area delineated on the Haymeadow project site, with a combined total of 12.75 acres.

9.0 FIGURES



BASE: USGS 7.5' Eagle Quadrangle, Colorado



N

1:24,000

Figure 1. Project Location Map
Haymeadow

Prepared by:
Birch Ecology LLC
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(720) 350-2530
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106°49'0"W 106°48'0"W 106°47'0"W

39°38'0"N

Pool & Ice Rink
Tract E Restoration Area
Mathews Ditch
Trailhead Restoration Area
Hernage Ditch
Love & White Ditch
Sylvan Lake Road
Brush Creek
Wetland A
Phase I Wetland
Enhancement Area
Wilkinson Ditch
Eagle Ranch
Brush Creek Road

bing

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106°49'0"W 106°48'0"W 106°47'0"W

LEGEND

Haymeadow Property

N

1:14,000
Date: September 2018

Figure 2. Aerial Photograph
Haymeadow
Eagle County, CO

Prepared by:
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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
Subtotal:	254.8	344 (41%)	493 (59%)	837

	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
Subtotal:		54.83	
Road ROW		15 Ac.	

Development Parcels	254.8 Ac.
Tracts	54.83 Ac.
ROW	15.00 Ac.
Open Space	335.37 Ac.
Total:	**660.00** Ac.

Multi-Family

Single Family / Duplex Lots

Haymeadow

PUD DEVELOPMENT PLAN DRAWING

dhm design | berglund architecture | pylman assoc. | alpine engineering

scale = 1" = 300' Revised 03.25.14

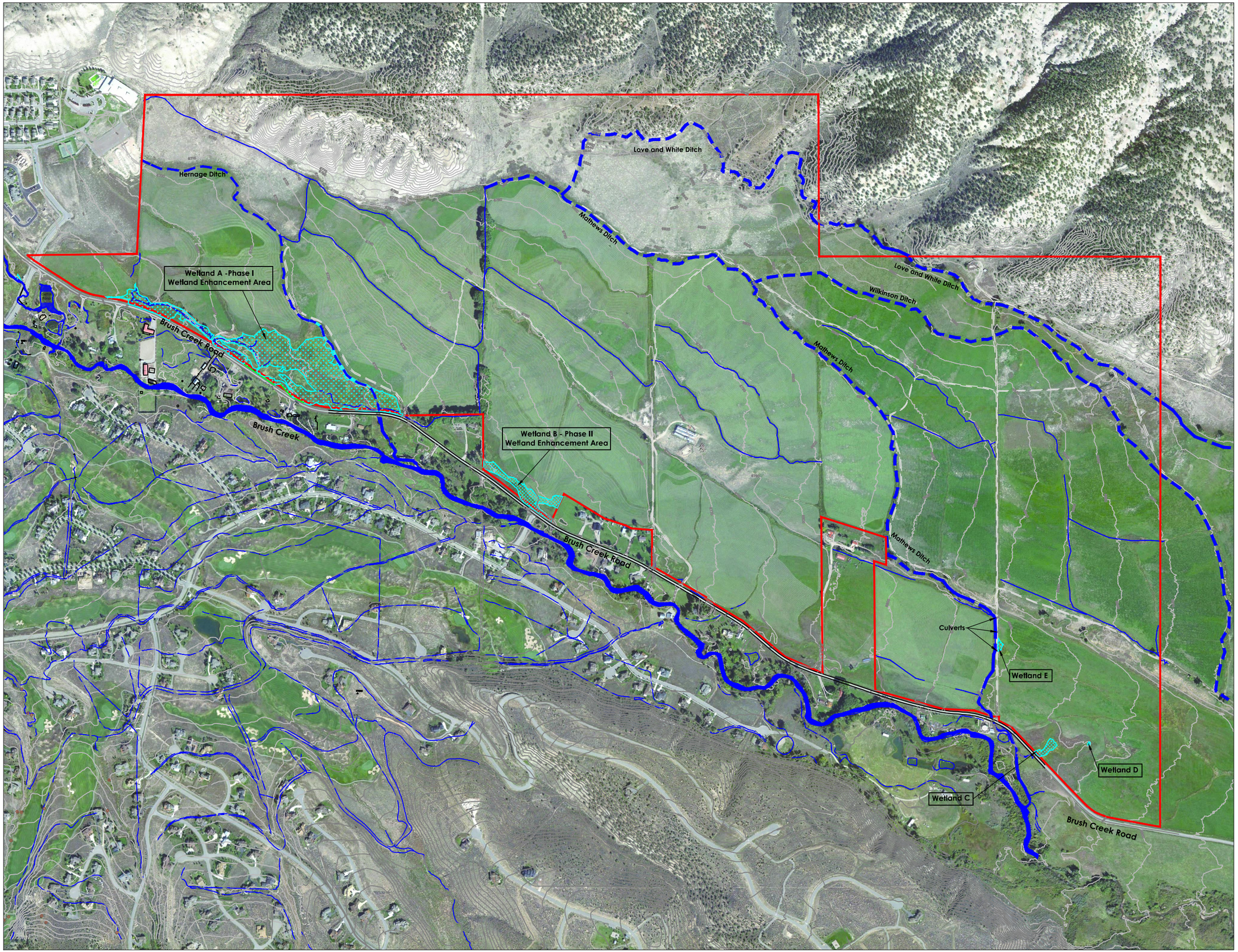
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See Haymeadow PUD Development Plan Application Book dated 12/2013 for general descriptions, as amended by the approved Haymeadow PUD Annexation Development Agreement.

APPROVAL OF THIS PLAN CONSTITUTES A VESTED PROPERTY RIGHT PURSUANT TO SECTION 24-68-103,C.R.S., AS AMENDED

Figure 3. Haymeadow PUD Development Plan

Figure 4. Wetland Map Haymeadow PUD



Legend:

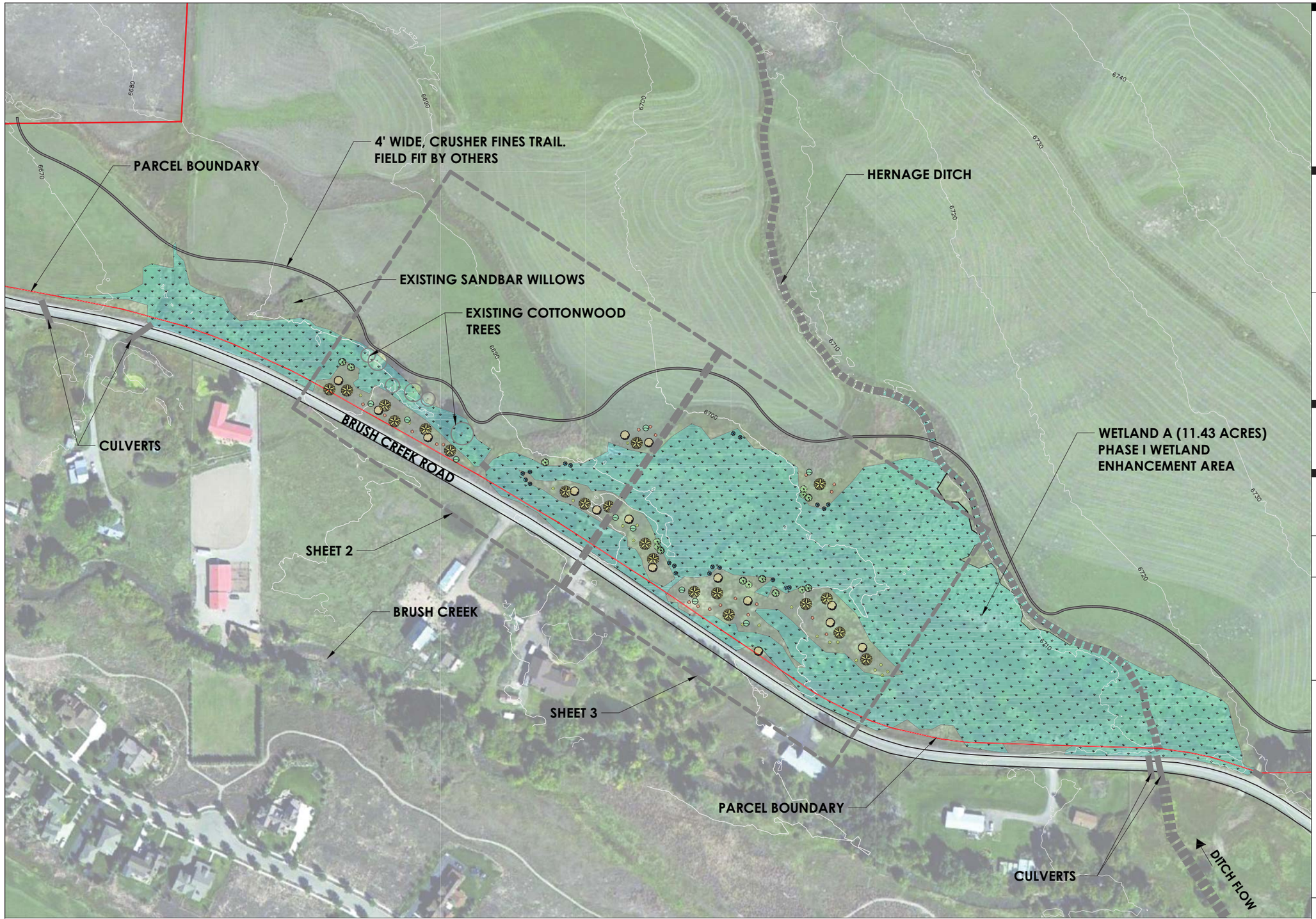
- Wetlands
- Aquatic Habitats
- Irrigation Ditches
- Minor Ditches and Laterals
- Property Boundary

Date: September 2018
Scale: 1 in = 750 ft
Contour Interval = 2 ft

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LEGEND:

- WETLANDS- 2018 DELINEATION
- HERNAGE DITCH
- PROPOSED TREE/SHRUB PLANTINGS
- PROPOSED TRAIL

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Client:
Abrika Properities, LLC

Project Name:
Haymeadow Phase I Riparian Enhancement

Status:
PHASE 1 DESIGN

Drawing Name:
PLANTING PLAN - KEY MAP

Revisions:

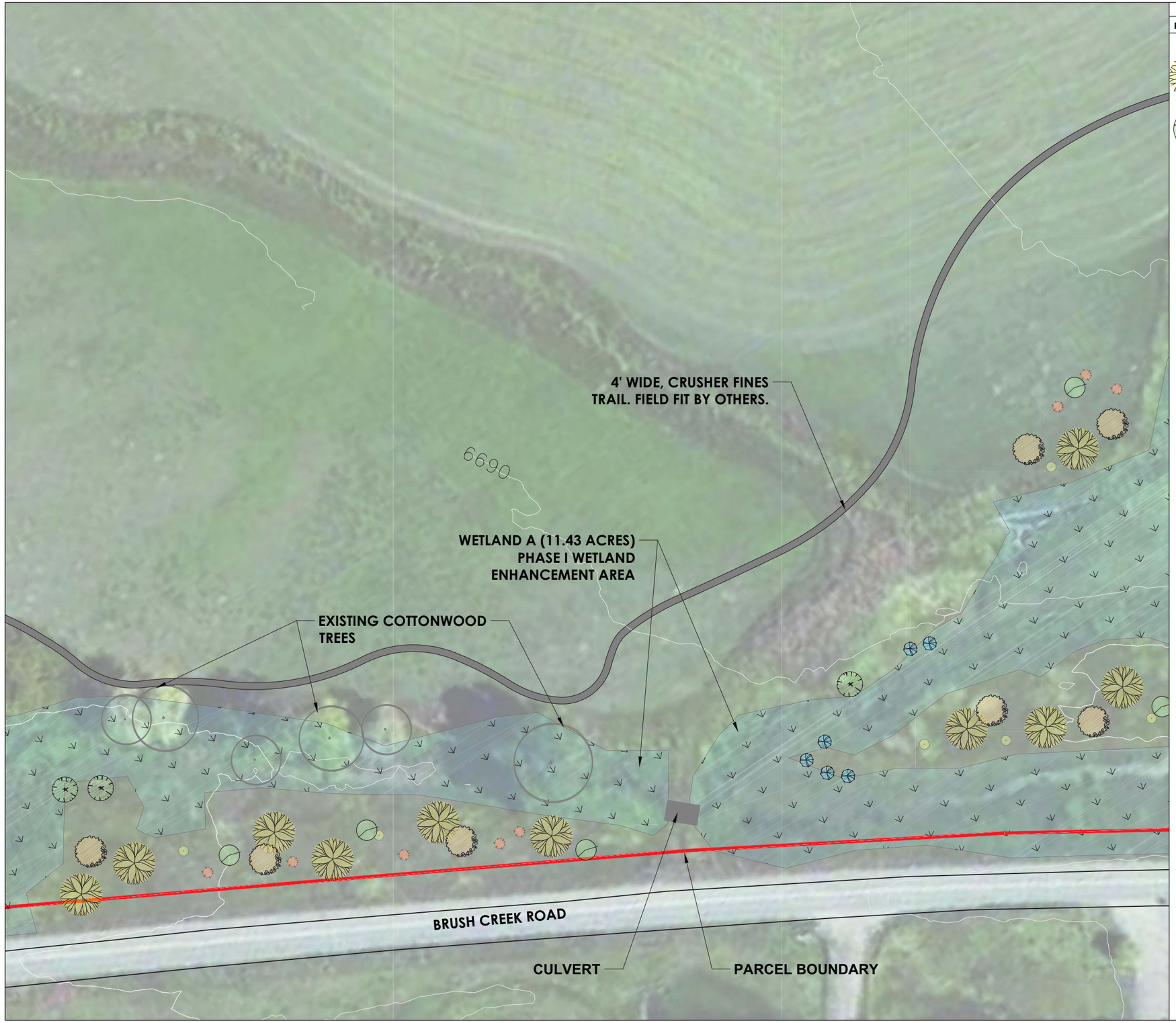
Drawn By:
Heather Houston, Christine Clark PLA

Checked By:
Heather Houston

Scale:
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Date:
September, 2018

FIGURE 5:
WETLAND PLANTING PLAN
SHEET 1 OF 4



KEY	BOTANICAL NAME	COMMON NAME
Trees		
	Populus angustifolia	Narrowleaf cottonwood
	Betula occidentalis	River birch
Shrubs		
	Prunus virginiana var. melanocarpa	Choke cherry
	Ribes aureum	Golden currant
	Rosa woodsi	Woods' rose
	Shepherdia argentea	Silver buffaloberry
	Salix exigua	Sandbar willow
Willow Cuttings (to be field located)		
	Salix bebbiana	Bebb willow
	Salix exigua	Sandbar willow
	Salix lasiandra var. caudata	Whiplash willow
	Salix monticola	Mountain willow
EXISTING VEGETATION		
	Existing tree/shrub	
	Wetlands	

NOTES:

1. PLANTING PLAN TO BE FIELD VERIFIED AND FIELD FIT BY BIRCH REPRESENTATIVE PRIOR TO INSTALLATION.
2. CRUSHER FINES TRAIL LOCATION IS APPROXIMATE. TRAIL TO BE FIELD FIT BY OTHERS.
3. TRAIL WILL BE DESIGNED TO AVOID AND MINIMIZE WETLAND IMPACTS. 4' WIDE BRIDGES WILL BE USED WHERE NEEDED.
4. REMOVE ALL RUSSIAN OLIVE TREES IN ACCORDANCE WITH THE HAYMEADOW INTEGRATED WEED MANAGEMENT PLAN.

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Client:
Abrika Properities, LLC

Project Name:
Haymeadow Phase I Riparian Enhancement

Status:
PHASE 1 DESIGN

Drawing Name:
PLANTING PLAN - WEST

Revisions:

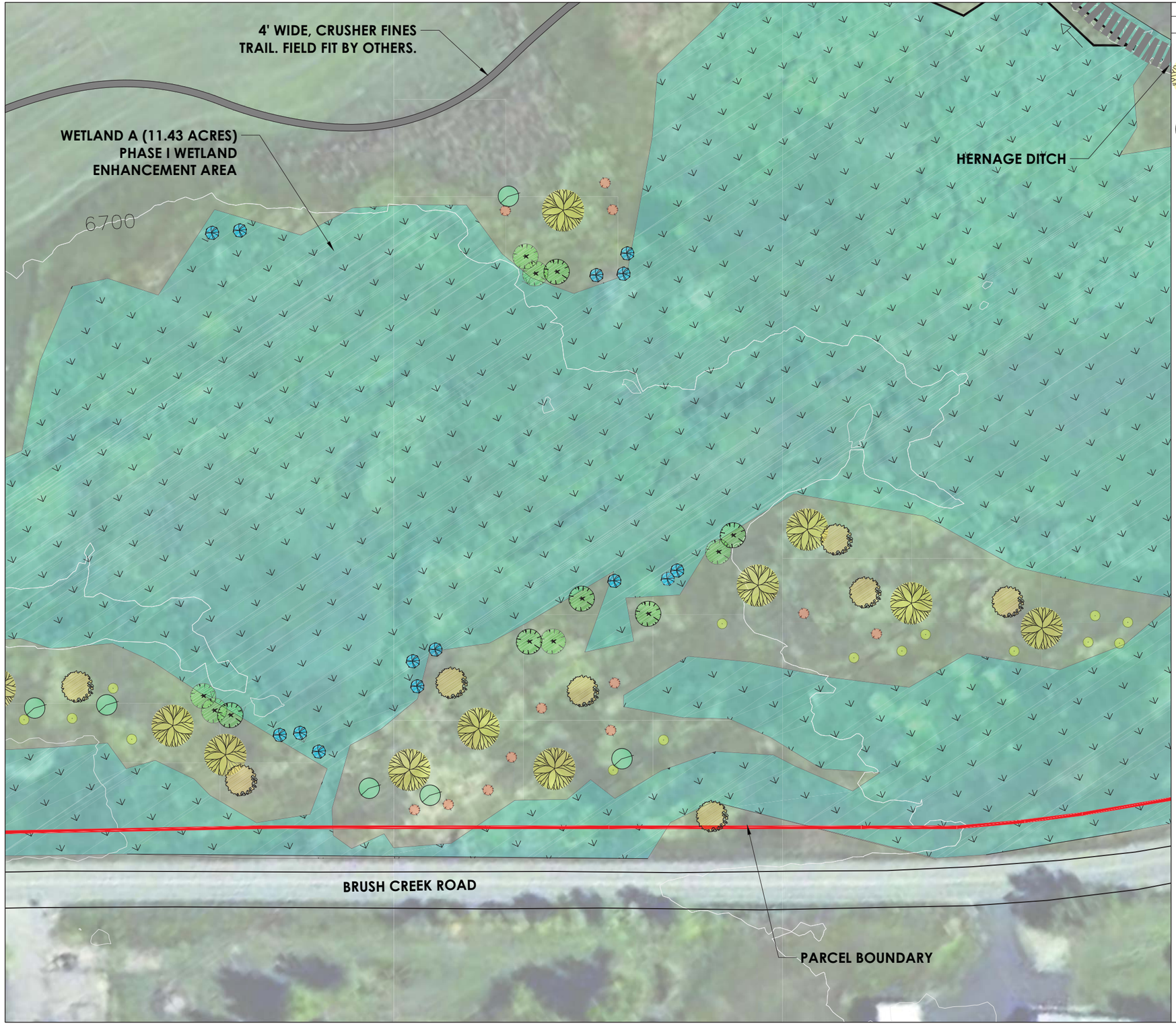
Drawn By:
Heather Houston, Christine Clark PLA

Checked By:
Heather Houston

Scale:
0 30 60 Feet

Date:
September, 2018

FIGURE 5:
WETLAND PLANTING PLAN
SHEET 2 OF 4



KEY	BOTANICAL NAME	COMMON NAME
Trees		
	Populus angustifolia	Narrowleaf cottonwood
	Betula occidentalis	River birch
Shrubs		
	Prunus virginiana var. melanocarpa	Choke cherry
	Ribes aureum	Golden currant
	Rosa woodsi	Woods' rose
	Shepherdia argentea	Silver buffaloberry
	Salix exigua	Sandbar willow
Willow Cuttings (to be field located)		
	Salix bebbiana	Bebb willow
	Salix exigua	Sandbar willow
	Salix lasiandra var. caudata	Whiplash willow
	Salix monticola	Mountain willow

EXISTING VEGETATION

Existing tree/shrub

Wetlands

NOTES:

1. PLANTING PLAN TO BE FIELD VERIFIED AND FIELD FIT BY BIRCH REPRESENTATIVE PRIOR TO INSTALLATION.
2. CRUSHER FINES TRAIL LOCATION IS APPROXIMATE. TRAIL TO BE FIELD FIT BY OTHERS.
3. TRAIL WILL BE DESIGNED TO AVOID AND MINIMIZE WETLAND IMPACTS. 4' WIDE BRIDGES WILL BE USED WHERE NEEDED.
4. REMOVE ALL RUSSIAN OLIVE TREES IN ACCORDANCE WITH THE HAYMEADOW INTEGRATED WEED MANAGEMENT PLAN.

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Client:
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Project Name:
Haymeadow Phase I Riparian Enhancement

Status:
PHASE 1 DESIGN

Drawing Name:
PLANTING PLAN - EAST

Revisions:

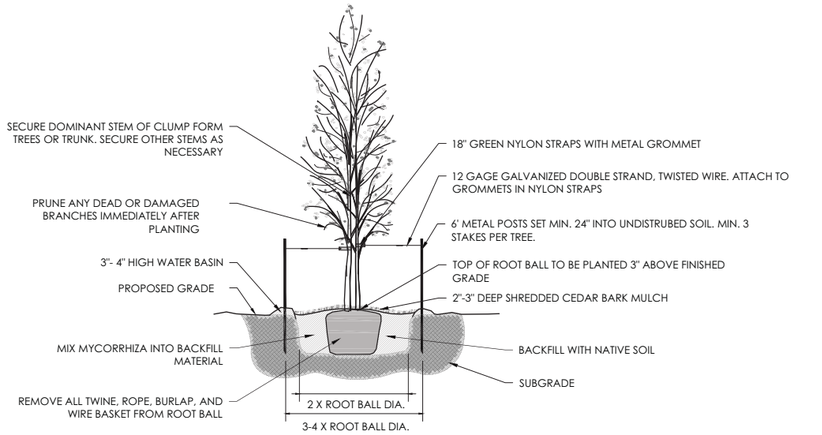
Drawn By:
Heather Houston, Christine Clark PLA

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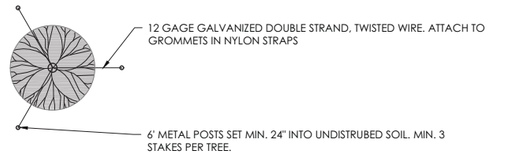
Scale:
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Date:
September, 2018

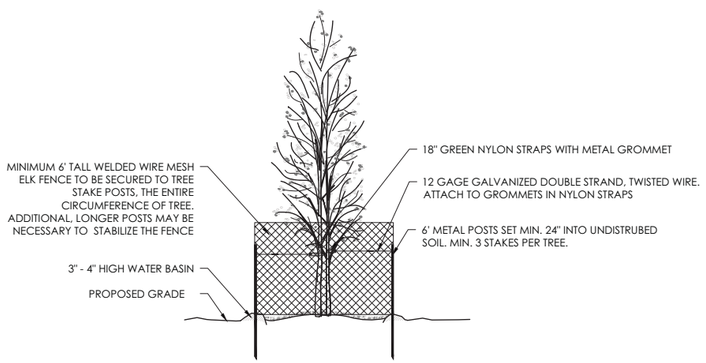
FIGURE 5:
WETLAND PLANTING PLAN
SHEET 3 OF 4



1 TREE PLANTING (TYP.)
SECTION
SCALE: 1:5

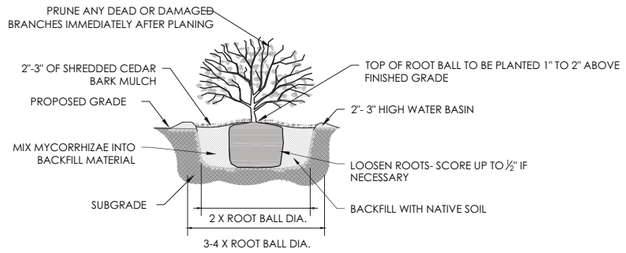


2 TREE STAKING PLAN (TYP.)
PLAN
SCALE: 1:5



3 ELK PROTECTION FENCE (TYP.)
SECTION
SCALE: 1:5

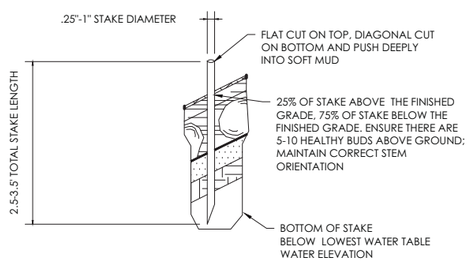
NOTES:
1. APPLY MYCOAPPLY ENDO GRANULAR MYCORRHIZAE TO THE NATIVE BACKFILL SOIL AT A RATE OF 2oz/5gal SHRUB AND 3oz PER 2" CALIPER TREE.
2. PLANTING HOLES SHOULD BE SURROUNDED BY A 2"-4" HIGH SOIL BERM TO CREATE A WATER BASIN.
3. THOROUGHLY WATER TREES AND SHRUBS AT THE TIME OF PLANTING TO SATURATE THE ENTIRE ROOT BALL.
4. A 2"-3" LAYER OF SHREDDED CEDAR BARK MULCH SHOULD BE APPLIED TO EACH PLANTING HOLE TO RETAIN SOIL MOISTURE.



4 SHRUB PLANTING (TYP.)
SECTION
SCALE: 1:5

WILLOW CUTTINGS SHOULD BE HARVESTED FROM NEARBY POPULATIONS TO ESTABLISH LOCAL ECOTYPES. CUTTINGS SHOULD BE HARVESTED IN SPRING, PRIOR TO BUD BURST. CUTTINGS SHOULD BE PLANTED THE SAME DAY THEY ARE CUT OR SOAKED FOR UP TO 3 DAYS BEFORE INSTALLATION.

TOP OF CUTTING SHOULD BE ABOVE COMPETING VEGETATION. BACK FILL HOLE WITH WATER AND SOIL MIX TO ACHIEVE GOOD SOIL TO STEM CONTACT. SPACE STAKES IN A 1 TO 3 FOOT RANDOM PATTERN.



5 LIVE STAKING (TYP.)
DETAIL
SCALE: NTS

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Client:
Abrika Properities, LLC

Project Name:
Haymeadow Phase I Riparian Enhancement

Status:
PHASE 1 DESIGN

Drawing Name:
PLANTING DETAILS

Revisions:

Drawn By:
Heather Houston, Christine Clark PLA

Checked By:
Heather Houston

Scale:
REFER TO DETAIL

Date:
September, 2018

FIGURE 5:
WETLAND PLANTING PLAN
SHEET 4 OF 4

10.0 TABLES

TABLE 1
Vascular Plant Species List
Haymeadow Wetland Delineation

Scientific Name	Common Name	Family	Origin*	Wetland Status**
Trees				
Elaeagnus angustifolia	Russian olive	Eleangnaceae	I+	FAC
Populus angustifolia	Narrowleaf cottonwood	Salicaceae	N	FACW
Populus x acuminata	Lanceleaf cottonwood	Salicaceae	N	FAC
Salix fragilis	Crack willow	Salicaceae	I	NL
Shrubs				
Ribes aureum	Golden currant	Grossulariaceae	N	FAC
Rosa woodsii	Woods' rose	Rosaceae	N	FACU
Salix exigua	Sandbar willow	Salicaceae	N	FACW
Salix lasiandra var. caudata	Whiplash willow	Salicaceae	N	FACW
Perennial Graminoids				
Agrostis gigantea (A. alba)	Redtop	Poaceae	I	FAC
Alopecurus pratensis	Meadow foxtail	Poaceae	I	FAC
Bromus inermis	Smooth brome	Poaceae	I	UPL
Carex lanuginosa	Woolly sedge	Cyperaceae	N	OBL
Carex nebrascensis	Nebraska sedge	Cyperaceae	N	OBL
Carex praegracilis	Clustered field sedge	Cyperaceae	N	FACW
Carex utriculata (C. rostrata)	Beaked sedge	Cyperaceae	N	OBL
Dactylis glomerata	Orchard grass	Poaceae	I	FACU
Eleocharis palustris	Creeping spikerush	Cyperaceae	N	OBL
Elymus cinereus	Basin wild rye	Poaceae	I	NL
Elymus lanceolatus	Thickspike wheatgrass	Poaceae	N	FACU
Elytrigia repens (Elymus)	Quackgrass	Poaceae	I+	FAC
Festuca arundinacea	Tall fescue	Poaceae	I	FAC
Glyceria grandis (G. maxima)	American mannagrass	Poaceae	N	OBL
Hordeum jubatum	Foxtail barley	Poaceae	N	FAC
Juncus arcticus ssp. ater (J.balticus)	Baltic rush	Juncaceae	N	FACW
Pascopyrum smithii	Western wheatgrass	Poaceae	N	FACU
Phalaris arundinacea	Reed Canarygrass	Poaceae	I	FACW
Phleum pratense	Timothy	Poaceae	I	FAC
Poa compressa	Canada bluegrass	Poaceae	I	FACU
Poa palustris	Fowl bluegrass	Poaceae	N	FAC
Poa pratensis	Kentucky bluegrass	Poaceae	I	FAC
Scirpus acutus	Hardstem bulrush	Cyperaceae	N	OBL
Triglochin maritimum	Arrowgrass	Juncaginaceae	N	OBL
Typha latifolia	Broadleaf cattail	Typhaceae	N	OBL

TABLE 1
Vascular Plant Species List
Haymeadow Wetland Delineation

Scientific Name	Common Name	Family	Origin*	Wetland Status**
Perennial Forbs				
Acroptilon repens	Russian knapweed	Asteraceae	I+	NL
Argentina anserina	Silverweed	Rosaceae	N	OBL
Asclepias speciosa	Showy milkweed	Asclepiadaceae	N	FAC
Aster spathulatus	Western aster	Asteraceae	N	FAC
Barbarea orthoceras	Wintercress	Brassicaceae	N	FACW
Cardaria draba	White top	Brassicaceae	I+	NL
Cirsium arvense	Canada thistle	Asteraceae	I+	FAC
Cirsium vulgare	Bull thistle	Asteraceae	I+	FACU
Clematis ligusticifolia	Virgin's Bower	Ranunculaceae	N	FAC
Epilobium ciliatum	Northern willowherb	Onagraceae	N	FACW
Lepidium latifolium	Broad leaf peppergrass	Brassicaceae	I+	FAC
Medicago sativa	Alfalfa	Fabaceae	I	UPL
Mentha arvensis	Field mint	Lamiaceae	N	FACW
Nasturtium officinale	Water cress	Brassicaceae	N	OBL
Plantago major	Common plantain	Plantaginaceae	I	FAC
Rumex crispus	Curly dock	Polygonaceae	I	FAC
Rumex triangulivalvis	Willow-leaved dock	Polygonaceae	N	FAC
Sidalcea candida	Checker mallow	Malvaceae	N	FACW
Sidalcea neomexicana	New Mexico checkermallow	Malvaceae	N	FACW
Sium suave	Water parsnip	Apiaceae	N	OBL
Solidago canadensis	Canada goldenrod	Asteraceae	N	
Solidago gigantea	Giant goldenrod	Asteraceae	N	FACW
Symphyotrichum lanceolatum ssp. hesperium	White panicle aster	Asteraceae	N	OBL
Taraxacum officinale	Dandelion	Asteraceae	I	FACU
Trifolium hybridum	Alsike clover	Fabaceae	I	FAC
Trifolium pratense	Red clover	Fabaceae	I	FACU
Veronica catenata	Pink water speedwell	Scrophulariaceae	N	OBL
Vicia americana	American vetch	Fabaceae	N	FAC
Ferns & Fern Allies				
Equisetum arvense	Field horsetail	Equisetaceae	N	FAC
Hippochaete laevigata	Smooth horsetail	Equisetaceae	N	FACW
Annual/Biennial Forbs				
Cynoglossum officinale	Houndstongue	Boraginaceae	I+	FACU
Descurainia sophia	Flixweed	Brassicaceae	I	NL
Kochia scoparia	Kochia	Chenopodiaceae	I	FAC
Lactuca serriola	Prickly lettuce	Asteraceae	I	FACU
Melilotus officinalis	Yellow sweet clover	Fabaceae	I	FACU
Sisymbrium altissimum	Tumble mustard	Brassicaceae	I	FACU
Sonchus arvensis	Field sow thistle	Asteraceae	I+	FACU

TABLE 1
Vascular Plant Species List
Haymeadow Wetland Delineation

Scientific Name	Common Name	Family	Origin*	Wetland Status**
Thlaspi arvense	Pennycress	Brassicaceae	I	UPL
Tragopogon dubius	Salsify	Asteraceae	I	NL

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

** Wetland Status: OBL = Obligate Wetland; FACW = Facultative Wetland; FAC = Facultative; FACU = Facultative Upland; UPL = Obligate Upland, NL/NO = Not Listed

TABLE 2
Wetland Planting
Haymeadow Phase I Wetland Enhancement

Scientific Name	Common Name	Wetland Status*	Size	Quantity
Trees				
Populus angustifolia	Narrowleaf cottonwood	FACW	2" caliper	20
			Total Trees	**20**
Shrubs				
Betula occidentalis	River birch	FACW	#5	15
Prunus virginiana var. melanocarpa	Choke cherry	FACU	#5	15
Ribes aureum	Golden currant	FAC	#5	20
Rosa woodsii	Woods' rose	FACU	#5	20
Salix exigua	Sandbar willow	FACW	#5	20
Shepherdia argentea	Silver buffaloberry	FACU	#5	10
			Total Nursery Grown Shrubs	**100**
Willow Cuttings*				
Salix bebbiana	Bebb willow	FACW	cuttings	100
Salix lasiandra var. caudata	Whiplash willow	FACW	cuttings	100
Salix monticola	Mountain willow	OBL	cuttings	100
Salix exigua	Sandbar willow	FACW	cuttings	200
			Total Willow Cuttings	**500**

*Willow cuttings will be harvested from local populations to establish the local ecotypes. At least 500 cuttings will be installed from the four species listed. The precise quantities of each species may vary based on the composition of the source populations.

11.0 PHOTOS



Photo 1. Wetland A, view to the southeast along Brush Creek Road. (7/30/13).



Photo 2. Wetland A, view to the north from Brush Creek Road. This wetland is dominated by herbaceous plants. (7/30/13).



Photo 3. Wetland A, view to the northwest from Brush Creek Road. (7/30/13).



Photo 4. Wetland A, view to the west with one of the mature cottonwood trees pictured just north of Brush Creek Road. (7/30/13).



Photo 5. Native sandbar willows are pictured just north of Brush Creek Road in Wetland A. The Russian olive trees in the background will be eradicated. (7/30/13).



Photo 6. The native forb water cress grows in the shallow water, with dense stands of reed canarygrass in the saturated soil. The weedy forb yellow sweet clover is pictured in the lower right. (7/30/13).

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