

## **Hansen Natural Habitat Buffer Zone**

### **Uplands and Wetlands Restoration and Monitoring Plan**

The project creates Natural Habitat Buffer Zones within a 50-foot buffer along the Mail Creek Ditch (Upland Buffer), initiates restoration activities to the isolated, non-jurisdictional wetland (Wetland), and improvements to the associated 50-foot buffer (Wetland Buffer) on the Hansen Development Site (Site). In accordance with City of Fort Collins guidelines, these Buffers should be managed to:

1. Preserve or enhance the ecological character or function and wildlife use of the natural habitat or feature and to minimize or adequately mitigate the foreseeable impacts of development.
2. Preserve or enhance the existence of wildlife movement corridors between natural habitats and features, both within and adjacent to the site.
3. Designed to enhance the natural ecological characteristics of the site. If existing landscaping within the buffer zone is determined by the decision maker to be incompatible with the purposes of the buffer zone, then the applicant shall undertake restoration and mitigation measures such as regrading and/or the replanting of native vegetation.
4. Designed to provide appropriate human access to natural habitats and features and their associated buffer zones in order to serve recreation purposes, provided that such access is compatible with the ecological character or wildlife use of the natural habitat or feature.

Essentially, this plan aims to define an approach and provide specific treatments to improve ecological function and enhance the ecological characteristics of Upland Buffer, Wetland Buffer, and Wetland. Specifically, this plan will attempt to 1) increase both species and structural diversity of the Upland and Wetland Buffer vegetation communities using native species, and 2) restore the isolated, non-jurisdictional Wetland in the central portion of the Site. This plan strictly applies to centrally located, isolated wetland, and does not apply to wetlands within the banks of Mail Creek Ditch as they will not be disturbed by the proposed development.

#### **Step 1: Creating Opportunity or Niches**

Vegetation currently inhabiting the Mail Creek Ditch Upland Buffer is primarily aggressive, non-native perennial grasses (smooth brome – *Bromus inermis*) and forbs (alfalfa – *Medicago sativa*). The central, wettest portion of the isolated wetland is dominated by perennial forbs (smartweed – *Polygonum* sp.) and a perennial noxious weed (perennial pepperweed – *Lepidium latifolium*), while the Wetland Buffer is dominated by a native perennial grass (reed canarygrass - *Phalaris arundinacea*). These species tend to dominate an ecosystem by outcompeting minor, desirable species. Therefore, creating opportunities for a variety of native species to establish is vital. Some method of vegetation control must be used on these aggressive grasses and forbs. Typically, mechanical or chemical control is used. Mechanical control entails scraping or plowing to increase bare ground exposure which will serve as a seedbed / planting medium. Chemical control entails the use of herbicide to diminish dominance of perennial grasses and forbs. Mechanical control is an appropriate method for the Upland Buffer but not for the Wetland and Wetland Buffer due to the

ability of both perennial pepperweed and Canada thistle to reproduce by root fragments. If chemical control is selected, only City of Fort Collins approved herbicide should be used by a qualified contractor, in accordance with the label.

## **Step 2: Soil Preparation**

The soil surface should be optimized for seeding or planting. An agronomic assessment should be implemented to evaluate the chemical and physical properties of the soil. This information can be used to determine whether soil amendments would benefit the establishing plant communities and allow for optimization of the seed mix to soil conditions. Prior to seeding, the soil surface should be loose, allowing for good soil/seed contact. A disc harrow prior to seeding is best on the Upland Buffer, while hand raking is suitable for the Wetland and Wetland Buffer to avoid the spread of perennial pepperweed and Canada thistle.

The top four to six inches of the existing wetland topsoil will be salvaged and stockpiled separately from the other soil horizons to protect the hydrophytic plant propagules and seed bank. The salvaged wetland topsoil will not be stockpiled more than three to four feet high, and will be stockpiled for as little time as possible. The salvaged wetland topsoil will be returned and used for the new wetland area in the NHBZ.

## **Step 3: Seeding and Planting**

The species used should be native and suitable to the soil and moisture conditions of the Buffers and Wetland. Seed mixes should be designed to facilitate growth of appropriate and sustainable species. An initial seed mix for the Upland Buffer, Wetland, and Wetland Buffer is presented below but may be changed based on the agronomic assessment results. Seeding can be accomplished using both broadcasting and drilling techniques, following final contouring and amendment application/incorporation, if appropriate. If seed is broadcast, a light disc harrowing (Upland Buffer) perpendicular to the flow of energy (wind and/or water) or hand raking (in the Wetland and Wetland Buffer) should immediately follow seeding to increase seed to soil contact and provide some protection from wind or water erosion and granivory, in addition to doubling the seeding rate. If seed is drilled, final drilling pass must occur on the contour, to create subtle ridges perpendicular to the flow of energy. The following guidelines are provided by the City of Fort Collins:

1. Prepare soil as necessary and appropriate for native seed mix species through aeration and addition of amendments, then seed in two directions to distribute seed evenly over the entire area. Drill seed all indicated areas as soon as possible after completion of grading operations.
2. If changes are to be made to the seed mix based on site conditions, then approval must be provided by a city Environmental Planner.
3. Appropriate native seeding equipment will be used (standard turf seeding equipment or agriculture equipment shall not be used).
4. Drill seed application recommended per specified application rate to no more than ½ inch depth (or appropriate depth for selected species). For broadcast seeding instead of drill seeding

method, double the specified application rate.

5. After seeding, the area shall be covered with crimped straw, jute mesh, or other appropriate methods.

Planting of native shrubs in the Upland Buffer should occur to provide structural diversity. Species to be used should be approved by a city Environmental Planner. According to the NRCS Web Soil Survey, the following native shrubs, sub-shrubs, and agavoids are found on these soils and presumably would be appropriate to plant:

- Fourwing Saltbush (*Atriplex canescens*)
- Rubber Rabbitbrush (*Ericameria nauseosa* var. *nauseosa*)
- Winterfat (*Krascheninnikovia lanata*)
- Prairie Sagewort (*Artemisia frigida*)
- Soapweed Yucca (*Yucca glauca*)

Shrubs should be planted using industry Best Management Practices.

<b>UPLAND MIX</b>			
	<b>Common Name</b>	<b>Scientific Name</b>	<b>lbs/PLS/Acre</b>
<b>Wildflowers</b>	Plains coreopsis	<i>Coreopsis tinctoria</i>	0.17
	Purple Prairie Clover	<i>Dalea purpurea</i>	0.81
	Indian blanketflowe	<i>Gaillardia aristata</i>	1.85
	Rocky. Mtn. penstemon	<i>Penstemon strictus</i>	0.35
	Mexican hat	<i>Ratibida columnifera</i>	0.2
<b>Grasses</b>	Indian ricegrass	<i>Achnatherum hymenoides</i>	1.13
	Sideoats grama	<i>Bouteloua curtipendula</i>	1.15
	Buffalograss	<i>Bouteloua dactyloides</i>	3.27
	Blue grama	<i>Bouteloua gracilis</i>	0.25
	Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.95
	Prairie Junegrass	<i>Koeleria macrantha</i>	0.08
	Green needlegrass	<i>Nassella viridula</i>	1.01
	Switchgrass	<i>Panicum virgatum</i>	0.71
	Western Wheat	<i>Pascopyrum smithii</i>	1.61
	Sand dropseed	<i>Sporobolus cryptandrus</i>	0.04
		<b>Total for Upland Mix</b>	<b>13.58 lbs/PLS/Acre</b>
<b>Substitutes</b>	<b>ACCEPTABLE SUBSTITUTES FOR WILDFLOWERS</b>		
	Fringed sage ( <i>Artemisia frigida</i> )	0.03 lbs/PLS/Acre	
	Blue flax ( <i>Linum lewisii</i> )	0.41 lbs/PLS/Acre	
	Prairie aster ( <i>Machaeranthera tanacetifolia</i> )	0.25 lbs/PLS/Acre	
	<b>ACCEPTABLE SUBSTITUTES FOR GRASSES</b>		
	Canada wildrye ( <i>Elymus canadensis</i> )	1.59 lbs/PLS/Acre	
	Inland saltgrass ( <i>Distichlis stricta</i> )	0.35 lbs/PLS/Acre	
Mountain muhly ( <i>Muhlenbergia montana</i> )	0.11 lbs/PLS/Acre		
<b>Requirements</b>	*Contractor is responsible for locating and purchasing all species listed in mix. If a species can't be located, contractor must replace each missing species with the acceptable substitutions (listed above). Contractor is responsible for providing seed tags to appropriate City staff. This mix is based on 70 seeds/ square foot and is only calculated for one acre. This mix is based on the contractor using a drill seed application. Mix should be doubled if hand broadcasted. Contractor is responsible for calculating the appropriate seed amounts to purchase. Please note that the pounds per acre are in PLS (Pure Live Seed) and must be ordered that way. All materials furnished shall be free of Colorado State noxious weeds as defined in Article III, Section 21-40 of the Code of the City of Fort Collins.		

<b>WETLAND MIX</b>			
	<b>Common Name</b>	<b>Scientific Name</b>	<b>lbs/PLS/ Acre</b>
Wildflowers	Marsh sunflower	<i>Helianthus nuttallii</i>	1.51
	Pennsylvania smartweed	<i>Polygonum pensylvanicum</i> ( <i>Persicaria pensylvanica</i> )	3.13
	Goldenglow daisy	<i>Rudbeckia ampla</i>	1.36
	Blue verbena	<i>Verbena hastata</i>	0.2
Grasses	American sloughgrass	<i>Beckmannia syzigachne</i>	0.39
	Inland Saltgrass	<i>Distichlis stricta</i>	0.67
	Giant mannagrass	<i>Glyceria grandis</i>	0.27
	Fowl bluegrass	<i>Poa palustris</i>	0.35
	Prairie Cordgrass	<i>Spartina pectinate</i>	1.9
Wet Species	Spikerush	<i>Eleocharis palustris</i>	0.42
	Arctic rush	<i>Juncus balticus</i> ( <i>J. arcticus</i> )	0.03
	Hardstem bulrush	<i>Schoenoplectus acutus</i>	0.65
	Alkali bulrush	<i>Scirpus maritimus</i> ( <i>Bolboschoenus maritimus</i> )	1.14
	Common three-square	<i>Schoenoplectus pungens</i>	0.65
		<b>Total for Wetland Mix</b>	<b>12.68 lbs/PLS/Acre</b>
Substitutes	<b>ACCEPTABLE SUBSTITUTES FOR WILDFLOWERS</b>		
	Black-eyed Susan ( <i>Rudbeckia hirta</i> ) 0.19 lbs/PLS/Acre		
	Beebalm ( <i>Monarda fistulosa</i> var. <i>mentifolia</i> ) 0.23 lbs/PLS/Acre		
	If one or more species is unavailable, double the quantity of an available wildflower (In mix above).		
	<b>ACCEPTABLE SUBSTITUTES FOR GRASSES</b>		
	Salt and Pepper grass ( <i>Deschampsia caespitosa</i> ) 0.14 lbs/PLS/Acre		
	Switchgrass ( <i>Panicum virgatum</i> ) 1.35 lbs/PLS/Acre		
	Alkali sacaton ( <i>Sporobolus airoides</i> ) 0.20 lbs/PLS/Acre		
Requirements	<b>ACCEPTABLE SUBSTITUTES FOR WET SPECIES</b>		
	If one or more species is unavailable, double the quantity of an available wet species (In mix above).		
	<p>*Contractor is responsible for locating and purchasing all species listed in mix. If a species can't be located, contractor must replace each missing species with the acceptable substitutions (listed above). Contractor is responsible for providing seed tags to appropriate City staff. This mix is based on 100 seeds/ square foot and is only calculated for one acre. This mix is based on the contractor using a broadcast seed application. Contractor is responsible for calculating the appropriate seed amounts to purchase. Please note that the pounds per acre are in PLS (Pure Live Seed) and must be ordered that way. All materials furnished shall be free of Colorado State noxious weeds as defined in Article III, Section 21-40 of the Code of the City of Fort Collins.</p>		

<b>WETLAND BUFFER (MESIC) MIX</b>			
	<b>Common Name</b>	<b>Scientific Name</b>	<b>lbs/PLS/ Acre</b>
Wildflowers	Smooth aster	<i>Aster laevis</i>	0.19
	White prairie clover	<i>Dalea candida</i>	0.65
	Purple Prairie Clover	<i>Dalea purpurea</i>	0.81
	Indian blanketflower	<i>Gaillardia aristata</i>	1.85
	Black-eyed Susan	<i>Rudbeckia hirta</i>	0.14
Grasses	Big Bluestem	<i>Andropogon gerardii</i>	1.3
	Salt and pepper grass	<i>Deschampsia caespitosa</i>	0.07
	Inland Saltgrass	<i>Distichlis stricta</i>	0.35
	Streambank wheatgrass	<i>Elymus lanceolatus ssp. Lanceolatus</i>	1.36
	Switchgrass	<i>Panicum virgatum</i>	0.71
	Western Wheatgrass	<i>Pascopyrum smithii</i>	1.61
	Fowl bluegrass	<i>Poa palustris</i>	0.18
	Little Bluestem	<i>Schizachyrium scoparium</i>	0.7
	Yellow Indiangrass	<i>Sorghastrum nutans</i>	1.38
	Prairie Cordgrass	<i>Spartina pectinata</i>	1
		<b>Total for Mesic Mix</b>	<b>12.31 lbs/PLS/Acre</b>
Substitutes	<b>ACCEPTABLE SUBSTITUTIONS FOR WILDFLOWERS</b>		
	Mexican hat ( <i>Ratibida columnifera</i> )	0.10 lbs/PLS/Acre	
	Marsh sunflower ( <i>Helianthus nuttallii</i> )	0.56 lbs/PLS/Acre	
	Beebalm ( <i>Monarda fistulosa</i> var. <i>menthifolia</i> )	0.09 lbs/PLS/Acre	
	<b>ACCEPTABLE SUBSTITUTIONS FOR GRASSES</b>		
	American sloughgrass ( <i>Beckmannia syzigachne</i> )	0.20 lbs/PLS/Acre	
	Alkali sacaton ( <i>Sporobolus airoides</i> )	0.11 lbs/PLS/Acre	
		Prairie sandreed ( <i>Calamovilfa longifolia</i> )	0.67 lbs/PLS/Acre
Requirements	*Contractor is responsible for locating and purchasing all species listed in mix. If a species can't be located, contractor must replace each missing species with the acceptable substitutions (listed above). Contractor is responsible for providing seed tags to appropriate City staff. This mix is based on 70 seeds/ square foot and is only calculated for one acre. This mix is based on the contractor using a drill seed application. Mix should be doubled if hand broadcasted. Contractor is responsible for calculating the appropriate seed amounts to purchase. Please note that the pounds per acre are in PLS (Pure Live Seed) and must be ordered that way. All materials furnished shall be free of Colorado State noxious weeds as defined in Article III, Section 21-40 of the Code of the City of Fort Collins.		

#### **Step 4: Maintenance and Management**

Maintenance and management activities should be implemented to ensure success of the ecological restoration project. After seeding, the area shall be covered with crimped straw, jute mesh, or other appropriate soil surface stabilization methods. Temporary irrigation will be used until seed is established; an irrigation plan will be prepared prior to seeding. The irrigation system for seeded areas shall be fully operational at the time of seeding and shall ensure 100% head-to-head coverage over all seeded areas. A weed management plan should be implemented to ensure that weeds are properly managed before, during, and after seeding activities. Particular attention should be paid Canada thistle (*Cirsium arvense*) in the Upland and Wetland Buffers, and perennial pepperweed (*Lepidium latifolium*) in the Wetland. Overall, the contractor shall monitor seeded area for proper irrigation, erosion control, germination and reseeding as needed to establish cover.

### **Step 5: Monitoring and Completion**

The Upland Buffer, Wetland, and Wetland Buffer will be monitored twice a year (once in the middle and once at the end of the growing season), for a period of three years following construction and planting. Restored vegetation communities will be considered established when seventy percent vegetative cover is reached with no larger than one foot square bare spots and/or until deemed established by city planning services and erosion control. The developer and/or landscape contractor is responsible for adequate seedling coverage and growth at the time of final stabilization, as defined by state and local agencies. If final stabilization is not achieved to the satisfaction of the agency, the developer and/or landscape contractor shall be responsible for additional corrective measures to satisfy final vegetative requirements for closeout.