



Nissen Reservoir Channel *Weed Management Plan*

BROOMFIELD COUNTY, COLORADO

DHM DESIGN

March
2019

Prepared By: DHM DESIGN

Table of Contents

FOREWARD	1
INTRODUCTION	1-2
VEGETATIVE ZONES.....	2
METHODS.....	2-3
RESULTS.....	2-3
Table 1.0 Noxious and nuisance Weed Species	3
RIPARIAN ZONE	3-4
Table 1.1 Riparian Zone Noxious and Nuisance Vegetation	4
UPLAND ZONE	4-5
Table 1.2 Upland Zone Noxious and Nuisance Vegetation	5
TURF ZONE	5
Table 1.3 Turf Zone Noxious and Nuisance Vegetation	5
DISTRIBUTION PATTERNS.....	6
Table 2.0 Nissen Reservoir Channel Weed Distribution	6-8
MANAGEMENT RECCOMENDATIONS	8-9
Table 3.0 Nissen Channel Weed Management Recommendations.....	10-12
IMPLEMENTATION PLAN.....	12-13
Table 4.0 Implementation Plan for Nissen Reservoir Channel Weeds	13-14
POST CONSTRUCTION WEED MANAGEMENT	14
CONCLUSIONS	15
CITATIONS	16
APPENDIX A – WEED MANAGEMENT MAP	18-19
APPENDIX B – PHOTO POINT DOCUMENTATION	20-21

FOREWORD

Invasive non-native plants are widely recognized as diminishing agricultural productivity and ecological functions across the state of Colorado and throughout the western U.S. (Colorado Department of Agriculture, 2000). Due to this threat, the Colorado Noxious Weed Act was implemented which requires each county in Colorado to adopt a weed management plan (WMP). The state defines a noxious weed as: “an alien plant or parts of an alien plant that have been designated by rule as being noxious or has been declared a noxious weed by a local advisory board, and meets one of more of the following criteria: (a) aggressively invades or is detrimental to economic crops or native plant communities; (b) is poisonous to livestock; (c) is a carrier of detrimental insects, diseases, or parasites; (d) the direct or indirect effect of the presence of this plant is detrimental to the environmentally sound management of natural or agricultural ecosystems.”

Broomfield County refers to the Colorado Department of Agriculture management recommendations for the control of state listed noxious species that exist in Broomfield County. This Weed Management Plan has been developed according to the Noxious Weed Act and it was used as the guiding document for the identification of noxious weeds and the prioritization of noxious weed control for the Nissen Reservoir Channel Project. All management recommendations in this report are based on an “Integrated Management Plan” (IMP) approach, which incorporates a variety of methods to control noxious vegetation and promote desirable plant communities. The goal of this report is to provide an effective management plan for the control of noxious weeds and any other undesirable vegetation for the Nissen Reservoir Channel Restoration.

INTRODUCTION

The City and County of Broomfield, Urban Drainage and Flood Control District, and Icon Engineering are working together to improve flood control and function of a section of Nissen Channel below Nissen Reservoir. The portion of the Nissen Reservoir Channel that was evaluated is located in Section 31, Township 1 South, Range 68 west in southeast Broomfield, Colorado in Broomfield County. The channel reach located in the Project Area extends from Lowell Boulevard to Tennyson Street and the entire Nissen Channel flows southeast from Nissen Reservoir to Big Dry Creek. The elevation of the Project Area is approximately 5,420 feet. The City of Broomfield averages 14.36 inches of precipitation per year. The average high temperature is 68° F and the average low temperature is 37° F. The City of Broomfield is classified in USDA plant hardiness zone 6a.

The proposed improvements include new channel design and alignment to improve sinuosity and flood control. Significant ground disturbance is anticipated as part of the proposed improvements. The purpose of this weed management plan is to identify and locate noxious and nuisance weed species as they exist on the property, provide

management recommendations for control including a detailed implementation schedule, and best management practices for construction activities.

VEGETATIVE ZONES

For the purpose of developing a weed management plan for the property, a broad classification was used to define and map “vegetation zones”. Vegetation zones also correspond to how the property is currently used and how it will be used and managed going forward. Classification of vegetation zones was made through aerial imagery, previous property visits, and observations made during the weed inventory. These zones will help guide weed management priorities and strategies. There were (3) vegetation zones mapped on the property that include: Riparian (~3.8 acres), Upland (~2.2 acres) and Turf (~1.3 acres) (Appendix 1).

METHODS

An inventory of noxious weeds inventory was made on September 19th, 2018 by DHM Design Ecological Services. The Colorado noxious weed list was used as a reference to identify problem weed species on the property. During the inventory, an aerial image of the property was used to visually identify the extent of the property. The entire property and the adjacent surrounding properties were walked on foot and observations for weed species, locations and densities were made. Representative photos of the weeds encountered were taken along with GPS coordinates of each photo location. When large patches of weeds were observed, a GPS unit was used to capture the approximate perimeter of these patches. General notes/observations about the occurrence and distribution patterns of noxious weeds and any other undesirable vegetation was recorded during the inventory.

After completing field work, a Geographical Information System (GIS) was used to map: 1) location of vegetation zones; 2) location of photo points; and 3) location of weed patches. These features were compiled on a map using a satellite base image acquired from ArcMap 10.6 dated August of 2017. Based on the results of this initial inventory, management recommendations for the control of weeds observed within each of the vegetation zone are provided. These recommendations are based on various land management resources including: Colorado Weed Management Association, Colorado State University Extension, Colorado Parks and Wildlife, Colorado Department of Agriculture, and the U.S. Forest Service (*see Citations*).

RESULTS

A total of (11) species classified as noxious in Colorado were observed throughout the Nissen Reservoir Channel during the inventory. (see table 1.0).

TABLE 1.0 Noxious and Nuisance Weed Species Observed

Species Name (Common/Scientific)	State Classification	Broomfield County Management Objective
Common Teasel (<i>Dipsacus fullonum</i>)	Noxious-List B	Suppression
Canada Thistle (<i>Cirsium arvense</i>)	Noxious-List B	Suppression
Scotch Thistle (<i>Onopordum acanthium</i>)	Noxious-List B	Suppression
Musk Thistle (<i>Carduus nutans</i>)	Noxious-List B	Eliminate by 2020
Houndstongue (<i>Cynoglossum officinale</i>)	Noxious-List B	Eliminate by 2020
Cheatgrass (<i>Bromus tectorum</i>)	Noxious-List C	Suppression
Field Bindweed (<i>Convolvulus arvensis</i>)	Noxious-List C	Suppression
Common Burdock (<i>Arctium minus</i>)	Noxious-List C	Suppression
Poison Hemlock (<i>Conium maculatum</i>)	Noxious-List C	Suppression
Chicory (<i>Cichorium intybus</i>)	Noxious-List C	Suppression
Russian-olive (<i>Elaeagnus angustifolia</i>)	Noxious-List B	Eliminate by 2022
Siberian Elm (<i>Ulmus pumila</i>)	Non-Native	N/A
Crack Willow (<i>Salix fragilis</i>)	Non-Native	N/A
Silver Poplar (<i>Populus alba</i>)	Non-Native	N/A
Prickly Lettuce (<i>Lactuca serriola</i>)	Non-Native	N/A
Kocia (<i>Kochia scoparia</i>)	Non-Native	N/A
Curly Dock (<i>Rumex crispus</i>)	Non-Native	N/A
Common Mallow (<i>Malva neglecta</i>)	Non-Native	N/A
White Sweet Clover (<i>Melilotus albus</i>)	Non-Native	N/A
Red Clover (<i>Trifolium pratense</i>)	Non-Native	N/A
Black Medick (<i>Medicago lupulina</i>)	Non-Native	N/A

Each zone contained a similar assemblage of noxious vegetation however there are some differences between the different vegetation zones. These are listed in *Tables 1.1, 1.2, and 1.3*. There were also (10) additional non-native weed species observed on the property that are not classified as noxious in Colorado. The occurrence and distribution patterns of all of these species within each vegetation zone are given in *Table 2.1*, and an overview map and photo documentation are provided in *Appendix A - Weed Management Map* and *Appendix B - Photo Documentation*.

RIPARIAN ZONE

The Riparian Zone is approximately 3.8 acres in size and includes all vegetation within and immediately adjacent to Nissen Channel. Overstory within the Riparian Zone is primarily composed of plains cottonwood (*Populus deltoids*), narrowleaf cottonwoods (*Populus angustifolia*), and coyote willow (*Salix exigua*) is the primary shrub. Understory is dominated by noxious vegetation in some areas and a mixture of native and non-native grasses in other areas. Little aquatic vegetation was observed with

the exception of cattails (*Typha sp.*) and soft-stem bulrush (*Schoenoplectus tabernaemontani*) occurring most frequently. Moss and algae were observed throughout the channel.

All Noxious and nuisance vegetation observed within the Riparian Zone is shown on Table 1.1 below. The dominant species observed included common teasel (*Dipsacus fullonum*) and curly dock (*Rumex crispus*). Common teasel was observed in high densities East and West of Perry Street. Musk thistle (*Carduus nutans*), Scotch thistle (*Onopordum acanthium* and Canada thistle (*Cirsium arvense*) were all observed in medium to high densities throughout this zone, primarily on the periphery between the Riparian and Upland Zones. Russian olive (*Elaeagnus angustifolia*) was found in higher densities between Perry Street and Lowell Boulevard.

TABLE 1.1 Riparian Zone Noxious and Nuisance Vegetation

Scientific Name	Common Name	¹ State List Status	² Broomfield County Management Objective
Vegetative Riparian Corridor			
<i>Cirsium arvense</i>	Canada Thistle	B	Suppression
<i>Onopordum acanthium</i>	Scotch thistle	B	Eradication
<i>Carduus nutans</i>	Musk thistle	B	Eradication
<i>Conium maculatum</i>	Poison hemlock	C	Suppression
<i>Lactuca serriola</i>	Prickly Lettuce	N/A	Containment
<i>Kochia scoparia</i>	Kochia	N/A	Containment
<i>Rumex crispus</i>	Curly Dock	N/A	Containment
<i>Dipsacus fullonum</i>	Common Teasel	B	Eradication
<i>Malva neglecta</i>	Common Mallow	N/A	Containment
<i>Arctium minus</i>	Common Burdock	C	Containment

UPLAND ZONE

The Upland Zone is approximately 2.2 acres in size and encompasses areas to the north and south of the riparian zones throughout the inspected area with the exception of the turf zone. This area was dominated by noxious vegetation or grasses. Where dominated by grasses, both native and non-native grasses were observed with smooth brome (*Bromus inermis L.*), western wheatgrass (*Pascopyrum smithii*), and Kentucky bluegrass (*Poa pratensis*) occurring the most frequently. The dominant noxious vegetation observed in these areas include Canada thistle (*Cirsium arvense*) and musk thistle (*Carduus nutans*). A complete list of noxious vegetation observed within the upland zone is included below in Table 1.2. Areas adjacent to the upland zones were inspected for additional threats and sources. Nuisance and noxious vegetation in the open space adjacent to the west end of the property consisted primarily of smooth brome, common teasel, and Canada thistle. The properties adjacent on the east end consisted primarily of Canada thistle and smooth brome.

TABLE 1.2 Upland Zone Noxious and Nuisance Vegetation

Scientific Name	Common Name	¹ State List Status	² Broomfield County Management Objective
<i>Cirsium arvense</i>	Canada Thistle	B	Suppression
<i>Onopordum acanthium</i>	Scotch thistle	B	Eradication
<i>Carduus nutans</i>	Musk thistle	B	Eradication
<i>Convolvulus arvensis</i>	Field Bindweed	C	Suppression
<i>Cichorium intybus</i>	Chicory	C	Suppression
<i>Lactuca serriola</i>	Prickly Lettuce	N/A	N/A
<i>Kochia scoparia</i>	Kochia	N/A	Containment
<i>Dipsacus fullonum</i>	Common Teasel	B	Eradication
<i>Arctium minus</i>	Common Burdock	C	Containment
<i>Medicago lupulina</i>	Black Medic	N/A	Containment
<i>Bromus tectorum</i>	Cheatgrass	C	Suppression

Notes: NL = Not Listed

TURF ZONE

The Turf Zone is dominated by a bluegrass species (*Poa pratensis spp.*). This majority of this zone is located on the far western side of the project area and is approximately 1.3 acres in size. There is a small section of turf located immediately south of the U-Haul facility. Noxious vegetation within this zone includes and cheatgrass (*Bromus tectorum*). These species were observed to the east side of the paved trail. Additional nuisance species observed include red clover (*Trifolium pratense*), white sweet clover black medic (*Medicago lupulina*), and Common Mallow (*Malva neglecta*). A complete list of noxious and nuisance vegetation for the Turf Zone is included in Table 1.3 below.

TABLE 1.3 Turf Zone Noxious and Nuisance Vegetation

Scientific Name	Common Name	¹ State List Status	² Broomfield County Management Objective
Non-Irrigated Agricultural Zone			
<i>Malva neglecta</i>	Common Mallow	NL	Containment
<i>Arctium minus</i>	Common Burdock	C	Containment
<i>Trifolium repens</i>	White sweet clover	NL	N/A
<i>Trifolium pratense</i>	Red Clover	NL	N/A
<i>Medicago lupulina</i>	Black Medic	NL	Containment
<i>Bromus tectorum</i>	Cheatgrass	C	Suppression

Notes: NL = Not Listed

¹State List Status: Under the CO Noxious Weed Act, the state designates noxious weed species and categorizes them based on priority for management in Colorado. List B includes plants whose continued spread in Colorado should be halted. List C plants are those which local government has the authority to decide the management strategy.

²Broomfield County Management Objective: Broomfield County has established management objectives for state listed (B) noxious weeds that occur in the county. Objectives include:

Eradication = Reducing the reproductive success of a noxious weed species or specified noxious weed population in largely un-infested regions to zero and permanently eliminating the species or population with a specified period of time. Once all specified weed populations are eliminated or prevented from reproducing, intensive efforts continue until the existing seed bank is exhausted.

- Containment = confinement of populations of a weed to a defined area
- Suppression = Reducing the vigor of noxious weed populations within an infested region, decreasing the propensity of noxious weed species to spread to surrounding lands, and mitigating the negative effects of noxious weed populations on infested lands. Suppression efforts may employ a wide variety of integrated management techniques.

DISTRIBUTION PATTERNS

Table 2.0 provides a brief description of observed patterns of noxious and other weed occurrences on the Nissen Channel Project. Specific photo points are referenced as they pertain to a particular species and its distribution on the property. Also included are specific notes about growth patterns for each species. Any areas on the property with a higher density of weeds or any specific weed patches are provided in Appendix 1.

TABLE 2.0 NISSEN RESERVOIR CHANNEL WEED DISTRIBUTION

Common Name	Growth Notes	Distribution within Zone
Canada Thistle	A perennial species that emerges from its root system from late April-May, flowering from late spring-summer.	This species is in high densities in the upland areas located near Lowell Boulevard. <i>Photo point 4.</i>
Common Teasel	A tall, somewhat spiny, short-lived perennial or biennial that dies after it goes to seed. Emerges from its root system from late April-May, flowering from late spring-summer.	This is the most dominant species throughout the project area. It is found in high densities directly east of Perry Street and in other various spots within the Riparian Zone. <i>Photo points 2, 6, 11</i>

Nissen Channel Reservoir Weed Management Plan - 2018

Common Name	Growth Notes	Distribution
Houndstongue	A short-lived perennial or biennial that produces basal rosettes in the first year, and produces a 1-4' stem by the second year. Flowering occurs from May-July. This species only reproduces by seed.	This species is found in higher densities east of Perry Street along both sides of Nissen Channel.
Common Mallow	A winter annual, biennial, or perennial that reproduces by seed.	This species is found primarily in the turf area and the upland area to the north of the turf area. <i>Photo point 12.</i>
Field Bindweed	A creeping perennial that reproduces by seed and rhizomes.	This species was observed in low densities south of the U-Haul facility.
Scotch Thistle	A perennial species that emerges from its root system from late April-May, flowering from late spring-summer.	This species was found throughout the project area in small high density patches. There are multiple patches located on the periphery of the Riparian Zone and Upland Zone. <i>Photo point 7.</i>
Musk Thistle	A perennial species that emerges from its root system from late April-May, flowering from late spring-summer.	This species was also found throughout the project area in high density patches. There is a large patch located along Nissen Channel in the transition area between Riparian and Upland Zones.
Common Burdock	A biennial species, Burdock is a tall, unmistakable plant. It flowers from July until frost, and reproduces by seed.	This species is primarily concentrated on the eastern portion of the project area between Perry Street and Lowell. <i>Photo point 3.</i>
Poison Hemlock	This species is a biennial, forming large basal rosettes in the first year, and in the second year it bolts an erect stem that is 4-8' tall. It flowers in June and July and produces fruit in August and September.	This species was observed in low densities and only in the forested area located south of the U-Haul facility.

Common Name	Growth Notes	Distribution
Black Medic	Annual or short-lived perennial that emerges as March or April, depending on the weather. Flowering and seed production begin within 6 weeks after seedlings emerge.	This species was observed in moderate densities on the west side of the project area between the Turf and Riparian Zones.
Red Clover	An annual or biennial, red clover starts growing in the early spring (April) and flowers in May -June.	This species was observed in low densities on the west side of the project area within the turf zone. <i>Photo point 15.</i>
White Sweet Clover	An annual or biennial, white sweet clover starts growing in the early spring (April) and flowers in May -June.	This species was observed in low densities on the west side of the project area within the turf zone. <i>Photo point 14.</i>
Curly Dock	A robust perennial with a deep, fleshy taproot. The plant initially forms a basal rosette of lance-shaped leaves; it later bolts, sending up an erect flower stalk that can reach 5 feet in height.	This species was observed in moderate densities east and west of Perry Street. It is also found close to Lowell Blvd. <i>Photo point 3.</i>
Kochia	This species is an annual with a deep taproot that forms a tumbleweed and reproduces from seed.	This species was observed in small densities and contained mostly to the area directly south of the residential zone on the north central part of the project area. <i>Photo point 16.</i>
Prickly Lettuce	This species is an annual or biennial that can grow up to 3-5 feet. It starts growing in April or May and flowers in July to September.	This species was observed in moderate densities throughout the project area. A large patch was observed just west of Perry Street. <i>Photo point 9.</i>
Chicory	Chicory is a deeply rooted erect, branching, biennial or perennial, warm-season forb, from 1 to 6 feet tall with milky sap. Long fleshy taproot. Flowers from June - August. Flowers are lavender in color.	This species was observed in low densities west of Perry Street to the U-Haul facility.

MANAGEMENT RECOMMENDATIONS

The priority species for control at Nissen Channel are common teasel and the three species of thistle. Found in high densities throughout the project area, these species will spread aggressively once the soil is disturbed. Although teasel is not known to have allelopathic properties, it is aggressively competitive. An opening within the vegetation coupled with light soil disturbance is an invitation for

invasion. Canada thistle is found in abundance towards the western end of the project area.

The other species of noxious weeds observed during the inventory were either sparsely distributed or concentrated in specific areas. Control of these species will prevent them from becoming widespread and potentially destructive to the ecological values of the property. The observed species list in this report was from a snapshot in time, many additional species that were not encountered during the site visit may be encountered at various stages of the project and an adaptive management will be critical for long-term weed control.

Noxious and non-native grasses including cheatgrass and smooth brome are found in high densities throughout the project area. It will be critical to aggressively manage these species to establish and maintain other desirable grass species.

Specific management recommendations for each noxious and nuisance weeds are included in Table 3.0 below. These recommendations are meant to eradicate and suppress noxious weeds and allow desirable plant communities to persist. The strategy to implement these recommendations on the property is given in the next section (Implementation Plan). Management recommendations are based on an integrated weed management approach that uses a combination of techniques to suppress weeds (Colorado Dept. of Agriculture, 2017). The specific techniques recommended for use in combination on the property are: Prevention (limiting soil disturbance to the extent possible), Cultural (promoting desirable plant communities), Hand Pulling, Mechanical (mowing and cutting), Chemical (application of herbicides), and monthly/yearly Monitoring (to track progress and current patterns of weed distribution).

When construction is complete and during the first year of weed management, it is highly recommended that *only* mechanical treatment and hand-eradication techniques are utilized to allow for adequate establishment of young native vegetation. Invasive species should be allowed to reach a height of 6 - 12 inches (or before seed development, whichever comes first) prior to initiating removal to allow for soil stabilization and to protect young native vegetation. Species specific management strategies included in Table 3.0 are for both short and long-term management and therefore include both mechanical and chemical treatment strategies.

TABLE 3.0 NISSEN CHANNEL WEED MANAGEMENT RECOMMENDATIONS

Common Name	Management Recommendations
Canada Thistle	<p>The key to control requires repeatedly stressing established plants to diminish their energy reserves and to eliminate the seed bank. Repeated applications of herbicide and mechanical control is a good strategy to suppress this species. In late spring, newly emerged rosettes should be sprayed with an herbicide. In early summer, any above ground thistles should be cut to the ground before they go to seed. In mid-summer, a follow-up herbicide application to re-treat already sprayed plants and to treat any missed plants. During the fall, and after the first frost, another follow-up spray to re-treat already sprayed plants and to treat any individuals missed during the other applications. The fall spray is particularly important because the herbicide will have the maximum effect on the root system during this time of year.</p>
Musk Thistle	<p>The key to control requires repeatedly stressing established plants to diminish their energy reserves and to eliminate the seed bank. Repeated applications of herbicide and mechanical control is a good strategy to suppress this species. In late spring, newly emerged rosettes should be sprayed with an herbicide. In early summer, any above ground thistles should be cut to the ground before they go to seed. In mid-summer, a follow-up herbicide application to re-treat already sprayed plants and to treat any missed plants. During the fall, and after the first frost, another follow-up spray to re-treat already sprayed plants and to treat any individuals missed during the other applications. The fall spray is particularly important because the herbicide will have the maximum effect on the root system during this time of year.</p>
Scotch Thistle	<p>Like Canada thistle, the key to controlling Scotch requires repeatedly stressing established plants to diminish their energy reserves and to eliminate the seed bank. Repeated applications of herbicide and mechanical control is a good strategy to suppress this species. In late spring, newly emerged rosettes should be sprayed with an herbicide. In early summer, any above ground thistles should be cut to the ground before they go to seed. In mid-summer, a follow-up herbicide application to re-treat already sprayed plants and to treat any missed plants. During the fall, and after the first frost, another follow-up spray to re-treat already sprayed plants and to treat any</p>

individuals missed during the other applications. The fall spray is particularly important because the herbicide will have the maximum effect on the root system during this time of year.

Common Teasel	Control and containment methods recommended for the larger teasel infestation that exists on the property. The perimeter of large infestations should be treated first to prevent the infestation from spreading. A combination of mechanical, cultural and chemical methods will be most effective in control. Apply a pre-emergent herbicide and treat with herbicide when in the seedling or rosette stage. Apply additional herbicide for missed plants and seedlings throughout the growing season.
Poison Hemlock	This species prefers wet habitats and can be controlled with repeated mowing's to deplete root reserves and decrease seed production. Chemical control is highly effective when done in early spring and/or late fall.
Houndstongue	A late spring - early summer application of herbicide, frequent cutting, or removal before plants got to seed will prevent the spread of Houndstongue. Additional herbicide treatments and mechanical removal of the plant throughout the growing season will be necessary for control.
Chicory	Chicory is best controlled using herbicide early in the season to young plants. Deep tillage is also effective in removing existing infestations. There was minimal chicory observed on the property.
Field Bindweed	There were only a few areas where this species occurred close to the U-Haul facility. Effective control requires repeatedly stressing the plant, especially during the early seedling stage. Care should be taken to not cut into the root system as this can cause it to spread more rapidly. Maintaining a healthy cover of desirable species in areas with field bindweed can help prevent this species from spreading rapidly.
Common Burdock	Common burdock can be effectively controlled through use of herbicide treatments early in the growing season when the plant is in the rosette or bolting stage. Mechanical removal is effective in controlling smaller densities, removing the plant and root before it goes to seed is recommended.

Houndstongue A late spring – early summer application of herbicide, frequent cutting, or removal before plants got to seed will prevent the spread of Houndstongue.

Cheatgrass Cheatgrass can be effectively controlled by cutting every two to three weeks, progressively cutting it shorter each time. In combination with the use of herbicide in the fall between the first frost and first heavy frost. Caution should be taken when spraying Cheatgrass that is among other grass species, and is a better tool when there is a monoculture of Cheatgrass. The planting of aggressive native perennial grasses can also help to compete with Cheatgrass.

IMPLEMENTATION PLAN

Combating noxious weeds and other undesirable vegetation is a long-term endeavor that requires persistence and yearly monitoring. Yearly monitoring is critical so the success of management actions and current patterns of weed infestations can be tracked. This information allows the management plan to be tailored to current conditions so resources are used efficiently.

The implementation plan is based on the results of the 2018 weed inventory and provides a strategy to significantly improve current weed issues on the property as well as prevent future weed infestations post construction. This plan establishes the foundation for improving the condition of the current property and all species and control methods should be implemented post construction. All aspects of the plan can be tailored to meet any needs, considerations, or specific goals for future weed management on the property.

This implementation plan utilizes an integrated weed management approach. The specific techniques for this approach for Nissen Reservoir Channel include: Cultural, Prevention, Hand Pulling, Mechanical Control, Chemical Control, and Monitoring. The following summarizes how these techniques are to be accomplished at Nissen Reservoir Channel under the implementation plan.

1. **Cultural:** Immediately re-seed any areas of disturbance to establish desirable plant communities.
2. **Prevention:** Plan ahead to offset weed establishment from significant soil disturbances are expected to occur by immediately re-seeding with desirable species and closely monitoring these areas for weed establishment.
3. **Hand Pulling:** Targeted pulling of certain noxious weeds, for example musk thistle or teasel before they go to seed to reduce the available seed bank. Hand pulled weeds should be collected, bagged and removed from site to minimize spreading seeds or plant fragments.

4. **Mechanical:** Regularly mowing or cutting any annual weed species from going to seed. Targeted cutting (wire-trim) of weed species early in the summer and at select areas on the property to diminish the available seed bank. Cut weeds should be collected, bagged and removed from site to minimize spreading seeds or plant fragments.
5. **Chemical:** Specific application of herbicides at optimal time periods to knock back aggressive noxious weed species observed on the property.
6. **Monitoring:** Monitoring visits should be timed accordingly to track the distribution patterns of weed species and the success of management actions, i.e. during the first year when mechanical treatments are utilized, additional monitoring will be required.

An implementation schedule describing specific treatments and timeframes for those treatments for the Nissen River Channel is included in Table 4 below.

TABLE 4.0 IMPLEMENTATION PLAN FOR NISSEN RESERVOIR CHANNEL WEEDS

TIMING ¹	WEED MANAGEMENT ACTIVITIES
May 1st	<ol style="list-style-type: none"> 1. Depending on site conditions, construction schedule and planned earthmoving activities, identify a short-term management plan utilizing control methods described in table 3.0. 2. If no immediate soil disturbance is anticipated, proceed with early season survey of entire project area and locate areas where rosettes or seedlings exist.
May 15th	<ol style="list-style-type: none"> 1. Initial cut of Cheatgrass six inches from the ground. 2. Spot spray or boom spray for Canada thistle, musk thistle, and Scotch thistle <i>Photo points 4, 7, 10</i>. Spot spray areas where Canada Thistle is not dense mixed in with pasture grasses. Consider Boom spraying areas where there is raw dirt. 3. Spot spray for common teasel, common burdock, and curly dock. <i>Photo points, 1, 2, 3, 6, 11</i>.
June 1st	<ol style="list-style-type: none"> 1. Spot Spray or boom spray any missed Canada thistle, musk thistle, and Scotch thistle. 2. Second cut of Cheatgrass 4. Spot spray any missed common teasel, common burdock, and curly dock. 5. Spot spray or mechanically remove common mallow, red clover, white sweet clover and chicory. <i>Photo points 12, 14, 15</i> 5. Reseed areas with poor germination that are no longer under construction with approved seed mixes.
June 15th	<ol style="list-style-type: none"> 1. Third cut of Cheatgrass. 2. Monitoring visit to determine if implemented actions are successful and adapt plan if needed. Additional inventory if new or originally undetected weeds are present.
July 1st	<ol style="list-style-type: none"> 1. Determine if a fourth cut of Cheatgrass is needed, if so proceed with cutting. 2. Spot spray or boom spray for Canada thistle, musk thistle, and Scotch thistle (same areas previously treated). 3. Reseed areas with poor germination that are no longer under construction with approved seed mixes. 4. Spot spray common teasel, common burdock, and curly dock. Weed whip bolted plants bagging any flowers/seed.

July 15th	1. Monitoring Visit; track the success of management actions to this point in time.
August 1st	1. Spot spray or boom spray for Canada thistle, musk thistle, and Scotch thistle (same areas previously treated). 2. Spot spray red clover, white sweet clover, and common mallow.
August 15th	1. Spot spray or boom spray for Canada thistle, musk thistle, and Scotch thistle (same areas previously treated). 2. Reseed areas with poor germination that are no longer under construction with approved seed mixes.
September 1st	1. Monitoring Visit track the success of management actions and any areas needing additional treatments.
September 15th	1. Spot spray Canada thistle, musk thistle, and Scotch thistle (after first frost). 2. Spot spray Hoary Cress (after first frost). 3. Apply herbicide to Cheatgrass (after first frost). Reseed Cheatgrass areas with approved native grass seed mix.

Timing¹ = the dates given are approximate guidelines and are meant to be flexible and adjusted to current conditions.

POST CONSTRUCTION WEED MANAGEMENT

To accommodate for the restoration of the stream channel, large sections of the project area will undergo significant soil disturbance that will provide excellent opportunities for weed invasions post construction. Given the extensive seed bank that has developed over time on the property, it will be critical to aggressively combat noxious and nuisance vegetation in the future. This requires an extensive and pro-active weed management strategy to prevent weeds from invading these areas and to ensure the re-establishment of desirable vegetation. The best strategy is to re-seed/re-vegetate areas where germination from previous seeding is poor with desirable vegetation once construction is complete within a disturbed area - AND - to closely monitor for the presence of weed species, while concurrently controlling the weed species that are already present.

Monitoring visits are critical to prevent weed species from becoming established. Pre-contracted weed control services should be available to immediately react (herbicides/hand pulling) to any weed species detected during frequent monitoring visits. Additional spot seeding over time may be necessary to promote the establishment of desirable vegetation in disturbed areas. The success of this strategy will require close coordination between the contractors implementing construction, the weed monitor, and the weed control contractor. Best management practices such as cleaning off equipment (tracks, wheels, etc.) is recommended to prevent the spread of weeds.

CONCLUSIONS

Current weed densities are significant within the project area. The re-construction of the channel, restoration of the riparian corridor and other property improvements provide an excellent opportunity reduce existing densities and have a fresh start at weed control and management. Noxious weed management is a long-term effort, and repeated treatments over a growing season are needed to effectively limit seed production and spread of noxious vegetation. This management plan establishes the foundation for protecting the property from further harmful impacts of noxious weed invasions. The plan is dynamic and capable of adapting to changing patterns of weed invasions on the property now and into the future. Yearly monitoring visits will provide the basis of adapting the plan to meet the challenges presented by invading weed species. This will allow the best response to be implemented to changing conditions.

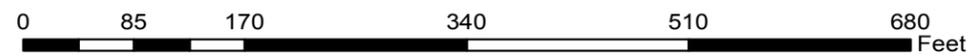
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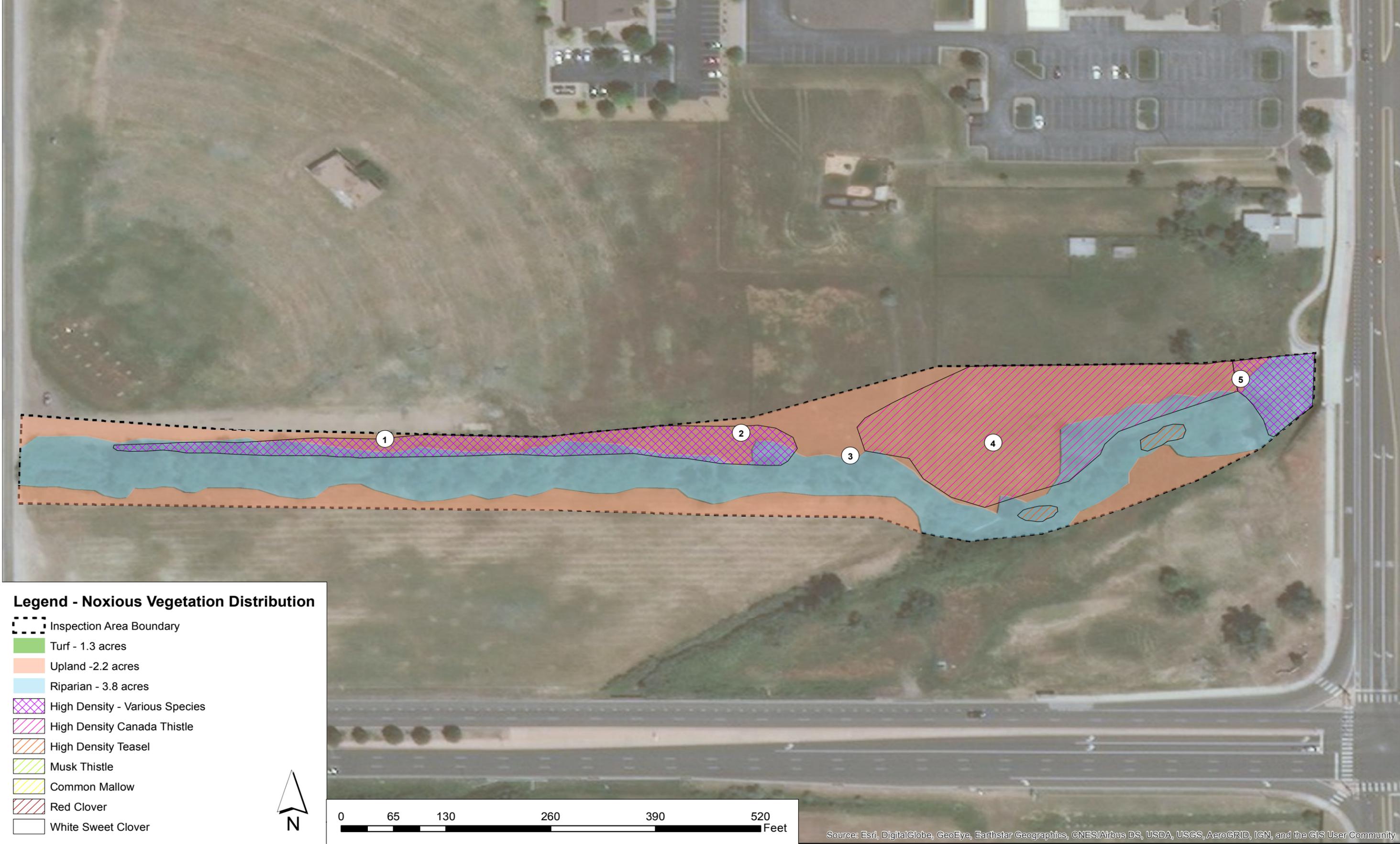


Legend - Noxious Vegetation Distribution

- Inspection Area Boundary
- Turf - 1.3 acres
- Upland - 2.2 acres
- Riparian - 3.8 acres
- High Density - Various Species
- High Density Canada Thistle
- High Density Teasel
- Musk Thistle
- Common Mallow
- Red Clover
- White Sweet Clover

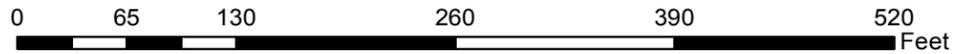


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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Appendix B. Photo Documentation

The following provides photo documentation of noxious and nuisance weeds within the Nissen Reservoir channel and surrounding areas.. The location of each photo point is represented in Appendix 1. Common and scientific names are given on first mention of a species and then common names are used thereafter. The photo points are organized by each mapped vegetation zone.



Photo Point 1 - View looking east from Perry Street at high density teasel and other weeds.



Photo Point 2 - View looking west at high density teasel and thistle area.



Photo Point 3 - View looking southeast at cheatgrass, teasel, Russian olive and common mallow.



Photo Point 4 - View looking east at a large zone of Canadian thistle.



Photo Point 5 - View looking east at Lowell Bridge. High density of various weed species including thistle, cattail, kochia and teasel.



Photo Point 6 - View looking southwest at high concentration of teasel and other weed species.



Photo Point 7 - View looking south at Scotch Thistle Patch.



Photo Point 8 - View looking at lambs quarter east of Perry Street.



Photo Point 9 - View looking at prickly lettuce located west of Perry Street.



Photo Point 10 - View looking at patch of musk thistle located at west end of project area.



Photo Point 11 - View looking west at thick patch of common teasel near residential area on west side of project area.



Photo Point 12 - View looking at common mallow located along path on west side of project.



Photo Point 13 - View looking east along Nissen channel. Cattail, curly dock, prickly lettuce and teasel shown in picture.



Photo Point 14 - View looking at white sweet clover located along sidewalk on east side of project area.



Photo Point 15 - View looking at red clover located along sidewalk on east side of project area.



Photo Point 16 - View looking at Kochia located near U-Haul facility fence.