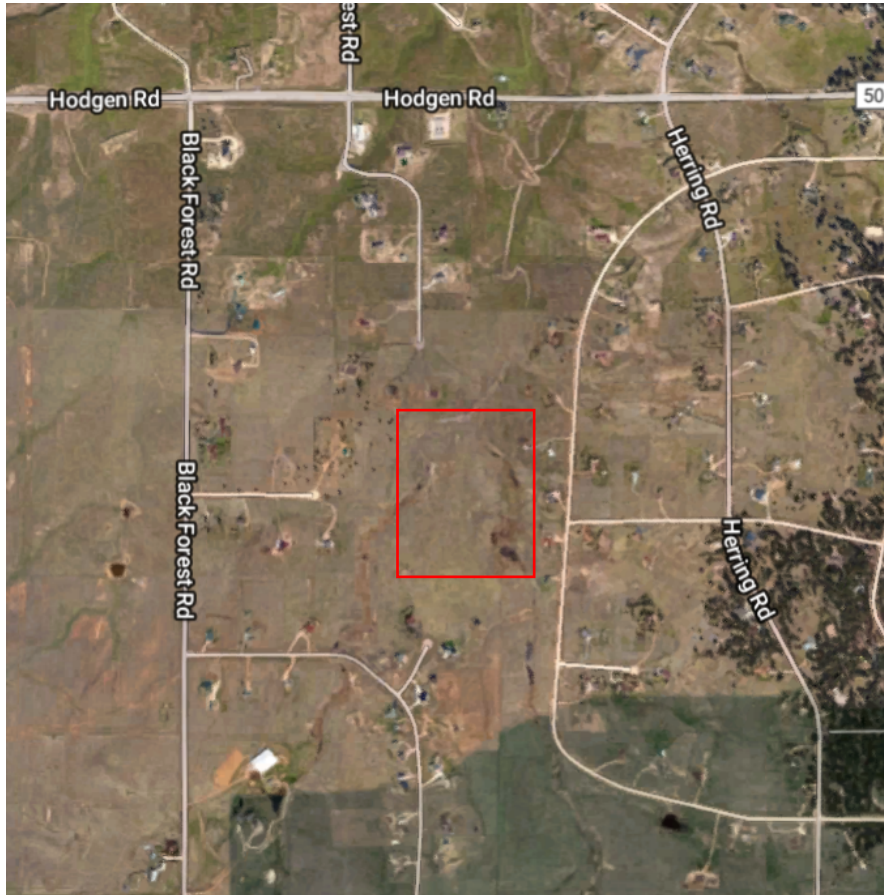


Terra Ridge North

Residential Community

Noxious Weed Management Plan



VICINITY MAP

Prepared By:
Lodestar Engineering, LLC
For:
Phillip & Jennifer Miles
15630 Fox Creek Lane
Colorado Springs, CO 80908

Developer:
Phillip & Jennifer Miles
15630 Fox Creek Lane
Colorado Springs, CO 80908

Civil Engineer:
Lodestar Engineering, LLC
PO Box 88461
Colorado Springs, CO 80908

Site Location, Size, Zoning:

The site lies directly north of Lots 5 & 6 in Terra Ridge Estates and is currently a 39.72-acre undeveloped site. The property is bounded by Ridgeview Acres to the north, Whispering Hills Estates to the west Wildwood Village to the east, and Terra Ridge Estates to the south. All lots surrounding the subject property are all zoned RR-5. The entire 39.72-acre parcel lies within unincorporated El Paso County and is currently zoned RR-2.5.

Management Goal:

The goal is to contain, suppress, and eradicate an infestation of noxious weeds that may be found in the developing community known as Terra Ridge North while promoting desirable self-sustaining native plant communities.

Weed Control Objective:

Through urbanized development, the use of properly timed herbicide applications, grazing, maintenance, and the possible establishment of a community of predacious insects within the property, any emerging noxious weeds can be mitigated early and the onset of dense growth can be greatly reduced in the following years. Also, well-defined thresholds are a critical element of integrated vegetation management.

Distinguishing Plant Features:

At this time, there have been no known noxious weeds identified within the Terra Ridge North by El Paso County weed management personnel. The property is currently undergoing urbanized development, regular ranching with grazing livestock, and mowed at least twice a year. Shall any evidence of noxious weeds emerge eradication efforts will begin utilizing the techniques as outlined in the El Paso County Weed Management Plan.

Control Methods:

Key control is to prevent noxious weeds from spreading. There are several options for noxious weed mitigation that include the use of integrated vegetation management techniques to control spread. a. Biological i. Insects: The Colorado Department of Agriculture Insectary in Palisade, CO can recommend the appropriate insect to release to establish a community of predatory insects that may assist in the suppression of diffuse knapweed on the property. Call the insectary at (866) 324-2963, or see the

Colorado Department of Agriculture website – Divisions – Conservation Services – Biological Pest Control Program. Once the insect community is well established on the property, they can have a great influence reducing noxious weed infestation. ii. Population establishment: An appropriate population of feeding insects may take 2-4 years to become established in an area protected from mowing and herbicide application such as under a grove of scrub oak or other woody shrubs. b. Mechanical/cultural Mowing: Regular mowing and maintenance to keep weeds from growing and spreading depending upon the species of noxious weed and the recommendations for mowing. c. Chemical: i. Aminopyralid (Milestone) ii. Clopyralid plus triclopyr (Redeem R&P) iii. 2,4-D plus Dicamba (Weedmaster) (The above control methods and the below timeframe are all listed on the State of Colorado Department of Agriculture Website search noxious weeds and fact sheets.)

Timeframe:

Herbicide control is most effective in early spring (May/June) when the rosette is bolting. Chemical control is not as effective during the flowering stage, which is July and August. A fall (September) herbicide application following the rainy season will successfully treat the new seedlings and rosettes.

Monitor:

The Terra Ridge North area shall be monitored to ensure the suppression of any new emerging noxious weeds.

Evaluation Methods:

Photographs/plant counts at permanent monitoring points are a good way to compare and ensure the decline of the infestation from one year to the next. In most cases, the suppression of an infestation will take several years with multiple treatments per year to kill the plants and reduce the seed bank in the soil. Successive sprouting of seeds in the soil from desirable plant groups will eventually re-vegetate bare soils until an optimum community of plants develops.

Analyze Effectiveness:

Management objectives are aided by monitoring, which assures that the treatment effects are gauged and shortfalls are corrected.

Assistance:

El Paso County weed management personnel are available for assistance as needed. Contact El Paso County at (719) 520-7879.



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NOXIOUS WEED REPORT
JENISHAY FARMS DEVELOPMENT
EL PASO COUNTY, COLORADO



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NOXIOUS WEED REPORT
JENISHAY FARMS DEVELOPMENT
EL PASO COUNTY, COLORADO

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1.0 INTRODUCTION

Smith Environmental and Engineering (SMITH) prepared this noxious weed report for Shay Miles, for the JeniShay Farms Development (Study Area) in unincorporated El Paso County, Colorado, in January 2020. The development will consist of nine lots. This report was written to support the requirements of El Paso County, and includes a) applicable weed management laws and regulations, b) an inventory of noxious weeds in the Study Area, c) and recommendations for management.

1.1 PROJECT LOCATION

The Study Area consists of 52.34 acres of land bounded by Ridgeview Acres to the north, Whispering Hills Estates to the west, Wildwood Village to the east, and Terra Ridge Estates to the south in the NE and SE quarter of the SW quarter of Section 29, Township 11 South, Range 65 West of the 6th Principal Meridian on the Black Forest US Geological Survey (USGS) quadrangle. The Study Area consists of three parcels: #5129302011, #5129302012, and #5129300002. Respectively, the current land uses are single family residence, vacant residential lots, and vacant land.

2.0 WEED MANAGEMENT

2.1 COLORADO NOXIOUS WEED ACT

The Colorado Noxious Weed Act (35-5.5-101-119 CRS) is the regulation that outlines management requirements for noxious weeds in the state. The Act requires all residents to control noxious weeds, though voluntary compliance is preferred over active enforcement. Local governments are charged with developing management plans and providing resources to landowners within their jurisdictions. The Act also establishes a noxious weed list with prioritized management goals for the weeds on the A, B and C Lists. List A species have been designated for state-wide eradication. List B species have targeted management plans designed to stop their spread. List C species also have targeted management plans, but the goal is not to stop the spread as these species have become too widespread for this to be realistic (Colorado Department of Agriculture 2018).

2.2 LOCAL REGULATIONS

Per the requirements of the Colorado Noxious Weed Act, the El Paso County Board of Commissioners established a local Noxious Weed Advisory Committee. The primary act of the committee is to develop and frequently evaluate an integrated weed management plan for noxious weeds with El Paso County. Though it is ultimately the responsibility of landowners to manage weeds on their property, the County plan strives to strengthen, support, and coordinate weed management efforts between private, municipal, county, state, and federal entities. Management efforts outlined in the County plan include prevention; inventory, mapping, and monitoring; control; restoration; and education and awareness (El Paso County 2017).

2.3 MANAGEMENT APPROACHES

The recommended approach for controlling noxious weeds is Integrated Weed Management (IWM). IWM combines the use of mechanical, cultural, biological, preventative, and chemical control techniques to eradicate weeds. Mechanical control involves physical removal by mowing, mulching, tilling, prescribed burning, grazing, and hand pulling. Cultural control involves enhancement of native plant community using methods such as revegetation or reduction in grazing. Biological control incorporates releasing beneficial insects which feed only on certain noxious weeds and well-managed grazing practices that target specific plants. Preventative techniques entail planting weed free seed, mulching with weed free material, cleaning machinery before moving between sites and controlling weeds prior to their setting seed. Chemical control involves the use of herbicides to destroy noxious weeds that do not adversely affect the desirable plant community.

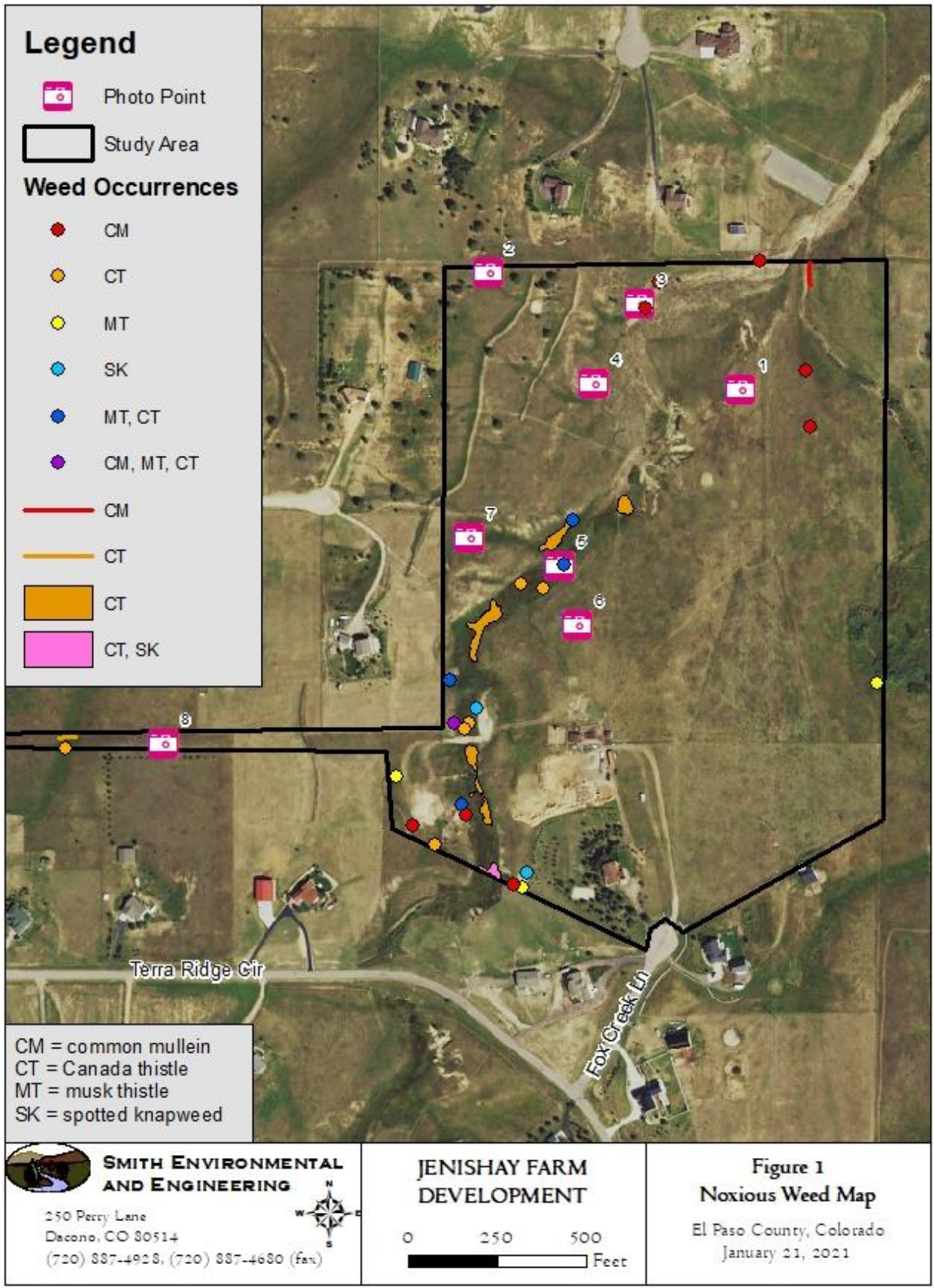
3.0 NOXIOUS WEED INVENTORY

The field survey for the noxious weed inventory was conducted on January 21, 2021. SMITH performed a pedestrian and windshield survey throughout the Study Area. SMITH drove and walked the Study Area and used a Trimble 3B Global Positioning Systems unit with TerraSync software to record the locations of infestations. Areas with sparsely distributed, isolated groupings of plants are noted on the map, but only by a point. Extensive infestations, even with lower densities, are indicated by polygons and polylines. The features were plotted on a map using ArcGIS.

SMITH observed four Colorado state-listed noxious weed species in the Study Area: three B-List species and one C-List specie (Table 1 and Figure 1). Canada thistle, common mullein, musk thistle, and spotted knapweed were all observed in low densities. It is important to note that this inventory was conducted in January when some individual plants and species are not readily observed. These and other species may occur more extensively than was observed.

TABLE 1
NOXIOUS WEEDS WITH POTENTIAL TO OCCUR IN THE STUDY AREA

Common Name	Scientific Name	State List	Observed in Study Area?
Bull thistle	<i>Cirsium vulgare</i>	B	No
Canada thistle	<i>Cirsium arvense</i>	B	Yes
Common mullein	<i>Verbascum thapsus</i>	C	Yes
Diffuse knapweed	<i>Centaurea diffusa</i>	B	No
Leafy spurge	<i>Euphorbia esula</i>	B	No
Musk thistle	<i>Carduus nutans</i>	B	Yes
Redstem filaree	<i>Erodium cicutarium</i>	C	No
Russian knapweed	<i>Acroptilon repens</i>	B	No
Spotted knapweed	<i>Centaurea stoebe</i>	B	Yes
Yellow toadflax	<i>Linaria vulgaris</i>	B	No



4.0 MANAGEMENT RECOMMENDATIONS

Identifying and inventorying noxious weeds on a property is important as the first step in management, because rarely can multiple species be managed with a single approach. A chemical pesticide applied to one species may have no effect on a different species, or the optimal seasonal timing of an application may vary for different species. Similarly, some species may be controlled effectively with mechanical removal, but others can actually spread if such techniques are used. Therefore, Table 2 presents targeted weed management approaches for each species observed in the Study Area. Adherence to these recommendations, which are adapted from the Colorado Department of Agriculture (2018), over several seasons should yield significant results in managing the current noxious weed infestations in the Study Area.

Active construction sites can yield additional opportunities for noxious weeds to establish and spread throughout a site. Frequent incoming vehicles, especially those with muddy tires or undercarriages, and large expanses of disturbed ground create ideal circumstances for introduction and establishment of many noxious weeds. Fortunately, there are several preventative techniques that can be implemented on construction sites to reduce the potential for new infestations and the expansion of existing populations.

- Prior to entry onto the property, all construction vehicles should be inspected and cleaned to ensure that they are free of soil and debris capable of transporting noxious weed seeds or roots.
- Potential areas of topsoil salvage should be assessed for presence and abundance of noxious weeds prior to salvage and replacement. Topsoil heavily infested with weeds can be chemically treated, removed from the site, or buried.
- Any fill materials or revegetation products, including topsoil, seed, mulch and soil conditioners (if needed), should be certified weed-free.
- Chemical control should only be performed by a certified applicator licensed with the Colorado Department of Agriculture. Applicators must follow all pertinent federal and state laws, including all pesticide label requirements.
- If possible, construction activities should be phased in order to minimize the amount of disturbed surface at any given moment. Construction traffic should also be restricted to established access roads, parking areas, and laydown yards.
- Noxious weed management activities should occur approximately twice per year; late spring and early fall are generally recommended, especially for chemical treatments, because most species are susceptible to management at one or both seasons. Management activities should occur before, during, and for at least one year after construction.
- Annual monitoring should be conducted to assess the effectiveness of the ongoing management activities. The weed inventory map should be updated to determine if new species have become established and if existing populations are being managed effectively. The results of the monitoring should inform the management approach for future treatments.

TABLE 2
NOXIOUS WEED MANAGEMENT

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
Bull thistle	<i>Cirsium vulgare</i>	B	Biennial forb that reproduces by seed. Flowers July to September.	Aminopyralid: Apply to rosettes through bolting in spring or to rosettes in fall. Chlorsulfuron: Apply from bolting to bud stage. Clopyralid: Apply to rosettes through bud stage in spring or rosettes in fall. Aminocyclopyrachlor + Chlorsulfuron: Apply from seedling to bolting.	Restore competitive forb and grass assemblage using locally adapted seeds. Include annuals and perennials, as well as warm and cool season grasses.	None currently approved for use in Colorado.	Hoeing, tilling, and digging can be effective on small populations if the root is severed below the soil surface. Mowing, chopping, and deadheading require several years of season-long treatment.
Canada thistle	<i>Cirsium arvense</i>	B	Deep-rooted perennial that spreads by seeds and rhizomes. Emerges late April through May. Flowers late spring to early summer.	Aminopyralid: Apply in spring until flowering and/or to fall regrowth. Clopyralid + Triclopyr: Apply from rosette to bud stage when all plants have emerged (spring or fall). Aminocyclopyrachlor + Chlorsulfuron: Apply in spring until flowering and/or to fall regrowth.	Prevent bare ground. Continually monitor for new infestations.	Cattle, goats and sheep will graze when plants are young and succulent. Methods for Canada thistle rust (<i>Puccinia punctiformis</i>) are being refined.	Mowing can be effective if done every 10-21 days throughout the growing season. Combining mowing with herbicides will further control.
Common mullein	<i>Verbascum thapsus</i>	C	Deep-rooted biennial that spreads by seed. Emerges in the spring. Flowers and	Chlorsulfuron: Apply to rosette stages in spring and/or in fall prior to bolting.	Prevent bare ground by cultivating native grasses and forbs. Continually	None currently approved for use in Colorado.	Hand pull or dig when soil is moist, prior to flowering and seed set.

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
			produces seeds June to August.	2,4-D + Picloram: Apply to rosette stages in spring and/or in fall prior to bolting. Picloram: Apply to rosette stages to early growth stages in spring or fall. Metsulfuron: Apply to rosette stages in spring and/or in fall.	monitor for new infestations.		
Diffuse knapweed	<i>Centaurea diffusa</i>	B	Biennial forb that reproduces exclusively by seed. Emerges in the spring or fall, flowers July through August, and seeds by mid-August.	Aminocyclopyrachlor + Chlorsulfuron: Apply pre-emergence or from seedling to mid-rosette stage. Aminopyralid: Apply in spring at rosette to early bolt stage, and/or to the rosette in fall. Clopyralid: Apply to rosette in spring or fall before the flowering stalk lengthens.	Establish native grasses and forbs to prevent it from colonizing.	The seedhead weevil (<i>Larinus minutus</i>) and root weevil fly (<i>Cyphocleonus achates</i>) can be effective for large infestations when used together.	Any method that severs the root below the surface. Mowing or chopping are effective when plants are in full bloom.
Leafy spurge	<i>Euphorbia esula</i>	B	Deep-rooted perennial that spreads by seeds and roots. Plants emerge in mid-April to late May, and flower from May to July.	Aminocyclopyrachlor + Chlorsulfuron with Diflufenzopyr + Dicamba: Apply at flowering in the spring and/or fall. Quinclorac with Diflufenzopyr + Dicamba: Apply at flowering in the spring and/or fall.	Prevent bare ground by cultivating native grasses and forbs.	Sheep and goats can be effective grazers. The flea beetles <i>Apthona nigriscutis</i> , <i>A. lacertosa</i> , and <i>A. cyparissiae</i> are effective when combined with	Mowing will reduce seed production if repeated every 2-4 weeks during the growing season, but will not provide long-term control.

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
				Aminocyclopyrachlor + Chlorsulfuron: Apply post emergence in spring until flowering and/or fall.		grazing and/or herbicides.	
Musk thistle	<i>Carduus nutans</i>	B	Biennial forb. Flowers from late May to June.	Aminopyralid: Apply in spring to rosette or early bolt stages, and/or in the fall to rosettes. Chlorsulfuron: Apply in spring to rosette through early flower growth stage. Clopyralid: Apply to rosettes through bud stage in spring or rosettes in fall.	Restore competitive forb and grass assemblage using locally adapted seeds. Include annuals and perennials, as well as warm and cool season grasses.	<i>Trichosirocalus borridus</i> is the only biological control agent available in Colorado.	Hoeing, tilling, and digging can be effective on small populations if the root is severed below the soil surface. Mowing, chopping, and deadheading require several years of season-long treatment.
Redstem filaree	<i>Erodium cicutarium</i>	C	Winter annual or biennial forb that primarily reproduces by seed. Flowers from March to April.	Metsulfuron: apply at rosette through early flower stage. 2,4-D + Dicamba: apply to rosettes.	Prevent bare ground, and establish native grasses and forbs.	None currently approved for use in Colorado.	Hand pulling or digging when soil is moist. Remove flowers before seed set.
Russian knapweed	<i>Acroptilon repens</i>	B	Deep-rooted perennial that spreads by rhizomes and seeds. Flowers from June to August.	Aminopyralid: Apply in fall when stems die back and root buds are susceptible. Can also apply in the bud to senescence stage, or during early bolt before buds form in the spring. Aminocyclopyrachlor + Chlorsulfuron: Apply in fall when stems die back	Prevent bare ground. Establish sod-forming grasses or vegetation with dense shade.	None currently approved for use in Colorado, but the gall midge, <i>Jaapiella ivannikovi</i> , is being developed.	Mowing several times before bolting stresses the plant, but will not eliminate infestations. Mowing with a fall herbicide application will enhance control.

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
				and root buds are susceptible. Can also apply in the bud to senescence stage, or during early bolt before buds form in the spring.			
Spotted knapweed	<i>Centaurea stoebe</i>	B	Short-lived perennial forb that reproduces mainly by seed. Flowers from June to October.	Aminocyclopyrachlor + Chlorsulfuron: Apply pre-emergence or from seedling to mid-rosette stage. Aminopyralid: Apply in spring to rosette to early bolt stage and/or in the fall to rosettes. Clopyralid: Apply to spring/fall rosettes before flowering stalk lengthens.	Prevent bare ground, and minimize disturbance and overgrazing.	The seedhead weevil (<i>Larinus minutus</i>) and root weevil fly (<i>Cyphocleonus achates</i>) can be effective for large infestations when used together.	Digging when soil is moist can be effective for small populations if repeated for several years. Mowing before seed set can stress the plant, but not kill it.
Yellow toadflax	<i>Linaria vulgaris</i>	B	Perennial forb that reproduces by seed and creeping roots. Flowers from July to September.	Aminocyclopyrachlor + Chlorsulfuron: apply at flowering into senescence. Picloram + Chlorsulfuron: apply at flowering into senescence.	Prevent bare ground, and establish native grasses and forbs.	<i>Calophasia lunula</i> , <i>Eteobalea intermediella</i> , and <i>Mecinus janthinus</i> are all available for use in Colorado.	Not recommended unless a single plant is observed.

*Seasonality of occurrence information from Colorado Weed Management Association 2017. Control measures from Colorado Department of Agriculture 2021.

5.0 REFERENCES

Colorado Department of Agriculture. 2021. Noxious Weed Species. Available online at: <https://www.colorado.gov/pacific/agconservation/noxiousweeds>. Accessed January 22, 2021.

Colorado Weed Management Association. 2017. Noxious Weeds of Colorado, 13th edition.

El Paso County. 2017. Noxious Weed Management Plan. Available online at: <https://communityservices.elpasoco.com/wp-content/uploads/Environmental-Division-Picture/Noxious-Weeds/Weed-Management-Plan-December-2017.pdf>. Accessed April 26, 2018.



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The Study Area consists of 52.34 acres of land bounded by Ridgeview Acres to the north, Whispering Hills Estates to the west, Wildwood Village to the east, and Terra Ridge Estates to the south in the NE and SE quarter of the SW quarter of Section 29, Township 11 South, Range 65 West of the 6th Principal Meridian on the Black Forest US Geological Survey (USGS) quadrangle. The Study Area consists of three parcels: #5129302011, #5129302012, and #5129300002. Respectively, the current land uses are single family residence, vacant residential lots, and vacant land.

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Per the requirements of the Colorado Noxious Weed Act, the El Paso County Board of Commissioners established a local Noxious Weed Advisory Committee. The primary act of the committee is to develop and frequently evaluate an integrated weed management plan for noxious weeds with El Paso County. Though it is ultimately the responsibility of landowners to manage weeds on their property, the County plan strives strengthen, support, and coordinate weed management efforts between private, municipal, county, state, and federal entities. Management efforts outlined in the County plan include prevention; inventory, mapping, and monitoring; control; restoration; and education and awareness (El Paso County 2017).

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The recommended approach for controlling noxious weeds is Integrated Weed Management (IWM). IWM combines the use of mechanical, cultural, biological, preventative, and chemical control techniques to eradicate weeds. Mechanical control involves physical removal by mowing, mulching, tilling, prescribed burning, grazing, and hand pulling. Cultural control involves enhancement of native plant community using methods such as revegetation or reduction in grazing. Biological control incorporates releasing beneficial insects which feed only on certain noxious weeds and well-managed grazing practices that target specific plants. Preventative techniques entail planting weed free seed, mulching with weed free material, cleaning machinery before moving between sites and controlling weeds prior to their setting seed. Chemical control involves the use of herbicides to destroy noxious weeds that do not adversely affect the desirable plant community.

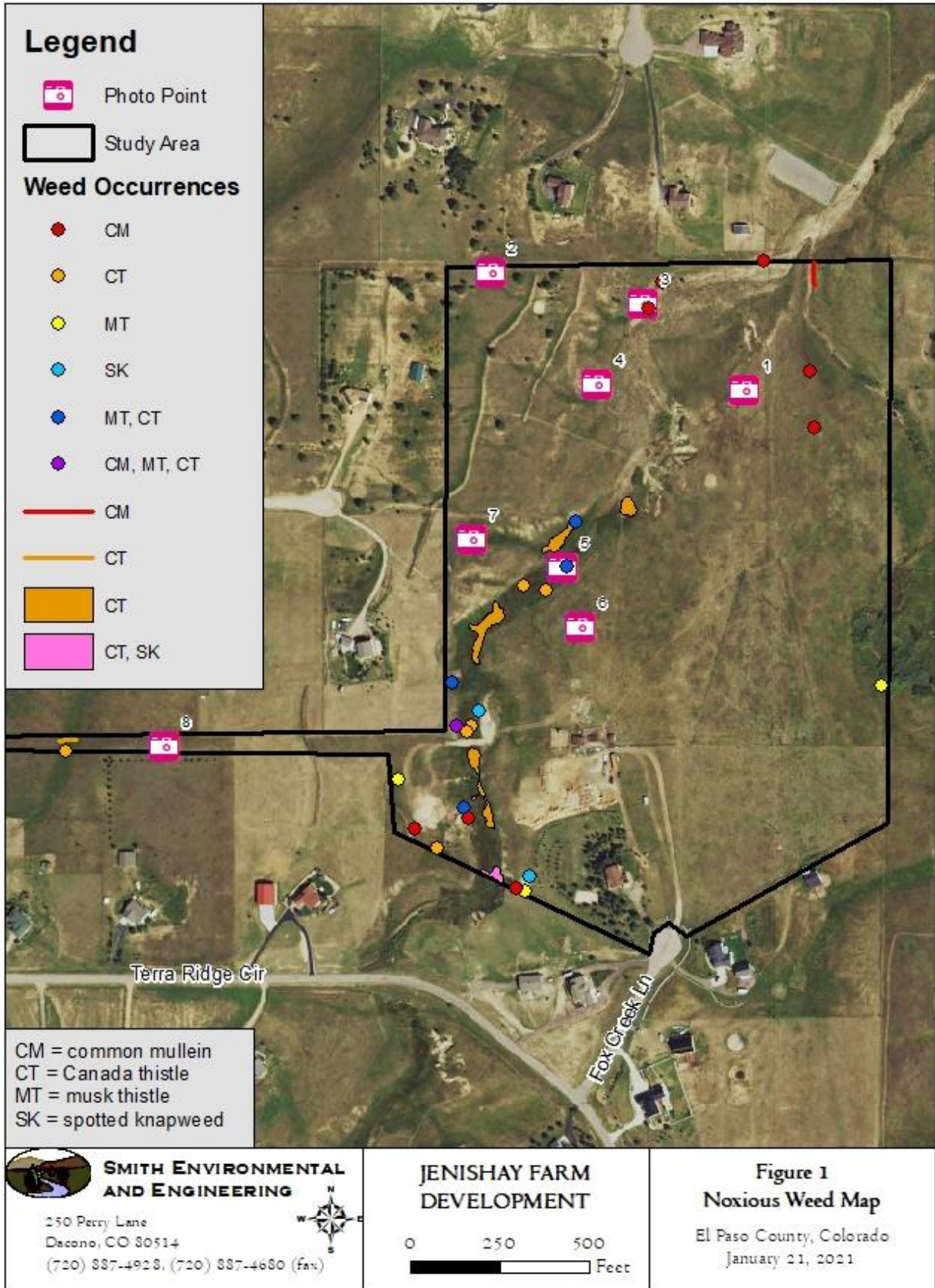
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Diffuse knapweed	<i>Centaurea diffusa</i>	B	No
Leafy spurge	<i>Euphorbia esula</i>	B	No
Musk thistle	<i>Carduus nutans</i>	B	Yes
Redstem filaree	<i>Erodium cicutarium</i>	C	No
Russian knapweed	<i>Acroptilon repens</i>	B	No
Spotted knapweed	<i>Centaurea stoebe</i>	B	Yes
Yellow toadflax	<i>Linaria vulgaris</i>	B	No



4.0 MANAGEMENT RECOMMENDATIONS

Identifying and inventorying noxious weeds on a property is important as the first step in management, because rarely can multiple species be managed with a single approach. A chemical pesticide applied to one species may have no effect on a different species, or the optimal seasonal timing of an application may vary for different species. Similarly, some species may be controlled effectively with mechanical removal, but others can actually spread if such techniques are used. Therefore, Table 2 presents targeted weed management approaches for each species observed in the Study Area. Adherence to these recommendations, which are adapted from the Colorado Department of Agriculture (2018), over several seasons should yield significant results in managing the current noxious weed infestations in the Study Area.

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- Prior to entry onto the property, all construction vehicles should be inspected and cleaned to ensure that they are free of soil and debris capable of transporting noxious weed seeds or roots.
- Potential areas of topsoil salvage should be assessed for presence and abundance of noxious weeds prior to salvage and replacement. Topsoil heavily infested with weeds can be chemically treated, removed from the site, or buried.
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- Chemical control should only be performed by a certified applicator licensed with the Colorado Department of Agriculture. Applicators must follow all pertinent federal and state laws, including all pesticide label requirements.
- If possible, construction activities should be phased in order to minimize the amount of disturbed surface at any given moment. Construction traffic should also be restricted to established access roads, parking areas, and laydown yards.
- Noxious weed management activities should occur approximately twice per year; late spring and early fall are generally recommended, especially for chemical treatments, because most species are susceptible to management at one or both seasons. Management activities should occur before, during, and for at least one year after construction.
- Annual monitoring should be conducted to assess the effectiveness of the ongoing management activities. The weed inventory map should be updated to determine if new species have become established and if existing populations are being managed effectively. The results of the monitoring should inform the management approach for future treatments.

TABLE 2
NOXIOUS WEED MANAGEMENT

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
Bull thistle	<i>Cirsium vulgare</i>	B	Biennial forb that reproduces by seed. Flowers July to September.	Aminopyralid: Apply to rosettes through bolting in spring or to rosettes in fall. Chlorsulfuron: Apply from bolting to bud stage. Clopyralid: Apply to rosettes through bud stage in spring or rosettes in fall. Aminocyclopyrachlor + Chlorsulfuron: Apply from seedling to bolting.	Restore competitive forb and grass assemblage using locally adapted seeds. Include annuals and perennials, as well as warm and cool season grasses.	None currently approved for use in Colorado.	Hoeing, tilling, and digging can be effective on small populations if the root is severed below the soil surface. Mowing, chopping, and deadheading require several years of season-long treatment.
Canada thistle	<i>Cirsium arvense</i>	B	Deep-rooted perennial that spreads by seeds and rhizomes. Emerges late April through May. Flowers late spring to early summer.	Aminopyralid: Apply in spring until flowering and/or to fall regrowth. Clopyralid + Triclopyr: Apply from rosette to bud stage when all plants have emerged (spring or fall). Aminocyclopyrachlor + Chlorsulfuron: Apply in spring until flowering and/or to fall regrowth.	Prevent bare ground. Continually monitor for new infestations.	Cattle, goats and sheep will graze when plants are young and succulent. Methods for Canada thistle rust (<i>Puccinia punctiformis</i>) are being refined.	Mowing can be effective if done every 10-21 days throughout the growing season. Combining mowing with herbicides will further control.
Common mullein	<i>Verbascum thapsus</i>	C	Deep-rooted biennial that spreads by seed. Emerges in the spring. Flowers and	Chlorsulfuron: Apply to rosette stages in spring and/or in fall prior to bolting.	Prevent bare ground by cultivating native grasses and forbs. Continually	None currently approved for use in Colorado.	Hand pull or dig when soil is moist, prior to flowering and seed set.

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
			produces seeds June to August.	2,4-D + Picloram: Apply to rosette stages in spring and/or in fall prior to bolting. Picloram: Apply to rosette stages to early growth stages in spring or fall. Metsulfuron: Apply to rosette stages in spring and/or in fall.	monitor for new infestations.		
Diffuse knapweed	<i>Centaurea diffusa</i>	B	Biennial forb that reproduces exclusively by seed. Emerges in the spring or fall, flowers July through August, and seeds by mid-August.	Aminocyclopyrachlor + Chlorsulfuron: Apply pre-emergence or from seedling to mid-rosette stage. Aminopyralid: Apply in spring at rosette to early bolt stage, and/or to the rosette in fall. Clopyralid: Apply to rosette in spring or fall before the flowering stalk lengthens.	Establish native grasses and forbs to prevent it from colonizing.	The seedhead weevil (<i>Larinus minutus</i>) and root weevil fly (<i>Cyphocleonus achates</i>) can be effective for large infestations when used together.	Any method that severs the root below the surface. Mowing or chopping are effective when plants are in full bloom.
Leafy spurge	<i>Euphorbia esula</i>	B	Deep-rooted perennial that spreads by seeds and roots. Plants emerge in mid-April to late May, and flower from May to July.	Aminocyclopyrachlor + Chlorsulfuron with Diflufenzopyr + Dicamba: Apply at flowering in the spring and/or fall. Quinclorac with Diflufenzopyr + Dicamba: Apply at flowering in the spring and/or fall.	Prevent bare ground by cultivating native grasses and forbs.	Sheep and goats can be effective grazers. The flea beetles <i>Apthona nigriscutis</i> , <i>A. lacertosa</i> , and <i>A. cyparissiae</i> are effective when combined with	Mowing will reduce seed production if repeated every 2-4 weeks during the growing season, but will not provide long-term control.

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
				Aminocyclopyrachlor + Chlorsulfuron: Apply post emergence in spring until flowering and/or fall.		grazing and/or herbicides.	
Musk thistle	<i>Carduus nutans</i>	B	Biennial forb. Flowers from late May to June.	Aminopyralid: Apply in spring to rosette or early bolt stages, and/or in the fall to rosettes. Chlorsulfuron: Apply in spring to rosette through early flower growth stage. Clopyralid: Apply to rosettes through bud stage in spring or rosettes in fall.	Restore competitive forb and grass assemblage using locally adapted seeds. Include annuals and perennials, as well as warm and cool season grasses.	<i>Trichosirocalus borridus</i> is the only biological control agent available in Colorado.	Hoeing, tilling, and digging can be effective on small populations if the root is severed below the soil surface. Mowing, chopping, and deadheading require several years of season-long treatment.
Redstem filaree	<i>Erodium cicutarium</i>	C	Winter annual or biennial forb that primarily reproduces by seed. Flowers from March to April.	Metsulfuron: apply at rosette through early flower stage. 2,4-D + Dicamba: apply to rosettes.	Prevent bare ground, and establish native grasses and forbs.	None currently approved for use in Colorado.	Hand pulling or digging when soil is moist. Remove flowers before seed set.
Russian knapweed	<i>Acroptilon repens</i>	B	Deep-rooted perennial that spreads by rhizomes and seeds. Flowers from June to August.	Aminopyralid: Apply in fall when stems die back and root buds are susceptible. Can also apply in the bud to senescence stage, or during early bolt before buds form in the spring. Aminocyclopyrachlor + Chlorsulfuron: Apply in fall when stems die back	Prevent bare ground. Establish sod-forming grasses or vegetation with dense shade.	None currently approved for use in Colorado, but the gall midge, <i>Jaapiella ivannikovi</i> , is being developed.	Mowing several times before bolting stresses the plant, but will not eliminate infestations. Mowing with a fall herbicide application will enhance control.

Common Name	Scientific Name	CDA List	Seasonality of Occurrence	Recommended Chemical Control Measures	Cultural Control Measures	Biological Control Measures	Mechanical Control Measures
				and root buds are susceptible. Can also apply in the bud to senescence stage, or during early bolt before buds form in the spring.			
Spotted knapweed	<i>Centaurea stoebe</i>	B	Short-lived perennial forb that reproduces mainly by seed. Flowers from June to October.	Aminocyclopyrachlor + Chlorsulfuron: Apply pre-emergence or from seedling to mid-rosette stage. Aminopyralid: Apply in spring to rosette to early bolt stage and/or in the fall to rosettes. Clopyralid: Apply to spring/fall rosettes before flowering stalk lengthens.	Prevent bare ground, and minimize disturbance and overgrazing.	The seedhead weevil (<i>Larinus minutus</i>) and root weevil fly (<i>Cyphocleonus achates</i>) can be effective for large infestations when used together.	Digging when soil is moist can be effective for small populations if repeated for several years. Mowing before seed set can stress the plant, but not kill it.
Yellow toadflax	<i>Linaria vulgaris</i>	B	Perennial forb that reproduces by seed and creeping roots. Flowers from July to September.	Aminocyclopyrachlor + Chlorsulfuron: apply at flowering into senescence. Picloram + Chlorsulfuron: apply at flowering into senescence.	Prevent bare ground, and establish native grasses and forbs.	<i>Calophasia lunula</i> , <i>Eteobalea intermediella</i> , and <i>Mecinus janthinus</i> are all available for use in Colorado.	Not recommended unless a single plant is observed.

*Seasonality of occurrence information from Colorado Weed Management Association 2017. Control measures from Colorado Department of Agriculture 2021.

5.0 REFERENCES

Colorado Department of Agriculture. 2021. Noxious Weed Species. Available online at: <https://www.colorado.gov/pacific/agconservation/noxiousweeds>. Accessed January 22, 2021.

Colorado Weed Management Association. 2017. Noxious Weeds of Colorado, 13th edition.

El Paso County. 2017. Noxious Weed Management Plan. Available online at: <https://communityservices.elpasoco.com/wp-content/uploads/Environmental-Division-Picture/Noxious-Weeds/Weed-Management-Plan-December-2017.pdf>. Accessed April 26, 2018.