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LTU Restoration Project
Monitoring/Maintenance plan

Year of Project Installation: 2023 Fall/2024 Summer
Prepared by: ECT
Date : October 2025

Estimated Annual Monitoring/Maintenance Cost

Pricing will vary dramatically from site to site and year to year as no two sites are alike. In 2023, the typical price range falls between $100 and $1,000 per acre per visit. For estimating purposes, we use an average rate of $500 per acre per visit for upland areas at LTU, with a total of 1.2 acres of upland area. For emergent planting areas, we use an average rate of $1000 per acre per visit, with a total of 0.5 acres. Therefore, the estimated annual cost for monitoring and maintenance at this site averages around $3,300, accounting for 3 visits during a year, subject to factors such as weed infestation, erosion, woody plant encroachment, etc. Over time, time requirements and associated pricing for management also generally decreases to a point but then tends to plateau since weeds will always migrate into a site through water, wind, and animal dispersal (in addition to possible neighbor encroachment, erosion, etc.)

Seasonal Monitoring/Maintenance Schedule

Year 3-5 after installation

*Plan for 3 site visits each year for monitoring and schedule physical maintenance activities as needed.

SPRING	Focus	Description	Maintenance Actions
Erosion	Erosion?	Walk the site to ensure there are no erosion gullies forming, particularly on steeper slopes or below water inflow pipes.	• Repair with additional soil, cover crop, erosion control blanket, and/ or stone as needed.
Native herbaceous Plant	Establishment?	Consider using prescribed fire in sites to reduce thatch layer, stimulate native herbaceous plants, and kill or weaken invasive species. For most sites, fire is an important management tool that should be applied to a site every 2-4 years.	• Prescribe burn • Mowing
Turf Invasion	Outcompeting natives?	Target turf grasses that may be outcompeting native species.	• Target turf grasses that may be outcompeting native species.

Year 3-5 after installation - continued

SUMMER	Focus	Description	Maintenance Actions
Weeds	Aggressive biennials presence?	In June, biennials such as sweet-clover, bull or nodding thistles, and teasel should be cut near the ground when buds are forming or plants have been flowering for up to three days. Cut material can be left where it falls unless it's so dense that it will smother adjacent native vegetation. Visit https://www.canr.msu.edu/pestid/resources/plant-and-weed-identification/index for common Michigan weeds identification resources.	• Timed cutting @ base
	Other perennial weed?	Other aggressive perennial weeds such as spotted knapweed, crown-vetch, bird's foot-trefoil, and Canada thistle should be spot-treated with the appropriate herbicide.	• Spot treat
Invasive Species	Reed canary grass & cattail presence?	Reed canary grass and cattail patches should be sprayed or hand-swiped.	• Spray/hand-swipe
	Woody Invasive	Woody invasives should be cut and stump-treated or foliar sprayed, based on the size.	• Cut stump-treated • Foliar spray

FALL	Focus	Description	Maintenance Actions
Invasive species	Reed canary grass & cattail presence?	Retreat reed canary grass and cattail as needed	• Spray • Hand-swipe
	Phragmites presence?	Continue treating Phragmites	• Continue treating Phragmites
	Woody Invasive	Continue spot-treatments of other aggressive perennial and woody invasives as needed.	• Spot treat

Year 5-10 after installation

*Plan for 3 site visits typically June through September in a year every 2 to 3 years. During site visits, conduct monitoring and schedule physical maintenance activities as needed.

SPRING/ SUMMER	Focus	Description	Maintenance Actions
Weeds	Aggressive biennials presence?	In June, biennials such as sweet-clover, bull or nodding thistles, and teasel should be cut near the ground when buds are forming or plants have been flowering for up to three days. Cut material can be left where it falls unless it's so dense that it will smother adjacent native vegetation. Visit https://www.canr.msu.edu/pestid/resources/plant-and-weed-identification/index for common Michigan weeds identification resources.	• Timed cutting @ base
	Other perennial weed?	Other aggressive perennial weeds such as spotted knapweed, crown-vetch, bird's foot-trefoil, and Canada thistle should be spot-treated with the appropriate herbicide.	• Spot treat
Invasive species	Reed canary grass & cattail presence?	Reed canary grass and cattail patches should be sprayed or hand-swiped.	• Spray • Hand-swipe
	Woody Invasive?	Woody invasives should be cut and stump-treated or foliar sprayed, based on the size.	• Cut stump-treated • Foliar spray

FALL	Focus	Description	Maintenance Actions
Invasive species	Reed canary grass & cat-tail presence?	Retreat reed canary grass and cattail as needed	• Spray • Hand-swipe
	Phragmites presence?	Continue treating Phragmites	• Continue treating Phragmites
	Woody Invasive	Continue spot-treatments of other aggressive perennial and woody invasives as needed.	• Spot treat

Year 10+ after installation

*Plan for 2 site visits typically June through September in a year every 2 to 3 years. During site visits, conduct monitoring and schedule physical maintenance activities as needed.

SUMMER	Focus	Description	Maintenance Actions
Weeds	Aggressive biennials presence?	In June, biennials such as sweet-clover, bull or nodding thistles, and teasel should be cut near the ground when buds are forming or plants have been flowering for up to three days. Cut material can be left where it falls unless it's so dense that it will smother adjacent native vegetation. Visit https://www.canr.msu.edu/pestid/resources/plant-and-weed-identification/index for common Michigan weeds identification resources.	• Timed cutting @ base
	Other perennial weed?	Other aggressive perennial weeds such as spotted knapweed, crown-vetch, bird's foot-trefoil, and Canada thistle should be spot-treated with the appropriate herbicide.	• Spot treat
Invasive species	Reed canary grass & cattail presence?	Reed canary grass and cattail patches should be sprayed or hand-swiped.	• Spray • Hand-swipe
	Woody Invasive	Woody invasives should be cut and stump-treated or foliar sprayed, based on the size.	• Cut stump-treated • Foliar spray

FALL	Focus	Description	Maintenance Actions
Invasive species	Reed canary grass & cattail presence?	Retreat reed canary grass and cattail as needed	• Spray • Hand-swipe
	Phragmites presence?	Continue treating Phragmites	• Continue treating Phragmites
	Woody Invasive	Continue spot-treatments of other aggressive perennial and woody invasives as needed.	• Spot treat

Management Tool & Timing

** Pick your management need from the column on the left and learn the timing of the appropriate technique listed in columns.

Management Tools		Winter		Spring			Summer			Fall			Winter	Notes
Month		1	2	3	4	5	6	7	8	9	10	11	12	
General management							June, July/August, and September are ideal times.							Most newly establishing sites need three or more site visits during the first 1-10 years of establishment, and then typically 2-3 after that.
Invasives & Weeds	Reed canary grass control						Foliar Spray(Rodeo)							
	Phragmites control								Foliar Spray (Rodeo)					
	Cattail control						Foliar Spray(Rodeo)							
	Garlic mustard and dame's rocket				Hand pull									Easiest to pull when the plants bolt. Remove pulled material from site
	Crown vetch, bird's foot-trefoil						Foliar Spray(Milestone)							
	Canada thistle, spotted knapweed, other pernicious broad-leaved weeds					Foliar Spray(GLY)								Plants are most susceptible when forming buds and early flower stage
	Woody invasives	Foliar spray: stem<pencil size; Cut stump: stem>/= pencil size												**Cut-stump:** Use Garlon 3a at 54% active ingredient. Stump should be "painted" with herbicide within 5 minutes of cutting and anytime from 6/1 to 3/1.
Mowing/ Cutting	Annuals control						High mowing (4")		High mowing (4")					
	Sweet-clover control						Timed cutting @ base							
	Biennial thistles					Timed cutting @ base								Each time plants develop buds and during early flowering stage
	Early establishment--young natives/many annuals						High mowing (4")		High mowing (4")					

Management Tools		Winter		Spring			Summer			Fall			Winter	Notes
Month		1	2	3	4	5	6	7	8	9	10	11	12	
Reseeding/ Replanting	Bare soil				Re-seeding (for seasonally saturated soil)						Re-seeding (for unsaturated soil)			Typical rate is 8 lbs per acre. 1/2 this rate when overseeding zones with some native vegetation.
	Erosion		Erosion control blanket + Re-seed											Replace lost soil with clean fill, sow cover crop of annual oats, lay ECB on sloped areas
Herbivore damage	Deer damage; Tree/ shrub dieback	*Non-oak spp.*	1. Prune 2. Replace/install caging/tree tubes as needed											
	Deer damage; Tree/ shrub dieback	*Oak spp*										1. Prune only when dormant 2. Replace/install caging/tree tubes as needed		
	Goose/turkey browse				Fencing									Consider erecting stakes with lines at 1', 2', and 3' heights and mylar flagging tied on lines

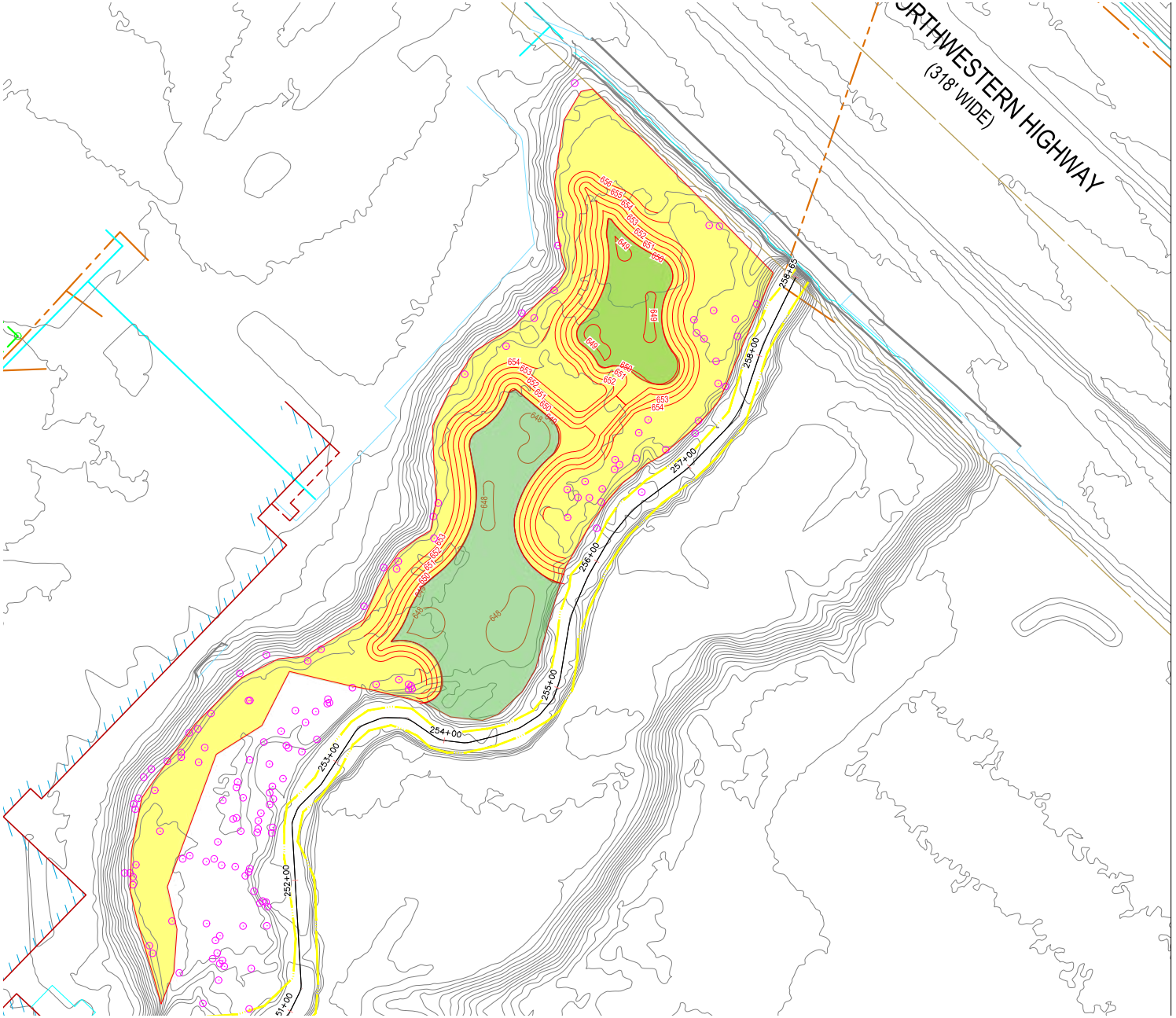
Herbicide applicator qualification

Regarding herbicide applications: The Michigan Department of Agriculture requires applicators who are applying herbicide as part of their work to be licensed applicators. All applicators must take the core exam and categories 4 (right-of-way) and 5 (aquatics) cover all aspects of natural area management.

Maintenance intro

During fall 2023, the woody invasive shrubs were removed and the wetland basins were constructed and revegetated as part of the construction process. During 2024 and 2025, the site was maintained monthly by NCS as part of the post-construction maintenance. The maintenance visits focused on spot-treating weeds such as Phragmites, Reed canary grass, hybrid cattail, canada thistle, and teasels in the wetlands and adjacent areas. In the wooded areas, resprouts of buckthorn, honeysuckle, and garlic mustard from the seed bank were the primary focus of weed control.

Site Map (Total area: 1.7 acres)



Maintenance Notes

The project was constructed and seeded in the summer of 2023. Native plantings were installed subsequently in the same fall and the following spring, which includes wetland fringe plugs, aquatic plugs, shrubs and trees. The bare root shrub plugs did not do well and soon disappeared. But during the two years of maintenance in 2024 and 2025, native aquatic plantings seemed to have do well and expanded along the pools.

Nuisance species that we have dealt with during the past two seasons include Canada thistle(big patches, Phragmites(singlular stems), Reed Canary grass(small patches), and the re-emergence of garlic mustard after the initial treatment since fall 2023.

Deers are not a concern here.