

Riverside North Redevelopment

Ecology Text for Report

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ECOLOGICAL CONTEXT

Glacial History, Landforms and Soils

The site is located in the “Western Coulee and Ridges” Ecological Landscape of Wisconsin. The site is located within the “Driftless Area” – an area not covered by the most recent glacial advance, the Wisconsinan Glaciation. This unglaciated region has developed highly eroded landforms, including dramatic bluffs, steep slopes, and steep headwater streams. The Riverside Redevelopment Site is located at the confluence of three rivers (Mississippi, Black, and La Crosse), which are largely responsible for creating the region’s landforms.

The 1919 Soil Survey of La Crosse County, Wisconsin mapped the entire site as “Peat,” indicative of the site’s previous wetland condition. The USDA/NRCS Web Soil Survey (2014) identifies the northern portion of the site as “Urban land, valley trains,” and the southern portion as “Alganssee-Kalmarville complex, 0-3% slopes, frequently flooded” and water. As of the 1938 aerial photograph of the site, significant fill had already been placed on the northern portion of the site. This historical aerial photograph shows railroad tracks paralleling the river (along the current trail alignment) as well as an arcing track that looped to the east, crossing the La Crosse River adjacent to the existing Copeland Avenue Bridge. The site’s upland soils appear to be dominated by well-drained sands. The site’s riverbanks are sandy with peat substrates. This combination of unconsolidated mineral soils over organic soils provides an unstable environment, complicating development and safe access for human use.

Hydrology and Wetlands

The site’s southwest corner abuts the confluence of the Mississippi, Black, and La Crosse Rivers. These rivers are classified as Waters of the U.S. and are regulated by the state and federal government. The northern portion of the site currently consists of a disturbed/irregular landscape undergoing active fill. A flood levee runs through the site, generally following a northwest to southeast alignment. Below this levee, drainage is generally to the south and west toward the site’s wetlands and adjacent rivers.

A portion of the site experiences annual flooding due to the confluence of rivers and relatively low elevations. The southwest half of the site lies within the floodway (where flood waters experience significant flow), and most of the site’s remainder (as well as surrounding areas) lies within the 100-year floodplain. The northern portion of the site is undergoing fill so that future development will occur 2 feet above of the 100-year floodplain. The site’s water table is isostatic with the stage of surrounding rivers—it rises and falls as the adjacent river levels rise and fall.

As with other Waters of the U.S., wetlands are also regulated under state and federal laws. A formal wetland delineation has not been conducted for the site, but based on existing data and a preliminary

site review, three distinct wetlands have been identified. The largest site wetland consists of an emergent wetland encompassing the southern third of the site. This wetland includes deep marsh to wet meadow to floodplain forest plant communities. One of the historical railroad tracks in this area has been removed from this wetland. A triangle-shaped area of floodplain forest wetland is located in the southwest corner of the site, abutting the three-river confluence. A smaller wetland is located northwest of the large emergent wetland. A damaged corrugated metal culvert was observed discharging into the north end of this smaller wetland; its source has not been confirmed. An outlet from this wetland or a connection to the large emergent wetland near to the south was not identified. Site wetlands are maintained by both groundwater and surface water inputs. As a result, the maintenance of these connections will be imperative to protect these natural resources under any development scenario.

Historical Vegetation

Based on historical vegetation cover mapping by others, in 1890 the site consisted of wet shrubland, wet forest, wet meadow, sand/mud, deep marsh, and open water. These wetlands would have contained a diversity of native plant communities and associated habitats for many wetland-dependent species.

Existing Land Cover and Invasive Species

The majority of the site has been significantly altered due to historical and ongoing fill, other land disturbance, hydrologic modifications to the rivers (e.g., Mississippi River Lock and Dam No. 7), and inadvertent introduction of invasive species. The site's most intact natural areas lie in the southern (mostly wetland) portion of the site. The ecosystems existing on the property follow a transition from disturbed uplands in sandy soils (along the old railroad right-of-way) to forested and grassy wetlands (along the rivers and in the site's wetlands). Significant portions of the site's uplands consist of bare or disturbed ground, resulting from recent fill activities. "Semi-natural" plant communities (e.g., weedy grasses and volunteer trees) occupy the remainder of the site.

Invasive vegetation exists in most of the project area's natural and semi-natural plant communities. Invasive plant populations impact a site's ecological health, aesthetics, and market value. These species thrive in disturbed habitats and often dominate and out-compete native plants, reducing habitat and species diversity and lessening an ecosystem's resilience in the face of disturbances and environmental change.

The site's uplands are dominated by disturbed and sparsely vegetated grasslands. These degraded grasslands are dominated by smooth brome grass (*Bromus inermis*), but contain some isolated prairie plants such as switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), bush clover (*Lespedeza capitata*), and a few other native species. Additional upland areas consist of disturbed woodlands dominated by invasive Siberian elm (*Ulmus pumila*) and black locust (*Robinia pseudoacacia*) saplings and trees. Invasive black locust trees are failing in the impoverished and seasonally saturated sands. Dead and dying trees and limbs present an unattractive backdrop to the proposed redevelopment site and convey the appearance of a deteriorated landscape. The understory in these areas contains invasive Tartarian honeysuckle (*Lonicera tatarica*) and European buckthorn shrubs (*Rhamnus cathartica*). Beneath these trees and shrubs were additional invasive species, such as garlic mustard (*Alliaria petiolata*), mullein (*Verbascum thapsus*), creeping Charlie (*Glechoma hederacea*), quack grass (*Elymus repens*), and smooth brome grass.

The site's floodplain forest is dominated by cottonwood trees (30-79 years of age), silver maple, and river birch. The large emergent wetland has transitional vegetation adjoining the uplands and includes native wetland species such as wool grass (*Scirpus cyperinus*), sedges (*Carex stricta*, *C. emoryi*, *C. lanuginosa*), and shrubs such as sandbar willow (*Salix interior*) and buttonbush (*Cephalanthus occidentalis*). The upland sandy soils contribute to the localized recharge of rainfall and snow melt, which supports the seepage zones at the edges of the site wetlands. This transitional zone also contains invasive plants, such as giant reed (*Phragmites communis*) and reed canary grass (*Phalaris arundinacea*). The large wetland's vegetation of emergent and submerged rooted aquatic plants is dominated by cattails (*Typha x glauca*, *T. latifolia*) but contains other species such as giant bur reed (*Sparganium eurycarpum*). Aquatic plants in the site's open waters include coontail (*Ceratophyllum demersum*) and elodea (*Elodea canadensis*) among others.

Controlling invasive plant species is essential for ecological restoration to succeed. In addition, market premiums and price points will be improved with these investments in the amenity value, especially if the development is targeting informed, educated homebuyers and tenants.

Invasive animals (e.g., European carp, zebra mussels) also cause ecological harm to native populations and habitats. Most invasive animals in the site vicinity are found in river habitats. Unfortunately, control of invasive animals is usually difficult and costly – especially in large river systems. Documenting invasive animal populations and not facilitating their spread can help to control infestations and slow their spread.

Existing Wildlife and Habitats

A formal wildlife survey has not been completed at the site. However, during multiple brief site visits, AES documented several species of wildlife and indications of animal species. Wildlife identification was based on direct sightings, calls, scat, prints, feathers and other signs. Wildlife species confirmed to be using the site, as well as species expected to use the site, are listed in Table 1 below.

Table 1. Wildlife Species Observed or Expected at La Crosse Riverside Redevelopment Site

Mammals	Birds	Reptiles/Amphibians	Insects
Species Confirmed at Site			
Cotton-tail rabbit	Bell's vireo (State Threatened)	Turtle (eggs/nest on site)	Water strider
Woodchuck	Great blue heron	Western chorus frog	Whirligig beetles
Meadow vole	Canada goose	Spring peeper	Deer tick
Beaver	Cooper's hawk		Green darner dragonfly
Gray squirrel	Blackburnian warbler		
	American redstart		
	Common yellowthroat		
	Yellow warbler		
	Baltimore oriole		
	Catbird		
	American coot		
	Red-winged blackbird		
	Sora		
	Peregrine falcon		
	Bald eagle		
Species Expected to Use Site			
White-tailed deer	Eastern meadowlark	Snapping turtle	White cabbage butterfly
Coyote	Grasshopper sparrow	Painted turtle	Monarch butterfly
Muskrat	Song sparrow	Common gartersnake	Copper (butterfly)
Opossum	Killdeer	Leopard frog	Giant swallowtail
Raccoon	Red-tailed hawk	American toad	Fritillary (butterfly)
	Ring-billed gull		Widow skimmer (dragonfly)
	Turkey vulture		12-spotted skimmer (dragonfly)
	Wild turkey		
	American goldfinch		
	Indigo bunting		
	Red-eyed vireo		
	Mourning dove		
	Mallard		
	Hooded merganser		
	Lesser scaup		
	Ring-necked pheasant		

For over a century, the site's and region's habitats have been degraded, destroyed, and fragmented as a result of development and human use. Since the mid-1800s, development has largely ignored natural resources, with the more recent exception of floodplain avoidance and wetland protection. This has created a patchwork of smaller and degraded habitats along this critical river corridor, compromising conditions for migratory birds as well as resident wildlife. The site provides an important opportunity to fill critical habitat gaps that would benefit species on site and within the region.

Special Status Species and Habitats

The U.S. Fish and Wildlife Service identifies five rare species in La Crosse County.

Table 2 Federally-protected and tracked species in La Crosse County (USFWS 2014)

Species	Status	Habitat
<u>Higgins eye pearly mussel</u> (<i>Lampsilis higginsii</i>)	Endangered	Mississippi River
<u>Sheepnose</u> (<i>Plethobasus cyphus</i>)	Endangered	Mississippi River
<u>Northern long-eared bat</u> (<i>Myotis septentrionalis</i>)	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
<u>Eastern massasauga</u> (<i>Sistrurus catenatus</i>)	Candidate	Open to forested wetlands and adjacent uplands
<u>Whooping crane</u> (<i>Grus americanus</i>)	*Non-essential experimental population	Open wetlands and lakeshores

*Whooping Crane - On June 26, 2001, a nonessential experimental population of the whooping crane was designated in a 20-state area of the eastern United States. The first release of birds occurred in Wisconsin in 2001, and the counties listed are those where the species has been observed to date. It is unknown at this time which counties the species will occupy in the future, as the birds mature and begin to exhibit territorial behavior. For purposes of Section 7 consultation, this species is considered as a proposed species, except where it occurs within the National Wildlife Refuge System or the National Park System, where it is treated as a threatened species.

The Federally-Endangered Higgins eye pearly mussel and Sheepnose mussel occur in the Mississippi River, which abuts the west edge of the site. The Northern long-eared bat (proposed as Endangered) may use the site's forests and wooded habitats. Eastern massasauga (a rattlesnake that is a candidate for federal listing) may use the site's open and forested habitats. Whooping crane may use the site's open water and wetland habitats.

In order to assess state records of rare natural features, an Ecological Resource Review was conducted of the Wisconsin Department of Natural Resources (WiDNR) Natural Heritage Inventory (WiDNR 2014). The search area included the La Crosse Riverside Redevelopment site plus a 2-mile radius. Forty-three element occurrences (i.e., special status species and habitats) were identified within the search area (Table 3).

Table 3. State-protected and tracked rare natural feature records within site vicinity (WiDNR 2014)

Common Name	Scientific Name	Type	State Status	Federal Status	Group	# EOs
American Eel	<i>Anguilla rostrata</i>	A	SC/N		Fish	~ 2
Bald Eagle	<i>Haliaeetus leucocephalus</i>	W	SC/P		Bird	~ 1
Bell's Vireo	<i>Vireo bellii</i>	T	THR		Bird	1
Black Buffalo	<i>Ictiobus niger</i>	A	THR		Fish	~ 1
Black Tern	<i>Chlidonias niger</i>	W	END		Bird	~ 1
Blanding's Turtle	<i>Emydoidea blandingii</i>	A	SC/H		Turtle	~ 1
Blue Sucker	<i>Cycleptus elongatus</i>	A	THR		Fish	~ 2
Buckhorn	<i>Tritogonia verrucosa</i>	A	THR		Mussel	~ 1
Bullhead	<i>Plethobasus cyphus</i>	A	END	LE	Mussel	~ 1
Carolina Anemone	<i>Anemone caroliniana</i>	T	END		Plant	1
Emergent Marsh	Emergent marsh	W	NA		Community	~ 1
Fawnsfoot	<i>Truncilla donaciformis</i>	A	THR		Mussel	~ 1
Floodplain Forest	Floodplain forest	W	NA		Community	~ 2
Goldeye	<i>Hiodon alosoides</i>	A	END		Fish	~ 1
Henslow's Sparrow	<i>Ammodramus henslowii</i>	T	THR		Bird	1
Higgins' Eye	<i>Lampsilis higginsii</i>	A	END	LE	Mussel	~ 1
Monkeyface	<i>Quadrula metanevra</i>	A	THR		Mussel	~ 1
Mud Darter	<i>Etheostoma asprigene</i>	A	SC/N		Fish	~ 1
Paddlefish	<i>Polyodon spathula</i>	A	THR		Fish	~ 1
Pallid Shiner	<i>Hybopsis amnis</i>	A	END		Fish	~ 1
Peregrine Falcon	<i>Falco peregrinus</i>	T	END		Bird	1
Pirate Perch	<i>Aphredoderus sayanus</i>	A	SC/N		Fish	~ 1
Pugnose Minnow	<i>Opsopoeodus emiliae</i>	A	SC/N		Fish	~ 1
River Redhorse	<i>Moxostoma carinatum</i>	A	THR		Fish	~ 2
Rock Clubmoss	<i>Huperzia porophila</i>	T	SC		Plant	1
Rope Dodder	<i>Cuscuta glomerata</i>	T	SC		Plant	1
Shoal Chub	<i>Macrhybopsis hyostoma</i>	A	THR		Fish	~ 1
Shrub-carr	Shrub-carr	W	NA		Community	~ 1
Silver Chub	<i>Macrhybopsis storeriana</i>	A	SC/N		Fish	~ 2
Small-flowered Woolly Bean	<i>Strophostyles leiosperma</i>	T	SC		Plant	1
Snowy Campion	<i>Silene nivea</i>	T	SC		Plant	2
Timber Rattlesnake	<i>Crotalus horridus</i>	T	SC/P		Snake	1
Washboard	<i>Megalonaias nervosa</i>	A	SC/P		Mussel	~ 1
Weed Shiner	<i>Notropis texanus</i>	A	SC/N		Fish	~ 2
Western Sand Darter	<i>Ammocrypta clara</i>	A	SC/N		Fish	~ 2

For an explanation of the fields and codes used in this report, please refer to:
<http://dnr.wi.gov/topic/NHI/calypso/EOREport.html>

Many of these species are restricted to large and medium sized rivers; therefore, many of these species may be located adjacent to the site, but are likely not within the site boundary.

The La Crosse Riverside Redevelopment site is a very unusual piece of property. Even during the peak of its industrial use, it supported state and federal special status wildlife species – Bell's Vireo, Henslow's Sparrows, Bald Eagle, among many others. Some of the habitats that attracted and supported these and other wildlife species are still present and can be enhanced as a part of site redevelopment.

Species of Greatest Conservation Need

Species of Greatest Conservation Need (SGCN) is a wildlife classification for regional conservation purposes. It includes state-listed species and non-listed species that are regionally rare or in decline, often as a result of habitat loss. Within the “Western Coulee and Ridges” Ecological Landscape, the WiDNR has identified 10 mammals that are SGCN species, 65 birds, 19 reptiles and amphibians, and 20 fish (WiDNR 2012).

Establishing the site’s natural areas as a refuge for certain SGCN species would be appropriate, given the site’s regional location, significant size, existing rare species habitats, and enhancement and restoration potential. The existing and potential diversity of habitats at the site raises the likelihood that that SGCN species use or could use the site. Ecological restoration and management of the site would be expected to attract some of the region’s upland, wetland, and river-dependent SGCN species.

DEVELOPMENT CONSIDERATIONS AND OPPORTUNITIES

Assessment of the data described above enabled identification of constraints and opportunities specific to the La Crosse Riverside Redevelopment site. By overlaying key constraints, one can begin to understand site-specific opportunities and the feasibility for redevelopment in different portions of the property. Areas that appear inappropriate or infeasible for redevelopment can be used to expand the conservation, ecosystem restoration, and open space amenity functions of La Crosse’s larger open space, park, and trail system. This approach increases the value of areas suitable for redevelopment. The most significant constraints on this site include the river floodplain and wetlands.

Flooding

The site’s existing levee has been altered in recent years. While the levee is designed to prevent floodwaters from entering the site’s uplands, it can also impound water in these areas. Ongoing grading operations at the site are bringing some of the potentially developable land above the floodplain; however, much of the site will remain below flood level. These lower elevation areas will require flood-compatible design and use in these areas, which may include trails and boardwalks. Sediment management and ice-scour often affect the usability of such features on an annual basis, leading to increased maintenance costs. These factors need to be understood and considered during site planning and design. These issues can be accommodated through design of the recreational trail system and neighborhood stormwater management features. Tying in the site’s proposed grades with existing/adjacent grades that will remain in the short-term will also require resolution and phasing considerations.

Existing flood damage risk reduction is not comprehensive due to inadequate room to adapt to the unpredictable flood stages of the three rivers. A site at such a confluence is always at risk of unpredictable dynamics in water levels as land use changes occur in the watersheds. Re-use of this site acknowledges that the levees provide a defined level of flood damage reduction risk, but flood frequencies from rare events (e.g., 500-year storms) are increasing in the Mississippi River watershed and on many Midwestern rivers, especially those affected by upstream agricultural and urban lands uses. The site’s location is at high risk given predictions and trends in flood flows, stages, and rare storm event frequencies, durations and magnitudes. This constraint needs to be fully understood and dealt with during the design process.

Wetlands

Direct and indirect impacts to wetlands by dredging, filling or hydrological and water quality modifications are subject to permit requirements. Due to its size and connection to the river confluence, the site's large emergent wetland likely cannot be impacted, regardless of mitigation. If wetlands are impacted negatively by development, they can detract from and devalue the re-use and redevelopment potential of the site.

These floodplain and wetland issues will impact design considerations for the site; however, through their protection and integrated design, these features can be leveraged into important aesthetic, functional, and experiential amenities for the development.

Protected Species

While there are many special status plant and animal species in the vicinity of the site, the rare species confirmed to be using the site is Bell's vireo. Redevelopment of the site, including construction of recreational trails through the property, will bring more human activity to what has essentially been an off-limits, fenced industrial site for decades. Studies of trail-wildlife interactions have demonstrated that special status species such as Bell's vireo may find the site less desirable or intolerable with increased human activity. Visually, programmatically, and phenologically separating areas of wildlife activity from human activity (e.g., buffering) will be essential to ensure the continued use of the site by wildlife or to attract other special status species to the site. In the case of Bell's vireo, which nests in shrubs and small trees near the large emergent wetland, vegetation screening and/or limited use during the nesting season may be essential to protect this species' continued use of the site. Maintaining and/or attracting rare species such as Bell's vireo represents a unique feature of a development.

Green Infrastructure

Sites like the La Crosse Riverside Redevelopment property are among the most challenging for redevelopment. They often undergo waves of re-use with weak long-term solutions unless they are integrated into a well-designed master plan that embraces and protects the site's natural resources. High groundwater tables, groundwater upwelling during river flooding, impervious cover runoff, and similar site characteristics do not lend themselves to traditional design and redevelopment strategies. Green infrastructure—the substitution of natural and naturalized systems to deliver the functions of traditional “gray” infrastructure systems—is a proven effective approach to integrate ecological and traditional design for long-term sustainability. Green infrastructure strategies are often far more applicable and cost effective in locations such as the site. Moreover, studies from the U.S. Environmental Protection Agency, American Rivers, Applied Ecological Services, and others have demonstrated that such an approach usually achieves better cost-savings, place-making, and conservation outcomes than traditional approaches to infrastructure design.

Interpreting and Celebrating the Site

The La Crosse Riverside Redevelopment Site provides unique opportunities for interpreting and celebrating the natural and cultural history of the site, as well as the ecological and sustainable principles integrated into the site’s design. Interpretive opportunities at the site include:

- Regional natural history: Mississippi River Valley, glacial history of the Driftless Region, bedrock geology, and watersheds;
- Flood dynamics and functions;
- Site history: Progression from a natural wetland/floodplain landscape to railroads and industrial uses to restored natural area and sustainable development;
- Cultural history: Native Americans, early white settlers, rail and lumber yards;
- Native ecosystems: Specifically those being restored to the site—prairie, savanna, forest, and wetlands;
- Ecological restoration and management practices;
- Local wildlife and their habitats; and
- Naturalized stormwater treatment train elements.

Interpretive signage, self-guided trails, and a nature center can be methods to provide interpretive materials to site residents, tenants, and other public users. The size and diversity of site habitats provides a plethora of opportunities to engage in the site’s natural cycles. Phenology addresses natural phenomena as they change over the course of the year. Bloom times of specific wildflowers, singing of frogs and toads, and ripening of raspberries are all examples of natural cycles that can be conveyed to the public, enriching their experience and connection to the site. An example of natural phenomena and how, when, and where they could be experienced on the site is provided in Phenology chart, attached.

ECOLOGICAL RESTORATION

Proposed Native Plant Communities

Proposed native plant communities are those largely self-sustaining ecological combinations of species that are designed to match the site’s ecological conditions and desired functions and aesthetics. Functional integrity includes providing site-appropriate habitats for desirable native wildlife. Based on the site’s natural history, specific environmental conditions, and goals for the site, a customized ecological restoration plan should be developed to provide guidance to restore and/or manage the following native plant communities.

Table 3. **Proposed Native Plant Communities for the La Crosse Riverside Redevelopment Site**

Proposed Native Plant Community	Regional Rarity	Current Condition	Years to Achieve Expected Condition with Restoration & Management
Savanna Copse	Rare	-	10
Sand Prairie	Uncommon	-	5
Mesic Prairie	Uncommon	-	5
Wet Prairie	Uncommon	-	5
Emergent Marsh	Common	C/D	5
Floodplain Forest	Common	C	20
Aquatic Vegetation	Common	C	5

Note: Condition ranks range from A (high quality) to D (poor quality).

Planning for this site should envision the possibility of expanding, restoring, and connecting native habitats. In addition to benefitting native plants and wildlife, these connections will benefit human use, enhance people's appreciation of the site, and increase the value of the development in the marketplace. It could also be consistent with a desire to draw to the development educated buyers with aspirations to become involved in participatory conservation, lifelong learning, and local conservation efforts.

Proposed native plant communities indicate desired conditions at the site. Some of these native plant communities (e.g., savannas and prairies) will require full restoration, including soil preparation and installation of native seeds and/or plants. In other cases, these native plant communities will be restored by enhancing an existing plant community. Establishment and management of these plant communities will require maintenance, but considerably less than turf and other conventional landscapes.

Plant species lists for restoration of native plant communities are provided in Appendix 1a. Native plant materials should have a source-origin within 200 miles of the project area whenever possible, and only native, wild-type (non-cultivar) species should be used. Substitutions for specified seed and plant materials may be necessary due to the rapidly changing availability and pricing of native plant materials. Every effort should be made to match the ecological purpose of species that are unavailable in the selection of substitution species.

Restoration and Management Approach

Restoration and Management Stages and Implementation Phasing

Ecological restoration and management occurs in two stages.

- 1. Restoration and Short-Term Management.** This initial stage is the most intensive and costly. Significant effort is often necessary to reestablish native vegetation and plant community structure. Actions include tasks such as selective woody brush removal, spraying invasive species with herbicide, native seeding and planting, and using bio-control techniques when available. After invasive plants are removed and native seed and plants are installed, short-term management is critical. The period of time required to complete this restoration and short-term management stage varies depending on the condition of the ecological system, its response to restoration efforts, as well as the size of the site and intensity and scope of the of the restoration work. Typically this initial stage requires about three years for a given management unit, after which the perpetual management stage begins.
- 2. Perpetual Management.** After achieving initial restoration goals within a management unit, the restoration process shifts to a reduced-intervention, lower-cost perpetual management stage. The perpetual management stage is critical for maintaining the value of the investment, perpetuating healthy plant communities, and maximizing the ecological and aesthetic benefits of the native plant communities. This perpetual management provides long-term control of invasive species, remedial seeding/planting as necessary, and maintains necessary disturbance regimes (e.g., fire) within the management units.

To carry out these two stages in the project area, work tasks are listed and scheduled over a multi-year period for each “management unit.” Once work begins in a management unit, it is often important that all tasks be completed in sequence, or the restoration targets for that unit may not be achieved. It is important that the restoration and management program and schedule be flexible. Flexibility is necessary because some tasks require suitable weather conditions or are dependent on the completion of preceding tasks. Flexibility is also necessary because feedback from the monitoring program may result in changes of strategy, techniques, and timing in order to meet restoration goals.

Ecological Monitoring & Reporting

In all stages of ecological restoration and management, ecological monitoring is used to evaluate the effectiveness of the program. An ecological monitoring program measures and evaluates the status of:

- Native plant and animal diversity and abundance;
- Development of native plantings;
- Invasive species populations; and
- Erosion issues.

Initial data collection provides a baseline against which future monitoring data can be compared. Data collected are species counts and mapping, estimates of plant cover, and repeat photography. Specific indicators of plant community health are defined and measured; for example, the presence in good numbers of birds characteristic of prairie, savanna and woodland is an indicator of habitat suitability. These data are used to assess the response of native plant and animal communities to ecological restoration and management. The effectiveness of management activities is judged against “performance standards” for the project—targets of progress as indicated by ecological conditions that are measured. Project goals, stated at the beginning of this document, can be modified over time if monitoring suggests the goals are not realistic or ambitious enough. Each year’s monitoring results are compiled into a report, which is used to guide the next year’s activities. A detailed ecological monitoring program should be developed for the site to support the ecological management program in perpetuity.

Specialized Training

Specialized training (often involving licensing or certification), oversight, and guidance are required of personnel before implementation of ecological restoration and management plans. Personnel and volunteers involved in prescribed burning, brush control, monitoring, seed collection, etc. should receive training commensurate with the activity in which they would be involved. Training is especially important for those activities that may have risk and safety implications, such as prescribed burning and herbicide application. However, even misidentification of plant species (e.g., mistaking native cherry shrubs for common buckthorn, mistaking native grasses for invasive reed canary-grass) can have adverse effects on restoration implementation and management.

RESTORATION AND MANAGEMENT PLAN IMPLEMENTATION AND SCHEDULE

Management Units and Tasks

Management units are used to organize ecological restoration and management. Management units may contain one or a variety of land cover types that warrant different restoration and management tasks. Restoration and short-term management tasks generally include site preparation, weed control, brushing and thinning (in wooded communities), seeding and planting, and ecological monitoring and reporting.

Management unit boundaries were delineated along existing roads, existing and proposed trails, topography, areas of similar management needs (e.g., use of prescribed fire), and proposed uses. The need to provide refuges for invertebrates during and after prescribed fires was also considered. Native plantings at entryways, near buildings and in parking lots are not included in this plan. Rather, they would be part of a separate landscaping plan for the site. Invasive plants are not recommended for use in site landscaping (Appendix 1b). Native woody plants are recommended for landscaping and ecological buffering (Appendix 1c).

The following sections outline tasks to be performed throughout the entire site as, general restoration and short-term management tasks for uplands and wetlands, and the steps to be taken in individual management units. When possible, implementation of this NRMP should begin with tasks for the entire site, then proceeding to individual management units. Management units have been numbered primarily for identification purposes; however, they do represent a generalized phasing strategy.

9.1.1 General Tasks for the Entire Site

Restoration and management tasks that should be carried out throughout the entire project area include:

1. Biological Inventory

- Establish permanent vegetation monitoring plots in representative plant communities to document changes in the vegetation over time.
- As scheduling allows, conduct a thorough wildlife inventory with a focus on target indicator species. Different groups require different techniques. For example, point counts are useful for birds, calling censuses for amphibians, and transect counts for butterflies and dragonflies. Tracking changes in the presence and abundance of target indicator species will document whether the restoration and management activities favor the conservation of regionally uncommon species.
- As scheduling allows, conduct a thorough inventory to identify additional rare plants on site.
- Conduct a “bioblitz¹” to involve technical experts and area residents in an inventory of the site’s biological resources. This is not a substitute for the highly technical monitoring of plant communities and target indicator species.

2. Prescribed Burn Management

- Prescribed burning is an important and cost-effective ecological restoration and management tool – and one that is appropriate for more than just prairies. Oak savanna, which used to occupy portions of the site, burned quite regularly prior to European

¹ A bioblitz is usually a 24-hour period when volunteers document all living species within a given area, such as a public park. Bioblitzes help to gather important baseline data on plants and animals in a specific area, while also engaging people in discovery of the natural world and scientific research in the company of experts.

settlement. However, these burns were typically low-intensity ground fires, fueled by oak leaves. The City of La Crosse may reintroduce prescribed fire to the site as a restoration and management tool, critical to cost-effective stewardship of the site.

- Less frequent and less intense ground fires also burned through the site's historical forests, so we recommend fire be used in these ecosystems as well – especially to aid initial restoration and enhancement work. Over time, intermittent use of prescribed fire will shift plant species composition to carry a low-intensity surface fire through the site's wooded areas.

3. Annual Ecological Monitoring & Reporting

- As part of adaptive management, complete an annual walkabout of each management unit. Document the success of native seeding and planting, regeneration of important plant species, invasive species presence, problems with vegetative cover, and observations of herbivory, erosion, or damaging activities.
- Establish fixed photo-reference points and take photos annually, including landscape views as well as oblique downward photos to capture ground layer vegetation.
- Prepare an annual ecological monitoring report that summarizes findings and provides recommendations for management in the upcoming year.
- Where vegetation plots are established, repeat the sampling annually. In the context of restoration and management activities, summarize status and trends at the end of each calendar year.

9.1.2 General Restoration and Management Tasks for Uplands

Restoration and management tasks that should be carried out in the site's uplands include:

1. Site Preparation & Weed Control

- Use a combination of broadcast herbicide, tilling, spot herbicide, mowing, and prescribed burning to remove undesirable vegetation and prepare site for native seeding. Potential species of concern include, but are not limited to: smooth brome, Kentucky bluegrass, Canada thistle, bull thistle, leafy spurge, sweet clovers, ground clovers, crown vetch, hairy vetch, bird's foot trefoil, spotted knapweed, reed canary-grass, and garlic mustard.
- A minimum of two (and ideally three) herbicide treatments is recommended for preparing cool season grass fields for native seed.
- Prior to burning, secure necessary permissions, issue community notifications, and take appropriate precautions.

2. Brushing & Thinning

- Where present, cut and stump treat all invasive non-native woody vegetation, including but not limited to: common buckthorn, glossy buckthorn, and exotic honeysuckles. Remove or selectively thin aggressive native woody plants (e.g., boxelder) to achieve target vegetation structure and shade regime. Careful use of a brush mower may be appropriate in areas (e.g., where desirable woody vegetation is absent).
- Woody clearing should be done when the ground is frozen. Cut material can be stacked and burned on site, chipped and thin spread on site, or transported off-site for biomass-to-energy or firewood. Care should be taken to not spread invasive propagules (e.g., buckthorn berries) during removal activities. Handling and transport of cut wood should follow all state and federal recommendations to minimize the potential transfer of pests such as Emerald Ash Borer, Gypsy Moth, etc.
- Treat invasive non-native woody vegetation seedlings and re-sprouts with foliar herbicide for up to 5 seasons.

- If sufficient fuel, prescribed burning can also be effective for removing/controlling undesirable woody brush.

3. *Seeding & Planting*

- After weed control is established, install specified local ecotype native seed. When possible (e.g., most prairie and savanna areas), seed should be installed with a no-till drill. Live herbaceous and woody plants may be installed to expedite the restoration process and establish appropriate ecosystem structure and composition.

9.1.3 General Restoration and Management Tasks for Wetlands

1. *Site Preparation & Weed Control*

- The site's reed canary grass wet meadow has few other plant species present and represents a severely degraded wetland. Therefore, restoration of this plant community will need to be aggressive and thorough if a moderate quality native plant community is desired. This will entail using a combination of broadcast herbicide, mowing, and prescribed burning to remove the undesirable vegetation and prepare the area for native seeding. A minimum of two (and ideally three) herbicide treatments are recommended prior to installing native seed.
- Prior to burning, secure necessary permissions, issue community notifications, and take appropriate precautions.

2. *Seeding & Planting*

- After weed control is established, install specified local ecotype native seed. Due to wetter conditions, wetland seed will typically be broadcast onto wet or moist soil (not over open water). In areas of standing water, live plants should be installed.

9.2 Short-Term Restoration and Management Tasks

The following table illustrates a typical restoration and short-term management program for the initial establishment of a given restoration area. However, restoration projects within a management unit will require a more detailed scope and will likely follow a slightly different schedule. It is also important to note that due to the development schedule, portions of the site will not be restored for many decades.

Table 9. Generalized Schedule for Restoration and Short-Term Management of a Given Project Area

Task	Description/Subtask	Year 1				Year 2				Year 3			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Site Preparation (all zones)	Broadcast herbicide, till, spot herbicide, and/or mow	■	■	■									
Brushing & Thinning (upland zones)	Cut & stump treat invasive woody plants				■								
	Remove or selectively thin aggressive native woody plants				■								
Weed Control (all zones)	Prescribed burn (prep burn either late Summer, Fall or Spring)		■	■		■							
	Spot herbicide and/or spot mow					■	■			■	■		
	Foliar herbicide non-native woody re-growth							■				■	
Seeding & Planting (all zones, where weed control adequate; if weed control achieved sooner, plantings can be installed sooner)	Install native seed							■					
	Install live woody plants when dormant							■					■
	Install live herbaceous plants								■				
Ecological Monitoring & Reporting (all zones)	Assess/document site, and prepare summary report	■	■	■	■	■	■	■	■	■	■	■	■

The restoration and short-term management tasks listed above (i.e., site preparation, brushing and thinning, weed control, seeding and planting, and ecological monitoring and reporting) are described in greater detail in the management unit discussions below.

9.3 Perpetual Management

Perpetual management is essential to restoring and maintaining the composition, structure, and function of healthy native ecosystems. Perpetual management begins after initial restoration work is completed, usually the fourth year after restoration is initiated. The two primary perpetual management tasks are:

1. *Weed Control*

- Control invasive non-native herbaceous vegetation, primarily with appropriate spot herbicide applications. Cutting of invasive woody vegetation may also be necessary in some areas. Plant communities proposed for prairie restoration may employ haying or mowing if prescribed burning is not feasible. Mowing is less effective than haying because it does not remove plant material; over time the accumulated organic matter results in nutrient enrichment, which can favor invasive plants.

2. *Prescribed Burning*

- Prescribed burning is a very cost-effective management tool for many native plant communities, including not only prairies but also savannas and some woodlands and forests. Generally, perpetual management burns are conducted on a rotational basis, beginning with the fall or spring following the third full year of growth after seeding. In order to mimic natural fire regimes, burns should extend across habitat gradients (e.g., burning from prairies into adjacent savannas, woodlands, and wetlands) when feasible.

Perpetual management tasks (Table 10) are repeated at different intervals for different plant communities to ensure that healthy restored plant communities are maintained over the long term.

Table 10. Perpetual Management Schedule

Plant Community	Task Frequency (once every X years)			
	Prescribed Burning	Weed Control (Spot Herbicide)	Remedial Seeding/Planting	Detailed Monitoring & Reporting
Forest	3-5	3-4	5	1
Hill Prairie	3	2-3	3	1
Savanna	3-4	1-2	3-5	1
Prairie	2-3	2-3	3-5	1
Wet Prairie	2-3	1-2	3-5	1
Wet Meadow	2-3	1-2	3-5	1
Marsh	2-3	2-3	3-5	1
Pond	NA	NA	NA	NA

Notes: NA = not applicable

Schedule assumes that prescribed burning will be employed as a restoration and management technique. If prescribed burning is not employed, haying should be used in prairie areas to remove accumulating plant material.

11 CONCLUSION

The site's natural environment contains a variety of plant communities, ranging from moderate quality native remnants to altered/disturbed cultural landscapes. The ecological restoration, enhancement, and management tasks, as well as trail and recreational facilities described in this NRMP & TRMP will help achieve the conservation and recreational goals. Carrying out these tasks by qualified restoration and recreation specialists, together with monitoring and adaptive management, will help ensure a legacy of healthy ecosystems and community engagement at the site. The restored and enhanced native ecosystems will provide aesthetically pleasing landscapes for the community, recreational opportunities for site visitors, habitat for wildlife, and ecosystem services that benefit the entire region.

Specific outcomes expected from implementation of this plan include:

- Approximately 30 acres of restored landscapes
- Convenient access to nature for the adjacent urban population center
- Example of how residential and commercial development can be mindful of restoration and recreation opportunities, both short-term (during operations) and long-term (end use)
- Example of how restoration and recreation can be phased in over time as opportunities arise, land becomes available, and funding is allocated
- Interpretive center and opportunities addressing cultural history, sustainability, native ecosystems, etc.
- Long-term ecological restoration, study, and observation site regarding ecological processes and natural ecosystems
- Provide large blocks of high quality habitat for wildlife uncommon in the region

12 NEXT STEPS & RECOMMENDATIONS

Based on the results of previous studies, recent research, and County and stakeholder input, the following next steps and recommendations are offered.

- Develop a more detailed restoration and management plan
- Develop a detailed monitoring program
- Determine annual funding available for implementation and maintenance
- Develop interpretive messages/signage/style

REFERENCES

- Wisconsin Department of Natural Resources (WiDNR). 2012. *Species of Greatest Conservation Need - Western Coulee and Ridges Ecological Landscape*. <http://dnr.wi.gov/topic/landscapes/index.asp?mode=detail&Landscape=11> (accessed October 2013).
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- USFWS. 2013. Endangered Species: County Distribution of Federally-listed Endangered, Threatened, Proposed and Candidate Species. <http://www.fws.gov/midwest/endangered/lists/wisc-cty.html> (Accessed May 2014).

Appendix 1a. Native Plant Lists

Forest Enhancement (upland, full shade)

COMMON NAME	SCIENTIFIC NAME	Rate
GRAMINOIDS		(lb/ac)
Hairy woodland brome	<i>Bromus pubescens</i>	0.30
Long-beaked sedge	<i>Carex sprengei</i>	0.10
Bottlebrush grass	<i>Elymus hystrix</i>	0.20
Virginia wild rye	<i>Elymus virginicus</i>	3.40
Total Grasses		4.00

COMMON NAME	SCIENTIFIC NAME	Rate
FORBS		(lb/ac)
Long-headed thimbleweed	<i>Anemone cylindrica</i>	0.10
Canada columbine	<i>Aquilegia canadensis</i>	0.20
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	0.20
Large-leaved aster	<i>Eurybia macrophylla</i>	0.03
Harebell	<i>Campanula rotundifolia</i>	0.04
Pointed-leaved tick-trefoil	<i>Desmodium glutinosum</i>	0.05
Common false Solomon's seal	<i>Smilacina racemosa</i>	0.20
Zig zag goldenrod	<i>Solidago flexicaulis</i>	0.05
Heart-leaved aster	<i>Symphyotrichum cordifolium</i>	0.03
Sky blue aster	<i>Symphyotrichum oolentangiense</i>	0.05
Early meadow-rue	<i>Thalictrum dioicum</i>	0.05
Total Forbs		1.00

COMMON NAME	SCIENTIFIC NAME	Rate
COVER CROP (select ONE)		(lb/ac)
Oats	<i>Avena sativa</i> (Oct 15 – Aug 1)	15.00
Winter wheat	<i>Triticum aestivum</i> (Aug 1 – Oct 15)	15.00

Savanna (upland, partial shade)

36-211

Woodland Edge South & West

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
big bluestem	<i>Andropogon gerardii</i>	1.12	1.00	2.90%	3.68
side-oats grama	<i>Bouteloua curtipendula</i>	1.12	1.00	2.89%	2.20
kalm's brome	<i>Bromus kalmii</i>	1.68	1.50	4.34%	4.40
nodding wild rye	<i>Elymus canadensis</i>	1.40	1.25	3.61%	2.38
bottlebrush grass	<i>Elymus hystrix</i>	0.36	0.32	0.91%	0.88
slender wheatgrass	<i>Elymus trachycaulus</i>	1.40	1.25	3.64%	3.18
switchgrass	<i>Panicum virgatum</i>	0.07	0.06	0.17%	0.30
little bluestem	<i>Schizachyrium scoparium</i>	0.69	0.62	1.79%	3.40
Indian grass	<i>Sorghastrum nutans</i>	1.12	1.00	2.89%	4.40
	Total Grasses	8.97	8.00	23.14%	24.82
common yarrow	<i>Achillea millefolium</i>	0.03	0.03	0.09%	2.00
blue giant hyssop	<i>Agastache foeniculum</i>	0.11	0.10	0.28%	3.20
white snakeroot	<i>Ageratina altissima</i>	0.03	0.03	0.09%	1.70
white prairie clover	<i>Dalea candida</i>	0.19	0.17	0.50%	1.20
Canada tick trefoil	<i>Desmodium canadense</i>	0.16	0.14	0.42%	0.29
ox-eye	<i>Heliopsis helianthoides</i>	0.15	0.13	0.38%	0.30
wild bergamot	<i>Monarda fistulosa</i>	0.07	0.06	0.18%	1.60
stiff goldenrod	<i>Oligoneuron rigidum</i>	0.07	0.06	0.17%	0.90
Clayton's sweet cicely	<i>Osmorhiza claytonii</i>	0.07	0.06	0.17%	0.06
smooth wild rose	<i>Rosa blanda</i>	0.07	0.06	0.17%	0.06
black-eyed susan	<i>Rudbeckia hirta</i>	0.20	0.18	0.52%	6.10
Lance-leaved Figwort	<i>Scrophularia lanceolata</i>	0.06	0.05	0.14%	3.20
zigzag goldenrod	<i>Solidago flexicaulis</i>	0.02	0.02	0.05%	0.50
showy goldenrod	<i>Solidago speciosa</i>	0.07	0.06	0.18%	1.80
smooth aster	<i>Symphotrichum laeve</i>	0.07	0.06	0.19%	1.30
American vetch	<i>Vicia americana</i>	0.20	0.18	0.52%	0.14
golden alexanders	<i>Zizia aurea</i>	0.12	0.11	0.33%	0.46
	Total Forbs	1.68	1.50	4.38%	24.80
Oats or winter wheat (see note at beginning of list for recommended dates)		28.02	25.00	72.48%	11.14
	Total Cover Crop	28.02	25.00	72.48%	11.14
	Totals:	38.67	34.50	100.00%	60.75
Purpose:	Partly shaded grassland planting for native roadsides, reclamation, etc.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

Prairie (upland, full sun)

35-641

Mesic Prairie Southeast

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
big bluestem	<i>Andropogon gerardii</i>	1.01	0.90	7.49%	3.30
side-oats grama	<i>Bouteloua curtipendula</i>	1.54	1.37	11.38%	3.01
nodding wild rye	<i>Elymus canadensis</i>	1.18	1.05	8.77%	2.01
slender wheatgrass	<i>Elymus trachycaulus</i>	1.01	0.90	7.50%	2.28
switchgrass	<i>Panicum virgatum</i>	0.24	0.21	1.78%	1.10
little bluestem	<i>Schizachyrium scoparium</i>	1.42	1.27	10.59%	7.00
Indian grass	<i>Sorghastrum nutans</i>	2.24	2.00	16.68%	8.82
	Total Grasses	8.63	7.70	64.19%	27.52
butterfly milkweed	<i>Asclepias tuberosa</i>	0.07	0.06	0.53%	0.10
whorled milkweed	<i>Asclepias verticillata</i>	0.01	0.01	0.10%	0.05
Canada milk vetch	<i>Astragalus canadensis</i>	0.18	0.16	1.33%	1.00
partridge pea	<i>Chamaecrista fasciculata</i>	0.67	0.60	5.00%	0.60
white prairie clover	<i>Dalea candida</i>	0.01	0.01	0.07%	0.06
purple prairie clover	<i>Dalea purpurea</i>	0.10	0.09	0.76%	0.50
Canada tick trefoil	<i>Desmodium canadense</i>	0.17	0.15	1.24%	0.30
ox-eye	<i>Heliopsis helianthoides</i>	0.06	0.05	0.43%	0.12
rough blazing star	<i>Liatris aspera</i>	0.03	0.03	0.21%	0.15
great blazing star	<i>Liatris pycnostachya</i>	0.03	0.03	0.29%	0.14
wild bergamot	<i>Monarda fistulosa</i>	0.01	0.01	0.06%	0.18
stiff goldenrod	<i>Oligoneuron rigidum</i>	0.02	0.02	0.17%	0.31
gray-headed coneflower	<i>Ratibida pinnata</i>	0.02	0.02	0.15%	0.20
black-eyed susan	<i>Rudbeckia hirta</i>	0.06	0.05	0.38%	1.54
heath aster	<i>Symphotrichum ericoides</i>	0.01	0.01	0.05%	0.40
smooth aster	<i>Symphotrichum laeve</i>	0.06	0.05	0.41%	1.00
bracted spiderwort	<i>Tradescantia bracteata</i>	0.04	0.04	0.34%	0.15
blue vervain	<i>Verbena hastata</i>	0.04	0.04	0.37%	1.50
hoary vervain	<i>Verbena stricta</i>	0.11	0.10	0.85%	1.05
golden alexanders	<i>Zizia aurea</i>	0.08	0.07	0.60%	0.29
	Total Forbs	1.79	1.60	13.34%	9.64
Oats or winter wheat (see note at beginning of list for recommended dates)		3.03	2.70	22.47%	1.20
	Total Cover Crop	3.03	2.70	22.47%	1.20
	Totals:	13.45	12.00	100.00%	38.36
Purpose:	Regional mesic prairie reconstruction for wetland mitigation, ecological restoration, or conservation program plantings.				
Planting Area:	Eastern Broadleaf Forest Province excluding Hardwood Hills subsection. Mn/DOT Districts Metro & 6.				

Detention Water Basin (bottom of temporarily flooded basins)

33-261

Stormwater South & West

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
big bluestem	<i>Andropogon gerardii</i>	2.24	2.00	5.72%	7.35
fringed brome	<i>Bromus ciliatus</i>	2.24	2.00	5.73%	8.10
bluejoint	<i>Calamagrostis canadensis</i>	0.07	0.06	0.18%	6.40
slender wheatgrass	<i>Elymus trachycaulus</i>	1.12	1.00	2.85%	2.53
Virginia wild rye	<i>Elymus virginicus</i>	1.68	1.50	4.28%	2.31
switchgrass	<i>Panicum virgatum</i>	0.43	0.38	1.07%	1.93
fowl bluegrass	<i>Poa palustris</i>	1.19	1.06	3.03%	50.70
Indian grass	<i>Sorghastrum nutans</i>	0.13	0.12	0.36%	0.55
prairie cordgrass	<i>Spartina pectinata</i>	0.43	0.38	1.07%	0.91
	Total Grasses	9.53	8.50	24.29%	80.78
awl-fruited sedge	<i>Carex stipata</i>	0.28	0.25	0.71%	3.10
dark green bulrush	<i>Scirpus atrovirens</i>	0.21	0.19	0.54%	31.70
woolgrass	<i>Scirpus cyperinus</i>	0.07	0.06	0.18%	39.00
	Total Sedges and Rushes	0.56	0.50	1.43%	73.80
Canada anemone	<i>Anemone canadensis</i>	0.08	0.07	0.19%	0.20
marsh milkweed	<i>Asclepias incarnata</i>	0.12	0.11	0.32%	0.20
leafy beggarticks	<i>Bidens frondosa</i>	0.12	0.11	0.31%	0.20
flat-topped aster	<i>Doellingeria umbellata</i>	0.07	0.06	0.17%	1.50
spotted Joe pye weed	<i>Eutrochium maculatum</i>	0.07	0.06	0.18%	2.19
autumn sneezeweed	<i>Helenium autumnale</i>	0.15	0.13	0.36%	5.97
obedient plant	<i>Physostegia virginiana</i>	0.08	0.07	0.21%	0.30
tall coneflower	<i>Rudbeckia laciniata</i>	0.08	0.07	0.21%	0.37
New England aster	<i>Symphotrichum novae-angliae</i>	0.08	0.07	0.19%	1.56
blue vervain	<i>Verbena hastata</i>	0.06	0.05	0.15%	1.85
golden alexanders	<i>Zizia aurea</i>	0.22	0.20	0.56%	0.79
	Total Forbs	1.12	1.00	2.85%	15.13
Oats or winter wheat (see note at beginning of list for recommended dates)		28.02	25.00	71.43%	11.14
	Total Cover Crop	28.02	25.00	71.43%	11.14
	Totals:	39.23	35.00	100.00%	180.85
Purpose:	Stormwater pond edges, temporarily flooded dry ponds, and temporarily flooded ditch bottoms.				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

Wet Meadow (wetland slough)

34-271		Wet Meadow South & West			
Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
fringed brome	<i>Bromus ciliatus</i>	1.23	1.10	9.18%	4.45
bluejoint	<i>Calamagrostis canadensis</i>	0.06	0.05	0.41%	5.00
Virginia wild rye	<i>Elymus virginicus</i>	1.12	1.00	8.37%	1.55
rice cut grass	<i>Leersia oryzoides</i>	0.28	0.25	2.07%	3.10
tall manna grass	<i>Glyceria grandis</i>	0.17	0.15	1.26%	3.90
fowl manna grass	<i>Glyceria striata</i>	0.11	0.10	0.83%	3.30
fowl bluegrass	<i>Poa palustris</i>	0.39	0.35	2.88%	16.50
	Total Grasses	3.36	3.00	25.00%	37.80
bristly sedge	<i>Carex comosa</i>	0.24	0.21	1.78%	2.36
pointed broom sedge	<i>Carex scoparia</i>	0.06	0.05	0.43%	1.60
awl-fruited sedge	<i>Carex stipata</i>	0.19	0.17	1.40%	2.10
tussock sedge	<i>Carex stricta</i>	0.03	0.03	0.21%	0.50
fox sedge	<i>Carex vulpinoidea</i>	0.16	0.14	1.13%	5.00
path rush	<i>Juncus tenuis</i>	0.04	0.04	0.34%	15.00
dark green bulrush	<i>Scirpus atrovirens</i>	0.20	0.18	1.48%	30.00
woolgrass	<i>Scirpus cyperinus</i>	0.09	0.08	0.67%	50.00
	Total Sedges and Rushes	1.01	0.90	7.44%	106.56
marsh milkweed	<i>Asclepias incarnata</i>	0.27	0.24	2.03%	0.43
common boneset	<i>Eupatorium perfoliatum</i>	0.02	0.02	0.18%	1.30
grass-leaved goldenrod	<i>Euthamia graminifolia</i>	0.01	0.01	0.06%	1.00
spotted Joe pye weed	<i>Eutrochium maculatum</i>	0.02	0.02	0.18%	0.75
autumn sneezeweed	<i>Helenium autumnale</i>	0.03	0.03	0.23%	1.30
sawtooth sunflower	<i>Helianthus grosseserratus</i>	0.04	0.04	0.30%	0.20
great lobelia	<i>Lobelia siphilitica</i>	0.02	0.02	0.13%	2.90
blue monkey flower	<i>Mimulus ringens</i>	0.01	0.01	0.07%	6.80
Virginia mountain mint	<i>Pycnanthemum virginianum</i>	0.07	0.06	0.53%	5.10
giant goldenrod	<i>Solidago gigantea</i>	0.02	0.02	0.14%	1.50
eastern panicled aster	<i>Symphotrichum lanceolatum</i>	0.03	0.03	0.22%	1.50
red-stemmed aster	<i>Symphotrichum puniceum</i>	0.19	0.17	1.42%	5.00
tall meadow-rue	<i>Thalictrum dasycarpum</i>	0.01	0.01	0.12%	0.11
blue vervain	<i>Verbena hastata</i>	0.15	0.13	1.12%	4.61
bunched ironweed	<i>Veronia fasciculata</i>	0.03	0.03	0.28%	0.30
Culver's root	<i>Veronicastrum virginicum</i>	0.01	0.01	0.12%	4.20
golden alexanders	<i>Zizia aurea</i>	0.28	0.25	2.06%	1.00
	Total Forbs	1.23	1.10	9.19%	38.00
Oats or winter wheat (see note at beginning of list for recommended dates)		7.85	7.00	58.37%	3.12
	Total Cover Crop	7.85	7.00	58.37%	3.12
	Totals:	13.45	12.00	100.00%	185.48
Purpose:	Wet meadow / Sedge meadow reconstruction for wetland mitigation or ecological restoration projects				
Planting Area:	Tallgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

Appendix 1b. Invasive Landscaping Plants to Avoid

The following undesirable plant species are known to escape from plantings, invading natural areas, often with adverse ecological effects. These species should not be used at the site.

Trees, Shrubs and Vines

Common Name	Scientific Name
Amur Maple	<i>Acer ginnala</i>
Norway Maple	<i>Acer platanoides</i>
Barberry	<i>Berberis thunbergii</i> and related species
Siberian Peashrub	<i>Caragana arborescens</i>
Russian Olive	<i>Eleagnus angustifolia</i>
Bittersweet	<i>Euonymus</i> spp or <i>Celastrus</i> spp, except <i>E. atropurpurea</i> and <i>C. scandens</i>
Non-native Honeysuckles	<i>Lonicera tatarica</i> , <i>L. x bella</i> , <i>L. morrowii</i> , <i>L. xylosteum</i>
White/European Poplar	<i>Populus alba</i>
Common, Glossy Buckthorn	<i>Rhamnus cathartica</i> , <i>R. frangula</i>
Black Locust	<i>Robinia pseudo-acacia</i>
Multiflora Rose	<i>Rosa multiflora</i>
Siberian Elm	<i>Ulmus pumila</i>

Herbaceous Plants

Common Name	Scientific Name
Smooth Brome	<i>Bromus inermis</i>
Flowering Rush	<i>Butomus umbellatus</i>
Crown Vetch	<i>Coronilla varia</i>
Queen Anne's Lace	<i>Daucus carota</i>
Leafy Spurge	<i>Euphorbia esula</i>
Common St. John's Wort	<i>Hypericum perforatum</i>
Yellow Water Iris	<i>Iris pseudacorus</i>
Bird's-foot Trefoil	<i>Lotus corniculatus</i>
Purple Loosestrife	<i>Lythrum salicaria</i>
White, Yellow Sweet Clover	<i>Melilotus alba</i> , <i>M. officinalis</i>
Silver or Banner Grass	<i>Miscanthus</i> species
Reed Canary-grass	<i>Phalaris arundinacea</i>
Giant Reed Grass	<i>Phragmites australis</i>
Japanese Knotweed	<i>Polygonum cuspidatum</i>
Ornamental water lilies	Various species
Mullein	<i>Verbascum thapsus</i>
Cow, Hairy Vetch	<i>Vicia cracca</i> , <i>V. villosa</i>

It is illegal to plant any species listed as noxious in state or federal listings. Contact the County Weed Inspector or visit <http://plants.usda.gov/java/noxious?rptType=State&statefips=55> or <http://plants.usda.gov/java/noxious?rptType=Federal>.

There are hundreds of beautiful native trees, shrubs, wildflowers and grasses that can be selected to create aesthetically pleasing landscapes that grow easily without a great deal of maintenance. Some recommended native trees and shrubs, and innocuous non-native trees and shrubs, are provided in Appendix 1c.

Appendix 1c. Native Woody Plant Recommendations for Site Landscaping

These native woody plants are indigenous to La Crosse County and the surrounding ecological region. They are adapted to local conditions of soils, climate, diseases and competition. While some of these species may not have existed historically at the site, they are suitable for landscape plantings with the goal of visual screening, ecological buffering, and wildlife habitat enhancement.

Certain species are recommended because they have a high wildlife value as food (e.g., oak, serviceberry, aspen) or as nesting sites (conifers). These and other species are also attractive or have natural history interest because they are used by people or have interesting physical properties. As a precaution, wild genetic stock within a 200-mile radius of the project area is preferred over cultivars and more distant genetic strains. Some research suggests that wild strains benefit wildlife to a greater extent than cultivated strains of the same species. Some research also suggests that local genetic strains of certain species are better able to survive local soil, climate, disease and competitive conditions than more distant genetic strains. Additionally a few species are not indigenous to the area but are innocuous in landscape plantings, and fulfill particular landscape design needs.

Upland Native Trees

Common Name	Scientific Name
Black Maple	<i>Acer nigrum</i>
Red Maple	<i>Acer rubrum</i>
Sugar Maple	<i>Acer saccharum</i>
River Birch	<i>Betula nigra</i>
Hackberry	<i>Celtis occidentalis</i>
Kentucky Coffee-tree	<i>Gymnocladus dioica</i>
Black Walnut	<i>Juglans nigra</i>
Eastern Red Cedar	<i>Juniperus virginiana</i>
Eastern White Pine	<i>Pinus strobus</i>
Big-toothed Aspen	<i>Populus grandidentata</i>
Quaking Aspen	<i>Populus tremuloides</i>
Black Cherry	<i>Prunus serotina</i>
Swamp White Oak	<i>Quercus bicolor</i>
Northern Pin Oak	<i>Quercus ellipsoidalis (coccinea)</i>
Bur Oak	<i>Quercus macrocarpa</i>
Red Oak	<i>Quercus rubra</i>
Eastern White Cedar	<i>Thuja occidentalis</i>
Basswood	<i>Tilia americana</i>

Upland Native Understory Trees and Shrubs

Common Name	Scientific Name	Form
Low Serviceberry	<i>Amelanchier humilis</i>	Shrub
Smooth Serviceberry	<i>Amelanchier laevis</i>	Short Tree
Black Chokeberry	<i>Aronia melanocarpa</i>	Shrub
Pagoda Dogwood	<i>Cornus alternifolia</i>	Shrub
Gray Dogwood	<i>Cornus racemosa</i>	Shrub
Red-twig Dogwood	<i>Cornus sericea</i>	Shrub
American Hazelnut	<i>Corylus americana</i>	Shrub
Fireberry Hawthorn	<i>Crataegus chrysocarpa</i>	Short Tree
Large-thorned Hawthorn	<i>Crataegus macrocarpa</i>	Short Tree
Bush Honeysuckle	<i>Diervilla lonicera</i>	Shrub
Witch Hazel	<i>Hamamelis virginiana</i>	Shrub
Winterberry	<i>Ilex verticillata</i>	Shrub

Common Name	Scientific Name	Form
Ironwood	<i>Ostrya virginiana</i>	Short Tree
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	Vine
Ninebark	<i>Physocarpus opulifolius</i>	Shrub
Wild Plum	<i>Prunus americana</i>	Shrub
Chokecherry	<i>Prunus virginiana</i>	Shrub
Smooth Sumac	<i>Rhus glabra</i>	Shrub
Smooth Rose	<i>Rosa blanda</i>	Shrub
Prairie Willow	<i>Salix humilis</i>	Shrub
Red Alder	<i>Sambucus pubens</i>	Shrub
Nannyberry	<i>Viburnum lentago</i>	Shrub
Highbush Cranberry	<i>Viburnum opulus var. americanum (trilobum)</i>	Shrub
Riverbank Grape	<i>Vitis riparia</i>	Vine

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Ecological Phenology For Riverside North - LaCrosse, WI													
2	The Experience													
3	Months		Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
4	Species/Phenomenon/Experience													
5														
6	Celebrating News Years Next to the River	Listening to the Ice setting in and cracking as it expands to cover the rivers surface	XX											
7	Watching bald eagles congregate around open water	Watching eagles catch fish, and interact at perching locations, perching on the ice	XX											XX
8	Bald Eagles start nest building/repair activities	Watch eagles carrying sticks for nest repair		XX										
9	Bald Eagle Nestling Fledging	Downy headed juvenile eagles climbing around branches in nest trees				XX								
10	Great Horned Owls calling throughout the night	5-parted Who, who, who, who, who call heard nightly	XX	XX										
11	Great Horned Owls Nesting	Adult owl hunkered on nest		XX										
12	Juvenile Great Horned Owls Fledging	See the downy juveniles flying around nesting locations			XX									
13	Snow Sweeps driven by high winds funnel down river's ice	Watch the drifting snow across the ice	XXX											
14	Ice Fishing in backwater areas	Fish for bluegills, walleye, pike from your ice fishing shanty	XX	XX										XX
15	First melt of snow and snowmelt floods local streams	Beware and watch flooding			XX									
16	Ice Breaks up and flushes from river as river comes to flood stage	Watch river water levels rise			XX									
17	River is in flood stage	Appreciate the power of water and the immense quantity of water moving through the river			XX	XX								
18	Frogs come out of hibernation, back to life	Life for the first calling Western Chorus frog, Spring peeper with ice out			XX									
19	Buds on Silver maples in floodplain, Sugar maple trees in tributary stream valley swelling	Become enthralled with the turning of the season			XX									
20	Maple syrup season begins	Help tap trees, have maple syrup on home-made vanilla icecream		XX	XX									
21	Spawning runs of Red Horse suckers and others begins in rapids on tributary streams	Watch the fish congregate for spawning below the rapids			XX	XX								
22	Spawning of Northern Pike begins as on-site wetlands flood and La Crosse river floods into site	Watch the massive swirls on the wetlands water surface as the Pike move into the marsh and spawn			XX									
23	Trout Fishing Season Opener	Watch the fly fishers or grab your fishing pole and wade the crystal clear Coolee streams in pursuit of Browns, rainbows and Brookies					XX							
24	Shad bush (Amelanchier) blooms	Notice the how this small shrub punctuates the ridge top of bluffs and cool north-faced draws				XX	XX							
25	Apple trees and other fruit orchards in full bloom	Smell the wonderful fragrance and listen to the hum of the honey bees pollinating the flowers					XX							
26	First few spring flowers bloom on sand prairie on the project site	Marvel at the small mustards (Arabis lyrata) growing from pure sand				XX								
27	River Otters use the sandy beaches to stage as they a midden of stockpiled clam shells	Find the piles of clam shell				XX	XX							
28	The ground is blanketed with giant trilliums and other wildflowers	Enjoy the beauty and diversity of the regional wildflowers				XX								
29	Find Pasque flowers blooming on south facing "Goat prairies" on ridges abutting the river.	Like pieces of the spring sky blue sky, these crocus like flowers emerge from the melting landscape			XX									
30	Celebrate the return of migratory birds, sandhill cranes, turkey vultures, Canada geese, and others	Flocks of cackling, honking, rapture creating primitive call of the crane return north following the river			XX									
31	Enjoy the bird life coming back; over 300 species of warblers, "Oh Sweet Canada Canada Canada" call of the white throated sparrow; the sweet plaintiff call of the Upland Sandpiper,	Participate in local bird watching morning tours--enjoy living in a Bird City					XX							

