

**LA CROSSE COUNTY LANDFILL
CONCEPTUAL NATURAL RESOURCE MANAGEMENT PLAN
&
TRAIL & RECREATION MASTER PLAN**



September 9, 2015



La Crosse Disposal System

A Responsible Resource



**Applied
Ecological
Services, Inc.**

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Prepared for:

La Crosse County Solid Waste Department

6500 State Road 16
La Crosse, WI 54601

Prepared by:

Applied Ecological Services, Inc.

21938 Mushtown Road
Prior Lake MN 55372
952.447.1919
AES project 12-0106

Kim Alan Chapman, PhD
Douglas M. Mensing, MS
Caitlin Blue, MA

EXECUTIVE SUMMARY

The La Crosse County Solid Waste Department recognizes that a landfill can provide community benefits far beyond waste disposal. In addition to this core service, the La Crosse Landfill already provides a variety of recycling services, interpretive opportunities, and limited recreational facilities (primarily the existing multi-use trail). The Landfill's unique regional setting (near the confluence of the Mississippi and La Crosse Rivers), large acreage, and interesting landforms and habitats all present a unique opportunity for expanding ecological restoration, environmental education, and recreational programming on the site.

This *Conceptual Natural Restoration Management Plan and Trail and Recreation Master Plan* supports the Landfill's Master Land Use Plan and is a foundational tool that will enable La Crosse County to improve the ecological health of the Landfill, as well as expand the community benefits it provides. The Natural Resource Management Plan describes the existing plant communities and wildlife habitats, lays out a vision and goals for improving the site's ecological health, and lists the activities that need to be carried out to achieve those goals. The Trail and Recreation Master Plan provides an inventory of existing trails (on site and in the vicinity), a vision for future trails and interpretation, and a framework for other recreational opportunities provided by the site (e.g., bird watching, sledding hill). Concepts such as an interpretive center, interpretive signage along trails, site tours, and other programming will attract the community to the landfill and provide a unique opportunity for learning about waste, recycling, sustainability, energy, and other topics.

A driving principle in this plan is the *balance* of often opposing goals to maximize benefits to people and the environment. Therefore, the site will neither be completely set aside as a nature preserve, nor will it be completely developed for maximum human use. The site's unique setting and opportunities have been considered in this balance, and tremendous conservation and recreational benefits will be achieved.

This plan is conceptual. It represents a compilation of past reports and current studies, and outlines an approach to achieve the County's goals for the site. Goals, and means to achieve those goals, may change with time, and much of the landfill itself is a dynamic landscape that changes over time. Therefore, this plan should be viewed as neither rigid nor static, but one that will be revised based on changing circumstances and goals. This process is referred to as "adaptive management" and is fundamental to plans associated with dynamic systems. As funding is allocated, more detailed implementation and construction plans will be developed to advance the specific components of this conceptual plan.

Implementation of this plan will restore native plant communities, provide habitat for a variety of wildlife, and engage the community in healthy, educational activities. The plan can also be used to solicit funding to carry out land restoration and trail construction work. It can guide community involvement. It can serve as an educational backdrop for the landfill operations. It will make the La Crosse County Landfill a showcase for ecological restoration, recreation, and community engagement. Last but not least, it will contribute to the conservation of uncommon native species in the region.

1 INTRODUCTION

1.1 Reasons for a Natural Resource Management Plan and Trail and Recreation Master Plan at the Landfill

In its simplest form, a Natural Restoration Management Plan (NRMP) is a useful tool for landowners to preserve or improve the ecological health of their lands and waters. Such a plan describes the current state of plant communities and animal habitats, documents species, lays out a vision and goals for improving ecological health, and lists the activities that need to be carried out to achieve those goals.

When implemented, a Natural Restoration Management Plan generates many benefits. On one hand, the variety of plant and animal life increases over time, enlivening the setting for visitors or people who study the ecology of a place. In particular, uncommon species of plants and animals increase in number, making restored landscapes a refuge for species that are in decline or uncommon elsewhere. On the other hand, ecologically healthy landscapes are believed to respond better to disturbances and changes in the environment. With climate change, species ranges are expected to shift northward and the frequency and severity of some disturbances to increase. A diverse, ecologically-healthy landscape will adapt to those new conditions differently than a damaged landscape, with the potential to recover more quickly from disturbances and continue to provide ecosystem services at a high level.

Ecosystem services are another benefit of improved ecological health. An ecosystem service is an output from nature which benefits people. Replenishing groundwater reserves, for instance, is an ecosystem service delivered by healthy vegetation-soil systems. Another ecosystem service is the capacity of floristically-diverse landscapes to support a large number and variety of insects that pollinate crops and fruit trees. Being able to see wildlife that spontaneously arise in nature is another ecosystem service emerging from a resource-rich landscape.

A Trail and Recreation Master Plan (TRMP) provides an inventory of existing trails, a vision for future trails, and a framework for other recreational opportunities provided by the site. Trail alignments and slopes are designed to work with the natural environment and provide exceptional experiences and views for a variety of trail users (e.g., walking, hiking, cycling, mountain biking, cross-country skiing). Other recreational opportunities may include bird watching, a natural play area, or a sledding hill. Education and community involvement are also addressed under the Trail and Recreation Master Plan. Concepts such as an interpretive center, interpretive signage along trails, site tours, and other programming will attract the community to the landfill and provide a unique opportunity for learning about waste, recycling, sustainability, energy, and other topics.

With its existing wild spaces, its unique landforms, the potential for restoration, and this plan, the La Crosse Landfill can create high quality experiences in nature for people of all ages. The plan can be used to:

- Solicit funding to carry out land restoration and trail construction work,
- Guide community involvement,
- Serve as an educational backdrop for the landfill operations,
- Make the La Crosse County Landfill a showcase for ecological restoration, recreation, and community engagement, and
- Contribute to the conservation of uncommon native species in the region.

1.2 What is Ecological Restoration?

Simply defined, ecological restoration is the art and science of improving the natural environment by stabilizing and enhancing its diversity, resilience, and natural functions. Using a scientific understanding of the make-up and form of ecologically healthy plant communities and ecosystems, restoration ecologists describe current conditions and lay out a program of activity to alter conditions for the better. This is to the benefit of plant and animal species that need high quality or large habitats. Moreover, people benefit from the improved functioning of ecosystems, spinning off ecosystem services in the form of air and water regulation and purification, stormwater management, groundwater recharge, erosion control, pollination, pest control, soil building, wildlife and tree regeneration, climate moderation, scenery, and chances to learn about and experience a healthy natural world.

1.3 Benefits of Ecological Restoration

Over the past decade, the La Crosse Landfill has been advancing ecological restoration and recreation planning on the site. Landfill staff recognize the unique nature of the site, the educational and recreational opportunities it does—and could—provide to the community, and the multiple benefits of ecological stewardship, including support of sustainability goals. Restoration of native plant communities improves the health of ecosystems and enhances ecological functions. This in turn supports the delivery of ecosystem services, mentioned above. Restoration of a diversity of native plant species in the Landfill's forests, wetlands and grasslands will also enhance populations of breeding birds, insects and other invertebrates, amphibians, mammals and other wildlife.

1.4 Restoration and Management Philosophy

The philosophy of ecological restoration focuses on creating healthy and sustainable ecosystems, often in the context of a developed or disturbed landscape. The composition, structure, and function of restored ecosystems are similar to that of native ecosystems. As a result, a moderate level of management is sufficient to maintain these ecosystems in perpetuity. Restored ecosystems are recognizable by a diversity of native plant species. Restored aquatic ecosystems typically have a natural hydrological regime, with seasonal high and low water levels and slowly rising waters after storms.

The Landfill's regional context, its position in the watershed, the original vegetation (pre-1850), and current conditions were all considered during the development of this NRMP. This plan is designed to restore plant communities native to the region and project area. However, changes in the larger landscape and in local conditions usually prevent the re-creation of natural conditions from 150 years ago. Those historical conditions provide insight into what natural conditions are possible at the site, and no more. More importantly, the goals for the project area will dictate the level of effort expended and the eventual condition of the ecosystems. Not all of the project area will be restored to exceptional native plant communities, but all will be restored and managed to meet the Landfill's goals. As healthy and sustainable ecosystems are established here, wildlife populations, ecological functioning, and human enjoyment will be enhanced.

Restoration and management plans need to be flexible. Restoration programs experience variability in the timing of funding, adjustments due to the response of the ecosystems to restoration work, changing management needs, and cycles of funding. At times programs need to respond to new scientific data and insights. For these reasons, this NRMP should be viewed as a starting point in a process of restoring the biodiversity and natural processes of the project area. It should guide major restoration and management efforts and projects. As more detailed data are gathered, it is expected that restoration and management

activities will be refined. The most successful restoration programs use regular monitoring and reporting as feedback on the program’s effectiveness. Monitoring also generates information to justify changes in the restoration and management program. Adaptive management (a cycle of implementation, monitoring, evaluation, adjustment, and implementation) is central to the best restoration programs and should begin with the restoration work and continue indefinitely as part of the stewardship of the project area. Mutual benefit can be gained from engaging “citizen scientists” as well as universities and schools to assist with data collection and analysis, whereby the Landfill site becomes a “living lab” for research and study.

1.5 Project Background

The La Crosse County Landfill is located in west-central La Crosse County, Wisconsin (Figure 1). The City of Onalaska and Towns of Onalaska and Medary border the site on the north and west. The landfill was originally established in the late 1970s on what was a previously agricultural field. Forested bluffs rise in the eastern portion of the site (Figure 2). Landfill operations and expansions have resulted in the current landfill facility (Figure 3).

Most of the landfill property (referred to as “site” herein) consists of modified/disturbed lands; however, about 200 acres, or 57 percent of the site’s 350 acres, represent natural and semi-natural habitats (Figure 4). The highest quality natural areas lie in the eastern portion of the site, with more altered semi-natural systems scattered around the perimeter and interior of the site. These natural and semi-natural habitats support plant communities ranging in quality from low to moderately high, all with a potential for ecological restoration.

This NRMP and TRMP are designed to guide restoration, enhancement and management of the natural environment at the site. Through this work, the La Crosse Landfill will maintain and increase the ecological integrity of the project area and its surroundings. This NRMP and TRMP are guided by the goals in Section 2, which Landfill staff and stakeholders defined and prioritized with the assistance of AES.

This plan is organized around these major topics:

- Property vision and goals
- Property concept plan
- Existing procedural and legal conditions
- Natural resource inventory
- Ecological restoration plan
- Trails and recreation plan
- Sustainability principles in operations and ancillary facilities
- Community outreach
- Management plan implementation and schedule
- Perpetual management
- Generalized costs
- Reporting and record-keeping
- Conclusions
- Next steps and recommendations

A variety of La Crosse County staff, other agency staff, and other stakeholders commented in various ways on the plan (for some of these comments, see Appendix A). Further discussion occurred at a June 19, 2015 public open house at the landfill. Reviewer comments were assimilated into the plan in coordination with La Crosse County Staff.

2 PROPERTY VISION & GOALS

2.1 Ecological Stewardship Vision and Goals

Early in the development of this plan, representatives of the landfill, local municipalities, and stakeholder groups were asked to articulate their vision for the La Crosse County Landfill – in the coming decades and into the next century (see Appendix B for meeting agenda and attendees). The following draft vision statement was derived from that feedback:

The La Crosse County Landfill is a national model for demonstrating to and educating the public about the sustainable management of waste, while simultaneously providing exceptional interpretive and recreational opportunities for the community.

The participants' short- and long-term goals are listed below.

Short-Term Goals (1-5 years)

- Attract more people to the site to witness and learn about responsible waste management
- Provide more interpretive opportunities regarding: waste reduction, re-use, recycling; sustainable lifestyles; the site's unique history and ecology; and ecological restoration
- Provide more public trails and recreational opportunities
- Enhance the aesthetic and natural beauty of the site and improve wildlife habitat through ecological restoration
- Host community events at the landfill
- Establish links to universities and schools to promote research and study at the site (a "living lab")

Long-Term Goals (5-100 years)

- Become a hub and connector for a variety of local and regional trails
- Become a popular community destination in the region and source of pride
- Be able to look back at daring and innovative decisions made today and see how they have left a meaningful legacy for the La Crosse region and beyond

2.2 Property Concept Plan

In 2010, AES conducted a site review of the La Crosse Landfill property and met with landfill staff to help better understand the site and the County's goals for the property. A memorandum and two graphics were developed to summarize AES's preliminary observations, ecological values, help develop a future vision for the site and adjacent properties (AES 2010).

Over recent years and through the development of this plan, the County has refined a vision for the landfill that includes consideration of its natural areas, restoration potential, and recreational opportunities. Figure 5 provides an overarching concept plan that establishes a general vision for the site.

3 EXISTING PROCEDURAL & LEGAL CONDITIONS

The existing La Crosse County Landfill complex covers approximately 350 acres and was established in the late 1970s. The current life projection for this landfill is 30-50 years. At the landfill complex, numerous operations are conducted including municipal and construction waste disposal, wood waste and shingle processing for recycling, processing of concrete and asphalt waste materials, methane extraction for a gas

to energy project, a citizen's disposal area, operation of a household hazardous materials facility, and processing areas for harvested grasses, stumps, clean soils, and yard waste.

With this large, long-term facility and numerous operations, many different regulations apply. These regulations include RCRA Subtitle D for Municipal Solid Waste Landfills and various Wisconsin Administrative Codes governing solid waste, air emissions, and surface water quality and control. In addition, local ordinances such as County and City zoning govern development and use of the land, and a City wastewater permit is required for the site.

To ensure compliance with the various rules and regulations, the La Crosse County Solid Waste Department has developed an environmental management system (EMS) and employs a computer-based compliance tracking system. These systems identify the various rules that are applicable to the solid waste complex, define the parties responsible for compliance, and specify critical time requirements for achieving compliance. EMS was developed to support "Green Tier" certification by the Wisconsin DNR. The La Crosse County Landfill is the first and currently only landfill in the state of Wisconsin to obtain Green Tier certification under the WiDNR program. Appendix C provides a more detailed description of this program.

To become certified as a Green Tier facility, superior environmental performance must be documented. The Solid Waste Department has utilized an EMS and compliance tracking systems to go beyond minimum compliance with rules and regulations and establish goals that exceed minimum standards. The Solid Waste Policy Board and the Public Works and Infrastructure Committee strongly supported achieving Green Tier status. This status provides greater assurance to our customers that their waste is being disposed of in an environmentally conscious manner, and that long-term liabilities associated with waste disposal are minimized.

The primary document that governs the operation of the landfill is the existing Plan of Operation. This plan, approved by the WiDNR in 2006, lays out detailed operating requirements for the construction, operation, closure, and long-term care of the facility. On a periodic basis, plan modifications are required to address field conditions, new technology, or modifications to operating procedures. These are filed with the original Plan of Operation, which together govern operating procedures. While the Plan of Operation addresses the various operating and construction issues for the landfill, it does not address the broader concepts of how the property is to be developed and maintained.

The Solid Waste and the County Planning Departments prepared a Master Land Use Plan in 2011 to address broader issues of how the landfill complex will be developed, maintained, and utilized by future generations. This plan was approved by the County Board in 2011 and provides a broad overview of the concepts and vision to make the property a valuable asset to the community in future years. Two important concepts were addressed in the Master Land Use Plan. First, concurrent recreational use of the property is desirable so that citizens can enjoy the benefits of use as soon as possible. Second, the vision for the development of the property will change over time, and periodic updates to the Master Land Use Plan are needed. The first major update to the Master Land Use Plan is scheduled for 2015. This NRMP and TRMP were deemed an important document and tool to support the continued development of the master plan. Without understanding the natural resources of the property, and how best they can be utilized to meet the vision of the master plan, development may be inefficient or uncoordinated. This plan allows the assets of the property to be effectively utilized according to the vision of the Master Land Use Plan, providing desired uses for the public.

An additional agreement that exists for the La Crosse County Landfill site is a host agreement. In Wisconsin, all landfills are required to negotiate a host agreement with host communities. La Crosse County's host agreement is fairly straightforward, but does have one specific requirement of the host communities (City of La Crosse and City of Onalaska). That requirement is to provide an amount of \$25,000 per year, in total, for planting of trees in the viewshed of the landfill. This is distributed between the cities of La Crosse (\$15,000) and Onalaska (\$10,000). The purpose of this condition was to improve the aesthetic view of the landfill. As a result, the working relationship between the City of La Crosse, City of Onalaska, and La Crosse County has improved such that collaboration regarding walking trails on and surrounding the landfill site is being achieved.

Exhibit 1 illustrates the relationship between the Master Land Use Plan, this NRMP and TRMP, and other plans.

Exhibit 1. Relationship between various La Crosse County Landfill plans



There is an interrelationship between zoning on a local and County-wide basis and comprehensive land use planning with the overall land use patterns in the area of the landfill complex. The Plan of Operation is periodically updated, and with the Host Agreement, have an impact on site specific land use patterns. The NRMP identifies the ecological assets and conditions of the landfill property and relates them to a progression of steps in achieving the goals of the Master Land Use Plan. For that reason, the NRMP and Trail Resource Management Plan will be updated one year before any updates to the Master Land Use Plan so that new information can be incorporated.

The original Master Land Use Plan was approved in 2011 and significant changes and developments have occurred at the landfill complex. For that reason, it is expected that a routine schedule of updating the Master Land Use Plan will occur every five years, starting in 2015.

The process for updating the Master Land Use Plan will start one year prior to the year the plan will be updated. In that year, listening sessions will be held and public input obtained. The NRMP and Trail Resource Management Plan will also be updated. Any updates to the Plan of Operation, zoning conditions or comprehensive land use plans, and the Host Agreement will be incorporated into the Master Land Use Plan. Once the Master Land Use Plan has been updated, it will be presented to the Policy Board and the Public Works and Infrastructure Committee seeking a recommendation for approval. After that, it will be submitted to the County Board for approval. The intent is not to write a new Master Plan every five years, but to revise those sections that become outdated or where new knowledge and information require

adjustments. A flexible format for the Master Land Use Plan needs to be maintained to accommodate such changes.

The above summarizes the existing procedural and legal conditions under which the La Crosse County Landfill operates. Green Tier certification has been received for this landfill, demonstrating its superior environmental performance. A master plan has been prepared and will be updated in the near future to provide continued oversight and long-term guidance. The NRMP will be a part of the master plan and will direct how site and environmental assets can be better utilized in the development of the master plan. Additional information regarding the legal conditions, procedure requirements, and operations of the landfill can be obtained from the La Crosse County Solid Waste Department.

4 NATURAL RESOURCE INVENTORY

In 2012, AES completed a Turf Management Plan for the site, which included a Natural Resource Inventory (NRI) (AES 2012a). An NRI provides an inventory of land cover types (e.g., habitats) and an assessment of their ecological condition. Excerpts from AES's Turf Management Plan's are incorporated below.

4.1 Past and Current Ecological Conditions

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 (Figure 2).

The La Crosse County Soil Survey (USDA/NRCS Web Soil Survey 2013) indicates that the majority of the site is mapped as "Landfill" and "cut and fill" soils. This site's eastern forests are mapped with a variety of soils, including Churchtown silt loam, Norden silt loam, and Dorerton, very-stony Elbaville complex. These soils are situated on steep slopes, and some areas exhibit moderate erosion. Other (generally flatter) portions of the site's uplands contain Seaton silt loam (moderately eroded), Merrit silt loam, and Bilson sandy loam. The site's upland soils are generally well-drained. The site's wetland slough is mapped as Tarr sand; however, this soil series does not match observed site conditions (i.e., lowland/wetland setting).

Hydrology

Most of the site drains to the west and south. Runoff from the northern portion of the site generally flows into a grass swale that leads to a gentle wetland slough, dominated by reed canary-grass. This wetland flows west of the site into an unnamed stream that flows south, beneath Interstate 90, and into the La Crosse River at a point approximately 0.8 mile southwest of the site (Figure 1).

Historical Vegetation

Prior to European settlement (circa the early-mid 1800s), the site was dominated by prairie and savanna vegetation, while the moister north and east slopes (as well as other fire-protected areas) contained mesic hardwood forest. Upland prairies were dominated by tall and short grasses and a diversity of wildflowers. The lower, wetter prairies contained grasses, sedges, and wetland wildflowers. Wildfires (both naturally occurring and those set by Native Americans) maintained these open plant communities, and where wildfire frequency and/or intensity were less, savannas would develop. Savannas typically contained

prairie species in the understory, but also exhibited scattered trees and clustered groves of trees and shrubs. The site’s upland forests likely contained oak, maple, basswood, hickory, walnut, and elm.

Existing Land Cover

The majority of the site has been significantly altered due to earlier agricultural land use and subsequent solid waste management activities. Some relatively intact natural areas lie on the site’s eastern boundary, and disturbed/altered but “semi-natural” plant communities exist over much of the site.

General land cover types mapped for the site are listed in Table 1 below and illustrated in Figure 4.

Table 1. Land Cover Types at the La Crosse Landfill

Land Cover Type	Acres	Portion of Site
Mesic Forest (a native plant community)	92.7	27.5%
Disturbed Woods	0.7	0.2%
Boxelder Woodland	2.7	0.8%
Cool Season Grass Field	93.4	27.7%
Hill Prairie (a native plant community)	0.6	0.2%
Prairie Restoration	1.6	0.5%
Reed Canary Grass Wetland	2.5	0.7%
Turf	5.2	1.5%
Grass Swale	1.8	0.5%
Detention Water Basin	1.4	0.4%
Pond	1.1	0.3%
Existing and Proposed Landfill/Processing Areas	105.7	31.4%
Driveways	27.4	8.1%
Total	336.8*	100.0%

* An additional 13.2 acres was not mapped due to irregularities in topography and other technical factors.

A description and species list for each land cover type are provided in the Turf Management Plan. In brief, the native plant communities (located on the east edge of the site) are moderately intact, with some invasive vegetation and other indications of human disturbance (e.g., logging). A Forest Stewardship Management Plan has been developed for the site to assist with sustainable harvest of timber from the site’s eastern forests (WiDNR 2011). The remaining lands are dominated by non-native vegetation, much of which was planted for soil stabilization and landfill cover. Several invasive plant species exist on the site, and recommendations for their control are provided.

The site has a wetland slough that flows from the northern portion of the property, runs along the west edge of the site, and then flows off-site to the west. The on-site wetland is dominated by non-native invasive reed canary-grass. In 2012, an experimental wetland restoration project was conducted in this wetland to determine if excavation was a cost-effective means of removing reed canary-grass and establishment of native wetland vegetation (AES 2012b). The experiment resulted in the native wetland seedbank exhibiting a relatively weak response. Also, the majority of the native seedbank was incorporated within the same soil horizon as reed canary-grass rhizomes. This suggests that the restoration strategy of scraping the wetland to remove reed canary-grass would also, simultaneously, remove the limited but desirable native seedbank. Therefore, restoration of the site wetland will require a

combination of broadcast herbicide, prescribed fire, and possibly mowing to remove the invasive reed canary-grass and enable establishment of native wetland plants via seed.

Existing Wildlife

A comprehensive or detailed wildlife survey was not completed at the Landfill. However, during a single field visit, AES documented wildlife and indications of animal species. Wildlife identification was based on direct sightings, calls, scat, prints, feathers and other signs. Wildlife species observed utilizing the site on a single day are listed in Table 2 below, and other wildlife observation records are also provided.

Table 2. Wildlife Species Incidentally Observed to Use the La Crosse Landfill (Observed on August 14, 2013 and from other reports)

Mammals	Birds	Reptiles/Amphibians	Insects
Observed August 14, 2013			
White-tailed deer	Eastern meadowlark	Leopard frog	White cabbage butterfly
Coyote	Grasshopper sparrow		Monarch butterfly
	Song sparrow		Copper (butterfly)
	Killdeer		Giant swallowtail
	Red-tailed hawk		Fritillary (butterfly)
	Ring-billed gull		Widow skimmer (dragonfly)
	Turkey vulture		Wasp
	Wild turkey		12-spotted skimmer (dragonfly)
	Red-winged blackbird		
	American goldfinch		
	Indigo bunting		
	Red-eyed vireo		
	Mourning dove		
Other Records			
Coyote	Bald eagle	Brown/DeKay's snake	
	Golden eagle		
	Canada goose		
	Mallard		
	Hooded merganser		
	Lesser scaup		
	Ring-necked pheasant		

The paper, *A Breeding Bird Survey of Myrick Marsh and Hixon Forest* (Fiedler no date) provides lists of birds utilizing habitats near the Landfill. A bioblitz¹ conducted at the Landfill in April 2014 documented over 175 species. In the future, more detailed wildlife surveys and monitoring will be conducted at the Landfill site.

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.

Rare Natural Features

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

Table 3. Federally-protected and tracked species in La Crosse County (USFWS 2013)

Species	Status	Habitat
Higgins eye pearly mussel (<i>Lampsilis higginsii</i>)	Endangered	Mississippi River
Sheepnose (<i>Plethobasus cyphus</i>)	Endangered	Mississippi River
Northern long-eared bat (<i>Myotis septentrionalis</i>)	On May 4, 2015, this species was declared Threatened, with exemption for some activities under the 4d Rule	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Eastern massasauga (<i>Sistrurus catenatus</i>)	Candidate	Open to forested wetlands and adjacent uplands
Whooping crane (<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 is approximately 3.4 miles west of the site. The recently-listed Northern long-eared bat 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 is unlikely to use the site, due to the limited 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 2013). The search area included the entire La Crosse County Landfill site plus a 1-mile radius. Rare natural features records identified in this search are presented in Table 4.

Table 4. State-protected and tracked rare natural feature records within site vicinity (WiDNR 2013)

Species	Status	Habitat
Carolina Anemone (<i>Anemone caroliniana</i>)	State-Endangered	Dry bluff and sand prairies and gravelly hillsides, mostly near the Mississippi and lower Chippewa Rivers
Blue Sucker (<i>Cyprinus elongatus</i>)	State-Threatened	Prefers large, deep rivers with moderate to strong currents over substrates of gravel or cobble
River Redhorse (<i>Moxostoma carinatum</i>)	State-Threatened	Prefers moderate to swift currents in large river systems, including impoundments and pools; prefers river bottoms of clean gravel
Snowy Campion (<i>Silene nivea</i>)	State-Threatened	Streambanks and stream-side meadows, often in reed canary-grass; also along deciduous forest margins near streams and rivers
American Eel (<i>Anguilla rostrata</i>)	State Special Concern	Prefers large streams, rivers and lakes with muddy bottoms and still waters
Silver Chub (<i>Macrhybopsis storeriana</i>)	State Special Concern	Prefers large, low gradient rivers and found in moderate to strong currents, riffles, pools and sloughs with or without vegetation over substrates of sand, mud, silt or gravel
Marsh Horsetail (<i>Equisetum palustre</i>)	State Special Concern	Fens, alder thickets, wet meadows, bog and swamp margins, and wet swales near the Great Lakes
Timber Rattlesnake (<i>Crotalus horridus</i>)	State Special Concern	Prefers deciduous forests, woodland edges, and open-canopy bluff prairies
Dragon Wormwood (<i>Artemisia dracuncululus</i>)	State Special Concern	Dry bluff prairies and on roadsides
Rock Clubmoss (<i>Huperzia porophila</i>)	State Special Concern	Moist, shaded cliffs in mixed conifer-hardwood forests
Rope Dodder (<i>Cuscuta glomerata</i>)	State Special Concern	Moist habitats, including wet-mesic prairie, mesic prairie, southern Wet Meadow, and hardwood swamp
Alder Thicket	Rare natural community	NA
Northern Wet Forest	Rare natural community	NA

No rare natural features records were identified within the site boundary. Two state-listed Threatened species occur within one mile of the site: Blue Sucker and River Redhorse. Four state-listed Species of Special Concern occur within one mile of the site: American Eel, Silver Chub, Marsh Horsetail, and Timber Rattlesnake. Specific to the timber rattlesnake, the Landfill’s 2003 Feasibility Report provides recommendations regarding site development as it relates to the habitat of this species (Foth & Van Dyke and Assoc. 2003). Five additional state-listed species were identified in the region, but lacked location details: the State-Endangered Carolina Anemone, the State-Threatened Snowy Campion, and the State-Special Concern Dragon Wormwood, Rock Clubmoss, and Rope Dodder. Two state-listed rare natural communities occur within one mile of the site: Alder Thicket and Northern Wet Forest. Based on the site’s existing habitats and history of disturbance, any rare natural features that may be on the site would most likely be found in the site’s eastern forests.

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, 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 and wetland SGCN species, but not river-dependent species.

Invasive Species

Invasive vegetation exists in all but the highest quality portions of the project area’s native plant communities. Invasive 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. Of the plant species found by AES in the project area, several warrant management (see Turf Management Plan, AES 2012a). Controlling these species is essential for restoration work to succeed.

Invasive animals (e.g., non-native earthworms) also cause ecological harm to soils and vegetation. Unfortunately, control of invasive animals is usually difficult and costly. Documenting their locations and not facilitating their spread can slow infestations.

5 ECOLOGICAL RESTORATION PLAN

5.1 Proposed Native Plant Communities

Proposed native plant communities are those largely self-sustaining ecological combinations of species which are expected to develop at the site as a result of implementing the Nature Resources Management Plan. An ecological restoration plan specifically targets the plant communities of native species that are likely to arise. Based on the La Crosse Landfill’s natural history, specific environmental conditions, and goals for the site, this NRMP provides guidance to restore and/or manage the following native plant communities.

Table 5. Proposed Native Plant Communities for the La Crosse County Landfill

Proposed Native Plant Community	Regional Rarity	Current Condition	Expected Condition	Years to Achieve Expected Condition with Restoration & Management
Forest	Common	B/C	B	10
Hill Prairie	Rare	B/C	A	5
Savanna	Rare	-	B	20
Prairie	Uncommon	-	B	5
Wet Prairie	Uncommon	-	B	5
Wet Meadow	Uncommon	-	B	5
Marsh	Common	C/D	B	5
Pond	Common	C/D	B	5

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

Proposed native plant communities indicate desired conditions at the landfill (Figure 6). In most cases, these native plant communities will be restored by enhancing an existing plant community. For example,

disturbed woodland may be converted to native Savanna or improved as woodland. However, other areas may be restored by completely replacing a land cover type, such as converting an old field into a Prairie.

Plant species lists for restoration of native plant communities are provided in Appendix D. 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.

5.2 Restoration and Management Approach

5.2.1 Restoration and Management Stages and Implementation Phasing

Ecological restoration and management occurs in two stages.

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.

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 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.

5.2.2 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 bird's 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 *La Crosse County Landfill Ecological Monitoring Program* was developed in 2014 (Appendix E). Monitoring data can be compared with and submitted to public databases such as the USA National Phenology Network's "Nature Notebook" or organizations such as the Monarch Joint Venture.

5.2.3 Specialized Training

Specialized training (often involving licensing or certification), oversight, and guidance are required of personnel before implementation of this NRMP. 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.

6 TRAILS AND RECREATION PLAN

6.1 Goals of the Recreation System

The La Crosse County Landfill has invested in the conservation of natural resources and diversification of recreational opportunities while continuing its solid waste disposal and recycling activities. Working with the City of La Crosse and the Outdoor Recreation Alliance, the Landfill has begun building multi-use trails and mountain biking trails. The Landfill also hosts Boy Scout Camporees and other community events. Section 8 of this plan describes the Landfill's outreach program in greater detail.

This section of the Natural Resources Management Plan focuses on trail use and other recreational activities. The Landfill identified the following trail and recreational goals:

- Expand trail system to serve walkers and hikers, bicyclists, mountain-bikers, and cross-country skiers;
- Create scenic overlooks from tops of closed landfill caps and in natural settings to view the Mississippi River Valley;
- Establish an interpretive center at the current Landfill office;
- Provide interpretive signs, displays, materials and programs to explain the ecology of the restored prairie, savanna, and woodland;
- Create a BMX Park;
- Establish a sledding hill on a portion of a closed landfill cap; and
- Provide increased trail connectivity to off-site areas, such as north of Highway 16 and an underpass or overpass to reach areas south of I-90.

These goals will be phased in as budgets allow and as landfill cell closure opens up areas for trails and recreational uses.

6.2 Managing the Visitor's Experience

6.2.1 General Guidelines

The Landfill's goals prohibit high-impact activities such as ATVs and snowmobiles. Acceptable activities are medium-impact activities (e.g., mountain-biking, BMX) and low-impact activities (e.g., walking and cross-country skiing).

Sometimes human use can detract from the natural resources of a site. For example, several studies have documented that bikes and dogs on trails through core wildlife habitat drive away some bird species (e.g., Miller et al. 2001). For this reason, trails and recreational activities should be planned to conserve the site's natural resources.

The Landfill should employ a "Leave No Trace" ethic to manage visitors. These principles emphasize stewardship of ecologically sensitive lands with the following guidelines:

- Plan your route—know your destinations and the proper use in those areas;
- Keep to the proper surface—for example, no wheels on hiking trails;
- Leave no trace—if you bring material in, bring it out again;
- Leave what you find—don't remove artifacts, rocks, animals, or plants;

- Respect wildlife—watch from a distance and control your dog; and
- Respect other visitors.

Two activities with potential for conflict among users and negative effects on wildlife are discussed below.

6.2.1.1 Dog-Walking. Dog owners enjoy walking pets in outdoor settings, but are unaware of their impact on the ecology. Impacts of dogs on wildlife and users are:

- Intimidation of other users unfamiliar with dogs;
- Failure of dog-owners to pick up their pets' wastes, leading to unpleasant or unsanitary conditions;
- Even well-trained dogs' potential to chase birds, destroy nests and eggs of ground-nesting birds, and kill wildlife;
- Tendency of wildlife to flee the sight and scent of dogs, leashed or unleashed, leading to nest failure and abandonment of young.

6.2.1.2 Mountain Biking. The steep, forested eastern ridge at the Landfill is an ideal mountain biking venue. The course, however, should be separated from sensitive natural areas and other users for conservation and safety reasons. Where other recreational trails and mountain bike trails intersect, signs should direct users to the appropriate trail. Narrow hiking trails should not be used by mountain bikers because of the risk of collision. Flat, multi-use trails can be shared because of the safety afforded by their width long sight lines, and gentle slopes and curves.

6.2.2 Orientation and Wayfinding

A visitor's enjoyment of the Landfill environment and trails depends on how well they can learn about the site and find their way around it. This depends on them a) understanding where they are when they enter the site, b) knowing where to would like to go, c) being warned of problems in traversing the site, and d) finding their way around the site once they are in it.

6.2.2.1 Orientation and Guidelines. Each access point into the site will have an entry sign at a kiosk. The sign will have a detailed trail system map, prominently placed information about permitted activities, hours of operation, emergency contact information, and use guidelines. This sign should welcome the visitor and remind them that they are the stewards of the site. Such a message is more effective than warning statements about bad behavior. Target the issues and practices that are least understood, such as leashing dogs and knocking mud from cleats that may carry seeds of invasive plants.

6.2.2.2 Time-Urgent Information. When trail closures are necessary, post the schedule of closure at the entry kiosk. Place signs and temporary barriers at trail intersections. Notices for field trips, volunteer events, and other temporary events should be posted at entry kiosks.

6.2.2.3 Wayfinding. A standardized wayfinding system can help visitors easily navigate the site (Table 6). First, establish a unique trail name based on a distinct natural feature, a point of interest, a viewshed, or a destination. Use color-coded trail markers that match colors on the trail system map. Mark all trails at their entry points and at intersections with other trails. Indicate on trail signs a) the trail type—multi-use, walking-only, mountain bike, cross-country; b) the length of loops and distances to connecting trails; c) the difficulty based on steepness; and d) restrictions, such as no access during and after heavy rain, during spring snowmelt, and when a controlled burn is in progress.

Table 6. Wayfinding Guides

Wayfinding Type	Description	Typical Location
Informational Kiosk	Large display showing visitor information, site orientation/map, rules and regulations	Main entrance, parking
Primary Directional	Trail sign: trail name (color coded), direction to trail(s), distance, approved uses	Trail intersections between main trail and connector or loop trail
Secondary Directional	Trail sign: trail name (color coded) and direction	Trail head to specific named loop trail
Blaze Marker	Small, conspicuous graphic with color code for trail, and direction (if necessary)	Decision points or intersections; visible both ways
Private Property	Conspicuous sign clearly identifying the La Crosse County Landfill property boundary	Property boundaries
Cautionary	Warning of hazards, temporary closures, trail conditions	Trail head to affected trail
Interpretive	Educational, site specific	Points of interest

6.2.3 Interpreting the Natural Environment

The Landfill already provides talks and tours about landfill operations and the natural environment. Additional opportunities include a) story boards, b) exhibits in the nature center, c) outdoor public art, and d) hands-on learning. The Landfill is uniquely suited for hands-on learning in the following areas:

- Regional natural history: Mississippi River Valley, glacial history of the Driftless Region, bedrock geology, and watersheds;
- Site history: Progression from a wild landscape to farmland to landfill to restored natural area;
- Cultural history: Native Americans, early white ethnic groups, agricultural communities;
- Native ecosystems: Specifically those being restored to the site—prairie, savanna, forest, and wet meadow;
- Ecological restoration and management practices;
- Wildlife and their habitats; and
- Naturalized stormwater treatment train.

The La Crosse County Landfill wishes to establish a research relationship with local colleges and universities (see Section 8 - Community Outreach). Program partners or volunteer “interpreters” could staff educational stations and offer guided learning experiences. Interpretive features can be distributed with age and ability of visitors in mind (e.g., on trail segments near parking areas and on less hilly terrain for bus tours, younger children and seniors; on more distant challenging terrain for older children and adults). Interactive exhibits might include:

- A collection bucket and magnifier station at a wetland observation platform to examine aquatic organisms
- Casts of animal tracks with identification markers
- Tree tags to identify trees with background information
- Raptor and other bird silhouettes and information at observation points

Local artists (many living in the Mississippi River Valley) are often inspired to produce original interpretive programs, and many are able to provide environmentally-themed works in collaboration with designers, engineers, scientists, public agencies, and other organizations.

Emerging technologies also provide an opportunity for environmental education and interpretation. Geocaching has become an increasingly popular pastime that encourages participants to explore natural areas. Geocaching entails using a Geographic Positioning System (GPS) or GPS-equipped smart phone to locate hidden “caches,” often in parks or other public lands. Another opportunity is *ebird*, an online database maintained by Cornell University Laboratory of Ornithology, allows birders of various abilities to contribute to a growing database of bird abundance and distribution at a variety of spatial and temporal scales. A birder simply enters when, where, and how he/she went birding, then fills out a checklist of all the birds seen and heard during the outing. Users can keep track of their bird lists, explore dynamic maps and graphs, and share their sightings with an international birding community. The La Crosse County Landfill could establish a link to *ebird* on its website or create its own database of biodiversity information relevant to the site on its website. Visitors can download baseline information and then upload new information based on their field observations, creating an interactive experience.

6.3 Designing the Recreation System

The most sensitive natural resource on the site, such as core wildlife habitat, should be exposed to the least intrusive public uses, while areas already experiencing intensive human use can usually accommodate additional uses. For example, areas next to the active landfill, next to weighing and recycling areas, and near high-use roadways can absorb additional human use because their habitat value is already reduced and sensitive wildlife are probably already absent.

6.3.1 Design Principles

6.3.1.1 Avoid Habitat Fragmentation. Habitat fragmentation—breaking wildlife habitat into small, separate pieces—is one of the main reasons for species becoming rare. This is true in the Midwest, United States, and around the world. The Landfill’s best plant community is the eastern forest edge. This area also is ideal for mountain biking and hiking. Some of forest’s birds, however, can be disturbed by low levels of human activity. For this reason a Forest Reserve was established (Figure 7). This will be a hiking only location. Elsewhere in the site, trails in the future prairie area will be sited to create core habitat for grassland nesting birds.

6.3.1.2 Protect Sensitive Natural Areas. Wetlands at the La Crosse County Landfill are protected by state and federal law. The trail network avoids direct impact to these areas, which provide habitat for plants and animals not found elsewhere in the Landfill. The western trails at the Landfill will cross the reed canary-grass wet meadow with a bridge and boardwalk. Trail users will have an opportunity to view this natural wetland with minimal effects on water flow, soil stability, or wetland vegetation.

6.3.1.3 Develop Near Existing Areas of High Human Use. Even though the site was disturbed by agriculture in the past and is being used today as a landfill and transfer station, the planned restoration work will improve the site’s ecological health and create wildlife habitat. Future human use should therefore be planned to minimize disturbance of the restored natural environment, just as if that environment were a natural area being developed for the first time. For example, the most

active areas, such as a BMX Park or a frequently-used trail segment, should be located near areas that will be disturbed or heavily used in the future. For this reason, the multi-use trail is planned as a perimeter trail because the perimeter of the Landfill will be largely developed with a business park and landfill operation.

6.3.1.4 Design Trails Properly. Even hiking trails have some effect on natural areas, and wheeled recreation has an even greater effect. Foot traffic can wear away vegetation and leaf litter, exposing the soil to erosion. Foot and bike traffic can introduce seeds of invasive plants in mud stuck in cleats. Soils can become compacted, preventing new plant growth from establishing. Trails become wider over time just with use, as people walk around wet spots or downed trees. At all costs soil erosion on slopes must be prevented because it can quickly lead to gullies that are expensive to repair.

Avoid steep slopes, even if fun to ride on or offering stunning views of the distant landscape. If steep slopes must have trails, the following guidelines should be followed:

- Site trails should follow the slope contour, rather than follow the fall-line which is more prone erosion;
- Use a steep grade to limit the area of the trail surface (“tread”) and improve tread drainage;
- Change the tread grade uphill and downhill at intervals to shed runoff before it accumulates a volume and speed which causes soil erosion; this is called a “rolling grade”;
- Cut the tread into the slope and stabilize the cut face; this maintains a natural edge on the downhill slope—the natural edge contains plant roots which stabilizes the soil;
- On fill, stabilize the downhill edge of the fill to prevent slumping.

6.3.1.5 Use Multi-Use Trails. Multi-use trails are good for natural resources because they combine multiple trails in a single corridor and reduce the length of the overall trail network and its intrusion into natural areas. This trail consists of a paved surface and an adjacent, parallel, mowed surface. This allows wheels and walkers to use the pavement most of the time and cross-country skiers to use the mowed trail in winter. Grass retains snow better than pavement and bare ground, and skiers prefer a soft substrate that does not damage skis when the snowpack is thin. Slopes greater than 15% are not conducive to general cross-country skiing, but could be used by snow-shoers in winter.

6.3.1.6 Manage Stormwater Runoff. As suggested above, trails have a tremendous potential to promote soil erosion and create gullies which are costly to repair. This is made worse by impervious cover—pavement and rooftop. Even though little pavement or rooftop is envisioned at the site, management of stormwater runoff should be planned to avoid problems in the future. With proper design and construction, trails at the Landfill will not increase runoff or erosion at the landfill site. Stormwater from these trails will be dispersed into areas where it will infiltrate into the soil profile.

Besides rooftops and the paved multi-use trail, gravel roads and other site infrastructure will generate excessive runoff that should be managed. This will not only prevent erosion, but also protect ponds, streams, and wetlands from pollution carried by stormwater runoff.

For gravel roads specifically the Landfill should consider using Driving Surface Aggregate (DSA) developed by Pennsylvania State’s Dirt & Gravel Road Maintenance Program. DSA is a tightly interlocking aggregate mix with fine rock particles, which improves water quality of rural streams by

reducing the erosion and sedimentation coming from gravel roads. All parking areas shown on the trail plan should be designed to manage runoff. Tree preservation and plantings, porous pavers, pervious surfacing, rain gardens, and soil reinforcement under turf can promote infiltration and reduce runoff from these surfaces. This would also demonstrate low impact development techniques at the Landfill.

6.3.2 Design Elements

The La Crosse County Landfill trail system is part of a larger network of trails and protected lands located spanning several communities in La Crosse County and along the Mississippi River. Connecting to the nearby Onalaska trail system will unite the sites trails with an extensive regional greenway system (see Onalaska's 2015 Comprehensive Plan Update, Chapter 4 - Transportation).

Inside the Landfill, several trail elements must be designed:

6.3.2.1 Parking and Entryways. The trail system is designed to bring people into the site at locations where they can best gain access to the interesting features of the site. Currently, vehicles gain access to the north portion of the Landfill from Landfill Road off Highway 16 (Figure 7). In the next several years this area will be redesigned, the Landfill office will be moved to the east, a new road alignment will be built, and a redesigned north access point will be established. The existing landfill office will become an interpretative center and be the primary recreational destination at the site's northern edge and a major trailhead for the entire site.

The site's southern trail will be accessed from a five-car parking lot near the future trailheads at Luoyang Avenue and North Kinney Coulee Road. Five spaces will control levels of visitation and help reduce the impression from neighbors and visitors that the site is too crowded. The parking lot may need to expand to accommodate school buses and emergency vehicles. Vehicular access to the rest of the Landfill will be controlled by signs and possibly gates. Landscape plantings of attractive native trees and shrubs combined with information kiosks and welcoming signs will ensure that the visitor's experience to the Landfill begins positively.

6.3.2.2 Trails. The goals of the Landfill's trail system are to:

- Connect with regional and City trails;
- Avoid adverse impacts to sensitive wildlife species;
- Accommodate a variety of trail users;
- Minimize capital and maintenance costs through an efficient layout;
- Meet Americans with Disabilities Act (ADA) standards on select trails;
- Support interpretive opportunities about Landfill operations, natural resource conservation, ecological restoration, and cultural heritage; and
- Provide a safe experience by preventing conflicts among trail users.

The proposed La Crosse County Landfill trail network will provide visitors with a range of landscapes and plant communities (Figure 7). It has the following features:

- Three major and three minor access points;

- A multi-use loop trail at the Landfill perimeter and across the middle of the site (over two miles long);
- Separation of trail systems for multi-use, walking, mountain-biking, and cross-country skiing (an additional four to five miles of trails);
- Three overlooks taking in the Landfill and the Mississippi River Valley; and
- Four interpretive stations.

The northern parking lot is the main hub for the network. Additional trail access points exist or are proposed for the site’s south, west, and north edges. All trail alignments in Figure 7 are designed at a coarse scale (1” = 300’) and require field-verification, micro-siting, and field-staking prior to construction.

Trails are segregated by user type to protect sensitive areas, provide a safe and enjoyable trail experience, minimize user conflicts, and prevent damage to trail treads. In general, trails are multi-use, walking, or mountain bike.

- **Multi-Use Trail.** Wide paved surface for wheels and pedestrians, with adjacent, grass-surfaced cross-country trail. Trail is generally flat for ease of travel.
- **Walking Trail.** Natural surface, usually mowed grass in open areas and compacted soil in wooded areas. The interior of the site is largely served by walking trails to provide a quiet experience for people and sensitive wildlife. The Forest Reserve is only open to walkers.
- **Mountain Bike Trail.** Constructed of compacted earth. Restricted to the forest in eastern site, it has both rolling and steep topography.
- **BMX Park.** Two areas are tentatively identified as potential general locations for a BMX Park. The northern location eventually will be sold, but could be used in the short-term as a BMX Park. The areas shown on Figure 7 are larger than is required for a BMX Park; further study will define the park’s actual footprint, which will occupy a smaller area.

Design criteria for grades and surfaces of the trail types are described in Table 7.

Table 7. Trail Design Criteria for La Crosse County Landfill

Design Criteria	Multi-Use Trail	Walking Trail (includes hiking, snow-shoeing)	Mountain Bike Trail & BMX Park (easy to moderate)	Cross-Country Ski
Tread Width	8-12'	2-6'	2-3'	8-10' (accommodates two-way classic style or one-way skate style)
Typical Grade	<8%	<12%	5-10%	4-10% easy, 6-12% intermediate
Maximum Grade	10%	15%	15%	10-12% easy, 12-18% intermediate
Cross Slope	5% max	5% max	5% max	4% max, 0-2% preferred
Trail Tread (Surface)	Uniform, smooth, firm, stable (paved)	Firm, stable	Firm, stable, with some obstacles 2-8" tall	Firm, stable, preferably grass surface. Pavement undesirable
Corridor Clearance	10-12' ht., 1-2' outside tread	8' ht., 1-2' outside tread	8' ht., 1-2' outside tread	10' ht., 2' outside tread, "run out" at bottom of slope as long as slope itself
Maintenance Inspections	1-2/year	1/year	1/year	Varies depending on desired level of grooming
Turn radius	Minimum 36' - accommodates 12 mph	No limit	Varies depending on challenge desired	100' preferred, 50' acceptable in flat areas

Trail tread (surface) materials are recommended based on intended user groups:

- **Paved.** The site’s multi-use trail is designed to meet ADA standards and will be paved for smooth travel by bicycles and small wheels (e.g., roller blades, wheelchairs).
- **Reinforced Turf.** ADA-compliant stabilized meadow trails can be constructed if a pervious ADA-accessible trail is desired for stormwater management. Similar to turf pavers, a cellular grid system or geotextiles provides a stable walking and wheelchair surface that can be seeded to grasses and mowed.
- **Aggregate.** Crushed stone or gravel, for trails that may be necessary for small maintenance vehicles to conduct well monitoring or similar light activities.
- **Compacted Earth.** Typically used in forested areas for mountain biking and hiking trails, and also in the BMP Park. The alignment of trails must be determined in the field based on trail design standards. Woodland trails must be fixed because they require tree clearing, grading, and tread surface stripping and compaction. If installed and maintained properly, woodland trails can last indefinitely with minimal environmental impacts.
- **Mown Meadow.** These trails are mown seasonally and can be rested or retired as needed.
- **Bridge.** For mixed-use travel by bicycles and pedestrians across the western wet meadow.
- **Boardwalk.** For pedestrian access to and across the western wet meadow. Boardwalk design will need to be addressed in a subsequent design development phase.

6.3.2.3 Seating. Seating improves the visitor’s experience. Many hikers like to rest briefly or eat lunch at locations where there is something interesting to be seen. Benches near parking areas also help seniors, less-able visitors, and parents with young children. Boulders, tree stumps, and cut logs salvaged during trail construction can be used to construct seats.

6.2.2.4 Salvage and Re-Use Materials. Grading, tree clearing, demolition of pavement, and retrofitting or constructing buildings may generate wood, stone, and concrete which would be available to construct trails, benches, and signs. For example, salvaged wood from cut trees can be used in parking lot fence rails and posts, trail markers, and benches. Excavated boulders can be placed for seats and to create interesting landmarks. Boulders are also useful in check dams as part of a stormwater treatment train by parking lots. Crushed concrete can fill gabion baskets and be used to stabilize steep or cut slopes along trails.

6.3.2.5 Waste Management. Visitors will be encouraged to take their trash away with them and follow “Leave No Trace” practices. Even so, the La Crosse County Landfill may choose to provide litter receptacles at strategic locations, such as the trailhead near the interpretive center—a waste receptacle at this location would remind visitors to pack out their garbage. Dog waste stations with plastic bag dispensers make it easier for dog walkers to be good stewards.

6.4 Operating and Maintaining the Recreation System

6.4.1 Assessing Visitor Impact

Stewardship means the management of the site that will be necessary after initial site improvements and restoration work is completed. Stewardship applies both to the natural areas and the public use infrastructure—the trails, parking lots, signage, etc. The specific management needs of the ecological enhancement and restoration areas are discussed in Section 9 of this report. In the end, stewardship must engender a sense of responsibility in visitors toward the La Crosse County Landfill trail system.

The Landfill's managers should recognize that change is an inevitable outcome of public use. In many organizations dealing with public access, management strategies focus on determining what changes in resources and social conditions are acceptable, and what actions are needed to maintain those conditions. One widely used assessment method was developed by the U.S. Forest Service, called "Limits of Acceptable Change" (LAC). Its key elements include:

- Define standards of quality and the indicators for assessment;
- Monitor the indicators to determine whether standards are met;
- Take management action when the standards of quality are not met; and
- Allow experience, common sense, and new information to guide future planning and implementation—this is called adaptive management.

Restoration will return the majority of the site to a healthy ecological condition over the next several decades. Standards of quality and indicators for assessment are easily developed for these future conditions. In the meantime, quality standards and the assessment indicators should be developed for conditions that the Landfill does not want to see occur—such as new incursions of invasive plants or significant erosion.

Monitoring and maintenance of the natural areas and public use areas will ensure long-term enjoyment and sustainable use of the Landfill. Once the trail and recreational system is built, monitoring will inform maintenance needs. Ecological monitoring is addressed separately in the *La Crosse County Landfill Ecological Monitoring Program*, developed in 2014.

6.4.2 Indicators of Visitor Impact

Three indicators of visitor impact are especially useful in guiding maintenance of trails and other public use areas: vegetation, soil erosion, and the creation of unauthorized trails.

6.4.2.1 Vegetation. Species composition, the extent of vegetation cover, and the quality of that cover should be assessed regularly to document the level of plant community health. The introduction and spread of invasive plants on trails is a significant issue, but can be prevented or minimized through user education and early intervention. Expertise in plant identification and biological surveys are necessary to identify invasive plants and assess the ecological health of plant communities. Control should be carried out by trained staff or contractors.

6.4.2.2 Soil Erosion. Soil loss from trails is a serious form of trail degradation because it is generally irreversible. Most eroded soil is transported off trail surfaces and cannot easily be recovered and replaced. Once the organic soil layers are lost, and roots and rocks are exposed, natural recovery of vegetation occurs slowly, if at all. The eroded soil also becomes a pollutant, potentially smothering adjacent ground vegetation and increasing sediment loads in waterways. The rutted trails left behind then intercept and transport even more water, which further accelerates soil movement and changes the natural surface drainage patterns. Visitors may find eroded paths more difficult, potentially unsafe to use, unattractive, and seemingly neglected.

6.4.2.3 Unauthorized Trails. Informal, unplanned trails created by users without the site manager's approval ("social trails") often develop in trail systems that lack close supervision and where users want to take a different route. Official trails that are damaged, obstructed, or impassible drive users to create new trails. Unfortunately, unplanned trails usually fail to account for topography, soils,

drainage, wildlife habitat, or sensitive plant communities. They are also not usually maintained, meaning they can start to erode, with the problems that entails. Staff should monitor the site for unauthorized trails and immediately take action if one is found. Action consists of closure, no entry signs, redirection to other trails, and restoration of vegetation. Unless these actions are immediately taken, social trails become embedded in the official trail network.

On the other hand, trail users may discover that the trail alignment is wrong or could be improved. If that is the case, adjustments in trail alignments should be evaluated. A planned approach to new trail creation and trail closure will ensure that, during the transition between trail alignments, no erosion occurs. Even a well-planned trail network requires periodic evaluation and adjustments in response to user behavior and demands, and changing environmental conditions. The La Crosse County Landfill will need to develop and monitor social indicators that provide information about visitor experiences, expectations, and behaviors. These indicators will gauge the effectiveness of education on user behavior that will ensure a satisfying experience for everyone.

6.4.3 GIS Mapping and Database

Trails at the Landfill are labeled with point values identifying specific trail segments. Point values can be located with GPS in the field and linked in GIS to a data table. This allows results from field assessment of trails to be mapped. New trail points and segments can also be added. GPS mapping and GIS can also help document social trails, unauthorized access points, and other public use outcomes. It can help plan future maintenance activities and identify conflicts between trail use and locations of sensitive plant and animal species as the restoration progresses. Overall, a GIS-based mapping system will be a tremendous aid in managing use of the recreational and trail system.

6.4.4 Staffing

Making La Crosse County Landfill staff and landfill operations visible to users will reinforce the idea that the site is actively managed and that rules and regulations are enforced. Routine patrols by Landfill staff or an organized group of volunteers (“park stewards”) will also emphasize that the site is managed in an orderly, consistent way.

7 SUSTAINABILITY PRINCIPLES IN OPERATIONS AND ANCILLARY FACILITIES

In 2007, the City and County of La Crosse passed resolutions to become one of the first joint Eco-Municipalities in the nation. The joint resolutions stressed the use of the Natural Step for municipalities as a guide in developing a strategic plan for sustainability. The Joint Oversight Committee for Sustainability was formed to create the Strategic Plan. In early 2009, the La Crosse County Board and City of La Crosse Common Council adopted the City of La Crosse & La Crosse County Strategic Plan for Sustainability. The Plan included several sustainability indicators, to be monitored on an ongoing basis. The Plan includes seven governmental indicators and eighteen community indicators. These are reported to the City and County on an annual basis and denote major sustainability initiatives undertaken by both City and County. The intent is to show the long range improvements or setbacks in the communities’ ongoing drive toward sustainability. The Sustainable La Crosse Commission was created to oversee the implementation of the plan’s goals and tasks, to give direction to the departments as goals are accomplished, and to inform the public of the success of the program.

The Solid Waste Department originally used seventeen goals in its own original strategic plan. Some were deemed irrelevant, so in 2012 a review was conducted and the goals were refined, consolidated and reduced to eleven. These strategic plan goals for the Solid Waste Department are shown below.

Solid Waste Goals

The County Solid Waste Department is responsible for the proper disposal of all the solid waste within the La Crosse region, which includes La Crosse, Trempealeau, Buffalo, Wabasha, and Houston Counties. The Solid Waste Department is uniquely situated to reduce, reuse, and recycle as much material as possible in order to keep our disposal of misdirected resources to a minimum. Those materials not taken care of through the use of the 3 Rs (reduce, reuse, recycle) are directed to the Waste to Energy Plant run by Xcel Energy. A portion of the refuse is then burned to produce energy enough to supply over 10,000 homes. As a last resort, the leftover material is then landfilled in a state-of-the-art facility.

The County Solid Waste Department will be responsible for implementation of the following action items, which will help us to meet the overall sustainable vision for the community.

Goals/Actions Established in 2010

1. Develop and enhance tools to keep waste within the region.
2. Organize and make consistent a system of municipal drop-off sites – potentially modeling it after Houston County’s system.
3. Explore the feasibility of food waste diversion.
4. Explore the feasibility of expanding C&D (construction and demolition) diversion.
5. Explore the feasibility of the County becoming the Responsible Unit (RU).
6. Continuously increase waste diversion rates.
7. Work with UWL, Western, and Viterbo to use the Landfill as a scientific learning center.
8. Explore how we might be able to enhance gas production to stabilize the landfill and support gas-to-energy.
9. Work with local entities to use recycled asphalt shingles and increase shingle recycling.
10. Explore the feasibility of developing an ordinance banning shingles from the Landfill.
11. Work with municipalities to pass ordinances banning burn barrels.

Significant progress was made in implementing the goals in 2012 and a summary report was completed (La Crosse County 2013). A further review was conducted, and with the success of the sustainability plan, it was determined that additional revision to the Solid Waste Department’s goals was needed. The goals for the Solid Waste Department were reduced to six, and each goal was tied to a Natural Step.

The Natural Step Goals

The La Crosse County Solid Waste Department will be responsible for implementing the following action items, which will help meet the overall sustainable vision for the community by meeting the four requirements of The Natural Step.

1. Reducing dependence on fossil fuels;
2. Reducing use of chemicals;
3. Protecting the environment; and
4. Treating people fairly.

Modified Goals and Actions Established in 2013

1. Develop and enhance tools to keep waste within our region.

- This will help reduce fossil fuel use in excess transportation to out-of-area landfills and reduce dependency on coal by creating refuse-derived fuel at the Xcel Energy plant.
2. Work to expand the use of waste drop-off sites through education and outreach.
 - This action treats people fairly by giving them greater opportunities to properly dispose of their waste and recyclables. It would also reduce fossil fuel use by giving people shorter travel distances to dispose of their materials.
 3. Continuously increase waste diversion rates by:
 - Working with local entities to use recycled asphalt shingles
 - Exploring the creation of an ordinance to ban used shingles from the Landfill
 - Exploring the feasibility of expanding construction and demolition diversion/recycling
 - Exploring the feasibility of food waste recycling
 - This action conserves resources by reducing dependence on imported fossil fuels, increasing recycling, reducing the mining of virgin resources, and preserving landfill space.
 4. Explore the feasibility of the County becoming a Responsible Unit (RU).
 - This action will help increase efficiency by consolidating the resources needed by the RU to perform the tasks required by the WiDNR.
 5. Work with University Wisconsin La Crosse, Western College, and Viterbo University to use the Landfill as a scientific learning center.
 - This action will treat people fairly by using the Landfill as a living educational center for anyone seeking to expand their knowledge and experience through these higher learning resources.
 6. Explore how we might be able to enhance gas production and augment the stabilization of the Landfill.
 - This action reduces our communities' dependence on fossil fuel, protects the environment, and treats people fairly by not postponing future maintenance costs to the next generation.

Recently a six month update on the implementation of these new goals was prepared for the Sustainable La Crosse Commission to review. Each of these Solid Waste Department goals is designed to enhance a) waste diversion, b) the Landfill's commitment to renewable energy and energy efficiency, and c) community outreach. These goals will continue to be an integral part of the mission of the Solid Waste Department and will expand the use of The Natural Step within the system, especially when it comes to the protection of the Landfill's ecology.

8 COMMUNITY OUTREACH

The following is a summary of La Crosse County's community outreach program. It encompasses the County's efforts to expand the information and dialogue between the Solid Waste Department, the Landfill, and the community. There are many ways to implement this program and a variety of stakeholders and interested parties that we need to engage to continue to evolve the Landfill into a community and recreational resource that all the people of the County can enjoy and benefit from.

La Crosse County Solid Waste Department - Community Outreach Program

It is essential for the successful management and operation of the La Crosse County Solid Waste System to build and maintain good relationships with key stakeholders, including site neighbors, haulers, local businesses, the media, regulators, and other participants in the regional system. Good relationships provide the basis for understanding, support, expanded collaboration, and financial stability.

The La Crosse County Solid Waste System has maintained a regular program of providing information and educational outreach for more than a decade. Specific tools, including newsletters, reports, open house events, tours, awards, media relations, and a website, have been completed and are collectively referred to as components of the Public Relations Program. The Program has been effective in disseminating information to key audiences in an accurate and timely manner. However, the Program has not emphasized providing access for community participation, input and feedback. In essence, the Public Relations Program has been a one-way street, with occasional “on-ramps” for participation or input. The Solid Waste System has determined that the Public Relations Program could be improved by evolving to a Community Outreach Program. In contrast to the Public Relations Program, the Community Outreach Program would put greater emphasis on meeting people where they are, identifying what is important to them, helping them make the most of participation opportunities while continuing education and information activities, and learning from them about potential improvements and changes to the system.

Specific goals of the Community Outreach Program are to:

- Establish and sustain authentic, genuine relationships with stakeholders
- Encourage varied and continuing public involvement opportunities throughout the Solid Waste planning, program development, and operations processes
- Provide timely, accurate information to stakeholders affected by solid waste plans and projects
- Actively solicit, review, and respond to all public input
- Implement activities to gauge the Program’s effectiveness, making revisions as necessary

The Community Outreach Program will be a sustained presence that builds trust and demonstrates transparency. Attributes of the Community Outreach Program include:

- An emphasis on creating tools that encourage listening and dialogue
- A focus on authentic communication
- Accountability for collaboration with various stakeholders
- Commitment to the approach and the mission
- Integrity in all aspects of the program

The transition to a Community Outreach Program should not be construed as eliminating or abandoning the information and education functions served by effective public relations. Instead, the Community Outreach Program will better leverage existing and new public relations tools in an effort to:

- Provide more opportunities for those who are affected by or use the system to participate in the system. Tactics may include:
 - Expanded opportunities for stakeholders to experience the active Landfill through tours and events.
- Ensure stakeholder input will influence decisions in some manner. Tactics may include:
 - Conducting meetings at locations throughout the service area.
 - Designing meetings to incorporate active participation tools beyond written or verbal comments.
 - Determining and communicating in advance how input will be assessed and addressed.
- Promote sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
- Provide participants with the information they need to participate in a meaningful way. Tactics may include:
 - Broader use of social media such as Facebook and Twitter to make information more accessible to more people at times convenient to them.
 - Implementation of real-time video and/or photographic documentation of site activities.
 - More timely and accurate information posted to the Department’s web pages.
 - More effective media relations.

- More community involvement and participation by department staff.
- Communicate to participants how their input affects decisions.

The graphic below, based on a model prepared by the International Association for Public Participation (IAP2), depicts the progression from public relations to community outreach and the tactical activities often associated with each.

Table 8. International Association for Public Participation (IAP2) Progression from Public Relations to Community Outreach

Increasing Level of Community Involvement and Impact 					
Public Participation Goal	Inform	Consult	Involve	Collaborate	Empower
Public Participation Goal	To provide the public with balanced and objective information to assist them in understanding challenges, alternatives opportunities, and solutions	To obtain public feedback on analysis, alternatives and/or decisions	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered	To partner with the public in each aspect of the issue, including development of alternatives and identification of preferred solution	To place final decision making in the hands of the public
Promise to the Public	We will keep you informed	We will keep you informed, listen to you and acknowledge concerns and aspirations, and provided feedback on how public input influenced the decision.	We will work with you to ensure your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how your input influenced the decision	We will look to you for advice and innovation in formulating plans, and will incorporate your advice and recommendations into the decisions to the maximum extent possible	We will implement what you decide.
Example Techniques	Fact sheets, websites, open houses, social media	Public comment, focus groups, surveys, public meetings, social media	Workshops, deliberative polling, social media	Citizen advisory committees, consensus building, participatory decision-making, social media	Citizen juries, ballots, delegated decision, social media
Public Relations.....Community Outreach 					

As the above outlines our new outreach efforts, we'll review our efforts up to this date and the variety of ways the Solid Waste Department has made progress in reaching out to neighbors, stakeholders, the community, nonprofit organizations and schools.

1. Annual meeting and report: this event is held every year to inform stakeholders, the public, haulers who use the solid waste system, government officials, and any other interested parties as to the health and well-being of the Solid Waste Department and the Landfill. A financial report is the centerpiece of this event to ensure the solubility and longevity of the organization. Annual participation is usually 50 people.
2. We have a variety of handouts and flyers that are used to convey as many aspects of the system as we can. The following is a short list of those items.
 - **The Recycler.** This handout covers a wide amount of information on the HHW (Household Hazardous Waste) site, including materials that can be accepted or disposed of at home, fees for service, and hours of operations. It also includes information on the citizen's drop off area and other services provided by the Landfill, with the inside of the flyer having specific recycling information for each municipality. This flyer reaches every household in the County.

- **Landfill Tour Sheet.** This handout goes to every tour participant and contains basic information about materials diverted from the Landfill including shingles wood and metals along with HHW diversion numbers.
- **Landfill Gas-to-Energy Project.** This sheet also goes out to tour participants and is specific the County's collaboration with Gundersen Health System.

Appendix F represents a portion of the Solid Waste Department's Tours and Presentations spreadsheet. This spreadsheet is used to track the number of participants who take tours, what organizations they're from, who was involved, and the nature of Landfill presentations.

A quarterly newsletter (The Landfill Scoop) is compiled by a Landfill scale attendant and includes safety issues and tidbits of information about the Landfill and activities going on within the site; this newsletter goes out to approximately 100 individuals quarterly, the majority of which are haulers and owners. The Department recently put together a 16-month calendar, about 1,000 were printed, and they've been handed out to stakeholders and customers.

Solid Waste Department staff makes presentations throughout the community on a regular basis; these would include talks to non-profits, business organizations, and schools from elementary to university. A monthly Directors Report is given to the Public Works and Infrastructure committee. This Committee has oversight of the Solid Waste Department and the Landfill and authorizes expenditures and operations of the site. The Report contains updates on operations, infrastructure, goals, and the sustainability program. Much of the same information is given to the Solid Waste Policy Board. The Policy Board is made up of elected officials and/or staff from each of the participating Counties in the Solid Waste System and gives direction to the Solid Waste Department that has direct impact on those stakeholders. Regular meetings are held with the haulers who use the Solid Waste System to get feedback and input from those that directly use the services of the Landfill and have eyes on the processing and disposal of waste.

The Solid Waste Department is currently investigating and developing a social media program. This effort may contain severe growing pains for the older individuals within the Solid Waste team, but this will be a significant opportunity to reach a much younger audience. With the social media outreach, the Department has instigated an effort to become a significant partner and living laboratory for the institutions of higher learning in the area. Viterbo, the University of Wisconsin La Crosse, and Western Technical College pose a unique chance to reach a much younger audience along with offering a research facility in the Landfill to teach a new generation about the complexity of the Landfill operations and maintenance.

The restored Landfill could be marketed as a valuable educational site for area elementary and secondary schools. Universities and colleges could be invited to integrate the site into their curricula and research programs, while simultaneously assisting with site monitoring. The Landfill might consider offering educator training workshops to help teachers become familiar with the site and learn how to use it in their teaching. Many opportunities for research exist at the site. Restoration efforts, water quality, carbon sequestration, and invasive species control methods are among the topics that might be pursued.

Many public agencies have an interest in promoting conservation and environmental education and provide funding for a wide range of activities. Potential programming/funding partners include:

- The Wisconsin Department of Natural Resources
- The Wisconsin Environmental Education Board
- Natural Resource Conservation Service

The Solid Waste Department has conducted significant outreach to the Boy Scouts of America, resulting in several Eagle Scout projects, the development of trails within the Landfill, several service projects and fundraisers, along with an annual Camporee.

All of these efforts will continue and must evolve to maintain the necessary connection of the Landfill to the community. Along with this connection, a new and significant marriage must be consummated between the community outreach efforts of the Solid Waste Department and the Natural Resources Management Plan, which must help put in place goals on how the site should and could evolve. All the tools are in place and working, but like all tools must be honed regularly and new tools added to the toolbox. Only with all of the proper tools can we do the job at hand and continue to build a facility that can be the model for others to follow.

9 MANAGEMENT PLAN IMPLEMENTATION AND SCHEDULE

9.1 Management Units and Tasks

Management units are used to organize ecological restoration and management. Based on discussions with Landfill staff, six management units were delineated for the site (Figure 6). Each management unit contains a variety of land cover types and warrants 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 Landfill. Invasive plants are not recommended for use in site landscaping (Appendix G). Native woody plants are recommended for landscaping and ecological buffering (Appendix H).

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 regionally uncommon species, conservation of which is a goal of Landfill staff.

- As scheduling allows, conduct a thorough inventory to identify additional rare plants on site.
- Conduct a “bioblitz” to involve technical experts, Landfill staff, 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 settlement. However, these burns were typically low-intensity ground fires, fueled by oak leaves. The Landfill has already been reintroducing prescribed fire to the site, and its use as a restoration and management tool is 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. **Deer Herd Management**

- Deer management would be advantageous to prevent over-browsing of the site’s herbaceous and shrub layers. Without herd management, the quality of the herbaceous ground layer may be decreased and planted or desirable volunteer tree seedlings may not germinate or survive. Deer removal may be pursued in partnership with non-profits, volunteer-run organizations, or WIDNR following the County approval process.

4. **Forest Harvesting**

- The Landfill has initiated a sustainable harvesting program for the site’s forests. Future harvests should be conducted with close attention to this NRMP to ensure that access roads, harvesting plans, and restoration procedures do not compromise the ecological integrity of the site’s forests or trail system. Inspections should be conducted before, during, and after actual harvesting to ensure compliance.

5. **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.
- A detailed *La Crosse County Landfill Ecological Monitoring Program* was developed in 2014.

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 permits/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 operational life of the Landfill, 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.

9.2.1 Management Unit 1

General Description

MU1 is located in the western portion of the site (Figure 6). The southern portion of MU1 has minimal landfill operations, but the northern portion contains the Landfill's container storage yard. The majority of the management unit consists of cool season grass fields located on a closed landfill cap and in adjacent areas. MU1 also contains the site's reed canary grass wetland – a slough that drains across the western edge of the site. The only formal trail that exists currently on the Landfill is a paved, multi-use trail that runs through MU1, near its northwest boundary. This trail continues west into the City of La Crosse's International Business Park (IBP), which abuts MU1.

Goals

MU1 is an important management unit in that it is currently one of the most accessible and visible portions of the site. This management unit is located in the site's "Prairie" zone (Figure 5). The primary goals for MU1 include:

- Convert cool season grass fields to Prairie;
- Convert reed canary-grass wetlands to diverse Wet Prairie and Wet Meadow;
- Establish walking trail and multi-use trail entrances into the Landfill;
- Extend the existing trails to connect with the future interpretive center and other trail circuits;
- Construct a pedestrian bridge and boardwalk;
- Develop an overlook from the top of the closed landfill cell;
- Install interpretive features; and
- Maximize public usage.

The goal for the restored Prairie, Wet Prairie, and Wet Meadow is to significantly increase cover by a diverse array of native species. This will provide greater aesthetic value (including a variety of bloom colors throughout the seasons) as well as higher quality habitat for a variety of native wildlife. The expanded trail system will include multi-use and walking trails, including pedestrian access to the wetland slough via the bridge and boardwalk. The multi-use trail will be extended along the southern edge of MU1 in order to connect with MU2. The walking trail will switch back up the closed landfill cell for spectacular views of the Mississippi River Valley, La Crosse River Valley, and surrounding landscapes. Interpretive features will both represent destinations for trail users and provide educational material regarding ecological restoration activities occurring at the site and the cultural history of the region.

9.2.2 Management Unit 2

Contrary to MU1 (which is already undergoing ecological restoration and recreational improvements), MU2 and all subsequent management units are described in less detail, since less is known about the exact nature and timing of improvements in these areas. MU1's same overarching goals for ecological restoration and enhancement also apply to MU2 and subsequent management units.

General Description

MU2 is located in the southern portion of the site (Figure 6). The majority of this management unit consists of a closed portion of the Landfill (with the active face just north of MU2); therefore, the area experiences minimal Landfill operations. The area beyond the landfill mound is dominated by cool season grass fields (both on the closed landfill cap and in adjacent areas), and a pond is located on the east edge.

This pond receives runoff from the Landfill grounds. No trails or other recreational amenities exist in MU2.

Goals

MU2 is an important management unit in that it is visible from the south edge of the site (IBP) and other landowners, and it is intended to be a future access point to the Landfill. This management unit is located in the site's "Savanna" zone (Figure 5), and trees have already been planted on portions of the closed landfill cap. The primary goals for MU2 include:

- Convert cool season grass fields to Savanna;
- Establish multi-use trail entrance into the Landfill;
- Develop trails to connect management units and other trail circuits;
- Develop an overlook and/or interpretive opportunity from the top of the closed landfill; and
- Increase public usage.

The expanded trail system will include multi-use and walking trails, including access to MU3's forested mountain bike trails. The multi-use trail will be extended along the southern edge of MU2 in order to continue the Landfill's "grand rounds" loop. The walking trail will lead up the closed landfill cell for spectacular views of not only the Mississippi River Valley, La Crosse River Valley, and surrounding landscapes, but also of the active landfill face. This provides a unique interpretive/educational opportunity to demonstrate the active management of solid waste.

9.2.3 Management Unit 3

General Description

MU3 is located in the southern portion of the site's eastern forested bluffs (Figure 6). Landfill operations generally do not occur here; however, limited sustainable forestry has been practiced in this area. This management unit consists almost entirely of Mesic Forest, but two small Hill Prairies exist near the crest of the bluff.

Goals

MU3 is an important management unit in that it contains a substantial block of relatively intact native forest. This management unit is located in the site's "Forest" zone (Figure 5). The primary goals for MU3 include:

- Enhance the existing forest through invasive removal and native plantings;
- Establish a network of mountain bike trails; and
- Increase public usage.

The hallmark of MU3 will be its mountain bike trails. Construction of these trails has begun, in partnership with the Outdoor Recreation Alliance (ORA) and WisCorps. The intentional separation of these mountain bike trails from the forested walking trails in MU4 to the north will eliminate user conflicts and restrict more aggressive activity to the southern portion of the site's forests.

9.2.4 Management Unit 4

General Description

MU4 is located in the northern portion of the site's eastern forested bluffs (Figure 6). Landfill operations generally do not occur here; however, limited sustainable forestry has been practiced in this area. This management unit consists entirely of Mesic Forest, including some of the site's highest quality forests.

Goals

MU4 is an important management unit in that it represents the site's Forest Preserve. This area has been set aside as a large block of relatively intact native forest that is contiguous with adjacent forest unlikely to be developed (due to steep slopes and access constraints). This management unit is located in the site's "Forest" zone (Figure 5). The primary goals for MU4 include:

- Enhance the existing forest through invasive removal and native plantings;
- Establish a network of walking (in this context, hiking) trails;
- Develop two overlooks at the forest edge that look out across the Landfill to the west;
- Install an interpretive feature explaining the significance of the Forest Preserve; and
- Increase public usage.

The hallmark of MU4 will be its forested walking trails. Their separation from MU3's mountain bike trails will allow the hiker a quiet, reflective experience. This low-speed, low-intensity use is compatible with the habitat needs of many interior forest birds, which likely use and will continue to use this forest.

9.2.5 Management Unit 5

General Description

MU5 is located in the west-central portion of the site, nearly connecting the southern edge of the site with its northern edge (Figure 6). A moderate level of the Landfill's operations occurs here, since this area includes one of the Landfill's aggregate processing areas. However, the majority of MU5 consists of cool season grass fields located on and adjacent to closed landfill caps, and several driving/parking surfaces.

Goals

Unlike the preceding management units, at least portions of MU5 are expected to be actively used in Landfill operations for 10 to 30 more years. Therefore, restoration and enhancements to portions of this area will not occur for some time. This management unit is located in the site's "Prairie" zone (Figure 5).

The primary goals for MU5 include:

- Convert cool season grass fields to Prairie;
- Develop trails to connect with other trail circuits;
- Establish a BMX park in the southern portion of the management unit ; and
- Increase public usage when and where appropriate.

9.2.6 Management Unit 6

General Description

MU6 is located in the north-central portion of the site (Figure 6). Significant Landfill operations occur here, since this area includes the Landfill's large materials and aggregate processing pad. In the coming decade, this area will be redesigned as the new main entrance to the Landfill. However, currently the majority of MU6 consists of the processing pad and cool season grass fields.

Goals

MU6 is expected to be actively used in Landfill operations for over 30 years; therefore, restoration and enhancements to this area will likely not occur for decades. This management unit is located in the site's "Prairie" zone (Figure 5). The primary goals for MU6 include:

- Convert cool season grass fields to Prairie;
- Establish multi-use trail entrance into the Landfill;
- Develop trails to connect with other trail circuits; and
- Increase public usage when and where appropriate.

9.2.7 Management Unit 7

General Description

MU7 is located near the central portion of the site and includes a small isolated area on the site's northern boundary (Figure 6). Significant Landfill operations occur here, since this area includes the active face of the Landfill, and MU7 also includes a proposed landfill expansion cell. Currently the majority of MU7 consists of active landfill cells and cool season grass fields.

Goals

MU7 is expected to be actively used in Landfill operations for over 30 years; therefore, restoration and enhancements to this area will likely not occur for decades. This management unit is located in the site's "Savanna" zone (Figure 5). The primary goals for MU7 include:

- Convert cool season grass fields to Savanna;
- Develop trails to connect with other trail circuits; and
- Increase public usage when and where appropriate.

9.2.8 Special Projects Outside Regular Restoration and Management Activities

Occasionally the Landfill undertakes special projects to address operational needs. These special projects are difficult to define and schedule in advance; therefore, they cannot be explicitly integrated into this NRMP. When a special project is identified, the Landfill should use the following procedure to integrate the project into the site's restoration and management activities.

1. Map project area
2. Refer to Proposed Plant Community (Figure 6) to determine future condition
3. Design site preparation and planting plan
4. Install
5. Monitor
6. Manage
7. Integrate into Management Unit's perpetual management schedule

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.

9.4 Generalized Costs

Planning and implementing ecological restoration and management plans and constructing trails and recreational facilities require an understanding of cost. While there are many variables that can significantly influence unit costs (e.g., size of area being addressed, existing site conditions, slopes), the following generalized costs for contracted work are provided for early planning purposes. Volunteers, partnerships with other organizations, donation of materials, and use of County staff time can reduce these costs.

Table 11. Generalized Ecological Restoration & Management Unit Costs

TASK	UNIT	UNIT COST RANGE
Brushing (cut and stump treat)	Acre	\$1,500-\$3,500
Foliar spray young woody brush	Acre	\$200-400
Broadcast herbicide	acre/trip	\$175-300
Spot herbicide	acre/trip	\$200-400
Mowing	acre/trip	\$150-350
Prescribed burn (min. 3 ac)	Acre	\$300-700
Tilling	Acre	\$150-350
Native seed (material only)	Acre	\$200-\$1,100
Native seeding (no-till drill, labor only)	Acre	\$200-500
Native seeding (hand-broadcast, labor only)	Acre	\$300-600
Straw mulch (spread and crimp)	Acre	\$600-900
Installed live herbaceous plant plug	Each	\$3-7
Installed shrub (#2)	Each	\$25-40
Installed tree (#10, 2" B&B)	Each	\$150-250, \$300-600
Ecological monitoring & reporting	Year	\$2,500-\$6,000

Restoring native plant communities typically requires a moderate initial investment – more than simply seeding with cool-season grasses. However, proper installation and management of native plant communities can actually reduce considerably the long-term maintenance costs. Many variables influence the return on investment, but many native landscapes can begin to save landowners money within approximately 5 years.

Table 12. Generalized Trails & Recreational Facilities Unit Costs

TASK	UNIT	CONSTRUCTION COST RANGE	MAINTENANCE COST RANGE	TYPICAL MAINTENANCE ACTIVITIES
Multi-use trail (Asphalt)	lf	\$60-125	\$3-6/LF every 3 years \$3.50/LF every 7-10 years \$5-10/LF every 21 years	* Seal coat, patch, and repair cracks every 3 years *Chip seal every 7-10 years *Resurface with asphalt every 20 years
Walking trail (unpaved, bare earth)	lf	\$6.50-15	0.40/LF every 3 years	*Re-grade areas where the tread is worn to prevent tripping hazards and erosion *Monitor and repair trail erosion
Mountain bike trail (unpaved, bare earth)	lf	\$6.50-15	0.40/LF every 3 years	*Re-grade areas where the tread is worn to prevent tripping hazards and erosion *Monitor and repair trail erosion
Cross-country ski trail	lf	-	0.20-2/LF annually	* Mow the trail in the fall to create a track *Regular trail grooming while trail is in use.
Interpretive sign	each	\$1,500-\$5,000	-	*Maintenance dependent on the design of the signage (wood, metal, etc). *Periodic upkeep due to vandalism or exposure to the elements may occur.
Mile marker, directional, or warning sign	each	\$50-\$400	-	*Maintenance dependent on the design of the signage (wood, metal, etc). *Periodic upkeep due to vandalism or exposure to the elements may occur.
Bicycle rack	each	\$900-\$2,000	-	*Minimal maintenance *Periodic upkeep due to vandalism or exposure to the elements may occur.
These numbers are general estimates and are not meant to reflect a formal opinion of probable cost. Trail costs will vary widely depending on many factors, including the amount of grading required to construct the trail system, desired depth of subgrade preparation, final trail width, rate of trail usage, and source of labor for construction and maintenance. Cross-country ski trail costs may vary depending on the degree of trail grooming that could occur on-site. These cost estimates should be refined in the next phase of design.				

10 REPORTING AND RECORD-KEEPING

The La Crosse County Plan of Operation and various administrative codes have identified routine reporting requirements for the La Crosse County Landfill. These reports vary from annual submittals on the overall Landfill operations to quarterly and monthly reporting on monitoring requirements, gas generation, and leachate generation. In addition, through our stakeholder agreement, an annual meeting is held whereby a summary of the Solid Waste Department activities are reviewed and an annual report, which provides economic and factual performance indicators for the department, is prepared. Periodically, Director’s Reports are prepared for the oversight committee, identifying critical issues and potential resolutions for such.

The WiDNR Green Tier certification also requires routine annual reports based on implementation of an environmental management system to address ongoing compliance and activities directed at achieving superior environmental performance. Other reports are also prepared, including annual summaries of tonnage, customer usage, and waste types. The Solid Waste Department routinely conducts surveys on customer usage and examines turnaround times in the facility, delay times at the scale, and other service-related metrics.

With these current reporting requirements, the issues of compliance and customer service are being well documented and meeting regulatory requirements. An area that has not yet been addressed is providing meaningful metrics to measure the implementation of the master plan and improvement to the ecology of the Landfill. It is anticipated that this NRMP will establish a baseline from which metrics can be developed in future years to measure change and improvements to the ecological community at the Landfill.

11 CONCLUSION

The La Crosse County Landfill'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 of the Landfill. 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 Landfill visitors, habitat for wildlife, and ecosystem services that benefit the entire region.

Specific outcomes expected from implementation of this plan include:

- Approximately 300 acres of restored landscapes
- Convenient access to nature for the adjacent urban population center
- Example of how to capitalize on the value of Landfill beyond waste management
- Example of how the Landfill's operations 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 waste management, recycling, sustainability, native ecosystems, etc.
- Long-term ecological restoration, study, and observation site regarding ecological processes and natural ecosystems
- Serve as a regional trail hub and recreational center
- Become a regional destination because of all recreation, education, and research opportunities
- Provide large blocks of high quality habitat for wildlife uncommon in the region

12 NEXT STEPS & RECOMMENDATIONS

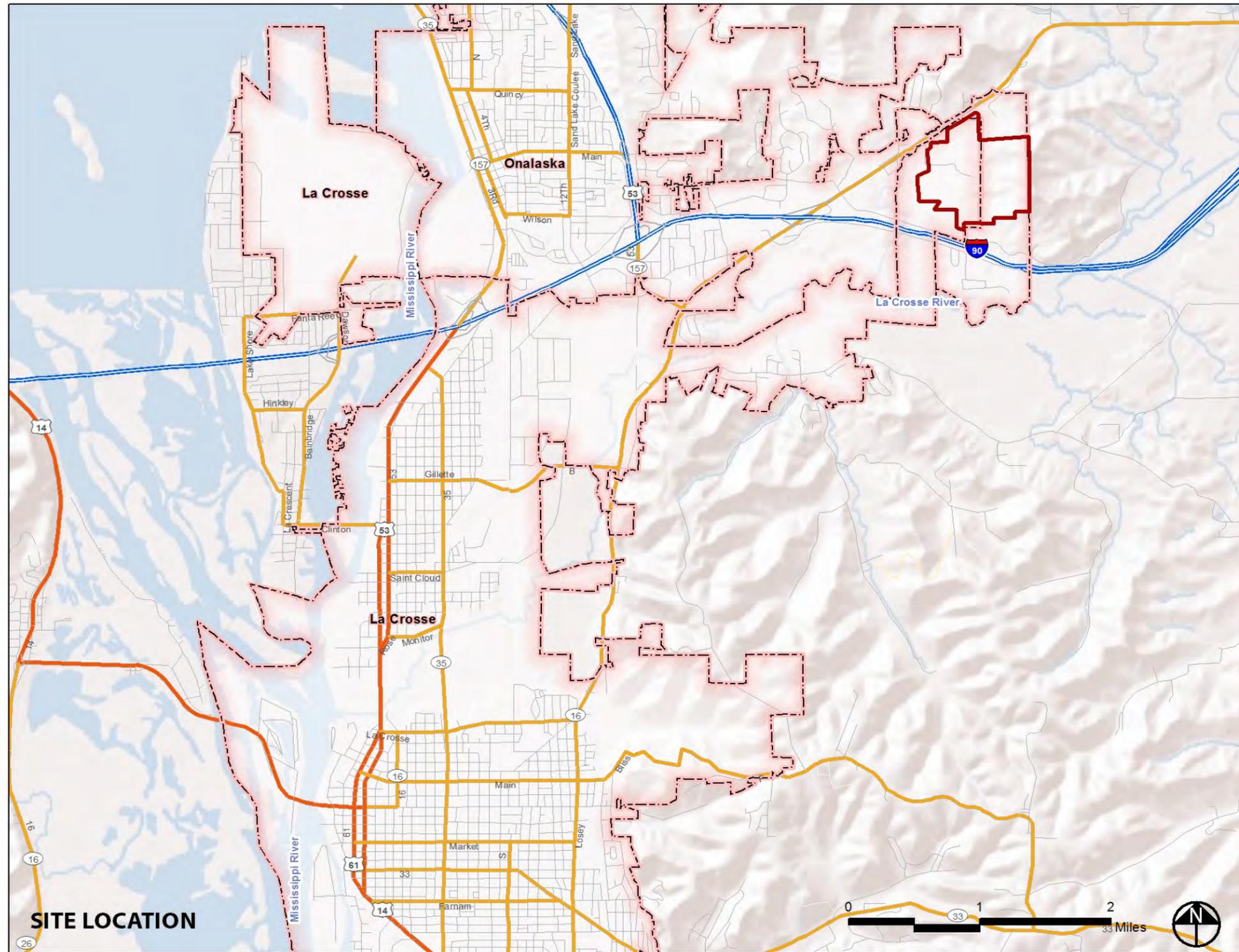
Based on the results of previous studies, recent research, and County and stakeholder input, the following next steps and recommendations are offered.

- Develop a more detailed restoration and management plan for individual projects scheduled for work in 2016
- Integrate this NRMP & TRMP with the Master Land Use Plan
- Pursue approval of this NRMP & TRMP by the County Board
- Determine annual funding available for implementation and maintenance
- Develop a research plan with partner educational institutions
- Develop interpretive messages/signage/style
- Develop partnerships for trail construction and maintenance
- Resolve any conflicts that exist with regard to Landfill operations, ecological restoration/management, and trail and recreation planning
- Prepare for 2020 NRMP & TRMP update
- Approach neighbors for participation, input, and land protection through a variety of means

13 REFERENCES

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Figure 1. Site Location

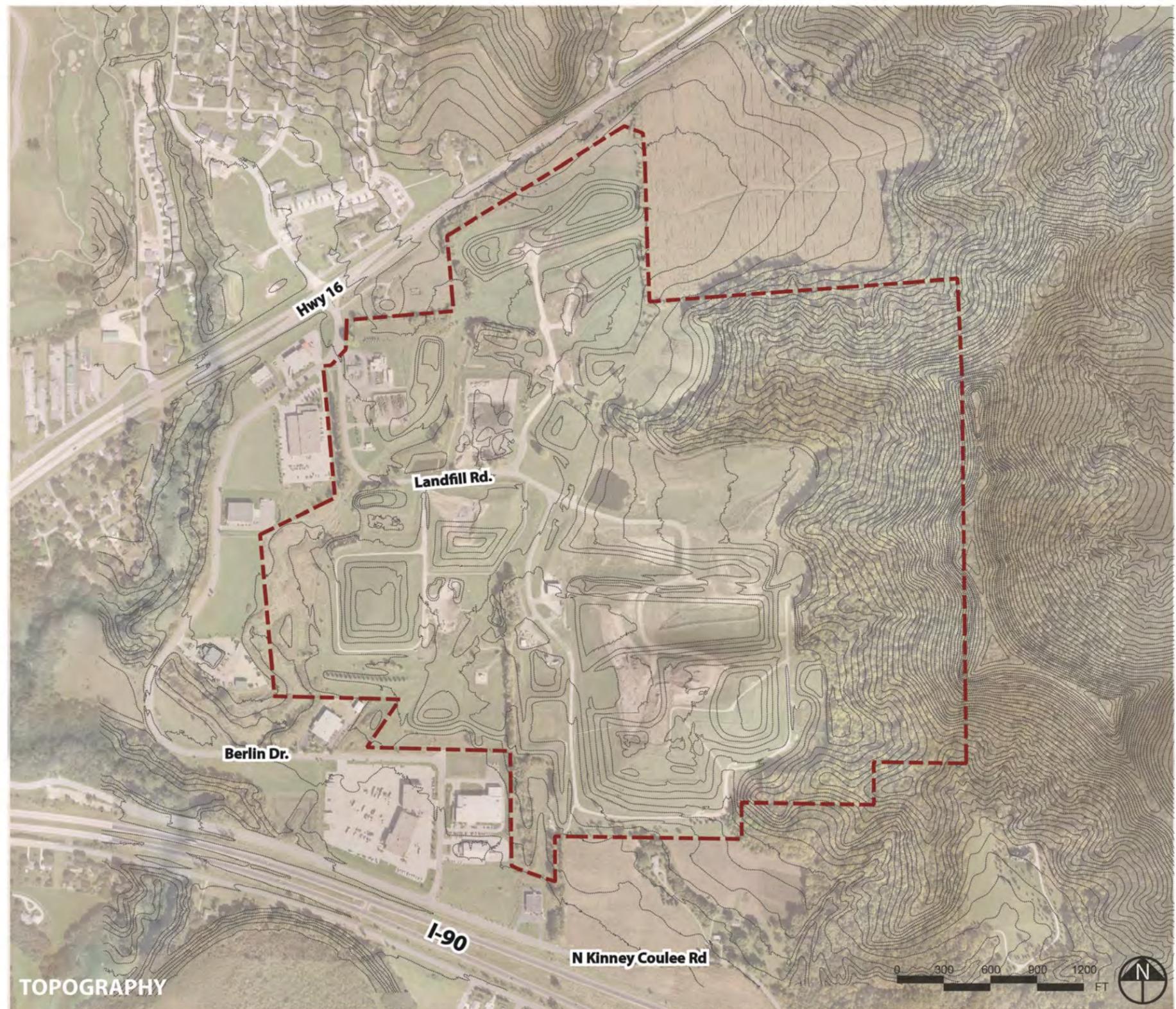


Legend

-  Site Boundary
-  Municipal Boundary

SITE LOCATION

Figure 2. Site Topography

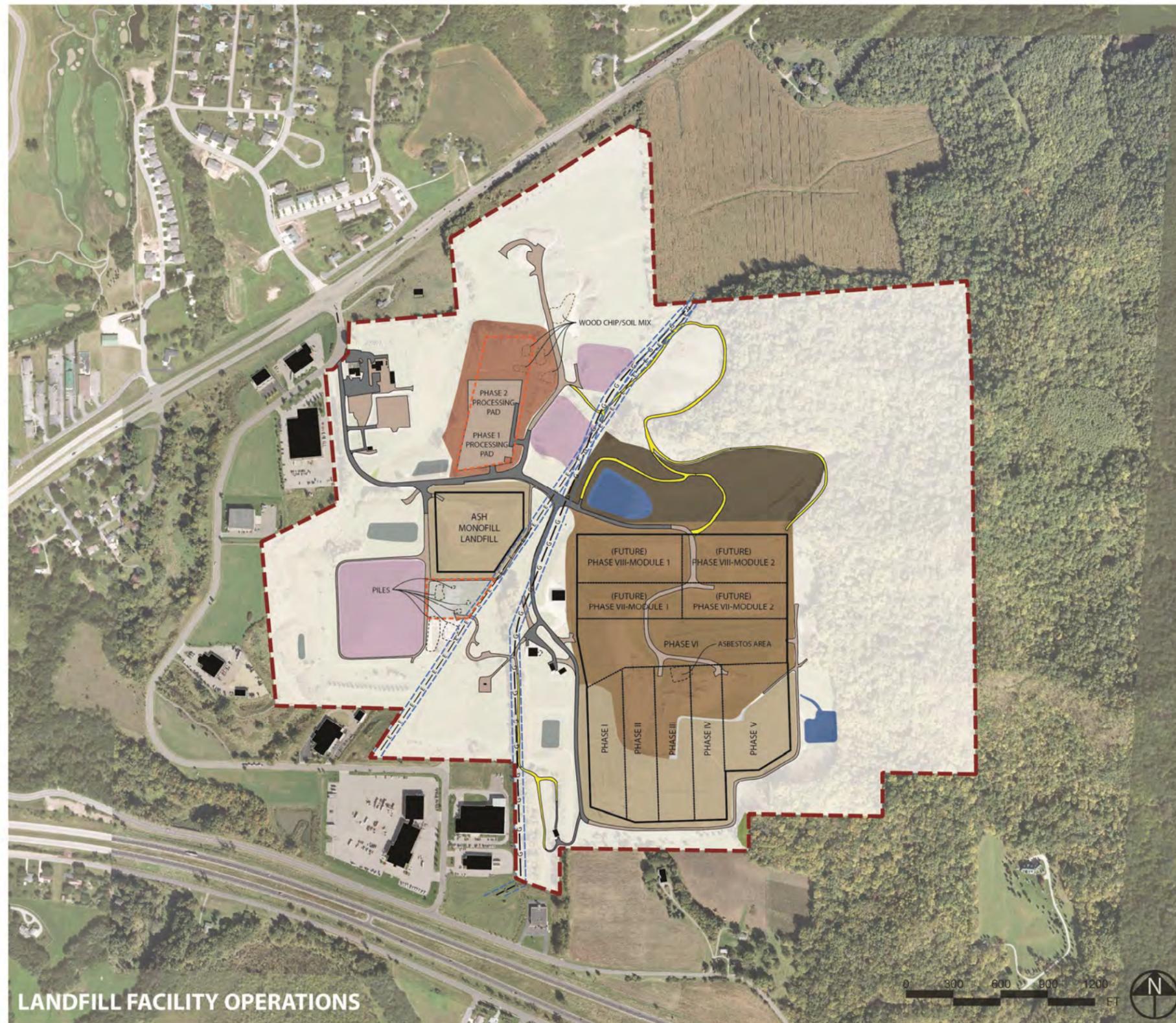


Legend

-  Site Boundary (336.8 AC)
-  10-Ft Contour

Aerial Imagery
On-Site 2013
Adjacent Property 2010

Figure 3. Landfill Facility Operations



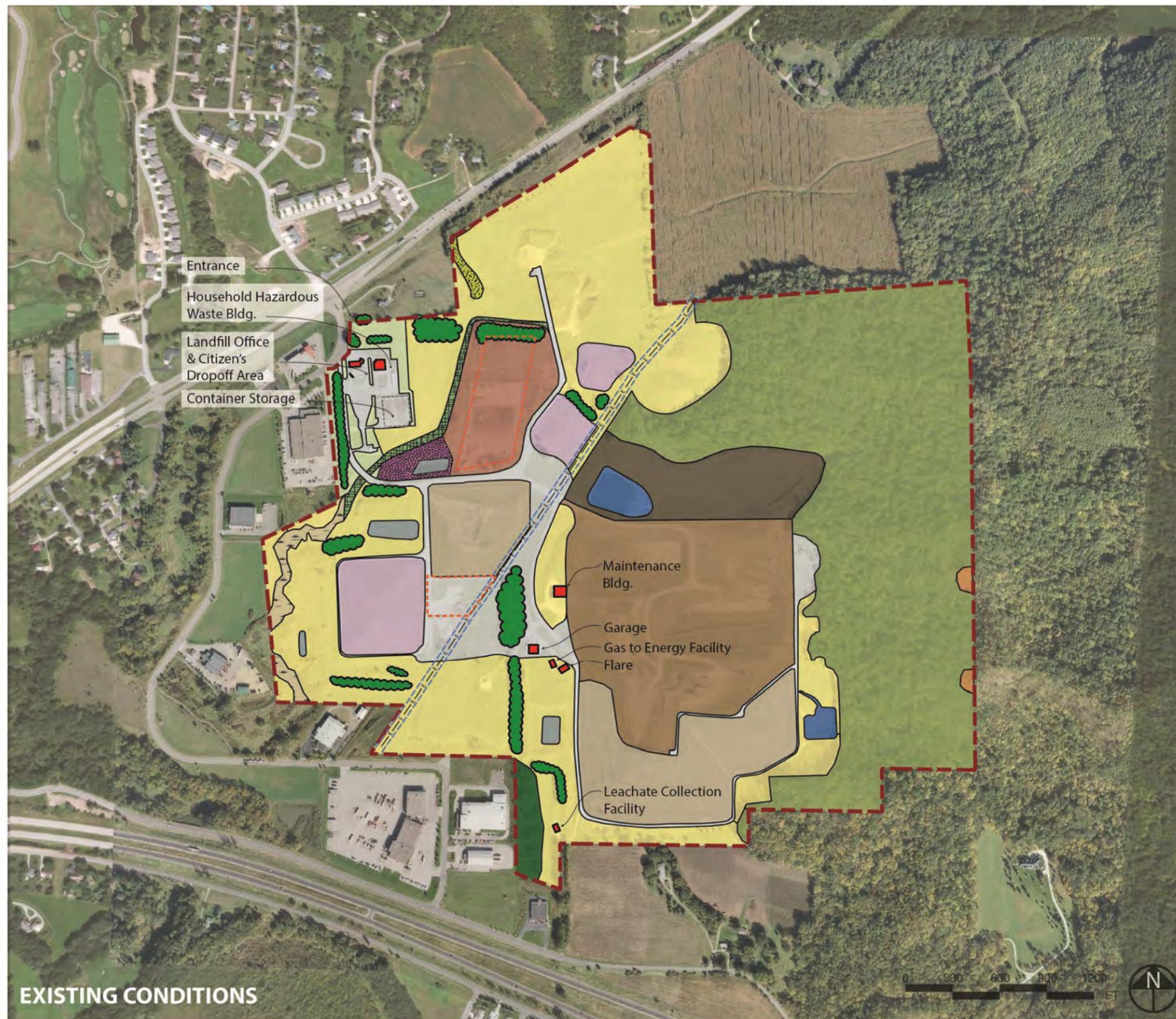
Legend

- Site Boundary (336.8 AC)
- Existing Utilities Right-of-Way
- Existing Overhead Electrical
- Existing Underground Gasline
- Asphalt Driveway
- Gravel Driveway
- Unpaved Trail
- Building
- Detention Water Basin (1.4 AC)
- Pond (1.1 AC)
- Closed Demolition Landfill (12.4 AC)
- Materials Processing Area (11.9 AC)
- Future Expansion Landfill (13.4 AC)
- Active MSW Landfill (49.0 AC)
- Closed MSW Landfill (19.0 AC)
- Aggregate Processing Area (8.3 AC)

Aerial Imagery
 On-Site 2013
 Adjacent Property 2010

LANDFILL FACILITY OPERATIONS

Figure 4. Existing Conditions



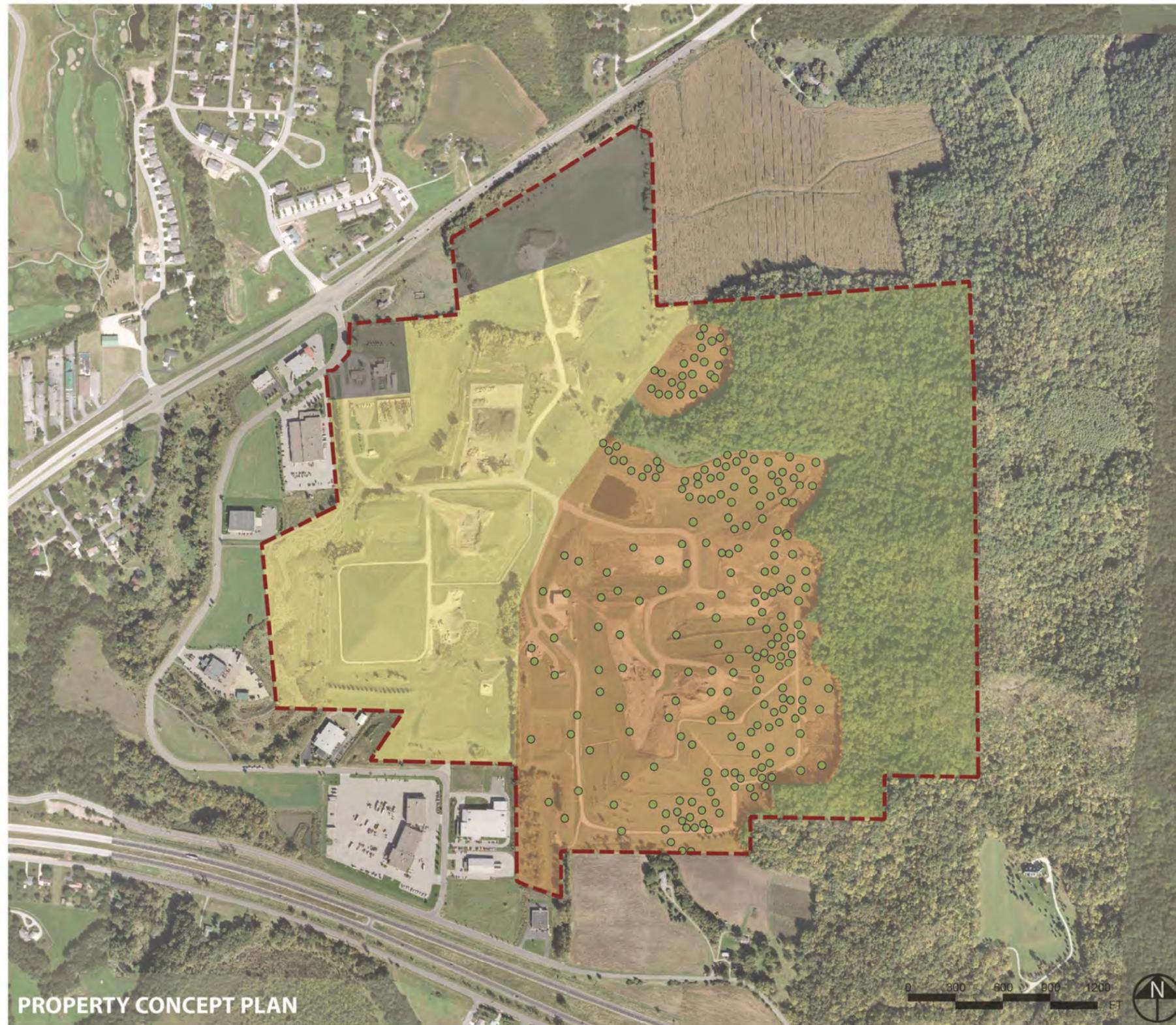
Legend

-  Site Boundary (336.8 AC)
-  Mesic Forest (92.7 AC)
-  Disturbed Woods (0.7 AC)
-  Boxelder Woodland (2.7 AC)
-  Cool Season Grass Field (93.4 AC)
-  Hill Prairie (0.6 AC)
-  Prairie Restoration (1.6 AC)
-  Reed Canary Grass Wetland (2.5 AC)
-  Turf (5.2 AC)
-  Grass Swale (1.8 AC)
-  Detention Water Basin (1.4 AC)
-  Pond (1.1 AC)
-  Closed Demolition Landfill (12.4 AC)
-  Materials Processing Area (11.9 AC)
-  Future Expansion Landfill (13.4 AC)
-  Active MSW Landfill (49.0 AC)
-  Closed MSW Landfill (19.0 AC)
-  Driveway & Storage
-  Aggregate Processing Area (8.3 AC)
-  Existing Tree Line
-  Existing Utilities Right-of-Way
-  Existing Electrical

Aerial Imagery
On-Site 2013
Adjacent Property 2010

EXISTING CONDITIONS

Figure 5. Property Concept Plan



Legend

- Site Boundary (336.8 AC)
- Forest (93.3 AC)
- Savanna (109.1 AC)
- Prairie (107.2 AC)
- Development (21.4 AC)

Aerial Imagery
On-Site 2013
Adjacent Property 2010

Figure 6. Proposed Plant Communities and Management Units

Legend

-  Site Boundary (336.8 AC)
-  Management Unit (Years to Completion)
-  Forest (93.3 AC)
-  Savanna (109.1 AC)
-  Prairie (107.5 AC)
-  Pond (2.9 AC)
-  Wet Meadow (2.5 AC)
-  Development (21.4 AC)

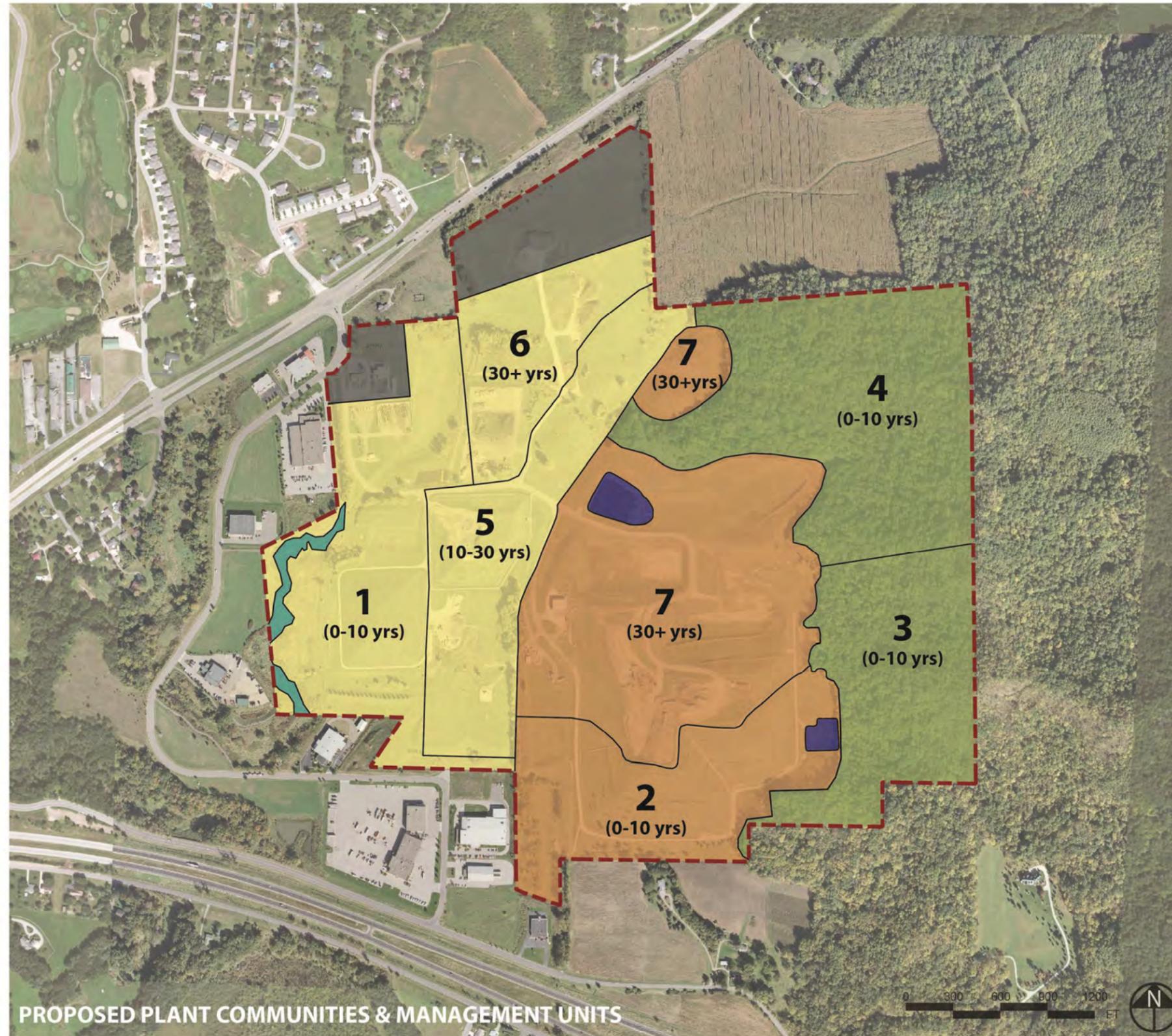
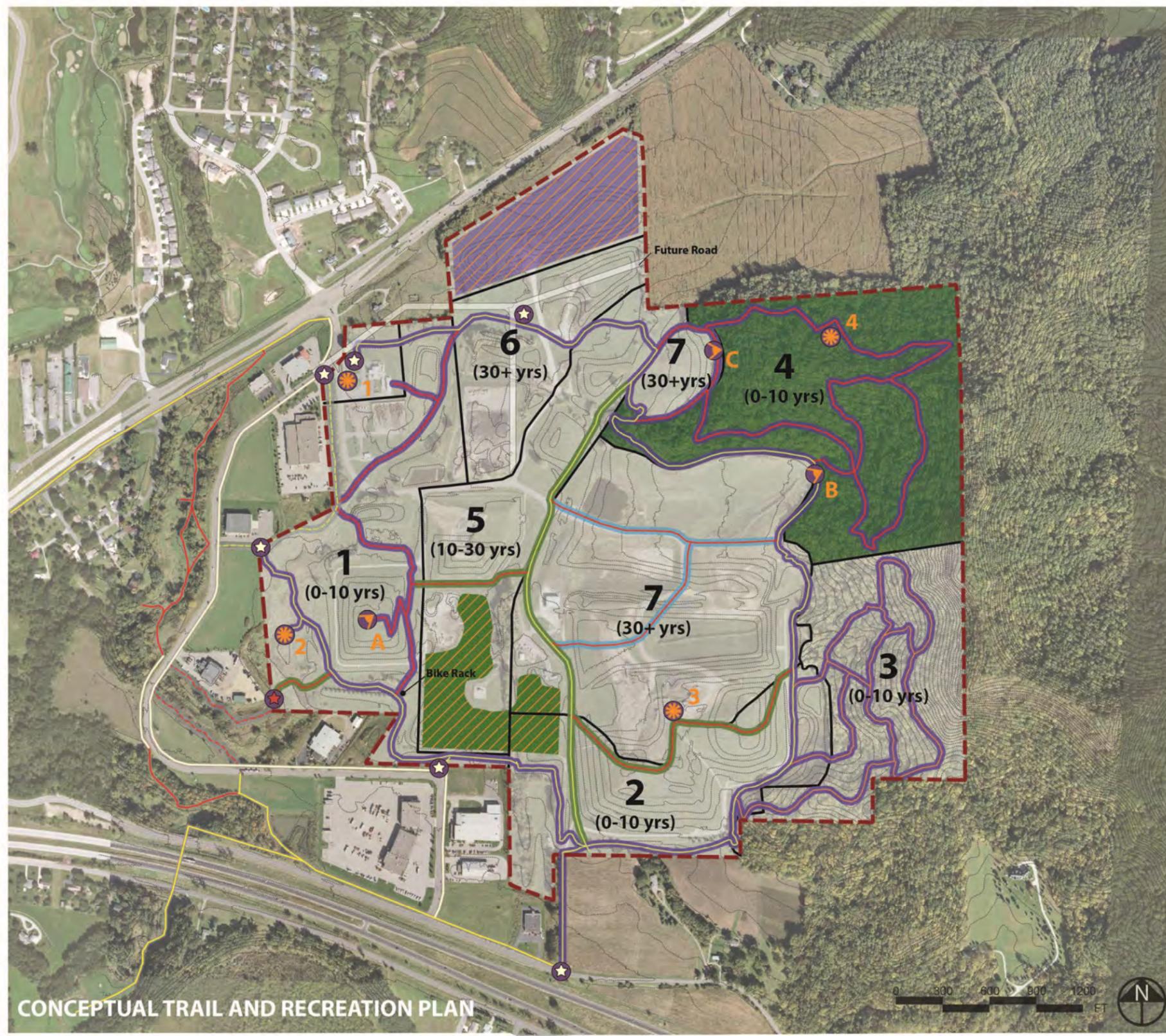


Figure 7. Conceptual Trail and Recreation Plan



Legend

- Site Boundary (336.9 AC)
- Management Unit (Years to Completion)
- Forest Preserve (57.6 AC)
- 10-Ft Contour

Existing Trails:

- Walking Trail
- Multi-use Trail

Proposed Trails:

- Phase 1
 - Mountain Bike Trail
 - Multi-use Trail
 - Walking Trail
 - Potential BMX Park
- Phase 2
 - Walking Trail
 - Multi-use Trail
 - Potential BMX Park
- Phase 3
 - Walking Trail

- City of La Crosse
 - Walking Trail
 - Multi-use Trail
 - Sidewalk

- Waypoints
 - Multi-use Trail Entrance
 - Walking Trail Entrance
 - Interpretive Opportunity
 - Viewshed

Aerial Imagery
On-Site 2013
Adjacent Property 2010

Appendix A

Reviewer Comment Letters and Public Meeting Notes Regarding Draft Conceptual Natural Resource Management Plan and Trail and Recreation Master Plan

1. Alysa Remsburg, PhD, University of Wisconsin – La Crosse
2. Mark Steingraeber, U.S. Fish and Wildlife Service
3. Jerry Den Boer, North American Squirrel Association
4. Kurt Schroeder and Sue Howe, Outdoor Recreation Alliance
5. Public Meeting Notes (June 19, 2015)

UNIVERSITY of WISCONSIN
LA CROSSE

Henry Koch, Director
La Crosse County Solid Waste Department
6500 State Rd 16
La Crosse WI 54601

March 6, 2015

Dear Hank,

Thank you for sharing copies of the Master Land Use Plan, Draft Natural Resource Management Plan, and Environmental Monitoring Plan documents. I congratulate your department on such conscientious visioning for a healthy, community-supported future of the property you manage.

My Ph.D. is in community ecology, so I have experience that is most relevant to the Ecological Monitoring Program. I have conducted long-term forest monitoring such as that described in the document, and I believe it is a useful plan. My only hesitation is whether data collectors can reliably estimate percent canopy cover and percent cover of bare soil and fine fuel in large plots (100 m², section 4.3.1 and first data sheet in the Appendix). I have seen this done on much smaller plots. It is more common to estimate tree dominance by recording tree diameter at breast height (dbh), and I don't think this would add an unreasonable amount of work. The necessary dbh tape measures are commonly owned by natural resource professionals, including the Environmental Studies Program in which I teach at UW-L.

I have conducted frog and dragonfly monitoring as described in the Ecological Monitoring Program, and agree with the protocols outlined. To the list of resources on page 7 (section 4.3.4), I would add the *Color Guide to Common Dragonflies of Wisconsin* (1998) by Karl and Dorothy Legler with Dave Westover, since La Crosse is at the southern edge of the range included in the Mead book listed. I would also suggest that taking photos of dragonflies and damselflies could help with species identification (page 8).

In the Draft Natural Resource Management Plan, I have one very minor suggestion that could help convince readers of ecological restoration's importance. In section 1.2 (or 1.3, which has some overlap, page 3), it could be helpful to add a few more important ecosystem services relevant to this property: pollination, pest control, scenery, and erosion control. I also note that the "Simply defined" explanation of ecological restoration in the middle of page 4 is clearer and more accurate than the way it is defined at the top of page 3, so I would suggest moving this sentence from section 1.5 to page 3, section 1.2.

As an unrelated long-term goal, I would urge you to consider the merits of composting household or industry food waste. As of 2012, 150 communities in the U.S. had such programs, now including the Twin Cities. I look forward to continuing conversations with you.

Sincerely,



Environmental Studies Program
4102 Centennial Hall, University of Wisconsin-La Crosse
1725 State Street, La Crosse, WI 54601
Phone: (608)785-8424
An affirmative action/equal opportunity employer



United States Department of the Interior

FISH AND WILDLIFE SERVICE
 Fish and Wildlife Conservation Office
 555 Lester Avenue
 Onalaska, Wisconsin 54650



IN REPLY REFER TO:
 FWS/La Crosse FWCO

Henry A. Koch, P.E.
 La Crosse County Solid Waste Department
 6500 State Road 16
 La Crosse, WI 54601

13 March 2015

SUBJECT: Landfill Master Use Plan

Dear Mr. Koch,

Thank you for sharing the Master Land Use Plan, Draft Natural Resources Management Plan, and Environmental Monitoring Plan for the La Crosse County Landfill with me and the privilege to comment on these documents.

Although employed by the U.S. Fish and Wildlife Service (Service) as a fishery biologist with greater professional experience in managing aquatic rather than terrestrial environments, I have lived in the La Crosse County for more than 35 years where I have spent considerable personal time and effort to actively restore and maintain a variety of native plant communities (prairie, woodland, and wetland habitats) on private lands. In fact, if I had not pursued a graduate degree in Aquatic Biology at the University of Wisconsin-La Crosse, I may well have pursued studies in Reclamation at the University of Wisconsin-Platteville.

I find the current Master Land Use Plan and Natural Resources Management Plan ecologically sound and well-reasoned frameworks to engage public participation and guide restoration activities at the site for the foreseeable future. Key among these features is the foresight and designed flexibility to integrate alternative adaptive management strategies that may be worthy of consideration based on the results of Environmental Monitoring Plan activities.

Going forward, I might recommend that an efficient and rewarding means to document the long-term success of restoration efforts at the landfill site may be to encourage public participation as *citizen-scientists*. For example, recreational trail system users could be encouraged to record the seasonal abundance and phenology of key plant and animal species from year to year as these taxa repopulate the site. These observations could be entered by the *citizen-scientist* directly into the National Phenology Network-Natures Notebook website (https://www.usanpn.org/natures_notebook) database where this information would also be available to scientists engaged in groundbreaking research, land managers struggling to make

better-informed decisions about natural resources in their care, and decision makers trying to formulate more effective public policy.

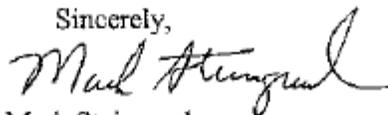
I would particularly like to commend planned habitat restoration efforts at the landfill site which will benefit not only the local population of amphibians (frog, toad, salamander) and insects (butterfly, dragonfly, damselfly), but will also have positive impacts for metapopulations of these taxa at spatial scales that extend far beyond the boundaries of this county-owned property. The Service seeks to prevent declines in the diversity and abundance of these commonly overlooked taxa which serve as keystone indicators of the ecological health and fitness of aquatic and terrestrial environments.

Here in the Midwest Region many Service offices are currently active in the Monarch Joint Venture (MJV), partnering with others across the country to provide habitats that will conserve the continental migration of this charismatic species and benefit many other pollinator species, birds as well as insects (see enclosed MJV information). In La Crosse County for example, the Service's recent acquisition of a 186-acre rural tract on Brice Prairie and its subsequent conversion from agricultural production to prairie has substantially increased the local availability of habitat that is critical for pollinators like the monarch which have been in widespread decline. Meanwhile in Vernon County, the Genoa National Fish Hatchery now has the expertise and resources to begin rearing the federally endangered Hines Emerald dragonfly for reintroduction at sites in its historic Midwestern range. In addition, most Service offices offer environmental education opportunities, particularly geared towards youth, to engage the next generation to be good stewards of the environment. I might also point out that an office like the Upper Mississippi River National Wildlife and Fish Refuge on Brice Prairie has a private lands biologist on its staff (Bill Kiser) who is knowledgeable and experienced in terrestrial/wetland habitat restoration and might provide additional guidance in successfully restoring the landfill site.

My point here is that I believe the Service and La Crosse County share many common interests regarding the planned restoration, management, and ecological monitoring of the county landfill site that can only benefit the people we serve and resources we hold in trust for the public good.

Please do not hesitate to contact me or other members of the Service community if we may be of additional assistance in any phase of the La Crosse County Landfill restoration project.

Sincerely,



Mark Steingraeber
Fishery Biologist

Enc: monarchjointventure.org materials

Cc: Bill Kiser (UMRNWFR-LaX)



April 20, 2015

Nick Nichols
Solid Waste Department
6500 State Road 16
La Crosse, WI 54601

Dear Nick,

Thank you for the opportunity to discuss a future partnership between nasa and the La Crosse County Landfill. We are very excited about working with you in putting together this deer hunt.

As you know, we have done similar hunts with Hixton Forest and Goose Island to help them reduce their deer herd. We have found that not only are we able to get the herd back to a healthy number but also reduce the amount of damage to vegetation and landscaping.

After reading and reviewing your management plan for La Crosse County landfill site we feel that the services nasa would provide would help you reach your herd management goals thus by reducing damage to the vegetation in the area and assist with your community outreach program.

Ultimately this should be a win-win situation for both organizations as we will be able to get disabled individuals outside enjoying the outdoors and also reduce the deer herd situation for you. Also, we need to stress that we have been able to accomplish our hunts in a safe and ethical manner and have found that we are very well received by the general public for the work that we do. At this point, we would like to suggest two separate hunts. The first being an early season hunt held in September for the disabled youth. This hunt would be open to anyone 16 years and younger. The second hunt would be held in December for all adults. Once the herd is at an acceptable level we would recommend an annual hunt to maintain the herd numbers.

We appreciate your interest and look forward to developing a long-term partnership – one which allows the disabled and their care givers to enjoy the outdoors and also maintains a healthy deer herd population for the landfill.

Sincerely,

Jerry Den Boer
608-797-0192
President
North American Squirrel Association



Date: June 18 , 2015

La Crosse County Landfill
Hank Koch,
6500 State Road 16,
La Crosse WI 54601

Re: Landfill Site Master Land Use Plan

Dear Mr. Koch

On behalf of the Outdoor Recreation Alliance of the 7 Rivers Region I am writing to support and provide suggestions on the Landfill Site Master Land Use Plan for the La Crosse County Landfill.

The Seven Rivers Region of the greater La Crosse/ SE Minnesota Area is home to natural terrain, with scenic bluffs and pristine waterways that have created a unique, authentic playground for world-class multi-faceted recreational opportunities. The Outdoor Recreation Alliance aim is to strengthen our community by making it a recognized leader in outdoor recreational opportunities that increases the physical and economic health of our region. **The La Crosse County Master Land use Plan is a unique opportunity to protect, plan and develop the best our landscape has to offer and ensure this area's outdoor recreational resources are healthy and plentiful for all, and for many generations to come.** We applaud the plans foresight in embracing a 'dual' functionality of the site where it not only meets the obvious purpose of a place to dispose of waste as well as creating the open space into a park and recreational haven. This Master plan in addition to the Trails & Recreation plan lay out an impressive process for creating a valuable wildlife habitat within an urban setting that embraces the variety of topographical features: prairies, forest, meadows, and bluffs. Several key points come to mind in ensuring the goals and objectives of the plan are accomplished:

- Creating Off-site green fingers: this section should include any and all known connections such as:
 - connections over Hwy 16 ~ especially when Hwy 16 will re-built in 2016 and include bike/ped facilities
 - Connections from West side of the facility across Hwy 16
 - Under/over pass across the interstate to create connectivity to Gundersen Health Facility and shopping area
 - Route along the La Crosse River connecting to Lake Neshanic

Including these important connectors and others, will allow for greater grant opportunities, policy and ordinance support in terms of working with the Department of Transportation, federal and state obligations and mandates, as well as private donors and foundational support.

- Public involvement in the tasks and objectives: Throughout the plan the importance of public involvement, activities, and buy-in is highlighted, for instance on page 11, "...Involve the public in hands-on design of the park and conversation outcomes. Conduct fundraising and public education activities. Create relationships with neighbors...create several public conservation design planning sessions, create and disseminate communication collateral to inform media, community leaders and the public..." and on page 12, "...continually promote the landfill ecological restoration by establishing a program or event..." page 13, Public acceptance of and support for the conservation design..." as well as all the alternative concepts listed and on page 15 of providing updates every 5 years.

All items require public participation, opinions, engagement, and support. Creating a La Crosse County Landfill Outdoor Recreation Advisory Committee would help to ensure that this involvement occurs. This Advisory Committee could be comprised of representatives from the La Crosse County supervisors and Parks Department, City of La Crosse and Onalaska Parks Departments, and several members from communities neighboring the facility. This advisory committee would oversee the implementation of the Master Plan, coordinate and resolve conflicting issues, and create a consensus on desired outcomes. The advisory Committee would increase the pace, permanence, and quality of this plan.

The La Crosse County Landfill Master Land Use Plan is a great plan; by including the suggestions above it would be even more impressive and add a layer of accountability and sustainability.

The Outdoor Recreation Alliance would be a proud supporter and contributor to this project; we look forward to working on accomplishing this important and worthy cause. We support the Supervisors efforts to reach out to citizens and our communities by enhancing the quality of life in the La Crosse area through collaboration, economic growth, and by making this region "Nature's Place to Play".

See you on the trails!

Kurt Schroeder

Kurt Schroeder

ORA Board President

Sue Howe

Sue Howe

Executive Director

Outdoor Recreation Alliance • 119 N 19th Street • La Crosse WI 54601
608-792-6740 • NaturesPlaceToPlay.com



APPLIED ECOLOGICAL SERVICES

SPECIALISTS IN ECOLOGICAL SCIENCE, RESTORATION, MANAGEMENT, AND RESEARCH
 2193R MUSHTOWN RD • PRIOR LAKE, MN 55372

To: Hank Koch, Director Solid Waste Department, La Crosse County
 From: Kim Chapman, Principal Ecologist, Applied Ecological Services
 Date: June 19, 2015
 Re: La Crosse County Landfill Annual Meeting June 19, 2015 – Public Input on Master Land Use Plan & Draft Conceptual Natural Restoration Management Plan and Trail and Recreation Master Plan

At 1pm over thirty people were present at the landfill annual meeting as Hank Koch and Randy Nedrelo of the Solid Waste Department, with ecologist Kim Chapman of AES, gave an overview of the land use master planning process and plan outcome. Questions and comments were taken during the presentation. This document summarizes those questions and comments and the related discussion.

1. Comment: The whole idea of ecological restoration is problematic because restoration to pre-human conditions, if that is the intent, is not possible as long as people are living in the area.

Response: The purpose of ecological restoration at the landfill is to find a practical solution to the problems of vegetation and vegetation management, with goals of reducing mowing and weed control, increasing the interest of the area to visitors by expanding the number of plant and animal species, engaging people in the care and tending of the restored areas, and building partnerships with people interested in ecological restoration at the landfill.

2. Comment: Will the plan provide details to carry out management—specific tasks, schedules, etc.?

Response: Yes, the plan contains details on tasks, scheduling of tasks, by different management units, as well as general guidance for the entire project area, such as special deer hunts.

3. Comment: What is the reaction of residents from nearby neighborhoods to the ideas in the plan? While generally supporting the ideas in the plan, there was a question about increased visitation due to the expanded trail network and restored landscape.

Response: Most of the adjacent land is or will be commercial and therefore intrusion on residential properties will be automatically constrained. Only in the northeast corner of the landfill is it expected that some residential development may occur. Access to the landfill from that location will, however, be prevented and directed to a trailhead in the north-central portion of the landfill, a potential future site of the transfer station and scale, where trail use can be monitored and controlled.

4. Comment: Did you provide for regional trail connections? What about trail crossing of I-90 and Hwy. 16?

Response: Yes, there are four trail heads to the landfill which align with the future likely locations of the regional trail system. In addition, the City and County collaborated on the integration of City and landfill trails at the west edge of the landfill, allowing movement between the two trail networks. The trail crossing for Hwy. 16 is already determined because the Hwy. 16 road re-design process is completed, with work to begin in the next couple of years. There is a drainageway culvert under I-90 at a feasible location for the trail network, but due to the danger of flooding this location would not be allowable as an underpass without alterations. The other crossing option is to bring the trail to Hwy. 16. A bridge crossing is unlikely due to cost.

www.appliedeco.com

5. Comment: The North American Squirrel Association, an outdoor recreation organization serving physically challenged people, is proposing special deer hunts on the landfill for physically challenged people in the community, and offering to contribute to trail construction that also benefits these individuals.

Response: People were very supportive of increasing access to and use of the landfill. Deer numbers are higher than the landscape can sustain—at other locations with too many deer, excessive grazing and browsing of some groundlayer plants and tree saplings alters the forest composition and structure. Prominent overlooks along the trail network at the landfill should be made accessible.

6. Comment: How will the ecological restoration and trail-building be paid for?

Response: Funding for this work is on a pay-as-you-go basis. Cost savings, new revenue streams, and grants are the main funding mechanisms. Funding from capital and operating budgets are not being tapped, although if restoration and trail-building can be integrated with a necessary project for an incremental cost, that will also be done.

7. Comment: The Outdoor Recreation Alliance commented on improvements to the conceptual trail plan and public input process. ORA submitted a letter with these comments to Hank Koch. ORA also noted that grants are available to assist with trail construction.

Response: Good points were made on trails and public input and will be considered in the revision to the plan.

8. Comment: A member of the Ho-Chunk Nation commented on the proposal to build effigy mounds on the landfill. He emphasized how important it is to strengthen ties between the older and younger generations through projects and activities around culturally relevant symbols and ideas.

Response: Hank Koch agreed and stated that his intent in contacting the Ho-Chunk Nation was to offer the landfill as a space for the Nation to engage in ways that they felt were uplifting to their community. Because that was the intent of this project, the effigy mound idea was supported by the individuals from the Nation whom the landfill contacted.

No other comments were offered. The public presentation and discussion ended at 3:15pm.

Appendix B

Conceptual Natural Resource Management Plan and Trail and Recreation Master Plan Kick-off Meeting (August 14, 2013) – Agenda and Attendees

A G E N D A

Location: La Crosse County Landfill

Date: August 14, 2013

Time: 9am-4pm

La Crosse County Landfill

Draft Conceptual Natural Resource Management Plan (NRMP) & Draft Trail & Recreation Master Plan (TRMP)

Kick-Off Meeting

Purpose of Meeting: *To inform invitees of work completed to date that may influence future planning and management related to the area's natural resources and trails; to solicit additional data and input regarding constraints and opportunities related to natural resources and trails.*

Invitee Sign-In (gather contact information for invitees, including name, organization, phone number, and e-mail)

1. Introductions (9:00-9:05)

Name	Organization	Phone #	E-mail
Henry A. Koch, PE	La Crosse County	(608) 785-9572	Koch.henry@co.la-crosse.wi.us
Brian Kent	SEH	(608) 498-4844	bkent@sehinc.com
Nick Nichols	La Crosse County	(608) 785-9768	nnichols@lacrossecounty.org
Kim Chapman	AES	(651) 341-5980	kim@appliedeco.com
Doug Mensing	AES	(612) 202-2252	dougm@appliedeco.com
Invitees introduce themselves			
Charlie Handy, La Crosse County Planner Amy Peterson, City of La Crosse Bernie Lenz, City of La Crosse Bruce Woods, Woods Studios		Jim Dalton, Bigfoot Forestry Adam Hatfield, Gunderson Lutheran Willie Bitner, Outdoor Recreation Alliance George Arimond, Outdoor Recreation Alliance	

2. Project Overview/Context (9:05-9:15)

a) Past work (provides foundation for moving forward)

2010 Greenways and Natural Areas concept and restoration concept memo	2013 Bruce Wood's assessment of tree planting on the landfill cap
2011 Master Land Use Plan	2012 wetland excavation experiment
2011 Turf Management Plan;	2012 experimental burn
2011 Forest Stewardship Management Plan	2005 County feasibility study and subsequent DNR determination

b) Current work (focus of this meeting)

- Conceptual Natural Resource Management Plan (NRMP) Outline/Overview
 - Existing Procedural & Legal Conditions
 - Property Concept Plan
 - Natural Resource Inventory (NRI)
 - Ecological Restoration Plan
 - Trails & Recreation Plan
 - Sustainability Principles in Operations and Ancillary Facilities
 - Community Education and Involvement
 - NRMP Implementation and Schedule
 - Reporting and Record-Keeping
 - Trail & Recreation Master Plan (TRMP) Overview
 - Based on and integrates with preceding Conceptual NRMP
 - Outcome will be a 20-year plan (conceptual and subject to change)
- c) Future Work
- Listening sessions
 - Plan refinement

3. Opportunities & Constraints Discussion, related to NRMP and TRMP (9:15-10:30)

- a) General topics
- Additional pertinent data, reports, plans, etc. (not listed above)
 - Stewardship vision
 - Good neighbor practices, including surrounding land use (current and future)
 - Coordination regarding
 - timing of entry road relocation and shift of office facility to nature center
 - sedimentation basin and processing pad
 - landfill O&M affecting natural resources
 - recreation activities and locations
 - other planned infrastructure and related improvements in vicinity
 - Targeted plant communities and restoration zones, plans and phasing
 - Long-term management units
- b) Other topics/discussion

4. Site Tour (10:30-12:30) – see figure of priority areas

5. Working Lunch and Subsequent Planning Session (12:30-4:00)

- a) Continue site tour, if warranted
- b) Recap morning session
- c) Continue with opportunities and constraints discussion
- d) Strategies for using steps/publicity as platforms to launch subsequent work
- e) Next steps, responsibilities & deadlines
- f) Schedule next (3-hr) meeting for Sept/Oct

6. Adjourn (4:00)

Appendix C

La Crosse County Solid Waste - Green Tier

The La Crosse County Solid Waste Department became Wisconsin's first publicly-owned solid waste disposal system to join the state's Green Tier program. This program encourages participants to voluntarily collaborate with the Wisconsin Department of Natural Resources (WiDNR) to go beyond compliance with minimum regulatory standards and supports the participant's efforts to engage in superior environmental performance. The Solid Waste Department was recognized for its leadership in diverting waste from the landfill through the waste-to-energy facility at Xcel, the Household Hazardous Materials Program, its numerous other recycling programs, and for collaboration with Gundersen Lutheran to turn landfill gas into energy. The result of these initiatives is that approximately 45% of the waste delivered to the La Crosse County System does not go into the landfill.

Wisconsin's Green Tier program is designed to provide incentives for participants to move beyond environmental compliance to address unregulated problems and restore natural resources. The following description relates to the entry level program.

Green Tier incentives include:

1. Recognition of participation by WiDNR
2. Use of the Green Tier logo and branding
3. Assignment of a specific WiDNR professional as a single point of contact
4. Lowest allowed level of inspection frequency, once an environmental management system (EMS) is in place
5. Deferred enforcement of violations if violations are corrected within 90 days

Green Tier requirements include:

1. A strong environmental compliance record
2. A commitment to a formal EMS
3. Annual performance reviews, with results submitted to WiDNR, usually in the form of an annual report outlining progress toward environmental goals
4. Continual improvement of environmental performance

The advantages of Green Tier to the La Crosse County Solid Waste Department include:

1. Having a unique position in the industry; currently there are no municipal solid waste organizations in the program
2. The ability to use the Green Tier logo and brand
3. Recognition of the efforts by La Crosse County to attain improvements in environmental performance and for its sustainability efforts
4. A single point of contact with the WiDNR gives the participant a person to contact if an issue with any program in the WiDNR arises
5. Formalizing an EMS may be helpful in standardizing our operations and putting the sustainability goals more at the forefront

Appendix D

Native Plant Lists

Forest Enhancement (upland, full shade)

COMMON NAME	SCIENTIFIC NAME	Rate
GRAMINOIDS		(lb/ac)
Hairy woodland brome	<i>Bromus pubescence</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%	2.26
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%	2.38
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 E

La Crosse County Landfill Ecological Monitoring Program

LA CROSSE COUNTY LANDFILL
ECOLOGICAL MONITORING PROGRAM



September 1, 2015



La Crosse Disposal System

A Responsible Resource



**Applied
Ecological
Services, Inc.**

LA CROSSE COUNTY LANDFILL ECOLOGICAL MONITORING PROGRAM

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FIGURES

FIGURE 1. ECOLOGICAL MONITORING LOCATIONS

APPENDICES

APPENDIX A. ECOLOGICAL MONITORING FIELD DATA FORMS

Citation: Applied Ecological Services, Inc. 2015. *Ecological Monitoring Program*. Minneapolis, Minnesota.

1 INTRODUCTION

Over the past several years, the La Crosse County Landfill (Landfill) has been engaged in a process of conservation and end use planning for the active facility and surrounding lands. Ecological restoration has begun at the site and will continue over the coming decades. A significant outcome of planning has been the development of a Conceptual Natural Resource Management Plan and Trail and Recreation Master Plan (NRMP & TRMP, AES 2015). This Ecological Monitoring Program is designed to support the work laid out in the NRMP & TRMP. This document outlines a program to evaluate the progress of restoration and management at the La Crosse County Landfill site, as well as achieve other County goals.

Ecological restoration will take a minimum of 30 years or more. Every 5 years the Landfill Master Plan will be updated, and periodically the NRMP & TRMP will be updated. This Ecological Monitoring Program is designed to guide the first 5 years of work and will need to be revised in the future.

One of the goals of this Ecological Monitoring Program is to establish a baseline and draw general conclusions about the condition of the restorations at the end of five years. There is no near-term goal of using the results and making decisions that change the restoration and management approach. Beyond five years and using the trends emerging from the monitoring data, the NRMP can be altered to improve the outcomes of restoration and management.

2 MONITORING PROGRAM GOALS

Goals for this Ecological Monitoring Program are:

1. Engage and educate local university staff and students and the general public to assist in the ecological monitoring of the environment at the landfill, and recruit, train, and use these partners to control costs to the Landfill;
2. Create a baseline at the end of 5 years and draw general conclusions about the condition of the restorations;
3. Provide meaningful data to assess, at a later date, the progress of ecological restoration and management activities and facilitate adaptive management; and
4. Control the costs of ecological restoration and management by more effectively using local resources to carry out ecological monitoring and to not invest unnecessarily in ecological restoration and monitoring tasks which appear to not be effective.

Data collection and analysis methods are designed to be accessible and implementable by local professors, students, birding enthusiasts, and other non-experts. After the baseline is established, the data will allow County staff to document and track restoration progress, assess success, and identify problems or ineffective treatments that warrant intervention. This approach of public engagement and adaptive management will help control the cost of the monitoring program and ecological management.

3 MONITORING PROGRAM DESIGN

3.1 Site Walkabout

Walkabouts provide a comprehensive overview of the entire site, which is important for overall condition assessment and problem identification. No formal field preparation is required prior to conducting the walkabouts. The walkabout protocol is provided in Section 4.1.

3.2 Biological Data Collection

The focus of this monitoring program is the systematic collection of biological data. While the walkabouts provide an overview of the site, and a bioblitz generates a species list, more detailed and standardized data are required for measuring biological populations in order to assess changes and trends.

3.2.1 Vegetation

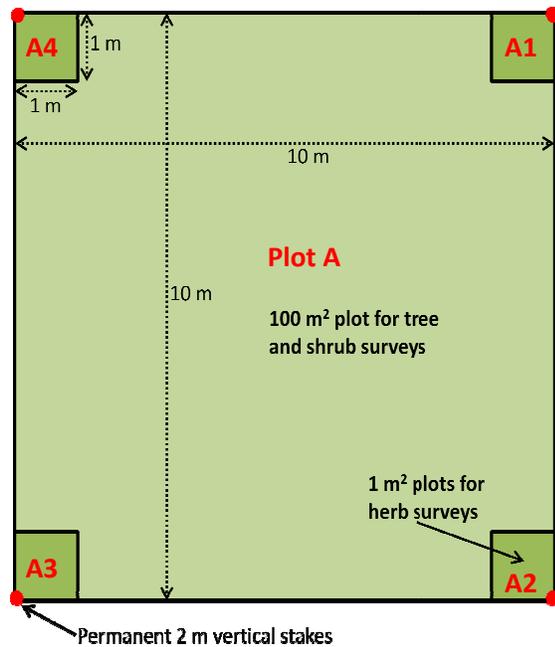
Vegetation is important in monitoring because vegetation is the foundation of most habitats, and establishment of native plant communities is the primary goal of most ecological restoration and management programs. Invasive plant populations are a significant threat to healthy, diverse ecosystems, while other plant species indicate high quality habitat. Therefore, close attention to vegetation is critical to effective ecological monitoring.

Based on the site's existing and proposed plant communities, eight permanent vegetation plots were identified (Figure 1). The use of plots, which are to be resampled in successive years, is standard in biological monitoring programs (McGlinn et al. 2010). The plots (designated as A through H, Figure 1) are distributed across the site's proposed habitat types as follows:

- Forest: 2 plots
- Savanna: 2 plots
- Prairie: 3 plots (including one on landfill cap)
- Wet Meadow: 1 plot

Each plot is a large, delineated, 100 m² square (10m x 10m), with a 1 m² small plot at each corner (Figure 1). Plots are oriented so that plot edges run north-south and east-west. Each small corner plot is identified by the plot letter (e.g., A) followed by a 1, 2, 3, or 4, with 1 representing the northeast corner, and subsequent numbers assigned clockwise (Figure 1). Final plot siting will require field verification. Permanent marking of the plots will entail installation of a durable and visible stake at each corner of each large plot. Stakes should be installed such that 2m remains out of the ground. Flagging, painting, or other visual aid should be used so stakes can be protected during site activities and located during monitoring. The northeast corner of each plot should be surveyed using a sub-meter global positioning system (GPS) in the event that vandalism or other disturbance eliminates the plot markers and requires plot re-establishment. Detailed vegetation monitoring protocols are provided in Section 4.2.

Figure 1. Schematic of vegetation large plot design



3.2.2 Wildlife

Wildlife is important to monitoring because it responds to available habitat (both quantity and quality). Understanding the presence or absence of particular animals can illuminate the ecological health of a landscape. While vegetation is stationary and relatively easy to survey, animals can be more difficult to study. For this reason, four categories of wildlife that are more easily detected were selected for monitoring:

- Birds,
- Frogs and toads,
- Butterflies,
- Dragonflies and damselflies.

Birds are relatively abundant, can usually be identified reliably by non-experts, and can serve as important indicators of habitat quality. Bird surveys will be conducted at the northeast corner stake of each vegetation plot. The plot on top of the closed landfill cap (Plot H, Figure 1) will not be surveyed for birds because little if any bird activity is expected and a bird survey conducted here would overlap significantly with Plot B.

The seven bird survey locations encompass the site's four proposed habitat types, with two locations each in the Forest, Savanna, and Prairie habitats, and one location in the Wet Meadow. Detailed bird monitoring protocols for the seven bird survey locations (A through G) are provided in Section 4.2.

Frogs and toads are also a relatively easy biological group to monitor. Amphibians, in general, are regarded as a group of animals sensitive to environmental changes, making them a useful indicator of habitat quality. Frog and toad surveys will be conducted at four amphibian monitoring points (designated as 1 through 4, Figure 1). These monitoring points were selected due to their proximity to open water

typically present during the frog and toad breeding season (April 15-July 10). Detailed frog and toad monitoring protocols are provided in Section 4.2.

As a source of food for numerous faunal groups and pollinators of plants, insects are a vital component of overall ecosystem health. However, their size and mobility make insect populations difficult to monitor. Only butterflies, dragonflies and damselflies will be included in the monitoring plan. For these relatively conspicuous groups, a count of total individuals and species will be made. Detailed insect monitoring protocols are provided in Section 4.2.

3.2.3. Bioblitz

A “bioblitz” is a tool for inventorying the flora and fauna present at a site. Bioblitzes can be conducted as a one-time survey and provide a snapshot of plants and animals present. This is valuable as a “baseline” inventory of species and a foundation for a monitoring program. Bioblitzes can be repeated, too, but typically lack the rigor of a standardized ecological monitoring program.

In a bioblitz, volunteers document all living species within a given area in a 24-hour period. Bioblitzes help gather baseline data on plants and animals in a specific area, while allowing people to discover the natural world and engage in scientific research accompanied by experts.

A bioblitz occurred at the site in spring 2014. County staff reached out to the local community and collected baseline data. In a typical bioblitz, participants generate species lists by biological group (e.g., plants, butterflies, frogs, birds, mammals). Data are collected largely by non-experts using informal field methods. The bioblitz produces a good baseline of flora and fauna at a site. As more detailed, standardized monitoring data are collected, these can be compared with data from bioblitzes to confirm species presence and absence and, over time, perhaps provide trend data.

4 MONITORING PROTOCOLS

4.1 Field Equipment & Supplies Checklist

Table 1 is a list of field equipment and supplies required or recommended for field monitoring of vegetation and wildlife. Some items are needed for specific surveys.

Table 1. Field Equipment & Supplies Checklist

EQUIPMENT	SUPPLIES	PERSONAL
Camera	Data Sheets (see appendices)	Hat (Sun/Warmth)
Binoculars	Field Log Paper/Notebook	Light/Heavy Gloves
Compass	Pens/Pencils (2)	Raingear
Clipboard	Field Maps	Hiking Boots
Knapsack	Field Guides	Sunscreen
1m x 1m frame (for vegetation sampling)	Camera batteries	Sunglasses
GPS Unit (optional)	First Aid Kit	Insect Repellent
	Bird Call CDs/Tapes	Water Bottle
	Bird Alpha Codes	
	Frog and Toad Call CDs/Tapes	

4.2 Site Walkabout

Twice each year (early summer, early fall), a site-wide walkabout will be conducted by a qualified restoration ecologist. The walkabout will cover each management unit, with special attention given to areas that have experienced recent restoration or management activity. The ecologist will document the success of native seeding and planting using performance criteria included in the planting specifications, regeneration of important plant species, invasive species presence, problems with vegetative cover, and observations of herbivory, erosion, or damaging activities. Photographs will be taken from fixed photo-reference points (Figure 1) to document landscape change over time. Additional anecdotal observations will also be recorded (e.g., erosion features, new plant populations, wildlife).

4.3 Biological Data Collection

The vegetation, bird, and insect monitoring protocols described below may all be carried out on the same day. Since birds are easily disturbed, bird monitoring at a site should be conducted first, followed by insect monitoring, then plants. Not all sample sites include these three data collection procedures (see Figure 1).

4.3.1 Vegetation

Vegetation monitoring will be conducted or supervised by a qualified botanist. Technical taxonomic manuals and layperson-friendly field guides are available to identify vegetation. AES recommends “Newcomb's Wildflower Guide” (Newcomb 1989) for herbaceous plants and “Grasses: An Identification Guide” for grasses (Brown 1992).

Vegetation will be surveyed once a year at each of the eight permanent plots (A through H, Figure 1). There is no best time to conduct vegetation monitoring, but AES recommends it be conducted in July or August when vegetation is substantially developed but identification of spring plants is still possible. A qualified botanist can usually identify all plant species at this time. Vegetation monitoring methods in large plots will be different than in small plots. As mentioned, vegetation monitoring should be performed last in order to avoid disturbing birds and insects that also must be monitored.

Large Plots (100m²). Trees and large shrubs will be surveyed in large Plots A through H. All woody vegetation with diameter at breast height (dbh) ≥1in will be included. One field data form will be completed to record tree and shrub species. This includes all trees and large shrubs with canopies hanging over the large plot. Use the *Vegetation - Tree and Large Shrub Canopy Cover* data form (Appendix A). For each tree or shrub species record the scientific name and estimate the total percent canopy cover (i.e., areal cover or light interception) for each species inside the large plot. Overlapping canopies will result in a total canopy cover in a plot of more than 100%. Also estimate the percent of bare soil (e.g., due to disturbance or erosion) and fine fuel (e.g., grasses, sedges, leaf litter).

Small Plots (1m²). Small plots at each large plot corner (e.g., A1, A2, A3, A4) will be used to estimate the percent cover of herbaceous vegetation and small shrubs (i.e., <1in dbh). A 1m x 1m frame will be placed over the vegetation, taking care not to bend the vegetation into or out of the plot. Record the scientific name of each plant species and estimate the percent the 1m² plot covered by each species. See Appendix A, *Vegetation – Herbaceous Stratum Cover*. Overlapping plants will result in a total aerial cover of more than 100% in a plot.

Photo documentation. Take photos annually at fixed locations, on or about July 31 at approximately 3:00pm. Place a digital camera on top of the southwest corner stake of each large plot, facing the

northeast plot corner. Take two photos: a) a landscape shot with the camera lens parallel to the ground, and b) an oblique shot, with the lens pointing into the center of the small corner plot (e.g., see plot 3; Exhibit 1). Taking repeat photographs will establish a consistent visual record to help document changes in vegetation structure, composition, density, and aesthetics as the restoration progresses.

4.3.2 Birds

Bird monitoring will be conducted or supervised by a qualified birder with comprehensive knowledge of western Wisconsin bird species. Numerous field guides, from technical to layperson-friendly, are applicable to identify the site's bird species. AES recommends the "Peterson Field Guide to Birds of Eastern and Central North America" (Peterson 2010). Additionally, a number of Smartphone applications are available to assist with field identification of birds, including the "Sibley eGuide to Birds" and "iBird Pro." These applications include song recordings for most species. For further reference, the paper, *A Breeding Bird Survey of Myrick Marsh and Hixon Forest* (Fiedler, no date) provides lists of birds using habitats near the Landfill.

Bird monitoring will be conducted in June, during the early summer breeding season. Spring and fall migration surveys could be conducted, but would not be as informative because the presence of passing migrants does not accurately reflect habitat quality as much as breeding birds do.

Bird surveys will be conducted between dawn and 10:00am or until a noticeable drop in bird activity. Surveys should be conducted during weather that promotes bird activity. Steady rain, poor visibility or steady, strong winds over 25mph are not acceptable. Brief periods of rain, light drizzle and gusts up to 30mph are acceptable if birds remain active. Since human movement through the area may disturb the birds, the bird point-count should be completed prior to insect and vegetation data collection.

Bird surveys will use a point-count method centered on the northeast corner stake of each of the vegetation plots, with the exception of Plot H which is not surveyed. Each bird survey area is defined by a 100m radius from its center (Figure 1). The surveyor will arrive at a point and wait five minutes for birds to habituate to the surveyor's presence. While waiting, they can begin filling in the general point and weather information on the data sheet. On the first visit to a point, the surveyor will sketch and label the habitat cover type in the circle on the *Bird Point Count Data Form* (Appendix A). Note the dimensions of the habitat, including distances from the sampling point. Note significant features in the 100m radius area, such as roads, hedgerows, structures, ditches, open water, etc.

The surveyor will document on the data form all bird species seen or heard within the 100m radius of the point during a 10-minute survey period. (If there is reason to believe 10-minute point counts are missing rare bird species, such as Henslow's Sparrow, the count should be extended to 15 minutes.) Record one line of data for each species (individual or group at one general location) using the appropriate American Ornithologist's Union 4-character alpha code for common name (AOU 2012, http://www.birdpop.org/DownloadDocuments/Alpha_codes_eng.pdf). Note the number of individuals of a species for each observation. For the first 3 minutes, record the number of birds observed in the 0-3 min. column. For the next 2 minutes, record the number of birds observed in the 3-5 min. column. For the last 5 minutes record the number of birds in the 5-10 min. column. Record a number in the column, not a tally mark. On the data form, also note bird behavior (see data form codes), direction from point, distance from point (meters), flight direction (if flying), and height (if flying or perched; in meters; 0 if on ground). The Notes column is for recording identifying features of a bird for later identification/confirmation or for clarification or explanation of data.

4.3.3 Frogs & Toads

Frog and toad monitoring will be conducted or supervised by qualified personnel familiar with the calls of species potentially present at the site. In the site's existing Forest, potential frog and toad species are: American toad, Gray treefrog, Spring peeper, and Wood frog. In the sites proposed Savanna and existing Prairie and Wet Meadow, potential frog and toad species are: Cope's gray treefrog, Northern leopard frog, and Western chorus frog. Several field guides, from technical to layperson-friendly, are applicable to the site's frogs and toads. Since breeding calls will only be made by frogs and toads in or near open water, four amphibian monitoring sites were established as follows: 1) north end of Wet Meadow, 2) adjacent to northern sedimentation pond, 3) adjacent to irrigation pond, and 4) adjacent to southeast sedimentation pond, on the edge of the Forest. AES suggests the "Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America" (Collins and Conant 1998). Since the identification of frogs and toads will be based on calls, it is also important to become familiar with each species' unique call. The Wisconsin DNR maintains a website with descriptions and call recordings for each species found in the state (WIDNR 2014).

Frog and toad surveys will be conducted during the late April to early May breeding season. Warm nights with high humidity are ideal for frog and toad surveys. As with bird surveys, frog and toad surveys should be conducted in weather conditions conducive to calling and monitoring.

Frog and toad surveys will use a point-count method conducted at the four amphibian monitoring points (Figure 1). The surveyor will arrive at a point and wait five minutes for amphibians to habituate to the surveyor's presence (while waiting, begin filling in the general point and weather information on the data sheet). On the first visit to a point, sketch and label the habitat cover type in the circle on the *Frog & Toad Point Count Data Form* (Appendix A). Note the dimensions of the habitat, including distances from the sampling point. Note significant features in the 100m radius area, such as roads, hedgerows, structures, ditches, open water, etc.

As with bird surveys, the surveyor will document on the data form all frog and toad species seen or heard within a 100m radius of the point during a 5-minute survey period. (If 5 minute counts are missing rare species known to be present at the Landfill, extend the counts to 10 minutes each.) Record one line of data for each species (individual or group at one general location) using the common name. Note the number of individuals of a species for each observation. For the first 3 minutes, record the number of frogs observed in the 0-3 min. column. For the next 2 minutes, record the number of frogs observed in the 3-5 min. column. Record a number in the column, not a tally mark. On the data form, also note amphibian behavior (see data form codes), direction from point, distance from point (meters), and height (if perched; in meters; 0 if on ground). The Notes column is for recording the identifying features of a frog or toad for later identification/confirmation or for clarification or explanation of data.

4.3.4 Insects

Two insect groups will be monitored: 1) butterflies and 2) dragonflies and damselflies. For each group, the metrics collected will include total species encountered and number of individuals of each species. Since no perennial streams exist on site, dragonfly and damselfly numbers may be low relative to butterfly numbers because dragonflies and damselflies develop as larvae in streambeds and ponds. "Dragonflies of the North Woods" (Mead 2009) describes dragonfly and damselfly species that may be encountered at the site. For butterflies, AES recommends "Butterflies Through Binoculars: the East" (Glassberg 1999).

Since the insects in the monitoring protocol are not likely to be found in forests, transect counts will occur only in Wet Meadow (1 transect), Prairie (2 transects), and Savanna (2 transects), as indicated in Figure 1. Each transect will be 100 meters long, beginning at the northwest stake of a vegetation plot and extending due north. Walk the transect slowly, and when a butterfly, dragonfly, or damselfly is encountered, the observer should stop to document the species or genus, with the aid of binoculars if necessary. (If an expert is conducting the survey, they may use a net to capture the individual. Netting should not be tried without experience as these insects are easily damaged or killed.) The transect should end at the edge of the bird survey area. Since walking along the transect will disturb birds, it is important that the bird point count is completed prior to beginning the insect transect.

4.3.5 Tree Survival

Onalaska requires that the Landfill plant trees in order to create “varied topography and vegetation in the viewshed from City vantage points and homes”. Each year a number of trees are planted and their survivorship documented. Landfill staff submits an annual report documenting a) the number and type of trees planted each year, b) the survivorship of planted trees, c) a list of proposed new tree plantings, and d) a map of tree plantings.

5 DATA MANAGEMENT, ANALYSIS & REPORTING

5.1 Data Management

After each monitoring event, field data forms will be labeled sequentially, scanned and archived as hard copy (e.g., 3-ring binder) and in digital format (e.g., pdf). Pertinent data from the forms will be entered into a spreadsheet and each subsequent year of data will be added to the spreadsheet.

5.2 Data Analysis

This Ecological Monitoring Program will generate data to perform analysis of trends. The cumulatively updated spreadsheet is the basis for comparing monitoring events, statistically analyzing differences among plots, and visualizing trends in graphs of changing species richness and abundance.

5.2.1 Metrics for Trend Detection

Common metrics used to assess habitat quality and measure changes in biological populations, and recommended here, are:

- Plant species cover (amount of ground covered by different plant species)
- Animal abundance (the number of individuals observed);
- Species richness (the number of species present);
- Species frequency (the percentage of plots in which a species is detected among several plots).

These metrics are usually reported by habitat and by group. Habitats in this monitoring plan are Forest, Savanna, Grassland, and Wetland. Groups often used are:

- Native species versus non-native species,
- Trees, shrubs, herbs,
- Indicator species.

Six metrics are recommended (Table 2). The metrics are commonly used measures of condition and can be used to detect trends as a result of restoration work.

Table 2. Metrics for Detection of Trends

Metric	Woody Vegetation (large plots)	Herbaceous Vegetation (small plots)	Birds	Frogs & Toads	Insects	Comment
Plant species cover (amount of vegetation hanging over the ground, by tree, shrub, herb)	X	X	X	X	X	Group by native vs. non-native animals
Animal species abundance (number of individuals per species)	X	X	X	X	X	Group by native vs. non-native animals
Species richness (number of species)	X	X	X	X	X	Plants and animals
Richness and abundance of bird indicator species (see section 5.2.2 below)	X	X	X	X	X	Other indicators may be added later
Species frequency (the percentage of plots in which a species is seen among several plots)		X				Plants and animals. N = 8 (4 small plots x 2 large plots per habitat type) except wetland (n = 4)
Bare soil/erosion (percent cover)	X					
Fine fuel/litter (percent cover)	X					

5.2.2 Indicator Species

Indicator species give an indication of the condition of habitat by their presence. They typically are neither rare nor common, but just common enough to be attracted to habitat if conditions are right. The more indicator species present, by inference the better the habitat condition. They are used as proxies for ecosystem health and can make monitoring easier because fewer species are being investigated. For this monitoring program, indicator bird species are proposed for each habitat type at the La Crosse County Landfill (Table 3). The occurrence of these species on the site would suggest moderate to high-quality habitat conditions.

The indicator species concept can be applied to other animals and plants as well. For example, the Wisconsin Floristic Quality Index (WIDNR no date) is used to grade entire sites on the basis of whether many or few native plant species sensitive to disturbance are present. This monitoring program does not include other indicator species, but those can be developed later as the program matures.

Table 3. Bird Species Indicating Good Habitat Conditions (data from Chapman 2001)

Wet Meadow	Prairie	Savanna	Forest
None identified	Eastern Meadowlark	Eastern Bluebird	Black-and-white Warbler
	Grasshopper Sparrow	Eastern Kingbird	Eastern Wood-pewee
	Tree Swallow	Eastern Phoebe	Red-eyed Vireo
	Field Sparrow	Indigo Bunting	Yellow-throated Vireo
	Vesper Sparrow	Blue-winged Warbler	Ovenbird
		Golden-winged Warbler	Least Flycatcher
		Blue-gray Gnatcatcher	Scarlet Tanager
		Chestnut-sided Warbler	
		Lark Sparrow	

5.2.3 Monitoring Opportunities for Future Consideration

Raptor Migration. Monitoring Plot H (Figure 1) is located on top of a closed landfill cell. While not used for bird surveys on the site, this location has a clear view of the Mississippi River Valley (approximately 3 miles west). Since the river valley is an important migratory flyway, this monitoring point may be well suited for monitoring raptor migration. The Hawk Migration Association of North America (HMANA, <http://www.hmana.org/>) maintains a number of sites across the continent where official counts are taken every year during one or both of the raptor migration seasons (spring and/or fall). Currently, nearby HMANA sites include Eagle Valley, WI (spring and fall counts) and Mankato, MN (fall counts only). To strengthen its reputation as an important destination for birding and nature enthusiasts, the County may consider contacting HMANA about initiating official raptor migration counts at the site.

Soils. AES expects that the conversion of the site’s old fields to native prairie will result in changes to a number of soil parameters. Infiltration rates and soil carbon sequestration will likely increase because native graminoids have much deeper and more extensive root systems than non-natives, such as smooth brome grass (*Bromus inermis*). Nutrient availability and soil microbial communities are also likely to change as litter inputs and other species-specific characteristics shift with plant composition. Reaching

out to ecosystem ecology or soil science professors at local colleges may spark interest in monitoring the soil parameters vital to ecosystem health and function.

5.3 Reporting & Decision-Making

A baseline monitoring report should be prepared after collecting the first year's data. Data from the bioblitz should be included in the baseline report. A monitoring report provides a summary of "baseline" conditions prior to significant ecological restoration on the site. Analysis of baseline data will illustrate the biological richness of the site by habitat or other category. After the first year's monitoring is completed, the monitoring program should be assessed and modifications made as needed. For example, the bird indicator species may need to be revised.

Monitoring data can be used to detect trends in natural resource condition, in comparison to a baseline. Trends can be positive, negative or neutral in relation to the baseline. Negative trends may indicate that the restoration and management approach should be changed. Negative trends include:

- Declining native plant species richness or diversity,
- Declining cover of native plant species,
- Increasing cover of non-native and invasive plant species,
- Failure to attract indicator animal species,
- No increase in insect richness or diversity.

Sometimes negative trends are caused by natural phenomena, such as drought or wet years. Sometimes a catastrophe, such as tornado or disease, affects plant and animal species, producing a temporary negative trend. Due to this natural variability, five years of monitoring are recommended before trends can be considered real.

Baseline conditions are established in the first year's monitoring report, which reports on vegetation, birds, frogs and toads, insects, planted trees, and bioblitz results. To detect trends, several years of data are compared to data in the baseline conditions report. A simple visual inspection, or more rigorous regression analysis, can determine whether a trend is positive, negative or neutral (no significant change). Of course, an ever-increasing number may actually be a negative trend—invasive plant cover, for example, should increase with a program of ecological restoration.

Trend data can be used to decide whether to change a restoration technique. A decision about restoration technique based on trend data should not, however, be made lightly. The cause may be natural variability, for instance. Rather, trend data merely give notice that something should be looked at more carefully. Investigating negative trends is a normal part of implementing a restoration plan and within the adaptive management cycle. Establishing a target condition is also not useful in many restorations, except to ensure that the initial establishment of a planting has occurred as intended. Achieving a certain percent native cover, for example, is expected by the third year after planting and is usually provided as a performance standard for a native planting.

In highly disturbed sites, like landfills and mines, setting a target is challenging and not advised because

- achieving conditions like those in a natural area will not occur,
- it is difficult to anticipate the level of recovery that will occur,
- It leads to disappointment when the target is not achieved in a short period of time.

6 SUMMARY

Implementation of this Ecological Monitoring Program at the La Crosse County Landfill will engage and educate the local community, guide future restoration and management efforts, and protect investments made to improve the site's natural resources. This Monitoring Program document will help the County prepare and train for implementing the program, collect data, and properly analyze and interpret the data, so that useful information can be incorporated into the Landfill's Master Land Use Plan and Natural Resources Management Plan. Guidance for implementing a monitoring program is provided here, along with recommendations for using the results of the program to detect natural resource trends and improve the restoration and management program.

7 REFERENCES

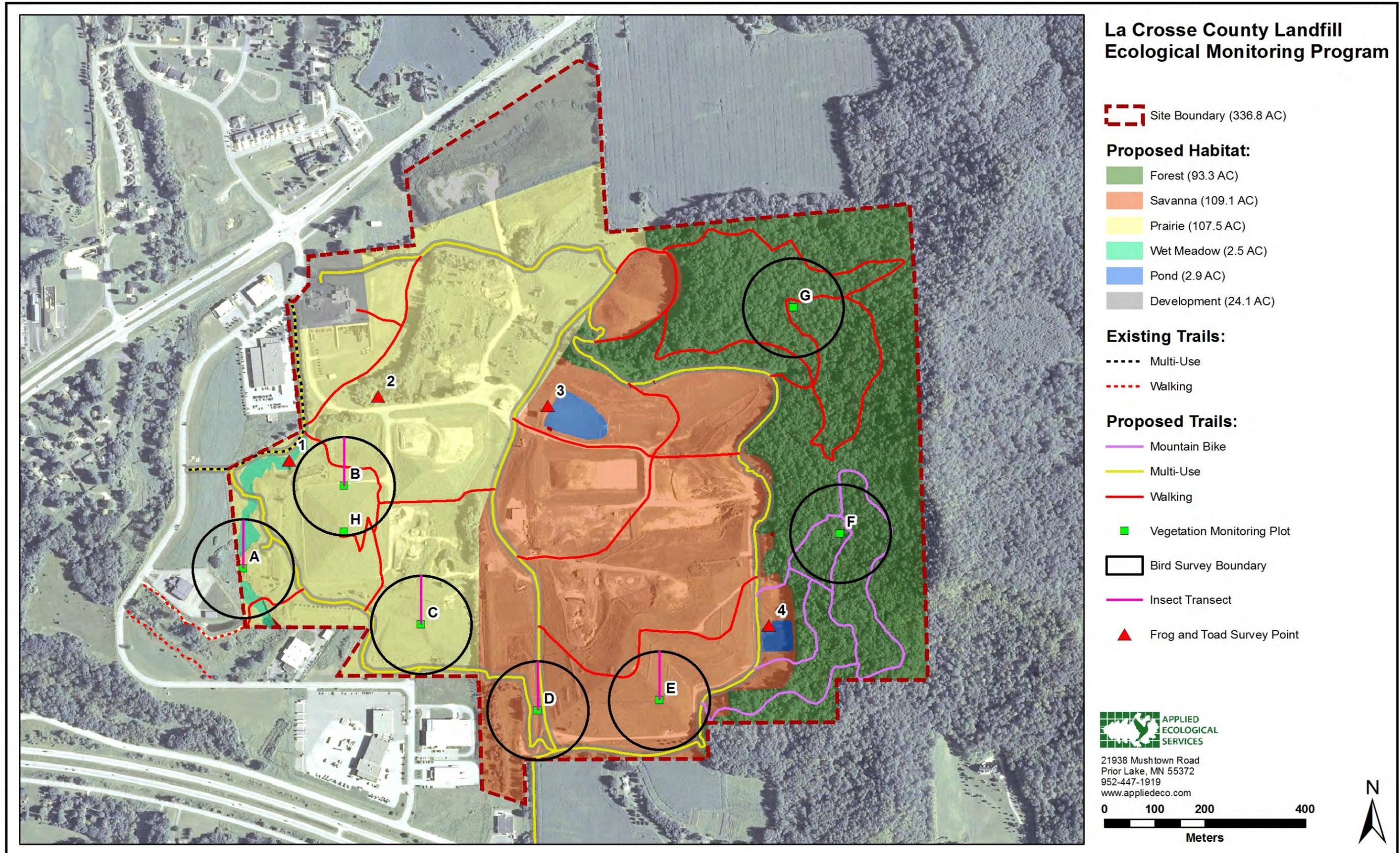
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Figure 1. Ecological Monitoring Locations



Appendix A

Ecological Monitoring Field Data Forms

FROG & TOAD POINT COUNT DATA FORM

La Crosse County Landfill
Project Name

Sample Point ID

X coordinate, Y coordinate (optional)

Date

Start Time (24 hr format)

Stop Time

Observer

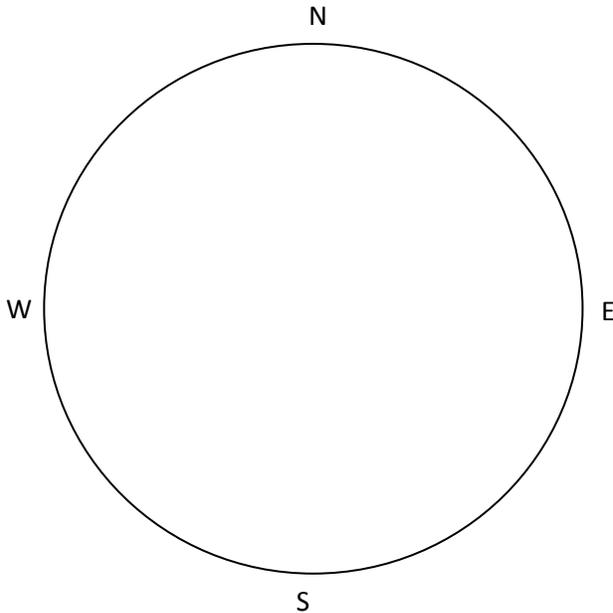
Wind Speed

Wind Dir.

Sky

Temp

Dominant (>50%) AES Habitat Type



Other Habitats _____

Wind	Sky	AES Habitat Type
0 = none	0 = <10% clouds	Developed
1 = 1-3mph	1 = partly cloudy	Cropland
2 = 4-7 mph	2 = mostly cloudy	Barren Land
3 = 8-12 mph	3 = overcast	Grassland
4 = 13-18 mph	4 = rain	Upland Shrub-Scrub
5 = 19-24mph	5 = fog	Upland Broadleaf Forest
6 > 24 mph		Upland Coniferous Forest
Behavior		Upland Mixed Forest
H = Heard, not seen		Wetland Forested
P = Perched, on water or on ground		Wetland Shrub-Scrub
O = other (describe)		Wetland Emergent
		Open Water

Notes:

Circle radius = 100m

	Species	Behav. Code	Dir. from Point	Dist. from Point (m)	Flight Dir.	Ht. (m)	0-3 min	3-5 min	5-10 min			Notes
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												

Appendix F

La Crosse County Solid Waste Department's 2013 & 2014 Tours and Presentations

2013 Tours					
Name of Group/ Organization	Date	Details/Notes	# of Guests	Who gave tour?	What area toured?
National Audubon society	01/08/13	Scott Martin from Burns and McDonald	1	Nick	Landfill Complex, G2e
UWL	01/12/13	Sean Henniman and other scout leaders	6	Nick	Landfill Complex
UWL	02/14/13	Scott Lee 2X classes	52	Nick/Randy	HHM and Landfill
UWL	02/27/13	Jeff Muse 2X Classes	60	Randy	HHM and Landfill
WI DOT	03/07/13	John Mueller	2	Hank	2013 proposed burn area
Ho Chunk	03/13/13	Taryn Greendeer	2	Nick	Landfill
Brookwood HS	04/04/13	John Hanson	15	Randy	HHM
UWL	04/04/13	Buzz Bocher's environmental studies class	17	Nick	my place
Boy Scouts	04/05/13	Aaron Craig details for Camporee	2	Nick	Landfill
UW La Crosse soils students	04/22/13	Professor Ryan Perroy	14	Hank	Landfill
Chris Schneider Honda Motorwerks	04/22/13	3 vans of people to tour G2e	17	Nick/Hank/Jadd/Paul	G2e
Boy Scout Camporee	05/03/13	120 Scouts 40 Leaders Education and service projects	160	Nick, Hank, Paul, Jadd, Randy and others	Landfill, HHM, G2E, Woods
American Public Works Assoc.	05/10/13	Public works directors and engineers	30	Hank	G2E presentation
Cub Scouts	05/11/13	Clean up conservation project at front entrance and along walking trail	30	Hank and Mel, Jadd	Walking trail and front entrance
Luther High School	05/03/13	physical science field trip 2 classes	52	Nick/Randy	HHM and Landfill
Western Technical College	4/30/2013	Michaeleen Bonner instructor	9	Nick	my place
Ted Peck	6/7/2013	Fishing Guide	1	Hank	Landfill
Legacy Communities	6/24/2013	Quarterly meeting with presentation	3	Hank	Landfill
Mayor Joe Chilsen, Onalaska	6/26/2013	General tour. Mayor stated, "This was well worth my time!"	1	Hank	Landfill complex
Mayor Tim Kabat and 6 council members	30-Jul	presentation and lunch then tour of landfill	9	Hank/Nick drove the van	landfill complex
Dave Clements tour	8-Aug	presentation and tour of the landfill along with Jeremiah and Michelle from Dave's office	3	Hank /Nick	Landfill complex and trails
Representative Chris Danou	12-Aug	presentation and tour of the landfill	1	Hank	landfill complex
Cole Lewis potential intern	5-Sep	Tours	1	Nick	landfill complex
Bolivians	11-Sep	Brian and Mark from SEH and two people from Bolivia, one a civil engineer	4	Hank	G2e and landfill
Harter's Employees	7-Oct	General tour of landfill	3	Hank	Landfill
Viterbo, environmental Science class	1-Oct	HHM and landfill tour with Angela Smith three tours throughout the day	37	Randy/Nick	HHM/Landfill
Western Technical College	3-Oct	Michaeleen Bonner instructor	13	Nick	my place
UWL	7-Oct	Jeff Muse 2X Classes	61	Randy/Kirk/Nick	HHM/Landfill
Western Technical College	7-Oct	Michaeleen Bonner instructor	6	Nick	Landfill complex
Pat Bellacero - WXOW	16-Oct	tour after sales visit	1	Randy	Landfill
Kari Reyburn Western tech	5-Nov	Community outreach coordinator, staff and students	7	Hank	Landfill complex

2013 Tours					
UWL	6-Nov	Alysa Remsberg and class	28	Randy/Nick	HHM and Landfill
UWL	7-Nov	Alysa Remsberg and 2 classes	59	Randy/Nick	HHM and Landfill
Barb Strohm and friends	11-Nov	LOLITS	5	Nick	Landfill and trails
UWL	14-Nov	Scott Lee 2X classes	56	Randy/Nick	HHM and Landfill
Total Guests:			768		

2013 Presentations					
Name of Group/Organization	Date	Presentation Title	Details/Notes	Approximate Number Attending	Presenter
LMOP	01/31/13	G2e with Gundersen	EPA award ceremony on 30 Jan	60	Nick
Madison presentation	02/27/13	Innovative public private partnerships in waste reduction	with George Dreckman, City of Madison recycling coordinator	48	Nick
Sustainability Forum in Madison	03/07/13	engaging change our food, our energy, our world	Dr. Craig Benson, panel discussion	78	Nick
Viterbo environmental class	03/15/13	Systems thinking and change management	Kelly Nowicki, instructor	7	Nick
UWL	04/02/13	Sustainability in La Crosse	Buzz Bocher instructor, environmental studies class	19	Nick
Summit Environmental School	05/06/13	Sustainability in La Crosse	Dirk Hunter Principal and sustainability committee	7	Nick
Towns Association	05/29/13	La Crosse County Solid Waste System	Requested after annual meeting	20	Hank
Boy Scouts of America	06/21/13	Check Presentation	From Camporee cleanup and Scrap a Thon	100	Hank
Master Class at Viterbo on Servant Leadership	06/23/13	Environmental Stewardship through Community Service	Richard Kyte, professor	11	Hank
Legacy Communities	06/24/13	Environmental Stewardship through Community Partnerships	Quarterly meeting with tour of landfill	15	Hank
report on sustainability to County Board	05/06/13	Sustainability in 2012	Annual report	40	Nick
presentation of picture to County Board on G2e project	06/10/13	G2e project of the year	framed poster for County board room	40	Nick
Retired teachers of WI. La Crosse chapter	07/08/13	sustainability	overview of system and its local impact	13	Nick
1490 AM with bob Schmidt	10/04/13	HHM reuse/sustainability	overview of system and its local impact	Radio	Nick
Logan Middle School	10/08/13	Sustainability in La Crosse County	overview of sustainability efforts, Xcel energy, and the gas to energy system	73	Nick
1490 AM with bob Schmidt	10/21/13	Pharmaceutical Drop Off 10/26/13	discuss upcoming event	Radio	Randy
1410 Mike Hayes	10/23/13	Pharmaceutical Drop Off 10/26/14	discuss upcoming event	Radio	Randy
Viterbo University	10/15/13	Leadership at Noon	Sustainability and Servant Leadership with the Solid Waste Department	60	Hank
Town's Association	11/21/13	Update on Landfill and Ag Bag disposal	how can we help the Town's provide better service	19	Nick

2013 Presentations					
UWL	12/10/13	Our Landfill as a Living Lab	How can the La Crosse landfill serve as a laboratory and research center to the community	75	Hank
Wisconsin Sustainable Business Council Conf.	12/13/13	Environmental Management Systems	Value of and how to develop an EMS	45	Randy
Count of Presentations:	21		Total Attending:	730	

2014 Tours						
Date	Day of Week	Name of Group/Organization	Details/Notes	# of Guests	Who Gave Tour?	What Area Toured?
01/04/14	Sat	Boy Scouts 11 am - 12 pm	Recycling Tour	7	Hank	Processing Pad/Landfill
02/04/14	Tues	Viterbo	Janet Holter	9	Randy/Nick	HHM/Landfill
02/13/14	Thurs	UWL Environmental Studies	Scott Lee	56	Kirk/Nick	HHM/Landfill
03/06/14	Thurs	Brookwood High School	John Hanson	5	Kirk/Nick	HHM/Landfill
04/09/14	Wed	UWL Environmental Studies Class	Richard Frost	31	Randy	HHM/Landfill
04/10/14	Thurs	UWL Environmental Studies Class	Alysa Remsberg	87	Randy/Nick	HHM/Landfill
04/23/14	Wed	Coulee Montessori Adolescent Program tour	Gina Meinertz	11	Randy/Nick	HHM/Landfill
04/24/14	Thurs	Jasper Duberry, Videographer for Bioblitz	Jasper	1	Nick	Landfill
05/01/14	Thurs	Luther H.S. Physical Sciences classes	Joel Babinec	70	Randy/Nick	HHM/Landfill
05/05/14	Mon	Onalaska 7th Graders	Megan Sacia	200	Randy/Nick	HHM/Landfill
05/09/14	Friday	Lincoln Middle School	Brian Olson	105	Randy/Nick	HHM/Landfill
05/15/14	Thurs	DNR Sustainability and Business Support	Laurel Sukup	13	Hank	Landfill
06/05/14	Thurs	Sherry Kneifl and Reena	Exchange students	3	Nick	Landfill
06/16/14	Mon	Onaventure HS	enrichment class tour	11	Randy/Nick	HHM/Landfill
07/09/14	Wed	Boy Scout Group from Camp Decorah	Aaron Craig	32	Randy/Nick	HHM/Landfill
07/16/14	Wed	Boy Scout Group from Camp Decorah	Aaron Craig	15	Randy	HHM/Landfill
07/23/14	Wed	Ho Chunk Tour	Jessica Johnson	7	Randy/Nick	HHM/Landfill
07/29/14	Tues	Tribune	Allison Geyer	1	Nick	Landfill
07/31/14	Thurs	Outdoor Recreation Alliance	Sue Howe	4	Nick/Hank	Landfill
08/01/14	Friday	WisCorps	Willie Bittner	10	Nick	Landfill
08/26/14	Tues	Bill Carter Prairie Moon Nursery	Bill	1	Nick/Hank	Landfill
09/18/14	Thurs	City of Onalaska	Dave Lein	1	Nick/Hank	Landfill
09/30/14	Tues	Viterbo Tours (2)	Jennifer Thogmartin	38	Randy/Nick	HHM/Landfill
10/02/14	Thurs	Gregg C from SHE	Gregg	1	Nick	Landfill
10/06/14	Mon	Learning in Retirement	Phyllis Stevens	42	Randy/Nick	HHM/Landfill
10/07/14	Tues	UWL Environmental Studies	Alysa Remsberg	74	Randy/Nick	HHM/Landfill
10/09/14	Thurs	UWL Environmental Studies	Shannon Amsberg	26	Randy/Nick	HHM/Landfill
10/13/14	Mon	UWL Environmental Studies	Shannon Amsberg	55	Randy/Nick	HHM/Landfill
10/20/14	Mon	Cub Scout Tour	Catherine Wright	14	Randy/Nick	HHM/Landfill
10/22/14	Wed	Western Teck Building Trades	Jon Burman	15	Nick/Paul	Gas to Energy
11/11/14	Tues	Onalaska Business Association	Community Business Personnel	40	Hank	Dept Business Activities

12/09/14	Tues	La Crosse Co. Health and HS Board	Medication Collection	15	Randy	Presentation
10/24/15	Friday	WXOW	Caroline (Reporter)	1	Nick	Landfill
10/27/15	Mon	UWL	Danielle Koestler	3	Nick	Landfill
10/30/15	Thurs	UW Extension	Steve Huntzinger	1	Hank/Nick	Landfill
11/04/15	Tues	John Hickey	former employee	1	Nick	Landfill
11/08/15	Sat	CAP Rocket Launch	Linda Zimmerman	19	Nick	Landfill
11/13/15	Thurs	Scott Latos	Thrive	1	Nick	Landfill
11/14/15	Friday	ORA Tour	Marvin Wanders	3	Hank	Landfill
11/19/15	Wed	Children's Museum	Christina Knudson	1	Nick	Landfill
			Total Guests:	1030		

2014 Presentations					
Name of Group/ Organization	Date	Presentation Title	Details/Notes	Apprx. # Att.	Pres.
WDNR	01/08/14	Annual Mtg. with WDNR	Review 2013 and discuss upcoming events in 2014	3	Hank
Boy Scouts	02/01/14	Sustainability Merit Badge	Nick and Randy taught the Sustainability Merit badge for the council merit badge day	16	Nick, Randy
Houston County Board	02/25/14	Lax Co. Sustainability initiatives	Nick presented to the board the report given to the Lax Co board in May of 2013 and highlighted the Solid Waste departments partnership with Houston County	19	Nick
Viterbo Residential Assistants group	03/23/14	Sustainability in La Crosse Cnty and what you can do at home	Nick presented to the RA group on a Sunday night during the groups regular monthly meeting	26	Nick
UWL Environmental Studies Class	04/01/14	Sustainability in La Crosse Cnty and what you can do at home	Nick presented to a class at owl Centennial Hall	16	Nick
Environmental Awareness Day	04/11/14	HHM, safe handling of household hazardous materials	4th and 5th grade students at Bluff View Elementary PDC; the day before the Clean Sweep	170	Randy
WPR local	04/14/14	Bioblitz	Cole, Christa, and Nick gave a half hour interview on the Bioblitz	4	Nick, Cole, Christa
WKBT Interview	04/14/14	Bioblitz	Christa and Nick were interviewed on WKBT about the upcoming Bioblitz	3	Nick, Christa
WIZM AM Interview	04/21/14	Renewable Energy and Energy Efficiency	Nick talked about sustainability on Earth Day and what the County is doing	Radio	Nick, Mitch
WXOW Interview	04/24/14	Medication Drop-Off	Medication Drop-Off	TV	Randy
WKTY	04/22/14	HHM, safe handling of household hazardous materials	Mike Kearns live radio show at landfill	Radio	Randy
WIZM AM, KCLH, KQYB	04/02/14	HHM, safe handling of household hazardous materials	Live radio show at HHM 3 stations	Radio	Randy
WLFN	04/22/14	Medication Drop-Off	Interview on BS with Bob Schmidt	Radio	Randy
WLFN	04/29/14	HHM, safe handling of household hazardous materials	Interview on BS with Bob Schmidt	Radio	Randy
Wabasha County Board	05/06/14	The value of the La Crosse Solid Waste System	Power point presentation on history, goals and values to stakeholder of LAX SW system	20	Hank
Pac 91 Cub Scouts	05/17/14	Work and Learn	Tour of HHM by Randy, installed fertilizer spikes at planted trees on landfill, power point presentation on landfill, pizza lunch	20	Hank
WLFN	05/06/14	Landfill Construction	Interview on BS with Bob Schmidt	Radio	Nick
WLFN	05/13/14	Bioblitz and Cell Construction	Interview on BS with Bob Schmidt	Radio	Nick
WLFN	05/20/14	Citizens Area	Interview on BS with Bob Schmidt	Radio	Nick
WLFN	05/27/14	HHM reuse, adopt a hwy, landfill life, landuse plan	Interview on BS with Bob Schmidt	Radio	Nick
WLFN	06/03/14	Scrapathon, Collaboration	Interview on BS with Bob Schmidt	Radio	Nick
WLFN	06/10/14	Pedestrian Bridge, HHM Reuse	Interview on BS with Bob Schmidt	Radio	Nick

WLFN	06/17/14	New Cell Construction	Interview on BS with Bob Schmidt	Radio	Nick
WLFN	06/24/14	Safe handling of haz. waste	Interview on BS with Bob Schmidt	Radio	Randy
Komptech Demo	05/20/14	Demo of age bag and wood waste grinding	County Board members, Xcel Energy staff and St Joe's employees	13	Komptech
Annual Meeting	06/27/14	Customer Appreciation	County Board members, Xcel energy staff and Stakeholders	70	Hank, SEH, Xcel Energy
Logan Middle School	10/01/14	Sustainability and You	5 classes of 8th grade students, 3 presentations	109	Nick
Honda Motorwerks	10/17/14	Gas to Energy	National Alternative Fuels Day	66	Nick
Count of Presentations:	28		Total Attending:	555	

Appendix G

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 La Crosse County Landfill.

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 arborescence</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>Meililotus 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 H.

Appendix H

Native Woody Plant Recommendations for Landfill 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 Landfill, 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 chrysoarpa</i>	Short Tree
Large-thorned Hawthorn	<i>Crataegus macroantha</i>	Short Tree
Bush Honeysuckle	<i>Diervilla lonicera</i>	Shrub
Witch Hazel	<i>Hamamelis virginiana</i>	Shrub
Winterberry	<i>Ilex verticillata</i>	Shrub
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