

City Engineering Storm Water Utility
Storm Drainage and Environmental Corridors
(Greenway Channels, Basins, and their Edges)
Land Management Policy

PURPOSE

The City of Madison Storm Water Utility is responsible for the design, construction, operation, and maintenance of the City's storm water drainage and conveyance system. Storm water management functions often occur within a system of connected environmental corridors that include significant acreage beyond the storm flow areas. The purpose of this plan is to define the different types of land cover present in the storm drainage and environmental corridors, and create a framework of management practices and goals for each land cover type.

This policy is designed to ensure that these systems perform their primary function of storm water drainage and conveyance while improving both the water quality and habitat function of the systems. In this document we will refer to the storm drainage and environmental corridors, their immediate edges and side slopes as greenway channels and basins. Basin types include retention, detention and infiltration.

BACKGROUND

Stormwater Management History

In Madison's early years storm water was all piped directly to wetlands and waterways. In the 1960s open drainage ways became the preferred treatment wherever possible. Well-designed greenways were constructed, seeded with turf grass and mowed to create park like areas.

As Madison expanded, detention and retention ponds, raingardens and a greater focus on infiltration were added for stormwater management. Greater protection of wetlands and environmental features also led to more acreage being included in the greenways, and expanding their function to be multipurpose environmental corridors. The challenge today is to manage approximately 1500 acres for multiple environmental benefits in addition to storm water conveyance.

To accomplish the land management maintenance goals for the areas outlined in this plan, Engineering will, whenever feasible, follow established Integrated Pest Management strategies. A combination of Engineering employees, contractors and volunteers will be used to accomplish both routine and special project based land management maintenance. Funding for these efforts will come through city budget allocations and grants. Volunteer labor is important for maintaining in a cost-effective manner.

Creation of a land management policy and maintenance goals will provide direction for staff and volunteer initiated projects. This policy will be used to inform alders, friends groups, neighborhood associations, board and commission members as well as potential volunteers on what types of efforts we are undertaking. Notably, lands designated as Landfills and Athletic Fields have not been included in this plan due to the specialized functionality requirement along

with different types of maintenance and training of staff coupled with the larger scale project work often associated with these land uses.

Engineering acreage has been broken into seven broad land categories, each with more defined subsets and specific goals, maintenance practices and responsibilities. Each greenway channel and basin is being mapped to define these area types through the ongoing efforts of both volunteers and Engineering staff.

OVERVIEW OF LAND CATEGORIES AND MAINTENANCE

City drainage and environmental corridors are typically maintained operationally by mowing, sediment removal. Capital projects are scheduled and funded when the work required includes re-grading channels, restoring eroding channel banks, seeding and erosion matting exposed soils. Land categories include: prairie and meadows (mowed and unmowed), newly seeded prairie, and accessible riprap and concrete channels, wooded, wetland, steep sloped, and un-engineered.

GOALS

The short term goal is to keep all constructed channels and basins functioning well under current circumstances. We typically want these areas to be stable (not eroding) and to have grassy/herbaceous vegetation because that type of root system provides more soil stability than shaded woodland vegetation.

The long term goal is to restore a greater percentage of the system to native prairie vegetation. Engineering shall budget for one restoration project annually. The project will be chosen by Engineering based on a number of factors including public acceptance, site suitability, and contiguous native system opportunities.

Broad goals for management of these drainage environmental corridors include:

- 1-Ability to perform primary function of stormwater drainage and conveyance
- 2- Improve water quality by minimizing erosion and maximizing infiltration.
- 2-Eliminate or reduce invasive species and other weeds.
- 3-Provide habitat for pollinators and other wildlife.
- 4-Establish and maintain stable vegetation that requires minimal mowing or other maintenance.
5. Create a sense of place for our local community

GREENWAY CHANNEL AND SIDE SLOPE ASSESSMENT AND RATING SYSTEM (STRUCTURAL)

All City of Madison greenway channels and greenway side slopes will be assessed by Engineering staff by the end of 2017. After 2017, they will be in a rotation to be re-assessed by Engineering staff every 5 years to check for functioning issues such as eroding side slopes, sediment build up, and volunteer trees growing in the channel. At each assessment, the channel and its side slopes will be given a rating number from 1 to 10. A rating of 1 means the corridor is in extremely poor condition and 10 is excellent condition. This rating system distinguishes areas that are most in need of a restoration project from ones that are stable, functioning properly, and in better general condition. This rating system also allows Engineering to give an immediate informed answer when residents are concerned about the state of the greenway corridor abutting their property. If there is a significant flooding or erosion issue in a particular corridor, it

will become a priority project to be repaired by a qualified contractor or City crews, as funding allows.

EMERALD ASH BORER (in all categories)

Emerald Ash Borer, found in Madison in 2013, will infest and kill all untreated ash trees. As a result, Engineering staff inventoried and mapped every ash tree on Engineering property, that once infected, could pose a threat to private property and/or utilities in drainage ways. Engineering Operations have implemented a plan to complete removal of these at-risk ash trees by 2019. Ash trees will be allowed to die naturally unless they threaten an adjacent property or an established recreational use.

A portion of these ash trees will have to be contracted for removal due to accessibility issues, and a few of the trees have been adopted by residents and are being treated for EAB preemptively every other year by licensed applicators.

LAND CATEGORIES

1. EXISTING PRAIRIE AND GRASS MEADOWS

BACKGROUND

Prior to the year 2000, channels and basins were typically grass. In 2000, Engineering began requiring newly or re-constructed greenway channels and basins to be established with prairie seeds in an effort to improve water quality, promote storm water infiltration, to increase natural habitat and plant diversity, and reduce maintenance costs.

Parks was responsible for maintenance of these areas until 2003 when Engineering assumed this responsibility.

Engineering initiated a program to improve these corridors to perform their primary function of storm water management. Complete mowing of greenway channels and basins with heavy duty mowers was used to control volunteer trees, brush and weeds. With a goal of mowing twice each year, many areas overtaken by volunteer trees, brush and weeds were reclaimed as grassy greenway corridors. To meet the needs of different areas, the staff established several different mowing schedules e.g. mow once in early spring or late fall; or mow twice annually. For greenway corridors and basins that were not planted with prairie, these schedules have remained in effect and will continue for 2016.

Prairie Areas

While Engineering began requiring newly or re-constructed greenway channels and basins to be established with prairie seeds in 2000 we did not implement a process by which developers were required to properly maintain these and turn them over to the City as established prairies. Nor did we coordinate a change in our maintenance of these newly establishing prairie areas with the changes in seeding. As a result, by 2011, many of the acres that had been seeded with prairie had: 1) reverted to reed canary grass 2) resulted in a mix of grasses and invasive weeds, or 3) resulted in a mix of prairie and weeds. This mix of conditions made complete mowing twice each year counter-productive to prairie growth, but staffing levels also did not allow all weed areas to be mowed at ideal times to suppress weeds and avoid spreading invasive seeds.

SELECTIVE PRAIRIE MANAGEMENT (SPM) PROCESS

In 2011 Engineering began a pilot project, SPM, to manage chosen test channels and basins differently. Mowing would remain as a primary tool for maintaining large areas, but would be localized to mow only patches of invasive or undesirable plant species, rather than mowing the entire greenway channels and basins twice a year. This mowing only targets the major weed areas and leaves the rest of the corridor “unmaintained” allowing native plants to compete more effectively. This pilot proved to be successful both in terms of cost effectiveness* and also from the perspective of species management, preserving the prairies and achieving better weed control. SPM requires Engineering staff to locate and map invasive weed patches, determine the best time to mow to avoid spreading invasive seed, and coordinate mowing with operations staff. Prairie channels and basins will still need to be mowed entirely every 3 years to suppress the establishment of woody plants.

*Note that the costs reviewed to determine the cost-effectiveness of this program only included Engineering’s direct labor and equipment costs for mowing. It did not include the volunteer labor hours or the additional staff costs for inventorying, mapping and coordination.

Additional management may include prescribed burning by contractors and in some cases herbicide is needed to eradicate especially aggressive invaders. Herbicide will be applied by a certified applicator. As of 2015, approximately 10% of 1,500 Engineering storm drainage and environmental corridor acres are managed by SPM.

SPM IMPLEMENTATION GOALS

Ideally, managing entire greenway channel and basin systems in the same way would increase efficiency for staff and equipment and decrease spread of invasive seeds downstream (example targeting Canada thistle throughout an entire corridor instead of just in every other parcel). We will take advantage of opportunities to do this where and when they exist, however in some cases, we have limitations due to requests from neighborhoods, alders and other agencies.

OUTCOMES

By using SPM we believe that we will meet the goals previously noted in this document.

2. NEWLY SEEDED PRAIRIE

BACKGROUND

Newly seeded prairie channels and basins result primarily from new construction done by a developer. We have changed developer contract specifications to get more consistent establishment of prairies.

Detailed information is provided in Appendix A.

3. MOWED MEADOWS

BACKGROUND

Older greenway channels and basins were traditionally mowed turf and are now often dominated by a monoculture of reed canary grass or mixed with other herbaceous species. Many unimproved areas in the drainage corridors have grassy areas with a mix of other species. Some are invasive or weedy species while others may provide good habitat for pollinators or other species.

MANAGEMENT PLAN

Maintenance Practices for General Engineering Mowed Meadows:

The majority are mowed twice a year at a 6" height unless they are identified as weedy, in which case they will be mowed more frequently. Currently as of 2016, there are 13 channels and basins identified as weedy. Engineering will establish weed infestation thresholds at which point these areas will be mowed frequently (4 or 5 times a season). This establishment of thresholds and remedy actions is a critical part of any Integrated Pest Management program. If weeds can be adequately controlled, these areas will be returned to mowing twice a year.

4. UNMOWED (MANAGED) MEADOWS

Most maintenance changes proposed for 2016 are in this category. It includes newer areas that were probably seeded to prairie, but have been not been mowed on a schedule for good prairie establishment. It also includes large environmental corridors in mostly non-residential areas. Past mowing there varies from 0-2 times/year. Much of the acreage is undevelopable buffer land. Although all of these areas have not been planted to prairie, they have many plants that support pollinators and other wildlife, and can have their mowing reduced without compromising other goals.

In 2015 the Common Council approved a report and recommendations from the Pollinator Protection Task Force. This requires a review of mowing practices, which is already underway for lands managed by Engineering staff. In addition to prairies being managed under SPM, the managed meadow category has good potential to provide improved pollinator habitat.

Most of the areas in this category are recommended to be mowed once annually. Monitoring in 2016 will be necessary to determine the best time for mowing to control and not spread weeds, and to protect habitat for pollinators and other species. The monitoring will also be used to improve mapping of land cover, habitat elements and invasive species.

5. WOODLAND GREENWAYS

BACKGROUND

Historically woodland channels and basins were part of larger waterways and continue to be primarily used to convey water, ideally with minimal erosion and flooding risk. These areas were typically dedicated to City Engineering in the platting process and had existing channels flowing through the woods and no engineering improvements were completed with the plat.

MANAGEMENT GOALS

- Prevent drainage channel from flooding

- Prevent drainage channel from eroding
- Reduce / suppress exotic species in targeted areas
- Remove ash trees identified to be a potential hazard to people, private property, the drainage way, or utilities in the drainage way

MAINTENANCE

Equipment access to the channel or basin to be maintained is often limited due to trees and steep slopes. During a restoration project, we will make an effort to preserve as many high quality trees and non invasive brush as possible if an access path needs to be constructed. A few wooded greenways have a maintenance access path that is maintained by Engineering typically by mowing twice a year.

1. The removal of ash trees identified as potential hazards due to EAB are a priority over other tree and brush removal because the longer they are infected with EAB, the more dangerous and costly the ash trees become to remove.
2. Inventory the channel or basin periodically to check for maintenance issues such as sediment buildup, volunteer trees growing in the channel, and blocked inlets. This shall be done as part of the greenway rating system. If the channel or basin is eroding or flooding, it will require a restoration project for improved storm water drainage.
3. Engineering staff and volunteers will identify woodland edges where competing trees are shading desirable oaks, hickories, other high quality tree and shrub species, and establish a work plan. This work plan will typically include an initial plan for removal of invasives (mechanical, chemical, hand work) as well as annual or biannual work to be performed to keep the woodland edge free of invasive trees or shrubs. Work plan may exclusively use volunteer, contract or Engineering staff labor or be a combination of any three.
4. Assess species type and relative abundance of weeds that appear in woodland edges that are cleared of trees. If weed pressure is significant it may require control measures (mowing, herbicide application) prior to planting native seed. While mowing would be an Engineering staff function, the chemical application could be done by staff, contractors or volunteers.
5. Wooded channels tend to erode frequently because grass doesn't grow well in shade and without vegetation to stabilize the channel banks, they are prone to erosion. To prevent the drainage channel from eroding, volunteer trees growing in the middle/bottom of the channel need to be removed. These trees tend to cause problems by blocking and/ or re-routing the storm water flow and the water exposes the tree roots making them unstable.
6. Trees that die as part of natural and normal causes in wooded channel or basin are left as is to provide invaluable habitat for a variety of wildlife. If the tree dies in an area frequented by people and/or poses a hazard, or will cause storm water drainage issues, it will be felled and left on-site for wildlife by Engineering staff.

OUTCOME

Woodland channels that are inspected, rated, and maintained will function properly for a longer period of time before having flooding or erosion issues.

6. WETLAND CHANNELS AND BASINS

BACKGROUND

City Engineering owns a significant number of wetlands which vary widely in quality. Some are high quality and some reed canary grass monoculture.

PLAN

As the name indicates, mowing these parcels is normally not possible because these lands are often wet and therefore unmowable. Ideally these areas would be mowed once every three years or as weather allows for brush and woody invasive removal.

MANAGEMENT GOALS/ PROCESS

Short term goals are to identify each wetland parcel that Engineering maintains and map the locations.

At this time, we are not proposing a comprehensive management policy for wetlands.

7. CONCRETE AND RIPRAP CHanneled GREENWAYS

BACKGROUND

Concrete and riprap channels are designed and constructed to convey stormwater runoff without erosion.

MANAGEMENT GOALS /PROCESS

RipRap and concrete cunette greenway channel rating focuses on an assessment of the condition of the material. Riprap lined channels will be inspected periodically to look for scour occurring beneath the fabric underlining the riprap layer. Concrete will be inspected to look for undermining of the channel. Engineering staff will give a low rating to greenways with significant concrete deterioration or erosion occurring, and prioritize them for a restoration project either by a contractor or Engineering staff. A high rating signifies the riprap or concrete channel and banks are in stable condition and nothing is blocking storm water movement.

Sediment removal and storm water structure replacement are the most common maintenance issues. This work is typically performed by Engineering crews as needed.

OUTCOME

Concrete and riprap channels that are inspected, rated, and maintained will function properly for a longer period of time before having flooding or erosion issues.

APPENDIX A

CONSTRUCTION AND MAINTAINED TO SEED ESTABLISHMENT BY A DEVELOPER PRIOR TO BECOMING CITY PROPERTY

Most new greenways and ponds are constructed as part of a new plat development and in many cases do not become Engineering's responsibility for three years after initial construction. As noted previously, all new ponds and greenways created are planted with prairie/native species and it's the developer's responsibility to establish and maintain them until final acceptance by Engineering.

IMPLEMENTATION

A new Engineering policy is being implemented to insure that the prairie seed that was planted gets established with appropriate prairie maintenance from the start, so when the parcel becomes Engineering property, it is set up for continued success.

MANAGEMENT

Contracts for new plats shall include specifications on the following:

The Developer shall be responsible for seeding greenway channels or basins and ponds with a native species mix that is provided and approved by the City of Madison. The seeding shall be done by a qualified landscaper with knowledge and experience in completing native planting/seeding. This mix shall be referenced on the plan sheet provided and sealed by the Developer's Engineer and approved by City Engineering.

The Developer shall be responsible for establishment and maintenance of the newly seeded area with a goal of prairie establishment. This will include a requirement of provision of a proposed course of action for establishment of the prairie at the time of pond/greenway approval. This will include an annual report of actions completed (mowing, burning, pesticide application), conditions of the prairie and recommended actions for the next year to City Engineering annually until the channel or basin is accepted.

OUTCOME

By establishing these standards for developers, the City will receive a higher quality product in newly acquired channel or basin. Acquiring properly established prairie will result in significantly less labor and herbicide to maintain in the future and less invasive weeds will spread to nearby areas.

CONSTRUCTED OR RESTORED AND MAINTAINED BY CITY ENGINEERING

BACKGROUND

If an existing pond or greenway has significant flooding or erosion issues, a restoration project is needed. These projects are designed by City Engineering and the work is done by City crews or a contractor.

MANAGEMENT OF NEWLY RESTORED AND SEEDED POND OR GREENWAY

The restoration sites will need to be prepared by eliminating existing weeds and grass. Care shall be taken to leave topsoil on site as undisturbed as possible. Next the site will be seeded

with a diverse native seed mix especially seeds for flowers that provide bee and pollinator habitat. The first years of prairie establishment take the most work to keep the weed seed bank that was previously on site under control.

- Maintenance Mowing During the First Season:
Mow the new prairie to a height of *SIX INCHES* (no lower) each time the average height of the planting reaches *12 INCHES*. If you wait too long to mow, you can do more harm than good because the cut thatch will shade out the new seedlings and stunt their growth. Depending on rainfall, you may have to mow once a month from June to September in the first season. If you are not able to do this mowing until late in the season, it's better to wait and start mowing in the second growing season next year unless you have a way of removing the cut thatch.
- Maintenance Mowing During the Second Season:
Mow the new prairie to a height of *10-12 INCHES* (no lower) each time the average height reaches *24 INCHES*. NEED a mower that can be set this high. Mowing too low in the second season can set establishment time back by a full season. The second season of mowing is not as critical as the first, but it will ensure good survival of new native plants. Prescribed burning in the second year is recommended.
- Maintenance Mowing During the Third Season
Burning in the third season is recommended

OUTCOME

A properly established prairie will require minimal general maintenance. Prescribed burning, mowing and spot treatment with herbicide to target invasive weeds will be part of ongoing maintenance every 3-5 years as needed.

Definition of Terms

"Integrated Pest Management" - IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions and controls. In practicing IPM follow a four-tiered approach. The four steps include: setting action thresholds, monitor and identify pests, prevention measures and control of the pest.

"Exotic or invasive" - Non native plant, shrub, or tree to southern Wisconsin.

"Cut and Treat" – Process whereby an undesirable woody plant is cut and the remaining stump is directly treated with an herbicide to prevent regrowth.

"Controlled Burn" – Management practice whereby tracts of land are burned in specific timeframes and circumstances to control undesirable plant species and provide favorable opportunities for regeneration of the native species in the burned area.