

City of Oshkosh

Landscaping Audit and Recommendations

University of Wisconsin Oshkosh
Environmental Studies: Senior Seminar – Fall 2018
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Executive Summary

This document contains our evaluation, analysis and recommendations for ways that the City of Oshkosh can improve its stormwater management practices. We begin by providing background and context on the issues of stormwater management, followed by the results of an audit we conducted of the city's ordinances regarding stormwater management and landscaping features. The audit used the Green Infrastructure Audit Tool created by the Wisconsin Sea Grant to provide guidance in grading the city's landscaping standards and regulations. In addition to giving grades to each code section, we have provided possible strategies and ideas to improve stormwater management in the City of Oshkosh. As a result of our audit and research, we are recommending several changes to improve stormwater management in the City of Oshkosh. In our research we have found that the use of bioswales, rain gardens, and naturally vegetated buffers near waterways can help reduce the amount of flooding and harmful runoff into waterways. We are recommending changes to ordinance language to promote and encourage the use of green infrastructure, such as bioswales and rain gardens, in commercial and public areas. By implementing these changes, damaging effects from stormwater in the City of Oshkosh will be reduced.

Background

Stormwater management is an often overlooked, yet vital component of keeping the waterways we value safe and usable. Improperly managed stormwater can cause massive harm to an area's waterways as well as its infrastructure. Having effective stormwater management infrastructure in place can help communities prevent or reduce the effects of problems such as the contamination of local waterways, land degradation, and damage to city infrastructure. The City of Oshkosh, like many communities across Wisconsin, takes pride in clean, accessible waterways which benefit local economies and improve the quality of life for their surrounding communities.

Part of keeping those waterways safe from contamination and degradation is a landscape that minimizes runoff and erosion. The gradient, vegetation composition, and type of infrastructure has a major role in determining what impacts are felt from excessive stormwater. Runoff from urban areas can lead to the buildup of pollutants in waterways like the Fox River (Fletcher, 2013). The Fox River and Lake Winnebago are integral parts of the City of Oshkosh, providing area residents with fishing, boating, and a host of other recreational opportunities. Additionally, these waterways provide an important source of drinking water for nearby communities. Proper storm management is key to keeping these waterways clean so that they may continue providing for the residents of Oshkosh.

Green Infrastructure Audit: Landscaping

1. Do preliminary or sketch plans include stormwater measures and landscape techniques for initial review?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Procedures [Site plan, Planned unit development, Subdivision]	Early review of land use concepts helps identify opportunities to integrate green infrastructure into landscaping and drainage.	Section 30-385: Site Plan Review and Approval Procedures. See Sections (D) (4) and (5).	<ul style="list-style-type: none"> Language in code could provide potential loopholes 	B

2. Is a consolidated plan for landscaping, grading/drainage and stormwater-control measures encouraged or required?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Procedures [Site plan, Planned unit development, Subdivision] Stormwater ordinance	Putting grading/drainage and landscaping plans on the same sheet illustrates where and how landscaping and stormwater management can be integrated.	Section 30-385 (D) (4), (5), and (6). Not really at this point. Consolidated plans can be submitted but nothing in the ordinance encouraging or requiring them to be consolidated.	<ul style="list-style-type: none"> Code can be amended to encourage, and possibly require consolidated plans 	C

3. Is the use of deep-rooted or native plants, plants with habitat value, or edibles allowed or encouraged in the landscaping standards?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Landscape standards Design guidelines	Explicitly listing or illustrating the use of native plantings, deep-rooted plants or other alternatives to turfgrass and shrubs tells site planners up front that the community encourages these types of plantings.	Section 30-254: Figure 30-254a: see asterisks and note adding 10% to the point values of WI native plant species.	<ul style="list-style-type: none"> Contradictions in promoting some invasive plant species while prohibiting some native species 	A

4. Is there a process or standard to waive numerical, spacing, and species requirements for stormwater-control measures in required landscape areas?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Landscape standards Design guidelines	Specific dimensional standards, such as a requirement to space trees 25 feet apart, may conflict with the design of vegetated stormwater controls. Waivers can allow variation where needed to accommodate green infrastructure.	No. Section 30-255(B)(5). The standard requires that bioswales and rain gardens be vegetated to qualify for landscaping points.	<ul style="list-style-type: none"> Bioswales are permitted Required to be vegetated Consider exemptions to landscaping standards for stormwater control installations 	C

5. Do visual buffer and screening provisions enable a variation in plantings or substitution of fencing if co-designed for stormwater?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Landscape standards Design guidelines	Codes often require buffers between properties or uses be composed of a “dense evergreen hedge” or similar. Codes can be modified to provide an option for integrating vegetated stormwater-control measures where needed using a combination of fencing and plants for screen and buffer areas	No. Section 30-253. Code allows for variation in plantings or substitution of fencing to achieve a required visual buffer opacity, but does not mention the option to co-design for stormwater control.	<ul style="list-style-type: none"> Revise code to count or encourage co-designing visual buffers to also function as stormwater management areas. 	C

6. Do vegetated stormwater management areas such as bioretention areas, rain gardens, stormwater trees or other plantings count toward required landscape minimums?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Landscape standards Design guidelines	Requiring ornamental landscaping in addition to bioretention areas or other green infrastructure is a significant barrier; often, there will not be enough area on the site to accommodate both.	Section 30-255(A) and (B). Rain gardens and bioswales may count but only up to 100 points per site.	<ul style="list-style-type: none"> Rain Gardens and bioswales clearly defined Define and encourage other types of green infrastructure 	A

7. Is berming of setback and landscape areas along right-of-ways required and/or habitually preferred as a method of visual screening?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Landscape standards Street standards Design guidelines	Requirements for berms will limit or entirely prevent the use of “edge” areas and road frontage for stormwater management.	See Figure 30-253f and Section 30-353(C). Berms are not required but can reduce the number of landscaping points required per 100 feet.	<ul style="list-style-type: none"> Reduce landscape point reduction to discourage berming 	B-

8. Are naturalized landscaping standards and requirements promoted for use in stormwater treatment practices?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Stormwater ordinance Landscape standards Subdivision	Communities may have standards that encourage or require naturalized landscaping or native plantings in and around stormwater ponds and swales.	Section 30-255(B)(5): Figure 30-254a - encourages native plants in landscape. Nothing called out specifically in Chapter 14 Stormwater Regulations regarding native plantings.	<ul style="list-style-type: none"> Add a “wet” classification to Fig. 30-254b Include language about vegetation in Chapter 14 Stormwater Regulations 	B

9. Are there minimum landscaping requirements for parking lots? Perimeters, islands, or both (e.g., percentage or parking landscaped, number of trees per parking spaces, canopy coverage)?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Site plan Parking standards Landscape standards	Parking lot landscaping - both perimeter and island - can mitigate urban heat island effects and can be co-designed as green infrastructure for stormwater treatment.	Figure 30-253d (Paved area Column). Section 30-253(B) Paved Areas	<ul style="list-style-type: none"> For every 10 off-street stall or 1000 sq. ft., a minimum number of landscaping points must be met. Does not say if bioswales or rain gardens may be used. 	B+

10. Is there a minimum size for parking lot landscape islands?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Site plan Parking standards Landscape standards	Parking lot islands must be large enough (typically a 100-square-foot minimum) to have sufficient soil volume for healthy tree and plant growth.	Section 30-253(B)(4)(c) and Figure 30-253a, Figure 30-253b, and Figure 30-253c show minimum sizes/dimensions for parking islands.	<ul style="list-style-type: none"> • Yes. Minimum sizes for islands are given, as well as, different layouts for parking lot design. 	A

11. Do parking lot edge landscaping requirements (islands and edges) specifically allow or encourage use as stormwater-control areas? Is a standard adopted?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Site plan Parking standards Landscape standards	Actively encouraging the use of islands and perimeters for green infrastructure gives important direction to site planners.	Section 30-253(B)(4)(d) - mentions crowning islands for drainage unless bioretention methods of stormwater management are used. Does not necessarily encourage it but allows the use of these areas as stormwater control areas.	<ul style="list-style-type: none"> • Crowning required unless bioretention methods are being used, requires approval by the Dept. of Public Works. • Adds extra steps and does not encourage the use of bioretention methods. 	B

12. Are flush curbs and/or curb cuts allowed to direct runoff into vegetated landscaped islands?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Site plan Parking standards	Allowing breaks in curbs or the use of wheel stops/barriers enables co-design of islands and perimeters for stormwater, while also protecting adjacent landscaping.	Section 30-175(N)(5)(a): Explains potential alternatives to required 6" curbing if bioretention methods are used as an alternative in an approved grading and drainage plan.	<ul style="list-style-type: none"> 6" crown required unless approved by Dept. of Community Development. Does not promote use of bioretention methods. 	B

13. Are green walls defined or encouraged? Do they count toward required landscaping?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Landscape standards Definitions Design guidelines	Green wall systems are gaining popularity and have many applications for landscaping and screening; some definitions of "fence" may be too specific to allow green walls.	Nothing in Landscaping Requirements defining green walls. Fences or walls can count towards landscaping requirements. Figure 30-253f.	<ul style="list-style-type: none"> Define green walls Designate landscaping value for green walls 	C

14. Is turfgrass required in new subdivisions or construction? Could deep-rooted plants be substituted?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Subdivision Landscape standards Site plan Stormwater ordinance	Subdivision regulations often require lots to be "sodded." Standards should state that native or deep-rooted plantings may be used, even if temporarily, on new residential lots.	Section 30-411(J); Section 30-72(F)(1) Turfgrass or hardy groundcover requirement	<ul style="list-style-type: none"> Define hardy groundcover Language should be added to encourage native plantings in disturbed areas. 	D

15. Do the standards encourage or require that turfgrass be used only for active recreation areas?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Subdivision Landscape standards Site plan Stormwater ordinance [construction provisions]	In subdivisions or planned unit developments with common open space, or large-lot commercial development, limiting turfgrass to active recreation areas encourages the use of deeper-rooted plants and trees that reduce runoff volumes and sediment loads.	Section 30-255(B)(5) explains requirements to line bioswales and rain gardens with vegetation other than turf to count for landscape requirements. Currently no other limitation on turfgrass for new subdivisions/PDs.	<ul style="list-style-type: none"> Introduce a code that limits turfgrass in certain areas such as those not used for active recreation. 	D

16. Are snow storage areas required to be shown on site plans?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Subdivision Landscape standards Site Plans Stormwater ordinance [construction provisions]	Snow storage should be required to be shown on site plan applications. Storage should be located in areas where melting and infiltration can occur and spring residue removed, without affecting the performance of stormwater treatment practices or leading to sedimentation and pollution in adjacent streams and wetlands.	“Public Works has stated that they require snow storage to be shown on site plans.”	<ul style="list-style-type: none"> Fines for those do not follow site plans. Snow storage identification for large/semi large parking lots. Email, letters, or verbal communication to follow site plans once a year. 	F

17. Is snow storage in bioretention areas prohibited or discouraged, unless the area is specifically designed for snow storage (i.e., grass swales)?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Subdivision Landscape Site Plan Stormwater ordinance [construction provision]	Snow storage should be required to be shown on site plan applications. Storage should be located in areas where melting and infiltration can occur and spring residue removed, without affecting the performance of stormwater treatment practices or leading to sedimentation and pollution in adjacent streams and wetlands.	Section 30-255 - No snow storage allowed in these areas (Public Works). Chapter 14 and 30 does not appear to have any prohibitions.	<ul style="list-style-type: none"> Tell the effects of bulk accumulation of snow in bioretention areas. Say that storing snow in these areas are prohibited. 	D

18. Are street trees required or encouraged along streets (residential, commercial, other, or all)?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Site plan Subdivision Landscape standards Public works specifications Design guidelines	Street trees help attenuate stormwater flows and pollutants, especially if planted in sufficient volumes of well-aerated soils. This can be specified in a stormwater management plan.	Street Trees are encouraged by policy along streets with terraces wide enough for them. See Chapter 26 of the Municipal Code for Tree Regulations.	<ul style="list-style-type: none"> City Forester and SAB currently working on a policy to allow for terrace trees as part of new street construction projects. ReLeaf Oshkosh and Taking Root Fund Diverse, native species 	A+

19. Are tree lawns and terraces allowed or encouraged to be designed as stormwater treatment areas rather than turfgrass and trees only?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Landscape standards Public works specifications Municipal code	Some tree lawn or terrace areas may be suitable for use as stormwater management areas or can be landscaped with deeper-rooted plantings. Maintenance responsibility and an approval procedure should be specified.	Currently nothing in the ordinance prohibiting this. New practice.	<ul style="list-style-type: none"> Add section to Fig. 30-254b on suitable trees for managing stormwater Include language about trees in Chapter 14 Stormwater Regulations 	C

20. Can landscaped islands for stormwater treatment be created within culs-de-sac or medians?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Public works specifications	If standard specifications do not allow for different engineering designs (i.e., "all medians shall be composed of..."), some variance procedure or alternative standard may be needed.	Public Works - Yes see the Prairie Treatment System at eh Coughlin Center. Nothing explicitly stating.	<ul style="list-style-type: none"> No codes specifically addressing this. Has been done at the Coughlin Center. 	D

21. Are native plantings specifically allowed in front yards or lawn areas?

Barrier	Tips	Code References and Language	Notes, Ideas and Strategies	Grade
Municipal code Nuisance weeds ordinance Landscape standards	Consider establishing a written review or approval procedure, simple standards requiring demarcation or edging and bordering with native and deep-rooted plants and a procedure for mowing if noxious weeds or lack of maintenance occurs.	See Ch. 17 Sec. 17-44. Currently nothing in the ordinance prohibiting this. Ordinance does not really mention native plants or not in lawn areas. It prohibits obscuring vision triangles (Section 30-174(D) and (E)). Stormwater utility credit for rain gardens.	<ul style="list-style-type: none"> Simplify approval process for declaring a private nature area Use native plantings as tools for community outreach 	D

Notes and Strategies for the Audit Items

1. Do preliminary or sketch plans include stormwater measures and landscape techniques for initial review?

The City of Oshkosh does require preliminary sketch plans to include landscaping and stormwater measures to be reviewed, however, the "if required" language in the code appears to provide discretionary loopholes. Ordinance language should specify in more detail what areas are exempt from implementing these measures and techniques.

2. Is a consolidated plan for landscaping, grading/drainage and stormwater-control measures encouraged or required?

The City of Oshkosh does not prohibit consolidation of landscaping, drainage/gradient, and stormwater measurement plans, but it does not require or encourage the practice either. Consolidating plans in these areas can assist in determining how certain landscaping will influence stormwater control. Consider requiring, or at least encouraging the practice in the ordinance.

3. Is the use of deep-rooted or native plants, plants with habitat value, or edibles allowed or encouraged in the landscaping standards?

The City of Oshkosh promotes the use of native vegetation in its ordinances by giving native species a 10% point bonus towards landscaping requirements. However, revisions should be made to Fig. 30-254a: "Commonly-Used Appropriate Landscaping Species" and Fig. 30-254b: "Sample Plant Species Appropriate for Specific Situations" to ensure that no known invasive species, such as barberry, are listed as acceptable species. Barberry is a state restricted/prohibited species by WI-NR40. Fig. 30-254c: "Prohibited Species and Species to Use Sparingly" should be revised to include all non-

native invasive plant species and remove native plant species. Also, some native tree species are prohibited because they spread and/or are messy. Such species, however, provide services to native insects and should be permitted in circumstances where these characteristics are unlikely to cause significant problems such as in parks or open spaces.

4. *Is there a process or standard to waive numerical, spacing, and species requirements for stormwater-control measures in required landscape areas?*

The code allows bioswales as long as they are properly maintained, but it does not specify landscaping requirements or offer a waiver to numerical, spacing, or species composition used in bioswales. Consider including exemptions to standard landscaping requirements when dealing with bioswales or other stormwater control installations.

5. *Do visual buffer and screening provisions enable a variation in plantings or substitution of fencing if co-designed for stormwater?*

The City of Oshkosh allows variation of fencing and vegetation to meet the opacity requirements for visual buffers between properties. It would be more efficient though to co-design such visual buffers so that they also serve as a stormwater control. The code should encourage this practice and perhaps give a point bonus towards a project's total landscaping requirements.

6. *Do vegetated stormwater management areas such as bioretention areas, rain gardens, stormwater trees or other plantings count toward required landscape minimums?*

The City of Oshkosh clearly defines and allows rain gardens and bioswales to count towards landscaping minimums, also known as "landscaping points," on a site. Consider language encouraging use of rain gardens and bioswales, as well as possible exemptions for use of these types of stormwater infrastructure.

7. *Is berming of setback and landscape areas along right-of-ways required and/or habitually preferred as a method of visual screening?*

The code does not require berming of setback and landscape areas, but it does allow for landscaping minimums to be reduced if berming is installed. Berming an area prevents that area from being used for stormwater management. Consider eliminating the landscaping minimums reduction for berming to discourage use.

8. *Are naturalized landscaping standards and requirements promoted for use in stormwater treatment practices?*

The code (specifically Fig. 30-254b) should include another section under classification for preferred Wisconsin native species that are best adapted to rain gardens, bioswales, and/or very wet areas. This can help guide individuals and developers in planting species that perform optimally in stormwater management areas. Language should also be included in Chapter 14 Stormwater Regulations that discusses the use of vegetation as an important stormwater management strategy.

9. *Are there minimum landscaping requirements for parking lots? Perimeters, islands, or both (e.g., percentage or parking landscaped, number of trees per parking spaces, canopy coverage)?*

For parking lots with more than 10 off-street stalls or 1,000 sq. ft., whichever is greater, they must meet the minimum landscaping requirements (See Appendix A). The codes do not specify if bioswales or rain gardens are acceptable for meeting these requirements.

10. *Is there a minimum size for parking lot landscape islands?*

City codes provide minimum sizes for parking lot islands as well as several examples of different layouts for parking lot designs. Depending on the layout chosen,

the sizes of individual islands may vary, but the total area of island space remains the same.

11. Do parking lot edge landscaping requirements (islands and edges) specifically allow or encourage use as stormwater-control areas? Is a standard adopted?

Parking lot edges must be crowned unless bioretention methods are used.

Allowing island and edging to be used as bioretention areas will help to filter stormwater and parking lot runoff before it enters the city's stormwater systems or local waterways.

To have edging or islands without curbing requires approval by the Department of Public Works. The city code could try to add language to encourage the use of bioretention methods.

12. Are flush curbs and/or curb cuts allowed to direct runoff into vegetated landscaped islands?

A minimum curbing of 6 in. is required on islands unless bioretention methods are used and an approval is granted by the Department of Community Development.

This code does not encourage the use of bioretention methods, but it does allow for their use.

13. Are green walls defined or encouraged? Do they count toward required landscaping?

The City of Oshkosh does not define or encourage the use of green walls.

Without a definition or regulation, citizens will not know whether or not they can install a green wall. With fences already counting towards landscaping minimums consider defining green walls, and giving a landscape value to such features.

14. *Is turfgrass required in new subdivisions or construction? Could deep-rooted plants be substituted?*

Turfgrass or hardy groundcover is required in all areas not occupied by a building parking, or storage. The section should be made clearer by defining hardy groundcover. Also, undisturbed areas may keep natural vegetation if kept free of foreign or noxious plants, but this does not mention the possibility of installing a planting of native species or implementing ecological restoration in a newly developed area or post construction. Language should be added to encourage the use of native prairie species in disturbed areas after construction when applicable.

15. *Do the standards encourage or require that turfgrass be used only for active recreation areas?*

Turfgrass is only limited in bioswales and encouraged nearly everywhere else even if turfgrass is not the best vegetation cover for the scenario. Limitations should be put in place to encourage the use of native vegetation in areas where turfgrass is not necessary and is not in line with best management practices for the site.

16. *Are snow storage areas required to be shown on site plans?*

Introduce a fine or a penalty for property owners who do not follow through with site plans. Properties that have large permeable surfaces with a considerable amount of parking stalls could indicate through proper identification where snow will be stored. Property owners with these types of properties could be sent a reminder notice, email, or phone call once a year that they should follow their site plans of where to store snow. If a large permeable surface is near surface water (i.e. streams, lakes, ponds, and wetlands), there could be a sign indicating that snow dumping is prohibited in these areas.

17. Is snow storage in bioretention areas prohibited or discouraged, unless the area is specifically designed for snow storage (i.e., grass swales)?

Incorporate more knowledge as to what these areas are supposed to do and how a bulk of snow accumulation can hinder its intended responsibility. This would give the property owner the insight into how storing snow would greatly affect the ability of the bioretention area or grass swale to fulfill their main purpose. An ordinance that gives property owners the wherewithal and awareness that snow, when collected, contains various types of pollutants that degrade the environment. Say in the ordinance that snow storage is prohibited and if there are any questions to contact the Oshkosh Public Works Department.

18. Are street trees required or encouraged along streets (residential, commercial, other, or all)?

The City of Oshkosh has lost substantial numbers of trees due to Dutch elm disease, Emerald Ash Borer, and wind throw, but the city seems committed to replacing these trees. The SAB and City Forester are working to create policy to include provisions for street trees in new construction projects. The city also has tree planting programs, ReLeaf Oshkosh and the Taking Root Fund (supported by the Oshkosh Area Community Foundation), that help residents get street trees planted in their neighborhoods. Special attention should be paid to ensure that the planted street trees are native species and that diversity is an important factor when selecting tree species.

19. Are tree lawns and terraces allowed or encouraged to be designed as stormwater treatment areas rather than turfgrass and trees only?

Tree lawns and terraces are allowed, but they are not necessarily encouraged as way to manage or treat stormwater. Diversely vegetated areas should be encouraged as a way to manage stormwater. Similarly to audit item eight, a classification for species

that thrive in wet conditions should be added to Fig. 30-254b. The use of vegetation as a means of controlling stormwater should also be included in Chapter 14 Stormwater Regulations.

20. *Can landscaped islands for stormwater treatment be created within culs-de-sac or medians?*

The city code does not specifically prohibit the use of islands within culs-de-sacs, and it has been used at the Coughlin Center in Oshkosh. The city codes should be updated to openly state that this can be done.

21. *Are native plantings specifically allowed in front yards or lawn areas?*

Native plantings are allowed in front yards or lawn areas, but there is ambiguity due to the eight inch restriction for lawn height. An approval process is in place to declare an area a private nature area, but the process may be restricting and somewhat subjective. This process could be made more efficient while keeping property owners accountable for their landscapes. Establishing a Planned Natural Landscape program (See Benchmarking Section), the city could create a new community outreach and networking ability that promotes urban conservation and creates hands-on educational opportunities for people of all ages.

Stakeholder Identification

Bill Sturm

Bill Sturm works for the City of Oshkosh Parks Department as the Landscape Operations Manager and City Forester. Sturm is a key stakeholder in the development of the city's green infrastructure because he has a strong voice in developing landscaping ordinances and implementing more sustainable landscape designs. He has a great deal of experience in landscaping and serves as a valuable resource for the city. Sturm believes that using vegetation and trees is both an important and the most natural strategy in stormwater management since using vegetation creates a more complete system. Plants are physically able to reduce the rate of water runoff as well as improve soil structure that allows excessive water to quickly percolate into the ground. He also believes that vegetation is useful because plants take up water in their root systems which further reduces the prevalence of standing water. These benefits are evidenced in the renovations made at South Park which were intended to improve the control of stormwater by making the park's ponds deeper and including vegetated buffer strips (Sturm, pers. comm., 2018).

Sturm recommends the use of bioswales and rain gardens as other beneficial strategies for managing and reducing stormwater especially in parking lots. However, he sees road widths and underground utilities as potential limitations to installing such features in residential terraces. Instead he suggests that homeowners consider installing stormwater management features on their own properties to reduce runoff into streets since ordinances do not prevent this practice. Sturm also plans to increase the city's overall canopy cover which has been negatively impacted by Dutch elm disease,

Emerald Ash Borer, and wind throw events. He says that road widths and above ground utilities also pose problems in urban tree plantings because small terraces restrict root spaces in already compacted soils. Sturm also acknowledges the growing interest in using native plant species in landscaping applications but feels that not all native species thrive optimally in urban settings. He instead suggests using a variety of hybridized native species with desirable traits and non-invasive tendencies (Sturm, pers. comm., 2018).

John Ferris

John Ferris is currently the City of Oshkosh's Civil Engineer Supervisor who oversees how the city handles anything relating to how the public works department handles snow removal, storage, and applicants that are applied to the public roadways. His job also entails approving sites as to where they can store snow on those properties. Ferris is a key stakeholder as he is a major influence on how the City of Oshkosh Public Works Department handles anything snow related that is in the public's best interest. One of the major concerns he expressed was public safety. He indicated that the city only uses rock salt while plowing public roadways, but indicated that the city does apply a significant amount of a salt brine solution before heavy snowfall events. The brine solution uses around one-third less salt and is more evenly distributed on the roadways (Ferris, pers. comm., 2018). He explained why alternative applicants such as sand were not feasible for this municipality due to its lack of availability and its accumulation in manholes and in the storm system (Ferris, pers. comm., 2018).

Ferris acknowledged that in new properties with large impermeable surfaces such as a parking lot, the site plans have to indicate where snow storage would be, and

then be approved by his members of the Public Works Department. The site approval took into consideration the locations of surface waters, manholes, storm drains, and other urban stormwater management infrastructure. One other stormwater management technique is the installation of grass swales and bioretention areas. He indicated that both of these areas prohibit snow storage, since their main purpose is to mitigate stormwater (Ferris, pers. comm., 2018). The difficult thing for me, and any other concerned citizen that does not know where to store snow is that the city ordinance online does not specifically say that these areas cannot store snow. The property owner or citizen has to either call or meet with public works officials to discuss if these areas could store snow.

Laura Jungwirth

Laura Jungwirth is the Principal Civil Engineer for the City of Oshkosh. As a civil engineer she plays an important role in the design, type, and implementation of various types of stormwater infrastructure. Because of this role within the city's governing institution, she is a key stakeholder. As a key stakeholder, Jungwirth has an influence on the location and implementation of the actions and infrastructures within the city.

In speaking with Jungwirth regarding stormwater management, she indicated that Oshkosh is taking stormwater management seriously. Jungwirth discussed several projects in which the city is installing green infrastructure to deal with stormwater, such as dry basins and bioswales. Jungwirth also discussed the city's aggressive leaf collection program, showing that the city has awareness for the issues that excessive nutrient runoff from leaves can have on water bodies (Janke et al., 2017). Jungwirth also alluded to a two year study that the city is doing with the U.S. Geological Survey to

monitor the phosphorus runoff from leaf litter, further showing the city's seriousness in dealing with stormwater.

Lisa Mick

Lisa Mick works for the University of Wisconsin Oshkosh as the Supervisor of Grounds and Automotive. Since joining the UW Oshkosh community, she has full heartedly embraced its commitment to sustainability. Mick is a primary stakeholder in the development of the city's green infrastructure because the work she does is directly affected by a number of city ordinances. In her experiences with green infrastructure, Mick has found that bioswales are an extremely effective method of managing stormwater on campus. She acknowledges that bioswales can be difficult to establish due to initial management requirements such as removing weedy and/or invasive plants, but once established, Mick says that they require very little maintenance. Mick also believes that vegetation is an important component of stormwater management. She suggested that grasses are especially useful for this purpose, and that some are exceptional at filtering salts from runoff. She is of the mindset that using native plants in her landscape designs is very beneficial, but she also likes to work in some non-native ornamentals for aesthetics so long as they do not have invasive or aggressive qualities (Mick, pers. comm., 2018).

Mick says that she is very careful to follow city ordinances when designing or working on a landscaping project. One ordinance that she has found to prohibit some of the work that she would like to do, however, is in regards to fire. Since native prairie vegetation has been planted on campus, such plantings benefit from and are best managed with periodic prescribed burning (Copeland et al., 2002). She feels that

prescribed fire can play an important role within the City of Oshkosh when it comes to managing native prairie plantings. According to Mick, controlled fires in sites that are relatively self-contained by concrete or turfgrass, such as those planted on campus, would be highly unlikely to spread or cause damage to nearby infrastructure (Mick, pers. comm., 2018).

[Dr. Maureen Muldoon](#)

Dr. Maureen Muldoon is currently a professor of hydrogeology and geology at the University of Wisconsin Oshkosh. She is considered an expert in her field attributed by the 25 plus years in researching how human interactions, as well as natural cycles, have impacted the hydrologic cycle and geologic features. Dr. Muldoon elaborated on the detrimental effects of salt to private well water systems. This is not a problem for the City of Oshkosh's waters supply, as it receives its water from Lake Winnebago. Dr. Muldoon acknowledged that all stormwater systems in Oshkosh lead to Lake Winnebago and that the salt applied on the city road system is also transported to and accumulated in the lake. Thus, salt applied to Oshkosh's roadways contribute to increasing the salinity of local waterways which has negative consequences for the biotic communities that depend on clean streams, rivers, and lakes.

When questioned about snow stored on grass swales and bioretention areas, Dr. Muldoon thought this was "pointless" and that the practice should be prohibited by the city as these features mitigate and channel off stormwater runoff (Muldoon, pers. comm., 2018). Dr. Muldoon suggested that storing snow in bioretention areas was without benefit and would "defeat the purpose of having a bioretention feature on the property" (Muldoon, pers. comm., 2018). Dr. Muldoon recognized that people who store

snow on bioretention areas do not know or understand the purpose of these features. If snow absorbs harmful materials such as sediment, salt, and other contaminants, the bioretention area will lose porosity in the ground reducing filtration of runoff.

In regards to the availability of sand in the area, Dr. Muldoon agreed with John Ferris that sand was scarce. She asked me to look at a geologic map of the state of Wisconsin. The map indicated that the City of Oshkosh and its surrounding areas, have clay-like glacial till feature. Sand could be an alternative application to the public roadways. However, freezing and thawing cycles would force public workers to apply additional sand due to the intermittent freezing of sand and water causing the formation of ice followed by thawing.

[Donna VanBuecken](#)

Donna VanBuecken is the former Executive Director for Wild Ones, an advocacy group for native vegetation and natural landscaping in the Fox River Valley based in Neenah, Wisconsin. VanBuecken is both a primary stakeholder and an expert in terms of using of native vegetation and natural landscaping designs. VanBuecken finds that the younger generations are quite receptive to native landscaping, and while there is more resistance from the older generations, she noted that resistance has been reduced. VanBuecken noted that awareness of native landscaping options and costs have prevented native vegetation from taking hold in residential and municipal landscaping measures, as installing native vegetation has traditionally been more expensive. However, VanBuecken is encouraged by what she has seen from Fox Valley communities in terms of native landscaping. With costs for native vegetation continuing to drop, she hopes to see communities implement native species in their landscapes.

Benchmarking

Planned Natural Landscapes – Ferndale, Michigan

In April 2015, an ordinance was passed by the City Council of Ferndale, MI to officially recognize and encourage the use of natural vegetation on residential properties as an effective strategy for managing stormwater (Proxmire, 2015). Interest in this proposal originated along two paths: 1) a community member saw the inefficiency of managing her high maintenance turfgrass lawn which, given Ferndale's sandy soil, required frequent seeding, fertilizing, watering, and mowing. Instead of reseeding, she began filling in bare spots with other vegetation to reduce the size of her lawn. Upon realizing the benefits of this practice, she filed a complaint with Councilmember, Melanie Piana that the city's ordinances were not clear enough about whether this practice was allowed. 2) Simultaneously, the Ferndale Environmental Sustainability Commission (FESC) was looking for a way to improve stormwater management and reduce CO₂ emissions (Piana, pers. comm., 2018).

The FESC met and discussed the prospect of encouraging natural landscaping within the city as a way to meet their goal. The practice was not previously prohibited, but it was not necessarily encouraged, nor were its benefits acknowledged by municipal ordinances. Together the FESC and the council member drafted ordinance Section 20-45 (see Appendix B) which was voted on and accepted by the city council. The ordinance created a program in which property owners planning to convert their lawn into a Planned Natural Landscape must register their address with code enforcement so that the city has a record of which properties are participating in the program. This also serves as a way for the city to distinguish between Planned Natural Landscapes and

lawns that are simply unmanaged. Participants fill out an online form from the city's website in which they provide their name, registration date, home address, email address, phone number, and a list of species they plan to include. The code draws on Michigan State University's Native Plants and Ecosystems as a guide for the allowed plant species that can be included in a Planned Natural Landscape. Homeowners can also opt to post a small sign in their yard that identifies the space as a Planned Natural Landscape to help educate others in the community about the practice. Planned Natural Landscapes have also inspired several community workshops led by groups such as the Ferndale Garden Club and Ferndale Permaculture Club that focus on teaching others how to successfully convert their lawns. Councilmember Piana supports this program because it allows residents to directly participate in the city's green infrastructure (Piana, pers. comm., 2018). Ferndale's Environmental Sustainability Planner, Erin Quetell, shared with me that one of the program's initial problems was that some plantings were either accidentally cut down by the city or intentionally by unhappy neighbors. The city is now collaborating with a student led marketing team to produce signage like the image on the right so that Planned Natural Landscapes can be more easily recognized (Quetell, pers. comm., 2018). Such a program in Oshkosh would be a great way to promote species conservation and better stormwater management practices at a local level.

[Vegetated Buffers and Bioswales – Cross Plains, Wisconsin](#)

Located in western Dane County, Wisconsin, the Village of Cross Plains decided in 2002 to require green infrastructure to be implemented in a new subdivision being added near a local waterway to mitigate harmful runoff from entering the creek. The

plan consisted of the installation of a naturally vegetated buffer between the subdivision and the creek, along with the installation of several bioswales. Additionally the plan protected existing wooded areas near the subdivision, and took measures, such as deep tilling to ensure soil compaction was avoided.

This area was then studied by the U.S Geological Survey to determine whether the use of green, stormwater conscious infrastructure successfully reduced runoff into the creek. The study by the USGS found that landscaping measures taken in the building of the subdivision, were effective in reducing runoff and erosion in the area. By taking a "low impact" approach, the Village of Cross Plains was able to engage in economic development while protecting their local waterway (Balousek et al, 2007). This case is useful for showing the effectiveness that green infrastructure can have in keeping local water sources clean and healthy.

Costs

There are inevitable costs associated with developing green infrastructure. However, many such costs can be recouped over time since green infrastructure is able to save money long term by reducing maintenance costs and other economic inputs required by conventional landscape design and management. In one case study conducted by the EPA, it was determined that the city of Lancaster, Pennsylvania could save more than \$120 million after 25 years of implementing green infrastructure in their city (Mittman and Kloss, 2014). These savings resulted from avoiding upfront capital costs of replacing grey stormwater infrastructure and the annual savings associated with energy savings, air quality protection, and the estimated value of adapting to

climate change. Though Lancaster is considerably larger than Oshkosh, there is reason to believe that the City of Oshkosh could realize similar benefits from its developing green infrastructure. Some of these economic benefits can result directly from changing the city's relationship with its current landscaping practices.

An important aspect of a city's landscaping is its selection of vegetation that is planted and maintained. This choice dictates much of the economic and human resources that must be allocated towards its upkeep. According to an economic benefit analysis of native prairie installations compared with sodded turf and seeded turf installations prepared by the Northeastern Illinois Planning Commission, there are clear cost savings associated with native prairie plantings (2004). The analysis used one acre as its reference size and suggested that both sodded turfs and seeded turfs cost more to install and maintain than prairie plantings (See Appendix C). If the analysis is expanded to account for the costs of each landscape type over a twenty year period, it illustrates installation and maintenance of sodded turf costing \$29,680, seeded turf costing \$24,668, and prairie costing just \$7,000, nearly a quarter of the cost of conventional turf landscaping. The City of Oshkosh currently has approximately 415 acres devoted to park space with a variety of landscape installations (Parks Department, 2017). If the city were to convert just ten percent of these acres (41.5 ac) to represent native prairie habitat, the city could potentially realize a savings of \$733,222 to \$941,220 over a twenty year period that would otherwise be spent on turf management (see Fig. 1).

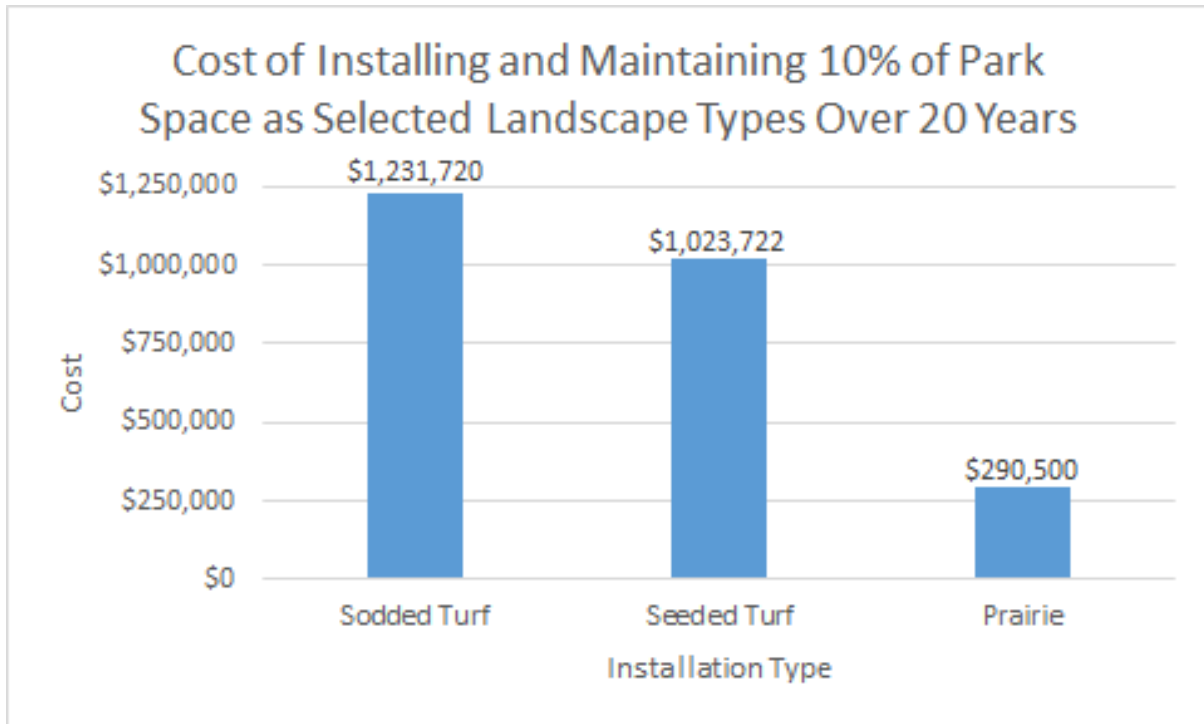


Figure 1: Potential cost comparison of installing and maintaining 10% of Oshkosh’s park space (41.5 ac) to sodded turf, seeded turf, or prairie over a twenty year timespan.

Another way that municipalities can save money while reducing their environmental impact is by implementing a different road applicant to combat icy driving conditions. The city currently applies a brine solution before heavy snowfall events. This brine solution contains about 23% less salt than applying rock salt (New York, NY, n.d.), which is much more environmentally friendly then applying rock salt to the roadways. In 2016, the City of Oshkosh applied about 3,000 tons of salt to the public roads (Ferris, pers. comm., 2018). Currently, the city pays about \$65 per ton for rock salt (Ferris, pers. comm., 2018). The city could reduce its cost as well as its environmental impact by applying sand as a road applicant. Sand sold to municipalities can be found 45 minutes away in Fairwater, Wisconsin where businesses such as Badger Mining Corporation offer 20 x 50 grade sand for \$28.00 a ton (Huggins, pers. comm., 2018). Sand is more

environmentally and people-friendly since the substance does not harm aquatic life or deteriorate automobiles. The City of Oshkosh could reduce one-half of their tonnage in salt and use sand as its replacement. The combination of sand and salt would give traction as well as a deicing agent to prevent icy conditions on roadways. If the city does not want to mix salt and sand applicants together, there are alternatives to applying sand on city's roads.

In Eau Claire, WI, approximately 3,500 tons of sand are applied to their secondary and residential streets annually (Thompson, pers. Comm., 2018). I spoke with Steven Thompson, Eau Claire's Street and Fleet Manager, and gained valuable information regarding Eau Claire's winter road care. He told me that the city typically pays \$35 per ton for sand. They categorize their streets by ice control routes, secondary streets, and residential areas. Ice control routes are the only city roadways that receive rock salt and brine. These city routes have heavy traffic. Secondary streets receive sand application when snow accumulation occurs. Sand in residential areas is applied to hills, intersections, and curves for traction. This technique of sand application to the road system in Eau Claire is used to reduce city spending, and reduce environmental impact. If Oshkosh adopted a similar snow removal process, they too, could save money and reduce impacts on the environment (Snow and Ice Control, n.d.).

Cost effectiveness is still another issue which needs to be addressed regarding snow removal. When determining the cost to change how a city handles snow storage on site plans and in bioretention areas, the cost could be lower than changing how the city handles snow removal on public roadways. City planners could revise the city ordinance by simply stating something such "property owners who have 50 or more

parking stalls shall follow site plans. If not, property owners would be subjected to a \$100 fine.” City workers, while driving past the large parking areas when handling city snow removal, could monitor this new ordinance.

The cost to critique the audit as it relates to snow storage in bioretention areas (i.e. grass swales), would be completed by city planners. In the ordinance, there is nothing pertaining to the effects of snow storage in these areas, nor are there any prohibitions of this practice. In section 30-255, the ordinance does not explicitly say that snow storage is banned in such areas. City planners would need to incorporate a sentence identifying and clarifying that snow storage within these areas is indeed off-limits. Additional research of the effects of snow storage would be of great value and merit if written into the ordinance.

Barriers

As is the case with most public projects, there are barriers that stand in the way of their implementation. This seems particularly true when developing projects intended to promote sustainability such as those that attempt to build green infrastructure. One of the most prominent barriers to implementing better landscaping practices is the scrutiny of the public. Considering native prairie installations and the use of native species in stormwater control systems, many individuals simply do not find these species as aesthetically appealing as conventional landscaping plants since they grow taller and often more densely than typical turfgrass. They regard areas planted with native species as looking unkempt or messy and tend to believe that these areas will attract rodents or

other undesirable wildlife. For these individuals, increased education and awareness about both the ecological and economic benefits of naturally vegetated areas may, however, prove to be a significant tool in changing their perspectives of natural landscaping.

Bioretention methods such as bioswales are often more expensive to construct and maintain than traditional parking lot islands and edging. The cost would fall on the individual or business installing these bioretention methods, which may discourage them from using these methods of stormwater management, especially since they would see little personal economic benefit from their installation. However, the city and community would be the ones to benefit from them. Another problem with bioswales is the popular misconception that bioretention areas serve as breeding grounds for mosquitoes. This is an unfounded belief because a properly constructed and maintained bioswale will drain of all water within one to two days after the storm event has passed.

Another barrier to developing green infrastructure in the City of Oshkosh is the code language. If the code does not encourage or define various green infrastructure types such as green walls, residents and developers will not know that such green infrastructure options are available to them. Also, if the ordinance language gives the impression that green infrastructure is not preferable, residents may feel that those are not viable options to their landscaping and stormwater management designs. Similarly, if code language can be interpreted as encouraging landscaping, such as berming, that hinders green infrastructure implementation, the impression may be given that green infrastructure is not preferred.

Specific Recommendations

Our first set of recommendations involve promoting the use of native vegetation. First, we would recommend the City of Oshkosh adopt a Planned Natural Landscape program similar to the one created in Ferndale, MI. We would advise that residents register for this program through the city to avoid confusion between native vegetation and poorly maintained turfgrass. We also recommend the language in city code Section 30-411(J) be changed to promote the planting of native vegetation in disturbed areas. An example of this new language might be: “Use deep rooted vegetation on new residential lots to promote soil quality and to absorb rainwater.”

Secondly, we recommend the city offer additional incentives to businesses and individuals who would choose to implement green stormwater infrastructure. New construction projects in the City of Oshkosh must meet a minimum requirement of landscaping points. These points are earned through planting various trees and plants, following requirements set by the city. The city could offer higher point values for items pertaining to green stormwater infrastructure, such as the planting of native vegetation and the construction of bioswales. This would incentivize businesses and individuals to consider implementing such management strategies instead of traditional, status quo plantings and landscaping designs.

Third, we would suggest that the city includes more specific language on snow storage. Currently the ordinances do not prohibit storing snow in bioretention, and the language should be updated to include such a prohibition. We recommend that the ordinances state some of the negative impacts that storing snow in these areas may have on the environment. Currently, the Department of Public Works requires site plans

to identify areas for snow storage, however, there is no language on how to enforce this or how the city would check if property owners are following through with their storage plans. We also recommend the city create signs for larger parking lots to designate where snow is to be stored. This would help to ensure that the correct areas for snow storage are being used.

Significance for Sustainability

Updating the City of Oshkosh's stormwater infrastructure to include more holistic landscaping and design standards will allow the city to make strides towards goals developed by the Sustainability Advisory Board. The idea of sustainability is relatively straightforward and is generally defined as "a *system* which survives or persists" (Costanza and Patten, 1995). In this case, the City of Oshkosh, its environment, economy, and community well-being make up the system that is to be sustained. In terms of addressing the city's landscaping standards, the changes recommended in this report would improve the city's resiliency and adaptability moving into the future where changes in weather patterns are predicted to cause more frequent and severe rainfall events (Palmer and Raisanen, 2002). Having the built-in capacity to respond to such events is just one example of sustainability in action. Sustainability, however, is not limited to responding to climate change or being environmentally conscious. In order to achieve sustainability in the City of Oshkosh, goals and actions must address environmental, economic, as well as social aspects of sustainability. Components of each are often interlinked and applicable to many facets that comprise green infrastructure and improved design standards.

Environment

Adopting some of the changes we have recommended would create a healthier living environment in the City of Oshkosh. Encouraging a variety of native vegetation would attract a range of important species including pollinators to the area. Bringing environmental features such as native vegetation to the urban landscape can reconnect the people living there with nature. Many city residents experience the lack of nature in their lives to where they forget what nature is. Promoting green infrastructure through city's ordinances will allow private and public owners to install features that promote environmental stewardship in a landscape that is urbanized. The environmental impact of green infrastructure might not be realized immediately, but reducing our impacts to the natural environment in the slightest way is beneficial to all life.

Economy

The Fox River and Lake Winnebago play an important role for the City of Oshkosh's economy. In addition to serving as a water source for the community, these two waterways provide opportunities for the city's businesses to benefit from the tourism and recreation that they attract. Every summer, many people use the Fox River and Lake Winnebago for boating and fishing, and with this comes economic opportunity for the many local businesses in the area. Improperly managed stormwater, however, can interfere with the ability of these waterways to provide that economic prosperity in the future. Stormwater runoff in urban areas has been shown to degrade waterways, affecting their flow, function, and ability to be used (Glinska-Lewczuk, 2016). By implementing green infrastructure to manage stormwater runoff, the Fox River and Lake Winnebago will continue to provide a sustainable source of economic opportunity for the City of Oshkosh into the future.

Society

The final piece that completes the picture of what a truly sustainable city looks like is the social component. A city may have the means to invest capital into environmentally conscious engineering or infrastructure projects or choose to encourage the flow of capital within the community, but having social sustainability is the glue that holds these three pillars of sustainability in place. In general, the essence of social sustainability lies in equitable access and community stability (Dempsey et al., 2011). McKenzie (2004) defines social sustainability as “a life-enhancing condition within communities, and a process within communities that can achieve that condition.” By implementing green infrastructure such as diverse landscaping features consisting of native plant species, the aesthetic qualities of a community can be greatly improved. This alone can create a sense of pride that strengthens a community and makes people want to live there. Such landscaping design standards as suggested in this report will not only benefit the city’s environment and economy, but beautiful and healthy landscapes can help to attract newcomers and retain residents who might otherwise move. Furthermore, addressing poorly designed infrastructure such as landscaping features or empty space in economically challenged parts of a community can improve both the environmental health of the community as well as its mental well-being. Research supports that aesthetically pleasing landscaping features in a city, as well as more frequent exposure to nature, has tremendous effects on the mental health of urban residents (Browning et al., 2014). Thus, addressing the city’s infrastructure in and of itself can impact the social sustainability of a community. Including these social components of sustainability and their effects in the development process for green

infrastructure will surely expand the possibilities for a project and provide important, diverse, and unique perspectives that build a sustainability community.

Conclusion

Landscaping choices are crucial when it comes to ensuring that stormwater is properly managed. The shape, composition, and type of landscape directly influences how and where stormwater travels. Thus, problematic outcomes are inevitable when a landscape is not designed to handle stormwater in an efficient and sustainable way. From the obvious issues, such as flooding, to the detrimental effects of stormwater runoff, stormwater can wreak havoc when not managed correctly. Since the City of Oshkosh is largely located along significant bodies of water, conditions are in place for stormwater to potentially cause sizeable environmental and economic harm. Whether that damage occurs to the lake or to a building, stormwater can hinder the community's ability to enjoy a clean and healthy environment.

In order to assist the City of Oshkosh in improving stormwater management in ways that are compatible with the goals of sustainability, we audited the city's codes and ordinances regarding landscaping for stormwater management. Additionally, several stakeholders from the area were interviewed to further our research into what changes need to be made. From our audit, research, and stakeholder interviews, we formulated several recommendations for the City of Oshkosh for changes in the city's ordinances to promote environmentally conscious infrastructure that encourages better stormwater management. This includes changes such as discouraging the use of berming and the

restructuring of code language to promote and encourage green stormwater infrastructure. Carrying out these recommendations will lead to improved stormwater management and a healthy, sustainable environment for the City of Oshkosh.

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Appendices

Appendix A: Landscaping Requirements for Regular Development

Figure 30-253d: Landscaping Requirements for Regular Development*

	Landscaping Component				
	Building Foundation	Paved Areas	Street Frontages	Yards	Bufferyards
Type of Landscaping:	A minimum of 25 % of points on side facing public street and 50% of points on side of main entrance. Shade Trees and Tall Trees not allowed.	A minimum of 30% of points devoted to Tall Trees and 40% to Shrubs.	A minimum of 50% of points devoted to Medium Trees. <i>[revised 4/24/18]</i>	Any type allowed.	See types "Appropriate for Screening" in Figure 30-254b
Placement of Landscaping:	Within 10 feet of building foundation.	Within 10 feet of paved area or within paved area.	Within 10 feet of street right-of-way.	Any location.	Within bufferyard, per Figure 30-253f
Calculation of Landscaping Points:	Points per 100 linear feet of building foundation	Greater of: points per 10 parking stalls or 10,000 square feet of paved area	Points per 100 feet of street right-of-way frontage	Points per 1,000 square feet of gross floor area for all principal and accessory buildings on lot	See Figure 30-253f
Zoning Districts:					
Rural Holding (RH-35)	20	20	20	10	Only required along certain zoning district boundaries.
Single-Family Res. (SR-2)	40	50	100	20	
Single-Family Res. (SR-3)	40	50	100	20	
Single-Family Res. (SR-5)	40	50	100	20	
Single-Family Res. (SR-9)	40	50	100	20	
Duplex Res. (DR-6)	50	50	100	20	See Figure 30-253b for requirements
Two Flat Res. (TR-10)	50	50	100	20	
Multi-Family Res. (MR-12)	60	50	100	20	
Multi-Family Res. (MR-20)	70	50	100	20	

City of Ferndale - 'Planned Natural Landscaping'

Sec. 20-45. - Planned natural landscaping.

(a) Any person who is an owner of real property wishing to maintain a planned natural landscaping area shall register his or her property with city, through a registration process established by the city manager or city manager's designee.

(b) Any registered planned natural landscaping area shall be setback at least three feet from any side yard lot line in the front yard.

(c) Planned natural landscaping shall be cut back at least annually to remove dead or unmaintained growth. A person who is an owner of real property shall cut or remove any dead or unmanaged growth on his or her property, including a planned natural landscaping.

City of Green Bay - 'Noxious Weeds and Maintenance of Vegetation'

SECTION 1. Section 8.11, Noxious Weeds and Other Unsightly Growth, Green Bay Municipal Code, is repealed and recreated as follows:

8.11 NOXIOUS WEEDS AND MAINTENANCE OF VEGETATION

(1) PURPOSE. It is the purpose of this Section to prohibit the uncontrolled growth of vegetation and to control noxious weeds, while permitting the planting and maintenance of planned natural landscaping that add diversity and richness to the quality of life. There are reasonable expectations regarding the proper maintenance of vegetation on any lot or parcel of land. It is in the public's interests to provide standards regarding the maintenance of vegetation because vegetation which is not managed can decrease the value of nearby properties and threaten the public health and safety. It is also in the public's interests to encourage diverse landscaping treatments, particularly those that encourage the preservation, restoration, and management of native plant communities which can be economical, low-maintenance and effective in soil and water conservation. The City enacts this Section to balance these competing interests.

(2) DEFINITIONS.

(a) "Destroy" means the complete killing of weeds or the killing of weed plants above the surface of the ground by the use of chemicals, cutting, tillage, cropping system, or any or all of these in effective combination, at a time and in a manner as will effectually prevent the weed plants from maturing to bloom or flower stage.

(b) "Garden" means a cultivated area dedicated to growing vegetables, fruits, annual and perennial plants, ornamental grasses and ground cover in a well-defined location.

(c) "Native Plants" means those grasses (including prairie grasses), sedges (solid, triangular-stemmed plants resembling grasses), forbs (flowering broadleaf plants) that are native to or naturalized to the state of Wisconsin. Native plants do not include weeds.

(d) "Noxious Weeds" means any plant listed under §§ 23.235(1)(a) or 66.0407(1)(b), Wis. Stats., and shall also include *cirsium* and *carduus* spp. (thistle), *ambrosia* spp. (ragweed), *alliararia petiolata* (garlic mustard), *plantago lanceolata*

(buckthorn), and poison ivy.

(e) "Ornamental Grasses and Groundcovers" means grasses and groundcovers not indigenous to Wisconsin. Ornamental grasses do not include turf grasses and weeds.

(f) "Planned Natural Landscaping" means a planned, intentional and maintained planting of native plants, ornamental grasses and groundcovers, rain gardens, shrubs and trees. Planned natural landscaping does not include any species of turf grasses and is not intended to allow a property owner to ignore lawn care duties

(g) "Rain Garden" means a native plant garden that is designed not only to aesthetically improve properties, but also to reduce the amount of storm water and accompanying pollutants from entering streams, rivers and lakes.

(h) "Turf Grasses" means grasses commonly used in regularly cut lawns or play areas including bluegrass, fescue or rye grass blends or any other similar grasses.

(i) "Unmanaged Plant Growth" means any grass, hay, weeds, brush or other offensive vegetation which has grown to a height of over 9" but does not include:

1. Gardens,
2. Plants located on agricultural land,
3. Plants located on shoreland within 35 feet of the ordinary high-water mark,
4. Plants located within environmentally sensitive areas such as steep slopes, drainage ways, wetlands, and protective buffer areas, or
5. Planned natural landscaping that is wholly contained within the parcel on which it is planted and maintained.

(3) CONTROL OF NOXIOUS WEEDS

(a) A person owning, occupying, or controlling land shall destroy all noxious weeds on the land. The person having immediate charge of any public lands shall destroy all noxious weeds on the lands.

(b) If a person neglects to destroy all noxious weeds as required under par. (a), the Weed Commissioner shall destroy or have destroyed the noxious weeds. The cost of destroying the weeds shall be charged and assessed in the manner provided by § 66.0517(3)(b)1, Wis. Stats.

(4) UNMANAGED PLANT GROWTH

(a) A person owning, occupying, or controlling any residential lot or property adjacent to or adjoining a residential lot shall cut and remove any unmanaged plant growth on the land.

(b) If a person neglects to cut and/or remove unmanaged plant growth as required under par. (a), the Weed Commissioner shall cut down and remove or cause to be cut down and remove the unmanaged plant growth. The cost of cutting and removing the unmanaged plant growth shall be charged and assessed in the manner provided by § 66.0627(2), Wis. Stats.

(5) PLANNED NATURAL LANDSCAPING

(a) Any person wishing to maintain a planned natural landscaping area on their property may register their property with the Department of Public Works.

(b) Planned Natural Landscaping Guidelines:

1. Turf grass is to be eliminated and the native plants, trees and shrubs are to be planted through transplanting or seed by humans or mechanical means.
2. Setbacks:

- a. 3 feet from front lot line when adjacent to a public sidewalk and 0 feet from front lot line if there is no public sidewalk
- b. 3 feet from rear and side lot lines
- c. No setback is required on side and rear lot lines if there is a fence along the lot lines, or the native landscaping abuts a neighboring planned natural landscaping area public park/open space, or is adjacent to a natural area.
- d. The setback area should be regularly cut turf grass, garden beds, trees, shrubs, mulch, wood chips or landscape stone.
- e. Planned natural landscaping is to be cut to a maximum height of 9” once annually by July 15th.

(c) Complaint Notification. Any person who registers a parcel as natural landscaping with the Department of Public Works shall receive a notice that the Weed Commissioner intends to take action on the parcel under this section ten (10) business days before any action is taken. If the registered parcel owner objects within ten (10) business days after the notice was issued, the Improvement & Services Committee shall recommend whether the parcel is a planned natural landscaping exempt from §8.11(4) of this ordinance to the Common Council. The Common Council shall affirm or reverse the Improvement & Service Committee’s recommendation and issue a final decision.

(6) APPEAL.

Any property owner wishing to contest a charge assessed under this section may appeal to the Improvement & Services Committee. The appeal shall be in writing and submitted to the City Clerk within 30 days of the date on which the unmanaged plant growth and/or noxious weeds were cut and/or destroyed. The Committee may uphold, modify or cancel the charge. This procedure for administrative review shall not be governed by Ch. 68, Wis. Stats.

SECTION 2. All ordinances, or parts of ordinances, in conflict herewith are hereby repealed.

SECTION 3. This ordinance shall take effect on and after its passage and publication.

Appendix C: Cost Breakdown for Turf grass and Native Vegetation Landscape Features

Table 1: Low Estimate Cost Comparison of Installing and Maintaining a 1 Acre Site Using Sodded Turf, Seeded Turf, or Prairie Planting Over 5, 10, and 20 Years

Procedures & Material	Sodded Turf	Seeded Turf	Prairie
Herbicide	\$140	\$140	\$140
Tilling	\$392	\$392	\$392
Sod & Installation	\$5,964	\$0	\$0
Seed & Installation	\$0	\$1,064	\$1,232
Wildflower Planting	\$0	\$0	\$1,680

First Year Mowing	\$784	\$672	\$196
Total Installation Per Acre	\$7,280	\$2,268	\$3,640
Subsequent Annual Maintenance Per Acre	\$1,120	\$1,120	\$168
Cost Over 5 Years	\$12,880	\$7,868	\$4,480
Cost Over 10 Years	\$18,480	\$13,468	\$5,320
Costs Over 20 Years	\$29,680	\$24,668	\$7,000

(Adapted from Northeastern Illinois Planning Commission)

Table 2: High Estimate Cost Comparison of Installing and Maintaining a 1 Acre Site Using Sodded Turf, Seeded Turf, or Prairie Planting Over 5, 10, and 20 Years

Procedures & Material	Sodded Turf	Seeded Turf	Prairie
Herbicide	\$140	\$140	\$140
Irrigation	\$1,680	\$1,680	\$0
Top Soil	\$4,480	\$4,480	\$0
Tilling	\$392	\$392	\$392
Sod & Installation	\$5,964	\$0	\$0
Seed & Installation	\$0	\$1,064	\$1,232
Wildflower Planting	\$0	\$0	\$1,680
First Year Mowing	\$784	\$672	\$196
Total Installation Per Acre	\$13,440	\$8,428	\$3,640
Subsequent Annual Maintenance Per Acre	\$1,120	\$1,120	\$168
Cost Over 5 Years	\$19,040	\$14,028	\$4,480
Cost Over 10 Years	\$24,640	\$19,628	\$5,320
Cost Over 20 Years	\$35,840	\$30,828	\$7,000

(Adapted from Northeastern Illinois Planning Commission)