

Zoning Quick Sheets

Best Practice 2.6 – Green Infrastructure

What is this best practice?

Best Practice 2.6 outlines the expectation that communities will incorporate standards for environmental protection and green infrastructure standards into the zoning code to improve air quality, mitigate effects of climate change and better manage stormwater.

Why is this a best practice?

In recent years, more communities are recognizing the importance of addressing sustainability and environmental stewardship in terms of mitigating the impacts of climate change, protecting natural resources, and improving water and air quality. Zoning is one of the most effective tools for addressing the direct and indirect impacts of development on the built environment.

Utilizing “green infrastructure” improves air quality by absorbing carbon dioxide and other air pollutants as well as minimizes pollutants and sediments reaching lakes and streams. As water infiltrates permeable surfaces, the soil naturally filters sediment and pollutants and replenishes groundwater supplies. Green infrastructure also ensures water temperature remains at natural levels. This is important because stormwater runoff exposed to warm or hot impervious surfaces can raise the temperature of stormwater runoff —adversely affecting ecosystems.

In addition to its contribution to environmental quality, green infrastructure is increasingly being recognized for its contribution to placemaking, economic vitality and healthy communities. Green infrastructure can improve neighborhood aesthetics and provide green connections between parks and open space.

What are terms to know?

Gray infrastructure: A system of gutters, pipes, and tunnels that moves stormwater away from where people live and work to treatment plants or straight to local water bodies.

Green infrastructure: A system that filters and absorbs stormwater where it falls. Green infrastructure can include wetlands and trees as well as manmade parks, green roofs, bioswales and rain gardens.

Green Roofs. A green roof is an extension of a roof surface that includes a waterproofing system installed on a flat or slightly sloped roof that may be used to grow vegetation, including grasses, wildflowers, or agricultural products.

Resiliency: Being able to meet the basic needs of all residents even in the face of short and long-term threats, difficulties, and stressors, and be quickly recover from disruptions.

Sustainability: Having systems and policies in place that meet residents’ current material, financial, and social needs without compromising the ability of future residents to meet their needs.

Criteria and Expectations for Essentials and Certified

The RRC Best Practices expect certified communities to administer at least three regulations pertaining to green infrastructure. Essentials communities, while not expected to address environmental protection and green infrastructure in their zoning codes, are encouraged to consider them.

CRITERIA: The zoning ordinance includes standards for green infrastructure.	
ESSENTIALS EXPECTATIONS	CERTIFIED EXPECTATIONS
N/A	<input type="checkbox"/> The ordinance includes regulations for three or more of the following: low impact development techniques (rain gardens, bioswales, etc.); rain water collection (blue roofs, cisterns, water harvesting, stormwater vaults, etc.); green roofs; pervious pavement; steep-slope protections; street-tree planting standards; tree preservation or replacement standards; parking lot internal landscaping standards; open space preservation development (i.e., cluster housing); required native or low-maintenance plantings; renewable energy; buffering standards around water bodies or other natural resources; and/or off-site stormwater regulations allowing site developers to participate in district-scale stormwater management plans

Zoning Tools

Low impact development techniques Low Impact Development techniques are sustainable stormwater management strategies that consider site planning and natural features to emulate natural hydrologic processes. Common LID techniques include rain gardens, bioswales, bioretention, permeable pavements, or rain barrels. LID techniques help to reduce stress on existing stormwater infrastructure and mitigate community flood risk, while incorporating natural features and attractive landscape design elements into developments.

Rainwater Collection. Collecting rainwater through rain barrels, cisterns, water harvesting, and stormwater vaults, can provide a range of benefits to communities and residents by helping with water conservation, reducing stormwater runoff, and relieving municipalities from stress on the infrastructure and treatment facilities needed for stormwater.

Green Roofs. Zoning ordinances that incentivize or require green roofs, particularly on buildings with substantial roof area, can help communities reduce the stress of stormwater runoff by converting impervious surfaces into ones that absorb stormwater. In addition, green roofs help to improve the energy efficiency of buildings and curtail the overall heat-island effect in urban areas.

Pervious Pavement. Paved surfaces are impervious to rain, causing pooling and flooding without stormwater management and infrastructure. One way to reduce the stormwater runoff from paved surfaces is by permitting pervious pavement, or pavement that infiltrates rainwater. Pervious pavement should be well-maintained to ensure that sediment build-up does not

prevent water from infiltrating, especially when developments are granted waivers from stormwater requirements because pervious pavement is located on the site.

Steep Slope Protections. Limiting the disturbance of steep slopes (typically those greater than 15%) can help prevent erosion, which degrades water quality and damages structures. Steep slopes can be protected by maintaining adequate vegetation, including trees, on hillsides and minimizing the amount of unvegetated open space on hillsides.

Street Tree Planting Standards. Street trees provide many public benefits, they offer shade for pedestrians, improve the urban heat-island effect, reduce air pollution, and enhance stormwater management, while adding to the community's aesthetic charm. Zoning ordinances can include street tree planting requirements to ensure that new development aligns with the community's goals for tree-laden streetscapes and overall canopy cover.

Tree Preservation or Replacement Standards. Tree preservation or replacement standards are zoning tools that communities use to maintain their canopy cover when new development takes place. Tree preservation standards are requirements for on-site tree preservation; communities often use a credit-based scoring system to allow developers some flexibility in determining which trees to preserve, with higher credits assigned to trees with greater maturity. Some communities also have replacement standards for trees, requiring a certain portion of trees proposed to be removed are replaced with new trees on-site, helping communities recover some of their lost canopy cover when new development takes place.

Parking Lot Internal Landscaping Standards. Internal lot landscaping standards, such as requirements for the landscaping of internal parking lot islands, make parking lots more attractive for users by providing shady places to park in aesthetically pleasing lots. Often times, landscape islands are engineered to improve and direct traffic flow within the site. In addition, internal landscaping also provides environmental benefit; islands can receive stormwater runoff and help with on-site stormwater management, and any canopy cover will help to reduce the overall heat island effect of the parking lot.

Open Space Preservation (Development/ Cluster Housing). Zoning ordinances should incentivize large developments to incorporate open space preservation, to provide contextually appropriate density, while maintaining natural areas and wildlife habitats. Often, communities will use a cluster housing incentive to grant density bonuses for sites that incorporate the preservation of open space.

Required Native/ Low Maintenance Plantings. Some communities include requirements for new development to preserve or plant native or low maintenance plantings to conserve water and restore and preserve wildlife habitats. Native plantings create a vibrant landscape and offer a different aesthetic from the traditional American lawn.

Renewable Energy. As technology for renewable energy continues to improve, communities should consider incorporating new requirements to incentivize renewable energy. In addition, zoning ordinances may require new standards to ensure that renewable energy uses are constructed to be in line with the local community vision.

Buffering Standards Many communities have adopted buffering standards into their ordinance, prohibiting development from taking place within a specified distance from wetlands, water bodies, or other important natural resources. These provisions protect natural resources, wildlife habitats, and biodiversity from development impacts, while improving stormwater management

and flood control. In addition, protections for water resources help to provide aesthetic and recreational benefits community-wide.

Off-Site Stormwater Regulations Some communities include provisions in their stormwater standards or zoning ordinance provisions that incentivize developers to work together to create district-scale stormwater plans and shared retention, bioswales, or other green infrastructure to manage stormwater across multiple sites. Unlike grey infrastructure, like pipes, curb, and gutter, these practices lead to reductions in overall stormwater runoff and help to protect water resources from nonpoint source pollution. In addition to the environmental benefits, green infrastructure systems frequently provide attractive enhancements to the neighborhood or district.

Application in Communities

Until recently, many communities have not been focused on issues of sustainability and resiliency explicitly, although they are often implied goals of master plans. The master plan review and updating process can help identify areas where communities are already prepared for challenges, areas to improve preparedness and ways today's activities could be improved to reduce future impacts. These resilience and sustainability suggestions can be incorporated into other community goals and needs, such as infrastructure updates and land use considerations.

Communities that incorporate green infrastructure components in the zoning code demonstrate a forward-thinking approach to development which is attractive to investors and residents alike. Sustainable infrastructure investments also reduce a community's long-term costs by reducing the need for more costly "gray" infrastructure.

Low Impact Development

Name of Community: Holland, Michigan

Population: 34,378 (2020 Census)

Description: Holland is located across the county line of Ottawa and Allegan Counties, near the eastern shore of Lake Michigan. Holland is known for its Dutch heritage, which is not only pivotal to its cultural identity, but also as a boon for tourism; the city's Tulip Festival and Dutch-themed attractions along the Lake Michigan shoreline are a major draw for outside visitors every year. In addition to the attractions, Downtown Holland is composed of vibrant, walkable streets with a variety of retail, restaurants, and galleries to peruse. Holland is one of the most recent communities to receive Michigan Redevelopment Ready Community Certification, after adopting a new public participation plan and updating the strategic plan, including the city's economic development strategy.

The City of Holland's Unified Development Ordinance emphasizes the importance of low-impact development with many declarative intent statements distributed throughout the ordinance. In addition, the zoning ordinance requires applicants to employ stormwater management BMP's (Best Management Practices" for Low-Impact Development) to the greatest extent possible in the fulfillment of all stormwater requirements. While many communities have requirements for managing stormwater on-site, additional requirements for the inclusion of green infrastructure and natural hydrological systems will ensure sustainable methods for mitigating flood risk and reduce the overall maintenance burden for long-term management.

View Holland's Unified Development Ordinance [here](#).

Section 39-6.05 Green Infrastructure and Stormwater Management Site Design Requirements.

A. Intent. To meet the City of Holland's sustainability and resiliency goals, development needs to diversify the ways that stormwater runoff is collected, infiltrated, stored, and treated. Continued reliance solely on conventional infrastructure (water runoff into pipes and ponds) has proven to be unsustainable, especially with an increase in large storms and built development. The use of Green Infrastructure Best Management Practices (BMPs) has proven to be effective in working in conjunction with conventional infrastructure to mimic natural processes and to meet Low Impact Development site design.

B. Chapter 29 Stormwater Ordinance and UDO Relationship. Most developments shall be required to obtain a Stormwater Permit from the City Engineer in addition to obtaining Site Plan approval. Chapter 29, Article VI (Stormwater Ordinance) in the City's Code of Ordinances provides specific engineering standards to meet the ordinance and obtain a Stormwater Permit and references the applicant to the City of Holland's Stormwater Standards Manual for additional stormwater designs and details.

C. This section of UDO requires the applicant to meet the Stormwater Ordinance requirements in specific ways that are critical for site design and achieving Low Impact Development goals. The 2 ways these requirements do this are through the use of Structural Green Infrastructure Best Management Practices and by making retention and detention ponds amenities in addition to being used for stormwater storage.

D. Structural Green Infrastructure Requirement:

1. Structural Green Infrastructure Best Management Practices (BMPs) shall be used to the maximum extent practicable to comply with the Chapter 29 Stormwater Ordinance, the adopted Stormwater Standards Manual, and to obtain a required Stormwater Permit. Credits are provided when using Green Infrastructure BMPs to meet the Stormwater Ordinance and are determined through Stormwater Permit Calculations.

2. Non-Structural BMPs are encouraged to be used in addition to using the required Structural Green Infrastructure BMPs.

3. Additional Best Practices include managerial and certain other structural and non-structural BMPs that are encouraged to be used in addition to the required Structural Green Infrastructure BMPs. These are listed in Section 39-6.08.

E. Examples of Green Infrastructure BMPs

1. Structural Green Infrastructure Best Management Practices (BMPs) are stormwater management and treatment techniques where devices are constructed for temporary storage and treatment of stormwater runoff.

The following Structural Green Infrastructure BMPs shall be approved in meeting the requirement in Section 39-6.05.C.

a. Pervious Durable Surface. Section 39-6.06

- b. Rain Garden / Bioretention. Section 39-6.07.A
- c. Vegetated Swale / Bioswale. Section 39-6.07.B
- d. Vegetated Green Roof. Section 39-6.07.C
- e. Tree Box Filter. Section 39-6.07.D
- f. Constructed Filter. Section 39-6.07.E
- g. Vegetated Filter Strip. Section 39-6.07.F

2. Additional Structural Green Infrastructure BMPs are listed in Appendix 3 of the City's Stormwater Standards Manual as 'LID and Small Site Structural Best Management Practices.' Other Structural Green Infrastructure BMPs may be requested and approved by the Approving Authority.

3. Non-Structural Green Infrastructure BMPs are stormwater treatment techniques that use natural measures to manage and treat stormwater and do not involve the construction or installation of devices.

These types are encouraged, but are not required or countable in meeting the requirement of this section. They include:

- a. Native Revegetation
- b. Minimized Soil Compaction
- c. Natural Flow Paths and Sensitive Area Preservation
- d. Wetland Preservation
- e. Tree Preservation

Rainwater Collection

Name of Community: City of Ypsilanti

Population: 20,648 (2020 Census)

Description: The City of Ypsilanti is located in Washtenaw County and home to Eastern Michigan University. Ypsilanti was the second city to incorporate in the State of Michigan and has a rich tradition of historic preservation to prove it, with the fifth largest preservation district in the state. The decline of the auto-industry in Michigan and 2008 recession had a profound impact on Ypsilanti's economy; during the years since, Ypsilanti has worked to recover lost jobs and tax revenue by seeking a more diverse economy. Revitalization has been a community-wide effort, and recently, culminated in Ypsilanti receiving \$4.3 million in State funding for the Water Street Redevelopment Project in the heart of Downtown.

In addition to having local stormwater requirements to manage off-site stormwater, the City of Ypsilanti has zoning regulations that include standards for several different accessory

stormwater control features, including rain barrels or cisterns. While these standards do not serve as an incentive or require rainwater collection as a part of site plan approval, they provide clear guidelines for developers who choose to incorporate them into their plans and permit them to be included in all zoning districts. By providing clear site standards for rainwater collection, developers are more likely to consider rainwater collection as a part of their plan. In addition to standards for rainwater collection, other communities may include rainwater collection as an incentive tied to a section of the ordinance where there may be some flexibility to the discretion of the planning commission (i.e. PUD requirements, landscaping standards, commercial design standards, etc.).

See the City of Ypsilanti's zoning ordinance [here](#).

Section 122-639 Accessory Stormwater Control Features

(d) Rain barrels or cisterns. Rain barrels or cisterns are permitted in all districts.

(1) Underground cisterns or rain barrels are subject to engineering review and constructed in accordance with the State Building Code.

(2) Aboveground rain barrel or cistern systems in excess of 250 gallons accessory to the Mansion, Estate, Apartment House, Courtyard Apartment, Apartment Building, Commercial/Mixed-Use Small, Commercial/Mixed-Use Medium, Commercial/Mixed-Use Large, Single-story Commercial Building, Large Footprint Single Story Commercial Building, Multiple Story, or Institutional building types; or in excess of 250 gallons and located in the R-1 district not accessory to a single-family use; or in excess of 250 gallons and located in the MD or PMD districts, must conform to the accessory building standards in place for those building types and be subject to engineering review and constructed in accordance with the Building Code.

Green Roofs

Name of Community: Grand Rapids, Michigan

Population: 198,917 (2020 Census)

Description: Grand Rapids is Michigan's second largest city and the county seat of Kent County. Between the 2010 and 2020 Census, the Grand Rapids Metropolitan Area population increased by over 40%, making it the fastest growing metropolitan area in Michigan. During this time, Grand Rapids has completed many pivotal redevelopment, infill, and adaptive reuse projects that have garnered attention from outside visitors, generated economic opportunities, and helped to connect key areas of the Downtown. To keep up with the momentum of growth and development, the city has embarked on its first master plan update in twenty years.

The City of Grand Rapids has a requirement for minimum required green space in all of the mixed-use commercial zoning districts, with residential-only developments often requiring more intensive green space than mixed-use or non-residential sites depending on the district. The intention of the minimum green space is to provide recreational and stormwater benefits, however, the ordinance grants applicants some forgiveness from the minimum green space requirement when pervious surfaces are incorporated into the site design elsewhere on the site, with green roofs listed as a potential exception. By including green roofs as an alternative to

required open space, developers may be able to maximize density and site improvements, while including adequate pervious cover to slow stormwater runoff and manage flood risk.

View the City of Grand Rapids Zoning Ordinance [here](#).

Section 5.6.07 (H) Site Layout and Building Placement Requirements

H. Minimum Lot Greenspace.

1. *Purpose.* The minimum greenspace requirements are designed to ensure a sufficient amount of area for recreation, nature, and greenspace as well as to provide a pervious surface to assist in stormwater management.
2. *Applicability.* The minimum required greenspace provision shall apply to each lot in its entirety. Greenspace includes all natural pervious land surfaces that are covered with soil (and usually with lawns, landscaping, or other plant materials) or water bodies; and does not include permanent structures, sidewalks, patios, decks, or pavement of any type including gravel except as permitted for a stormwater credit.
3. *Stormwater Credit.* Up to twenty-five (25) percent of the minimum calculated greenspace requirements may consist of pervious hardscape surfaces, such as grass pavers, uncovered decks, brick pavers with a sand base, pervious concrete and asphalt, if used to account for the stormwater requirements of Chapter 32 of the City Code.
4. *Front Yards.* Front yards shall consist of greenspace, and impervious surfaces shall be limited to driveways and private sidewalks, except in the MON-C Zone District where hard surfacing for parking areas is allowed.
5. *Greenspace Credits.* Landscape buffers, permanent planters, landscape islands, rain gardens, vegetated walls and green roofs that are readily accessible and usable by building tenants may be included in greenspace calculations.
6. *Exception.* A reduction of not more than fifty (50) percent of the required greenspace listed in Table 5.6.07.A. is permitted for development projects that satisfy at least one (1) of the following criteria:
 - a. A stormwater mitigation plan that retains one hundred (100) percent of all stormwater on site, as approved by the City's Environmental Protection Services Department (EPSD).
 - b. Submittal of a LEED checklist and proof of registration that demonstrates the intent to apply for LEED building certification, or other generally recognized sustainable building certification.

Pervious Pavement

Name of Community: Kalamazoo, Michigan

Population: 73,808

Description: The City of Kalamazoo is the County Seat of Kalamazoo County and is located

about half-way between Detroit and Chicago along the I-94 corridor. Kalamazoo is known as home to some of Michigan's leading academic institutions, Western Michigan University and Kalamazoo College. In 2017, Kalamazoo adopted several unified plans to consider how future development can align with broad community goals. In addition to the strategic plan and master plan, Kalamazoo began efforts to align its long range planning documents according to the community's shared goals. The strategic plan establishes the community's ten long range planning goals and lists all implementing plans aligned with each goal; for example, one of the goals is to create "a green and healthy city," and the implementing plans include the Master Plan, Hud Consolidated Plan, Parks and Recreation Plan, Climate Action plan, Asset Management Plan, and the Transportation Improvement Plan. Since the adoption of the Master Plan, Kalamazoo has made substantial progress towards its goals, including several road diet and complete streets projects, zoning updates, and the adoption of neighborhood-specific plans.

The City of Kalamazoo's district specific standards include a maximum impervious cover for each zoning district. This impervious requirement ensures that residential and commercial developments are not overly burdensome on the local stormwater system by managing the amount of land that does not absorb water. Included with this requirement is an exception for surfaces which contain pervious pavement, granting developers the opportunity to maximize their desired paved footprint, without compromising community goals for impervious land cover. The pervious pavement must be a city-approved material. In addition to requiring administrative approval of the pervious material, some communities may require a maintenance agreement or include maintenance standards to ensure that pervious pavements remain clear of dirt and sediment which could hamper water absorption.

Section 5.3 (F) Measurements, Computations, and Exceptions

F. Impervious Cover. Impervious surface is any hard surfaced, human-made area that does not readily absorb or retain water, including but not limited to building roofs, parking and driveway areas, graveled areas, sidewalks and paved recreation areas. In addition, impervious cover includes swimming pools, because absorbed and retained water is not permitted to permeate the ground. City approved pervious paving materials may be excluded from impervious cover calculations.

Steep Slope Protections

Name of Community: City of Ann Arbor, Michigan

Population: 123,851 (2020 Census)

Description: The City of Ann Arbor is the County Seat of Washtenaw County and home to the University of Michigan. Downtown Ann Arbor has long been recognized for its broad mix of retail, restaurant, and service establishments, but in recent years, has experienced substantial residential growth through mixed-use zoning, increased densities and density bonuses, and the reevaluation of auto-oriented land uses, such as surface parking.

The City of Ann Arbor has adopted development standards for steep slopes to prevent disturbances which would cause erosion, depositing soils in watercourses and on the land below. Retaining steep slopes helps to manage runoff and the volume of discharges to water resources, while maintaining vistas and natural features that enhance the overall landscape. The steep slope standards in Ann Arbor's ordinance define which slopes are of high, moderate, and low concern based on the steepness of their slope and connection to other natural

resources, with the most restrictive preservation standards applied to the slopes of highest concern. The ordinance also includes protection measures to manage erosion and protect steep slopes from disturbances, if construction must take place within a high or mid-level priority slope, mitigation standards will be applied to restore natural resources on the site. Communities should consider their topography holistically before crafting a steep slope ordinance.

5.23.7 Steep Slopes

Steep Slopes in Ann Arbor are found on the sides of moraines, kames, and ravines, and the eroded valleys of waterways. Steep Slopes are prone to Erosion if the vegetation on them is disturbed, or if surface runoff is directed toward them or down them. As a result, disturbed slopes often result in deposition of soils in Watercourses and on the land below. Hydrologic functions such as infiltration, frequency and volume of discharges, and impacts of the proposed Development upon water resources on and off site must be considered. The City's Steep Slopes still often retain on them or adjacent to them various Wetlands, prairie-savannas, rare species, Floodplains, Watercourses, and the City's largest areas of native forest fragments. Steep Slopes with native forest fragments or other overlapping Natural Features have high natural and scenic value. Scenic values are measurable. Each Site can be quantified for its relative overall scenic value as viewed from vista points off the Site. Steep slopes, especially those in the Huron River Valley still covered by native forest fragments, are the most important natural scenic assets of the City. Vistas of unbroken native forest tree Canopy, visible on Steep Slopes and moraine tops, are vital to maintain across the City.

A. Identification

1. Steep Slopes are naturally occurring landforms with a vertical change in elevation of ten feet or more, a slope of 20% or more, and a length of 50 feet or more, measured parallel to the contour lines. They were identified on the "Map of Steep Slopes of Ann Arbor, 2004." Most Steep Slopes in the City occur in the Huron River corridor or along its tributaries.

2. Also shown on the map are zones 3,000 feet each way from the centerline of the Huron River, and zones 500 feet each way from the centerlines of the tributary streams in the City. These zones encompass the great majority of Steep Slopes in the City, and are an initial approximation of the areas in which there are likely to be both other Natural Features of high concern and slopes of high visual sensitivity.

B. Protection Priorities

1. Highest Concern

a. Extremely Steep Slopes of 40% or greater anywhere in the City are of highest concern. These are predominantly adjacent to the River and typically also include one or more other Natural Features.

b. Steep Slopes of 20% or greater that are within 3,000 feet of the Huron River or within 500 feet of its open or historic tributaries and that: a) have native forest fragments or other high quality Natural Features in addition to the Steep Slope; or b) serve as a source of water for adjacent or connected water features; are of highest concern.

c. These Natural Features need to be sustained and cared for as natural areas. In the event the public benefits of a proposed Development in an area of highest concern are deemed to outweigh the benefits of maintaining it as a protected natural area, the project shall meet the highest standards of mid-level concern. When Steep Slopes are considered for Development the impact on the City's visual character shall be considered, and negative impacts minimized in the approval process.

2. Midlevel Concern

a. Steep Slopes within 3,000 feet of the Huron River or within 500 feet of its open or historic tributaries that do not meet the criteria for highest concern are of mid-level concern.

b. The landform and vegetation on these slopes must be disturbed to the least extent possible. The visual integrity of the Site in relation to adjacent areas should be maintained. The techniques for Erosion and water protection described for low-level Steep Slopes shall be followed.

3. Low-level Concern

a. Steep Slopes not within 3,000 feet of the Huron River or within 500 feet of its open or historic tributaries are of low-level concern.

b. Development on Steep Slopes requires special techniques to prevent soil Erosion and to protect water resources. A study of ground and surface water flows of the Site may be required to understand possible on- and off-site impacts of a proposed Development on the water resources. Landscape work on these Sites should be designed to restore native ecologies, to reduce storm water runoff, to enhance infiltration, to increase Flood storage capacity, to allow only clean water to exit the Site, and to honor natural linkages and natural areas and adjacent water features. Soils must not be permitted to wash from these Sites under any circumstances.

c. The Site's design should incorporate the slopes so that the Development complements the character of the landforms, vegetation and topography. Any Development must meet all the standards for any other Natural Features of the Site.

C. Protection Measures

1. Barrier fencing shall be installed at the Limits of Soil Disturbance adjacent to Steep Slopes. Barrier fencing shall be a minimum of four feet in height and shall remain in place in good condition until it is authorized to be removed. No filling, excavating or storage of materials, Debris or equipment shall take place within the fenced area.

2. Protection measures must be in place before landform or vegetation disturbance to prevent any off-site damage. Any damage to waterways or off-site locations from Erosion must be promptly repaired to the fullest extent practical, using best management techniques. A heavy rain event is not an excuse for such damage to occur. Collateral damage during and after construction to Canopy trees on scenically important Sites must be scrupulously avoided (it will take 150 years to replace any unintended losses). Plans presented for Development on Steep Slopes must reflect sound analysis of scenic values, must show very serious concern for soil Erosion controls, and have very carefully crafted limits of disturbance

lines, and must indicate procedures whereby all contractors, subcontractors, owners and inspectors are fully and continuously informed of the values on the Site that must be protected, without errors.

3. Great attention should be exercised in the approval and inspection process regarding the design of drainage systems, roads and paved surfaces, retaining walls, and the means by which the entire project will actually be constructed, to avoid collateral, unintended damage. The use of retaining walls can reduce the amount of Grading necessary, but are not encouraged (they are rarely durable Structures). If retaining walls are proposed, the use of walls that incorporate vegetation are encouraged to improve aesthetics. Underground utilities should not be located in Steep Slopes and should not run lengthwise along them. Drainage should be directed to inlet structures and not be permitted to flow down slopes during and after construction.

4. The primary goal in protecting Steep Slopes is to prevent Erosion and subsequent damage to Natural Features on and off the Site. Underground utilities should not be located in Steep Slopes, and should not run lengthwise along them. Drainage should be directed to inlet structures and not be permitted to flow down slopes during and after construction.

5. Protection measures for other Natural Features placed at risk by intrusion onto a Steep Slope should be designed and implemented in such a way that risk of damage to the Natural Features involved is the minimum possible. These provisions may need to be significantly more strenuous than those which might be implemented for the same Natural Features on flat ground.

D. Mitigation Disturbed areas of Steep Slopes shall approximate the natural terrain and be planted with native vegetation at the completion of construction. No new drainage may be directed over areas of disturbed slope. Disturbed areas to be reestablished shall be planted with species native to Michigan and characteristic of the plant communities of the area before disturbance. The density and coverage of vegetation (except trees) shall be such that it will approximate the density and coverage before disturbance within three years of planting.

E. Guidelines for Best Mitigation Practices

1. If any portion of a high or mid-level concern Steep Slope must be disturbed as part of an approved project, then the balance of the Steep Slope area must be protected from disturbance during construction and it must be managed/restored as a natural area thereafter. This means considerable attention will be paid to herbaceous, understory, and Canopy flora. The built landscape around any approved Buildings shall use minimum Impervious Surface, and shall be very complementary to the adjoining natural area. Roof water on the Site and other surface rainwater drainage systems on the Site are to be designed to infiltrate to groundwater (where possible) in such a way as to approximate infiltration on the site prior to the project (runoff from roads may need cleaning first). The use of green Roofs are encouraged to reduce runoff. The design of the Building and its location on the Site should not diminish the views of or character of the views of the Site, i.e. removal of a closed native forest Canopy.

2. Change to any Natural Features on a Steep Slope Site must meet the mitigation standards for those Natural Features. Replacement materials, techniques, and long-term maintenance routines required as mitigation should serve to restore the visual character of the Site.

3. Follow-up monitoring may be required in some instances for a period of time related to the duration of the restoration work or recovery from damage.

Street Tree Planting Standards

Name of Community: Marquette, Michigan

Population: 20,629 (2020 Census)

Description: The City of Marquette is in Marquette County along the Lake Superior shoreline and is the largest city in Michigan's Upper Peninsula. Marquette has a vibrant and walkable traditional downtown with a mix of professional, service-oriented, eclectic shops and restaurants, and recreational opportunities, including its beautiful waterfront. In recent years, Marquette has experienced population growth and a growing population nearing retirement age; with changing preferences for housing, new technologies, and climate change, recent planning efforts have centered on housing, accessibility, and sustainability.

The City of Marquette includes specific requirements for street trees in its landscaping standards to provide form and comfort to the street-space, with an emphasis on the benefits of using native trees and plants for street trees. The ordinance requires approval by the City Arborist for street trees to ensure they are of an appropriate species for the unique conditions applicable to each site. Trees must be planted in the road right-of-way at an average spacing no greater than one tree per 30 feet on center except when accommodating for curb cuts, fire hydrants, and other existing features, when the spacing can be up to one tree for every 45 feet on center. The street tree requirements include detailed regulations for planting location and maintenance requirements, as well as a street tree planting list with permitted species (alternative species may be permitted if approved by the City). The planting list includes information about the growth habit of each species, such as canopy shape, ability to survive harsh winters, color, fruits produced, sun, pollution, and soil compaction tolerance, to help determine the best tree for the space.

View the City of Marquette's zoning ordinance [here](#).

Section 54.1003 Landscaping Design Requirements

A. Street Trees

5. Location of Planting. Street trees may be planted in a tree lawn (the area in between the sidewalk and the curb or edge of pavement) or in tree grates where no tree lawn exists between the curb and the sidewalk. Street trees shall not be planted over public underground utilities without the approval of the City Engineering Department. Street trees must be centered horizontally and meet the following separation requirements:

- a. Two (2) feet from walkways, curbing, and other impervious pavements when planted in a tree well or continuous planter;
- b. Three (3) feet from walkways, curbing and other impervious pavements when planted in a continuous swale;
- c. Five (5) feet from street lights, underground utilities, utility meters and service lines, fences, walls and other ground level obstructions;
- d. Six (6) feet from porch eaves, and awnings and similar overhead obstructions associated with the ground level of buildings;
- e. Eight (8) feet from balconies, verandas, building eaves and cornices, and similar overhead obstructions associated with the upper stories of buildings.

6. Groundcover in Tree Lawn. Tree lawns located in the public right-of-way must be at grade (no raised or curbed planters), contain sufficient soil area to encourage healthy growth, and planted with grass or other suitable live ground cover.

7. Clearance. Street trees must remain “limbed up” as they gain appropriate maturity so as to not interfere with pedestrian or vehicle travel. A minimum clearance of seven (7) feet must be maintained over a sidewalk or walkway, and a minimum clearance of 14 feet must be maintained over the travel lanes of the street.

Parking Lot Internal Landscaping Standards

Name of Community: Novi

Population:66,243 (2020 Census)

Description: The City of Novi is located in the southwest portion of Oakland County along I-96 and about 30 miles northwest of Detroit. The community has quite a few districts and areas that allow uses that would require large parking lots, such as business districts, a conference district, an EXPO district, office and industrial districts, and town center districts. Given the suburban nature of the community, most residents and visitors are likely to drive to their destinations. The city is currently updating its master plan, but the previous plan adopted in 2017 includes objectives related to sustainability and stormwater management, maintaining high quality infrastructure and accessibility, and encouraging the use of landscaping to improve aesthetics.

Novi’s zoning ordinance includes requirements for internal landscaping in parking areas to reduce “solid expanses of impervious surfaces, to decrease runoff, to shade parking areas, and to create aesthetically pleasing and environmentally enhanced parking areas.” The Ordinance includes a formula to calculate the size of islands required and the associated landscaping, with less intensive requirements in the industrial districts than other non-residential zoning districts. Creativity in the layout of islands is encouraged, as well as incorporating pedestrian walkways into the design. The ordinance allows applicants to include curb cuts to allow stormwater to move from the parking area to the islands, and sunken islands are permitted if the plantings are salt tolerant, the island provides adequate drainage for the plantings, and all engineering standards are met. Materials for the landscaping must include a mix of canopy deciduous trees, subcanopy trees, shrubs, groundcovers, ornamental grasses and/or perennials, and every island must contain at least one deciduous canopy tree in order to count towards the total required landscape area.

View the City of Novi's Zoning Ordinance [here](#).

C. Parking Area Landscaping Requirements

i. Intent. The intent of this subsection is to require curbed landscape islands within parking areas, thereby reducing solid expanses of impervious surfaces, to decrease runoff, to shade parking areas, and to create aesthetically pleasing and environmentally enhanced parking areas.

ii. General Requirements.

a. The design and layout of all parking lots and islands shall be subject to review and approval by the City of Novi.

b. Islands are to conform to the general requirements in Section 5.3.12.

c. Creative island configuration is encouraged, such as islands between rows of parking in long, wide planting strips.

d. The use of pedestrian walkways in parking lot islands is encouraged, if the islands' paths are at least 5 feet wide with no vehicle overhang or seven (7) feet wide with vehicle overhang and a ten (10) foot planting area width is maintained.

e. Landscaped islands are to be installed with six (6) inch curbs that are designed to protect landscaping from damage by vehicles (four (4) inches where vehicles are to overhang the curb). However, periodic openings in curbs, which do not exceed two (2) feet in length, shall be permitted for the purpose of conveying storm water run-off.

f. If more than one (1) island is provided in a parking lot, they are to be distributed evenly throughout the lot.

g. Each parking lot landscape island shall have: (1) A minimum of two-hundred (200) square feet in area. (2) A minimum of two-hundred (200) square feet in unpaved area per tree planted in an island. (3) A minimum dimension of ten (10) feet in width from back of curb to back of curb. (4) A minimum of three (3) feet between the back of a curb and a tree trunk.

h. For any development other than a single one-family or two-family dwelling, the exact square footage of landscape islands required shall be as specified in the Interior Parking Area Landscape Islands and Canopy Tree Chart (Table 5.5.3.C.iii).

i. Wheel stops or raised curbing shall be installed to prevent vehicles from encroaching more than two (2) feet into any parking landscape area. When adjacent ninety (90) degree parking stalls are reduced from nineteen (19) to seventeen (17) feet in length, the required six (6) inch curbs shall be reduced to four (4) inches in height. This applies to both landscape and sidewalk overhangs. Where vehicles overhang a sidewalk, the sidewalk shall have a minimum width of seven (7) feet.

j. No plantings with a mature height greater than twelve (12) inches shall be within ten (10) feet of fire hydrants. Plant materials shall not block the visibility of the hydrant and be no taller than twelve (12) inches when below a fire department connection.

k. Trees are to be located at least ten (10) feet away from utility structures including catch basins and manholes, and should be at least five (5) feet away from underground utility lines whenever possible.

l. Islands are to have adequate drainage to the nearest catch basin or adequate areas of amended sandy loam soil, as specified on the plan, to achieve proper drainage. Depressed (sunken) islands are allowed if the plantings are salt-tolerant and the islands are designed to provide drainage adequate for survival of the island plantings and meet all City of Novi engineering standards.

m. Paint, contrasting brick or concrete pavers may be used to delineate stall lines within parking areas.

n. Any area within a parking lot not dedicated to parking use, driveways, or sidewalks exceeding one-hundred (100) square feet, shall be landscaped with a minimum of lawn or other living ground cover.

o. All parking lot landscaped areas required herein shall consist of a mix of plant materials such as canopy deciduous trees, subcanopy trees, shrubs, groundcovers (including lawn), ornamental grasses and/or perennials.

p. The total square footage of required interior landscape islands shall be provided as follows:

(1) The required square footage shall be provided only within islands that are surrounded by paved parking areas or that project into the parking lot from the perimeter of the parking area, if they meet the requirements of this Section.

(2) Areas abutting but not within the interior of the parking area shall not satisfy the requirements of this Section.

(3) Within the interior of the parking lot, islands shall be distributed evenly across the paved area so as to distribute the required landscaping throughout the parking area.

(4) No bay of parking (defined herein as a single row of side by side parking spaces) greater than fifteen (15) parking spaces in length shall be provided.

(5) If the use is primarily vehicular storage (i.e. automobile dealer vehicle inventory areas, vehicle stockpile areas, semi-trailer storage areas), bays of twenty-five (25) spaces will be allowed but the required interior landscape area must be provided.

(6) In order to count toward the total landscape area provided, an island must contain at least one (1) deciduous canopy tree.

iii. Greenspace and Parking Lot Tree Requirements. The following chart is to be used to calculate the square footage of island space and the number of canopy trees required for parking area interior and perimeter landscaping.

5.5.3.C.III Interior Parking Area Landscape Islands and Canopy Tree Chart					
	A	B	C	D	E
Category*	Total square footage of landscaped islands for VUA areas less than or equal to 50,000 sq. ft. equals:	Total square footage of landscaped islands for VUA beyond the initial 50,000 sq. ft. (A) equals:	Total square footage required in interior parking lot islands equals:	Total number of interior landscape deciduous canopy trees:	Perimeter (in linear feet) deciduous canopy trees required equals:
Footnotes	(1)(2)(3)	(1)(2)(3)		(4)(5)(7)	(6)(7)(8)
1	$VUA \times 7.5\%$	$(VUA - 50,000) \times 1.0\%$	A + B	$(A + B)/200$	Perimeter/35
2	$VUA \times 5\%$	$(VUA - 50,000) \times 0.5\%$	A + B	$(A + B)/200$	Perimeter/35
*Category 1 = OS-1, OSC, OST, B-1, B-2, B-3, C, NCC, EXPO, FS, TC, TC-1, RC Districts and Special Land Uses					
*Category 2 = I-1, I-2					
Notes to table:					
<ol style="list-style-type: none"> 1. Round fractions of trees to the nearest whole number. 2. Vehicular Use Area (VUA) to be used in this calculation includes parking spaces, loading areas, and access aisles. It does not include drives to the Vehicular Use Area. See illustration below. 3. If a vehicular use area is greater than 50,000 square feet, the landscape requirement for the first 50,000 square feet of VUA is to be calculated per Column A, and the requirement for the remaining VUA is to be calculated per Column B. The landscaping for the total requirement should be spread evenly across the entire VUA As an example, a 65,000 square foot parking area in Category 1 would require $50,000 \times 7.5\%$ plus $15,000 \times 1\% = 3750 \text{ sq. ft.} + 150 \text{ sf} = 3900 \text{ sq. ft.}$ landscape area within the parking lot boundary. 4. Deciduous canopy trees are required for all interior parking trees. In areas with overhead utility lines, subcanopy trees may be approved at a rate of 1.5 subcanopy trees per 1 canopy tree required. 5. Access drives outside of parking areas shall have perimeter trees planted at the rate of 1 per 35 linear feet of drive length on both sides of the aisle, ending at the right-of-way/property line. The portion of an access way to the parking lot that passes through the right-of-way greenbelt may be subtracted from the basis of calculation if an equivalent number of greenbelt canopy trees are within 15 feet of the drive and fulfill the requirement for 1 tree per 35 linear feet. 					

Open Space Preservation Development/ Cluster Housing

Name of Community: New Buffalo, MI

Population: 1,708 (2020 Census)

Description: New Buffalo, Michigan is in Berrien County, just over the Indiana border outside the Chicago Metropolitan Area. New Buffalo is along the sandy Lake Michigan shoreline and is known as a popular vacation destination for beachgoers and tourists during the summer months. In recent years, Downtown New Buffalo has flourished with new development, including new retail businesses, restaurants and attractions, missing middle housing, and mixed-use buildings, but during the same period, older, rural neighborhoods have struggled with disinvestment and a shrinking population. The City's recent master plan addresses these challenges by focusing on five core strategies that balance the demand for growth in the Downtown with the need for investment in neighborhoods due to population loss and seasonal

industries; the core strategies include: revitalize the downtown and lakefront, infrastructure, strengthen neighborhoods and housing, develop a year-round economy, and promote pedestrian and bicycle mobility.

The City of New Buffalo's Planned Unit Development standards require that at least 20% of the entire PUD area be dedicated to open space to preserve "the highest quality natural features" on the site. Open space areas are encouraged to be designed to be as contiguous as possible. The city can award density bonuses (an increase in the number of dwelling units allowed per unit area) up to a maximum of 50% for designing the site to include things such as a high level of clustered development with common open space exceeding the required 20% of the site, providing active recreational facilities, and preserving natural features such as wooded areas, wetlands, floodplains, and unique vegetation areas. A summary of these density bonuses is included below.

To view the City of New Buffalo's Zoning Ordinance, click [here](#).

18-6 General Design Standard for PUDs

F. Open Space. A minimum of 20% of the entire PUD area shall be provided in permanent open space. The permanent retention of this open space area shall be provided for in the PUD ordinance and illustrated on the development plan. This required open space area shall serve to preserve the highest quality natural features present on the site. Such areas may include woodlands, wetlands, floodplains, water bodies, and areas of unique vegetation. Open space areas shall also be designed to be contiguous to the extent possible. Required setbacks, road right-of-way or easements, and stormwater detention areas shall not be counted toward the open space requirement.

18-8 Density for residential PUDs

B. Density bonus criteria. The density bonus shall be based on an aggregate of one or more of the following elements for which the Planning Commission and the City Council determines the PUD qualifies; provided the total density bonus shall not exceed a maximum of 50%:

1. A high level of clustered development with common open space exceeding the requirements of Section 18-6F may qualify for density bonuses in accordance with the following:
 - a. Twenty-five percent of open space: 5% density bonus.
 - b. Thirty-five percent open space: 15% density bonus.
 - c. Forty-five percent open space: 20% density bonus.
2. Inclusion of an integrated mixture of housing types, such as detached housing with attached housing or multiple-family dwellings may qualify for up to a 5% density bonus.
3. Including a restriction in the PUD prohibiting the removal of tree cover beyond a one-hundred-foot distance from a dwelling unit may qualify for up to a 5% bonus.
4. Providing active recreational facilities such as a golf course, baseball diamond, tennis court, basketball court or community clubhouse may qualify for up to a 5% density bonus.

5. Cleanup of site contamination consistent with a baseline environmental assessment (BEA) approved by the Michigan Department of Environmental Quality may qualify for up to a 10% density bonus.

6. Combining parcels under different ownership for the PUD project may qualify for up to a 10% density bonus.

7. Preserving natural features such as wooded areas, wetlands, floodplains, and unique vegetation areas may qualify for up to a 5% bonus, depending on the degree of preservation and preservation plan.

Required Native/ Low Maintenance Plantings

Name of Community: Oshtemo Charter Township, Michigan

Population: 23,702

Description: Oshtemo Charter Township is in Kalamazoo County, in the Kalamazoo metropolitan area. Although the Township has historic roots as an agricultural center, Oshtemo's population has developed to become a mostly residential community with two main commercial areas. This shift resulted in substantial population growth, more than doubling the size of the township between 1980 and 2010, and projections indicate growth is expected to continue at a healthy pace. The Township's development policies and plans reflect an expectation that demands for new housing and public services will continue.

Oshtemo Township emphasizes the importance of native plantings by declaration in the intent of the ordinance. The landscaping provisions recommend native plantings where practical and require them in and around detention areas. Most notably, however, there is a native planting standard in the optional overlay district, a district where applicants can seek flexibility from the underlying zoning district by following additional standards. In this district, developers who opt into the overlay standards must include native materials for 60% of all proposed landscaping in addition to meeting several other standards intended to preserve and maintain the natural landscape. Other communities may consider adopting native landscaping requirements for all districts or determine special areas where conservation of the natural environment is of greater priority.

View Oshtemo Township's Zoning Ordinance [here](#).

Unifying Elements. The following unifying elements should be a part of every development within the 9th Street Sub-Area and West Main Street Sub-Area: 119

a. Existing natural features, such as wetlands, woodlands, landmark trees, and scenic vistas, should be preserved and incorporated into the development or redevelopment.

b. To screen uses from the roadway, undulating landforms and a combination of trees, shrubs, perennials and grasses should be used instead of rigid berms and rows of evergreen trees.

c. Where feasible, the required bicycle paths along 9th Street and West Main Street should

meander and undulate through the landscape and not proceed in a straight line parallel to the road. Lower level bike path lighting is allowed.

d. Building setbacks and landscape buffers should be designed as naturalized green spaces, incorporating sustainable storm water management features and creative use of vegetation.

e. At least 60 percent of the landscape proposed should be composed of materials that are native (For a listing of species native to Lower Michigan, see MICHIGAN FLORA ONLINE at www.michiganflora.net) and hardy in both rural and suburban settings, inspire rural images and vistas, maintain a healthy condition in a street side environment and provide visual interest to highlight the rural indigenous character of the Township.

2. Low Impact Development (LID) best management practices shall be used in the development of any site or development within the Overlay District. The design of stormwater management systems shall respond to the natural drainage patterns of the area and be in coordination with the groundwater protection standards of Section 56.10 and the groundwater protection policies set forth in the Master Plan.

3. All development shall be designed to incorporate and/or promote the preservation of the site's natural features and unique physical characteristics. A natural features preservation plan shall be submitted. This shall include an inventory of existing conditions. Green space enhancement plans for land area along public roads abutting the commercial development shall also be provided.

Renewable Energy

Name of Community: Frankfort, Michigan

Population: 1,252 (2020 Census)

Description: The City of Frankfort is in the Northern Lower Peninsula in Benzie County, along the Lake Michigan shoreline. Given its proximity to lakes and summer recreation destinations, Frankfort has long struggled with the imbalances presented by its seasonal economy and changes in the residential population over the course of the year. The new master plan includes goals and strategies to help expand winter tourism and diversify the local economy to sustain more year-round, knowledge-based industries. The Master Plan also seeks to incorporate new, walkable residential opportunities in and around the Downtown Area to provide urban amenities that will attract year-round residents and meet the City's high demand for housing. Beyond these key economic and land use goals, the plan emphasizes the value of the City's natural resources and includes goals of sustainability, preservation, and community stewardship, stressing that these natural resources are a key element of Frankfort's community character and identity.

Frankfort's zoning ordinance puts a strong emphasis on renewable energy, with provisions to address wind and solar energy at the residential and commercial scale. The intention of this section is to encourage these uses to reduce reliance on non-renewable energy sources, while ensuring that they are compatible with neighboring uses. The regulations for both solar and wind energy are district-specific and allow for more intensive systems in the industrial-entrepreneurial district. Wind energy systems are prohibited in the east and west main street districts and are required to be building mounted in the residential and waterfront districts; other districts allow pole-mounted systems, but the height limitations for pole-mounted wind energy

are the most permissive in the industrial-entrepreneurial district. Solar energy systems are permitted in the residential and waterfront districts, east and west main street districts, and the industrial-entrepreneurial, civic, rural, and institutional districts. The ordinance includes standards for the appearance of building-mounted solar energy systems contingent on the roof type of the structure and only permits building-mounted solar in the residential and waterfront districts and east and west main street districts (Downtown). More intensive, tower-mounted or freestanding solar systems are permitted in the industrial-entrepreneurial, civic, rural, and institutional districts, and the ordinance includes bulk and dimensional requirements for these types of solar energy systems.

View the City of Frankfort's Zoning Ordinance [here](#).

Section 8207: Renewable and Alternative Energy

8207.01 Intent The City of Frankfort encourages the use of local renewable/alternative resources, including appropriate applications for biomass conversion, solar, wind, and other energy capture technologies that reduce or eliminate the destruction or consumption of natural non-renewable energy sources. In conformity with the City Master Plan of 2010 objectives that begins with improved Energy Efficiency for commercial, industrial, civic, institutional buildings and residences the City creates this Section to provide regulations governing renewable energy systems. The locations for biomass, wind, solar and other energy systems, conversion, and storage locations are intended to ensure compatibility with surrounding uses; and they are intended to promote public health, safety and welfare through the effective and efficient use of renewable energy systems and to increase opportunities for generation of renewable energy within the City of Frankfort.

8207.03 Wind Energy Systems Permitted With Restrictions General standards for all wind energy systems and operating equipment shall comply with general standards for approval for site plan approval (see Section 8107: Site Development Plan Review) and land use permit, and with all county building department construction and electrical requirements. The Rotor Diameter shall be proportional to the mounting height with a minimum blade height above ground of ten (10) feet. Any installed wind energy collection or storage system that is not in operation for a continuous period of 12 months, or is damaged, or inoperable because of mounting or equipment failure, is considered abandoned, and the owner shall remove the same within 90 days of receipt of notice from the City. Any abandoned wind energy that is not removed within 90 days of said notification from the City may be removed by the City at the owner's expense. All wind energy collection systems will meet the standards set in the City of Frankfort Municipal Code, Chapter 5, Noise Control, specifically section 5404 Maximum Permissible Sound Levels. A wind energy system, which emits a pure tone, would be subject to a reduction of five dBA from the stated maximum.

1. East, West and North City Residential and Waterfront Districts,

a. Wind energy systems mounted on a building or an accessory building may be erected to a height not exceeding 10 feet above the highest point of the roof of the principal residence, excluding chimneys, antennae and other similar protuberances. Wind energy systems must be spaced at least 10 feet apart and quantity is limited to two (2) per parcel. Guy wires are not allowed.

b. Wind energy systems mounted on a tower or pole are not allowed in these districts.

2. Institutional, Rural and Civic Districts, subject to the following

a. Wind energy systems mounted on a building or an accessory building may be erected to a height not exceeding 20 feet above the highest point of the principal building roof deck, excluding chimneys, antennae, rooftop mechanical equipment and other similar protuberances. Wind energy systems must be spaced at least 20 feet apart and quantity is limited to three (3) per building. Guy wires are allowed.

b. Wind energy systems mounted on a pole or tower are allowed. Wind energy systems mounted on a pole or tower may be erected to a height not exceeding 20 feet above the height limit of the district and will only be permitted in the rear yard with the exception of being permitted on the streetward portion of lots fronting navigable water.

c. Pole/Tower-mounted wind energy systems shall be set back a distance equal to the height of the wind energy system from any adjoining lot line.

d. The Pole/Tower setback from side or rear yard may be reduced by up to 50%, or to a minimum of 20 feet from the lot line if it can be demonstrated through a registered architect or professional engineer's statement that the tower is designed to collapse, fall, curl or bend within a distance or zone shorter than the height of the wind energy system. Pole/Tower-mount wind energy systems must be spaced one (1) per parcel if less than one (1) acre and (1) per acre on parcels larger than one (1) acre. Guy wires are not allowed.

e. Wind energy systems mounted on a building will not be considered rooftop equipment

3. Industrial-Entrepreneurial District (I-E) subject to the following:

a. Wind energy systems mounted on a building or an accessory building may be erected to a height not exceeding 20 feet above the highest point of the principal building roof deck, excluding chimneys, antennae and other similar protuberances. Wind energy systems must be spaced at least 20 feet apart. Guy wires are allowed.

b. Wind energy systems mounted on a pole or tower may be erected to a height not exceeding 120 feet, subject to FAA/ Michigan Department of Transportation (Aviation) review and permit. The permit from FAA/Michigan Department of Transportation (Aviation) must be received in advance of site plan approval or issuance of a land use permit. System will only be permitted in the rear yard except can be located in the streetward portion of lots fronting navigable water. Pole/Tower-mount wind energy systems must be spaced no less than one (1) per 120 ft. radius. Guy wires are allowed.

c. Pole/Tower-mounted wind energy systems shall be setback a distance equal to the height of the wind energy system from any adjoining lot line.

d. The Pole/Tower setback from side or rear yard may be reduced by up to 50%, or to a minimum of 20 feet from the lot line if it can be demonstrated through a registered architect or professional engineer's statement that the tower is designed to collapse, fall, curl or bend within a distance or zone shorter than the height of the wind energy system.

e. Wind energy systems mounted on a building will not be considered rooftop equipment

4. Parks District subject to the following:

a. Wind energy systems shall be subject to review from the Parks and Recreation Commission with final approval from the Planning Commission.

8207.04 Solar Energy Systems Permitted With Restrictions

General standards for all solar energy systems and operating equipment are subject to the total lot coverage percentage requirements of the district in which it is installed. The solar collection system and operating equipment shall comply with the general standards for approval contained in this zoning ordinance for site plan approval and land use permit and with all county building department construction and electrical requirements. Any solar energy system that is not in operation or is damaged or inoperable because of tower or equipment for a continuous period of 12 months is considered abandoned, and the owner shall remove the same within 90 days of receipt of notice from the City. Any abandoned solar energy that is not removed within 90 days of said notification from the City may be removed by the City at the owner's expense.

1. East, West and North Residential and Waterfront Districts subject to the following:

a. Solar energy systems-structure-mounted on a building or an accessory building are allowed by right subject to the following:

1. With a flat or mansard style roof may be erected to a height not exceeding 10 feet above the highest point of the roof, excluding chimneys, antennae and other similar protuberances.

2. With a pitched roof style shall not exceed the peak height of the roof.

3. Square footage of the equipment is no greater than 80% of the available roof area.

4. Will not be considered rooftop equipment.

5. No Free-standing, tower or pole mounted systems in these districts.

2. Industrial-Entrepreneurial District (I-E), Institutional, Rural, and Civic Districts subject to the following:

a. Solar energy systems-structure-mounted on a building or an accessory building are allowed by right subject to the following:

1. Square footage no greater than 80% of the available roof area.

2. With a flat or mansard style roof may be erected to a height not exceeding 10 feet above the highest point of the roof, excluding chimneys, antennae and other similar protuberances.

3. With a pitched roof style shall not exceed the peak height of the roof.

4. Will not be considered rooftop equipment.

b. Solar energy systems-freestanding-mount is allowed by right subject to the following:

1. Towers may be erected to a height not exceeding 50 feet and area not greater than 325 square feet per unit with a maximum of one tower mount per 7,500 square feet of land area. Guy wires are not allowed.

2. Ground mounted units may not exceed the maximum coverage density for all buildings in the district, including all primary and accessory buildings in the calculation.

3. Both towers and ground mounted units must be set back 25 feet from side and rear property lines. 3. East and West Main Street Districts subject to the following:

a. Solar energy systems-structure-mounted on a building or an accessory building are allowed by right subject to the following:

1. Square footage no greater than 80% of the available roof area.

2. With a flat or mansard style roof may be erected to a height not exceeding 10 feet above the highest point of the roof, excluding chimneys, antennae and other similar protuberances.

3. With a pitched roof style shall not exceed the peak height of the roof.

4. Will not be considered rooftop equipment.

8207.05 Exceptions

1. For wind energy systems that exceed what is allowed by right. The Planning Commission Special Land Use Permit requirements of Section 8108: Special Uses and Variances will apply.

2. For Solar energy systems that exceed what is allowed by right. The Planning Commission Special Land Use Permit requirements of Section 8108: Special Uses and Variances will apply.

3. For all other renewable energy systems not addressed specifically in this ordinance, the Special Land Use Permit requirements of Section 8108: Special Uses and Variances will apply.

Buffering Standards Around Water Bodies/ Natural Resources

Name of Community: Milford Township

Population:

Description: Milford Township is in Western Oakland County in southeastern Michigan. Milford Township is known as the location of some of the regions' most coveted recreational destinations, including Kensington Metropark, Camp Dearborn, and the Proud Lake Recreation Area. These attractions and the pastoral setting have made Milford Township a desirable place for residential development, and recently the Township approved the construction of over 800 new high-end single family housing units to be developed in the coming years.

Milford Township includes a natural feature setback in its zoning ordinance to help preserve natural features by restricting development around them. The setback requirement includes a 25-foot distance from the boundary of a wetland or the high water mark of a watercourse (lake, pond, river, stream or creek). Activities that are prohibited in the setback include construction, removal or deposit of any structures or soils, including dredging, filling, or land balancing, ensuring that these buffer areas remain undisturbed. The ordinance includes exceptions for things like existing lawn areas, fence installation, tree-planting, seasonal structures for water recreation, and filling and grading when necessary to conform with requirements imposed by the Township Engineer. View Milford Township's zoning ordinance [here](#).

5.20 Design flexibility allowances for the preservation of environmental quality

G Natural feature setback regulations.

- 1) It is further the intent of this section to establish a natural vegetated buffer system along all perennial watercourses and wetlands part of a project granted relief to zoning chapter requirements as specified in this section in order to meet the following objectives:
 - a) To create a natural right-of-way for streams that protect aquatic ecosystems and provide a safe conduit for potentially dangerous floodwaters;
 - b) To treat stormwater and prevent drainage problems for adjacent property owners; and
 - c) To provide valuable wildlife habitat and act as wildlife corridors for smaller mammals and bird species which are present in urban areas. Within the established natural feature setback specified in subsection 2 below of this section, unless and only to the extent determined to be in the public interest by the township board of trustees, there shall be no construction, removal, or deposit of any structures or soils, including dredging, filling, or land balancing. This prohibition shall not apply with regard to those activities exempted below.
- 2) The following setbacks shall apply:
 - a) A 25-foot setback from the boundary or edge of a wetland.
 - b) A 25-foot setback from the ordinary high-water mark of a watercourse, herein defined to include a lake, pond, river, stream, or creek.
- 3) Regulation under this section shall be exempted if and to the extent the township is prohibited by other ordinances and/or law from regulating the proposed activity in or on the respective natural feature. In addition, the following activities shall be exempted; however, it is not the intent of this provision to exempt regulation by other ordinance provisions relative to the natural feature itself:
 - a) Installation of a fence within a setback area;
 - b) Maintenance of previously established lawn areas;
 - c) Grading and filling necessary in order to conform to express requirements imposed by the township engineer;
 - d) Installation of seasonal recreational structures for watercourse use; and
 - e) Planting of trees and other vegetation, but not the use of fertilization.
- 4) In determining whether proposed construction or operations are in the public interest, the benefit which would reasonably be expected to accrue from the proposal shall be balanced against the reasonably foreseeable detriments of the construction or other operation, taking into consideration the local, state, and national concern for the protection and preservation of the natural feature in question. If, as a result of such a

a balancing, there remains a debatable question whether the proposed project and/or operation is clearly in the public interest, authorization for the construction and/or operation within the natural feature setback shall not be granted. The following general criteria shall be applied in undertaking this balancing test:

- a) The relative extent of the public and private need for the proposed activity.
- b) The availability of feasible and prudent alternative locations and methods to accomplish the expected benefits from the activity.
- c) The extent and permanence of the beneficial or detrimental effects which the proposed activity may have on the public and private use to which the area is suited, including the benefits the natural features and/or natural feature setback provides.
- d) The probable impact of the proposed construction and/or operation in relation to the cumulative effect created by other existing and anticipated activities in the natural feature to be protected.
- e) The probable impact on recognized historic, cultural, scenic, ecological, or recreational values, and on fish, wildlife, and the public health.
- f) The size and quantity of the natural feature setback being considered.
- g) The amount and quantity of the remaining natural feature setback.
- h) Proximity of the proposed construction and/or operation in relation to the natural feature, taking into consideration the degree of slope, general topography in the area, soil type, and the nature of the natural feature to be protected.
- i) Economic value, both public and private, of the proposed construction and/or operation, and economic value, both public and private, if the proposed construction and/or operation were not permitted.
- j) The necessity for the proposed construction and/or operation.

Off-Site Stormwater Regulations Allowing Developers to Participate in District-Scale Stormwater Management Plans

Name of Community: West Branch, Michigan

Population: 2,351 (2020 Census)

Description: The City of West Branch is located in Ogemaw County, and despite its population of only 2,351, is the largest city in the county and serves as the County Seat. West Branch has a quaint, charming Downtown with buildings consistent with the community's Victorian-style aesthetic. The City's Master Plan seeks to promote new housing opportunities near downtown along with other enhancements to enhance walkability and improve services overall. The plan includes three key redevelopment sites, with a vision for mixed-use development or higher density multi-family residential to meet the community's growing housing demand.

West Branch has stormwater management standards within the zoning ordinance to provide flexibility for shared detention or retention in circumstances when multiple non-residential uses are constructed at the same time. Other communities may consider a reference to engineering standards that are necessary to ensure compliance with requirements for maintenance or legal agreements to grant one property owner the right to offsite drainage in accordance with the plans.

View the City of West Branch's ordinance [here](#).

Section 3.31 Stormwater Management/ Onsite Drainage and Runoff

- B. Uses other than Single-Family and Two-Family Dwellings.
 - a. The property owner or developer is required to retain on site all stormwater drainage in excess of natural conditions. This provision may require stormwater retention ponds where appropriate. An exception can be made for water leaving the site via an existing stormwater pipe or through other stormwater facilities which will be developed at the same time as the proposed new use. All stormwater facilities, including detention or retention ponds, shall be designed at minimum to handle a storm with the projected frequency of once every ten (10) years (ten year design storm). Tree Preservation or Replacement Standards

Tree Preservation or Replacement Standards

Name of Community: Charter Township of Bloomfield

Population: 44,247 (2020 Census)

Description: The Charter Township of Bloomfield is located in Oakland County, about 6 miles north of the City of Detroit. With a median household income of \$132,608 annually, Bloomfield Township is known as one of the wealthiest communities in the State of Michigan. The community's rolling hills, scenic lakes and streams, and winding roads provide a natural setting for residents who look to escape the rush of urban life. Residential land uses make up the greatest portion of the Township's landscape, comprising more than 75% of the total land area in the Township; the Master Plan reflects a desire to maintain and preserve the community's residential character, with some recommendations for contextually appropriate commercial or mixed use along key corridors.

Bloomfield Township's ordinance includes a tree preservation ordinance, emphasizing the importance of these natural features as physical, aesthetic, recreational, and economic assets to the residents of the Township, as well as visitors, businesses, and the general public. The ordinance uses a scoring system, with factors that examine the tree's life expectancy and consider the maturity of the tree to determine whether or not to qualify the tree as "protected." Protected and landmark trees must undergo a tree permit review and are required to provide replacement trees according to a formula provided in the ordinance. The review standards in the ordinance require that an applicant must demonstrate that no prudent alternative is available when removing a protected or landmark tree. The ordinance does allow some exceptions for routine maintenance, dead or dying trees, emergencies, invasive species or government/utility purposes.

42-5.14 Tree Preservation

Intent. The Township finds that trees and woodlands are an important asset to the natural ecosystem, beneficially contribute to the character of the community and positively influence the quality of life in the Township. Furthermore, the Township finds conventional development without specific regulations to protect natural resources frequently encroaches

- 1) upon, damages or eliminates important trees, other forms of vegetation and natural resources. These trees, if preserved and maintained in an undisturbed and natural condition, constitute important physical, aesthetic, recreation and economic assets to residents of the Township, visitors, businesses and the general public. The standards contained herein are further intended to:
 - A) Provide for the protection, preservation, replacement, and proper maintenance of trees and woodlands.
 - B) Protect the integrity of woodland areas as a whole, in recognition that woodlands serve as part of an ecosystem and to place priority on the preservation of woodlands, trees, similar woody vegetation and related natural resources over development when other on-site location alternatives exist.
 - C) Maintain areas for wildlife, flora and fauna habitat.
 - D) Provide paramount public concern for these natural resources in the interest of health, safety and general welfare for the residents.
 - E) Provide the minimum regulation necessary to ensure these important resources are preserved wherever possible while accommodating the landowners' property rights to make reasonable use of their property through compliance with other standards of this and other applicable Township ordinances.
- 2) Tree permit required.
 - A) Any clear-cutting activity on any property in Bloomfield Township requires a tree permit.
 - B) On any property in Bloomfield Township undergoing new construction or redevelopment a tree permit is required for any person to clear-cut, remove, cause to be removed, transplant or destroy any protected tree or landmark tree.
- 3) Activities not requiring a tree permit.
 - A) Routine yard maintenance. A tree permit shall not be required for legal lots of record that seek to perform routine yard maintenance and/or alteration to property that is not subject to site plan review and approval for building permit. Clear-cutting is not included in this exemption.
 - B) Invasive species/nuisance species. The following trees may be considered for exemption, provided that they are not landmark trees, they do not comprise the predominant species within the woodland or vegetated area, they do not contribute to the overall vigor of the woodland or have significant value for watershed or erosion control or are considered an invasive species/nuisance species. Singular trees in good condition are not automatically exempt unless otherwise approved by the Township.
 - i) *Acer negundo* (Box Elder)
 - ii) *Acer saccharinum* (Silver Maple)
 - iii) *Ailanthus altissima* (Ailanthus/Tree-of-Heaven)
 - iv) *Catalpa speciosa* (Catalpa)
 - v) *Elaeagnus umbellata* (Autumn-olive)
 - vi) *Frangula alnus* (Glossy Buckthorn)
 - vii) *Fraxinus* spp. (Ash)
 - viii) *Populus* spp. (Poplar)
 - ix) *Rhamnus cathartica* (Common Buckthorn)
 - x) *Salix* spp. (Willow, except horticultural varieties)
 - xi) *Ulmus* spp. (Elm, except American Elm)

- C) Emergencies. A tree permit shall not be required for actions made necessary to expedite the removal of damaged, destroyed or dead trees in the interest of public safety, health, and general welfare following high winds, storms, tornadoes, floods, freezes, fire or other natural or man -made disasters.
 - D) Governmental agencies and public utilities. A tree permit shall not be required to perform maintenance or repair of lawfully located roads, sewers, structures, and/or facilities used in the service of the public to provide transportation, electricity, gas, water, telephone, telecommunication, or other services, provided that such roads, sewers, structures, or facilities are not materially changed or enlarged, and provided that the work is conducted using best management practices to ensure that the woodlands areas are not adversely impacted. A permit shall not be required for the trimming or cutting of trees associated with the repair or maintenance work performed by public utilities.
 - E) Dead or damaged trees. A tree permit shall not be required for removal or trimming of dead, diseased or damaged trees. Determination of the health/ condition of the tree(s) is determined by utilizing the scoring criteria contained in Section 42-5.14.4. If a tree is determined by Bloomfield Township to be dead, diseased or damaged as to cause an immediate threat to public health, safety and welfare of the users of the property and/or adjacent properties, said tree shall be removed and a tree permit shall not be required.
- 4) Tree health/condition scoring criteria.
- A) Health/condition scoring must be clearly indicated on the tree survey. A tree with a score of ten (10) or greater qualifies as a protected tree and a tree with a score of nine (9) or less could be eligible as non-protected.
 - B) All protected trees and landmark trees shall be replaced as required by the provisions of this article. However, if the health/condition of the tree is such that it should not be counted, tree replacement shall not be required.
 - C) In requesting that a tree not be counted toward replacement, the applicant shall indicate the health/condition of the trees, as determined by an arborist or other qualified professional, utilizing the criteria contained herein.
 - D) Any tree with a score of ten (10) or greater is protected under this Section.

Tree Health/Condition Scoring			
Factor	3	2	1
Trunk is	Sound or solid	Sections of bark missing	Extensive damage or hollow
Growth rate	More than 6" twig elongation	2" to 6" twig elongation	Less than 2" twig elongation
Structure	Sound	1major or several minor limbs dead	2 or more major limbs dead
Disease	No disease or infestation present	1 disease or infestation present	2 or more diseases and/or infestation present
Crown/development is	Full and balanced	Full but unbalanced	Unbalanced and lacking full crown
Life expectancy	Over 30 years	15 to 20 years	Less than 5 years

- 5) Tree permit application requirements. A person seeking a tree permit shall submit an application on forms supplied by the Township along with a tree survey, prepared by an Arborist, to the Planning, Building & Ordinance Department, and pay the application and permit fee as established by resolution of the Township Board. The application shall be approved or rejected in the sole discretion of the Planning, Building and Ordinance Department.
- 6) Tree replacement requirements. As a condition of granting a tree permit, the applicant shall be required to replace all protected and/or landmark trees being removed having eight (8) inches or more DBH subject to the following conditions:
 - A) Required replacement calculations. The replacement calculations shall indicate the total caliper inch at DBH of protected and landmark trees being removed, as well as any trees being considered for exemption. The total number of replacement trees and caliper inches shall be provided and graphically illustrated on a plan.
 - i) Replacement trees shall be at least three (3) inches caliper and eight (8) feet in height for evergreens. Trees will be measured at six (6) inches above finished grade for replacement trees four (4) inches caliper or less and at twelve (12) inches above finished grade for all trees greater than four (4) inches caliper.
 - ii) Larger evergreen trees may be used to fulfill replacement requirements at the equivalent rate of one (1) inch for each 2.8 feet in height.
 - iii) Consideration may be given to allow smaller caliper trees if they are part of a replacement plan that specifies a mixture of sizes and intended to simulate as natural woodland habitat.
 - B) Replacement rate for protected trees. Protected trees, other than landmark trees, must be replaced at a rate of fifty (50) percent of the total DBH removed. Each protected tree(s) must be replaced with a tree that is a minimum of three (3) inch caliper or eight (8) feet in height for evergreens
 - C) Replacement rate for landmark trees. Landmark trees must be replaced at a rate of one hundred (100) of the total DBH removed. Each landmark tree(s) must be replaced with a tree that is a minimum of three (3) inch caliper or eight (8) feet in height for evergreens.
 - D) In instances where all of the trees being removed are entirely deciduous or entirely evergreen, the Township may approve substituting up to thirty (30) percent evergreen for deciduous or deciduous for evergreen. Diversity of tree species shall be maintained where essential to preserving a wooded area.
 - E) The location of transplanted trees and required woodland replacement trees must be provided on the landscape plan. Transplanted and replacement trees shall be clearly distinguished from required landscape elements.
 - F) Trees required to be planted in accordance with this Section shall be in place and properly supported prior to the issuance of a final certificate of occupancy. The center of said trees shall not be located closer than four (4) feet to any property line or ten (10) feet to any utility line.
 - G) All purchased replacement trees shall satisfy American Association of Nurseryman standards, including:
 - i) Nursery grown.
 - ii) State Department of Agriculture inspected.
 - (a) Tree spade transplanted while in the dormant state, or if not in the dormant state, having been balled and burlapped with a solid well-laced root ball when in the dormant state.
 - (b) No.1 grade, with straight unscarred trunk and a well-developed uniform crown. Park grade trees are not acceptable.
 - (c) Staked, watered and mulched in accordance with standard planting practices.

- I) Replacement trees shall be guaranteed for a minimum of one year, including labor. After one year, dead or diseased trees must be replaced prior to final Township approval.
- J) Where it is not reasonable or desirable to relocate or replace trees on site, relocation or replacement may be made at another approved location within the Township.
- K) Where the Township finds it is not reasonable, practical and desirable to relocate or replace trees on site or at another approved location within the Township, the Township may direct the applicant to pay into the Township's Woodlands Trust Fund an amount of money equal to the value of the replacement trees, including installation, that would otherwise be required.
 - i) The cost estimate shall be calculated at two times the wholesale cost from an established local nursery catalog with a current publish date, submitted by the applicant and approved by the Township.
 - ii) Use of the Woodland Trust Funds for various Township-wide beautification and/or tree preservation efforts including, but not limited to, gypsy moth management program, diplodia spraying and similar preservation efforts will be at the sole discretion of the Township Board.
- 7) Review standards.
 - A) The wooded area shall be evaluated for the quality, based upon the following information supplied by the applicant:
 - i) Soil quality as it relates to potential tree disruption.
 - ii) Habitat quality.
 - iii) Tree species, including diversity of tree species.
 - iv) Tree size and density.
 - v) Health and vigor of tree stand.
 - vi) Under story species and quality.
 - vii) Other factors such as the value of the wooded area as an aesthetic asset, wind block, noise and/or visual buffer, environment asset and the value of landmark trees within the woodlands area.
 - B) The preservation of woodland areas, individual trees, similar woody vegetation and related natural resources, shall have priority over development when there are other functional on-site location/design alternatives. The applicant shall be responsible for demonstrating that no feasible and prudent alternative locations exist without causing undue hardship. The Township may impose conditions on the method and extent of the proposed activity/use as necessary to ensure it will be conducted in a manner that will minimize damage, encroachment or interference with the natural resources and/or natural processes within areas containing protected and/or landmark trees.
 - C) Because natural systems do not occur in isolation, the location of woodlands with respect to topography, water features and other significant natural features shall be viewed as having a high priority in terms of preservation value.
 - D) The removal or relocation of trees or shrubs within wooded areas, or of protected and/or landmark trees outside of the wooded areas, shall be limited to the following:
 - i) When necessary for the location of a structure or site improvement and when no feasible and prudent alternative location can be had without causing undue hardship.
 - ii) When the tree is dead, diseased, injured or in danger of falling too close to proposed or existing structures, interferes with existing utility service, interferes with safe vision clearances or conflicts with other ordinances or regulations.
 - iii) When a landmark or protected tree does not meet the health/condition standards contained herein.

- E) The integrity of wooded areas shall be maintained irrespective of whether such woodlands cross property lines.
- F) All existing trees, wooded area and under story vegetation shall be preserved within the required roadway greenbelt or buffers.
- G) Where woodland densities permit, tree relocation or replacement shall be within the same wooded area as the removed plants. Where tree relocation or replacement is not feasible within the wooded area, the relocation or replacement on the site may be elsewhere on the subject property.
- H) A detail or narrative indicating the method of tree protection including protective barriers, tree walls, tunnels or retaining walls shall be provided.
- I) If haul roads or vehicle access points used during construction are different from proposed roads or access, their location must be identified on the woodland and/or landscape plan.