

The City of Ypsilanti Sustainability Plan

“It’s real. It’s us. It’s bad. Scientists agree. There’s hope.”

Anthony Leiserowitz, Director Yale Project on Climate Change Communication

Ypsilanti, in many ways, is a state leader in sustainability planning, yet these efforts had not unified into a Sustainability Plan until now. Inventories and strategies could be found in the City’s Climate Action Plan, Energy Plan, Nonmotorized Plan, Parks and Recreation Plan, or Alternative Fuel Policy. While these plans hold tremendous value, the recommendations within them carry more weight and are more accessible when included in the City’s primary policy document. The Master Plan is a community’s most comprehensive planning document and serves as the policy basis for the Zoning Ordinance, which directly regulates land use. Zoning provisions have the legal force to protect natural resources, prioritize sustainable development, and improve the infrastructure that enables nonmotorized travel. The previous efforts were influential and integral to the City’s “green” practices, and this next step officially denotes sustainability as an actionable City priority through the compilation and advancement of sustainable strategies into a single cohesive document. This Sustainability Plan is intended to serve as a data resource, community reflection, and policy guide to the Commission’s future actions.

The Impetus

The Sustainability Commission was established in 2017 with a primary mission of addressing environmental issues and prioritizing sustainability policies. In this short time, the Commission has embarked upon and accomplished numerous initiatives, including:

- Passing a resolution in support of native plants in local landscaping
- Partnering with the Washtenaw County Conservation District to provide support for grants to plant trees, hold workshops, and train for tree maintenance
- Reviewing and recommending the 2018 Energy Plan
- Partnering with the city of Ann Arbor on the Net Zero Initiative
- Passing an Energy Star Resolution to identify underperforming buildings and apply for certification
- Founding an annual Earth Day celebration

The Sustainability Commission recognizes that risk analysts, including the US Department of Defense, rank climate change as one of the most serious threats to ecosystems and people around the world.^{1 2} “Climate change” refers to a broad range of global phenomena resulting predominantly from the large-scale burning of fossil fuels, which add heat-trapping gases to Earth’s atmosphere. The result is a variety of challenges: extreme heat and increased cooling days, more severe winter storms, changing coastal dynamics, rising water levels, disruptions to growing seasons, pest migrations, habitat loss, temperature volatility, increasing extreme weather events and associated stress on natural ecosystems, and risk of drought that will disturb of the characteristics and functions of natural processes.³

There are generally two types of responses to climate change: mitigation and adaptation. Mitigation, or *reducing the risk of future changes* to the climate, necessitates dramatically reducing future GHG emissions and increasing the sequestration or storage of existing GHG in natural sinks such as forests or soil. While mitigation strategies will take decades to positively impact rising temperatures, reducing GHG emissions now will reduce future risk and make it easier to adapt to the future impacts of climate change. An example of a mitigation strategy would be increasing the deployment and utilization of renewable energy. Adaptation refers to actions that address the *effect* of the problem, but

¹ Intergovernmental Panel on Climate Change (IPCC). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change <http://www.ipcc.ch/report/ar5/syr>

² U.S. Department of Defense. Quadrennial Defense Review. Washington, DC. 2014.

³ Planning for Community Resilience in Michigan. 2017. <http://mirisingtide.org/wp-content/uploads/Resiliency-HandbookAPRIL-242017.pdf>

not the *root* of the problem. Adapting to climate change necessitates changing behaviors, systems, and our way of life *in response* to the results of climate change. One example would be relocating electricity and communication lines from overhead to underground locations to prevent power outages during extreme weather.

Where the two categories overlap is where resiliency is born – if an action can simultaneously mitigate negative effects of climate change and help a community adapt, then it rises to priority status. Because the tangible positive effects of mitigation will take the entire world’s coordination, not just the region’s or the City’s, a focus on adaptation is the most prudent and impactful.

Regional Climate Change

The Great Lakes Integrated Sciences and Assessments (GLISA) Center is one of the eleven regional centers funded by the National Oceanic Atmospheric Administration. It is a partnership between the University of Michigan and Michigan State University that seeks to provide usable and useful information on climate change impacts to decision makers across the Great Lakes Region. GLISA provides both *historic information*, derived from over 200 quality-controlled weather stations located in communities across the region, and *future climate information*, derived from regional and global climate models (RCMs and GCMs), as well as dynamically downscaled climate models. Historic climate information is useful for providing locally relevant information that communities can use to assess how well their physical infrastructure and social systems are faring in the face of current climate change, whereas future climate information is useful for incorporating into capital improvement processes when decisions will affect infrastructure investments over 10, 20, or 50 years.

Some positive news is that this scientific awareness is reaching a critical mass of Americans (and Ypsilanti residents). Most Americans believe global warming is happening (71%) and that it will harm future generations (73%).⁴ Public opinion estimates generated by the Yale Program on Climate Change Communication and the George Mason Center for Climate Change Communication suggest that 78% of Washtenaw County residents believe climate change is happening, 76% believe climate change will harm future generations, and 83% support policies that bolster renewable energy or limit CO₂ emissions.⁵

Figure 1: Southeast Michigan Climate Division Area

Included Counties	Included Watersheds
Genesee	Birch-Willow
Lapeer	Cass
Lenawee	Clinton
Livingston	Detroit
Macomb	Flint
Monroe	Huron
Oakland	Lake Erie
St. Clair	Lake Huron
Wayne	Lake St Clair
Washtenaw	Ottawa Stoney
	St. Clair
	Raisin
	Shiawassee
	Tiffin
	Upper Grand

⁴ Matthew T. Ballew, et al. 2019. Climate Change in the American Mind: Data, Tools, and Trends, Environment: Science and Policy for Sustainable Development. 61:3, 4-18, DOI: 10.1080/00139157.2019.1589300 <https://www.tandfonline.com/doi/full/10.1080/00139157.2019.1589300>

⁵ Marlon, J. Washtenaw County Michigan Public Opinion on Climate Change, 2019. https://factsheets.yppcc.tools/Michigan:Washtenaw_County

Historic Regional Climate Change

GLISA offers curated history climate information at two scales:

- Climate Division, which are multi-county, NOAA Designated regions,
- Quality-controlled weather stations.

Significant increases in precipitation across the entire region can be seen in data collected over the past 70 years (1950 to present). Increased seasonal precipitation is most notable in the spring and fall: fall precipitation has increased over 28%, and spring precipitation has increased over 21%. The region is experiencing this precipitation increase within storm events that are also increasing in severity, resulting in more rain falling in more concentrated bursts.

Figure 2: Precipitation Change 1950 – 2019 Southeast Michigan Climate Division

	in	cm	%
Annual	5.58	14.17	18.5
Winter	0.61	1.561	11.2
Spring	1.72	4.39	21.1
Summer	1.13	2.88	12.0
Fall	1.99	5.07	28.4

Source: GLISA

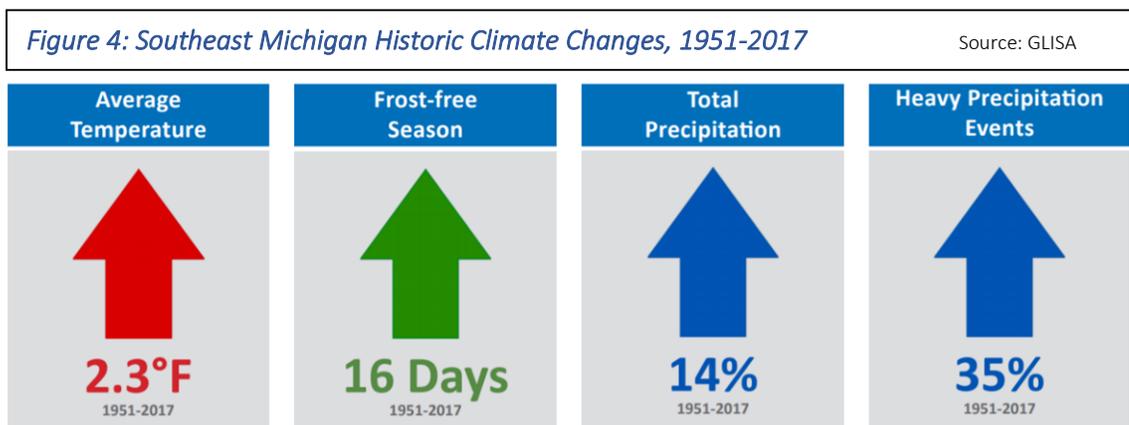
Over the same period, the average annual temperature has risen across Southeast Michigan by 2.4 degrees Fahrenheit (°F), and the gap between average high and low temperatures is closing and swinging upward towards warmer temperatures. Winter and spring are considerably warmer, with rising winter lows and earlier last frost dates leaving fewer days under 32°F in the spring season.

Figure 3: Rise in Temperature from 1950 through 2019

Season	°F	°C
Annual	2.43	1.35
Winter	2.80	1.55
Spring	2.86	1.59
Summer	1.91	1.06
Fall	1.94	1.08

Source: GLISA

Other important changes, in addition to temperature and precipitation, are occurring locally. Increases in freeze/thaw cycles create stress on built infrastructure. Extensions of the growing season, which improve agriculture, can also increase risk of vector-borne illness. Extended heat events in the summer and ice storms throughout the winter lead to more stress on the electric grid, increase the likelihood of power outages, and further exacerbate existing vulnerabilities among Ypsilanti residents.



Future Regional Climate Change

While future climate change can be more difficult to predict with the same precision historic information allows, GLISA can predict regional trends with high levels of certainty thanks to improved climate models and climate science translators. In terms of both temperature and precipitation, challenges are anticipated in the mid- to long-term. By the period of 2041-2070, southeast Michigan is expected to warm by 4.5 to 5°F from the average temperatures in the 1971-2000 time period. This average increase will be accompanied by more high heat days: in the same period, it is anticipated that there will be 30 to 40 more days over 95°F than there were in the 1971-2000 period.

Projected Change in Average Temperature
Period: 2041-2070 | Higher Emissions: A2

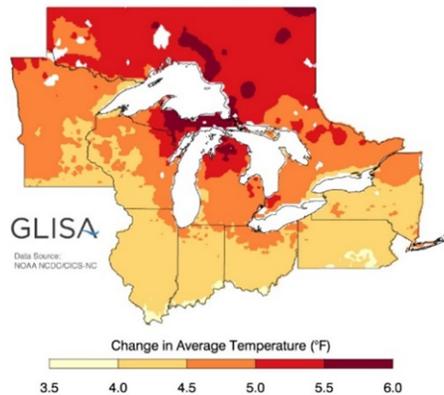


Figure 5

Projected Change in Number of Days Over 90°F
Period: 2041-2070 | Higher Emissions: A2

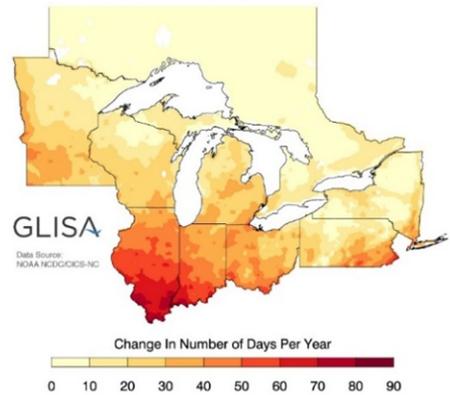


Figure 6

Projected Change in Average Precipitation
Period: 2041-2070 | Higher Emissions: A2

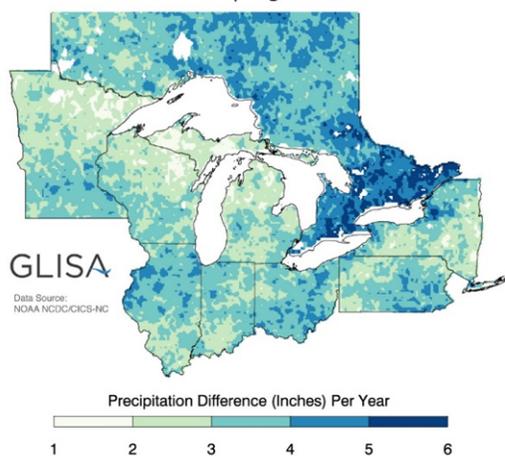


Figure 7

Increases in overall precipitation and acute rain events are also expected for our region during the same period. Annual rainfall is expected to increase by three to four inches over annual rainfall in 1971-2000. By 2040-2070, the region is likely to experience up to two more days per year with heavy precipitation, defined as the 2% heaviest precipitation events in the area.⁶

It is important to remember that while understanding climate change is critical to the process of planning for Ypsilanti's future, these impacts may also open new opportunities for our community and region that set us apart from other areas. A temperate climate, an extended growing season, an abundance of freshwater, and a legacy of innovation and production place southeast Michigan on the top of the list for "climate positive" regions of the world. To properly prepare ourselves and our

community for the future, we must adequately address how climate impacts do and will exacerbate existing vulnerabilities in our community, but also be diligent to build a resilient future – one that that not only "bounces back," but "bounces forward."

⁶ GLISA. Great Lakes Regional Climate Change Maps. <http://glisa.umich.edu/resources/great-lakes-regional-climate-change-maps>

Environmental Justice

In any crisis, the most vulnerable populations will bear a disproportionate level of the burden unless protective action is taken. Their lack of resources and influence means that they will suffer greater exposure to climate change threats, and be less able to adapt and react. Environmental justice (EJ) is a discipline pioneered by Dr. Robert Bullard in the 1960s as a result of his investigation into the unequal protection and enforcement of environmental laws and regulations. Bullard was a part of the National Environmental Justice Advisory Council that advised President Bill Clinton to sign the Environmental Justice Executive Order in 1994 where EJ is defined as: “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with the respect to the development, implementation, and enforcements of environmental laws, regulations, and policies.”

Today, the definition applies to the effects that climate crisis will have on the disadvantaged. Nearly 25 years later, as climate change has inequitably descended upon us, the City of Ypsilanti understands that its populations of people of color and low-income households are more vulnerable to both the physical and social impacts of climate change; likewise, women and members of the LGBTQIA community are vulnerable to climate change’s social effects. Where possible, this plan addresses what can be done on a local level to protect - our residents and visitors from the worst of these changes. As the structures that perpetuate structural inequity are brought to the attention of those in power, every attempt should be made to dismantle them or to minimize actual and potential harm.

As this plan is executed and amended, it’s important also to incorporate the voices of all people who may be affected, and to understand the impacts that decisions made by those in power may have. The Jemez Principles for democratic organizing ⁷ provide a useful roadmap for examining and updating our policies and our actions in the context of both environmental justice and good governance.

Definition of Sustainability

Sustainability is a tricky term to define. A commonly accepted definition of sustainability is “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” This definition comes from *Our Common Future*, a report published in 1987 by the United Nations (UN) that suggested concrete and realistic proposals for dealing with environmental and development issues. In 2017, the Ypsilanti City Council passed Resolution No. 2017-238 approving a recommendation from the Sustainability Commission that defined sustainability with a nod to the UN definition:

“Achieving a balance of ecological, social, and economic considerations to provide for an equitable path for the growth and improvement of our community in the uses of our resources, remaining conscious of the historical context, while ensuring the availability and vitality of those resources for future generations.”

As such, social equity, environmental health, and the economy become the three interrelated pillars of sustainable action. This Sustainability Plan will focus primarily on the environment; the social and economic sides of planning are discussed in greater detail in the City’s Master Plan. However, recommended sustainability actions call out which of the three pillars it touches to expose the interconnected nature of sustainability planning.

JEMEZ PRINCIPLES FOR DEMOCRATIC ORGANIZING

#1 Be Inclusive

#2 Emphasize Bottom-Up Organizing

#3 Let People Speak for Themselves

#4 Work Together in Solidarity and Mutuality

#5 Build Just Relationships Among Ourselves

#6 Commit to Self-Transformation

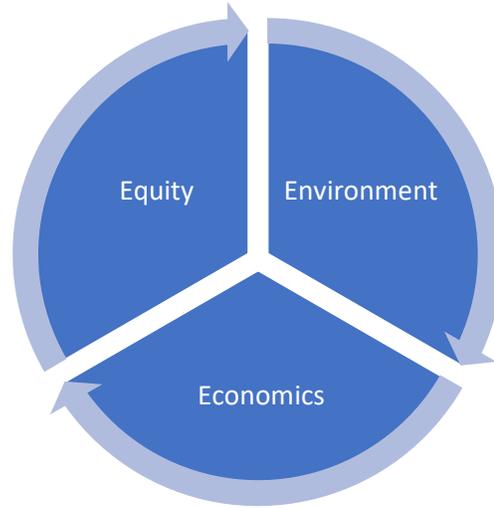
⁷ National Resources Defense Council, Jemez Principles for Democratic Organizing. <https://www.nrdc.org/sites/default/files/jemez-principles-organizing.pdf>

When the residents were asked in the community-wide survey, “What does sustainability mean to you?” the answers were unsurprisingly varied. Most of them touched on at least one aspect of the three-pronged definition using phrases like “repairing our natural environment,” “having a ...diverse community without pricing people out,” and “clean water, healthy citizens, easier access to public transportation.” The open responses were telling; Ypsilanti residents aptly identified that becoming a more sustainable city requires all-encompassing change.

Figure 8: Three Pillars of Sustainability

Equity: The degree to which all citizens of Ypsilanti benefit from the outcomes of this plan.

Examples: eliminate disparities among traditionally disadvantaged groups, increased participation in utility rebate programs or diverse attendance at educational community events.



Environment: The degree to which these actions restore natural systems and human health and positively impact energy use and climate trends.

Examples: habitat restoration, carbon sequestration, and a reduction in miles traveled by vehicle.

Economics: The degree to which this plan can positively impact community wealth and uplift the well-being of the working class.

Examples: investments in clean energy technologies and green jobs, support for a local food system, green job training, and employment and workforce wages.

Public Input

In 2019, high priority themes from The City of Ypsilanti Energy Plan (2018), The City of Ypsilanti Climate Action Plan (2012), and the Shape Ypsilanti Master Plan (2013) were identified and coupled with a round of community input.

Residents were invited to attend an in-person meeting held on July 11, 2019 to participate in group exercises that prioritized sustainability actions. There was also an online survey (physical copies were provided), and in an attempt to “go to the people,” boards were placed on easels at different locations throughout the City (City Hall, EMU Student Center, Parkridge Community Center, and Cream & Crumb) in the spring and summer of 2019 that allowed residents to select their environmental priorities. The findings from each engagement were compiled, analyzed, and used as a basis for outlining the City’s ongoing path towards sustainability. The action plans represent public engagement findings, data collection, best practices, and staff capacity.

Community Engagement Summary of Details
Survey respondents: 144
Board entries: 876 unique responses
Attendees at in person session: 25



Challenges, Goals, Objectives, and Strategies

This plan was developed in three phases: research, outreach, and confirmation. The existing physical setting of the City was inventoried, as was the community's current greenhouse gas emissions. Previous plans were reviewed, and progress towards those plans' goals were benchmarked. If there was a disconnect or gap between challenges noted during the inventory and plan review, this was noted for later review. Outreach was done in mid-2019, both specifically regarding sustainability and in tandem with the master plan scope, and the hopes and priorities of the community were incorporated into goal development. The challenges, goals, objectives, and strategies to reach those goals are presented below, loosely grouped into these categories: **earth**, including soil and contamination; **water**, including surface water, drinking water, and stormwater; **energy**, including production, consumption, and waste management; **biodiversity**, including urban forestry and outdoor lighting; **neighborhoods**, including land use and transportation; and **communication**.

Earth

Soil Structure

Soil characteristics can impose limitations that affect the suitability of land for potential uses, such as dwelling units with basements and surface composting facilities. There are five types of soil in the City, and the table below shows the percentage of area within the City for each soil.⁸

Figure 10: Soil Types

Soil Type	Basic Characteristics	Percentage of Area
Fine	Soil particles not visible to the eye, poor load bearing capacity, fairly impermeable, susceptible to frost action	56.4%
Coarse Loamy	Larger grain loam soil, visible to the eye	18.8%
Sandy	Light soil, quick water drainage, poor water retaining qualities	12.8%
Fine Loamy	Smaller grain loam soil, not visible to the naked eye	11.8%
Loamy	Not predominantly sand, silt, or clay, suitable for growing plants due to the nutrient and water capacity	0.2%

Source: United States Department of Agriculture Soil Survey, current

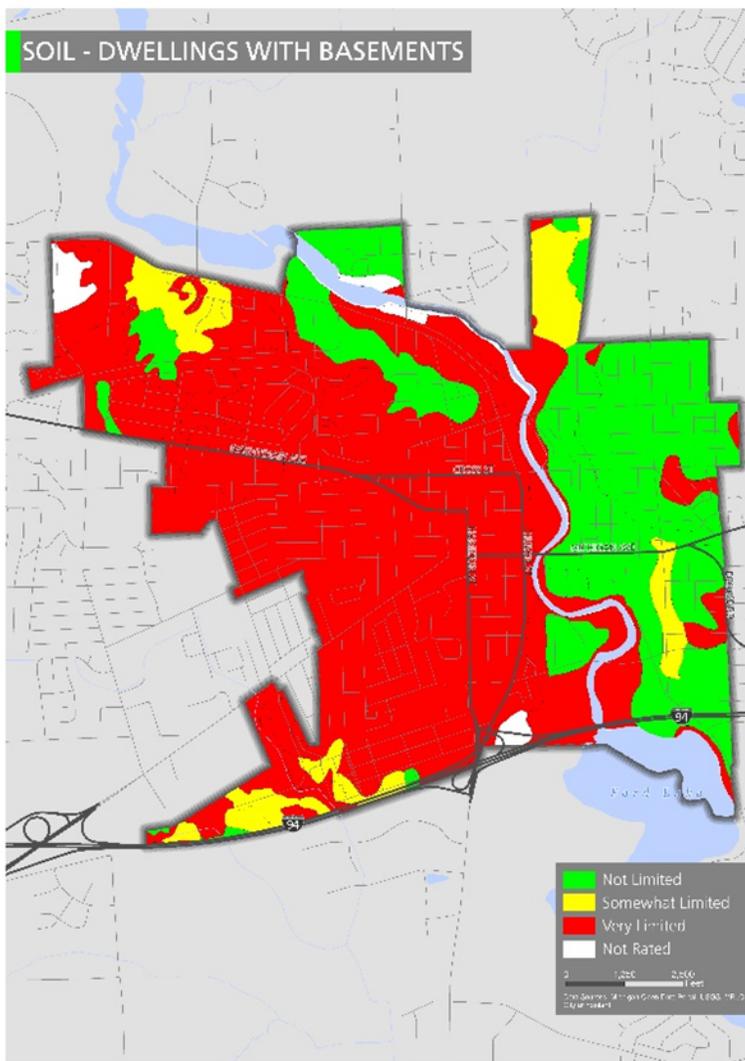


Figure 11: Soil – Dwellings with Basements

Basements and Foundations

As a foundational part of construction, soils impact development. The “Soils – Dwellings with Basements” map shows that most of the western side of the City is not conducive to basement construction based on the soil’s limited capacity to support a building without the soil shifting. As moisture content changes, the soils in the “very limited” category shrink and expand to a degree that could reduce their ability to support a basement.⁹ Given the predictions for greater concentrations of precipitation and instances of flooding, building basements in unsuitable soils is not a fruitful adaptation strategy. Basement construction is governed by the building code, which is not designed to take detailed soil considerations into account for smaller residential parcels.

Make soil information available to all, and directly provide information on soil structure to those who choose to build a new structure that requires a foundation. At a minimum, this information should be made available to all current and prospective property owners to discourage subterranean development that may have a high risk of failure. If continued construction, increased flooding events, or consistent property damage warrant a regulatory solution, an overlay zoning district could be applied to some or all of the “very limited” areas that require construction to meet floodplain standards, or that bans subterranean construction altogether.

⁸ Web Soil Survey, United States Department of Agriculture, <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

⁹ United State Department of Agriculture. Web Soil Survey. <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Green Infrastructure

Soil type factors into planning for stormwater infrastructure, urban gardens, and tree planting. The “Urban Greening” map shows where the soil is best suited for plantings, alongside streets and vacant and public land within the City. Areas that

are vacant or underutilized, held in the public trust, and have soils suitable for planting should be prioritized for green infrastructure as they will likely have the best outcomes. Alleys, culs-de-sac, parking lots, and low-traffic residential streets are also good candidates for green infrastructure installation. Because they represent a significant land area distributed throughout the community, likely have excess capacity that could be repurposed, and may see low traffic volumes less-durable permeable pavement may be an option in some areas. Elements for urban greening shall be incorporated in the maintenance plan for public alleys and culs-de-sac.

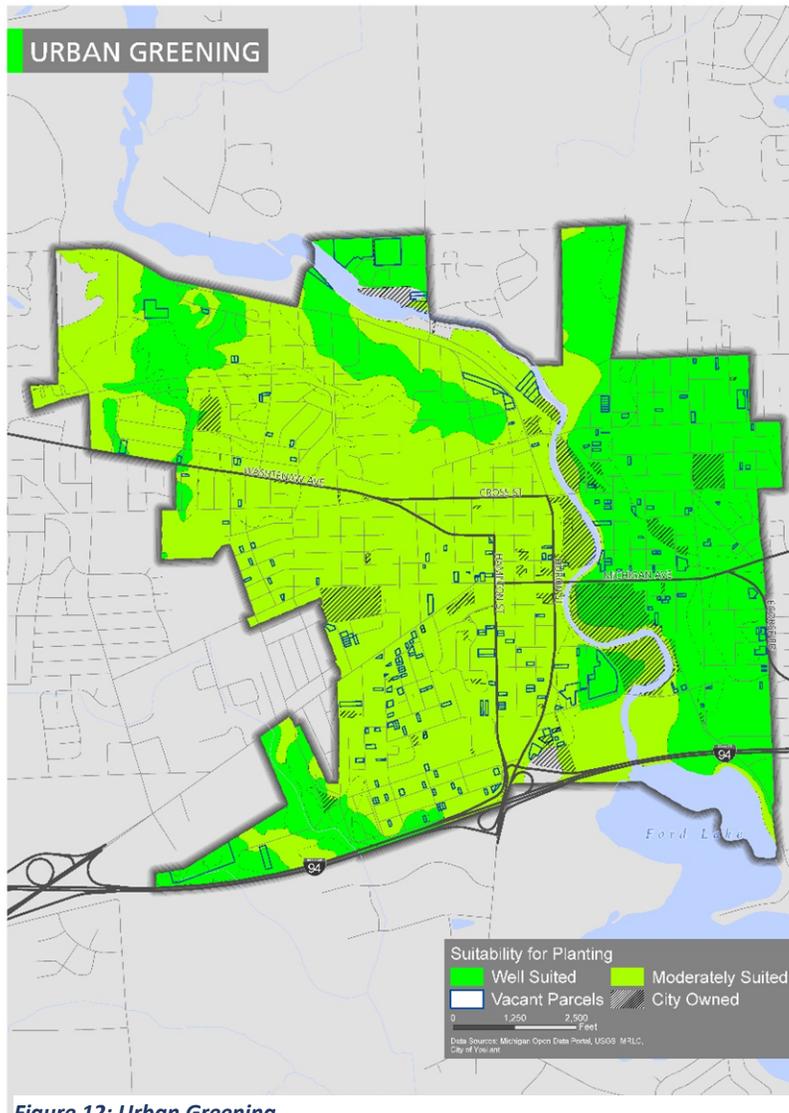


Figure 12: Urban Greening

Erosion

The City of Ypsilanti does not have any city-specific regulations regarding soil or soil health but works with the County on soil erosion protections. Some cities have addressed soil conditions through the adoption of sensitive features overlays which include soil and slope protection. In the City of Grand Haven, development in the sensitive feature zone is subject to more intensive site plan restrictions and review, including the prevention of soil erosion and disturbance.¹⁰ Any development in the sensitive feature overlay cannot move or disturb the soil at all without prior approval of the Planning Commission.

Ypsilanti participates in Washtenaw County’s Soil Erosion and Sedimentation Control Program. The program is often triggered in the development process and “works to protect surface water and the environment from the negative impacts of soil erosion pollution that are the result of earth changes.”¹¹ Any projects that require substantial earth moving, defined as an area of 400 square feet, are required to obtain a Soil Erosion and Sediment Control (SESC) permit. Projects that require a permit include earth changes within 500 feet of a surface water’s edge, earth changes more than 1 acre, earth changes related to gravel pits and landfills, installation or alterations to ponds, transportation facilities, and directional drilling or boring for utilities and infrastructure.¹²

¹⁰ City of Grand Haven, Article IV Zoning Districts, Section 40-422 Sensitive Features Overlay district,

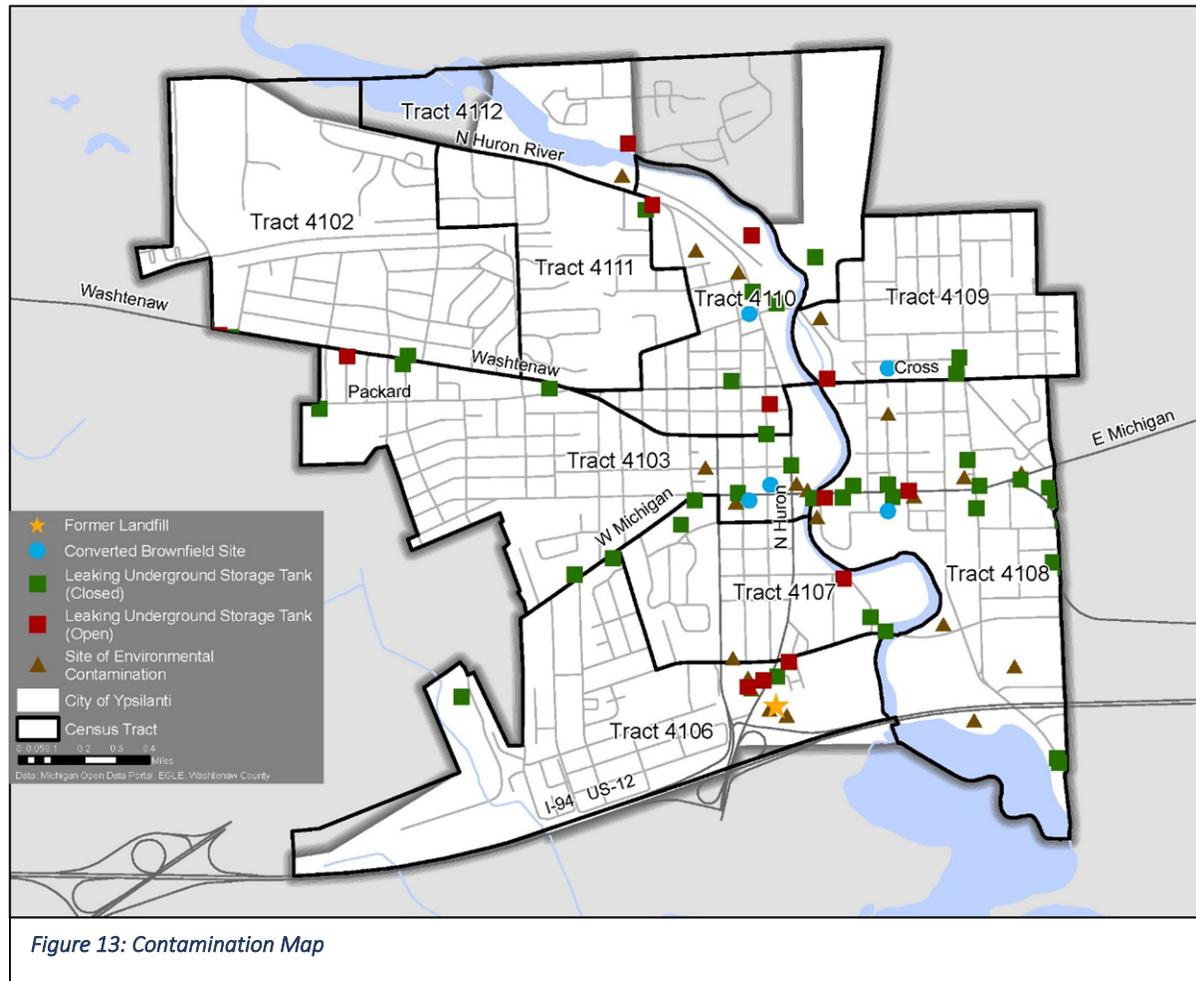
https://library.municode.com/mi/grand_haven/codes/code_of_ordinances?nodeId=PTIICOOR_CH40ZO_ARTIVZODI_S40-422SASEAROVDI.

¹¹ Washtenaw County Water Resources Commissioner, Soil Erosion Control <https://www.washtenaw.org/232/Soil-Erosion-Sedimentation-Control>.

¹² Washtenaw County Soil Erosion and Sedimentation Control Ordinance 2016, <https://www.washtenaw.org/DocumentCenter/View/758/Soil-Erosion---Sedimentation-Control-Ordinance---April-1-2016-PDF>.

Contamination

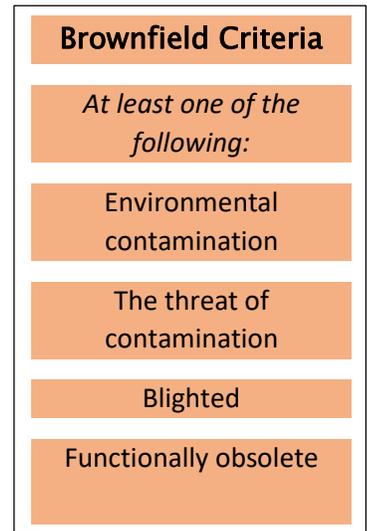
Ypsilanti’s industrial history has left behind environmental contamination that the City must still confront. Michigan’s Department of the Environment, Great Lakes, and Energy (EGLE) maintains a database of sites that have been affected by former development. This contamination can be found in many forms; from leaking storage tanks, from commercial activity, or from spills. The “Contamination Map” illustrates the location of all known brownfields that have been remediated or are in the process; sites of environmental contamination; and leaking underground storage tanks (LUSTs) in the City.



Brownfields have the broadest definition, covering most of the contamination spectrum and therefore applying to the widest range of sites. Brownfield sites could have experienced the threat of environmental contamination, are already contaminated, contain blighted structures, or have been deemed functionally obsolete. The map shows that most of these sites are primarily clustered along commercial corridors, the rail line, the river, and less frequently in neighborhoods.

EGLE tracks environmental contamination because of the significant impacts it can have on the drinking water supply and on residents living in proximity to these sites. This is a distinct database from LUSTs so that records are not duplicated. The main differences between the two systems are the source of the contamination, and which governmental division manages the sites. All other contamination releases, besides LUSTs, are covered under the Environmental Remediation Program (part 201). Twenty sites of environmental contamination were identified in the City.

Figure 13, Contamination Map, shows the most up-to-date data available for underground storage tanks (found in the Appendix). These are tanks that have been buried underground to mitigate their risk of explosion, usually because they contain petroleum, and regulations regarding their decommissioning have evolved over time. Businesses have not consistently removed them before leaving the site, and after years of deterioration their contents leak into the soil. If left underground long enough, the contents could reach groundwater or other sources of drinking water. An estimated 47 leaking underground storage tanks (LUSTs) have been recorded in the City; all but 11 are closed, meaning that corrective action has been taken to stop the spread of petroleum or other hazardous substances, and that action was appropriately documented with the State.¹³ Due to the long history of industrialization shaping the growth of the City, dating back to the 1800s when the Huron River was used as a power source, many of these sites are located in relatively close proximity to the river, posing an additional threat to the local ecosystems.



Contamination clean-up is often funded by higher levels of government, and specific projects are overseen by the state agency, Environment, Great Lakes, and Energy (EGLE). County-level Brownfield Redevelopment Agencies are an intermediary between these state and federal programs and the local municipalities with challenging redevelopment sites. The Washtenaw County Brownfield Redevelopment Agency (WCBRA) focuses on post-contamination efforts on a case-by-case basis as an economic and redevelopment tool, providing incentives in the form of grants, loans, and tax increment finance agreements that can be applied toward certain remediation costs in a proposed redevelopment project. The assistance is intended to make the cost to redevelop a brownfield site comparable to the cost of the same development in a “greenfield” (previously undeveloped) site on which remediation is not an issue. This helps to reduce sprawl and its associated vehicle emissions, makes use of established infrastructure, and prevents development damage such as contamination and habitat loss on undisturbed sites. While environmental remediation is a primary goal of the brownfield program, its overarching mission is redevelopment, and its tools are flexible enough to help communities fund previously restricted and generally more expensive redevelopment projects regardless of contamination level.

¹³ Underground Storage Tanks, United States Environmental Protection Agency. <https://www.epa.gov/ust/learn-about-underground-storage-tanks-usts>

The Environmental Protection Agency's Brownfields program, from which state and community programs are enabled, began in 1995; WCBRA was founded in 1999. Ypsilanti is one of the 23 municipalities that partners with the WCBRA to identify, assess, remediate, and redevelop brownfield properties. The WCBRA uses Tax Increment Financing, Community Revitalization Program, grants, and loans to advance projects through the various phases of redevelopment. Five sites in Ypsilanti have received assistance from WCBRA, only two of which had environmental contamination on site (the rest were deemed functionally obsolete), and all have been successfully converted into usable space except for the Water Street property. The small number of completed remediations underscores the reactive nature of the process, and highlights that on the local level, the most effective tools are preventative measures: upfront review, inquiry, and regular inspection of the design, storage, and uses in a zoning district. Ypsilanti has used its Zoning Ordinance to prevent automotive uses in certain zones because their practices and commonly used materials have a higher likelihood of contaminating soil.

The Bell Kramer neighborhood is an example of how environmental contamination, or even the threat of it, complicates land use planning. In 2014, the City of Ypsilanti rezoned the neighborhood to an industrial-commercial use in direct response to the findings of the 2012-2013 assessment, intending to prevent future homes from being built in a potentially hazardous area. However, after the rezoning, the existing homes became non-conforming structures, which are permitted to remain but not expand, not permitted to be rebuilt after a casualty, such as a fire, except under very specific circumstances. As lending agencies are reluctant to lend on non-conforming properties, the financial implications of this designation made it more difficult to sell or upgrade the homes. The residents' discontent, coupled with the vapor testing results in the homes, provided support for the City to rezone the neighborhood back to residential uses. The history of this neighborhood points to the complexity of changing land uses and monitoring the effects of environmental contamination. Rezoning is one mechanism to prevent development on contaminated sites, but is best used in conjunction with other methods. When used, the process must be accompanied by frank conversations with current property owners before the public hearing.

The Bell Kramer Neighborhood

Home to about a dozen households, this neighborhood is immediately adjacent to a former city landfill that has not been used since 1967. The first phase of an environmental assessment was conducted on the landfill in 2012-2013. Volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PNAs), metals, benzo(a)pyrene, and methane gas were detected at higher levels than the state permits. These substances produce substantial health and environmental risks. Property owners were notified because contaminations could have been migrating through the neighborhood. In 2017 and 2018, indoor air was tested in some of the Bell Kramer homes, and concentrations of contaminants were within acceptable ranges for the residents to stay.

Sustainability Goals: Earth

GOAL: Eliminate new instances of soil contamination and responsibly deal with the legacy of existing polluted sites

- Explore creation of an overlay zone, or other zoning or building regulations, to control the types of uses that may be permitted in areas with soils that would allow for easy transmission of contamination, or uses that have a high risk of contamination near ecologically sensitive areas, such as waterways.
- Research and confirm existing sites of contamination with EGLE
- Use Brownfield TIF capture to fund remediation of sites that may be redeveloped.
- Continue to work with the Washtenaw County Brownfield Redevelopment Authority to remediate sites.
- Explore and pursue grant opportunities to remediate sites that may not be good candidates for commercial redevelopment or that pose an immediate threat.

GOAL: Ensure buildings and infrastructure are constructed in a manner complementary to soil structure, slopes, and drainage.

- Make soil information available to all, and directly provide information on soil structure to those who choose to build a new structure that requires a foundation.
- Incorporate green infrastructure into planned capital improvement projects wherever possible, and identify potential sites for demonstration projects.
- Strengthen zoning protections to limit erosion in areas of steep slopes.

Water

Surface Water Quality

Ypsilanti is a part of the Lake Erie Basin. Within the City's boundaries are two watersheds - Huron River and Stoney Creek (into which the City's Paint Creek drains). The Huron Watershed, which covers most of the City, is divided into five sections. The section that encompasses Ypsilanti is known as the "Lower Middle Huron," enveloping about 27.7 miles of the river from North Maple Road (Barton Pond) downstream to Belleville Lake. It includes portions of the City and Township of Ann Arbor, Superior Township, Ypsilanti Township, and Van Buren Township.¹⁴ Because a watershed crosses several jurisdictional boundaries, it is incumbent on these municipalities to cooperatively maintain high-quality water while permitting access to the river. The health of the river depends on the quality of all its tributaries, which is often linked to land use policy. One way to coordinate across municipal jurisdictions is through a watershed council: the Huron River Watershed Council (HRWC) was the first in the state and has been working to protect and restore the Huron River since 1965. In addition to writing a management plan for the entire watershed, the HRWC also authors management plans covering specific sections of the watershed. The HRWC is updating the section of the watershed management plan that includes Ypsilanti, the Lower Middle, in 2020-2021.

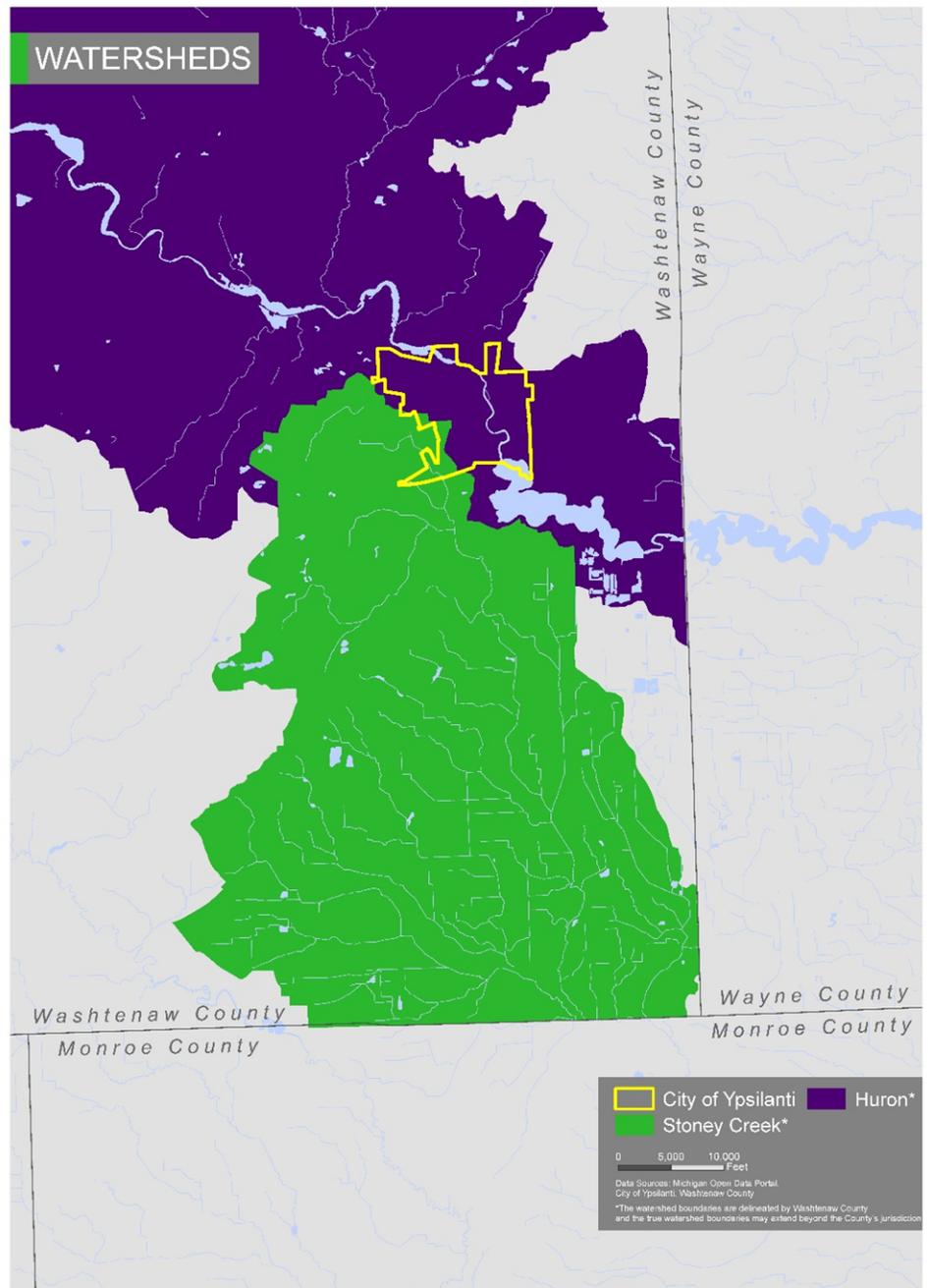


Figure 14: Watersheds

The HRWC identifies that the section of the Huron River that runs through Ypsilanti and Ann Arbor is heavily impounded: 77% of it is impounded by the seven dams that stretch across this area, making it more similar to a lake ecosystem than a river. Two sources afflicting the health of the watershed are runoff from impervious surfaces, and new development along the riverbank that clears vegetation vital to the absorbing runoff. In particular, phosphorous and *E. coli* are entering the river from Mill, Honey, and Boyden Creeks.

¹⁴ HRWC. "The Huron River: Lower Middle Huron." River Profile. <https://hrwc.maps.arcgis.com/apps/MapJournal/index.html?appid=67e1fd1bbc9a44cf853cd78dd6d8219f>

Some measures are in place to protect water quality. According to the City of Ypsilanti’s code of ordinances, all development along any river frontage must show where a planned conservation and/or access easement of 50 to 100 feet would be located.¹⁵ A conservation easement allows river access for potential restoration or cleanup efforts. Without an easement, the City would have to receive permission from private property owners to pursue any riverbank projects. The City has also adopted ordinances to limit phosphorus fertilizers and asphalt sealcoats; the success of this regulation is limited by enforcement and cooperation from property owners and has yet to be measured.

To further ensure protections for the Huron River, an overlay district could be implemented. The regulations would limit new development, curtail uses involving toxic chemicals on site, and enforce low impact design standards that allow the site to retain water to mitigate contamination entering the river. Ypsilanti has adopted the stringent standards from Washtenaw County Water Resources Commissioner, a mighty step in safeguarding future development from polluting practices. However, these regulations are not a panacea because they only apply to new or redeveloped sites, which are much fewer in number than established sites.

A retrofitting program would have wider scale effects, but its implementation is more controversial than policies pertaining only to new development. The adoption of stormwater fees based on the amount of impervious coverage on a property is an example of this type of effort and has been enacted in places like Detroit and Ann Arbor. In those communities, impervious surfaces incur drainage fees, thus incentivizing the implementation of pervious substitutes. Credits are offered for on-site stormwater management investments, such as the installation of a rain barrel, cistern, or rain garden to capture run-off from a rooftop. Rain barrels are a cost-effective method of storing water for residential properties when used correctly. Best practices suggest rain barrels should stand upright, be screened to prevent mosquito breeding and debris accumulation, connect to overflow barrels, have a “do not drink” spigot, and belong to property owners who have been educated about their use and maintenance.

It takes the work of many groups to see positive change in our water systems. The Middle Huron Partners, a group that works with the HRWC, has invested over \$10 million over 11 years on projects that reduce and capture stormwater runoff. At a larger scale, the Middle Huron Partners successfully lobbied to restrict phosphorous fertilizers, and the state followed suit in 2012 with new legislation to reduce algae blooms. At the county level, Washtenaw County modified its focus from flood control to quality control. This change in philosophy is backed by a hierarchy of preferred management practices that prioritizes natural vegetation first for infiltration, then minimizing impervious surfaces, and finally detention

Figure 15: Watershed Report Card

Subject ¹	Grade	Explanation
Watershed land use	D	High impervious surfaces along tributaries
Natural areas	D	12% of watershed has intact natural areas
River flow	F	Flashes following storms, erratic dam gate
River habitat	B	Where undammed, favorable features for river life
Aquatic Insect Community	C	Where undammed, good habitat for insects
Fish Community	B	Anglers enjoy good smallmouth bass
Phosphorous	C-	Concentrated of phosphorous exceed target; declining
<i>E.Coli</i>	C	After heavy rain, <i>E.coli</i> exceeds state standards
Total Suspended Solids (TSS)	A	Low levels of TSS
Water Temperature	B	High maximum summer temperatures
Conductivity	B	Mostly measured at normal levels
Dams	F	High presence of dams and poorly controlled

Source: HRWC

¹⁵ City of Ypsilanti Code of Ordinances, Article VI: Site Regulations, Section 122-607 (c). https://cityofypsilanti.com/DocumentCenter/View/1396/ZOUpdate--02--ZO_BW20170215_anno?bidId=

and conveyance of excess stormwater.¹⁶ Vegetation is at the top of the hierarchy for its varied benefits: plants provide structural support, stabilize the soil through their root networks to reduce erosion, keep rivers healthier for aquatic life, and purify runoff before it enters the river.

As vegetation becomes the priority for protecting water quality, it is important to recognize the maintenance challenges that have hampered its progress. Landscaping is not a short-term proposition. Specifically, it takes about three years for a rain garden to take root and maximize its capacity as a water absorber and purifier. During that time, it must be regularly nurtured *and* must avoid its other unintended function as a “litter collector.” In cases where rain gardens have amassed trash and debris, they have been deemed “blight” and subsequently removed. A rain garden sign that includes its year of inception can insulate them from removal during their nascent stages and give them sufficient time to mature.

Dam Removal

The Peninsular Paper Dam, in its current state, is a cause of many troubling ecological indicators regarding the Huron River’s health, namely creating impoundments where algae forms and changing water temperatures that alter dissolved oxygen levels, harming fish habitats.¹⁷ Ypsilanti and the HRWC conducted a feasibility report on removing the dam. The dam was classified as a high potential hazard by the DEQ due to the severity of impending damage it could cause if it failed, and its classification as obsolete because it no longer serves any purpose. Based on sediment quality and quantity, potential infrastructure and utility impacts, and riverfront land ownership, it was determined that removing the dam is feasible.¹⁸ In 2016, estimates for repairing the dam would exceed \$800,000 and removing it would cost closer to \$2.7 million. Its removal would help restore the Huron River to a flow that is better suited for the ecosystem that depends on it.

In May 2019, City Council voted to approve \$500,000 towards deconstructing the dam as opposed to continuing to pay for repairs so long as the City applies to grants to complete the project.¹⁹ ²⁰ Dismantling the dam will protect the environmental health of native species that rely on the Huron River, and protect the City’s budget in the long run.

¹⁶ Washtenaw County Water Resources Commissioner. Rules and Guidelines: Procedures and Design Criteria for Stormwater Management Systems. Revised October 2016. <https://www.washtenaw.org/DocumentCenter/View/302/Rules-and-Guidelines---Procedures-and-Design-Criteria-for-Stormwater-Management-Systems-PDF?bidId=>

¹⁷ Huron River Watershed Council. The Huron River Data Report: Ann Arbor and Ypsilanti Vicinity. <https://www.hrwc.org/wp-content/uploads/LowerMiddleHuron-11x8.pdf>

¹⁸ Princeton Hydro. Peninsular Paper Dam: Dam Removal Assessment and Feasibility Report. September 2018. <https://cityofypsilanti.com/DocumentCenter/View/1789/2018-11-21-Peninsular-Dam-Removal-Study-Report>

¹⁹ WXYZ Detroit. Ypsilanti City Council Votes to Tear Down Peninsular Dam. May 2019. <https://www.wxyz.com/homepage-showcase/ypsilanti-city-council-votes-to-tear-down-peninsular-dam>

²⁰ Ypsilanti City Council. Resolution 2019-101. May 7 2019.

Flooding and Stormwater Management

Flooding has the potential to harm the drinking water supply, human life, property, and infrastructure. The Federal Emergency Management Agency (FEMA) has identified zones based on the anticipated frequency an area will flood in a 100-year interval. These predictions are based on historical data, which means that they do not incorporate climate change considerations.

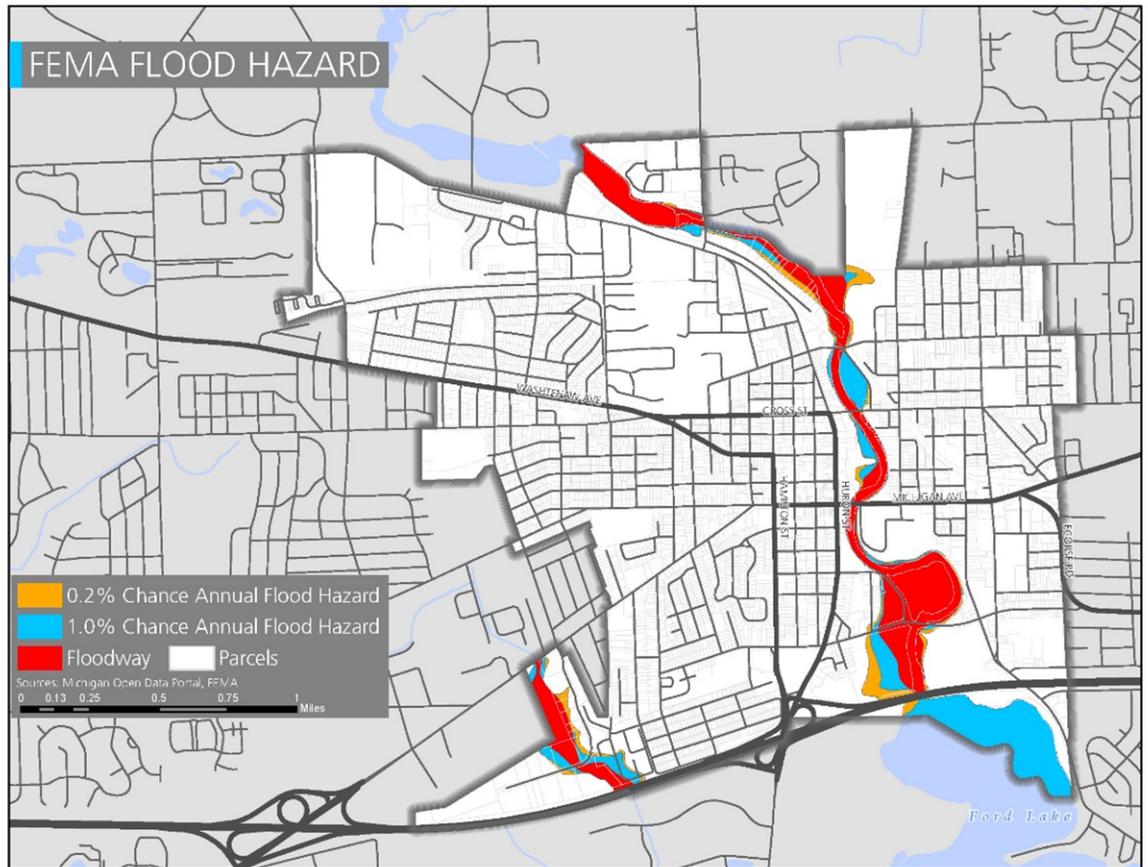


Figure 16: FEMA Flood Hazard

Already, the FEMA-delineated floodplains have been shown in many cases to be outdated, as areas vulnerable to flooding have expanded outside of its boundaries. Part of the increase in instances of flooding is linked to increased precipitation falling in concentrated storm patterns. Fortunately, Ypsilanti has not yet experienced flooding that has overwhelmed its storm sewer infrastructure, and much of the land that lies in the flood zones is designated parkland. The composition of Ypsilanti’s soil also helps in that regard, since only 7% of the soils in Ypsilanti are prone to “frequent flooding,” and the other soils experience no flooding aside from extreme circumstances.²¹ To gain more accurate depictions of how the City may flood in the future, Ypsilanti can invest in an updated study that incorporates recent data and includes forecasts of more intense and frequent storms. The study should also include how the river’s altered channel due to the anticipated removal of the dam may impact flooding.

Green Infrastructure, specifically green stormwater infrastructure (GSI), is one way to reduce the impacts of excess stormwater. Green stormwater infrastructure is a broad term that includes several practices of water management that protect or mimic the natural water cycle. As opposed to conventional “gray” stormwater infrastructure, which uses hard surfaces and systems to channel excess water elsewhere, this approach protects and expands the natural environment so that water can be absorbed naturally at several scales: a home, a downtown, an entire city, a watershed. Common examples are rain gardens, green roofs, trees, planter boxes, rainwater harvesting systems, and bioswales, and better protection of wetlands and floodplains.

The utility of GSI should not be underestimated. For example, one acre of imperviously-surfaced roadway can generate between 0.5 and 1 million gallons of stormwater runoff annually. On Michigan Avenue in Lansing, there are 30 planter box

²¹ Web Soil Survey, United States Department of Agriculture, <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

bioretention areas that collect runoff from four acres of roadway and reduce the annual stormwater runoff by approximately 75%.²²

Stormwater Drainage Program

A case study in Detroit quantified the combined advantage of pervious pavement and a rain garden on a church's parking lot. Using the EPA's stormwater management model, they calculated that a 4,530 square foot rain garden and a 33,000 square foot patch of pervious pavement reduced stormwater runoff volume by 70%, even during the heaviest six-hour period of precipitation in Detroit's recent history (2016).¹ In Detroit, there is an added incentive for property owners to use green infrastructure because they are charged a drainage fee based on the impervious surface area on the property. However, they may also earn a "green credit" for actions such as redirecting downspouts into areas where natural infiltration can take place.

Landscaping that beautifies a site can also capture stormwater. Already embedded in the landscaping requirements in the Zoning Ordinance is a tree protection plan for site plan review. The applicant is awarded credit for preserving or incorporating existing trees and shrubs into the development, and if trees or shrubs intended to meet the minimum landscaping requirements are cut down or damaged, the applicant must replace them according to ordinance specifications. Moreover, trees proposed for credit cannot be invasive (122-632). The frontage of all public and private streets for a new or altered use that requires site plan review must be landscaped with street trees (122-636). Existing regulation stops short of a tree preservation ordinance, which would prevent the removal of trees determined meeting criteria for condition, size, and species. In a tree preservation ordinance, regulations prioritizing transplanting trees prior to removal can also be included. Furthermore, wetlands are tremendous stormwater capturers and beautiful landscapes to behold. While most of them are regulated at the state level, the city can continue to monitor their health and work with partners to protect those that remain.

The Zoning Ordinance also permits accessory stormwater control features such as swales, pervious paving, rain gardens, rain cisterns, vegetated roofs, and other methods. Ypsilanti has one city-sponsored rain garden at the Freighthouse that is managed by volunteers, and several curbside raingardens in Depot Town that are maintained by the DDA with volunteer assistance and

assistance from local merchant groups.

In partnership with Washtenaw County Conservation District (WCCD), the Sustainability Commission has offered support to promote WCCD workshops to residents, encourage tree planting on residential lots, and identify a site and volunteers for an Earth day tree planting event. Washtenaw County has staff dedicated to teaching master rain gardener certification courses and provides technical advice for planting one on private property. The City of Ypsilanti also won bronze at the Michigan Sustainability Conference in 2019 for its work with the Washtenaw County Water Resources Commissioner to provide free consultations to households interested in developing or enhancing rain gardens.²³

In addition to enhancing green stormwater infrastructure, some expansion to grey infrastructure may also be needed. Ypsilanti was recently awarded a Stormwater, Asset Management, and Wastewater (SAW) grant. With the funds, the City mapped its storm sewers and plans to upgrade its software to aid in continuing to monitor and record its conditions. With improved information about existing infrastructure, Stormwater Management Plans can be tailored to specific areas for improvement so that estimates for expansion are based on accurate data. Using climate change predictions for

²² SEMCOG. Green Infrastructure Vision for Southeast Michigan. 2014. Page 45.

<file:///C:/Users/Michelle%20Bennett/Downloads/GreenInfrastructureVisionForSoutheastMichiganMarch2014.pdf>

²³ Michigan Green Communities (MGC). 2019 MGC Challenge Participants and Awards. <https://migrecommunities.com/blog/>

precipitation and updated inventory on the storm sewer system, Ypsilanti can continue to use the Capital Improvement Plan to plan for greater stormwater capacity with greater precision.

Drinking Water Sources

There are 13 water wells within the City: four type 1 (community) wells, now closed; one type 2 (facility) well, now inactive; four household wells, and four irrigation wells.²⁴ These are personal wells that the owners are responsible for testing. The City of Ypsilanti, through the Ypsilanti Community Utilities Authority, sources water from the Great Lakes Water Authority for its municipal water system.

The Ypsilanti Community Utilities Authority provides a municipal water system and requires households that can be serviced by municipal sewer shall be, according to ordinance 106-22. At the point of a sewer hookup, the City encourages households to use the municipal water system, and as most of the few remaining households convert, the installation of personal wells is no longer necessary nor advisable.

The City created two well exclusion areas which are written into local ordinances and recorded with the Register of Deeds. Well exclusion areas were instituted to protect property from water contamination. One, in the downtown, prohibits wells adjacent to a parcel where there was a leak from a former gas station; the other, in the Bell-Kramer neighborhood, prohibits wells adjacent to the former landfill.

What the City can focus on is how to improve services through its water and wastewater provider Ypsilanti Community Utilities Authority (YCUA). Because wastewater treatment plants are energy-intensive, and provide an essential service to households, upgrades to this system are a win-win. Potential policies are two-fold. First, the City and YCUA can collaborate on home and business water efficiency financing programs to reduce total load and peak flow rates, saving energy at the plant and potentially lowering water bills for households. Secondly, advances to sensors and software can also improve their energy efficiency so that our water sources and treatment can contribute less to emissions.²⁵ The City can also continue to work with YCUA on water transmission infrastructure upgrades and maintenance; this minimizes potential waste from leakages and helps to minimize the risk of lead or other exposure from older pipes.

Sustainability Goals: Water

GOAL: Protect the watershed from further contamination.

- Consider a sensitive features overlay zone providing a buffer around the Huron River and Paint Creek that provides site and use regulations tailored to the proximity to these waterbodies.
- Invest in consistent enforcement for compliance to the sensitive feature overlay zoning district.
- Continue to pursue updates to the zoning ordinance, such as tree protection regulations, that preserve and improve vegetation that can mitigate stormwater impacts.
- Continue to support the work of the Washtenaw County Water Resources Commissioner and other partners to educate members of the public, particularly single-family homeowners, on stormwater issues.
- Monitor adherence to the City's phosphorous fertilizer and tar sealcoat ordinances for effectiveness.
- Work with Washtenaw County Environmental Health to research the status of remaining private wells and provide resources and recommendations for testing water quality to property owners

GOAL: Preserve and expand the City's capacity to deal with heavy rainfall to mitigate negative effects on people and property.

- Incorporate capacity upgrades for grey stormwater management into the CIP based on predictions for greater precipitation
- Update the flood maps, including FIRM, based on climate projections and changes to the river channel since the FIRM formulation in the 1970s

²⁴ Michigan Open Data Portal, "Water Wells – South Central & Southeastern Michigan" <http://gis-michigan.opendata.arcgis.com/datasets/water-wells-south-central-southeastern-michigan?geometry=29.491%2C-17.893%2C-105.860%2C71.775>

²⁵ Ypsilanti Climate Action Plan. 2012. Pg 30.

- Investigate an equitable stormwater fee schedule that encourages converting impervious to pervious surfaces and proper use of rain barrels or other detention/retention systems.
- Consider banning basements or enforce floodplain standards in boundaries where the soil has limited capacity to handle stormwater
- Develop a Stormwater Management Plan
- Continue to pursue the removal of the Peninsular Dam
- Continue to maintain City lands that are in the flood zones and vacant for stormwater and floodwater mitigation.
- Pursue GSI projects in the City parks, particularly in the flood zones.
- Pursue conservation &/or access easements along the Huron River.
- Explore offering incentives to property owners to retrofit existing buildings and site improvements with stormwater-friendly infrastructure, including rain gardens.
- Explore the potential to equitably enact a stormwater fee structure to encourage private retrofit stormwater infiltration and detention infrastructure

GOAL: Promote resources for water conservation and testing to ensure access efficiency upgrades and clean water

- Work with YCUA to develop home and business water efficiency financing programs
- Promote Great Lake Water Authority program WRAP to perform conservation audits and funds for repairs to help reduce low-income households reduce water bills
- Collaborate with YCUA on water conservation and infrastructure improvement projects.

Energy

In November 2019, the City of Ypsilanti committed to carbon neutrality by 2035 in partnership with the City of Ann Arbor as a response to the climate emergency. The resolution calls for City Council to budget staff and resources to become carbon neutral. Achieving this goal will require the City to first measure, and then reduce, greenhouse gas (GHG) emissions that trap heat in the atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases.²⁶

The City of Ypsilanti has focused on measuring local emissions for a decade or more. In coordination with the 2012 Climate Action Plan, 2005/2008 community and government greenhouse gas emissions were evaluated. An updated Greenhouse Gas (GHG) Study was conducted alongside this Sustainability Plan to determine if the actions had achieved reductions in carbon emissions. The 2020 City of Ypsilanti Community and Government Greenhouse Gas Inventories present 2018 emissions from the City of Ypsilanti community as a whole and emissions from the City of Ypsilanti government operations. The inventory follows the approach and methods provided by the ICLEI US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (US Community Emissions Protocol). ICLEI is a global network of local and regional government committed to sustainable urban development. Because this protocol differs from the 2012 methodology, the results are not directly comparable, but do show movement in emissions.

Community Greenhouse Gas Inventory

The City of Ypsilanti examined community emissions through multiple frames, including “community-wide activities” and “government significant influence.” The community-wide activities frame shows the extent to which community members’ use of energy, materials, and services contribute to GHG emissions within or outside of the City boundary, regardless of whether the City has significant influence over those emissions. The findings show that the City of Ypsilanti’s total 2018 community emissions were 269,180 metric tons of CO₂e, comprised primarily of commercial energy, residential energy, and transportation sectors.²⁷

Despite its lack of direct control over major GHG contributors, the City included sources or activities in which it can exert significant influence over energy consumption. Already measured as the largest greenhouse gas contributors, the categories “residential” and “commercial-industrial” saw an increase in emissions between 2008 and 2018, making households and businesses starting points for new mitigation policy. It is possible that the uptick in commercial and residential emission is related to the legalization of marijuana for personal and commercial use, given that the time period coincides with the implementation of these notoriously energy-intensive operations. It was estimated that through policy, Ypsilanti can influence 64% of community emissions (171,310 MT CO₂e).²⁸ This figure will become the baseline for setting an emissions reduction target, against which future emissions in the “significant influence frame” will be measured.

Units of Measurement

CO₂ – carbon dioxide

CO₂e – carbon dioxide equivalent, a standard unit for measuring carbon footprints that conveys the impact of different greenhouse gases in terms of the functionally equivalent amount of CO₂

Transportation

I-94 passes through the City of Ypsilanti and represents a significant source of transportation related emissions which are not directly attributable to the community. The Southeast Michigan Council of Governments (SEMCOG) estimates that travel on I-94 represents 53% of all total on-road vehicle miles traveled within the City annually while non-highway vehicle miles represent 47%.

²⁶ Environmental Protection Agency. “Greenhouse Gas Emissions.” <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

²⁷ City of Ypsilanti 2020 Inventories of Community and Government Greenhouse Emissions. Figure 2. Pages 28-29.

²⁸ City of Ypsilanti 2020 Inventories of Community and Government Greenhouse Emissions. Figure 15. Pg 37.

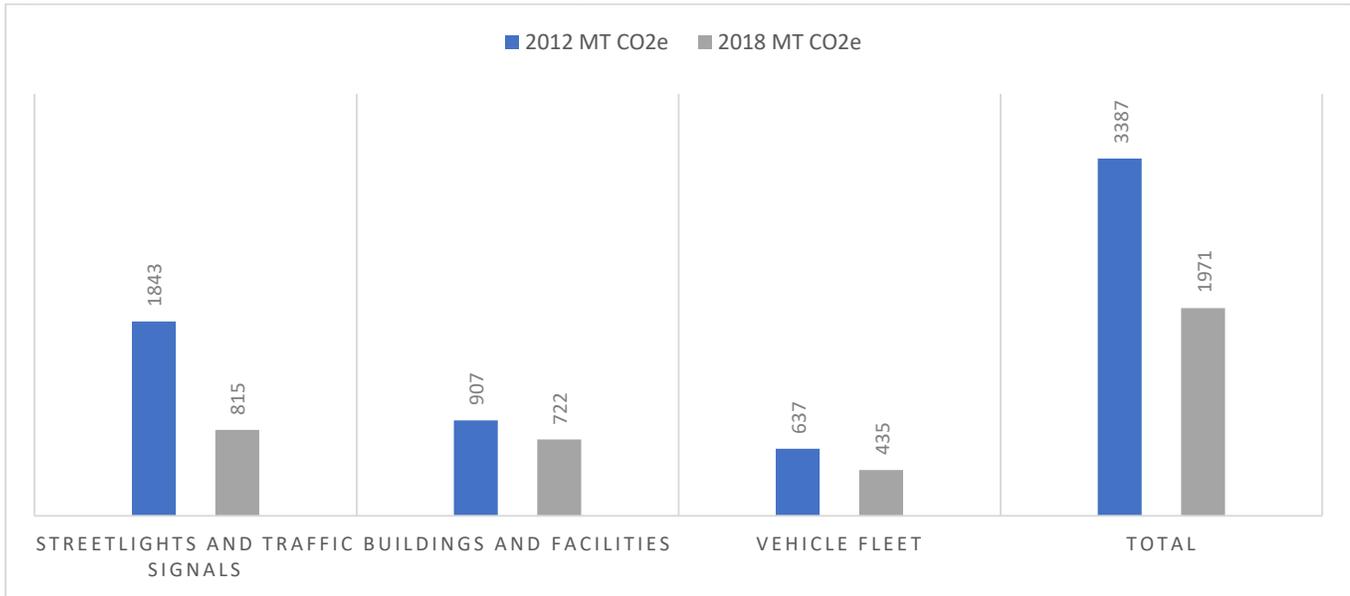
Government Operations Greenhouse Gas Inventory

The government operations inventory is a separate greenhouse gas emissions inventory that takes a deeper dive into emissions derived from municipal operations. The largest emitters are streetlights and traffic signals, accounting for 32% of emissions, followed by vehicle fleet emissions that comprises 17% of the total.²⁹ Actions to reduce emissions in both sectors are substantially underway in the City and will continue to play a key part of a carbon neutrality strategy. Ypsilanti has already transitioned the majority of its light fixtures to LED and begun introducing hybrid and electric vehicles to its fleet. Emissions are expected to continue dropping as the City continues to address harder-to-replace streetlights and continues fleet modifications. Not including emissions from employee commutes and solid waste, government operations emissions have dropped by 42% over a decade!

Residential

Within the residential sector, electricity use accounted for 60% of emissions, while natural gas use in stationary combustion accounted for 40%.

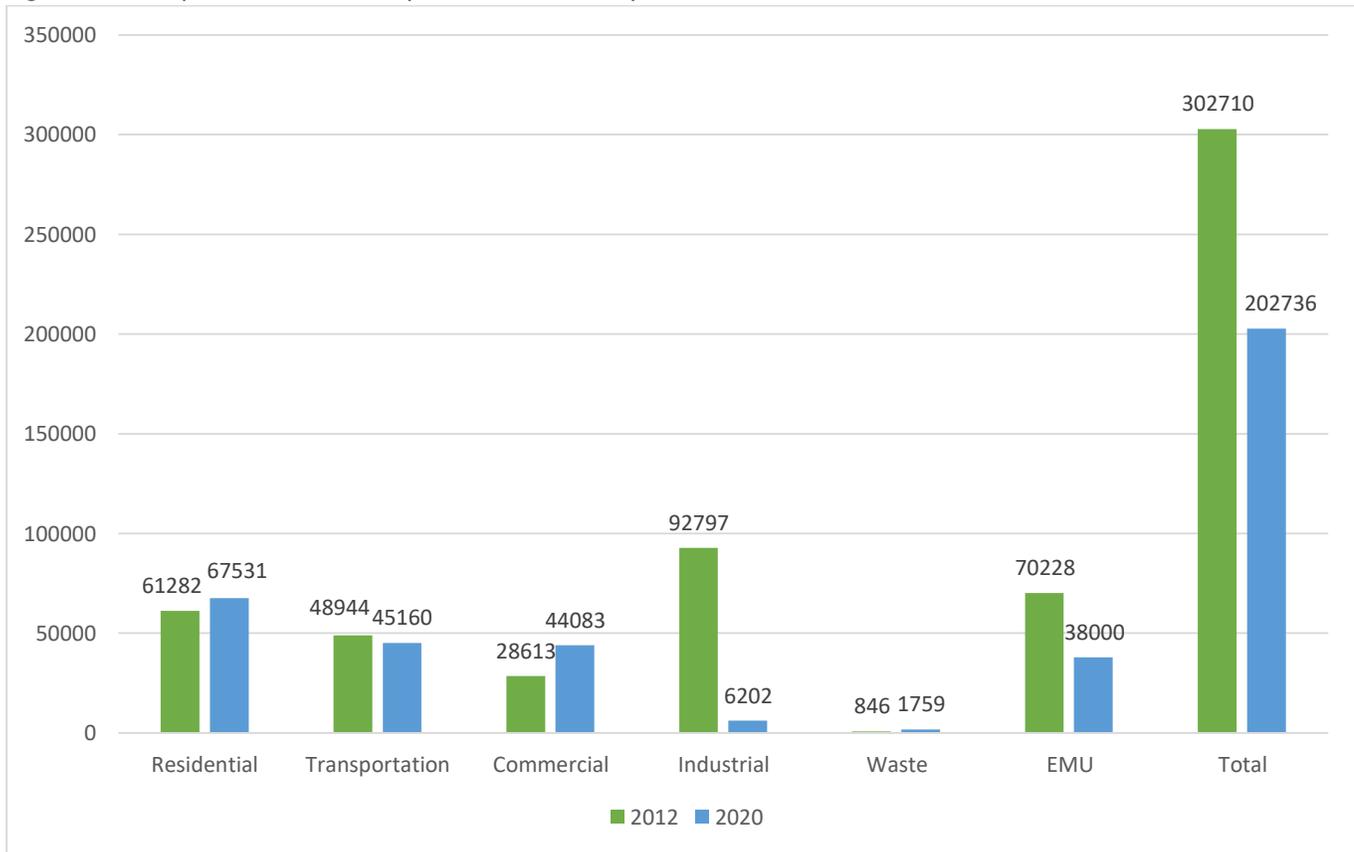
Figure 17: Comparative Government Emissions by Sector 2012-2018 (MT CO2e)



Source: EcoWorks

²⁹ City of Ypsilanti 2020 Inventories of Community and Government Greenhouse Emissions. Pgs 42 and 43.

Figure 18: Comparative Community CO2e Emissions by Section 2012 & 2020* GHG Inventories



Source: EcoWorks

The City has made successful strides in increasing its renewable energy portfolio. Ypsilanti continues to lead by example in its actions and in streamlining the solar permitting process to enable property owners to follow suit. The City has enabled solar installation as far as its authority permits, stopping just short of mandating them on new construction.

Ypsilanti worked with DTE and Solar Currents to install a solar farm by Highland Cemetery. The City has also installed solar panels on most of its municipal buildings and converted most of its lighting – both building and streetlighting – to LED. These efforts have translated into noticeable reductions in emissions since the last inventory was conducted. Moreover, the City has pursued other best practices that include low-flow water fixtures, programmable thermostats, air sealing, staff behavior changes, and increased awareness about conservation and efficiency. Another City policy that may have contributed to emissions reduction is an increased financial contribution to expand bus service, potentially taking cars off the road. Energy efficiency measures for municipally operated facilities have resulted in significant savings. The City should continue to address major projects at the most energy-intensive facilities and implement no- or low-cost efficiency opportunities at all facilities. Larger projects, which require more planning and money, should be integrated into capital improvement plans.

Commercial

In 2017, EMU replaced an aging cogeneration unit with a new high efficiency unit projected to reduce annual emissions of CO2 by 21,305 tons/year and reduce NOx emissions by 112 tons annually. Emissions from Eastern Michigan University represent 46% of total commercial emissions in the City of Ypsilanti.

Source: Ecoworks

The City has fallen short on its most ambitious goal related to energy: Resolution 2013-175 sought to place solar on 1,000 roofs or generate five megawatts of electricity from distributed solar by 2020.³⁰ Solar Ypsi has calculated that 72 sites have solar panels, totaling about 1.4 megawatts of capacity. Based on those calculations, the City has realized 7.2% of the solar roof target and 28% of the megawatt target. The City should revisit and update this goal- perhaps updating the target to 1,000 roofs that have solar by the year 2030.

A next step in emission reduction for Ypsilanti could be the purchase of renewable energy certificates (RECs) to expand consumers' service options and support renewable electricity development. An REC is a tradeable market-based instrument used in electricity markets. It allows organizations that purchase RECs to account for nonrenewable electricity use. REC purchasers diversify their consumption by expanding its use of low- to zero-emission energy sources and tracking its growing reliance on renewables. RECs are a flexible tool because they can be purchased separately from electricity, meaning the purchasing organization does not need to alter its existing power contract to use greener power. The two can be matched and use the same infrastructure.³¹

Making headway on properties that are not municipally owned is also an issue of equity and education. Increasing energy efficiency for residents and business owners means reducing the percentage of income spent on housing utility costs in addition to reducing the amount of energy consumed. Education programs for residents could help lower residential usage; this awareness and access may be especially promising in Ypsilanti given that residents are supportive of increased energy efficiency standards and the use of renewable energy. Promoting higher standards for new development, namely commercial and industrial, could be encouraged through incentives for developers to pursue energy-efficient standards (Energy Star, LEED, Living Building Challenge), applications for tax abatements, and promoting existing financial tools to help developers meet these standards during and prior to the site plan review process. For small businesses, Retired Engineer Technical Assistance Program (RETAP) provides pollution prevention, water conservation, and energy efficiency programs free of charge. RETAP teams review a site's operations and recommend strategies for reducing waste at a significant cost savings. Eligible businesses must be independently owned and operated, have fewer than 500 employees, and be primarily engaged in manufacturing.³²

Another issue to tackle in Ypsilanti is residential energy consumption. Renter-occupied units are a large portion of housing stock, so energy efficiency and safety of rental properties could lead to substantial reductions in use. The up-front costs of major efficiency improvements have so far exceeded their profit potential in the estimation of the local landlord community, and so the City will be in a stronger position to implement required standards as the market strengthens. In the meantime, there are intermediary steps to take. As outlined in the 2012 Climate Action Plan, a requirement to provide information regarding utility charges allows potential tenants to choose a unit based on its energy performance, however, this disclosure has proven impractical due to the varying use from tenant to tenant. During rental inspections, a certification process that verifies which units have met energy standards would enable tenants to shop and compare units more easily. Certification criteria can be based on existing programs such as the "Energy Star Homes" program. For eligible low-income homeowners, Washtenaw County has a weatherization program that reduces monthly energy bills by

Energy Competitions

In Traverse City, the month-long "kWh Challenge" was organized. Over 50 staff members from city departments participated in weekly challenges of unplugging unused electronics, using efficient computer settings, and using daylight as opposed to artificial light. These represent simple behavior changes that have significant savings, while creating a friendly competition to train staff on energy efficiency.

Source: SEEDS

³⁰ City of Ypsilanti, "Resolution for 1,000 Solar Roofs Initiative", No. 2013-175, September 3, 2013.

http://www.solarypsi.org/repository/documents/cityhall/Resolution_2013-175_1000_Roofs_by_2020.pdf

³¹ EPA Green Power Partnership. "Offsets and RECs: What's the Difference?" https://www.epa.gov/sites/production/files/2018-03/documents/gpp_guide_recs_offsets.pdf

³² EGLE. Pollution Prevention and Energy Efficiency Assessments. <https://www.michigan.gov/egle/0,9429,7-135-3304-11899--,00.html>.

improving a home's insulation.

The coordination of reducing municipal and community emissions should be performed by a dedicated member of staff. An Energy Manager position that is integrated into City Hall could make enduring progress on these goals. Many of the energy action plans items derived from the 2018 Energy Plan could fall under the Energy Manager's purview. An Energy Manager could improve data collection processes, spread knowledge of energy management among city staff, analyze trends in energy use, and develop communications with the residents and property owners. This person would lead a team to research and update available energy-saving equipment, determine how to incorporate more renewable energy in the City's portfolio, promote policies and incentives for reducing energy use, seek grants and other funding mechanisms to implement clean energy projects, liaise with the Sustainability Commission, expand outreach to commercial and industrial uses, and manage capital improvement projects related to energy efficiency. In recognition of the substantial financial commitment that a newly-created staff position represents for the City, a reasonable starting place could be to fund the position for one year and expect an early outcome of its efforts to result in savings sufficient to cover continued funding.

Importantly, development of this system will build institutional knowledge that outlasts the employment of any one dedicated staff member. A system that regularly schedules a GHG inventory update every five years using the same methods and program that forecasts reductions and benchmarks municipal utility bills to an annual goal would be a valuable organization change. The system should include internal reporting from the Sustainability Commission so positive results can be shared and celebrated with the community.

Ypsilanti has joined Ann Arbor in the goal of becoming carbon neutral by 2035. Recently, Ann Arbor published a draft Net Zero plan with seven strategies for getting there. The strategy "Power our Electrical Grid with 100% Renewable Energy" set forth in the plan is ambitious but necessary. Estimated to cost \$4.1 million and reduce greenhouse gases by 41%, the goal is supported by four actions. Community choice aggregation, which gives cities control over procuring power for its community, has one major roadblock: this step is not currently enabled by the state. Ann Arbor is working on recommendations for legislators to allow cities to bulk buy power on behalf of their residents and businesses. Through economies of scale and the right to integrate as much renewable energy as the community can manage, Ann Arbor has committed to buy 100% renewable energy by 2027 and provide it for the entire community through community choice aggregation. As a partner in this effort, Ypsilanti should support and lobby the state with Ann Arbor for legislation that has the power to convert widescale energy use into clean consumption.

Through the Net Zero community engagement sessions, microgrids were mentioned to produce, convey, and store energy. Microgrids are decentralized nodes that transmit energy with the capacity to disconnect from the traditional grid. In times of crisis, such as storms that cause major power outages, an entire area may lose energy if the traditional centralized grid is damaged. Because microgrids can disconnect from the traditional grid, they mitigate the effects of storm on households and businesses. They can be powered by generators, batteries, or renewable sources which plugs them into renewable energy goals and adaptation goals. Still, there is little discussion of deployment as further research is needed into how they should be operated and where they should be placed to have the largest impact.

On a larger scale, the City's support for sustainability is reinforced when it participates in regional, national, and international commitments to energy, climate, and sustainability causes. Ypsilanti has formed pivotal partnerships locally with EGLE, DTE, and Ann Arbor, among others but its work could be raised to higher heights by signing on to the Paris Climate Agreement, The Sierra Club's "Ready for 100" pledge, and the Global Covenant of Mayors for Climate and Energy. Although the goals embedded in each of these organizations' core missions may seem difficult to attain, the connection to case studies, methodologies, policies, and expertise will regenerate interest and help to sustain action in the pursuit of low-energy consumption.

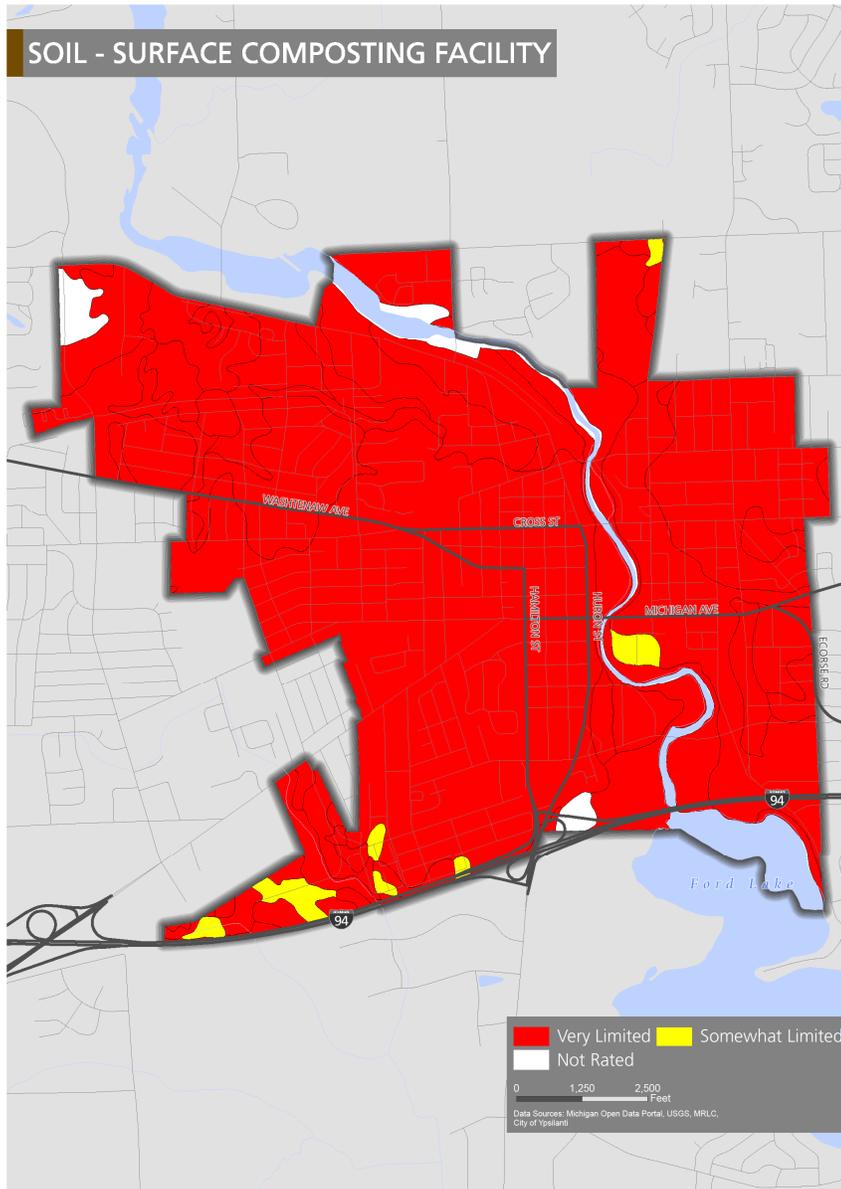


Figure 19: Soil – Surface Composting Facility

Waste Management

The City of Ypsilanti’s waste disposal is contracted to Stevens Disposal, which serves Southeast Michigan. Stevens Disposal provides waste services to 5,337 households, roughly 70% of households in the City.^{33 34} The solid waste generated in the City is transported to two landfills in southeast Michigan: Carleton Farms located in Sumpter Township and the City of Riverview’s municipal landfill, Riverview Land Preserve.³⁵ Carleton Farms accepts 2.25 million tons of waste annually, the third highest volume in Michigan, and has a total capacity of 101 million tons, the largest in the state. The landfill is estimated to produce 15.8 million cubic feet of gas per day, 40.1% of which is captured. Methane that cannot be captured is flared. Flaring gas is the process of lighting gas wells on fire to convert the more harmful methane to carbon dioxide as it enters the atmosphere. Carleton Farms flares 0.65 million cubic feet of landfill gas daily, roughly two-thirds the size of an Olympic size swimming pool. In 2018, Carleton Farms emitted 195,105 metric tons of carbon dioxide equivalents to the atmosphere.³⁶ Based on current capacity, Carleton Farms is anticipated to close in 2052. Riverview Land Preserve accepts 780,000 tons of waste annually and has a capacity of 39 million tons, and is expected to close in 2031.³⁷ In 2018, Riverview Land Preserve emitted 288,394 metric tons of carbon dioxide equivalents into the

atmosphere. While the waste generated by Ypsilanti is only a fraction of the waste sent to these two facilities, it is undeniably contributing to a highly emissions-generating system.

The closure of the two landfills that Ypsilanti relies on in the relatively near future provides an opportunity to pursue strategies for reducing and diverting as much of the waste stream as possible. In 2016, Kent County published a landfill reduction plan called “Strategy to Reimagine Trash,” calling for a 20% reduction in landfill contribution by 2020 and a 90% reduction by 2030. The study found that up to 75% of the waste stream in Kent County had the potential to be converted or reused and explores a variety of targeted means to address specific waste categories, including the development of a sustainable business park, targeted at businesses dedicated to the recovery and re-application of common elements

³³ Stevens Disposal Services Contract. Retrieved from email with Bonnie Wessler. February 27, 2020.

³⁴ United States Census “Quick Facts: Ypsilanti city, Michigan”

³⁵ Stevens Disposal Customer Service. Phone call on January 20, 2020.

³⁶ FLIGHT, United States Environmental Protection Agency. <https://ghgdata.epa.gov/ghgp/main.do>

³⁷ Landfill Methane Outreach Program (LMOP) United States Environmental Protection Agency. <https://www.epa.gov/lmop/project-and-landfill-data-state>

found in the waste stream. Although Ypsilanti’s built-out status would make developing a similar business part here challenging, the lesson that “one person’s trash is another’s treasure” is well-taken.

Reusing, recycling, and composting are household-level actions that can be supported or encouraged by the City. Community residents have developed several “buy nothing,” “freecycle,” “gift and grow,” and “mutual aid” groups devoted to individuals offering up for free items they no longer use to other individuals, and the city currently hosts two thrift shops and a wide array of vintage and other resale shops. The City could publicize these groups and shops in their communications. The City of Ypsilanti provides recycling hauling services, and as of 2020 serves 5,186 properties;³⁸ they also partner with Simple Recycling for curbside recycling of items such as textiles and small electronics. The City has also partnered with the nonprofit Recycle Ann Arbor for expanded waste dropoff services for recycling at the RAA site in Ann Arbor. The City has a composting site that can serve yard waste but not kitchen waste, and partners with Ypsilanti Township for yard waste dropoff services. Kitchen and yard waste can be composted by individual households using common aboveground systems and applied at the household level. For example, encouraging onsite leaf mulching has the benefit of creating high-quality, high-nutrient soil that can be used for gardening without the hassle of using a service. The City could support these efforts through education, perhaps in conjunction with education about natural lawn alternatives.



The public expressed the need for recycling and composting options in all three forms of engagement. Residents prioritized expanded recycling and composting services in the “infrastructure” category of the survey, and 61% believe that improved curbside access would realistically help their households divert waste from landfills. The Zero Waste Hierarchy describes a series of steps and considerations that will help communities, organizations, and individuals make smarter choices about materials purchases to reduce environmental impact.

A comprehensive waste strategy starts with source reduction or diversion of waste from landfills. Every ton of mixed paper recycled can save the energy equivalent of 166 gallons of gasoline. Not purchasing that paper to begin with makes an even bigger impact because no raw materials or energy are used to produce it, to transport it, or haul it at the end of its life. Diverting organic waste from landfills includes separate

collection requirements, education campaigns, financial incentives for food redistribution, and disincentives for generating food waste.³⁹ Nearly half of the solid waste produced globally is organic or biodegradable.

The City of Ypsilanti provides curbside recycling and composting pickup for certain materials, and households and property owners must rely on assorted partners for full service. The curbside recycling program does not collect glass and Styrofoam because they disrupt the recycling stream. The curbside recycling service is limited to properties with fewer than four units, which excludes many residential properties. Ypsilanti’s partnership with Simple Recycling provides households curbside recycling of textiles and small electronics, and the City relies on Washtenaw County for annual drop-offs and hazardous materials disposal. Items with Freon can be disposed of curbside with advanced planning and a fee. Residents are also eligible to use Recycle Ann Arbor’s drop-off recycling station for safe disposal of items that Ypsilanti

³⁸ City of Ypsilanti

³⁹ Corvidae, J. et al. The Carbon-Free Region Handbook. RMI. (2018) Retrieved from https://rmi.org/category/global-energy-transitions/cities-and-communities/carbon-free-regions-handbook/?post_type=insight

does not collect. This inventory shows that options for recycling do exist, but the decentralization of the services and locations is inconvenient and discourages full participation.

In 2018, the Sustainability Commission resolved (No. 2018-08-002) to increase recycling rates based on the Climate Action Plan findings. The resolution aims for increased education about the City's recycling program and the placement of artistic recycling bins throughout the City. The expansion of the recycling program would have to be accompanied by an extensive outreach and education program to ensure that best recycling practices are followed. The following summer, the Sustainability Commission defined 2019-2020 goals, one of which was to facilitate a Zero Waste event (No. 2019-07-002).

The curbside composting program operates from April through December, but this service is only for yard waste and not for household waste.⁴⁰ Due to the soil composition of the City, any new composting facility would likely have to locate outside of City boundaries as the "Soil – Surface Composting Facility" shows that most of the City's soil is not conducive to a surface composting facility. These ratings are based on factors that might lead to the contamination of groundwater from composting byproducts.⁴¹ Due to its current location in the floodplain, the compost services should not be expanded to other organic waste at this site. Because the City's soil conditions inhibit the likelihood of expanding its composting infrastructure, and the current compost yard is in a floodplain, Ypsilanti should cooperate with an organization that offers composting services and encourage residents to use it. Another possibility is a biodigester that use microorganisms to decompose waste. The decomposing waste produces methane, which can be captured for energy, and digestate, and then used as fertilizer.⁴² Biodigesters are more expensive to build than traditional composting facilities but produce two valuable resources, methane and digestate, which can be sold.⁴³ In 2017, the City of Ann Arbor conducted a feasibility study for a biodigester and concluded that the project would not yet be profitable – the startup costs are too high for the revenue stream it would provide. The study cited challenges such as low landfill fees, modest energy costs, and minimal financial reimbursement as the reasons for the improbable feasibility of the biodigester.⁴⁴ At a minimum, the City can offer educational resources to households interested in composting their own household waste.

Sustainability Goals: Energy

GOAL: Decrease the community's emissions by 171,310 metric tons of CO₂e by 2030.

- Work with the City of Ann Arbor to investigate bulk buying of renewable energy through the Community Choice Aggregation Legislation.
- Purchase renewable energy credits (RECs) for City operations.
- Promote state policies, incentives, grants, and Community Energy Management programs that encourage energy efficiency and renewable energy to property owners.
- Promote Washtenaw County's weatherization program for low-income homeowners.
- Work with community stakeholders to initiate an energy competition. The university and City can partner together to challenge another city and university to an energy reduction competition.
- Implement an inter-departmental site plan review process with attention to sustainability-related strategies such as energy use and efficiency, generation and offsetting of emissions, on-site water management and infiltration, etc.
- Investigate the feasibility of a microgrid.
- Review and incorporate aspects of the International Dark Sky Model ordinance to reduce energy waste (i.e. motion activated lighting on municipal buildings)

⁴⁰ The City of Ypsilanti, Meeting with Bonnie Wessler, March 4, 2020.

⁴¹ Web Soil Survey, United States Department of Agriculture <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

⁴² Nyifa, W. "Remember the Biodigester." Saskatchewan Research Council <https://www.src.sk.ca/blog/remember-biodigester>

⁴³ Dawson, L. "How Cities are Turning Food into Fuel." Politico, Nov. 11 2019.

⁴⁴ City of Ann Arbor. "Ann Arbor Biodigester Feasibility Study." June 2017. <https://www.a2gov.org/departments/systems-planning/planning-areas/climate-sustainability/SiteAssets/Pages/Sustainability/Ann%20Arbor%20Biodigester%20FS.PDF>

- Participate in or sign-on to regional, national, or international commitments to energy, climate, and sustainability including but not limited to the Paris Climate Agreement, the Sierra Club’s “Ready for 100” pledge, the Global Covenant of Mayors for Climate and Energy.
- Develop an electric charging vehicle infrastructure strategy
- Create a green rental certification program to encourage energy-efficient improvements
- Work with the HDC to incorporate historically compatible fixtures that are dark sky compliant
- Continue to pursue policies and projects that improve nonmotorized transportation.
- Continue to encourage solar energy installations throughout the City.
- Partner with other agencies, such as YCUA , DTE, and MiSaves to provide education and incentives for energy use reductions, both residential and commercial.
- Continue to participate in local, regional, national, and international efforts for climate mitigation and adaptation.
- Continue membership in communities such as ICLEI that help support local efforts to combat and adapt to climate change.

GOAL: Decrease government operation emission in support of attaining citywide net zero by 2030

- Establish an Energy Manager position to be responsible for the following duties:
 - Improve knowledge of energy management among city staff and appointed officials among staff
 - Create a data-driven system that is replicable over time, and includes annual forecasts, benchmarks for energy use reductions, and an internal reporting protocol
 - Work with the Sustainability Commission to produce an annual report that highlights where emission reductions and procedural improvements have been made
 - Improve communications with facility managers, utility providers, and relevant contractors to resolve issues quickly
 - Increase outreach to and participation of industrial and commercial customers in renewable energy and energy efficiency projects
 - Research and utilize the most efficient equipment available
- Continue to incorporate renewable energy into the energy portfolio of each government building including back-up generation
- Re-establish the City’s revolving loan fund for energy efficiency projects.
- Conduct a GHG inventory every 5 years using input from 2012 & 2018 findings in the ICLEI GHG framework
- Improve fleet fuel efficiency with clean diesel, alternative fuels, and electrification.
- Publicly report on progress made toward energy goals.
- Continue to make energy-efficiency improvements to City owned facilities

ENERGY: Reduce the amount of waste generated in Ypsilanti that enters landfills

- Conduct a waste audit to understand the baseline composition of the waste stream at the municipal operations and community level
- Help publicize local re-use opportunities, such as the Buy Nothing Project and Freecycle.
- Implement an educational campaign on existing recycling and composting options
- Expand recycling to public spaces and all City facilities by placing artful, educational, and engaging waste sorting stations throughout the community
- Create a coordinated recycling system that has a one stop for difficult-to-recycle materials including electronics and refrigerant management
- Increase access to curbside recycling services to multi-family units
- Define Zero Waste for Ypsilanti using the Zero Waste hierarchy. Set a goal for City operations to be zero waste (excluding medical waste) by a specific date with annual benchmarks.

- Require that any events with a City permit provide for recycling, compost, and provide a discount for Zero Waste events
- Require government operations to use durable or compostable materials
- Implement a pilot program for a municipal kitchen compost system with high food-waste generators.
- Investigate a partnership with a commercial-scale compost operation
- Pilot curbside community composting services for leftover food
- Investigate funding sources to bring down the cost of a biodigester
- Permit onsite composting of mulched leaves
- Continue to explore options to improve recycling and composting opportunities within the City and with partners.

Biodiversity

Endangered Species

The term “biodiversity” refers to the variety of living organisms within an ecosystem, and the plant and animal habitats of Ypsilanti and the broader region have been significantly impacted by urbanization and development. The Michigan Natural Features Inventory (MNFI) maintains a database of state and federally listed endangered and threatened species. This observational data is converted into the Biological Rarity Index. The Biological Rarity (Biorarity) Index model is based on the MNFI database of known sightings of threatened, endangered, or special concern species and high-quality natural communities. Each record is spatially joined to its habitat using land cover data, streamlines, and rail corridors. The records are then assigned three values based on the species' global status, state status, and occurrence quality rank. These values are multiplied by a likelihood of future sightings based on the age of the database record. Finally, the scores of all the records in a geographic unit are summed to determine the Biorarity Index for that geography.⁴⁵ The map “Biological Rarity Index” illustrates the areas in the City by that index. The higher the index, the more likely that area has threatened and endangered species. The areas with a higher index (darker colors) should be prioritized for conservation because of the importance of the habitat to threatened and endangered species. Overlaid on this map are three sites that have remained relatively untouched since the 1940s. Each of these areas fall into zoning districts with little protection from development *and* correspond to priority conservation areas on the map, creating conflict from a preservation standpoint.

Figure 20: Potential Conservation Areas Current Zoning Districts

Area	Zone	Description of Zone
Mansfield (adjacent to cold water trout stream) & Highland	Production, Manufacturing, Distribution	Buildings can be on large plots of contiguous land, serviced by railroad lines or major thoroughfares; uses are expected to generate waste, noise, odor, and truck traffic; however, uses should produce minimal external impacts that are detrimental to other uses in the district or to properties in adjoining districts
Clark	Multi-family dwelling	Adjacent to high traffic generators and major thoroughfares and corridors; insure sound development policies for concentrations of multifamily units; recreation, service, and retail uses are permissible as special land uses to allow residents to access everyday needs by foot, if they are not already within a quarter-mile walking distance

Due to the sensitive nature of threatened and endangered species, the MNFI does not release site specific data on threatened and endangered species, but in Washtenaw County there are 83 observed species that are listed as threatened or endangered, including the peregrine falcon, smallmouth salamander, and orange frilled orchid.⁴⁶

Native Plants

Native plants play an essential role in ecosystems: they are the primary producers that convert the sun’s energy into biological material. Secondary producers, such as insects and herbivores, rely on plants to survive, and tertiary species such as carnivores rely on the entire chain. When this chain is interrupted, it impacts every organism involved in the ecosystem. Some of the largest threats to plants are human development and invasive species. Invasive species disrupt the proliferation of native plants and can therefore throw off the balance needed for the local ecosystem. Invasive species are species from another ecosystem, usually from another area of the globe, that outcompete the native species for essential resources. Invasive species outcompete native species because there are no natural predators or processes in

⁴⁵ Biological Rarity Index, Michigan Natural Features Inventory – MSU Extension, <https://mnfi.anr.msu.edu/resources/biological-rarity-index>

⁴⁶ Michigan State University. MSU Extension. Michigan Natural Features Inventory. Accessed March 3, 2020. <https://mnfi.anr.msu.edu/resources/county-element-data>

the native ecosystem to curb their growth. When native species disappear from the landscape, other organisms whose survival depends on the native species also disappear.

As climate change continues to elevate global temperature averages, the composition of native species is subject to change. Species that were originally held south by a temperature barrier are now able to expand farther north because of rising overall temperatures. Meanwhile, native species that are not adaptive to warmer temperatures may disappear from the landscape.

Habitat Corridors

One of the most effective things a community can do to preserve biodiversity is to concentrate development so that it does not sprawl onto and degrade natural habitat. The Mansfield and Clark sites are located on the periphery of the City, in land-use-intensive zones, making them vulnerable to larger footprints from commercial, industrial, or residential uses. Effective policy ensures that untouched land is ample and contiguous so that animal species can minimize their contact with the developed world. Because habitat corridors, like other corridor types, frequently cross municipal boundaries, they should be considered in a multijurisdictional context. Prior to the next sale of these lands, an inventory of habitat corridors and undisturbed sites should be conducted through a partnership with the City of Ypsilanti, Ypsilanti Township, Washtenaw County's Natural Areas Preservation Program (NAPP), and private property owners, including the Southeast Michigan Land Conservancy NAPP can acquire natural areas once landowners have nominated their property for the program. The land is then owned and maintained by the Washtenaw County Parks and Recreation Commission with the purpose of preserving the land for plants and animals.⁴⁷ Building a relationship with property owners prior to the sale of their land, and maintaining an inventory database of the plant and animal species in need of protection, could prevent the loss of more habitat. Traffic calming infrastructure can also reduce animal crossing mortality.

Another approach to enhancing biodiversity is to attract animals back to the city. Distributed habitat improvement programs like bat houses, pollinator gardens, "bird safe" design, a "lights out" program during migratory seasons, and other innovations as they develop, can bring species to the city to rebuild the ecosystem.

Wildlife-friendly Gardens

In urbanized areas, converting lawns to gardens can create pockets of biodiversity and create and support habitat corridors. Lawns may be naturalized, with turfgrass replaced by native plant species, or turned into food or cultural gardens. Each type of garden is an improvement for insect and bird species over a turfgrass lawn, but naturalized lawns may be less legible as gardened and tended spaces than cultural or food gardens. Naturalized lawns, particularly those containing native grasses and goldenrods, are often perceived as unkempt due to their superficial similarity to overgrown traditional suburban American gardens and lawns. As blight ordinances, including the City's, are generally based on the model of a traditional suburban American garden having become overgrown, there's a supposition in the ordinance that a "weedy" garden consists of tall grasses and is likely to attract or harbor vermin and encourage dumping of trash, and is undesirable on that basis. This creates conflict when a code enforcement officer or neighbor misidentifies a naturalized garden or lawn as a weedy and unkept one.

The Sustainability Commission adopted a resolution (No. 2020-002) that acknowledges the value of native plants, particularly those in private landscaping, and requests that the City Council amend the ordinance to support the planting of native species, disregarding native plant blight violations in the meantime, to make reasonable efforts to use native plants on City property, and to educate residents about native species suitable for planting on private property. Other municipalities have passed ordinances that allow naturalized yards and gardens, but approaches vary from a "presumption of intent," such as the cities of Royal Oak and Ferndale, wherein gardens are presumed to be tended unless specified noxious weeds are identified, or a "presumption of abandonment," wherein gardens with plants over a certain height are presumed to be abandoned unless a permit or other type of permission has been sought. In both cases, the majority of municipalities have plant height restrictions in certain areas to preserve visibility and/or sidewalk navigability.

⁴⁷ Parks and Recreation Washtenaw County. Natural Areas Preservation Program. <https://www.washtenaw.org/939/Natural-Areas-Preservation-Program>

Ypsilanti has a history of urban food gardening, which can support biodiversity in two important ways. First, gardens directly support pollinators and other species (e.g., soil fauna and birds) when native plants are included in their design. Second, food-producing gardens reduce our reliance on industrial agriculture, which is a primary driver of biodiversity loss worldwide. For both of these reasons, it is imperative that Ypsilanti continue to support gardening and local food systems in any way it can. These endeavors benefit the local economy and improve the resiliency of our community, thus touching on all three of the pillars of sustainability.

Educational Materials

The traditional “lawn” is perceived as a matter of neighborhood interest, both in terms of property value and the public health, safety, and welfare concerns above, and the concept of “rewilding” constitutes a substantial shift in this perception. The provision of educational resources would ease tension among inspectors, the City, and private households. A list of the City’s preferences for native species (keeping in mind native species are changing as the climate changes⁴⁸), prohibited species, and a basic factsheet for property owners explaining the reasons the City supports such species, the potential benefits of planting them, and how it helps to achieve sustainability goals could clarify the motivation. For example, newly produced materials describing “lawn alternatives” encouraging property owners to re-landscape their yards should include the overlapping positive effects: reduced emissions from lawn mowers, increased biodiversity, and better stormwater absorption. Microhabitats can be constructed as part of commercial and industrial development too, although they may require different guidance considering their scale. Green roofs, for instance, are an opportunity to plant native species that provide food sources or refuge for insects and birds on a larger but less visible surface than a home. Over an entire city, these microhabitats can become effective in supporting urban wildlife, once the parameters for property owners are disseminated.⁴⁹



One area of the City that is an excellent candidate for focused native plantings is in the College Heights neighborhood. College Heights is situated at the headwaters of Owen Drain, an enclosed drain that runs into the Huron River after passing through the EMU campus. The drain system has required several upgrades to expand its capacity; using the neighboring properties to exhibit best practices for stormwater management with native vegetation could relieve some of the pressure on the system.

⁴⁸ “Climate Change Tree Atlas and Bird Atlas.” USDA, US Forest Service <https://www.fs.usda.gov/ccrc/index.php?q=tools/tree-and-bird-atlas>.

⁴⁹ URBANhabitats “Green Roofs and Biodiversity” December 2006 <http://www.urbanhabitats.org/v04n01/introduction.html>

Trees

Street Trees

Trees provide a suite of ecosystem services that are nearly incomparable: cleaner air,⁵⁰ cleaner water,⁵¹ sequestered carbon,⁵² temperature moderation,⁵³ stormwater management,⁵⁴ urban wildlife habitat,⁵⁵ increased property values⁵⁶, increased commercial sales,⁵⁷ lower crime rates,⁵⁸ faster healing,⁵⁹ lower prescription drug burden, lower rates of depression,⁶⁰ and improved academic performance.⁶¹ Despite these multifaceted benefits, there are practical day-to-day issues that stall planting and maintenance. Even though trees' ecosystem services pay off in the long-run, the shorter-term operational costs are resource-intensive. A tree's root system has the strength to push up sidewalks and, to a lesser extent, interfere with sewer infrastructure. When sidewalks heave from a growing tree root, it creates trip hazards that discredit another City goal: walkability. The tension lies in determining responsibility and corrective action over tree and sidewalk maintenance – by City code, residents are responsible for maintaining their sidewalks, but not for the trees that commonly disfigure them. When residents are cited for a heaved sidewalk, they push back on the City's lack of tree maintenance, which results from a lack of funding. The tension has brought the

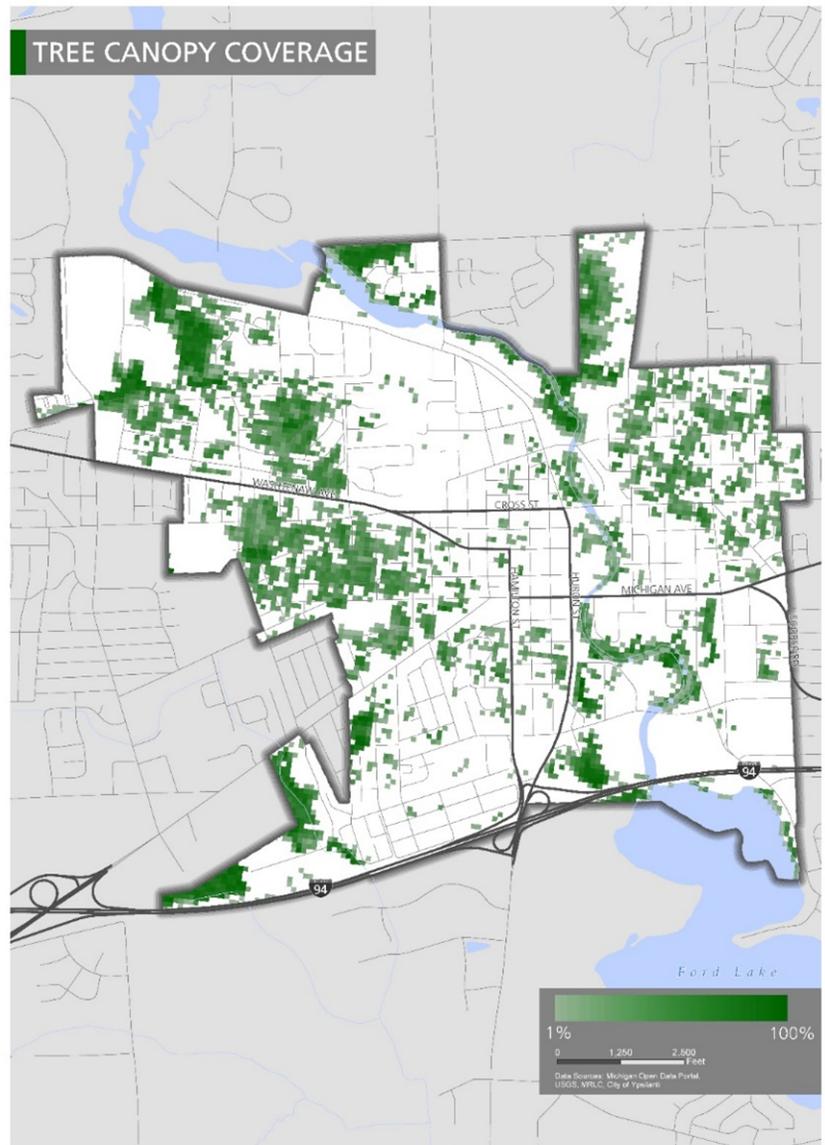


Figure 21: Tree Equity Placement

⁵⁰ United States Forest Services. "How Trees Help Clean the Air," 1977. <https://naldc.nal.usda.gov/download/CAT87209983/PDF>

⁵¹ Virginia Department of Forestry. "Trees Protect Water," March 2011. http://www.dof.virginia.gov/infopubs/_forest-facts/FF-Trees-Protect-Water_pub.pdf

⁵² United States Forest Service. "Carbon sequestration," retrieved May 2020. <https://www.fs.fed.us/ecosystemservices/carbon.shtml>

⁵³ United States Environmental Protection Agency. "Using Trees and Vegetation to Reduce Heat Islands," retrieved May 2020. <https://www.epa.gov/heat-islands/using-trees-and-vegetation-reduce-heat-islands>

⁵⁴ United States Environmental Protection Agency. "Soak Up the Rain: Trees Help Reduce Runoff" retrieved May 2020. <https://www.epa.gov/soakuptherain/soak-rain-trees-help-reduce-runoff>

⁵⁵ Yale School of Forestry and Environmental Studies. "Urban Nature: How to foster biodiversity in the world's cities," Richard Conniff. January 2014. https://e360.yale.edu/features/urban_nature_how_to_foster_biodiversity_in_worlds_cities

⁵⁶ University of Washington/USDA Forest Service. "Green Cities: Good Health - Community Economics," Wolf, K.L. 2010. https://depts.washington.edu/hhwb/Print_Economics.html

⁵⁷ Journal of Forestry. "Business District Streetscapes, Trees, and Consumer Response," K.L. Wolf. 2005. <https://www.fs.usda.gov/treesearch/pubs/34952>

⁵⁸ Landscape and Urban Planning. "The association between urban trees and crime: evidence from the spread of the emerald ash borer in Cincinnati," M.C. Kondo et al. July 2016. https://www.fs.fed.us/nrs/pubs/jrnl/2017/nrs_2017_kondo_001.pdf

⁵⁹ Science. "View through a window may influence recovery from surgery," Roger Ulrich. 1984. https://www.researchgate.net/publication/17043718_View_Through_a_Window_May_Influence_Recovery_from_Surgery

⁶⁰ Landscape and Urban Planning. "Urban street tree density and antidepressant prescription rates – a cross-sectional study in London, UK," M.S. Taylor et al. April 2015. <https://ore.exeter.ac.uk/repository/handle/10871/17340>

⁶¹ Urban Forestry and Urban Greening. "Beyond the school grounds: Links between density of tree cover in school performance and high school academic performance," Dongying Li et al. <https://www.sciencedirect.com/science/article/abs/pii/S1618866717307033?via%3Dihub>

conversation to a standstill for now; citations for sidewalk maintenance are rarely issued.

As the long and diverse list of ecosystem services identified above indicates, investment in trees pays back with dividends in the long run. In 2012, the City conducted an Urban Forestry Management Plan (UFMP) and is dedicated to fighting climate change, it is a reasonable next step to bolster the tree maintenance budget to alleviate tension with neighbors and provide better care for its stock.

To reduce sidewalk heaving, the size of the sidewalk cut out should be based on the tree species' need for water and area to grow. A uniform "one size fits all" ordinance for tree planting is easier to administer but may not yield desirable outcomes. An emphasis on species with a tap root system could alleviate infrastructure damage. Porous pavers or more malleable materials to surround trees may reduce instances of cracked surfaces. With porous surfaces, trees have greater access to water and may not have to push upward for hydration. In the meantime, citations for damage caused by public trees should continue to be sparsely issued.

Tree Species and Placement

The "Tree Canopy Coverage" map shows that trees are more prominent within peripheral neighborhoods and along the river. Large white swaths on the map represent zero coverage.

In 2012, an Urban Forestry Management Plan found that Ypsilanti had 8,835 public trees, stumps, and planting sites for a total appraised value of about \$10.7 million. There are 105 distinct species, but maples account for 55% of the tree population. This represents a tree diversity shortage, leaving the City vulnerable to a disease that could wipe out half of its tree population as has happened in communities with Dutch Elm Disease and, more recently and locally, Emerald Ash Borer. Public trees skew older and the majority are in fair condition; they would ideally be replaced with younger trees at a higher replacement rate.⁶²

Separate from the UMFP, a tree placement model was run for the entire City to determine what areas are most in need of trees based on two data sources. The two sources were weighted equally at 50%: existing tree canopy and an aggregate "heat stress index" map from the MI Environmental Project that includes climate projections, impervious surface, and social and physical health factors (https://michiganview.org/MI_Environment_Tool.html). The results of the tree placement model are shown in the "Tree Equity Placement Map." The darker purple areas represent highest-need areas and the green areas have adequate tree canopy coverage.

⁶² City of Ypsilanti Urban Forestry Management Plan. February 2012.

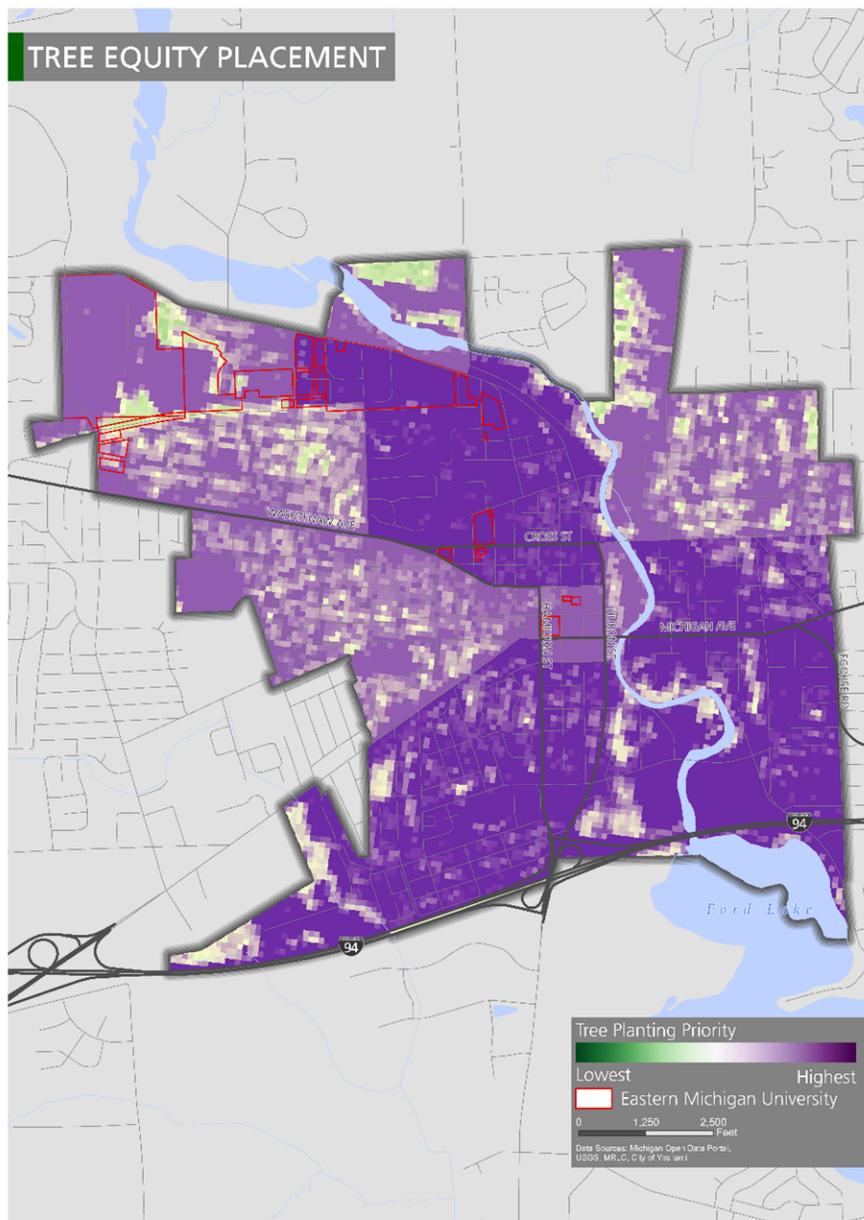


Figure 22: Tree Equity Placement

continue investing in it.

The 2012 Urban Forest Management Plan (URMP) details suitable locations, necessary budget, recommended species to plant, and maintenance practices. This document should serve as the guidebook for tree purchasing and placement decisions. The map “Tree Planting Priority” adds an equity-focused dimension to tree placement and planning and should be considered as an additional resource.

The challenge in tree planting is the initial funding and ongoing maintenance; the environmental challenges that result from a lacking tree canopy coverage come with high opportunity costs to human health, water quality, and aesthetics. When the City of Ann Arbor quantified the benefits that public trees provide, each tree was found to contribute \$97 in ecosystem services annually. Each tree provides annual energy savings of \$48 by shading buildings and slowing winds, which reduce the heating and cooling requirements in buildings. The aesthetic value and quality of life benefits each tree provides is estimated at \$29. Reducing runoff and other water quality benefits is valued at \$11 per tree, and the air benefits that tree provide is quantified at \$9 per tree.⁶³

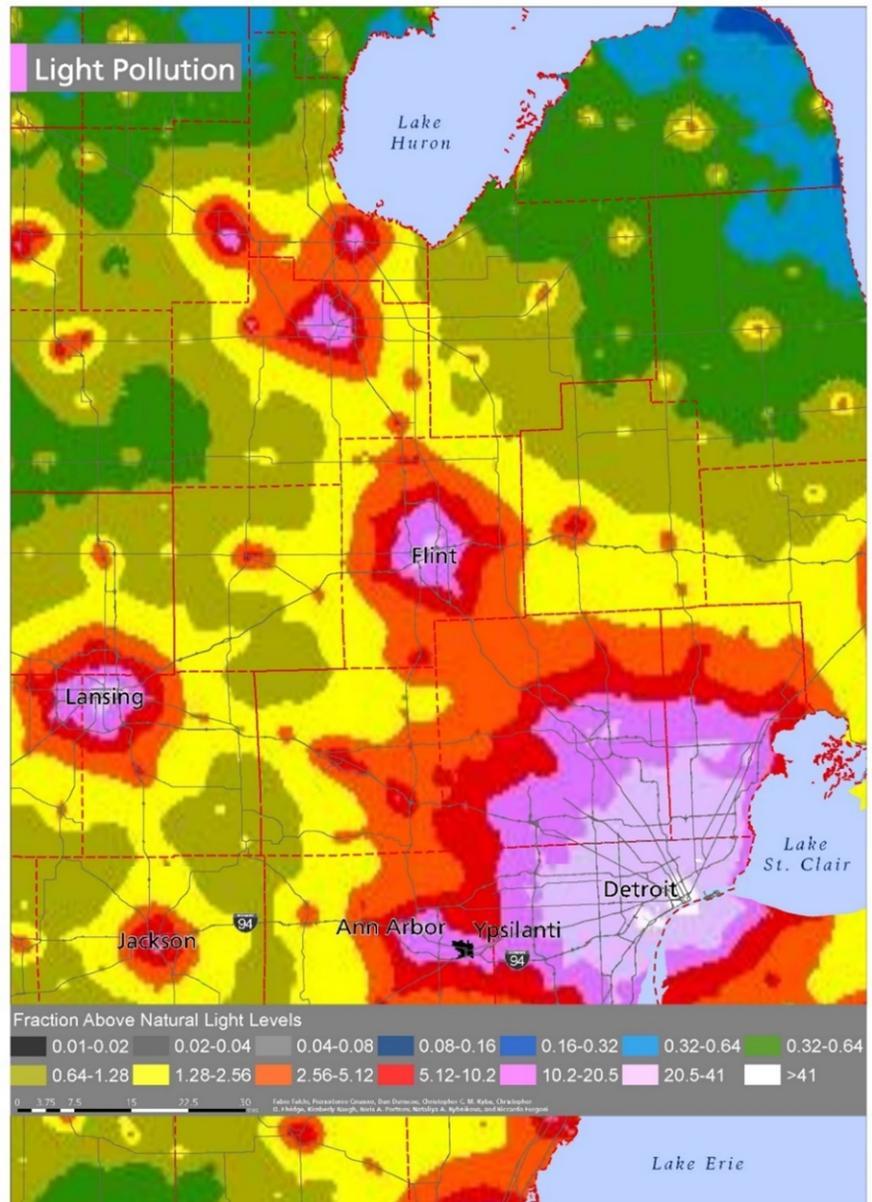
Communities that manage and expand their urban trees can achieve status as a “Tree City,” awarded by the Arbor Day Foundation based on four standards: a tree board or department, a tree care ordinance, a community forestry program with a budget of at least \$2 per capita, and observance of the Arbor Day holiday. As of June 2019, Ypsilanti no longer qualified for Tree City designation, but restored that certification in 2020. The primary benefit of Tree City status is the improved tree canopy, but the standards also provide a framework for action, and the status helps gain the necessary awareness and support to

⁶³ City of Ann Arbor Urban & Community Forest Management Plan, City of Ann Arbor, June 2, 2014.

Light Pollution

The inappropriate use of artificial light is referred to as “light pollution,” and includes excessive brightness, the brightening of the night sky, light where it is not needed, and the clustering of light sources.⁶⁴ Light pollution alters the perception of many nocturnal animals by turning the night into day, inhibiting their ability to forage, hunt, and breed. Migratory birds that use the moon and stars to navigate can be pulled towards urban areas and collide with lit buildings.⁶⁵ Outdoor lighting also impact insects that are attracted to the cooler white lights and less attracted to the warmer yellow lights.⁶⁶ Consequently, warmer lights have less influence on insects’ lifecycles and on the greater chain of its predators. Regulating and reconfiguring lighting can help alleviate disruptive migratory bird patterns.

The City of Ypsilanti has an artificial-to-natural light ratio that ranges from 10.2 to 20.5, indicating that the amount of night light is 10-20 times above natural levels.⁶⁷ The United States Department of Energy estimated that 35% of lighting is wasted, costing roughly \$3 billion dollars annually. With some changes, buildings can reduce lighting to solve problems of waste and pollution.



The challenges to making lighting upgrades are varied. To start, the DTE streetlights in Ypsilanti use white light in fixtures that are not dark sky compliant, meaning the City could not adhere to new regulations in its streetlights that it would enforce on others. Another barrier is the cost of a photometric study needed to ensure that standards are met, which can be prohibitive for property owners and small developers. Continuous compliance with lighting standards is also an issue, as property owners may change fixtures without being aware of the code or seeking a City permit Ypsilanti’s Historic District Commission, which oversees development in one of the state’s largest historic districts, only approves warmer lights that are friendlier to insects and night vision, but often determines the styles of fixtures that are dark sky compliant are not compatible with their standards.

Certain technologies, such as motion sensors, have not been accounted for in the ordinance. Article VI Section 122-609 of Ypsilanti’s Zoning Ordinance states that “parking and loading facilities, building entrances, and building exits used during

Figure 23: Light Pollution

⁶⁴ Light Pollution, International Dark Sky Association, <https://www.darksky.org/about/>

⁶⁵ Wildlife and Ecosystems, International Dark Sky Association, <https://www.darksky.org/light-pollution/wildlife/>

⁶⁶ Servick, Kelly “Which Light Bulb Attracts the Fewest Bugs? Study Reveals Surprises.” Science, Feb. 14, 2016. <https://www.sciencemag.org/news/2016/02/which-light-bulb-attracts-fewest-bugs-study-reveals-surprises>

⁶⁷ Cooperative Institute for Research in Environmental Sciences at the University of Colorado Boulder, <https://cires.colorado.edu/artificial-sky>

night-time shall be artificially illuminated,” and developments have been allowed to put certain lights on motion sensors that meet the standards when fully lit, but remain off or illuminate at a lower level when no motion is detected. This practice should be enshrined in the zoning ordinance.

The parameters around lighting standards are based on the effect on adjacent properties and take into account the height of a lighting fixture and the intensity of the light, but the complexity of measuring these criteria on varying properties is time-intensive. To reduce light pollution, the International Dark Sky Association created a Model Lighting Ordinance that recommends creating lighting zones permitting different intensities, applying “curfews” that turn off lighting after a given time, minimizing uplighting, and instituting performance standards indicating a maximum light measurement based on site conditions.⁶⁸ Motion detectors can help achieve many of these suggestions, along with an added bonus of reducing energy waste, and could be required by ordinance. Consideration of new guidelines should be adapted to Ypsilanti’s existing conditions. If a lighting curfew seems less realistic, for example, minimizing uplighting could be emphasized so that practice follows policy more closely with an emphasis on reducing energy consumption.

Sustainability Goals: Biodiversity

GOAL: Expand and protect natural habitats

- Incorporate model language for rewilding landscaping into the city’s ordinance
- Create informational materials for property owners on preferred and prohibited plants
- Rezone undeveloped land on Mansfield and on Clark to a more protective zoning district
- Continue to support the local food system
- Support traffic calming and other infrastructure design that help reduce animal road crossing mortality
- Promote “bird safe” designs and “lights out” programs during migratory season
- Consider programs for habitat improvement such as bat houses, pollinator gardens, and others as they develop
- Train inspectors to spot wildlife-friendly plants to prevent their removal
- Continue to monitor health of the city’s wetlands and work with the Washtenaw County Parks and Recreation to protect them
- Partner with the County to inventory land that could be nominated for NAPP
- Encourage warm light to protect insects
- Encourage use of native and climate-change adapted plants wherever possible
- Work with DTE to provide warmer, more night-sky friendly public lighting.
- Review the existing lighting ordinance and update to explicitly permit motion-sensitive lighting.
- Review and incorporate aspects of the Dark Sky Model Lighting Ordinance to reduce negative effects on insects and migratory birds

GOAL: To preserve and expand a resilient tree canopy

- Implement a tree preservation ordinance
- Plant additional street trees and trees in parks in accordance with the Urban Forest Management Plan, with a particular prioritization of those sites indicated by the Tree Equity map.
- Increase and diversify the public tree stock according to the Urban Forest Management Plan
- Invest in tree maintenance
- Continue the City’s Arbor Day Tree City USA designation
- Coordinate tree planting efforts with sidewalk maintenance efforts and considerations.
- Update street planting guidelines to prioritize tap roots species and vary pit size by species

⁶⁸ International Dark-Sky Association. “Model Lighting Ordinance.” June 2011. https://www.darksky.org/wp-content/uploads/bsk-pdf-manager/16_MLO_FINAL_JUNE2011.PDF

Complete Neighborhoods

Land use planning is a critical component of mitigating and adapting to climate change. Density, walkability, and access to urban gardens and greenery are just some ways a city can curtail dependence of fossil fuels. Ypsilanti residents want to live in neighborhoods that are green, connected, and complete. Over two-thirds of respondents recorded that “completeness” is deciding factor when choosing where to live. The features of a “complete neighborhood” were decided by survey-takers, and most important to them was the presence of “parks, recreation, and/or open space (96%),” and the fourth highest priority is trees and/or community gardens (77%).

Residents also see complete neighborhoods as physically connected so that streets safely accommodate bicyclists, pedestrians, public transportation passengers, and users of all ages and abilities. This was expressed in high response rates rating “sidewalks” (87%) and “public transportation options” (84%) as factors describing completeness of a neighborhood. Even though 64% of Ypsilanti residents commute to work alone in a personal vehicle,⁶⁹ improved nonmotorized transportation infrastructure can make a difference in how people choose to arrive to *other* destinations. One of the challenges in Ypsilanti is that the Michigan Department of Transportation owns and/or manages in the most-travelled roads in the city, some of which are one-way arteries with faster travel speeds, and many with incomplete sidewalks and missing pedestrian crossings. These roads often present a significant barrier to bicycle and pedestrian traffic, as well as neighborhood connectivity. Improvements to these roads must be led by the City with support from MDOT, and may face challenges including acquiring rights-of-way and funding.

Residents generally support alternative modes of transit, even those who report that they do not use the service themselves. Residents are proponents of expanded bicycle and pedestrian networks and public transit service including the development of an Amtrak stop. When residents were asked what prevents them from walking or riding a bicycle to destinations, they cited incomplete sidewalks or bicycle lanes, the condition of the nonmotorized infrastructure, and the difficulty in crossing some streets safely. On city owned roads, pedestrians should be prioritized at all crosswalks, and where possible to make pedestrian walk lights automatic. Ypsilanti has shown its commitment to connectivity by coordinating with the Township and County on the Border to Border trail and the AATA to expand bus coverage and frequency.

Motivated neighborhoods can establish “Eco districts” to concentrate focus on sustainability goals in a geographic area. This was proposed in the 2013 Master Plan, and the Zoning Ordinance has been updated to permit more components of an Eco district: community gardens, rain collection systems, and rooftop renewable energy projects. The City has enabled such developments, and while they cannot take on the lead on implementation, these changes support neighbors’ eco-friendly demonstrations. The next step would be for a group of neighbors to develop and agree to a set of performance standards, and, with the help of a Sustainability Commissioner liaison, look for funding and/or initiate smaller scale projects that meet their performance goals. Eco district performance goals could be tailored to the neighborhood but aligned with City sustainability goals, for example, expanding tree canopy coverage or developing green houses in open space.

A seldom-considered aspect of a complete neighborhood is its resiliency in case of an emergency, such as flooding, extreme weather, energy outages, or even pandemics. Generally, walkable and bikeable neighborhoods with a variety of uses and resources within them or adjacent are more resilient; their small-scale distributed nature helps them to ride out brief disruptions. However, to enable continued resilience and resilience during larger-scale disruptions, community resource centers should be identified and supported. These may be community centers, or other places of secular or religious assembly; these spaces may have backup generators, be able to serve as warming/cooling centers, be able to safely store and distribute food and other resources such as emergency kits, or that may be able to shelter people in a temporary basis. On a smaller scale, they may be the home of a community leader who can offer some or all of these functions. These facilities may also serve as area weather stations, helping to track air quality and rainfall both in times of

⁶⁹ American Community Survey. 2017 5-Year Estimates. Table DP03.

peace and disruption. The City should work to identify and outfit community resilience resources, geographically distributed throughout the city, that will be open to serve the community in times of disruption.

Transportation

City Ordinance No. 1156 provides for the planning, design, and construction of streets that offer appropriate access to all legal users and provide safe, accessible, comfortable, and efficient transportation options for people and goods in order to support the City's quality of life, economic vitality, and environmental sustainability. This is an important step in cutting vehicle miles traveled (VMT), as is coupling transportation routes with building density as the AAATA has done.

There is still much to be done in terms of reducing vehicle miles traveled. Undoubtedly, EMU is a primary traffic generator. A partnership between the university and the City to manage a bike-share and car-share program might limit how many trips students make by car. While it is hard to predict to what extent this will change behavior, an easy-to-use sharing system provides another option to ensure travelers are able to reach their destinations without use of a personal automobile. The Ride also makes a good partner to encourage commuting by bus. The City and the DDA could partner with the Ride and local businesses to offer discounted transit passes to employees who bus to work to not only reduce VMT but also to reduce demand for parking in compact areas. A parking cash-out alternative is another possibility for employees that would otherwise drive and take a parking space for patrons. Strategic development of electric vehicle charging infrastructure will allow greener power alternatives for those cars which remain on the road.

Nonmotorized path enhancements also have the potential to change travel behavior. The City has identified intersections in the Master Plan that would slow down vehicular traffic and include pedestrian and bicycle improvements to create safer, multi-modal streets. Ypsilanti's commitment to safety as a guiding principle applies to the continuation of bicycle lanes on major thoroughfare and trunklines to protect bicyclists from sharing the road with fast moving vehicles. The timing and location are crucial to a connectivity strategy. When roads undergo repair, it is an opportune time to include improvements such as bicycle lanes, sidewalks, or other pedestrian-friendly improvements. In terms of location, nonmotorized features should be installed where they connect to an expanding an existing network or build links between neighborhoods and job centers. Lastly, to protect their right to use the roads safely, enforcement of bicycle and pedestrian safety could, over time, help build an expectation of balanced road use.

Land Use and Mobility

Land use and mobility planning go hand in hand. Reliable transportation, mixed uses, and density are cornerstones of mobility. In that regard, Ypsilanti has a favorable combination. Permitting neighborhood-friendly stores that provide goods serving daily needs (convenience store, market) and personal services (hair salon, medical offices) in proximity to households makes destinations convenient by foot or bicycle. In Ypsilanti, 93% of residential parcels are within ¼ mile walk (and 100% are within ½ mile) from a small convenience retailer or service provider, based on 2015 SEMCOG land codes. This land use configuration has a huge impact, assuming that people walk to these locations when they can. The Urban Land Institute reviewed studies that show that compact suburban development reduces VMT by 12-18% compared to low-density suburban development.⁷⁰ With that in mind, Ypsilanti should continue to prioritize infill development, converting central lots that bolster mobility for residents before tending to the City's periphery. Along major corridors where the Ride traverses and the vehicular capacity permits, density bonuses for a mix of uses could strengthen nonmotorized access to goods and services.

Development

Ypsilanti residents' preference for green, connected, and complete neighborhoods are reflected in the US Green Building Council's LEED for Neighborhood Development standard as well as in Detroit's vision for "20 minute neighborhoods" and Kalamazoo's Imagine 2025 Master Plan, demonstrating an emerging trend in Michigan. The US Green Building Council's LEED for Neighborhood Development standard recognizes that neighborhoods can be designed to respond to the local

⁷⁰ Urban Land Institute. "Land Use and Driving: The Role Compact Development Can Play in Reducing Greenhouse Gas Emissions." <https://uli.org/wp-content/uploads/ULI-Documents/Land-Use-and-Driving-Low-Res.pdf>

impacts of global climate change and make significant advances toward a sustainable planet. The standards focus on achieving sustainability goals at a neighborhood scale, and align with Ypsilanti's broader sustainability goals:

- Lower operating costs and increased asset value
- Reduce waste sent to landfills
- Reduces VMT
- Increase energy and water conservation
- Provide more healthful and productive environments for occupants
- Reduce greenhouse gas emissions
- Promotes rebates, zoning allowances, and other incentives

Equity development in a complete neighborhood also includes housing choice. Ypsilanti has a considerable segment of the population with low earnings who need of affordable housing. The current stock of affordable units has waiting lists, leaving those in need in a financially precarious situation. The process for securing affordable housing is long and involves many parties. The City in conjunction with the Housing Commission can seek affordable housing development opportunities and identify parcels where they could locate in a neighborhood with access to services. Coupling subsidized housing and green development would be an exemplary sustainability project that unquestionably embraces the pillars of equity, environment, and economy. Because the City is largely built-out with no room for an entire new neighborhood, these standards could be applied to infill sites or on sites that have room to expand on their parcel.

Sustainability Goals: Complete Neighborhoods

GOAL: Maintain and expand transportation options including the development of bicycle, pedestrian, and sharing networks.

- Implement a parking cash-out alternative benefit option for City employees
- Prioritize transit-oriented development
- Partner with the DDA and AATA to provide a discounted transit pass as an alternative to downtown parking permits
- Encourage corporate sponsorship of transit passes and infrastructure to encourage employee bus and bikeshare ridership
- Consider pursuing car, scooter, or bike-sharing programs with Eastern Michigan University as a partner.
- Close sidewalk gaps
- Add bicycle lanes to major thoroughfares and trunklines
- Retain the mix of uses within each corridor but allow them throughout the area.
- Restore two-way function to Cross, Huron, and Hamilton Streets.
- Separate Cross and Washtenaw for vehicle traffic.
- Restore Harriet Street as the Main Street of adjacent neighborhoods.
- Prioritize pedestrians at crosswalks, and investigate where pedestrian walk signs can be made automatic
- Work with MDOT to make state-owned roads more accessible to nonmotorized users
- Coordinate with Townships and WPCRC on Border to Border (B2B) trail development
- Encourage police enforcement and legislative support for bike and pedestrian safety
- Improve neighborhood walkability by improving sidewalk connectivity and conditions. Prioritize the improvement of nonmotorized connections that link neighborhoods and job centers.
- Continue to support the development of intercity and commuter rail
- Coordinate citizens to advocate for slower traffic speeds on state owned corridors

GOAL: Incentivize energy efficient and socially responsible development

- Consider density bonuses, particularly on transit and commercial corridors, in exchange for developers meeting criteria that achieve city goals
- Incentivize US Green Building Council's LEED for Neighborhood Development standard for new development

- Develop a Green Business/Neighborhood Certification program
- Seek affordable housing development and identify parcels where it can locate near services
- Continue to prioritize infill development
- Continue to provide a variety of housing options, including affordable housing and missing middle housing.
- Provide a Sustainability Commissioner liaison to a neighborhood interested in developing an eco-district

GOAL: Increase neighborhood resiliency during times of disruption.

- Identify walkable/bikeable neighborhood resource centers throughout the City, such as community centers, churches, schools, or social clubs.
- Work with these identified resources to increase their capacity to serve as emergency resource centers, including backup power generation, emergency shelter, and food and resource distribution.
- Work with the Health Department and other partners to make resources available for community leaders who wish for their homes to serve as small-scale resources during disruptions.

Communication

Disaster Preparedness and Adaptive Responses to Climate Change

Extreme heat and cold events, heavy rainfall, flooding, and other extreme weather events are expected to increase over time as a result of climate change, and each will require a coordinated response among county, state, and federal levels of government amid a catastrophe. While sustainability-related actions will help mitigate these risks in the future, the City must help residents adapt to these increasing risks by expanding emergency preparedness and communication tools.

Extreme Heat and Cold

Extreme heat events are among the most harmful weather phenomena. They amplify ground-level ozone levels, which are associated with higher hospitalization rates for asthma, more severe allergic reactions, and premature deaths for people with heart and lung disease. Healthcare costs increase as a result of these negative health impacts. Heat events also put pressure on electrical distribution as people rely more on air conditioning and reduce grid reliability as a result of increased demand, and decrease energy efficiency and increase costs for rate payers. Conversely, shutoffs negatively impact residents with the fewest resources; the programs to support those in danger of shutoffs, such as THAW, should be publicized regularly before and during peak heating and cooling season. Additionally, the City should work with its utility partners and the County to explore prohibiting utility shutoffs for nonpayment during states of emergency.

Michigan will continue to experience extreme cold events as well, which disproportionately affect homeless people who are vulnerable to cold temperatures. The risk of illness increases for low-income individuals, the elderly, and those with chronic ailments who may be vulnerable to colder temperatures.

Heat

Because not everyone has access to air conditioning, this is an equity issue. While cooling centers have been identified at the county-level, it is worth preparing now for increasing locations and hours for air-conditioned rooms. Monitoring where ozone levels peak on hot days can indicate where “outbreaks” for respiratory problems may stem from and supplementary services to cooling centers could be targeted there. The Property Maintenance Code could also be updated to require air conditioning be provided for rental properties, similar to the requirement for heating, and to be turned on over certain temperatures.

Cold

The response to cold days could also be improved. When heating a household is too expensive for vulnerable populations to maintain, heating centers shall be distributed for households to get through the winters comfortably. Similar to cooling centers, there should be an expectation that established heating centers need to be revisited and likely expanded. On a municipal level, many processes are set in motion during rain and snow events. The shift in focus will be in capacity building and less so in wholesale change to established processes. For example, an apt overlap with goals of walkability is to improve snow removal from sidewalks and bicycle lanes so that weather doesn't have to stop residents from nonmotorized travel. With the expectation of colder and hotter weather, infrastructure made of the same materials will not last as long. The abrupt and prolonged changes cause roads and sidewalks to crack more frequently. An investment in

As GHG emission rates continue to rise, Michigan is expected to see up to a 5°F increase in average air temperature between 2041 and 2070. An additional 30 to 70 days per year, depending on the region, are expected to exceed 90°F. The amount of energy needed to cool buildings will also rise. This can be assessed by calculating “degree days,” which can be a confusing and counterintuitive concept. There can be more than 365 heating or cooling degree days in one year because degree days are measured relative to a base of 65°F (18°C) and reflect the *amount* of heating or cooling necessary at a facility. Above 65°F (18°C), it is assumed that a facility will need to be cooled, and below 65°F (18°C), it is assumed that a facility will need to be heated. Heating Degree Days (HDD) are the equivalent number of days a facility would need to be heated by 1 degree to accommodate the heating requirement. For example, one day where the temperature measures 80°F would be 15 Cooling Degree Days because it is 15 degrees above 65°F. There were 474 cooling “degree days” in 1990, 679 cooling degree days in 2000, and 1205 cooling degree days in 2019.

materials that withstand such swings should be investigated and incorporated in the City’s Capital Improvements Plan with a priority on longevity.

Heavy Rain and Flooding

Precipitation is projected to increase on average and to concentrate in more intense precipitation events, likely resulting in greater periods of both extreme flooding and extreme drought. An additional 2 to 3 inches of annual precipitation is expected for Michigan, and the number of days each year experiencing heavy rainfall is expected to increase by at least one day per year. These extreme weather events will impact the economy, disrupt the environment, and disproportionately impact vulnerable populations. Flooding puts residents and emergency response personnel in direct physical danger; increases pollution and waterborne illnesses; incurs expensive property damage; displaces households and businesses; creates damp conditions that spur the development of mold and reduce indoor air quality; stresses the capacity of aging sewer infrastructure and increases the risk it may be overwhelmed, forcing the release of untreated water into nearby water sources including those used for drinking; erodes banks and shorelines that support buildings and infrastructure; damages power lines, infrastructure, and vegetation; and disrupts power and transportation systems resulting in reduced productivity and profitability.

The City has a dedicated page on its website to emergency preparedness that has a list of links and contact information for essential services. Neither the City nor the County has a hazard mitigation plan that includes what to do in case of extreme weather. In 2004, Washtenaw County worked with all local units of government to adopt resolutions that would support a Hazard Mitigation Plan (HMP) to become eligible for FEMA grant funding for high-risk hazards. However, that year, FEMA grants focused on flooding mitigation instead and the Hazard Mitigation Plan was discontinued.⁷¹ Since then, the County conducted a risk assessment that put convective weather (severe winds, lightning, tornadoes, hailstorms) as the top threat.⁷² Together with the other municipalities in the county, an HMP that considers climate predictions is the only way to responsibly plan for the future.

For emergency planning, the county is the primary coordinator. The County has an Emergency Operations Center which becomes the centralized coordinating point for large-scale emergencies. It is recommended that Ypsilanti participates in this process when the County updates the plan to a multilingual and universally accessible plan for emergencies that include climate change predictions. At the city level, at a minimum, communication with non-English speakers should follow Ypsilanti’s Non-Discrimination Plan protocol, but critical documents should be made available in the most commonly spoken languages, aside from English.

More recently, the city has done some research on resiliency hubs. Resiliency hubs are decentralized nodes, positioned in the city’s most vulnerable areas, that supply essential goods and services in the event of an emergency. It is highly recommended that if the city pursues this concept further, that trained citizens or staff administer each hub to maintain order and logistical support on behalf of residents.

Outreach about Sustainability Goals and Practices

Based on the collective prioritization results, residents see a need for education and outreach focused on sustainability-related services and programs. Most survey-takers gave the City a grade of a B or C on the guiding principle “communication is key,” indicating that there is room for improvement. The decentralization of services makes it difficult for residents to know where to start when they are in need and/or how they can get involved. Most survey participants were unaware of the City of Ypsilanti Climate Action Plan (69%), let alone the strategies that the City is using to adapt to and mitigate the impacts of climate change that require buy-in from residents. Because sustainability topics are wide-reaching, and there is no single dedicated department, inquiries are not directed to one person but are diffused amongst several. While the ultimate goal is to hire an Energy Manager, in the meantime, the City shall designate a point person that can direct questions and comments to the correct department.

⁷¹ Email with David Halteman, Emergency Services Director. April 2020.

⁷² Washtenaw County. Washtenaw County’s Risk Assessment. <https://www.washtenaw.org/1760/Risk-Assessment-Hazard-Ranking>

Residents will be impacted by the effects of climate change and need easy access to resources that will help them respond to the negative impacts on their families and their health. Through its already established communication channels like the monthly newsletter and social media, the City can share its sustainability vision, efforts to fulfill it, and ways that residents can participate. Easy-to-follow tips for residents to reduce consumption could also be shared on a regular basis as a friendly reminder that it will require everyone to make change. Wide-scale reach would necessitate that Ypsilanti develop municipal marketing materials and have a plan for regularly schedule distribution.

When it comes to sustainability specifically, the public has also noted that sustainability education should place substantial emphasis on youth. Residents want to see a sustainability curriculum incorporated in the school district, pulling on the strength of local experts to teach these lessons. This has yet to be done at a national or state level, but some local efforts have incorporated sustainability into youth’s curriculum. In the foreseeable future, most of this education will have to remain extracurricular due to limited funding.

To increase the climate resiliency of residents, the City must make information easier to access, provide emergency response training for extreme events, and help residents take proactive measures to reduce GHG emissions. Community education is an important step in promoting adaptation and mitigation strategies on an individual and community level, and the City is in a good position to provide easily accessible and well-publicized information through its established channels. One practical adaptation action the City to take on would be the promotion of the Great Lakes Water Authority’s Water Residential Assistance Program (WRAP), and other helpful but unknown services, that provide direct assistance to low-income households who have trouble with paying water bills or making repairs to leaky plumbing. The hope is that as the City develops and disseminates informational materials that residents can access and rely on, a beneficial partnership will continue to be strengthened.

A federal grant was awarded to the Southeast Michigan Stewardship Coalition to educate students across nine schools, including one school in Ypsilanti, about climate resiliency. Discussion on this topic included identifying potential solutions to make communities more resilient through a community-based project. Ypsilanti Community High School students worked with City Council and the Sustainability Commission; all hope to forge a lasting partnership to complete more projects.⁷³

Working with the Sustainability Commission is the likely path forward for the City to educate its school-aged youth and residents on such issues. As the educational leader for sustainability initiatives, the Sustainability Commission can create and present a series of learning opportunities for energy savings and other assistance programs that lower monthly expenses and expose residents to new resources, or teach students and administrators at the local schools how to reduce waste and incorporate reusable items for its students. Ideally, these sessions will be held at different venues throughout the City and focus on reaching the most vulnerable populations in need of home repair, utility assistance, and energy efficiency measures. A fun way to educate the community is to introduce a friendly competition. Competitions can be set up between city staff, businesses, schools, neighborhoods on any measure the Sustainability Commission wishes to teach. For example, a designated “zero waste” day for waste management or “commute challenges” for alternative transportation would entice people to modify their behavior and have other groups to discuss the challenges and benefits to it. Other ideas proposed by community members included energy treasure hunts, adopting catch basins or green infrastructure, and a “Bring Your Green to Work” day.

Sustainability Goals: Communication

GOAL: Play a leading role in educating Ypsilanti residents on sustainability topics.

- Implement an educational series about energy efficiency in different venues with a focus on teaching the most vulnerable populations about resources that help reduce their utility bills
- Sustainability Commissions shall continue to work with sustainability-related organizations to develop and offer in school guest lectures, field trips, and other learning opportunities with local schools

⁷³ Michigan Radio. “Centering the Classroom on Climate Resilience.” December 2019. <https://www.michiganradio.org/post/centering-classroom-climate-resilience>

- Work with schools to reduce waste and incorporate reusable items on campus
- Determine a designated point person on city staff to direct sustainability-related questions or comments to the correct department
- Promote the city’s energy, climate, and sustainability vision through the established online newsletter and develop other municipal marketing materials to update residents on city efforts, key sustainability topics, and easy-to-follow tips at home
- Organize competitions between municipal employees, business owners, and neighborhoods that promote sustainability-focused activities:
 - “Bring Your Green to Work,”
 - Energy treasure hunts,
 - Adopting catch basins or green infrastructure,
 - Zero waste days,
 - Smart commute weeks, and challenges to bike, walk, or take public transit to work.
- Partner with Ypsilanti Community Schools on communication and education efforts.
- Consider creating a Communications Specialist position to lead and coordinate communication and education efforts within the City.
- Make critical public documents accessible and multilingual
- Publicize available efficiency and support programs, such as the County’s weatherization program and YCUA’s water assistance program.

GOAL: Develop the datasets necessary to determine where disaster relief should be targeted

- Conduct an Environmental Justice analysis that identifies vulnerable populations and structures that are disproportionately impacted by climate change
- Work with SEMCOG and the County to expand local air quality monitoring system
- Investigate infrastructure materials that can weather extreme weather

GOAL: Mitigate the damage inflicted on residents, infrastructure, and property from extreme weather.

- Implement renewable backup power systems for areas of refuge and emergency facilities
- Work with Washtenaw County, landlords, and utility partners to ban utility shutoffs for nonpayment during states of emergency or extreme weather events.
- Work with Washtenaw County to develop a Hazard Mitigation Plan
- Partner with Washtenaw County to expand emergency preparedness and communication tools including a multilingual and universally accessible plan that includes climate change predictions
- Work with the County to identify additional accessible warming and cooling shelters
- Require occupied residential rental units to have one air-conditioned room
- Review response protocol and update where needed to respond to severe storm events
- Continue to explore Resilience Hubs in coordination with local community partners and facilities.
- Publicize available utility assistance programs, such as THAW, leading into and during peak heating and cooling seasons.
- Improve snow and ice response for sidewalks

Action Plan

Each action is rated for its ability to achieve the goal it fits under on a scale of one to three for: equity, environment, economy, and effectiveness (three is the highest score). They are then listed in priority order based on the overall score. Unrelated to its score, is the “term” in which it should be achieved. An item may be scored very highly but cannot be achieved in the near term.

- Near term = 1-2 years
- Mid term = 3-6 years
- Long term = 7-10 years

	Timeframe	Lead Party
Sustainability Goals: Earth		
GOAL: Eliminate new instances of soil contamination and responsibly deal with the legacy of existing polluted sites		
· Explore creation of an overlay zone, or other zoning or building regulations, to control the types of uses that may be permitted in areas with soils that would allow for easy transmission of contamination, or uses that have a high risk of contamination near ecologically sensitive areas, such as waterways.	Mid	CED
· Research and confirm existing sites of contamination with EGLE	MID	CED
· Use Brownfield TIF capture to fund remediation of sites that may be redeveloped.	ONGOING	CED
· Continue to work with the Washtenaw County Brownfield Redevelopment Authority to remediate sites.	ONGOING	CED
· Explore and pursue grant opportunities to remediate sites that may not be good candidates for commercial redevelopment or that pose an immediate threat.	ONGOING	CED
GOAL: Ensure buildings and infrastructure are constructed in a manner complementary to soil structure, slopes, and drainage.		
· Make soil information available to all, and directly provide information on soil structure to those who choose to build a new structure that requires a foundation.	ONGOING	CED
· Incorporate green infrastructure into planned capital improvement projects wherever possible, and identify potential sites for demonstration projects.	ONGOING	DPS
· Strengthen zoning protections to limit erosion in areas of steep slopes.	NEAR	CED
Sustainability Goals: Water		
GOAL: Protect the watershed from further contamination.		
· Consider a sensitive features overlay zone providing a buffer around the Huron River and Paint Creek that provides site and use regulations tailored to the proximity to these waterbodies	MID	CED

· Invest in consistent enforcement for compliance to the sensitive feature overlay zoning district	ONGOING	CED
· Continue to pursue updates to the zoning ordinance, such as tree protection regulations, that preserve and improve vegetation that can mitigate stormwater impacts.	ONGOING	CED
· Continue to support the work of the Washtenaw County Water Resources Commissioner and other partners to educate members of the public, particularly single-family homeowners, on stormwater issues.	ONGOING	
· Monitor adherence to the City's phosphorous fertilizer and tar sealcoat ordinances for effectiveness.	ONGOING	
· Work with Washtenaw County Environmental Health to research the status of remaining private wells and provide resources and recommendations for testing water quality to property owners	ONGOING	
GOAL: Preserve and expand the City's capacity to deal with heavy rainfall to mitigate negative effects on people and property.		
· Incorporate capacity upgrades for grey stormwater management into the CIP based on predictions for greater precipitation	ONGOING	DPS
· Update the flood maps, including FIRM, based on climate projections and changes to the river channel since the FIRM formulation in the 1970s	LONG	DPS
· Investigate an equitable stormwater fee schedule that encourages converting impervious to pervious surfaces and proper use of rain barrels or other detention/retention systems.	MID	COUNCIL/ DPS
· Consider banning basements or enforce floodplain standards in boundaries where the soil has limited capacity to handle stormwater	LONG	CED
· Develop a Stormwater Management Plan	MID	DPS
· Continue to pursue the removal of the Peninsular Dam	ONGOING	MANAGER
· Continue to maintain City lands that are in the flood zones and vacant for stormwater and floodwater mitigation.	ONGOING	VARIOUS
· Pursue GSI projects in the City parks, particularly in the flood zones.	ONGOING	DPS
· Pursue conservation &/or access easements along the Huron River.	ONGOING	CED
· Explore offering incentives to property owners to retrofit existing buildings and site improvements with stormwater-friendly infrastructure, including rain gardens.	LONG	
· Explore the potential to equitably enact a stormwater fee structure to encourage private retrofit stormwater infiltration and detention infrastructure	LONG	
GOAL: Promote resources for water conservation and testing to ensure access efficiency upgrades and clean water		
· Work with YCUA to develop home and business water efficiency financing programs	MID	
· Promote Great Lake Water Authority program WRAP to perform conservation audits and funds for repairs to help reduce low-income households reduce water bills	ONGOING	

· Collaborate with YCUA on water conservation and infrastructure improvement projects.	ONGOING	
Sustainability Goals: Energy		
GOAL: Decrease the community’s emissions by 171,310 metric tons of CO ₂ e by 2030.		
· Work with the City of Ann Arbor to investigate bulk buying of renewable energy through the Community Choice Aggregation Legislation.	ONGOING	
· Purchase renewable energy credits (RECs) for City operations.	LONG	
· Promote state policies, incentives, grants, and Community Energy Management programs that encourage energy efficiency and renewable energy to property owners.	ONGOING	
· Promote Washtenaw County’s weatherization program for low-income homeowners.	ONGOING	CED
· Work with community stakeholders to initiate an energy competition. The university and City can partner together to challenge another city and university to an energy reduction competition.	LONG	
· Implement an inter-departmental site plan review process with attention to sustainability-related strategies such as energy use and efficiency, generation and offsetting of emissions, on-site water management and infiltration, etc.	ONGOING	CED
· Investigate the feasibility of a microgrid.	LONG	
· Review and incorporate aspects of the International Dark Sky Model ordinance to reduce energy waste (i.e. motion activated lighting on municipal buildings)	MID	DPS
· Participate in or sign-on to regional, national, or international commitments to energy, climate, and sustainability including but not limited to the Paris Climate Agreement, the Sierra Club’s “Ready for 100” pledge, the Global Covenant of Mayors for Climate and Energy.	SHORT	COUNCIL
· Develop an electric charging vehicle infrastructure strategy	MID	DPS
· Create a green rental certification program to encourage energy-efficient improvements	MID	CED
· Work with the HDC to incorporate historically compatible fixtures that are dark sky compliant	ONGOING	CED
· Continue to pursue policies and projects that improve nonmotorized transportation.	ONGOING	DPS/CED
· Continue to encourage solar energy installations throughout the City.	ONGOING	CED
· Partner with other agencies, such as YCUA , DTE, and MiSaves to provide education and incentives for energy use reductions, both residential and commercial.	ONGOING	
· Continue to participate in local, regional, national, and international efforts for climate mitigation and adaptation.	ONGOING	
· Continue membership in communities such as ICLEI that help support local efforts to combat and adapt to climate change.	ONGOING	

GOAL: Decrease government operation emission in support of attaining citywide net zero by 2030		
· Establish an Energy Manager position to be responsible for the following duties:	MID	MANAGER
o Improve knowledge of energy management among city staff and appointed officials among staff		
o Create a data-driven system that is replicable over time, and includes annual forecasts, benchmarks for energy use reductions, and an internal reporting protocol		
o Work with the Sustainability Commission to produce an annual report that highlights where emission reductions and procedural improvements have been made		
o Improve communications with facility managers, utility providers, and relevant contractors to resolve issues quickly		
o Increase outreach to and participation of industrial and commercial customers in renewable energy and energy efficiency projects		
o Research and utilize the most efficient equipment available		
· Continue to incorporate renewable energy into the energy portfolio of each government building including back-up generation	ONGOING	DPS
· Re-establish the City's revolving loan fund for energy efficiency projects.	MID	MANAGER
· Conduct a GHG inventory every 5 years using input from 2012 & 2018 findings in the ICLEI GHG framework	LONG	DPS
· Improve fleet fuel efficiency with clean diesel, alternative fuels, and electrification.	ONGOING	DPS
· Publicly report on progress made toward energy goals.	ONGOING	DPS/CED/MANAGER
· Continue to make energy-efficiency improvements to City owned facilities	ONGOING	DPS
ENERGY: Reduce the amount of waste generated in Ypsilanti that enters landfills		
· Conduct a waste audit to understand the baseline composition of the waste stream at the municipal operations and community level	SHORT	DPS
· Help publicize local re-use opportunities, such as the Buy Nothing Project and Freecycle.	ONGOING	CED
· Implement an educational campaign on existing recycling and composting options	SHORT	DPS
· Expand recycling to public spaces and all City facilities by placing artful, educational, and engaging waste sorting stations throughout the community	MID	DPS
· Create a coordinated recycling system that has a one stop for difficult-to-recycle materials including electronics and refrigerant management	LONG	DPS
· Increase access to curbside recycling services to multi-family units	MID	DPS
· Define Zero Waste for Ypsilanti using the Zero Waste hierarchy. Set a goal for City operations to be zero waste (excluding medical waste) by a specific date with annual benchmarks.	LONG	

· Require that any events with a City permit provide for recycling, compost, and provide a discount for Zero Waste events	LONG	
· Require government operations to use durable or compostable materials	MID	
· Implement a pilot program for a municipal kitchen compost system with high food-waste generators.	LONG	
· Investigate a partnership with a commercial-scale compost operation	MID	
· Pilot curbside community composting services for leftover food	LONG	
· Investigate funding sources to bring down the cost of a biodigester	MID	
· Permit onsite composting of mulched leaves	DONE	
· Continue to explore options to improve recycling and composting opportunities within the City and with partners.	ONGOING	DPS
Sustainability Goals: Biodiversity		
GOAL: Expand and protect natural habitats		
· Incorporate model language for rewilding landscaping into the city's ordinance	SHORT	
· Create informational materials for property owners on preferred and prohibited plants	SHORT	SUSTAINABILITY
· Rezone undeveloped land on Mansfield and on Clark to a more protective zoning district	MID	CED
· Continue to support the local food system	ONGOING	CED
· Support traffic calming and other infrastructure design that help reduce animal road crossing mortality	ONGOING	DPS/CED
· Promote "bird safe" designs and "lights out" programs during migratory season	SHORT	CED
· Consider programs for habitat improvement such as bat houses, pollinator gardens, and others as they develop		
· Train inspectors to spot wildlife-friendly plants to prevent their removal	ONGOING	CED
· Continue to monitor health of the city's wetlands and work with the Washtenaw County Parks and Recreation to protect them	ONGOING	
· Partner with the County to inventory land that could be nominated for NAPP		
· Encourage warm light to protect insects	ONGOING	CED
· Encourage use of native and climate-change adapted plants wherever possible	ONGOING	
· Work with DTE to provide warmer, more night-sky friendly public lighting.	ONGOING	DPS
· Review the existing lighting ordinance and update to explicitly permit motion-sensitive lighting.	SHORT	CED
· Review and incorporate aspects of the Dark Sky Model Lighting Ordinance to reduce negative effects on insects and migratory birds	MID	CED
GOAL: To preserve and expand a resilient tree canopy		

· Implement a tree preservation ordinance	MID	
· Plant additional street trees and trees in parks in accordance with the Urban Forest Management Plan, with a particular prioritization of those sites indicated by the Tree Equity map.	ONGOING	DPS
· Increase and diversify the public tree stock according to the Urban Forest Management Plan	ONGOING	DPS
· Invest in tree maintenance	ONGOING	COUNCIL
· Continue the City's Arbor Day Tree City USA designation	ONGOING	
· Coordinate tree planting efforts with sidewalk maintenance efforts and considerations.	ONGOING	
· Update street planting guidelines to prioritize tap roots species and vary pit size by species	SHORT	
Sustainability Goals: Complete Neighborhoods		
GOAL: Maintain and expand transportation options including the development of bicycle, pedestrian, and sharing networks.		
· Implement a parking cash-out alternative benefit option for City employees	SHORT	HR
· Prioritize transit-oriented development	ONGOING	CED
· Partner with the DDA and AATA to provide a discounted transit pass as an alternative to downtown parking permits	MID	DPS
· Encourage corporate sponsorship of transit passes and infrastructure to encourage employee bus and bikeshare ridership	MID	DPS
· Consider pursuing car, scooter, or bike-sharing programs with Eastern Michigan University as a partner.	ONGOING	CED
· Close sidewalk gaps	ONGOING	DPS
· Add bicycle lanes to major thoroughfares and trunklines	ONGOING	DPS
· Retain the mix of uses within each corridor but allow them throughout the area.	ONGOING	CED
· Restore two-way function to Cross, Huron, and Hamilton Streets.	LONG	DPS
· Separate Cross and Washtenaw for vehicle traffic.	LONG	DPS
· Restore Harriet Street as the Main Street of adjacent neighborhoods.	LONG	CED
· Prioritize pedestrians at crosswalks, and investigate where pedestrian walk signs can be made automatic	MID	DPS
· Work with MDOT to make state-owned roads more accessible to nonmotorized users	ONGOING	DPS
· Coordinate with Townships and WCPRC on Border to Border (B2B) trail development	ONGOING	DPS
· Encourage police enforcement and legislative support for bike and pedestrian safety	ONGOING	YPD
· Improve neighborhood walkability by improving sidewalk connectivity and conditions. Prioritize the improvement of nonmotorized connections that link neighborhoods and job centers.	ONGOING	DPS

· Continue to support the development of intercity and commuter rail	ONGOING	MANAGER
· Coordinate citizens to advocate for slower traffic speeds on state owned corridors	ONGOING	
GOAL: Incentivize energy efficient and socially responsible development		
· Consider density bonuses, particularly on transit and commercial corridors, in exchange for developers meeting criteria that achieve city goals	MID	CED
· Incentivize US Green Building Council’s LEED for Neighborhood Development standard for new development	MID	CED
· Develop a Green Business/Neighborhood Certification program	LONG	CED
· Seek affordable housing development and identify parcels where it can locate near services	ONGOING	CED
· Continue to prioritize infill development	ONGOING	CED
· Continue to provide a variety of housing options, including affordable housing and missing middle housing.	ONGOING	CED
· Provide a Sustainability Commissioner liaison to a neighborhood interested in developing an eco-district	ONGOING	SUSTAINABILITY
GOAL: Increase neighborhood resiliency during times of disruption.		
Identify walkable/bikeable neighborhood resource centers throughout the City, such as community centers, churches, schools, or social clubs.	SHORT	
Work with these identified resources to increase their capacity to serve as emergency resource centers, including backup power generation, emergency shelter, and food and resource distribution.	MID	
Work with the Health Department and other partners to make resources available for community leaders who wish for their homes to serve as small-scale resources during disruptions.	ONGOING	
Sustainability Goals: Communication		
GOAL: Play a leading role in educating Ypsilanti residents on sustainability topics.		
· Implement an educational series about energy efficiency in different venues with a focus on teaching the most vulnerable populations about resources that help reduce their utility bills	ONGOING	SUSTAINABILITY
· Continue to work with sustainability-related organizations to develop and offer in school guest lectures, field trips, and other learning opportunities with local schools	ONGOING	SUSTAINABILITY
· Work with schools to reduce waste and incorporate reusable items on campus	ONGOING	SUSTAINABILITY
· Determine a designated point person on city staff to direct sustainability-related questions or comments to the correct department		
· Promote the city’s energy, climate, and sustainability vision through the established online newsletter and develop other municipal marketing materials to update residents on city efforts, key sustainability topics, and easy-to-follow tips at home	ONGOING	SUSTAINABILITY

· Organize competitions between municipal employees, business owners, and neighborhoods that promote sustainability-focused activities:	ONGOING	SUSTAINABILITY
· “Bring Your Green to Work,”		
· Energy treasure hunts,		
· Adopting catch basins or green infrastructure,		
· Zero waste days,		
· Smart commute weeks, and challenges to bike, walk, or take public transit to work.		
· Partner with Ypsilanti Community Schools on communication and education efforts.	ONGOING	
· Consider creating a Communications Specialist position to lead and coordinate communication and education efforts within the City.	MID	MANAGER
· Make critical public documents accessible and multilingual	ONGOING	MANAGER
· Publicize available efficiency and support programs, such as the County’s weatherization program and YCUA’s water assistance program.	ONGOING	
GOAL: Develop the datasets necessary to determine where disaster relief should be targeted		
· Conduct an Environmental Justice analysis that identifies vulnerable populations and structures that are disproportionately impacted by climate change	LONG	
· Work with SEMCOG and the County to expand local air quality monitoring system	SHORT	
· Investigate infrastructure materials that can weather extreme weather	ONGOING	
GOAL: Mitigate the damage inflicted on residents, infrastructure, and property from extreme weather.		
· Implement renewable backup power systems for areas of refuge and emergency facilities	ONGOING	DPS
· Collaborate with landlords, YCUA, and DTE to ensure that in a time of crisis essential water and gas/electricity are not shut off	ONGOING	CED/MANAGER
· Work with Washtenaw County to develop a Hazard Mitigation Plan.	MID	YPD/YFD/DPS
· Partner with Washtenaw County to expand emergency preparedness and communication tools including a multilingual and universally accessible plan that includes climate change predictions	MID	MANAGER
· Work with the County to identify additional accessible warming and cooling shelters	MID	
· Require occupied residential rental units to have one air-conditioned room	MID	CED
· Review response protocol and update where needed to respond to severe storm events	MID	MANAGER
· Continue to explore Resilience Hubs in coordination with local community partners and facilities.	MID	
· Publicize available utility assistance programs, such as THAW, leading into and during peak heating and cooling seasons.	ONGOING	

<ul style="list-style-type: none"> · Work with Washtenaw County and utility partners to ban utility shutoffs for nonpayment during states of emergency or extreme weather events. 		
<ul style="list-style-type: none"> · Improve snow and ice response for sidewalks 	ONGOING	DPS (PUBLIC) CED (PRIVATE)

Appendix A

Table A: Contamination and LUSTs by Census Tract

Census Tract	Sites of Environmental Contamination	Leaking Underground Storage Tanks (Open)	Leaking Underground Storage Tanks (Closed)	Total
Tract 4108	8	2	13	23
Tract 4106	4	3	3	10
Tract 4107	1	1	4	6
Tract 4103	3	1	7	11
Tract 4110	2	2	4	8
Tract 4112	1	1	1	3
Tract 4109	1	1	2	4
Tract 4102	0	0	1	1
Tract 4111	0	0	1	1
Total	20	11	36	67

Source: Michigan Department of Environment, Great Lakes, and Energy, EnviroMapper

Appendix B

Ypsilanti Sustainability Maps

Layers are listed in drawing order, top to bottom.

Biological Rarity

- State Owned Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/state-owned-roads-v17a>)
- All Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/all-roads-v17a>)
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)
- Biological Rarity Index, Michigan Natural Features Inventory <https://mnfi.anr.msu.edu/resources/biological-rarity-index>
- Ypsilanti Feathered Edge, generated by consultant, created using a multiple ring buffer at intervals of 20 feet up to 200 feet and symbolizing at increasing levels of transparency
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Minor Civil Divisions (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/minor-civil-divisions-cities-townships-v17a>)

Environmental Contamination

- Leaking Under Ground Storage Tanks Part 213 – Open, EnviroMapper, Michigan Department of Environment, Great Lakes, and Energy (<https://www.mcgi.state.mi.us/environmentalmapper/>)
- Leaking Under Ground Storage Tanks Part 231 – Closed, EnviroMapper, Michigan Department of Environment, Great Lakes, and Energy (<https://www.mcgi.state.mi.us/environmentalmapper/>)
- Sites of Environmental Contamination Part 201, EnviroMapper, Michigan Department of Environment, Great Lakes, and Energy (<https://www.mcgi.state.mi.us/environmentalmapper/>)
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- 2010 Census Tracts (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/2010-census-tracts-v17a>)
- State Owned Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/state-owned-roads-v17a>)
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)
- Ypsilanti Feathered Edge, generated by consultant, created using a multiple ring buffer at intervals of 20 feet up to 200 feet and symbolizing at increasing levels of transparency
- 2010 Census Tracts (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/2010-census-tracts-v17a>)
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)

- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Minor Civil Divisions (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/minor-civil-divisions-cities-townships-v17a>)

Tree Planting Priority

- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Ypsilanti Feathered Edge, generated by consultant, created using a multiple ring buffer at intervals of 20 feet up to 200 feet and symbolizing at increasing levels of transparency
- All Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/all-roads-v17a>)
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)
- Tree equity placement, generated by consultant (see methods section)
- Minor Civil Divisions (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/minor-civil-divisions-cities-townships-v17a>)

Soil – Suitability for Dwelling Units with Basements

- State Owned Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/state-owned-roads-v17a>)
- All Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/all-roads-v17a>)
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)
- Ypsilanti Feathered Edge, generated by consultant, created using a multiple ring buffer at intervals of 20 feet up to 200 feet and symbolizing at increasing levels of transparency
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Dwellings with Basements, Web Soil Survey, United States Geologic Survey, United States Department of Agriculture (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>)
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Minor Civil Divisions (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/minor-civil-divisions-cities-townships-v17a>)

Soil – Suitability for Surface Composting

- State Owned Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/state-owned-roads-v17a>)
- All Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/all-roads-v17a>)
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)

- Ypsilanti Feathered Edge, generated by consultant, created using a multiple ring buffer at intervals of 20 feet up to 200 feet and symbolizing at increasing levels of transparency
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Composting Facility – Surface, Web Soil Survey, United States Geologic Survey, United States Department of Agriculture (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>)
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Minor Civil Divisions (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/minor-civil-divisions-cities-townships-v17a>)

Soil – Flooding Frequency

- State Owned Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/state-owned-roads-v17a>)
- All Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/all-roads-v17a>)
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)
- Ypsilanti Feathered Edge, generated by consultant, created using a multiple ring buffer at intervals of 20 feet up to 200 feet and symbolizing at increasing levels of transparency
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Flooding Frequency Class, Web Soil Survey, United States Geologic Survey, United States Department of Agriculture (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>)
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Minor Civil Divisions (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/minor-civil-divisions-cities-townships-v17a>)

Watershed

- Counties (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/counties-v17a>)
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)
- Watersheds, Washtenaw County, Provided by the client – City of Ypsilanti
- Counties (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/counties-v17a>)

Urban Greening

- City of Ypsilanti Parcels, Provided by client – City of Ypsilanti

- State Owned Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/state-owned-roads-v17a>)
- All Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/all-roads-v17a>)
- Hydrography Lines (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-lines-v17a>)
- Suitability for Hand Planting, Web Soil Survey, United States Geologic Survey, United States Department of Agriculture (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>)
- Ypsilanti Feathered Edge, generated by consultant, created using a multiple ring buffer at intervals of 20 feet up to 200 feet and symbolizing at increasing levels of transparency
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Hydrography Polygons (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/hydrography-polygons-v17a>)
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- Minor Civil Divisions (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/minor-civil-divisions-cities-townships-v17a>)

Light Pollution

- TI_2018_us_state, Tiger Line File, United States Census Bureau
- Ypsilanti Municipal Boundary, provided by the client – City of Ypsilanti
- State Owned Roads (v17a), Michigan Open Data Library, State of Michigan (<http://gis-michigan.opendata.arcgis.com/datasets/state-owned-roads-v17a>)
- New World Atlas Artificial Sky Brightness, Fabio Falchi^{1,*}, Pierantonio Cinzano¹, Dan Duriscoe², Christopher C. M. Kyba^{3,4}, Christopher D. Elvidge⁵, Kimberly Baugh⁶, Boris A. Portnov⁷, Nataliya A. Rybnikova⁷ and Riccardo Furgon

Methods

Tree Equity Placement

The layer was generated by running a tree placement model for the entire City to determine what areas are most in need of trees based on two sources: existing tree canopy and the Michigan Environmental Project’s Heat Stress Index. The sources were weighted accordingly: existing tree canopy (50%) and heat stress index (50%). The existing tree canopy layer was sourced from the National Land Cover Database (<https://www.mrlc.gov/national-land-cover-database-nlcd-2016>), areas with 100% tree coverage were assigned a value of 0 and areas with 0% tree coverage were assigned a value of 100. The heat stress index, which was developed using both social and physical factors, was sourced from MI-Environmental Project (https://michiganview.org/MI_Environment_Tool.html). These layers were all combined into a fishnet layer at 10ft resolution and because all of the layers were normalized on a scale of 100 the weights were just multiplied to the weighted values.