Master Land Use Plan

Adopted September 12, 2023

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Section C: Natural Features & Climate Resiliency

Introduction

Muskegon Lake and the creeks and ravines that connect with it run through numerous neighborhoods. These serve as a unique asset to the community, ensuring that natural areas are a short distance from most residents. As the lake transitions away from its past role supporting the many industries that once lined its shoreline, continued efforts to clean and protect both Muskegon Lake as well as its larger watershed must be balanced with the ongoing redevelopment of the city and its waterfront.

Ensuring that future development has minimal negative environmental impact on the lake and watershed will offer numerous benefits, as has been proven by the decades of restoration efforts that have taken place to date. An array of potential land uses along the Muskegon Lake shoreline must be both anticipated and planned for to ensure harmony between uses that may, at times, be at odds with one another.

Moving inland from the shoreline, the Muskegon Lake watershed plays a large role in the health of the lake, and is often a direct connection for neighborhoods without direct access to the waterfront. Four Mile Creek, Ryerson Creek, and Ruddiman Creek are among the largest waterways found winding through Muskegon. Wildlife corridor and greenway plans are opportunities to identify and connect these natural areas, creating key linkages for both people and wildlife. Public ownership, easements, or public-private partnerships could allow for improvements to public access, easing navigation around the surrounding, often private land uses that may currently fragment these natural corridors.

On a much larger scale, the challenges of climate change, happening on a global scale, will have profound impacts on the future of the city of Muskegon, and there exists an immediate need to address the local capacity of individuals, communities, and ecosystems to withstand and adapt to these impacts. Climate resilience includes measures to reduce vulnerability, enhance adaptive capacity, and promote sustainable development in the face of climate change.

Goals & Recommendations

1. Protect the quality of the Muskegon Lake watershed.

N1.1 Implement land-use regulations that will help filter and clean water before it enters the watershed.

N2.2 Create a program through which lakefront property owners can receive funding to plant native vegetation along their property.

N2.3 Promote sustainable practices through public and developer-specific education and outreach.

2. Balance the different interests on Muskegon Lake.

N2.1 Allow for a wide variety of land uses along the Muskegon Lake shoreline considering the necessity of certain land uses and paying special attention to location, past planning efforts, existing context, and market demand.

N2.2 Conduct a carrying capacity study for Muskegon Lake.

3. Create wildlife corridors with small natural pathways that connect large natural areas.

N3.1 Conduct a wildlife corridor study that focuses on linking existing greenway corridors.

N3.2 Bolster Muskegon's urban tree canopy.

4. Improve the environmental quality of greenway corridors by cleaning up contaminated sites, safeguarding areas highly susceptible to private land use, and reducing dumping.

N4.1 Help remediate contaminated open spaces with phytoremediation efforts.

N4.2 Require low impact design techniques at sites near environmentally sensitive ecosystems.

N4.3 Prioritize the development of residential vacant lots adjacent to open spaces.

5. Prepare for climate change and strengthen resilience strategies.

N5.1 Adopt a climate action plan.

Goal 1: Protect the quality of the Muskegon Lake watershed.

Discussion

Muskegon has come a long way from the days of waterfront industry. Decades worth of zoning, economic development, and environmental policies and initiatives have resulted in the restoration of Muskegon Lake and its connecting watershed. Tens of millions of dollars were utilized to restore Muskegon Lake resulting in its delisting as an Area of Concern by the United States Environmental Protection Agency. Protections must be established to ensure that future development around the watershed has minimal negative environmental impact.

Education and outreach are also important in maintaining the quality of the watershed. Conducting educational programs and campaigns to raise awareness about the importance of the watershed and encourage responsible behaviors among residents can help to ensure its continued protection. Engaging with community groups, businesses, and neighborhood jurisdictions to develop and implement watershed protection plans fosters collaboration and ensures a comprehensive approach to safeguarding the watershed.

Recommendations

N1.1 Implement land-use regulations that will help filter and clean water before it enters the watershed.

Creating and enforcing zoning regulations that control development and limit activities within sensitive watershed areas can help prevent pollution and maintain good water quality. Vegetated buffer zones could be required along bodies of water to help filter and absorb pollutants, minimizing their entry into the watershed. Implementing green infrastructure practices like permeable pavement, rain gardens, and detention ponds can help capture and treat stormwater runoff, reducing pollution and erosion. Protecting and restoring wetlands, forests, and other natural areas within the watershed helps maintain water quality, regulate flow, and provide habitat for wildlife.

Action Steps

- Vegetative buffer zone requirements for properties within the watershed are incorporated into an overlay district within the zoning ordinance.
- Zoning incentives are implemented to encourage green practices like permeable pavement, rain gardens and detention ponds.
- Economic invectives are created for developments that restore wetlands, forests, and other natural areas.

N1.2 Create a program through which lakefront property owners can receive funding to plant native vegetation along their property.

https://www.lakescientist.com/county-funded-shoreline-buffers-help-protect-lakes/

N1.3 Promote sustainable practices through public and developer-specific education and outreach.

Promoting water conservation, responsible pesticide and fertilizer use, and sustainable land management practices among residents, businesses, and farmers helps minimize pollution and preserve the watershed. There are several organizations the City can collaborate with on education and outreach. The West Michigan Shoreline Regional Development Commission and the Muskegon Conservation District have been dedicated to the restoration efforts of Muskegon Lake and have produced quality educational content on how local residents can assist in the process. Further partnerships with neighborhood associations can help distribute educational materials and demonstrate best practices.

Actions Steps

- Educational outreach programs are created in collaboration with local non-profits.
- Neighborhood associations are provided information and best practices to disseminate to citizens.

Goal 2: Balance the different interests on Muskegon Lake.

Discussion

As the Muskegon waterfront continues to transition from industrial to mixed-use and recreation, different uses and initiatives will inevitably be at odds. The addition of marinas along the waterfront offer the opportunity to clean up contaminating foundry fill, but also limit shoreline restoration efforts. With the addition of many new boat slips and a reported lack of enforcement of speed and noise ordinances on the water, congestion on Muskegon Lake has also been identified as a concern.

Muskegon Lake's deep-water port allows large vessels to efficiently dock and load/unload cargo. In the past, it was common to see industrial land uses and large aggregate piles occupying the Muskegon Lake shoreline. Most port operations are now located on the eastern end of Muskegon Lake, with a few longstanding port operations still sited to the west. Better concentrating industrial and aggregate storage operations may open up redevelopment and remediation opportunities along the waterfront.

Uses along the waterfront will continue to change and it is imperative that these new developments implement sustainable practices that will allow multiple uses to coexist. No matter what type of development occurs along the waterfront, public access and a variety of waterfront amenities are essential to creating a balanced lake that provides recreational opportunities to all.

Recommendations

N2.1 Allow for a wide variety of land uses along the Muskegon Lake shoreline considering the necessity of certain land uses and paying special attention to location, past planning efforts, existing context, and market demand.

The creation of the county wastewater treatment facility and three inland industrial parks have provided opportunities to remove many industrial land uses from the waterfront. Concentrating aggregate storage and shipping operations has been a goal of past planning efforts and has seen most port operations relocate to the east end of the lake, freeing up land for new and diverse waterfront redevelopment.

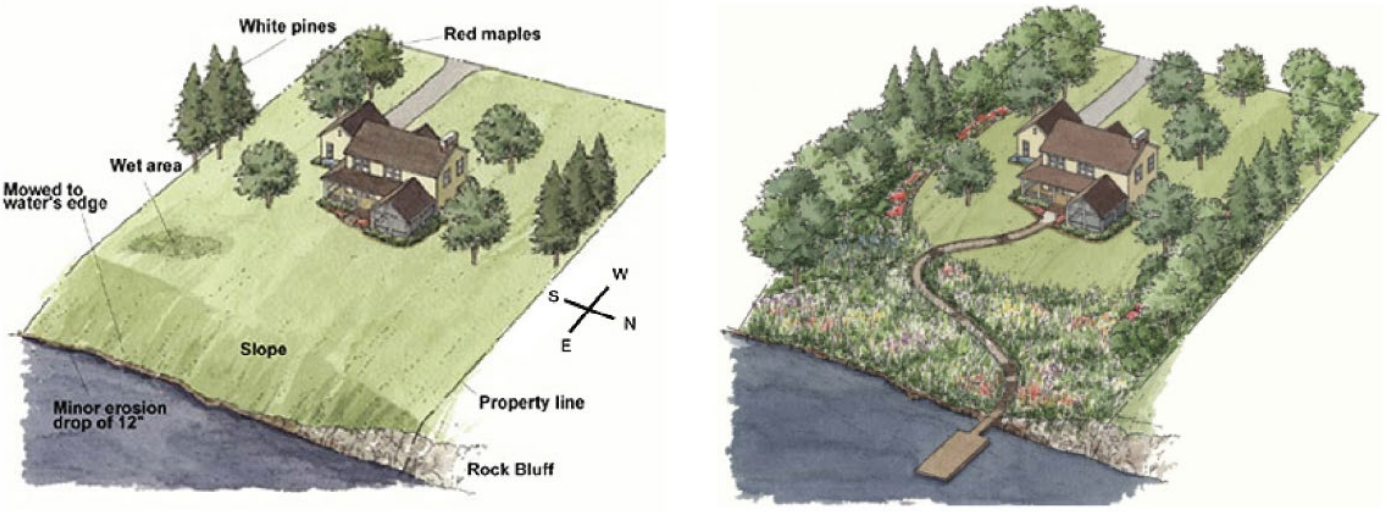
N2.2 Conduct a carrying capacity study for Muskegon Lake.

A carrying capacity study assesses the maximum number and types of boats that can safely and sustainably operate on a lake without causing negative impacts to the environment, safety, or user experience. It considers factors such as the lake's size, depth, shoreline characteristics, water quality, existing infrastructure, recreational activities, and regulations. The study helps inform management decisions and policies regarding boat access, mooring, speed limits, and other considerations to maintain a balance between recreational use and ecological preservation.

Goal 3: Create wildlife corridors with small natural pathways that connect large natural areas.

Discussion

The creeks and ravines bordering many neighborhoods are home to a variety of wildlife, but are segmented by developed areas. Wildlife corridor plans could identify opportunities to better connect the city's natural areas, improving these natural habitats. By creating linkages between existing greenways, natural habitats can be connected to allow wildlife to freely move between them. This can promote genetic diversity and help maintain healthy populations. Greenways provide safe pathways for wildlife movement, reducing the risk of vehicle collisions and fragmentation of habitats. This enables animals to access essential resources such as food, water, and shelter. By providing natural spaces, greenways can help maintain ecological balance by supporting predator-prey relationships and enabling natural processes like pollination and seed dispersal. They can also enhance local biodiversity by offering a range of habitats and resources. This can attract a variety of species, including both resident and migratory wildlife. Opportunities exist to link these greenways through public ownership, easements, or public-private partnerships. If publicly controlled, improvements can be made to make these areas more publicly accessible so that residents can enjoy nature.



https://robertgrooms.files.wordpress.com/2011/11/backyard.jpg

"By incorporating the natural characteristics of the landscape within the design of a backyard can create a corridor that is effective in moving small animals between wildlife patches."

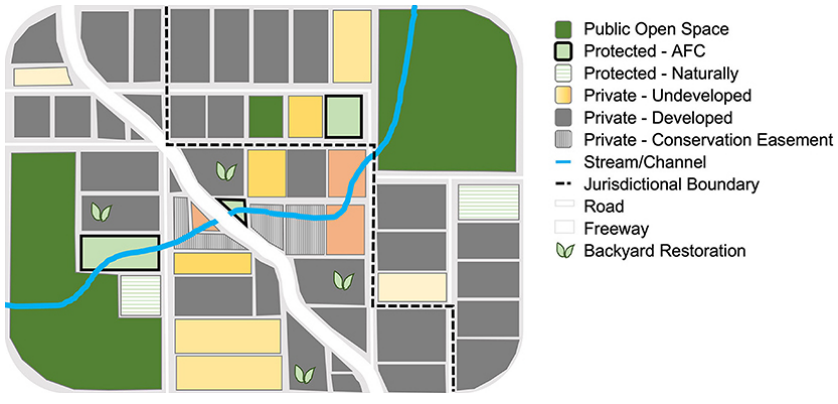


Figure 1. Illustration of the complexity of conserving urban wildlife corridors. Land parcels are shown on a street map with roads (white lines), jurisdictional boundaries (black dashed lines) and an urban stream channel (blue line). The culvert under the freeway (thick white line) would be assessed as a potential wildlife passage corridor. Land parcels are colored based on their ownership and status. Preserved public open space includes parks and undeveloped natural habitat (green). Privately owned undeveloped parcels are split into parcels that have been acquired and therefore protected (light green, black border), parcels that have been protected naturally due to land ordinances (green horizontal stripes), and parcels that have been ranked for corridor conservation need ranging from high (orange) to low (light yellow). Parcels in orange would be ground-truthed to assess conservation potential. Privately owned occupied parcels include developed parcels (grey) and parcels with conservation easements (grey vertical stripes). Properties on which landowners have participated in backyard restoration projects are also indicated (green leaf).

https://www.frontiersin.org/articles/10.3389/frsc.2022.954089/full

Recommendations

N3.1 Conduct a wildlife corridor study that focuses on linking existing greenway corridors.

In Muskegon, one is never more than a short walk from a greenway corridor, open space, or body of water. As the map below depicts, most residents are within a five-minute walk of a park, open space, or greenway corridor (see Parks and Open Space Map in the Appendix). These areas should be studied to create linkages between one another such as those illustrated on the following page. These connections can help reduce the effects of habitat fragmentation and create new opportunities for residents to connect to nature.

Property acquisitions and easements can provide additional land to plant native species, expand wildlife habitats, and create public access points. Undevelopable lots can be transformed into natural habitats and provide needed space for pollinator habitats and other restoration efforts. Walking trails can be incorporated into greenway corridors and their linkages.

Action Steps

- Conduct a wildlife corridor study.
- Acquire property and obtain easements to connect greenways.
- Plant native species on unbuildable City-owned lots.

N3.2 Bolster Muskegon's urban tree canopy.

Urban trees provide habitats for birds, insects, and other wildlife, supporting urban biodiversity and promoting ecological balance. An urban tree canopy can also improve air quality. Trees remove pollutants from the air, reducing the levels of harmful gases and particulate matter. Trees provide shade and reduce the urban heat island effect, helping to cool and regulate temperatures in urban areas. Trees also play a part in stormwater management. Trees absorb and store rainwater, reducing stormwater runoff and the risk of flooding. They also filter pollutants from rainwater, improving water quality. Properly placed trees can even provide shade to buildings, reducing the need for air conditioning and lowering energy consumption. Tree-lined streets can also help bridge gaps between natural habitats.

Action Steps

- The City applies for tree grants.
- The City's Forestry Department disseminates tree maintenance information to developers and residents.

Goal 4: Improve the environmental quality of greenway corridors by cleaning up contaminated sites, safeguarding areas highly susceptible to private land use, and reducing dumping.

Discussion

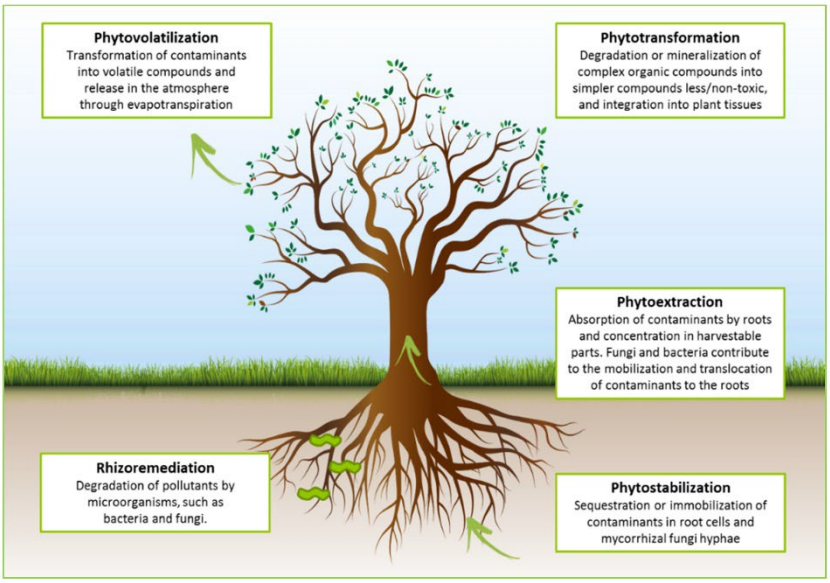
Despite many being publicly-owned, private land uses and development pressures have a direct effect on some natural corridors in the city. Identifying locations for acquisition of privately-owned land for public use and establishment of conservation easements should be considered to protect and improve the condition of greenway corridors.

The Muskegon Lake watershed encompasses a vast area. Large sections of the city as well as parts of neighboring cities route stormwater directly into Muskegon Lake, with Ruddiman Creek and Beidler's Creek also being directly affected. Adoption of design guidelines and construction of green infrastructure, where possible, will help to mitigate the negative effects of stormwater runoff. On-site stormwater retention is likely the most effective way of reducing runoff into the system, but much of it comes directly from the city's streets. Introducing green infrastructure features to streets would be one means of addressing this.

Recommendations

N4.1 Help remediate contaminated open spaces with phytoremediation efforts.

The heavy industrial and commercial uses of Muskegon's past contaminated many properties and foundry fill was used to create additional waterfront land. Brownfield tax credits provide opportunities for developers to clean up these sites for redevelopment, but contaminated sites without redevelopment plans are not afforded the same opportunities. Several contaminated sites throughout the city have no redevelopment plans, with some owned by the City. The former farmers market site is contaminated and poor soil conditions limit development options. Sites such as these may never be fully restored, but options do exist to remove contaminants naturally.



Phytoremediation can be an environmentally-friendly approach for cleaning up contaminated properties by using plants to remove, degrade, or stabilize contaminants in soil, water, or air. Every contaminated site has unique issues, so site assessments are needed to understand the nature and extent of contamination. This includes analyzing soil, water, and air samples to identify the contaminants and their concentrations. Different plants have varying capacities to uptake, break down, or stabilize specific contaminants, absorbing them through their roots.

Large planting efforts require significant time and resources. The City can target tree planting and environmental cleanup grants to help fund such initiatives, and the City's nursery can stock these areas.

N4.2 Require low impact design techniques at sites near environmentally sensitive ecosystems.

Low impact design methods aim to minimize the negative impact of development on the environment. Low impact design methods emphasize the efficient use of resources such as water, energy, and materials. By reducing resource consumption and optimizing their use, these methods help conserve natural resources and minimize the associated environmental impacts, including pollution and habitat destruction. LID often focuses on managing stormwater runoff in a sustainable manner. Traditional stormwater systems can lead to increased erosion, flooding, and water pollution. LID techniques, such as green roofs, permeable pavement, rain gardens, and constructed wetlands, help to mimic natural hydrological processes, allowing for the infiltration and treatment of stormwater on-site. This approach reduces the strain on existing infrastructure and helps maintain water quality.

Consider creating an overlay district identifying environmentally sensitive ecosystems and require that new development ensures their protection.

N4.3 Prioritize the development of residential vacant lots adjacent to open spaces.

Unfortunately, natural corridors have been and continue to be a common place for illegal dumping. Historically, creeks served as makeshift sewers for adjacent industrial land uses. Today, illegal dumping persists in areas isolated from residents and regular surveillance.

Improving access to activate these spaces has the potential to deter continued nefarious activity, and further improvements to these spaces have the potential to build a level ownership among neighbors. Transforming these areas into community assets has the potential to introduce expanded recreational opportunities to adjacent neighborhoods that may otherwise lack nearby, safe, or convenient access to the lakes or large parks.

Goal 5: Prepare for climate change and strengthen resilience strategies.

Discussion

Climate resilience refers to the capacity of individuals, communities, and ecosystems to withstand and adapt to the impacts of climate change. It involves building the ability to bounce back from climate-related shocks and stresses, such as extreme weather events, rising temperatures, rising lake levels, and changes in precipitation patterns. Climate resilience includes measures to reduce vulnerability, enhance adaptive capacity, and promote sustainable development in the face of climate change. It encompasses a wide range of strategies and actions, such as improving infrastructure, diversifying livelihoods, conserving natural resources, and enhancing disaster preparedness.

Recommendations

N5.1 Adopt a climate action plan.

In 2023, the Muskegon City Commission adopted a resolution declaring a human-caused climate change emergency that threatens all of humanity and the natural world. The resolution directs staff to prepare an analysis of the city's carbon footprint and to create a climate action plan that will eliminate municipal operations' carbon dioxide emissions by 2040.

A climate action plan typically includes a comprehensive set of strategies and actions aimed at mitigating and adapting to climate change. It generally consists of the following components:

- Emissions reduction targets: Setting specific goals to reduce greenhouse gas emissions, usually based on scientific recommendations or international agreements.
- Renewable energy promotion: Encouraging the adoption of clean and renewable energy sources like solar, wind, and hydro power, and phasing out reliance on fossil fuels.
- Energy efficiency measures: Implementing policies and programs to reduce energy consumption in buildings, transportation, and industrial sectors through efficiency improvements.
- Transportation improvements: Promoting sustainable transportation options such as public transit, cycling, and walking, while reducing reliance on private vehicles and supporting the transition to electric vehicles.
- Land use improvements: designing the city to be more compact, accessible, and sustainable, with considerations for green spaces, mixed land uses, and efficient infrastructure.
- Adaptation strategies: Identifying and addressing the risks and vulnerabilities associated with climate change impacts, such as extreme weather events, rising lake levels, and changing participation patterns.
- Waste management and recycling: Implementing practices to reduce waste generation, increase recycling rates, and minimize greenhouse emission from landfills.
- Public awareness and engagement: Educating and involving the public, businesses, and organizations in climate change issues, fostering behavior change, and promoting sustainable practices.
- Monitoring and evaluation: Establishing mechanisms to track progress, measure the effectiveness of implemented measures, and make adjustments as needed.