

CITY OF ANN ARBOR NATURAL FEATURES MASTER PLAN

JUNE 2004



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I. ACKNOWLEDGEMENTS

Natural Features Ordinance Committee Members

January 2003: Heidi Herrell, Chair of the Committee, 3rd Ward Council Member;
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Illustrations: Native plants and animals from "Wildlife Clip Art" pen and ink drawings of
North American wildlife by Cynthia Brunner, PO Box 1854, Ouray,
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Rain Garden Detail provided by Mary Borkowski
Cover Photo along the Huron River at Furstenberg Park
Photos and Water Cycle Diagram by J. D. Nystuen

Notes: **Creek names:** The creeks of Ann Arbor appear with various spellings in
documents and maps. Here we are following the usage of the Huron River
Watershed Council for Allen, Mallets and Millers creeks.

Reviews: City staff, the Environmental Commission, City Planning
Commission, and the Natural Features Ordinance Committee have reviewed
several drafts of the plan. They have made substantive contributions, and
their comments have been incorporated.

Natural Features Guidelines: City Code Chapter 57 and the Land
Development Regulations, including Attachment A: Guidelines for the
Protection and Mitigation of Natural Features address standards for
development. Many components of the Guidelines are reflected in this
document and referenced in the Resources section.

Natural Features Map: The Natural Features Map is in several colors and
needs to be fairly large to be interpreted. For that reason, it is attached as an
element of this plan.

II. Council Resolution

1994 Council Resolution to Natural Features Ordinance Committee

RESOLUTION CONCERNING RECOMMENDATIONS OF THE NATURAL FEATURES ORDINANCE COMMITTEE

Whereas, The Natural Features Ordinance Committee, established by City Council resolution on July 15, 1991, is charged to review the proposed Natural Features Ordinance of May 17, 1989;

Whereas, Pursuant to Committee recommendations, City Council approved the Wetlands and Watercourses Preservation Ordinance (Chapter 60) on June 15, 1992; revisions to Land Development Regulations, by resolution on September 8, 1992; and amendments to the Subdivision and Land Use Control Ordinance (Chapter 57) and to the Soil Erosion and Sedimentation Control Ordinance (Chapter 63) on October 5, 1992;

Whereas, In July 1993, the Council charged the Natural Features Ordinance Committee to report in fall 1993 the status of its continued review and deliberations to date concerning the previously proposed Natural Features Ordinance and the just noted ordinances and resolution; and

Whereas, The Natural Features Ordinance Committee did report to Council on November 1, 1993, and requested, among other things, that Council reaffirm the Committee's charge of July 15, 1991, so the Committee can recommend to City Council further actions consistent with that charge and with the community's interest in preserving its heritage of natural features for future generations;

RESOLVED, That the role of the Natural Features Ordinance Committee, created by Council resolution of July 15, 1991, be reaffirmed;

RESOLVED, That the Natural Features Ordinance Committee make specific recommendations to Council within sixty days for revisions to existing ordinances, regulations, and guidelines that reconcile conflicting or unenforceable aspects of them, and Council may refer these recommendations to the Planning Commission for its review;

RESOLVED, That the Committee be further charged to assess the nature and feasibility, including comments of City staff, of natural features ordinances, regulations, or guidelines, which may include such concepts as natural features districts for the protection, management, enjoyment, identification, and controlled use of woodlands, landmark trees, and hedgerows; and

RESOLVED, That the Natural Features Ordinance Committee further deliberate, with appropriate members of City staff from Planning, Building, Engineering, Parks (including the City Forester), and City Attorney's Office participating as requested by the Committee, in order to make recommendations to the City Council within six months and Council may refer these recommendations to the Planning Commission for its review in FY 1994-95.

Substitute Resolution
As Amended
March 7, 1994

**APPROVED
BY COUNCIL**

MAR 7 1994

**W. NORTHCROSS
CITY CLERK**

D-3

The Huron River Watershed

The Huron River begins at Big Lake in Oakland County and flows 125 miles to empty into Lake Erie. It is fed by 900 square miles of watershed in parts of seven counties.

Source: Huron River Watershed Council,
Map of the Huron River Watershed (modified).



III. EXECUTIVE SUMMARY

CITY OF ANN ARBOR NATURAL FEATURES MASTER PLAN

Purpose: The City of Ann Arbor is committed to securing a high quality of life for its current and future residents. It is City policy to promote sound stewardship of the City’s natural features. A healthy natural environment is necessary to sustain a high quality of life. This master plan describes our natural features, both publicly and privately owned, and sets forth policies to protect, restore and sustain them.

General Description and Protection Measures: Ann Arbor lies entirely within the central portion of the watershed of the Huron River, which begins many miles northeast in Oakland County. Hills, bluffs, ravines, and wetlands surround the river and its tributary streams with pockets of native soils, vegetation and wildlife. Generally, natural areas of the greatest size, diversity and number of features, and those with the least fragmentation or with multiple natural features are the most valuable.

Sustaining the ecological health of the City and the region requires cooperation between citizens and many partners: governmental bodies, educational and other community institutions, businesses, media, volunteers, and environmental and other civic organizations.

The plan identifies nine types of natural features. Goals and implementation strategies for each natural feature are found in Section VI of the plan. A summary of the protection goals and implementation methods is outlined below:

Natural Features and Protection Goal Summaries	Methods for Implementation
<p>1. The Watershed of the Huron River and Its Tributaries in Ann Arbor: The Huron River is the central natural feature of the City and its major source of water.</p> <p>Goal Summary: Update watershed plans; ensure that the City’s Capital Improvements Plan is consistent with Natural Features Master Plan; add greenways along the Huron River; add flood storage capacity and reduce adverse impacts of heavy rain events, including flooding.</p>	<p>Implementation Summary: Implement watershed plans, the City Master Plan and the Capital Improvements Plan; work with various partners to implements watershed planning; encourage native plantings and acquisition of lands along the river; improve education outreach techniques; improve city services; and improve GIS capabilities relating to data management.</p>
<p>2. Wetlands, Ponds and Lakes: The City’s original wetlands were open meadows, forested swamps, marshes and ponds. A few of the original wetlands remain, and there are numerous retention ponds and small wetlands.</p> <p>Goal Summary: Identify, assess, protect and sustain wetlands. .</p>	<p>Implementation Summary: Review and modify City codes relating to inspections, mitigation and other standards for wetlands; encourage stewardship and management techniques to reduce impacts to wetlands resulting from storm water run-off.</p>
<p>3. Floodways and Floodplains: The floodplain is land adjacent to lakes, streams, and rivers which is prone to flooding water levels rise and overflow the normal water channels during a 100-year frequency flood. The floodway is the sub-area of the floodplain needed to convey flood flows.</p>	<p>Implementation Summary: Review and modify City codes and policies to ensure that best management practices are implemented; restore city-owned wetlands; promote stewardship by educating the public on the identification and value of native plants and activities that can benefit floodplains.</p>

<p>Goal Summary: Identify, restore and sustain floodplains, especially those of highest-concern; reduce storm water volume and flood occurrences; support watershed groups and implement watershed plans.</p>	
<p>4. Groundwater and Groundwater Recharge Areas: A groundwater recharge area is land which readily permits water to move from the surface into a groundwater system. Groundwater recharge areas provide water for wells and a steady supply of clean filtered water to rivers and streams.</p> <p>Goal Summary: Protect drinking water and identify suitable groundwater recharge areas throughout the City and protect these areas from impervious surfaces and pollutants.</p>	<p>Implementation Summary: Implement policy changes that help to minimize adverse impacts to groundwater and groundwater recharge areas, such as protecting wellhead areas, minimizing impervious surfaces, installing and preserving essential vegetation, and eliminating contamination problems.</p>
<p>5. Land Forms and Steep Slopes: Steep slopes are prone to erosion when the vegetation on them is disturbed and storm water is allowed to move across the surfaces at high speed, or when surface runoff is directed toward them. Disturbed slopes often result in silting watercourses or disturbances to lands below.</p> <p>Goal Summary: Protect steep slopes; identify and protect scenic vistas and sustain the natural features that comprise them.</p>	<p>Implementation Summary: Maintain geographic information database for steep slopes; review standards, codes and policies for possible modifications that would help identify and protect natural land contours and scenic vistas.</p>
<p>6. Woodlands, Savannas and Prairies: Woodlands, savannas and prairies are important elements of the natural beauty of the City. They serve as buffers from pollution, moderate local climate and storm hazards, and provide areas of plant and animal diversity and habitats.</p> <p>Goal: Identify, steward, and conserve woodlands, savannas and prairies to protect water, air, and soil quality, to buffer air and noise pollution, to moderate local climate and storm hazards, to preserve wildlife habitats and natural corridors, and to maintain important elements of the natural beauty of the City.</p>	<p>Implementation Summary: Amend code to include definitions for savannas and prairies; review code to identify areas to improve protection measures, including enforcement; identify sites for possible acquisition; revise PROS Plan to include savannas and prairies in criteria for acquisition; develop native planting policy for city-owned property; develop additional tools and resources for public education and stewardship.</p>
<p>7. Landmark Trees: A landmark tree is generally any tree larger than 24 inches in diameter at breast height and any tree of a size listed on the Landmark Tree List (in the Land Development Regulations).</p> <p>Goal: Protect and preserve landmark trees that are in good or excellent condition, particularly trees that are rare, unusual, old or historically significant (over 100 years old), provide a diversity of species or contribute to a native forest fragment.</p>	<p>Implementation Summary: Establish a program that identifies and rewards landowners for stewardship of landmark trees; develop tools and resources to educate the public on possible impacts to and recommended care for landmark trees; develop a process to determine long-term impacts of protection measures, including reinspections after development; foster a long-term monitoring program.</p>

<p>8. Native Plant and Animal Ecosystems: Native plants are those that have evolved in the area over thousands of years, adapting to the local climate and providing habitats for native wildlife of the area. The use of native plant species offers great benefits to the City. Many of the native grasses and flowers are insect-rather than wind-pollinated so produce less air pollen. Native plantings require no mowing and once established require less water, hold water on the landscape much better with their deeper roots, and do not need pesticides or fertilizers.</p> <p>Goal: Identify, steward and protect habitats that are rich in native flora or fauna and that are threatened, endangered or contain special concern species, while reducing invasive species and increasing the diversity and distribution of native plants that are adapted to the extremes of climate of the region.</p>	<p>Implementation Summary: Inventory and rate plant species and consider acquiring those with high ratings; develop an assessment system for wildlife; identify best protection techniques; designate areas for on-going management; continue controls burns; develop policy for native plantings in City parks; continue public education regarding stewardship; develop a stewardship program for endangered species habitats.</p>
<p>9. Greenway Linkages between Natural Features: Greenways are linear open spaces connecting natural areas and parks. While greenways primarily link natural features, they may also facilitate connections in the built environment, such as links between neighborhoods retail areas, schools, downtown or employment centers.</p> <p>Goal: Establish a network of greenways throughout the City that provides non motorized connections between various land uses, such as neighborhoods, commercial and employment centers, downtown and the University of Michigan, and helps to retain the shape and continuity of natural features, especially along stream corridors, between parks and through new neighborhoods. The network also should extend to greenways located on adjacent township and County properties.</p>	<p>Implementation Summary: Implement greenway programs and initiatives and coordinate such activities with other organizations and governmental entities; identify new links, including possible acquisition; identify improvements to existing links; incorporate greenway systems and design principles into master plans and zoning; facilitate stewardship of privately owned linkages.</p>

IV. PURPOSE

The City of Ann Arbor is committed to securing a high quality of life for its current and future residents. It is City policy to promote sound stewardship of the City's natural features. A healthy natural environment is necessary to sustain a high quality of life. This master plan describes our natural features, both public and privately owned, and sets forth policies to protect, restore and sustain them. Loss of natural features has health, economic, aesthetic, educational and recreational consequences. Only through policies and actions that integrate high environmental quality and public health with other goals of the City can we ensure the City's aesthetic character, ecological stability, economic vitality, and quality of life.

This master plan provides a framework to guide the City and its citizens in their policy making and stewardship activities. Standards for protection are based upon the sensitivity of each natural feature and its importance and uniqueness as part of a local ecosystem. The principles of this document should be incorporated into all elements of the City Master Plan and in the day-to-day decision making processes of City departments.



Blue-eyed Grass

V. General Description and Protection Measures

A. Introduction

The City of Ann Arbor lies entirely within the central portion of the watershed of the Huron River, which begins many miles northeast, in Oakland County. Within Ann Arbor, the watersheds of Allens Creek, Traver Creek, Millers Creek and Malletts Creek are tributaries to the Huron River. Partly within the City are Fleming, Honey and Swift Run Creeks. Hills, bluffs, ravines, wetlands and woodlands surround these waterways, and present many of the finest areas of natural features in the City. "Natural lands" are commonly referred to as natural areas, since they contain various natural features and are usually vacant or undeveloped. Some natural areas are managed by the City's park system, while others remain in private ownership. Natural areas with the greatest size, biological diversity and the least fragmentation are the most sustainable and thus the most valuable.

Today, urban and suburban pressures erode the biological wealth of places left unprotected and threaten the ecological processes that sustain protected areas. These valuable environmental assets are easily disrupted or destroyed and cannot be replaced in a lifetime. The cumulative loss of natural features can rapidly result in the permanent loss of local ecosystems and their biodiversity. Setting aside several natural areas is not enough. In a fragmented, urban landscape, one that is under strong pressure from many destructive agents, including invasive exotic organisms, climate change, water drainage and runoff, soil compaction, and development, natural areas cannot survive without active stewardship.

Natural features in the City of Ann Arbor are regulated under an array of federal, state and local laws. Nonetheless, many natural features outside of the City's park system enjoy no special protection. While some protection may exist at the federal or state level, the City currently does not have local ordinances to help protect groundwater, groundwater recharge areas, savannas, prairies, or native plant and animal ecosystems. For certain natural features (watercourses, wetlands, woodlands, landmark trees, 100-year floodplain, steep slopes and endangered species habitats) there is limited local protection through Chapter 60. Wetlands Preservation Ordinance; Chapter 63. Storm water Management and Soil Erosion and Sedimentation Control; Chapter 57. Subdivision and Land Use Control, and the Land Development Regulations and Attachment A: Guidelines for the Protection and Mitigation of Natural Features. However, these regulations apply only to a small portion of Ann Arbor that is still vacant or may redevelop. These regulations do not apply to single or two-family homes or lots. Therefore, a large part of the City's natural features depend upon the stewardship of its citizens for protection.

This Natural Features Master Plan recognizes the importance of protecting natural features and natural areas throughout the City. It builds on existing federal, state, and local laws and regulations. The stewardship and policy recommendations found in this plan provide strengthened support for natural features protection and stewardship activities, as well as a comprehensive overview of the City's natural features and needed protection measures.

B. Protecting Ann Arbor's Natural Features Into the Future

The ecological health of the City and the region begins with the existence of a strong constituency of supportive and knowledgeable people. Sustaining ecological health requires cooperation between citizens, governments, businesses and other partners.

Government: The protection of natural features, prime farmland, and rural open space, both in and around Ann Arbor, is important to the citizens of Ann Arbor. The City will continue to work with township, village, municipal, county and state agencies to develop policies, regulations and procedures, including educational and action programs. Many tools are available to protect and sustain natural features, including state and federal laws, careful land-use zoning, transportation changes, greenway connections, well crafted local ordinances, controls on expansion of regional infrastructure, active management of runoff and infiltration in watersheds, acquisition of natural areas, and conservation easements, among others. Cooperative relationships developed between governments should include support of the goals described in this Plan.

Community Institutions, Organizations, Businesses and Media: Many institutions have a role to play in protecting natural features and natural areas. The City and its various agencies will coordinate and cooperate with the University of Michigan, public and private schools, churches and other institutions, businesses, watershed and neighborhood groups, and the media to further the goals of this Plan.

Volunteers, Environmental Organizations, and Educational Resources: Education on the significance of natural areas in the urban environment is an integral part of successful stewardship. The City promotes environmental stewardship and outreach through programs such as those of the Natural Area Preservation and Leslie Science Center divisions of the Parks Department, the Utilities Department storm water retention and water conservation policies and publications, and University work-study projects. In addition, neighborhood associations, watershed groups, The Ecology Center, The Huron River Watershed Council, and numerous other environmental and recreational organizations share the goal of actively promoting the protection and restoration of natural features and natural areas.

One example of the many successful stewardship initiatives is the *Stewardship Network*, which is a joint program of the Huron River Watershed Council, the City of Ann Arbor Parks and Recreation Department, and The University of Michigan. The Network brings together volunteer stewards from around the Huron River watershed to share their experiences and learn from each other about how to protect and restore natural areas in and around their neighborhoods. Those volunteers study streams, remove invasive species, collect seed from native plants, map the land around waterways, burn prairies, and participate in many other activities that are as varied as are the participants.

C. Natural Features Plan Over-Arching Goals

The primary goal of this Master Plan is to protect, restore, and maintain the City's important natural features: the Huron River and its Tributaries; Wetlands, Ponds and Lakes; Floodways and Floodplains; Ground Water and Groundwater Recharge Areas; Land Forms and Slopes; Woodlands, Savannas and Prairies; Landmark Trees; Native Plant and Animal Ecosystems; and Greenways. These features are described in section VI, along with specific goals and

implementation strategies for each feature. Below are over-arching goals that apply to multiple natural features.

- 1. Improve Water Quality:** The quantity and quality of natural features throughout the watershed greatly impacts water quality. Wetlands, floodplains and groundwater recharge areas help to filter toxins and control water flow to the Huron River. Water quality affects drinking water, as well as the health of plant and wildlife ecosystems.

The City should work with local and regional partners to implement watershed-based planning, environmental analysis and coordinated programs to protect the Huron River; diminish the quantities of pollutants, nutrients, and sediments reaching the Huron River; greatly reduce erosion of banks in each of the City's tributary waterways; and, greatly increase the number and effectiveness of storm water storage facilities and flood capacity throughout the City. Throughout the City there is a need to increase the opportunities for storm water to infiltrate soils; eliminate ground water pollution problems; insure the long-term viability of the City's drinking water wells; identify areas where infiltration of water collected on the surface can easily occur; restore wetlands where infiltrated ground water returns to the surface; and, work within the watershed to maintain base flows to the River.

- 2. Inventory Natural Features:** The City maintains a number of natural features inventories and a Natural Features Map showing woodlands, floodways, floodplains, wetlands and open water features. These lists and maps provide general identification and location. As the City's landscape changes and as more information is available, the City should update and add to the existing inventories and maps of natural areas and natural features. These inventories should include assessment of their condition and quality whenever possible. This information should be used to update or establish priority rankings for acquisition.

- 3. Foster Stewardship Through Education and Outreach:** Various natural features are found throughout the City's neighborhoods, many of which are not subject to local code requirements intended to help protect them. Stewardship of natural features by neighborhood groups, citizen groups, and individual landowners can have a significant impact on preserving and enhancing higher quality natural features, and it can dramatically affect the quality of life within the City.

The City should facilitate, support and foster widespread understanding of the value of natural features and communicate ways to sustain them as part of the fabric of the community. To help support stewardship, the City should maintain current information that is easily accessible by the public regarding monitoring data, best management techniques, inventory data, useful maps, etc. The City's effective leadership in education and outreach will initiate great strides in achieving the stewardship goals of this plan.

- 4. Minimize Invasive Organisms:** Invasive plants and animals, also known as exotic or non-native, are species introduced by human activity into a region in which they did not evolve. Invasive plants infest lawns as weeds, displace native plant species, reduce wildlife habitat, and alter ecosystem processes. Invasive plants and animals have become one of the most serious threats to native species, natural communities, and ecosystems.

The City should continue to expand public awareness and increase action against invasive plants, especially where high-quality natural features are threatened. These activities should be expanded to include invasive animal pests and pathogens.

- 5. Update Local Ordinances:** Chapter 57. Subdivision and Land Use Control, the Land Development Regulations and Attachment A: Guidelines for the Protection and Mitigation of Natural Features, Chapter 60. Wetlands Ordinance, and Chapter 63. Storm Water Management and Soil Erosion and Sedimentation Control provide local protection measures for natural features.

The City should continue to improve its ordinances, procedures and approaches in guiding the development process to help diminish harm to important natural features and natural areas. Additional ordinances, staffing or funding may be needed to implement the goals and implementation strategies of this plan.

- 6. Anticipate Climate Change:** The City should work to anticipate the impacts of a changing climate on the City's important natural features and take sensible action to mitigate those effects. The diversity and distribution of native plants that are adapted to the extremes of climate of the region should be increased. Membership in the International Council for Local Environmental Initiatives should be continued, as well as, participation in and coordination with other regional planning agencies that are developing strategies to respond to drought, flood, severe storms and other unusual climatic conditions.

SECTION VI. NATURAL FEATURES

VI-1. The Huron River and Its Tributaries

A. Description

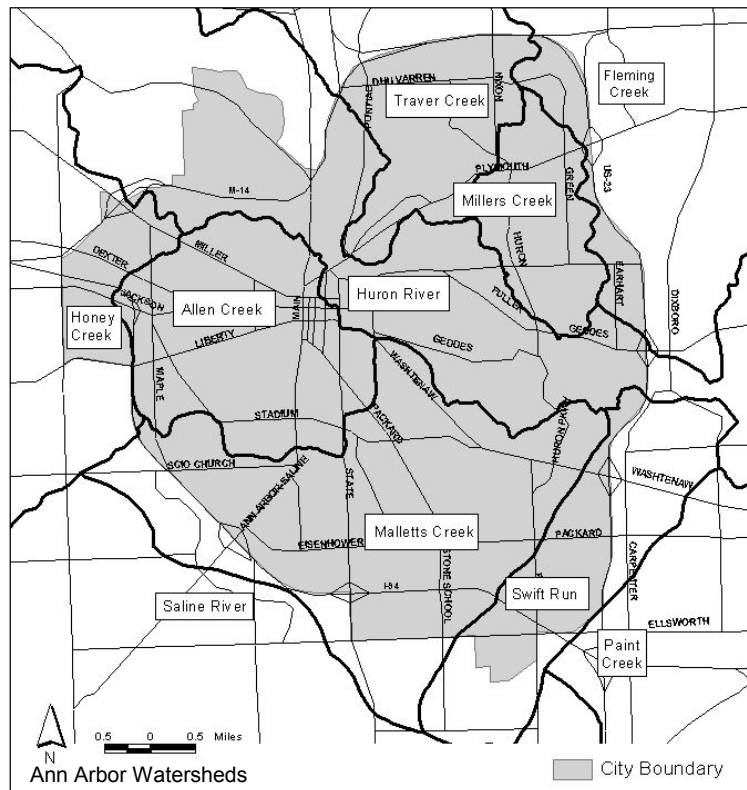
The Huron River is the central natural feature of the City. Its channels, pools, flow, floodplains and terraces, dams, fish and animal habitats, and the hills and moraines down through which it has cut, comprise its character. It transports water and sediment, it stores and moves floodwaters, and it is the major source of drinking water for the City (Barton Pond). Associated with the river are tributaries, wetlands and meadows, and the City's most significant topography.

Ann Arbor is the largest urban area along the Huron, and is the heaviest consumer of water from the River. The long-term vision for the river is to continue to restore the water quality of the River and its tributaries, making them once again rich in wildlife, and appealing for swimming, water sports, fishing, and for more pleasant recreation of all sorts.

The Huron River Watershed is made up of all land that drains either directly into the Huron River or into the streams, or tributaries, that feed into the Huron River, including Allen Creek, Mallets Creek, Honey Creek, Traver Creek, Millers Creek, Fleming Creek and Swift Run. The tributaries create vital wildlife corridors and natural habitat. They are key components of scenic beauty and of outdoor attraction.

Over time, watersheds and their tributaries have been altered as a result of farming, urbanization, and other forms of development. Many of these changes threaten local and downstream water quality and quantity. As development occurs, impervious surfaces deliver pollutants to waterways. Furthermore, these tributaries in urban areas are often overwhelmed by volumes of storm water running at speeds the streams cannot sustain without erosion and habitat damage. In some parts of the City, development has taken priority over the natural landscape; so that streams have “disappeared” into storm sewer pipes beneath the surface.

It is possible to restore portions of tributary waterways to their natural function, and in doing so can greatly improve water quality.



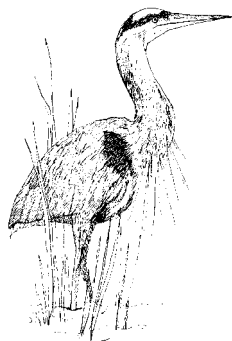
B. Goals

1. Develop, complete and regularly update watershed plans for the City's tributary waterways to improve water quality and to restore and preserve, waterways, banks, wetlands, floodplains, wildlife habits, native species and natural areas. Plans should include techniques to dramatically reduce the volume and speed of storm water runoff, increase water directed to infiltrate soil, and reduce the volume of toxics and pollutants reaching waterways.
2. Ensure that infrastructure projects proposed in the City's Capital Improvements Program are consistent with the goals and strategies found in the Natural Features Master Plan. Development should be planned and infrastructure maintained, so that the capacity of the infrastructure will not be exceeded during heavy rain events, electric power loss, or other infrastructure failures.
3. Continue to add greenways, linkages, parkland, and other open space, managed as much as possible as natural areas, along the River, up the tributaries, and upland.
4. Greatly reduce flooding throughout the City; especially the bottom reaches of Allen Creek during heavy rain events.

C. Implementation Strategies

1. Work with local and regional partners to implement watershed-based planning, environmental analysis and coordinated programs to protect and sustain the flow and the water quality of the Huron River. Include best management practices for the surface waters of Barton, Argo, Gallup and South Ponds to reduce concentrations of excess nutrients that cause algae blooms and eutrophication.
2. Implement the recommendations of the City's Capital Improvements Plan relating to improving water quality.
3. Review and modify current plans, codes and policies to ensure that best management practices, including new and innovative designs, are being applied to maintain or enhance flood storage capacity when land is developed or disturbed.
4. Continue to foster the work of watershed groups by assisting in the development and implementation of watershed plans. Participate in the development of watershed groups that currently do not exist (i.e., Fleming and Honey Creeks).
5. Continue to develop, support and implement new techniques and best management practices that reduce impervious surfaces and significantly increase infiltration. Modify code and policies, where applicable, to permit the use of these techniques and practices.
6. Research and develop standards that would allow flexibility in design for developments that reduce impervious surfaces or increase infiltration.
7. Ensure that recommendations for reducing impervious surfaces are included when the City Master Plan and watershed plans are updated.

8. Modify Chapter 57 regarding steep slope regulation provisions for developments either facing or adjacent to the river, both to guard against erosion and to protect scenic views.
9. Acquire lands along the Huron River Valley, focusing on natural areas that complete linkages or have significant natural features, and otherwise meet criteria consistent with the PROS (Parks, Recreation and Open Space) plan.
10. Identify and promote state of the art techniques to retain storm water and prevent runoff, such as rain gardens, rain barrels and porous pavements.
11. Increase public education on the ways citizens can improve water quality by retaining storm water on their property, using native plants, avoiding use of polluting chemicals, conserving water, and properly disposing of wastes.
12. Continue to update the public on the appropriate disposal of hazardous wastes including oil paints, pesticides, medications and other household chemicals. Support the County in continuing its program to collect such wastes.
13. Continue to improve street cleaning frequency and leaf collection methods, to reduce introduction of leaves and silt into the storm sewers. Work to diminish oils, antifreeze, etc. escaping from motor vehicles to the streets by educating the public and enforcing appropriate laws.
14. Continue to label storm sewer inlets to advise people not to dump polluting material into them.
15. Create an interactive geographic information system (GIS) map layer that identifies all existing retention or detention systems. For systems that were required by Chapter 63, include the maintenance schedule of each system as shown on the approved site plan.
16. Study the feasibility of establishing a program to perform regular inspections of private storm water facilities.
17. Research and acquire funding sources to update the City's elevation data and provide such data to the U.S. Federal Emergency Management Agency (FEMA) for its updates of the official flood zone map.
18. Continue to foster and support stewardship activities and organizations, such as the Stewardship Network of the Huron River Watershed Council, to protect and restore the Huron River and other natural features.



Great Blue Heron

VI-2. Wetlands, Ponds and Lakes

A. Description

The City's original wetlands were open meadows, forested swamps, and some marshes. The open meadows were spectacular fen/wet meadow ecosystems associated with the City's waterways. There were also many ponds throughout the forested landscape and fields. Few original wetlands and ponds remain in Ann Arbor. The majority of the City's historical wetlands have been drained for farming, roads, sewers and development. Many wetlands in the City have degraded hydrology and are dominated by invasive plants. The great majority of wetlands have been destroyed entirely.

Today, remaining wetlands continue to play a vital role in the function of the natural landscape. Wetlands help maintain and improve the water quality of streams, rivers, lakes, and estuaries. Diverse species of plants, insects, amphibians, reptiles, birds, fish, and mammals depend on wetlands for food, habitat, or temporary shelter. A percentage of the City's wetlands and ponds retain original ecosystem elements (c.1924). Others still have some native elements, as can be seen by the presence of sedges and forbs in open meadows, or by woodland swamp trees and forbs, in native forest fragments. They are beautiful natural areas in their own right and contrast with our predominantly forested natural landscape, and the built landscape.

Wetlands within and upstream of urban areas are particularly valuable for flood protection. The impervious surface in urban areas greatly increases the rate and volume of runoff, thereby increasing the risk of flood damage. Wetlands help minimize the impacts of flooding by serving as a storage and filtering facility for floodwaters. While some development projects are proposing to restore lower quality wetlands or create new wetland areas, development continues to be a threat to the natural functioning of healthy, high-quality wetlands.

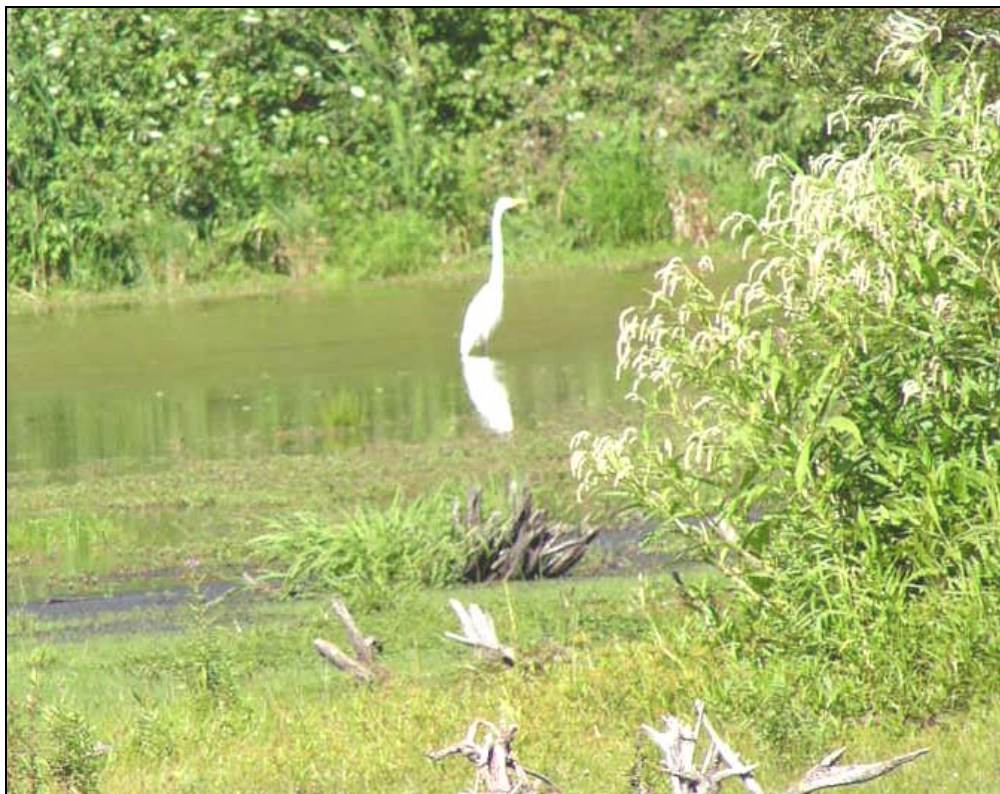
Wetlands, ponds and lakes are discernable in low altitude aerial photos, particularly on photos prior to 1960 and those older than the major colonization of exotic plants across Ann Arbor after 1960. The Three Sisters Lakes, located in Dolph Park and Saginaw Forest, are naturally occurring small lakes. Modified wetlands and constructed retention ponds can be found in many places such as Thurston Pond, the pond at Swift Run in Brown Park, the three ponds in Geddes Lake, and the pond in Earhart Village.

A number of federal and state statutes and programs exist to help regulate and protect wetlands, such as the federal Clean Water Act and the state's Wetlands Protection Act and wetland assessment program. Chapter 60. Wetlands Ordinance regulates wetlands that may not meet the criteria for a state-regulated wetland. Chapter 57. Subdivision and Land Use Control and the Land Development Regulations provide regulation during development and redevelopment. The City has an official Wetland Map, a composite of a number of surveys conducted over the years, to guide implementation of the City Wetland Ordinance.

B. Goals

1. Identify and assess wetlands that do not meet the minimum size requirement to be regulated and assessed by the MDEQ (Michigan Department of Environmental Quality).

2. Protect and sustain high-quality wetlands by reducing invasive organisms and storm water damage and restoring natural ecosystems.
3. For low- and mid-level wetlands, launch stewardship actions to improve their quality and allow them to continue to function as useful and interesting elements in the landscape.
4. Connect wetland natural areas to other natural areas, parks, and recreational facilities with greenway linkages.
5. Protect mid- and high-quality wetlands from disturbances from surrounding lands or changes in hydrology.
6. Strengthen City efforts to monitor and enforce compliance with approved storm water retention and wetland management plans.
7. Support work to improve success in wetland restoration and mitigation, and evaluate the techniques employed.
8. Support water quality management plans and neighborhood organization stewardship actions to maintain the quality and function of wetlands, lakes and ponds.



C. Implementation Strategies

1. Modify Chapter 60 to include inspections of protected wetlands after the completion of construction to determine the long-term effectiveness of wetland protection measures, including the wetland buffer area. Suggest ordinance changes to improve and enforce protection measures based on inspection findings.
2. Encourage the use of rain gardens and other techniques to reduce the volume, speed and contaminant levels of waters leaving sites.
3. Further educate the public about detrimental effects of the excessive use of pesticides, fertilizers, and other commonly used products that often contribute to the high amount of toxins found in waterways, wetlands, lakes and ponds.
4. Evaluate the City's wetland mitigation guidelines to determine possible modifications to improve the protection measures for wetlands, including more comprehensive definitions for highest, midlevel and lowlevel concern wetlands.
5. Consider modifications to Chapter 60 to include the removal of invasive species from wetlands as part of the wetland mitigation plan.



Pond at DhuVarren and Nixon Roads

VI-3. Floodways and Floodplains

A. Description

A flood is a general but temporary condition of partial or complete inundation of normally dry land areas from the overflow of streams, rivers or other waters. A floodplain is the lands adjoining a river or stream, which have been or may be expected to be inundated by floodwaters in a 100-year frequency flood (a flood which has a one-percent chance of occurring any given year). The floodway is the channel of the watercourse and portions of the adjoining floodplains, which are reasonably required to carry and discharge the 100-year frequency flood. This area is usually associated with repeated extensive flooding and fast moving water.

Prior to settlement of the City and its environs (c. 1824), floodplains were forested or were wet meadow or marsh wetlands. They existed in many more locations than now. This would have been true for the entire watershed, and so the Huron River's water quality would then have been outstanding, even after major rain events. Damaging floods in Ann Arbor would have been all but non-existent, even in heavy rain events. Farming, urbanization, and other forms of development have caused much change, increasing flooding in both frequency and damage during each event. Some mitigation of those impacts has occurred in recent years, as a result of local and state code changes.

A waterway's capacity to hold water is largely dependent upon the size and configuration of its floodplains, relative to the volume of storm water runoff it must carry. Local ordinance and building standards may permit construction in the floodway or floodplain, if capacity is not diminished; however, uncontrolled development can diminish capacity resulting in economic and environmental damage, including damage to structures, erosion of banks and soils, harm to beneficial plant and wildlife habitats. These effects are often pronounced, and have occurred in Ann Arbor along the Huron River as well as in each of its tributaries. Controlling the speed and volume of runoff through waterways is essential to maintaining high-quality natural features.

Federal, State and City statutes currently discourage development in floodways, and expect permissible development in floodplains not to diminish capacities. Floodplains, floodways and watercourses that have watershed areas of two square miles or larger are officially mapped and regulated under provisions of Federal and State statutes. Floodplain and floodway boundaries are available on Flood Insurance Rate Maps (FIRM), produced by the Federal Emergency Management Agency (FEMA). Chapter 57 and the Land Development Regulations also identify protection and mitigation measures for floodplains and floodways.

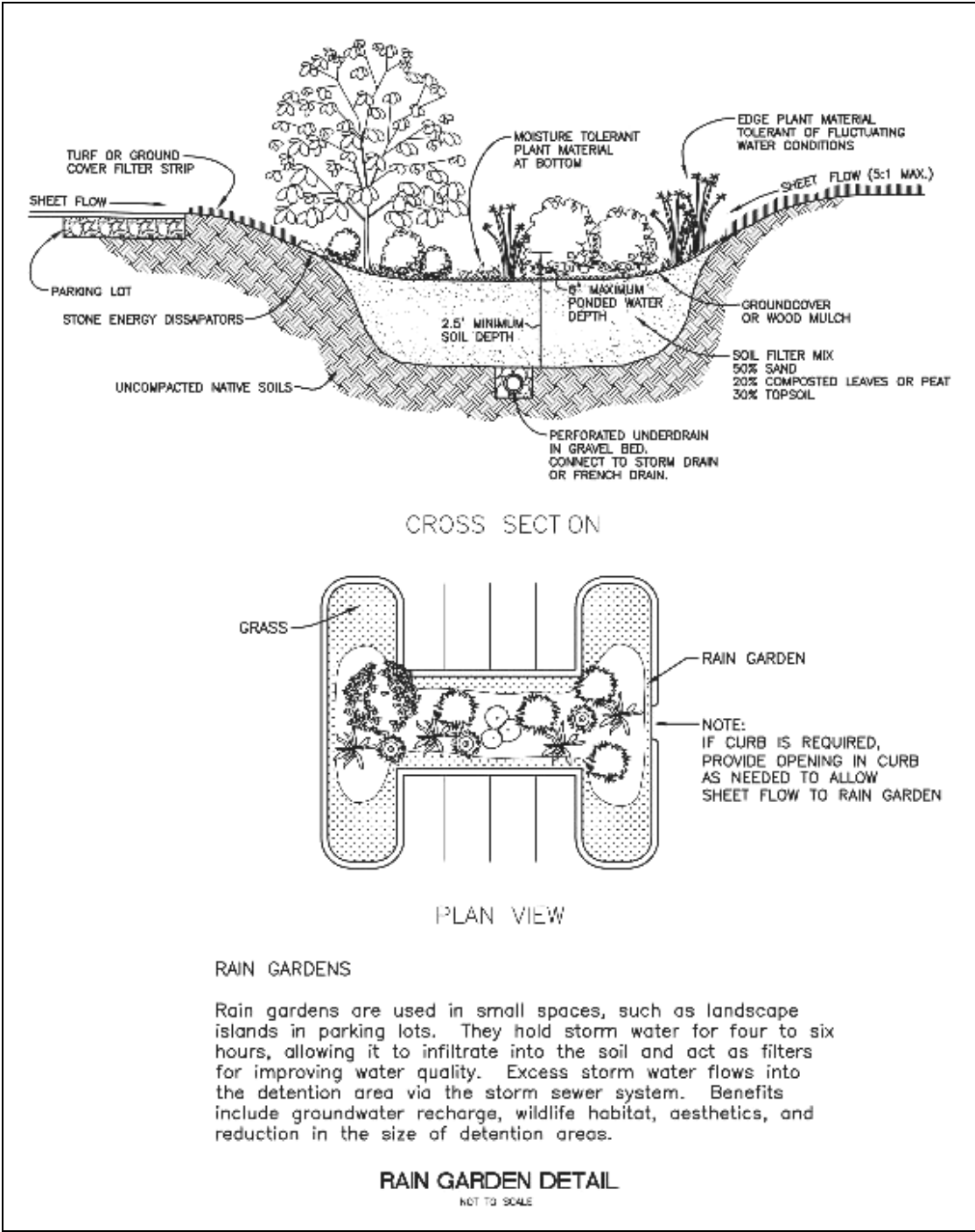
B. Goals

1. Identify, assess, protect, and steward the high quality floodplains within the City, with special attention paid to those with the largest capacity, biologically rich native floodplain forest fragments, native sedge meadows and fen ecosystems.
2. Reduce the adverse impacts of storm events that result from high volumes and speed of storm water, including conveyance of contaminants from impervious surfaces that are carried to aquatic habitats, erosion of waterway banks and the exceeding of the capacity limits of the City's storm water infrastructure.

3. Reduce flooding occurrences by increasing floodplain and flood storage capacity along waterways and by insuring that there is no net loss of floodplain and flood storage capacity.
4. Nurture and sustain native flora on high quality floodplains, and work to diminish invasive organisms in all floodplains.
5. Support the work of watershed groups, and implement their plans when completed.
6. Restore floodplains to natural conditions where possible.

C: Implementation Strategies

1. Encourage the use of deep-rooted and water tolerant native plants in floodplains on public and private lands to help increase floodplain capacity.
2. Promote stewardship on private lands by educating the public to identify native plants and invasive species.
3. Review City codes to determine whether they reflect current best management practices to help prevent soil erosion and washout from storm events. Revise codes to implement best management practices, where appropriate.
4. Develop a policy to restore city-owned wetlands, especially those with high flood storage capacity and those with the greatest potential for meeting City standards for a wetland of highest concern.
5. Provide educational material to private property owners regarding stewardship activities that will promote the value and healthy functioning of wetlands on private lands.
6. Encourage the use of rain gardens, green roofs, and other innovative storm water management techniques.
7. Consider establishing a policy and program to elevate or remove structures in the floodplains downtown that do not conform to current elevation standards.
8. Develop a policy that would restrict or prohibit new development within any floodway within the City unless the development is deemed to be of greater public interest than potential flooding hazards and damage. The policy should consider the location of the floodplain, proposed damage to or enhancement of natural features, and impacts to floodplain capacity and value. The policy also should consider ways to actively remove structures in the floodway that do not conform to policy standards.
9. Consider modifications to Chapter 57 to require a net gain in the one-hundred-year floodplain capacity as part of mitigating floodplain removal or disturbance.



VI-4. Groundwater and Groundwater Recharge Areas

A. Description

Groundwater recharge areas are lands that readily permit water to move from the surface into a subsurface aquifer. Aquifers are porous, water-bearing zones of glacial soils or bedrock layers beneath the soil surface capable of containing or producing water from a well. Functioning recharge areas deliver a supply of clean, cool water back to aquifers. They are necessary to recharge underground drinking and irrigation water supplies.

A considerable portion of the base flow of many waterways comes from groundwater. Nearly half the base flow of the Huron River is groundwater.

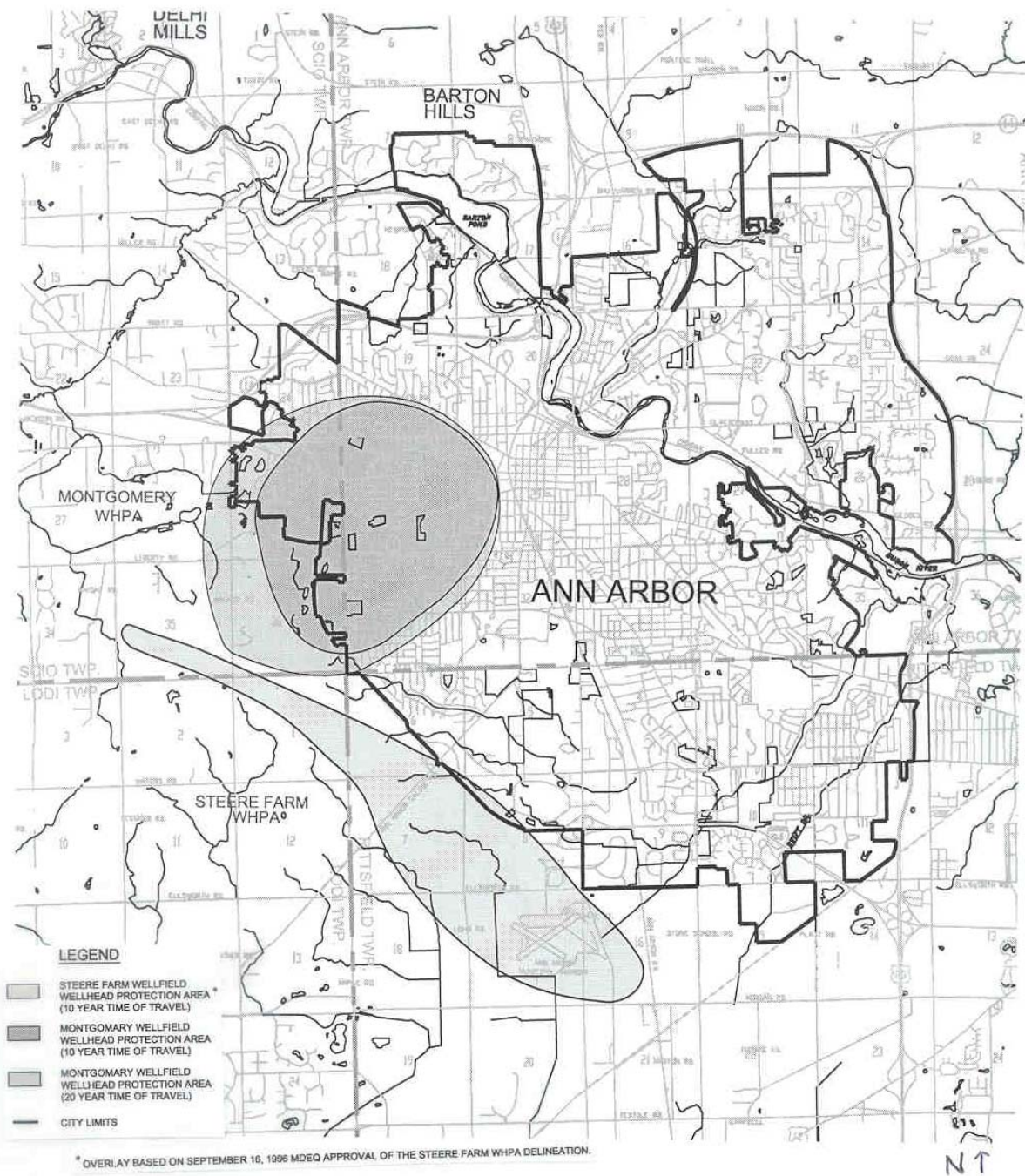
The base flow of most streams in the City are groundwater dominated. When the percent of surface water entering a groundwater dominated waterway increases, the temperature of the water in that waterway increases, water quality declines, and so do fish and wildlife populations. Erosion and flooding that often follows increased surface runoff add to the negative affects. Natural areas over ground water recharging zones help collect and retain rain water, directing it into soils and into aquifers.

Washtenaw County has mapped key groundwater recharge areas. Using data from the Washtenaw County Soil Survey and from well logs, trained experts can determine areas where the water flows quickly through the soil, where highly permeable sand, and gravel particles compose the soil layers, or where water tables are close to the surface. Areas not mapped by the County that also serve as recharge areas are those with permeable sand and gravel soils, extending down to groundwater layers. These conditions are often present in the glacial moraines bordering the River.

Groundwater recharge areas can present a risk of contamination to aquifers when waterborne foreign or toxic substances are allowed to permeate surface soils. This risk of contamination can be caused by injection wells and from storage of contaminated substances on the surface.

Certain groundwater underlying the City currently is a critical source of drinking water supply for City and township properties. Wellhead protection plans currently exist for the Three Fires (Steere Farm) Wellfield and the Montgomery Wellfield, which help protect the City's drinking water. In 1996 and 2001, data was collected from several private wells to develop a regional groundwater flow direction map. Additionally, the City wells (Montgomery and Steere Farm) were tested to evaluate how quickly groundwater can travel to wells. The information was used to develop a groundwater flow model to predict the area that contributes groundwater to the City's wellfields. This area is known as the Wellhead Protection Area.

City of Ann Arbor Wellhead Protection Area

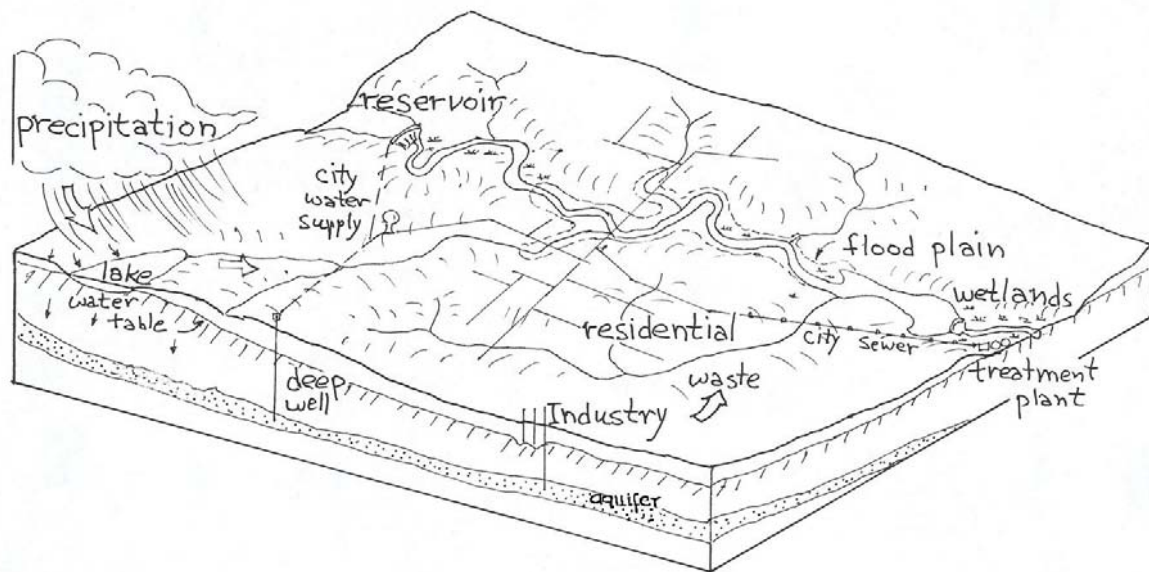


B. Goals

1. Protect the City's drinking water and improve water quality for all aquatic ecosystems by sustaining healthy ground water flows and by preventing and eliminating pollution and contamination that could threaten ground water and the Huron River.
2. Identify, map and assess all potential and known groundwater recharge areas in the City that may have suitable conditions for sustaining groundwater resources or diminishing storm water runoff.

C. Implementation Strategies

1. Implement the City's wellhead protection plans.
2. Minimize impervious surfaces and other potential impacts where development on recharge areas occurs. Techniques could include development guidelines or modifications to code that include: designs that enhance infiltration; installing or preserving vegetation essential to water holding and infiltration functions; maintaining the balance and integrity of hydrological surface and subsurface systems.
3. Continue to develop, improve and enforce codes and standards that minimize the potential for contamination on recharge areas when uses are considered that process, store, transport, or otherwise use toxic compounds.
4. Protect the City's well fields and sustain the flow of clean groundwater through them.
5. Develop standards and modify code to require a net gain in recharging function when development is proposed on a known wellfield area.



A sketch of the water cycle of Ann Arbor

VI-5. Land Forms and Steep Slopes

A. Description

Similar to much of the upper Midwest, Ann Arbor's landscape is a glacial landscape. As the glaciers retreated, they sculpted the hills, valleys, moraines, kames, ravines, watercourses and flat till plains that give Ann Arbor its unique, special character. Steep slopes in Ann Arbor are found on the sides of moraines, kames, and ravines. Many of the City's scenic landforms were crafted along watercourses where the intense runoff from the melting glaciers eroded them. Scenic qualities are associated with many of these slopes because the change in elevation creates desirable views to and from them. Many of the City's best native forest and savanna fragments are found in these areas, because steep slopes have always been difficult to farm or develop.

The river, the landforms and the vegetation that embrace them are the preeminent natural features of our City. Bluffs, concentrated generally north or south facing, that run from Ypsilanti west beyond Dexter are end moraines and kames, a result of pause in the glacier's recession. The Huron River has played a key role in shaping the land as the glacier retreated.

Steep slopes are prone to erosion when the vegetation is disturbed and storm water is allowed to move across the surfaces at high speed, or when surface runoff is directed toward them. As a result, disturbed slopes often result in silting watercourses or disturbances to lands below. For that reason, they are regulated in the building and development process to reduce erosion, maintain soil stability, control amounts and velocity of runoff, and to care for the community's aesthetic resources.

Chapter 57 and the Land Development Regulations provide regulations and guidance on the disturbance to or development upon steep slopes, including the installation of utilities.

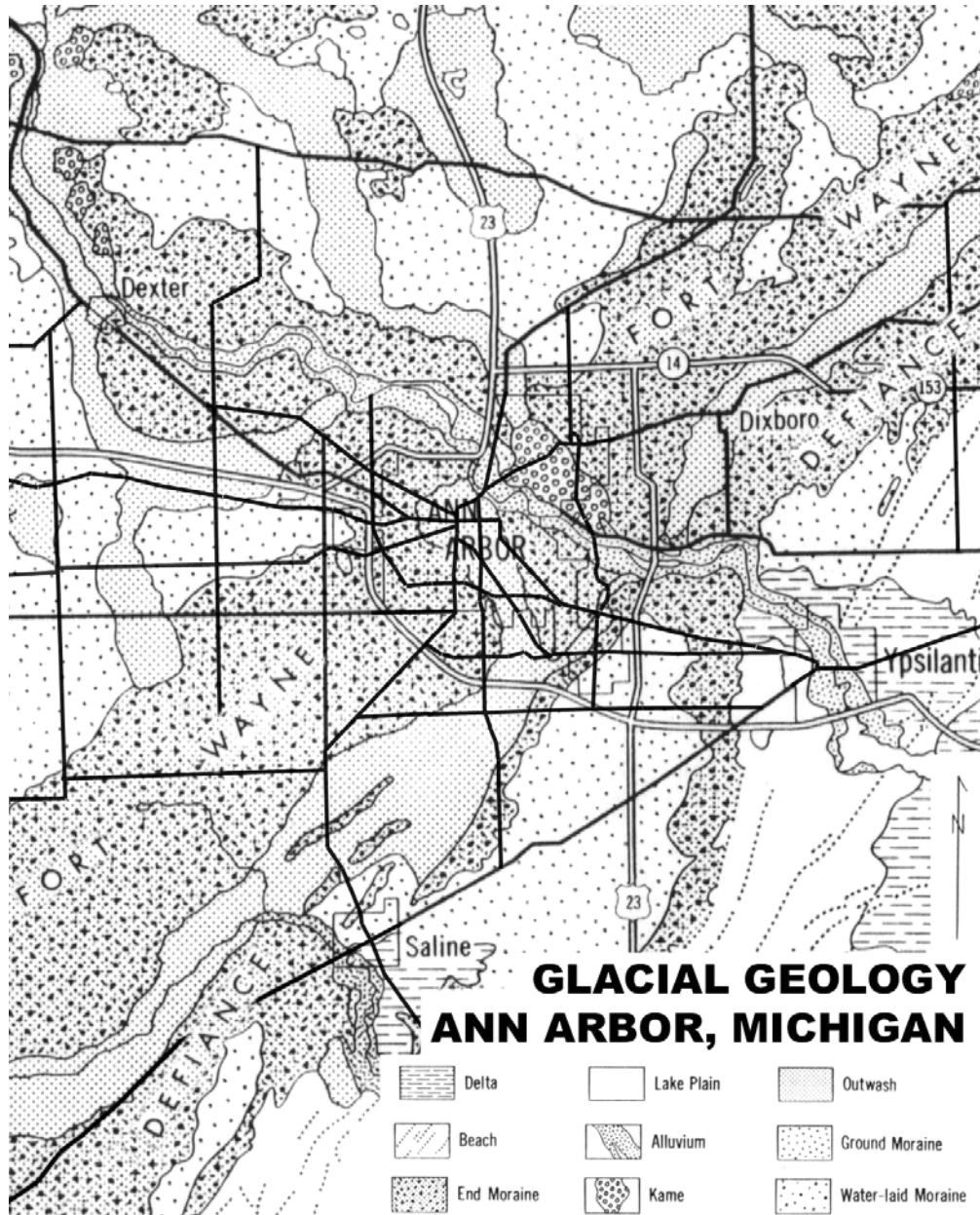
B. Goal

1. Protect steep slopes, with special attention given to undisturbed slopes along waterways.
2. Protect scenic vistas in the City, especially natural vistas along the Huron River, and sustain the natural features and natural areas that comprise them (steep slopes, native forest woodlands, waterways, etc.).

C. Implementation Strategies

1. Maintain a GIS data layer for steep slopes, and adopt and update as necessary a steep slope reference map.
2. Review and revise standards, codes and policies to minimize disturbance on steep slopes when utilities are placed on or near steep slopes.
3. Define scenic vistas, identify those located within the City, and develop regulations to protect them.

4. Review and revise current codes and policies to determine possible modifications that would help protect the natural contours of land when grading is proposed.
5. Amend code regulations for slopes to include standards that take into account soil types, evaluated for their infiltration rates and their susceptibility to erosion or instability.
6. Review and modify, if necessary, Attachment A: Guidelines for Protection and Mitigation of Natural Features of the Land Development Regulations to provide the most accurate description of protection priorities. Based on those priorities, develop standards for retaining undisturbed slopes, permitted disturbance, and mitigation.
7. Include as a highest concern protection priority any steep slope adjacent to an existing or historic watercourse.



VI-6. Woodlands, Savannas and Prairies

A. Description

Prior to European settlement, southern Michigan had a landscape that was a transition zone between the forests of the east and the prairies of the Great Plains – a mosaic of woodlands and savannas, areas of prairies grasslands and many types of wetlands. Comprehensive descriptions and illustrations of the plant and animal communities of Ann Arbor can be found in [Along the Huron, The Natural Communities of the Huron River Corridor in Ann Arbor, Michigan](#), written by Natural Area Preservation staff of the Ann Arbor Department of Parks and Recreation in 1999.

Woodlands were a dominant component of Ann Arbor's landscape at the time of the arrival of the first European settlers in 1824. Woodland and forest vegetation communities were diverse, containing many herbaceous plants on the forest floor and a number of mature trees. Most of these areas were cut down between 1840 and 1860, when much of the land was cleared for European-style farming. Today, remnants of these native forest communities have returned in a patchwork quilt of areas where farming did not occur for one reason or another. These areas are called "native forest fragments". These fragments are visible on aerial photographs of the City, especially on photos taken prior to 1960, prior to the establishment of numerous invasive, exotic species. These native fragments can occur in floodplains, swamps, stream galleries, and till plains; on hillsides and tops; or interspersed with savannas and wetlands.

Savannas were forested grasslands dotted with large, well-spaced trees occupying a maximum of 50% of the canopy, and contributed to much of the local landscape prior to settlement. These areas contained very fertile soils and were much easier than woodlands to clear for farming. As a consequence, there are few native savannas remaining in Ann Arbor today. The grove of Burr Oak trees in the vicinity of St. Andrews Church may signal the presence of an historical savanna. Savannas are also being restored in Foster Point, Furstenberg, and South Pond parks.

Prairies were never a major component of the Ann Arbor landscape, but they did occur in small patches throughout the area. Prairie habitats have relatively few trees or shrubs, but do contain a great diversity of grasses and forbs (flowers, small shrubs, and vines). Like savanna habitats, most of the prairies in the Ann Arbor area were destroyed by the plow. Today, the Ann Arbor Parks Department, Matthaei Botanical Gardens, and Nichols Arboretum are restoring prairies to our landscape.

The vegetation we see growing around the city is very different today than what existed prior to European settlement. Many of our native woodlands, savannas, prairies, and wetlands were destroyed as the city was developed from a farmland community to an urbanized environment. Many non-native trees, shrubs, and other types of vegetation have been planted over the last 150 years for wind protection, landscaping, erosion control, and other human needs. Areas where people have planted groves of non-native trees densely enough to qualify as woodlands are called **urban woodlands**. These urban woodlands typically contain pines or spruces. These landscapes are valued habitat, provide scenic resources, influence the climate, and make life in the city more enjoyable for people. In recent decades, some abandoned farmlands have been overgrown very densely by native or invasive trees. These areas are called **pioneer woodlands**. They are dominated by fast growing, early successional species including elm, ash, hawthorns, black cherry, box elder, and various poplars. Invasive, exotic shrubs, most notably buckthorns and honeysuckles, are also found in pioneer woodlands.

As land in the City is developed, great care must be taken to preserve the remaining native vegetation. Restoration and careful management of woodlands, savannas, and prairies are also needed. Chapter 57, the Land Development Regulations and Attachment A: Guidelines for the Protection and Mitigation of Natural Features provide protection and mitigation measures for various types of woodlands. However, there are currently no local statutes to protect or restore savannas and prairies.

B. Goal

Identify, steward, and conserve woodlands, savannas and prairies to protect water, air, and soil quality, to buffer air and noise pollution, to moderate local climate and storm hazards, to preserve wildlife habitats and natural corridors, and to maintain important elements of the natural beauty of the City.

C. Implementation Strategies

1. Amend Chapter 57 to include the definitions of savannas and prairies and develop standards for their protection, restoration and mitigation.
2. Review Chapter 57 and the Land Development Regulations for possible improvements to the standards for protection and mitigation of woodlands and landmark trees, including increasing the replacement requirements for their disturbance or removal.
3. Identify and consider the public acquisition of all high-quality native forest fragments, savannas, prairies, and urban forest areas located on private lands. Sites meetings the criteria requirements for acquisition should be prioritized with sites currently on the acquisition list.
4. Revise the PROS (Parks, Recreation and Open Space) plan to include undeveloped, high-quality savannas and prairies as part of the evaluation criteria for acquisition sites.
5. Develop a policy that requires only native plantings in all city-owned woodlands, savannas and prairies.
6. Consider modifications to City code and the Guidelines for the Protection and Mitigation of Natural Features to provide time limits for correcting violations to protection measures required by an approved site plan (i.e., barrier fencing) and appropriate action for not correcting the violation, including fines.
7. Develop appropriate tools and resources to educate citizens, neighborhood organizations and property owners the value of woodlands, savannas and prairies and to assist them in the identification and long-term protection, restoration, and stewardship of these features on their properties.
8. Modify code, where appropriate, to define high quality topsoil and require developers to identify and preserve high quality topsoil that support plants native to woodlands, savannas, prairies.

VI-7. Landmark Trees

A. Description

Large, old, picturesque, rare, well-located, or otherwise special and interesting trees play an important role in the fabric of the City. The many trees have a positive effect on the microclimate of the City, on its ability to attract and sustain wildlife, and on its visual beauty. In addition to providing the benefits of all trees, specimen trees are community landmarks, and thus community assets. Many of the native hardwood trees and most old trees are lost during construction activity, because they do not adapt well to changes in the critical root zone (CRZ).

A landmark tree is generally any tree larger than 24 inches in diameter at breast height and any tree of a size listed on the Landmark Tree List (in the Land Development Regulations). Large trees in natural areas, such as native forest fragments or forested wetlands or floodplain forest fragments, will often qualify as Landmark Trees. Chapter 57 and the Land Development Regulations provide protection and mitigation measures for landmark trees during development and redevelopment. However, Landmark Trees are not otherwise protected



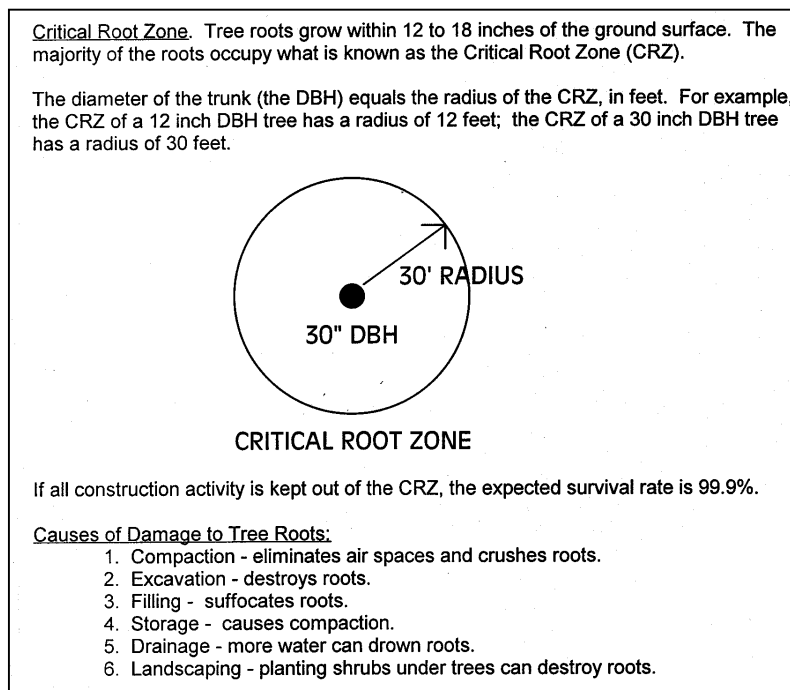
These trees are part of a grove of landmark Burr Oaks located east of the Veteran's Administration Medical campus. These trees were to be removed for a road, and were saved by the efforts of citizens and City officials negotiating with the VA and the University of Michigan to exchange land and modify the design of the road to spare the trees.

B. Goal

Protect and preserve landmark trees that are in good or excellent condition, particularly trees that are rare, unusual, old or historically significant (over 100 years old), that provide a diversity of species or that contribute to a native forest fragment.

C. Implementation Strategies

1. Based initially on the Ann Arbor Public Service Area's list of exceptional City trees, expand the information into a public program on "Champion" or "Special Trees" to educate, recognize, and reward owners for their stewardship of Ann Arbor's finest trees.
2. Provide information to property owners on the care required to protect landmark trees, including the impact of grading changes on surface water hydrology and moisture levels in soils, and how these changes can affect landmark trees.
3. Develop appropriate techniques and modify code, where applicable, to require developers to minimize adverse affects on landmark trees by limiting changes to surface water hydrology and moisture levels in soils during grading activities, even when the critical root zone of the landmark tree is untouched.
4. Develop a process to monitor the long-term impacts of development on landmark trees and the effectiveness of current protection measures. Based on the findings, modify City code as necessary.
5. Ensure that development sites are re-inspected within 3 years after issuance of a certificate of occupancy or final permit to determine the health and development impacts of existing landmark trees.
6. Modify Chapter 57 to include appropriate penalties for developments that remove or fail to protect landmark trees during grading or construction activities.
7. Foster a stewardship program that provides long-term monitoring of landmark trees.



VI-8. Native Plant and Animal Ecosystems

A. Description

Native plants are those that have evolved in the area over thousands of years, adapting to the local climate and providing habitats for native wildlife of the area. Abundant species are most likely to be found in the midst of natural areas. These species and their habitats are important to the City for the richness, attractiveness and diversity they offer. These sites and the species within them may be diminished by changes caused by development. Alterations in hydrology, soil compaction, light, wind, the arrival of invasive weeds and pathogens, and many other forces can diminish species diversity dramatically, within a decade or two, even when the habitat itself appears to be undisturbed by neighboring activities.

The use of native plant species offers great benefits to the City. Many of the native grasses and flowers are insect-rather than wind-pollinated so produce less air pollen. Native plantings require no mowing and once established require less water, hold water on the landscape much better with their deeper roots, and don't need pesticides or fertilizers.

Currently, the City does not regulate native plant and animal ecosystems. Chapter 57 does require that native trees be used when mitigation is required for the disturbance or removal of woodland or landmark trees. The City also strongly encourages native plantings when landscaping is required by Chapter 62. Landscape and Screening.

Endangered, threatened or special concern species: Within Ann Arbor, the areas most likely to contain endangered species are sandy, wet bottomlands and wetlands along the Huron River, along its tributaries, and in the many small pocket wetlands in native forest fragments. Many of these areas can be quite small in size. Rare and unusual endangered plant species (of ferns, bryophytes, orchids, grasses, etc.) may also be found on disturbed ground—including along shorelines and stream banks, flooded areas, old farmed fields, borrow pits, eroding slopes, burned areas, embankments along railroads and roads, in cemeteries, old settlement areas and farmsteads. The protection of endangered species and their habitats are regulated by the State of Michigan, Department of Natural Resources (MDNR), in cooperation with the US Fish and Wildlife Service.

B. Goal

Identify, steward and protect habitats that are rich in native flora or fauna and that are threatened, endangered or contain special concern species, while reducing invasive species and increasing the diversity and distribution of native plants that are adapted to the extremes of climate of the region.

C. Implementation Strategies

1. Identify and prioritize areas of unusually rich plant biodiversity throughout the City using the floristic quality assessment system. Those with the highest ratings, especially those that provide a link to existing natural areas, should be considered for public acquisition.
2. Develop an assessment system for wildlife, similar to that developed for floristic quality assessment for plant species, to rate habitats for diversity and abundance of animal species and preferred habitats.

3. Coordinate with state and federal regulating agencies to identify the best protection approach, based on the specific characteristics of the species involved.
4. Designate areas particularly rich in native flora and fauna in park lands, conservation easements and greenways for ongoing natural area management.
5. Continue controlled burns and other management techniques to maintain and restore native vegetation.
6. Develop a policy to ensure that plants introduced into City parks reflect a rich biodiversity of native species, especially those with high survival rates against disease, and periods of flood, drought or unusual periods of prolonged high or low average temperatures.
7. Continue to educate the public on the benefits of native plantings.
8. Expand programs to control or reduce invasive species and coordinate programs with other public and private organizations.
9. Develop a stewardship program for known endangered species habitats.

I-9. Greenway Linkages

A. Description

Linkages and greenways are linear open spaces connecting natural areas and parks, and are important to the protection and sustainability of diverse species and habitats. Although not categorized as a specific natural feature nor necessarily consisting of natural features, these corridors are essential for migration of plant and animal species. Linkages also preserve an attractive environment for residents, businesses and visitors. A growing population has increased the demand for walking, hiking and biking. Linkages make the recreational areas accessible for a greater population. They may serve as both physical and social linkages, providing alternatives to automobiles and promoting community participation.

While greenway linkages primarily link natural features, they may also facilitate connections in the built environment, such as neighborhood linkages and linkages between commercial areas or the downtown area. They may include pathways, parkways, stream corridors, bike paths, hedgerows, recreational areas, and scenic roadways or bridges. Such linear open space may be established along either a natural corridor such as a riverfront, stream valley or ridgeline, or overland along a railroad right-of-way converted to recreational use, a scenic road or other conservation easement. Some linkages are publicly owned, some are owned by private entities and some are the result of public/private partnerships. Some private properties are open to visitors. Some are designed for use by people, while others are intended to preserve wildlife connections. Linkages provide access to a variety of amenities and experiences. The types of resources and linkages that connect them will vary depending on the natural landscape and available connections.

B. Goal

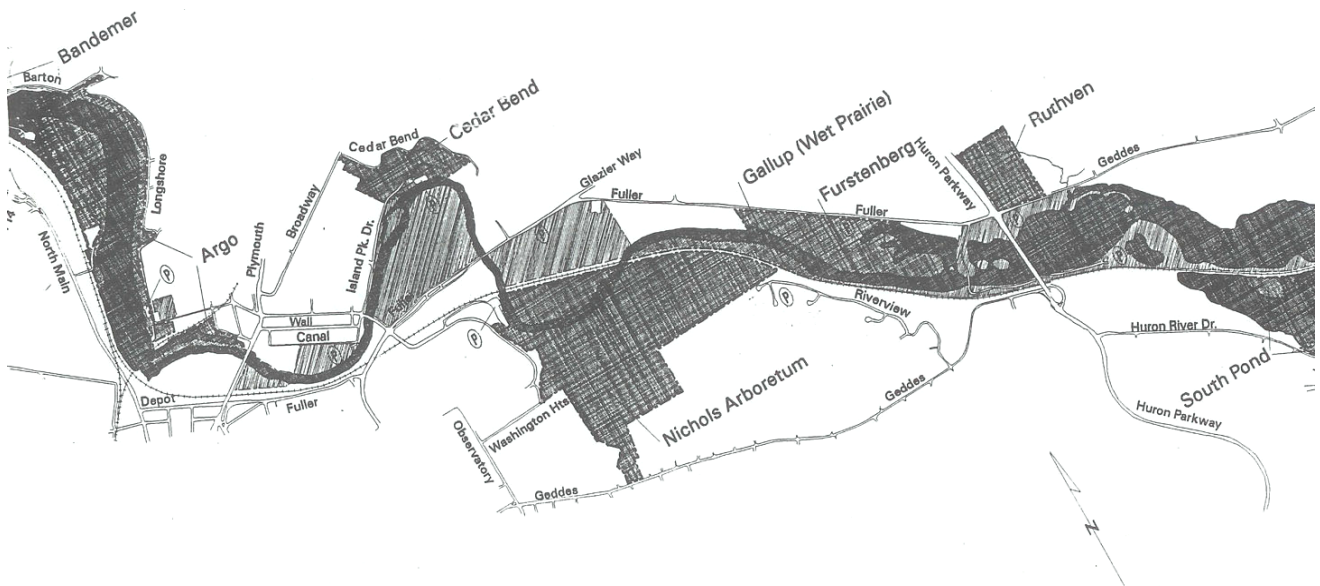
Establish a network of greenways throughout the City that provide non motorized connections between various land uses, such as neighborhoods, commercial and employment centers, downtown and the University of Michigan, and that help retain the shape and continuity of natural features, especially along stream corridors, between parks and through new neighborhoods. The network also should extend to greenways located on adjacent township and County properties.

C. Implementation Strategies

1. Foster linkages and greenways with neighboring communities as a means of promoting non-motorized transit and to connect parks, open spaces and other recreational facilities
2. Identify, establish and assemble wildlife linkages and corridors within the tributary watersheds.
3. Acquire missing links in the Huron River Greenway/path system as identified in the Parks and Recreation Open Space (PROS) Plan, including links up and down the River in neighboring municipalities.
4. Coordinate greenway activities with neighboring communities, townships, Washtenaw County, SEMCOG, the Community Foundation of Southeast Michigan,

the Washtenaw County Greenways Initiative, the Ann Arbor Greenbelt Initiative and others.

5. Implement the Ann Arbor Greenway Initiative with administrative staff to coordinate greenways plans between City, County, institutions and other public and private holders of greenway links, to publicize plans, oversee projects and prepare grants applications.
6. Identify the existing greenway links and key areas where links could increase the connectivity of the existing natural areas, particularly between larger areas of natural features.
7. Identify areas where greenways could link parks, neighborhoods, commercial areas, the University of Michigan, and the downtown.
8. Identify linkages that could benefit from improvements such as plantings and pathways.
9. Identify and acquire properties that will link greenways.
10. Maintain and improve existing bike paths and pedestrian ways to encourage greater use and exposure of the community to the natural areas, and to improve continuity and ease of access.
11. Incorporate greenway systems and design principles and into master plans and zoning.
12. Facilitate stewardship of privately owned linkages.
13. Support land acquisitions through the Ann Arbor Greenbelt Initiative that help protect and link natural features.



Natural areas along the Huron River Corridor

VII. Natural Features Information Resources

VII -1. Maps and Other Resources

- A. The Official Natural Features Map of Ann Arbor. This map is adopted and attached as part of this plan. It is a large wall map in color that displays digitized information on wetlands, open water features, woodlands, slopes, and flood plains. This map was created with the help of the City's Information Technology Services and is expected to be updated as additional information becomes available and as inventories change over time. The map is available for viewing or purchase in the City's Master Planning Services Unit.
- B. Development and Planning Services. This sub-unit of the City's Community Services Unit possesses a number of natural feature inventory maps and databases, including the City's official wetland map and the woodlot inventory map. Development and Planning Services also has current and historical aerial photographs at various scales, and it stores site plans that date back to the early 1970's. Many of the site plans contain information on existing natural features. This service unit also makes available to the public a number of documents, including the official invasive species list, master plans, studies and census information.
- C. Parks and Recreation Services. This sub-unit of the City's Community Services Unit has detailed maps of City parks, including the managed and undeveloped natural areas within the parklands. Also available is a listing of recommended native species for the Ann Arbor area. The Natural Area Preservation program (NAP), a component of the Parks and Recreation Services, has surveyed the species of plants, nesting birds, butterflies and amphibians within the City. The Ann Arbor Area Greenbelt Initiative calls for a 0.5-mill property tax for up to 30 years. About a third of the money would be used for parkland acquisition in the city, with the remainder used to buy development rights on farmland and open space in townships surrounding the city. The service unit also has prepared stewardship and management plans for City parks.
- D. Washtenaw County. The County has prepared digital maps of significant natural features throughout the County, including wetlands, hydric soils, easily eroded soils, steep slopes, watersheds and woodlands. Maps are available in a wide variety of formats and scales.
- E. Washtenaw County Tax Equalization Department. The County Equalization Office maintains township parcel maps and aerial photographs.
- F. The University of Michigan. The University library system has early plat maps of the City in addition to copies of original land survey records, which often indicate the type of vegetation, terrain and conditions that existed prior to settlement. Some departments have copies of aerial photos of flights over the City. Some of the faculty have done extensive studies of many of the City's natural areas, and may otherwise be helpful with many aspects related to identification, assessment and management of natural features.
- G. Michigan Resource Information System (MIRIS). The State of Michigan's MIRIS program (at MDNR) has aerial photos, maps and digitized information in many categories available for the Ann Arbor region. Information about endangered and threatened species is available from the Michigan Department of Natural Resources, Natural Heritage Wildlife Division, PO Box 30180, Lansing, MI 48909-7680. Phone (517)373-9418, Endangered Species Review.
- H. Southeast Michigan Council of Governments (SEMCOG) has maps, statistics, and information on Southeast Michigan's counties and communities.

VII-2. Online and Printed Resources

City of Ann Arbor: <http://www.ci.ann-arbor.mi.us/>

A. City Codes and Ordinances related to Natural Features

Chapter 57: Subdivision and Land Use Control
Land Development Regulations, Attachment A: Guidelines for the Protection and Mitigation of Natural Features
Chapter 60: Wetlands Preservation Ordinance
Chapter 63: Storm Water Management and Soil Erosion and Sedimentation Control

City codes also can be found online at www.municode.com

B. City of Ann Arbor Master Plan Documents, Master Planning Services Unit

Citywide Plans:

Transportation Plan Update, including the Fuller/Geddes/Conrail Corridor Study
Bicycle Plan
Park, Recreation and Open Space Plan

Geographic Area Plans:

South Area Plan, including the Briarwood Subarea Plan
Central Area Plan
Ann Arbor Downtown Plan
Northeast Area Plan
West Area Plan, including the Miller/Maple/Newport Traffic and Circulation Study

C. Other City Documents

Along the Huron, the Natural communities of the Huron River Corridor in Ann Arbor, Natural Area Preservation Division, Department of Parks and Recreation, City of Ann Arbor, Michigan, 1999.

Invasive Plants Fact Sheet, Natural Area Preservation Division, Department of Parks and Recreation, City of Ann Arbor, Michigan.

Malletts Creek Management Plan, Malletts Creek Association, Ann Arbor, Michigan, February 2000.

Native Shrubs of Southeastern Michigan, Natural Area Preservation Division, Department of Parks and Recreation, City of Ann Arbor, 1997.

Native Trees of Southeastern Michigan, Natural Area Preservation Division, Department of Parks and Recreation, City of Ann Arbor, 1997.

Native Vines, Grasses, Sedges, and Ferns of Southeastern Michigan, Natural Area Preservation Division, Department of Parks and Recreation, City of Ann Arbor, 1997.

Native Wildflowers of Southeastern Michigan, Natural Area Preservation Division, Department of Parks and Recreation, City of Ann Arbor, 1997.

D. Washtenaw County Documents

Washtenaw County Drain Commissioner, Procedures and Design Criteria for Storm Water Management Systems.

Malletts Creek Restoration Project.

Email: drains@co.washtenaw.mi.us and web: /www.ewashtenaw.org/ or <http://www.co.washtenaw.mi.us>

E. State of Michigan. Michigan Communities and Other Documents

The Michigan Department of Environmental Quality (MDEQ) has information on wetland assessment: <http://www.michigan.gov/deq>

Community Planning Handbook: Tools and Techniques for Guiding Community Change, Michigan Society of Planning Officials, 414 Main Street - Suite 211, Rochester, Michigan 48307

Resource Conservation Through Community Planning, Oakland County Development & Planning Division, August, 1997, Oakland County, Michigan.
http://www.co.oakland.mi.us/peds/assets/docs/es_docs/res_man2.pdf

Restoring a Community Resource, The Malletts Creek Report, Huron River Watershed Council, Joan Martin, Adopt-a-Stream Director, August 1999.

Summary Guide of Ordinances for Rouge River Communities:
<http://www.wcdoe.org/rougeriver/techtop/nonpoint/ordinances.htm>

Allman, Laurie. 1997. Natural areas: protecting a vital community asset. Minnesota Department of Natural Resources, Natural Heritage and Nongame Research Program. Jamestown, ND: Greatplains.org Home Page.
<http://www.greatplains.org/resource/1999/natural.htm> (Version 07APR99). 148pp.

City of Fort Collins Natural Areas Policy Plan: An Element of the Comprehensive Plan, City of Fort Collins, Natural Resources Division, 281 North College Avenue, P.O. Box 580, Fort Collins, CO 80522

Prince George's County , Maryland's Design Manual for Use of Bioretention in Stormwater Management, 9400 Peppercorn Place, Suite 600, Landover, MD 20785. There are many references on this topic in the document and also at www.stormwatercenter.net/

VII-3. Community Resources (Partial List)

- A. City of Ann Arbor
 - Community Services Unit
 - Master Planning Services
 - Parks and Recreation Services
 - Natural Areas Preservation (NAP)
 - Forestry and Horticulture - Horticulture Program
 - Public Services Unit
- B. Ecology Center of Southeast Michigan
- C. Recycle Ann Arbor
- D. The Huron River Watershed Council
 - Allens Creek Watershed Group
 - Friends of Traver Creek
 - Fleming Creek Advisory Council
 - Malletts Creek Association
 - Millers Creek Association
- E. The University of Michigan
 - School of Natural Resources
 - Matthaei Botanical Gardens
 - Nichol's Arboretum
- F. Washtenaw County
 - Drain Commissioner
 - Planning Resources
 - Parks and Recreation
- G. Washtenaw Land Conservancy
- H. Southeast Michigan Land Conservancy
- I. Michigan Environmental Council
- J. Michigan Natural Areas Council
- K. Rails to Trails Conservancy-Michigan Chapter
- L. Community Organizations:
 - Audubon Society
 - Huron Valley Group of the Sierra Club
 - Huron Valley Land Use Alliance
 - League of Women Voters, Ann Arbor Area
 - Neighborhood Associations
 - Pheasant's Forever (restoration of prairie grasses)
 - Wild Ones (promoting use of native plants)
- M. Environmental Education
 - Ann Arbor Public Schools - outdoor and environmental education programs
 - Hands On Museum
 - Leslie Science Center
 - Private schools outdoor and environmental education
 - Boy Scouts of America, Girl Scouts of America

VII-4. City of Ann Arbor – Invasive Species List

This list is authorized by Chapter 60 and is include here for reference only. It is periodically updated by City staff and may not be the most current list. Please check the City's website for the most current list of invasive species.

City of Ann Arbor - Invasive Species List

Revised May, 2004

Maintained by the City Building Department per Chapter 60, Section 5:206(4)(c)

Scientific Name	Common Name	National Wetland Cat	Type
Class #1			
These species are prohibited and should be removed from wetland mitigation areas. Long range wetland mitigation management plans must also provide for the ongoing removal of plants in this class.			
<i>AGROPYRON REPENS</i>	QUACK GRASS	Facultative Upland	Grass
<i>ALLIARIA PETIOLATA</i>	GARLIC MUSTARD	Facultative	Forb
<i>ALNUS GLUTINOSA</i>	BLACK ALDER	Facultative Wetland (-)	Tree
<i>ARCTIUM MINUS</i>	COMMON BURDOCK	Upland	Forb
<i>BERBERIS THUNBERGII</i>	JAPANESE BARBERRY	Facultative Upland (-)	Shrub
<i>BROMUS INERMIS</i>	SMOOTH BROME	Upland	Grass
<i>CARDAMINE IMPATIENS</i>	BITTER CRESS	Upland	Forb
<i>CARDUUS spp.</i>	MUSK THISTLE	Upland	Forb
<i>CELASTRUS ORBICULATA</i>	ORIENTAL BITTERSWEET	Upland	Vine
<i>CENTAUREA MACULOSA</i>	SPOTTED KNAPWEED	Upland	Forb
<i>CIRSIUM ARVENSE</i>	CANADIAN-THISTLE	Facultative Upland	Forb
<i>CIRSIUM VULGARE</i>	BULL-THISTLE	Facultative Upland (-)	Forb
<i>CONVOLVULUS ARVENSIS</i>	FIELD BINDWEED	Upland	Forb
<i>CORONILLA VARIA</i>	CROWN-VETCH	Upland	Forb
<i>CYNANCHUM spp.</i>	see VINCETOXICUM spp.		
<i>DIPSACUS LACINIATUS</i>	CUT-LEAVED TEASEL	Upland	Forb
<i>ELAEAGNUS UMBELLATA</i>	AUTUMN-OLIVE	Facultative Upland	Shrub
<i>ELYTRIGIA REPENS</i>	see <i>Agropyron repens</i>		
<i>EUPHORBIA ESULA</i>	LEAFY SPURGE	Upland	Forb
<i>FESTUCA ARUNDINACEA</i>	TALL FESCUE	Facultative Upland(+)	Grass
<i>FESTUCA PRATENSIS</i>	MEADOW FESCUE	Facultative Upland (-)	Grass
<i>GALIUM MULLUGO</i>	WHITE BEDSTRAW	Upland	Forb
<i>HERACLEUM MANTEGAZZIANUM</i>	GIANT HOGWEED	Facultative Wetland	Forb
<i>LESPEDEZA CUNEATA</i>	SILKY BUSH-CLOVER	Upland	Forb
<i>LIGUSTRUM OBTUSIFOLIUM</i>	BORDER PRIVET	Upland	Shrub
<i>LIGUSTRUM VULGARE</i>	COMMON PRIVET	Facultative (-)	Shrub
<i>LONICERA JAPONICA</i>	JAPANESE HONEYSUCKLE	Facultative Upland	Forb
<i>LONICERA MAACKII</i>	AMUR HONEYSUCKLE	Upland	Shrub
<i>LONICERA MORROWII</i>	MORROW HONEYSUCKLE	Upland	Shrub
<i>LONICERA TATARICA</i>	SMOOTH TARTARIAN HONEYSUCKLE	Facultative Upland	Shrub
<i>LONICERA XBELLA</i>	HYBRID HONEYSUCKLE	Facultative Upland	Shrub
<i>LYTHRUM SALICARIA</i>	PURPLE LOOSESTRIFE	Obligate Wetland	Forb
<i>MELILOTUS ALBA</i>	WHITE SWEET-CLOVER	Facultative Upland	Forb
<i>MELILOTUS OFFICINALIS</i>	YELLOW SWEET-CLOVER	Facultative Upland	Forb
<i>MICROSTEGIUM VIMINEUM</i>	JAPANESE STILT GRASS	Facultative	Grass
<i>MYRIOPHYLLUM SPICATUM</i>	EURASIAN WATER MILFOIL	Obligate Wetland	Forb
<i>PASTINACA SATIVA</i>	WILD PARSNIP	Upland	Forb
<i>PHALARIS ARUNDINACEA*</i>	REED CANARY GRASS	Facultative Wetland (+)	Grass
<i>PHRAGMITES AUSTRALIS*</i>	REED	Facultative Wetland (+)	Grass
<i>POLYGONUM CUSPIDATUM</i>	JAPANESE KNOTWEED	Facultative Upland	Forb
<i>POLYGONUM SACHALINENSE</i>	GIANT KNOTWEED	Upland	Forb
<i>PUERARIA LOBATA</i>	KUDZU	Upland	Vine
<i>RANUNCULUS FICARIA</i>	LESSER-CELANDINE	Facultative Wetland (-)	Forb
<i>RHAMNUS CATHARTICA</i>	COMMON BUCKTHORN	Facultative Upland	Tree

Scientific Name	Common Name	National Wetland Cat	Type
<i>RHAMNUS FRANGULA</i>	GLOSSY BUCKTHORN	Facultative (+)	Shrub
<i>RHAMNUS UTILIS</i>	BUCKTHORN	Upland	Shrub
<i>ROSA MULTIFLORA</i>	MULTIFLORA ROSE	Facultative Upland	Shrub
<i>RUMEX CRISPUS</i>	CURLY DOCK	Facultative (+)	Forb
<i>TYPHA ANGUSTIFOLIA</i>	NARROW-LEAVED CAT-TAIL	Obligate Wetland	Forb
<i>TYPHA XGLAUCA</i>	HYBRID CAT-TAIL	Obligate Wetland	Forb
<i>ULMUS PUMILA</i>	SIBERIAN ELM	Upland	Tree
<i>VINCETOXICUM spp.</i>	SWALLOW-WORT	Upland	Vine

Class #2

These species are prohibited but are not required to be removed from wetland mitigation areas.

<i>ABUTILON THEOPHRASTI</i>	VELVETLEAF	Facultative Upland (-)	Forb
<i>ACER GINNALA</i>	AMUR MAPLE	Upland	Tree
<i>ACER PLATANOIDES</i>	NORWAY MAPLE	Upland	Tree
<i>AEGOPODIUM PODAGRARIA</i>	GOUTWEED	Facultative	Forb
<i>AESCULUS HIPPOCASTANUM</i>	HORSE-CHESTNUT	Upland	Tree
<i>AILANTHUS ALTISSIMA</i>	TREE-OF-HEAVEN	Upland	Tree
<i>AMARANTHUS spp.</i>	AMARANTH species	Upland	Forb
<i>AMORPHA FRUTICOSA</i>	FALSE INDIGO	Facultative Wetland (+)	Shrub
<i>AMPELOPSIS BREVIPEDUNCULATA</i>	TURQUOISE BERRY	Upland	Vine
<i>BARBAREA VULGARIS</i>	YELLOW ROCKET	Facultative	Forb
<i>BERBERIS VULGARIS</i>	COMMON BARBERRY	Facultative Upland	Shrub
<i>CAMPANULA RAPUNCULOIDES</i>	ROVING BELLFLOWER	Upland	Forb
<i>CATALPA SPECIOSA</i>	NORTHERN CATALPA	Facultative Upland	Tree
<i>CERASTIUM FONTANUM</i>	MOUSE-EAR CHICKWEED	Facultative Upland	Forb
<i>CHELIDONIUM MAJUS</i>	CELANDINE	Upland	Forb
<i>CHENOPODIUM ALBUM</i>	LAMB'S QUARTERS	Facultative (-)	Forb
<i>CICORIUM INTYBUS</i>	CHICORY	Upland	Forb
<i>CONVALLARIA MAJALIS</i>	LILY-OF-THE-VALLEY	Upland	Forb
<i>DACTYLIS GLOMERATA</i>	ORCHARD GRASS	Facultative Upland	Grass
<i>DAUCUS CAROTA</i>	QUEEN-ANNE'S-LACE	Upland	Forb
<i>DIOSCOREA OPPOSITIFOLIA</i>	CHINESE YAM	Facultative	Vine
<i>DIPSACUS FULLONUM</i>	COMMON TEASEL	Upland	Forb
<i>DUCHESNEA INDICA</i>	INDIAN STRAWBERRY	Facultative Upland (-)	Forb
<i>ECHINOCHLOA CRUSGALLI</i>	BARNYARD GRASS	Facultative Wetland	Grass
<i>ELAEAGNUS ANGUSTIFOLIA</i>	RUSSIAN-OLIVE	Facultative Upland (-)	Tree
<i>EPILOBIUM HIRSUTUM</i>	GREAT HAIRY WILLOW-HERB	Facultative Wetland (+)	Forb
<i>EUONYMUS ALATA (including 'compacta')</i>	WINGED WAHOO	Upland	Shrub
<i>EUONYMUS EUROPAEA</i>	SPINDLE TREE	Upland	Shrub
<i>EUONYMUS FORTUNEI</i>	WINTERCREEPER	Upland	Vine
<i>EUPHORBIA CYPARISSIAS</i>	CYPRESS SPURGE	Upland	Forb
<i>GEUM URBANUM</i>	AVENS	Upland	Forb
<i>GLECHOMA HEDERACEA</i>	GROUND IVY	Facultative Upland	Forb
<i>HEMEROCALLIS FULVA</i>	ORANGE DAY-LILY	Upland	Forb
<i>HESPERIS MATRONALIS</i>	DAME'S ROCKET	Upland	Forb
<i>HYPERICUM PERFORATUM</i>	COMMON ST. JOHN'S-WORT	Upland	Forb
<i>IRIS PSEUDACORUS</i>	YELLOW FLAG	Obligate Wetland	Forb
<i>KALOPANAX SEPTEMLOBUS</i>	KALOPANAX	Facultative Wetland	Tree
<i>LATHYRUS LATIFOLIUS</i>	EVERLASTING PEA	Upland	Forb
<i>LEONURUS CARDIACA</i>	MOTHERWORT	Upland	Forb
<i>LINARIA VULGARIS</i>	BUTTER-AND-EGGS	Upland	Forb

Scientific Name	Common Name	National Wetland Cat	Type
<i>LONICERA XYLOSTEUM</i>	EUROPEAN FLY HONEYSUCKLE	Upland	Shrub
<i>LUNARIA ANNUA</i>	MONEY-PLANT	Upland	Forb
<i>LYSIMACHIA NUMMULARIA</i>	MONEYWORT	Facultative Wetland (+)	Forb
<i>MORUS ALBA</i>	WHITE MULBERRY	Facultative	Tree
<i>MYOSOTIS SCORPIOIDES</i>	FORGET-ME-NOT	Obligate Wetland	Forb
<i>PERILLA FRUCTESCENS</i>	PERILLA MINT	Upland	Forb
<i>PHLEUM PRATENSE</i>	TIMOTHY	Facultative Upland	Grass
<i>PINUS NIGRA</i>	AUSTRIAN PINE	Upland	Tree
<i>PINUS SYLVESTRIS</i>	SCOTCH PINE	Upland	Tree
<i>PLANTAGO LANCEOLATA</i>	ENGLISH PLANTAIN	Facultative	Forb
<i>PLANTAGO MAJOR</i>	COMMON PLANTAIN	Facultative (+)	Forb
<i>POA COMPRESSA</i>	CANADA BLUEGRASS	Facultative Upland(+)	Grass
<i>POLYGONUM PERFOLIATUM</i>	MILE-A-MINUTE VINE	Facultative Wetland	Forb
<i>POLYGONUM PERSICARIA</i>	LADY'S THUMB	Facultative Wetland	Forb
<i>POTENTILLA RECTA</i>	ROUGH-FRUITED CINQUEFOIL	Upland	Forb
<i>PRUNUS AVIUM</i>	SWEET CHERRY	Upland	Tree
<i>PRUNUS MAHALEB</i>	PERFUMED CHERRY	Upland	Tree
<i>RANUNCULUS ACRIS</i>	TALL or COMMON BUTTERCUP	Facultative Wetland (-)	Forb
<i>RHODOTYPOS SCANDENS</i>	JETBEAD	Upland	Shrub
<i>ROBINIA PSEUDOACACIA</i>	BLACK LOCUST	Facultative Upland (-)	Tree
<i>SALIX ALBA</i>	WHITE WILLOW	Facultative Wetland	Tree
<i>SALIX FRAGILIS</i>	CRACK WILLOW	Facultative (+)	Tree
<i>SALIX PURPUREA</i>	BASKET WILLOW	Facultative Wetland	Shrub
<i>SAPONARIA OFFICINALIS</i>	BOUNCING BET	Facultative Upland	Forb
<i>SILENE PRATENSIS (LYCHNIS ALBA)</i>	WHITE CATCHFLY	Upland	Forb
<i>SOLANUM DULCAMARA</i>	BITTERSWEET NIGHTSHADE	Facultative	Forb
<i>SONCHUS ARVENSIS (S. ULIGINOSUS)</i>	PERENNIAL SOW THISTLE	Facultative (-)	Forb
<i>TARAXACUM OFFICINALE</i>	COMMON DANDELION	Facultative Upland	Forb
<i>TORILIS JAPONICA</i>	HEDGE-PARSLEY	Upland	Forb
<i>TRIFOLIUM PRATENSE</i>	RED CLOVER	Facultative Upland(+)	Forb
<i>TRIFOLIUM REPENS</i>	WHITE CLOVER	Facultative Upland(+)	Forb
<i>VERBASCUM THAPSUS</i>	COMMON MULLEIN	Upland	Forb
<i>VIBURNUM LANTANA</i>	WAYFARING TREE	Upland	Shrub
<i>VIBURNUM OPULUS</i>	EUROPEAN HIGHBUSH CRANBERRY	Facultative	Shrub
<i>VICIA VILLOSA</i>	HAIRY VETCH	Upland	Forb

Class #3

These species are not recommended but can be planted under controlled circumstances provided the following criteria are met:

- The planting area is not in or adjacent to a wetland, natural feature open space, natural area or park
- Alternative species have been considered and shown to be unsuitable
- The property owner demonstrates an understanding of the method of dispersal of the species, and agrees to be responsible for implementing the control and eradication of the plant if it does spread
- The property owner agrees to eradicate the plant(s) prior to transferring the property to another owner.

<i>AKEBIA QUINATA</i>	CHOCOLATE-VINE	Upland	Vine
<i>GALIUM ODORATUM</i>	SWEET WOODRUFF	Upland	Forb
<i>HEDERA HELIX</i>	ENGLISH IVY	Facultative Upland	Vine
<i>LAMIASTRUM GALEOBDOLON</i>	GOLDEN ARCHANGEL	Upland	Forb
<i>LOTUS CORNICULATA</i>	BIRDFOOT TREFOIL	Facultative (-)	Forb
<i>ULMUS PARVIFOLIA</i>	CHINESE ELM, LACE BARK ELM	Facultative Wetland	Tree
<i>VINCA MINOR</i>	PERIWINKLE	Upland	Shrub

Scientific Name	Common Name	National Wetland Cat	Type
Class #4			
These species may only be planted in areas that will be mowed on a regular basis to prevent the plants from reseeding, and can only be planted outside of wetland areas, natural feature open space, or other natural areas.			
<i>AGROSTIS ALBA</i>	see <i>Agrostis gigantea</i>		Grass
<i>AGROSTIS GIGANTEA</i>	REDTOP	Facultative	Grass
<i>AGROSTIS PALUSTRIS</i>	see <i>Agrostis stolonifera</i>		Grass
<i>AGROSTIS STOLONIFERA</i>	CREEPING BENT	Facultative Wetland	Grass
<i>HOLCUS LANATUS</i>	VELVET GRASS	Facultative Upland (-)	Grass
<i>LOLIUM PERENNE</i>	PERENNIAL RYE GRASS	Facultative Upland	Grass
<i>POA PRATENSIS</i>	KENTUCKY BLUEGRASS	Facultative (-)	Grass
<i>POA TRIVIALIS</i>	BLUEGRASS	Facultative Wetland	Grass

* native grass species with invasive Eurasian genotypes.

These native species are NOT included on the invasive species list. However they are not recommended for planting since they are aggressive in disturbed areas.

<i>Acer negundo</i>	boxelder
<i>Typha latifolia</i>	broad-leaved cat-tail
<i>Viburnum trilobum</i>	high-bush cranberry

VII-5. American Planning Association Policy Guide on Smart Growth

AMERICAN PLANNING ASSOCIATION, POLICY GUIDE ON SMART GROWTH, Chicago, IL, April 15, 2002

A number of policies listed in this guide will help to achieve environmental protection and land conservation. For example, transportation and regional planning policies consistent with Smart Growth principles also achieve these ends. See also the related APA Policy Guides on Wetlands, Water Resources Management, Waste Management, Planning for Sustainability, Endangered Species and Habitat Protection, and Agricultural Land Preservation.

- 1. The American Planning Association and its Chapters encourage public, private, and non-profit cooperation to achieve a new level of partnership to preserve and enhance ecological integrity over the short- and long-term.**

Reasons to Support the Specific Policy: Environmental protection and land conservation have often been seen as the role of the public sector. However, nonprofit organizations and private property owners also have a role and responsibility in good stewardship of the environment. Cooperation and collaboration among all interested parties are needed to improve and enhance ecological integrity. The basis for all planning must be a sense of stewardship or “caring for the earth”, along with an expanded understanding of the long-term implications of daily decisions and the benefits of conservation.

- 2. The American Planning Association and its Chapters supports land and water conservation, including farmland preservation, soil and wetlands conservation, and brownfield remediation and redevelopment. An important tool is full funding of the federal Land and Water Conservation Fund.**

Reasons to Support the Specific Policy: Conservation of land and water resources is important to maintain and enhance healthy ecosystems, and is also an ethical imperative, to protect these resources for future generations. Soil conservation is an important concern and farmland preservation, e.g., with compact development, can be an important result of Smart Growth. The Land and Water Conservation Fund (LWCF), which was established by Congress in 1964, is an extremely important tool to create and enhance parks and open spaces, protect wilderness and wetlands, preserve wildlife habitat, and enhance recreational opportunities. The LWCF provides funding to all levels of government as well as the nonprofit sector. See also the policy below regarding water, and APA’s other Policy Guides.

- 3. The American Planning Association and its Chapters support protection and enhancement of biodiversity through the planning process. Planning for biodiversity should use the best available science to assess natural resources and determine areas of environmental vitality as the first step in incorporating “green infrastructure” into human settlements.**

Reasons to Support the Specific Policy: Natural systems and biodiversity are critical to the support of human populations. Biodiversity planning should be included in the early stages of land use planning. Planning should include an inventory of natural processes and ecosystems. To the extent such information is available, plans should include identification of natural vegetation, wetlands, arid lands, endangered and threatened

plant and animal species, umbrella and indicator species, species that are commercially important in the state, and species habitat (including food sources, denning and nursery areas, and migratory routes). Based upon this inventory, all land use and development plans should incorporate "green infrastructure" based on good science and best available management practices to limit deleterious impacts on fragile ecosystems. Green infrastructure is an interconnected network of greenways and natural lands that includes wild life habitat, waterways, native species and preservation or protection of ecological processes. All development -- including redevelopment, infill development, and new construction in urbanizing areas -- should plan for biodiversity and incorporate green infrastructure. Green infrastructure helps to maintain natural ecosystems, including clean air and water; reduces wildlife habitat fragmentation, pollution, and other threats to biodiversity. It also improves the quality of life for people. Tools for preservation of natural open spaces include acquisition of conservation easements by governments or non-profits, transfer of development rights, and conservation design, in addition to land acquisition by public agencies.

- 4. The American Planning Association and its Chapters support federal and state agencies providing assistance to county and local governments to collect and analyze information on natural communities and processes. County and local governments should supplement this information with local knowledge. Using the combined information, all levels of government should work with non-profit organizations, businesses, and citizens to designate green infrastructure policies and carry them out.**

Reasons to Support the Specific Policy: Many local governments, where land use planning takes place, do not have the staff or technological resources to inventory and map biodiversity resources for their communities. Federal and state agencies that have the resources and scientific/technical knowledge needed on topics such as ecology and biodiversity should provide financial and technical assistance to county and local agencies, which augment the information with local knowledge. A county or local government benefits by obtaining technical information necessary to write a strong plan, while the state and federal governments benefit by enhancing the protection of natural resources through partnerships with local governments and nonprofits.

- 5. The American Planning Association and its Chapters support a balanced energy policy including conservation and development of renewable energy resources.**

Reasons to Support the Specific Policy: A comprehensive energy policy should include reduction of energy consumption, development of new supplies, and use of existing natural resources, such as coal, gas and oil, while protecting sensitive ecosystems. Energy conservation would include transportation policy, development patterns that minimize vehicular miles traveled, and green architecture. Development of new energy supplies should include renewable energy. Use of renewable energy sources will contribute to reduce dependence upon fossil fuels, also helping to reduce concentrations of carbon dioxide and other gases in the atmosphere. Increased use of alternative energy sources will also contribute to healthier, more stable local economies through reduced dependence on one or two energy sources that have an uncertain future. Solar power is likely to become more important in future years and development patterns should balance the need for solar access with the need for dense urban development. Development may be able to take advantage of industrial cogeneration possibilities, utilizing waste heat from industry to heat surrounding buildings. APA's Policy Guide on

Planning for Sustainability can provide additional insight on steps that can be taken to develop a balanced energy policy.

6. The American Planning Association and its Chapters support environmentally conscious design and construction, including “green architecture” practices, adoption of LEED Green Building Rating System and the adaptive reuse of buildings, and land recycling.

Reasons to Support the Specific Policy: The U.S. Green Building Council (USGBC), a national nonprofit organization representing all parts of the building industry, has documented the environmental impact of buildings. Impacts reported as of January 2002 include, for commercial and residential construction:

- . 65% of total U.S. electricity consumption
- . 36% of total U.S. energy use
- . 30% of U.S. greenhouse gas emissions
- . 136 million tons of construction and demolition waste in the U.S. (almost 3 pounds per person per day)
- . 40% of raw material use globally.

The USGBC has developed and administers the “LEED” green building rating system to promote “green design” (see www.usgbc.org for details). LEED, or Leadership in Energy and Environmental Design, shows great promise to provide benefits such as reducing the impacts of natural resource consumption, enhancing comfort and health, and minimizing strain on local infrastructure while producing financial benefits for building owners and developers. LEED standards cover site design, conservation of materials and resources including water and energy, and indoor environmental quality. Green design practices include building reuse and preservation, which preserve a unique sense of place in our communities, save building resources, and keep demolition refuse out of landfills. Historic preservation also often saves energy and other natural resources. Green architecture is a growing practice that should be recognized and adopted by all who construct buildings.

7. The American Planning Association and its Chapters support comprehensive water supply, distribution, treatment, and storm water planning to protect water supplies, preserve water quality, and prevent flooding.

Reasons to Support the Specific Policy: Clean and adequate water supplies are indispensable for life. Comprehensive programs are needed to protect both water quality and quantity. Development practices, including design and construction, must protect water resources. A variety of planning strategies, design and development standards, and management practices are needed:

- . Xeriscaping and natural, local landscaping that minimizes water usage
- . Minimizing of paving and impervious surfaces that inhibit natural water drainage and ground water recharge
- . Innovative legislation and regulations -- may include conservation and engineering performance standards, buffers, maximum water run-off, agriculture zoning, etc.
- . Minimizing of fertilizer and other chemical usage that produces polluted run-off and affects water quality off-site “

Section VIII. Glossary

Biodiversity: The variety of different species in an ecosystem, genetic variation within a population of a species, and variety of kinds of ecosystems. Greater biodiversity makes species and systems more resilient, while loss of biodiversity weakens them, making them more vulnerable to extinction.

Bluff: A cliff, headland, or hill, with a broad, steep face.

Ecosystem: An interdependent system of living organisms of all kinds that together with non-living components makes up a particular environment.

Endangered/Threatened Species: Those plants and animals listed on the current Federal and State list of endangered or threatened species.

Ephemeral Ponds: Small ponds, which exist for a short time, usually in spring. Also Vernal Ponds.

Exotic Species: Non-native plants and animals

Fen: A type of wetland which develops on sites which are typically sloping, and with a steady flow of groundwater rich in calcium and magnesium bicarbonates, leading to highly alkaline soil.

Floodplain: Land adjacent to lakes, streams, and rivers which is covered as water levels rise and overflow the normal water channels during a 100 year flood.

Floodway: The sub-area of the 100-year Floodplain that is adjacent to a river or stream, which is needed to convey flood flows; this area is usually associated with repeated extensive flooding and fast moving water.

Forb: Any herbaceous plant that is not a grass.

Groundwater: Water found below the surface of the ground that completely fills the pore spaces and void spaces of soil and rock formations.

Habitat: The natural habitation of an animal or plant.

Hydric Soil: Soil types present in wetlands.

Hydrologic cycle: The circular flow or cycling of water from the atmosphere to the earth (precipitation) and back to the atmosphere through evaporation. While it is on the surface of the earth, water is involved in many processes including runoff infiltration into the soil, and storage in lakes, streams and groundwater.

Hydrology: The science dealing with water both on and under the surface of the land.

Hydrological Study: Study of the flow of water both on and under the surface of the land.

Invasive Species: Plants (usually exotics) that invade a habitat, crowding out native species, and reducing diversity. The Planning Department maintains a list of invasive species.

Kame: A glacial feature composed of sand and gravel with steep sides and a conical shape. Formed from a vertical hole in the glacier.

Marsh: A wetland characterized by the predominance of emergent vegetation, such as sedges, grasses and cattails.

Mesic: Adapted to an environment having a balanced supply of moisture.

Moraine: A glacial feature composed of clay and silt left behind as the glacier melted and retreated. End moraines are long, high, broad ridges, which were formed when the glacier was stationary, piling more clay and silt in one spot. Ann Arbor rests on two end moraines: Defiance Moraine and Fort Wayne Moraine. **Ground moraines** were formed as the glacier receded at a steady pace, behind the end moraines. They are lower and flatter than end moraines.

Native Forest Associations: Native plants that are usually found growing together in native forests, including herbaceous and woody, understory and canopy.

Native Soil: Soil, which has not been tilled, and contains the seed base and microorganisms that were here when the first European settlers arrived.

Native Wetlands: Wetlands with native plant communities.

Native Vegetation: Plants that originally occurred in the area.

Non-Point Source Pollution: Storm water conveyed pollution that is not identifiable to one particular source, and is occurring at locations scattered throughout the drainage basin. Typical sources include erosion, agricultural activities, and runoff from urban lands.

Prairie: Land dominated by native herbaceous plants – grasses and plants with soft stems rather than woody-stemmed bushes and trees. Usually flat or gently rolling. Fire is crucial in the evolution of tallgrass prairie, since it eradicates young trees and shrubs.

Rain garden: See Storm water garden

Ravine: A valley having steep side slopes.

Recharge Area: Area where water moves from the ground surface into an aquifer, or ground water.

Savanna: A type of prairie dotted with trees. Occurs in areas of transition between forest and grassland.

Sedge Meadow: A type of wetland dominated by sedges and other low herbaceous wetland plants.

Slope: The degree of deviation of land surface from the horizontal usually expressed in percentage or ratio.

Storm Water Detention: The temporary storage of storm runoff, to control peak discharge rates and provide gravity settling of pollutants.

Storm Water Garden: Small scale storm water infiltration device that may replace all or part of a storm water detention area, providing the benefits of groundwater recharge, beauty, and wildlife habitat. Usually two to six inch deep retention areas planted with native species. Also, Rain Garden.

Storm Water Retention: The holding of runoff in a basin without release except by means of evaporation or infiltration.

Stewardship: Protection and management of a natural system with the goal of maintaining or restoring a native habitat.

Terrace: A nearly level strip of land with a more or less abrupt descent along the margin of a river.

Topography: The configuration of the earth's surface, including the shape and position of its natural and man-made features.

Volunteer: A plant that grows without being seeded or cultivated by humans.

Washout: Severe soil erosion.

Watercourse: Any naturally occurring open waterway, river, stream, creek, lake, or any body of surface water having well defined banks and a bed, whether continually or intermittently flowing.

Watershed: The complete area or region of land draining into a common outlet such as a river or body of water.

Wet Meadow: A type of wetland dominated by low herbaceous wetland plants.

Wetland: Land characterized by the natural presence of water sufficient to support wetland vegetation.

Wildlife: Non-domesticated mammals, birds, reptiles, amphibians, or fish.

Woodland: A community of native plants, including canopy trees, understory trees, and herbaceous plants on the forest floor.

