Chapter 7: Natural Resources

Protect, Connect, Restore, and Manage Ecosystems, Plant Communities and Species

Why a Natural Resources Plan is Needed

Maplewood's quality of life depends on how it manages its natural resources. Natural resources are the air, minerals, land, water, and biota that form the foundation to life in Maplewood. For example, the oxygen we breathe comes from plants. Without plants, the atmosphere would be poisonous to people and animals. That is a free ecosystem service that benefits people in Maplewood. There are many others.

The benefits of treating natural resources in a sustainable way include:

- High quality forests, savannas, prairies, wetlands, lakes, and streams will support a variety of life—trees, shrubs, wildflowers, groundcover, fish, birds, and other wildlife.
- Lakes, streams, and wetlands will be clean enough to support aquatic life and provide recreational opportunities.
- Undeveloped land will provide essential ecosystem services.
- Vegetation will help prevent sediment, phosphorus, nitrogen, and contaminants from reaching lakes, streams, and wetlands.
- Rainwater infiltrates, which reduces flooding and feeds groundwater.
- Groundwater is recharged and can be used for drinking, irrigation, and to feed cold, clean water to lakes, streams, and wetlands.
- Water levels are more stable, which prevents erosion of shorelines and stream channels.
- Beautiful places exist for people to see and visit.

There is an economic value to treating natural resources in a sustainable way. Property values are higher near natural areas and open space[1]. New developments that protect natural resources using conservation design and low-impact development techniques can save an average of 24-27% in construction costs per development[2]. Damage to storm sewer outfalls, shorelines, and buildings due to flooding are reduced in such developments. In addition to the economic and recreational benefits of natural resources, for many people nature and natural resources merit protection and care due to their intrinsic value.

This natural resources plan is a guide for how Maplewood can manage natural resources in a sustainable way. It will help protect and enhance Maplewood's quality of life for current and future generations. It suggests strategies to protect, connect, restore and manage ecosystems, plant communities, and species. This plan can guide zoning and ordinances. It gives city staff and officials information to use when making annual and long-range budgets. This plan will also provide citizens with an understanding of how they can play a role in achieving these goals through wise land use and management of their property.

[1] Embrace Open Space study is at: http://www.embraceopenspace.org/EOSReport/EconomicValueofOpenSpace.pdf.
[2] EPA Low Impact Development study is at: http://www.epa.gov/owow/nps/lid/costs07/documents/reducingstormwatercosts.pdf; AES study is at: http://www.appliedeco.com/Projects/ConDevArticleLayout.pdf.

Wise use and management of natural resources is not all that Maplewood needs to be a great place to live in the 21st century: the city also needs good schools, a vital economy, and efficient public services. But healthy natural resources will help ensure that Maplewood has a high quality of life that can be sustained far into the future.

Vision and Goals for Natural Resources in Maplewood

The City of Maplewood has led the way in urban natural resource conservation in Minnesota. From a bonding referendum in 1993 to protect forests and wetlands, to a rain garden program for recharging groundwater and purifying runoff to its lakes and streams, Maplewood's citizens and elected leaders quickly adopt new ideas from scientists, businesses, and regulatory agencies. Maplewood has learned that supporting environmental laws and best practices has benefits for city residents. The city also believes that property values and the city's overall marketability will increase over time by improving natural resources and the environment.

Maplewood's desire to become sustainable depends on stewardship of its ecosystems, plant communities, and species. Good stewardship protects the functions of ecosystems and the free ecosystems services necessary for a high quality of life.

Following its tradition, the City of Maplewood holds the following vision for natural resources:

> *The City of Maplewood, in order to preserve a beautiful, functional, and varied environment for current and future residents, will protect, connect, restore and manage its ecosystems, plant communities, and species. The city will do this by using the best science and striving for the highest ecological standard.*

To realize this vision, the City of Maplewood has these goals for natural resources:

> *Natural Resources Goal 1. Protect and buffer ecosystems—forests, savannas, prairies, lakes, streams, wetlands—and other natural resources.*
>
> *Natural Resources Goal 2. Connect and enlarge natural areas and wildlife habitat.*
>
> *Natural Resources Goal 3. Restore and manage natural areas, wildlife habitat, and other natural resources for high ecological quality and for diversity of plant and animal species.*
>
> *Natural Resources Goal 4. Restore the natural ecological functions involving water by better managing stormwater runoff. This means vegetation filtering, infiltration, groundwater recharge, and maintaining stable water levels.*
>
> *Natural Resources Goal 5. Fund natural resource programs to achieve the vision and goals.*
>
> *Natural Resources Goal 6. Integrate the city's natural areas, open space, and active parks and trails.*
>
> *Natural Resources Goal 7. Incorporate the vision and goals for natural resources in the city's comprehensive plan, ordinances, policies, development standards, and zoning.*
>
> *Natural Resources Goal 8. Enhance public understanding of nature, natural systems, and environmental issues by providing programs, information, and interpretive facilities.*

Natural Resources Goal 9. Promote a culture of stewardship on public and private land through access to natural areas and education and volunteer opportunities in natural areas restoration and management.

Natural Resources Goal 10. Seek cost savings by using natural systems to provide services such as heating, cooling, stormwater management and water conservation.

The Natural Environment of Maplewood

Prior to settlement in 1851, most of Maplewood was covered by oak savanna, a plant community with scattered oak trees or oak groves and a groundcover of grasses, sedges, and wildflowers. Hazelnut, chokecherry, juneberry, nannyberry, and wild plum grew in the savanna and at wetland edges. Low, wet areas contained wet prairies, sedge meadows, and marshes. Forests grew on the Mississippi River bluffs in south Maplewood and in valleys where fires were not severe. Some forests were mainly oak and in others sugar maple and basswood mingled with oaks. Lakes were smaller at the time, and were later enlarged by excavating wetland vegetation from the shorelines.

Nearly every year the Mdewakanton Dakota Indians ignited fires in the region; the fires had burned the savannas and wetlands for thousands of years. As a result, most of the plants and animals living in the natural areas of Maplewood were residents of savannas, marshes, wet prairies, and sedge meadows. Plants and animals of forest settings lived in the small forest areas of the Mississippi bluffs and in ravines with flowing streams.

After settlement, many changes took place in Maplewood:

- Natural lands were developed with farms, houses, and businesses.
- Large savannas and forests were broken into small separated parcels.
- Remaining savannas became overgrown with trees and shrubs.
- Many wetlands were drained, excavated, and filled.
- Plant life was altered by grazing and the introduction of non-native plants.
- Trees from river floodplains seeded into uplands and wetlands.
- Erosion occurred in streams, at shorelines, and on steep slopes.
- More sediment, phosphorus, and nitrogen reached lakes, streams, and wetlands than historically.
- Some wildlife was eliminated by hunting.
- Some wildlife left or died out because there was not enough habitat to successfully breed.
- More water flowed directly into lakes, streams, and wetlands after rainstorms.
- Water levels in groundwater fell, and water levels in lakes, streams, and wetlands rose and fell more often and more quickly than historically.

One example of what these changes mean is many wildlife species are disappearing or are in decline. Generalist species, such as raccoon and deer, are species that can adapt to different types of habitat, including urban habitats. Many generalist species thrive in Maplewood. But specialist species, such as the ovenbird and Blanding's turtle, are more particular about habitat and often need large, connected habitat to persist. These species have declined, or are in danger of declining locally. Many of the species in Table 7.1 are specialists.

Table 7.1. Status of Selected Historical and Current Species in Maplewood. These species are on the Minnesota Department of Natural Resources' list of species in greatest conservation need and are found in the east Twin Cities region. The list is for illustration only and was not checked by field surveys.

Once Present, Now Gone	Possibly Present, In Decline?	Species Restored
American Woodcock	Common Mudpuppy	Bald Eagle
Black-crowned Night-heron	Brown Thrasher	Peregrine Falcon
Eastern Meadowlark	Common Nighthawk	
Red-headed Woodpecker	Eastern Wood-pewee	
Red-shouldered Hawk	Field Sparrow	
Sedge Wren	Least Flycatcher	
Trumpeter Swan	Northern Rough-winged Swallow	
Upland Sandpiper	Ovenbird	
Wood Thrush	Rose-breasted Grosbeak	
Persius Duskywing	Swamp Sparrow	
Regal Fritillary	Virginia Rail	
American Badger	Yellow-bellied Sapsucker	
Franklin's Ground Squirrel	American Brook Lamprey	
Prairie Vole	Least Weasel	
Blanding's Turtle	Common Snapping Turtle	
Gopher Snake	Smooth Green Snake	
Western Hognose Snake	Eastern Fox Snake	
	Eastern Hognose Snake	

Today, Maplewood is a patchwork of developed land and undeveloped natural areas (Figure 7.1). Maplewood has several lakes and ponds in the north, fringed by small amounts of wetland vegetation. The urban watershed that feeds the lakes provides poor water quality. There are many wetlands, but aggressive cattails and reed canary-grass cover most.

South Maplewood has large forests. The once large expanses of savanna and prairie no longer exist—remaining grasslands are small and support only a few species. Three streams—Battle Creek, Fish Creek, and Snake Creek—flow from Woodbury through Maplewood and then to the Mississippi. In places their banks are eroding and water quality is poor because the headwaters are in developed areas. Despite the problems they support a variety of aquatic insect and fish life.

There are few natural areas of high quality in Maplewood. Most have lost plant and animal species because they are small and suffer serious edge effects—invasion by non-native species, for example. However, in several places in the city there are large, continuous habitats well suited to preserving a wide variety of wildlife and plants if restored and managed. In many local habitats native plants and animals persist despite the small size of the habitat.

Maplewood faces the following challenges in managing its natural resources:

1. How to integrate a developed city and dense population with natural resource conservation.
2. How to protect and restore ecosystems in the city so that ecosystem services will continue.
3. How to retain and attract animal species that need high quality or large habitats (e.g., specialist species).
4. How to protect and restore the quality of upland and lowland plant communities, wildlife habitats, lakes, and streams.
5. How to generate funding for natural resources and associated infrastructure.
6. How to prioritize projects.

7. How to involve city residents and businesses with city staff and officials in carrying out the vision and goals for natural resources.

Natural Resources in Maplewood

The City of Maplewood intends to achieve its vision and goals for natural resources using a comprehensive approach. Maplewood's framework for protecting and managing natural resources focuses on four levels.

- *Natural Area Greenways.* Natural Area Greenways are large contiguous areas of habitat that cross ownership boundaries. They protect and expand ecosystem services and habitat. Because they are large they have the potential to provide habitat for both generalist and specialist species. Maplewood has identified four greenways.

- *Local Habitats*. Local Habitats are individual natural areas and backyard habitat connections. They serve the needs of people wanting to enjoy and learn about wild habitat near their homes and also provide ecosystem services and wildlife habitat locally. Because they are relatively small, they are typically not able to provide habitat for specialist species. Local habitats may be public or private lands.

- *Active Parks and Trails*. Active Parks and Trails connect Natural Area Greenways and Local Habitats and give people places to play sports, picnic, and bike.

- *Natural Resource Issues*. Some natural resource issues are addressed city-wide through individual programs, such as stormwater management.

Natural Area Greenways

Maplewood defines Natural Area Greenways as large contiguous areas of habitat that cross ownership boundaries. The purpose of Natural Area Greenways is to protect, connect, and restore large scale ecosystems and ecosystem services and provide habitat for species that need large natural areas. Greenways contain large natural areas, high quality plant communities and wildlife habitat, and provide a wide, continuous corridor for animal movement. In general, a corridor in a greenway should not be narrower than the habitat size for a species that needs the corridor. Scientific studies vary tremendously in their recommendations for corridor width. For Maplewood a reasonable minimum corridor width in a greenway is 660 feet (200 meters). This width tries to balance the limitations on natural resources in cities with the needs of animals that use corridors to survive. It is unlikely Maplewood will be able to achieve this minimum width throughout a whole greenway due to existing roads and development, however it is a goal to reach for where feasible.

Four Natural Area Greenways exist in Maplewood (Figure 7.2). They were selected by mapping and connecting large, better quality natural areas and avoiding major roads and watershed divides that are barriers to many species (Appendix 7.1). The two northern greenways are mostly lowland ecosystems (lakes and wetlands) north of I-94. The two southern greenways consist mostly of upland ecosystems (forests, grasslands) with small wetlands and streams south of I-94.

Greenways provide stopovers for the hundreds of bird species that migrate through Maplewood each spring and fall. But birds also use Local Habitats and backyards if food and shelter are present. Bird and insect migrants (e.g., monarch butterfly) move through Maplewood along a broad front. They may concentrate in some places due to local

geography and vegetation. The Mississippi Flyway, for example, is wider than the Mississippi River. Waterfowl, waterbirds, and shorebirds generally orient to it and use its open water in the spring while waiting for ice to melt on lakes and wetlands in the surrounding area. Once in Maplewood, these birds choose migratory stopover habitat based on size, quality, and isolation, not geographic location. Migrating songbirds from the tropics and subtropics also move on a broad front, but descend from flight elevations and move through vegetation eating insects as they journey north. As they move through Maplewood, these birds concentrate in woodlots, dense tree patches in developments, grasslands and brushland, and in the vegetated edges of wetlands and lakes. The more patches of permanent vegetation there are, the more opportunities these birds have to feed as they migrate.

1. Phalen-Casey Chain-of-Lakes

Greenway composition and regional barriers

This large, lowland greenway consists of a chain of lakes in formerly extensive wetlands. Stretching from Phalen Lake to Casey Lake, it includes Round, Keller, Gervais, Kohlman Lakes and Kohlman Creek. Most of the greenway is open water with a narrow wetland fringe. More wetlands are east of Kohlman Lake. This greenway extends into North St. Paul, Little Canada, and St. Paul.

Regional barriers to the movement of fish, freshwater mussels, crayfish, and some other aquatic life are the urban development south and west of the greenway, and the major watershed divides to the north and east. Water leaves this greenway from Phalen Lake and travels in a large storm sewer until it discharges to the Mississippi River at Mounds Park, St. Paul.

Eleven constrictions (pinch points) with greenway width of <660 feet (Figure 7.2) restrict wildlife movement in the greenway. Pinch points are mainly at road crossings (Frost Avenue at Round Lake, Highway 61 at Keller Lake, Highway 36 at Keller Lake, Highway 61 east of Kohlman Lake, west side of Hazelwood Park, and White Bear Avenue). Other pinch points are the outlet of Lake Gervais, the outlet of Kohlman Lake, a narrow wetland west of Hazelwood Park, and a drop structure at the outlet of Casey Lake.

Greenway challenges

- Reduced infiltration due to high percentage of impervious surface in the watershed causes a lower water table and reduces groundwater inflow to lakes and wetlands.
- Poor water quality in lakes and wetlands due to large amount of surface runoff from impervious surfaces and turf grass brings sediment, nutrients, and pollutants to waters.
- Narrow lake and wetland buffers reduce the filtering and cleansing effect of vegetation at the water-upland edge.
- The small size of upland habitats next to lakes and wetlands prevents some wetland animals from completing a life cycle that includes using uplands (e.g., Blanding's Turtle).
- Over-abundance of reed-canary grass and cattail degrades wetland habitat.
- Minnesota Pollution Control Agency has designated several lakes in this greenway as impaired: Kohlman, Gervais, Spoon, Keller, Round, and Phalen.

2. Holloway-Beaver Lake Wetlands

Greenway composition and regional barriers

This large, lowland greenway is more or less continuous wetland habitat from the marsh lands north of Holloway Avenue, southwest to wetlands and uplands at Priory Neighborhood Preserve, and continuing southwest along wetlands and Beaver Creek to Beaver Lake. This greenway extends into North St. Paul, Oakdale, and St. Paul.

Beaver Lake has a narrow wetland fringe. This is a historical wetland area, containing wet prairie, wet meadow, and marsh. The lowland forests with ash, elm, cottonwood, and silver maple that exist in this greenway were not here historically.

Regional barriers include a major watershed at the east edge, dense urban development in St. Paul, and minor watershed divides to the north and south. The greenway drains out of Beaver Lake and the water flows in a large storm sewer west to Phalen Creek. The movement of fish, freshwater mussels, crayfish, and some other aquatic species are restricted by these barriers.

Seven pinch points with greenway width of <660 feet (Figure 7.2) restrict wildlife movement in the greenway. Pinch points are where roads (Century Avenue, Maryland Avenue, and Lakewood Drive) and a railroad cross the greenway. The narrow wetland between Maryland Avenue and Lakewood Drive is also a pinch point.

Greenway challenges

The challenges are the same as for Phalen-Casey Chain of Lakes above.

3. Battle Creek Forests

Greenway composition and regional barriers

This large, mostly forested greenway includes Battle Creek Regional Park and connects to the Mississippi River bluffs in St. Paul. This greenway includes the Ponds at Battle Creek Golf Course, the forested portion of Highwood neighborhood, and Applewood Neighborhood Preserve. The largest, best quality forests are in Battle Creek Regional Park. Battle Creek is part of this corridor and begins in Tanner's Lake in Landfall, then flows to Battle Creek Lake in Woodbury, and then through a narrow stream valley to Battle Creek Park. This is a historical forest area of oak forest, oak-maple-basswood forest, and aspen-oak woodland.

Regional barriers around this upland greenway are the major divided highways: US61, I-494, and I-94. These highways prevent the movement of small mammals, amphibians, reptiles, and ground-dwelling insects that are an important part of the forest's food chain. They also pose a significant risk to other mammals, birds, and flying insects (e.g., butterflies, dragonflies) attempting to cross them.

Two pinch points in the continuous forest are on Battle Creek and Lower Afton Road west of McKnight Road. A pinch point in the greenway exists at Lower Afton Road between Battle Creek Regional Park and the golf course. Battle Creek is pinched where it crosses under I-94 between Tanner's and Battle Creek Lake, at the outlet of Battle Creek Lake, and at Century Avenue. Only two pinch points are within the City.

Greenway challenges

- The large forests are far from each other and connected by poor quality corridors.
- Development at the edges of the large forests affects habitat quality inside the forests. Edge effects shrink the actual size of interior forest habitat, reducing breeding area for forest songbirds (e.g., warblers, vireos) and other forest animals.
- Low quality forest habitat is due to over-abundance of European buckthorn and invasion by other non-native plants (e.g., garlic mustard).
- Groundcover plants, trees, and shrubs were affected by cattle grazing in the past, and are today affected by abundant white-tailed deer. Grazing and browsing affects some plant species but not others, reducing forest plant diversity.
- The forests were protected from severe fires historically, but not from all fire.
- Feral and free-roaming cats affect small mammal populations and shrub nesting birds.

- Two- and four-lane roads inside the greenway prevent movement of some species.
- The challenges described for the lowland greenways affect Battle Creek, a mostly developed 11.4 square mile watershed. Battle Creek is a typical urban stream, with very low flows at times and with very high flows after rainstorms[3], but water quality and aquatic life are fair to good.

4. Fish Creek Forests

Greenway composition and regional barriers

This large, mostly forested greenway includes four units of Ramsey County's Fish Creek Open Space. It is at the north end of a large, mostly forested greenway that includes forests in Newport, St. Paul, and Cottage Grove. Fish Creek is part of this corridor and begins at Carver Lake in Woodbury, then flows through the Fish Creek Open Space and beneath I-494 and US61 to the Mississippi River. A smaller creek, Snake Creek, begins in the Bailey Nursery grounds and also flows to the Mississippi. This is a historical forest area of oak forest, oak-maple-basswood forest, and aspen-oak woodland.

A portion of this greenway is in the Mississippi River Critical Area and the Mississippi National River and Recreation Area. The Critical Area was designated and established by two governors and the Metropolitan Council between 1976 and 1979. Executive Order 79-19 requires that municipalities and agencies coordinate planning and management in the Critical Area using common guidelines[4]. In 1991 the legislature made the National River and Recreation Area (part of the National Park Service) a critical area under Minnesota Statutes, Chapter 116G. The legislation also made the boundaries of the Critical Area and the National River and Recreation Area the same.

Regional barriers to this upland greenway are the major divided highway I-494 and development to the east in Woodbury. These barriers prevent the movement of small mammals, amphibians, reptiles, and ground-dwelling insects that are an important part of the forest's food chain. The highway poses a significant risk to other mammals, birds, and flying insects (e.g., butterflies, dragonflies) attempting to cross it.

The main pinch points in the continuous forest are near Sterling Street at I-494 and on the Bailey property.

Greenway challenges

- The challenges are the same as the challenges for Battle Creek Forests above.
- Loss of private land to development will decrease the amount of natural land in this greenway.
- Unwise development may degrade habitat.
- Developers and landowners are often not knowledgeable about or are not receptive to conservation design strategies.
- Fish Creek and Snake Creek are reported to have eroding banks and beds.

Local Habitats

Local Habitats are individual natural areas and backyard habitat connections (Figure 7-3). The purpose of Local Habitats is to protect, buffer, and manage small, isolated wild habitats and protect local ecosystem services outside the Greenways. Local Habitats will be difficult to enlarge and connect and will usually benefit generalist species but

[3] See Met Council monitoring reports for 2001 and 2003 at:
http://www.metrocouncil.org/environment/Riverslakes/Streams/Reports/Battle.pdf,
http://www.metrocouncil.org/environment/RiversLakes/Streams/Reports/2003_Report/03Battle.pdf
[4] For guidelines see: http://files.dnr.state.mn.us/waters/watermgmt_section/critical_area/execord.pdf.

not specialist species. These lands may be private or public. Private lands are included to show the natural resources that exist in the city. These private lands are not open for public use and these sites may be developed someday. Many of the public sites provide access and opportunities for people to enjoy and learn about wild habitats.

Local Habitats include:

- Some Maplewood Neighborhood Preserves;
- Natural areas within active parks;
- Neighborhoods that have contiguous backyard habitat;
- Natural areas that are used for stormwater management;
- County and city open space sites that have natural vegetation;
- Private sites that have natural vegetation.

Two Local Habitats are significant because of their size and arrangement.

3M Lake Wetlands

This is the largest concentration of Local Habitat in Maplewood. It contains 3M Lake and wetlands identified by the Minnesota Department of Natural Resources as regionally significant. It is at the top of a watershed and runoff comes from nearby. This improves chances to manage runoff and protect or restore water quality in the lake and wetlands.

Highwood-Vista Hills Wetlands

The Highwood and Vista Hills neighborhoods are unique in Maplewood due to the dozens of small, kettlehole wetlands formed by the glaciers melting in place here (i.e., an ice-stagnation moraine). It is at the top of a watershed and runoff comes from nearby lawns, driveways, and streets. This improves the chances to manage runoff and protect or restore water quality in the wetlands. The Highwood-Vista Hills Wetlands overlap with the Battle Creek Forest Greenway. Small forested wetlands provide excellent habitat for frogs and other aquatic life.

Local Habitat Challenges

- Small habitats are affected more than large habitats by edge effects. Edge effects include invasion by non-native plants (e.g., European buckthorn, garlic mustard) and animals (e.g., European Starling, House Sparrow) and predation on wildlife by feral and free-roaming cats.
- Many native species do not survive in small habitats for very long because they have small populations, and small populations can easily go extinct.
- Small habitats can be over-used by people because the impacts are concentrated in a small area. In small habitats vegetation is easily trampled and lost, erosion is quick to start, and dumping of trash, lawn clippings, leaves, and debris often happens.
- Small lakes and wetlands are easily polluted because the runoff from impervious surfaces and turf grass is large and overwhelms the ecosystem's ability to absorb and treat it. When they are at the top of a watershed, small lakes and wetlands tend to have better water quality because less runoff reaches them.

Active Parks and Trails

The purpose of active parks and trails is to provide easy access for people's recreational enjoyment. These places provide fewer ecosystem services than greenways and Local Habitats because they usually have turf grass, compacted soils, and impervious surfaces, and are poor wildlife habitat. However, some parts of active parks, trails, and golf courses could be used to expand habitat and reduce edge effects in greenways and Local Habitats. In

addition, areas within active parks that are not needed for active recreation may be restored to native plant communities. The Parks Chapter of the Comprehensive Plan covers parks in detail.

Challenges in Active Parks and Trails

- It is necessary to understand which parts of active parks and trails have an effect on greenways and Local Habitats, positive and negative.
- Some specialist wildlife is disturbed by human activity. This is more important in greenways than in Local Habitats.
- Wheels, shoes, dogs, and wildlife spread seeds of non-native plants to natural areas (e.g., garlic mustard).
- Maintenance activities in parks and along trails can affect greenways and Local Habitats. Herbicide drift is one example.

Special Natural Resource Issues

Some natural resources issues are widespread in the city and are addressed by topic through city-wide programs. Existing programs include:

- Stormwater Management Program;
- Maplewood Tree Program;
- Buckthorn Management Program.

Additional programs should be established to address natural resources issues such as:

- Invasive plants and animals (other than buckthorn);
- Wetland buffer improvements;
- Sustainable landscaping and yard care;
- Toxic waste sites;
- Impaired waters. Minnesota Pollution Control Agency has designated the following Maplewood Lakes as impaired: Kohlman, Gervais, Spoon, Keller, Round, Phalen, Wakefield, and Beaver;
- Stream restoration.

This natural resources plan provides a new framework for protecting natural resources in Maplewood. It addresses regional, city-wide, neighborhood, and site levels. It encompasses both public and private lands. This comprehensive approach will enable Maplewood to protect and manage natural resources. Implementation strategies are discussed in the following section.

Implementation Strategies for Natural Resources

The city's present and future residents will benefit by using Maplewood's natural resources in a sustainable way. The city's reputation and its quality of life will be enhanced, residents and visitors will see beauty and variety in the environment, and healthy ecosystems will provide services and benefits that keep the city's lakes and streams clean and its wildlife populations diverse.

This is a large vision with many ambitious goals for protecting, restoring and managing natural resources in the city. It will take many years of discussion, planning, budgeting, and other work to make it a reality.

The implementation plan for natural resources has the following strategies. The city will need to review and update the plan as priorities and resources change, as new strategies and opportunities arise, and as staff and officials learn about new approaches to sustainability.

Education

- Educate residents about nature, natural resources, and protection and management of resources.
- Adopt both city-wide and neighborhood-based educational programming.
- Give annual progress report to city council and the community.
- Organize public tours of the greenways and Local Habitats.
- Develop educational materials and create a natural resources page on the city's website. Post natural resources plan, maps of greenways and Local Habitats, brochures, technical information for stewardship work by residents, etc.
- Present workshops to explain the natural resources plan. Answer questions: What are greenways and Local Habitats, why are they needed, where are they, and how do they affect residents?
- Develop programs and events to involve citizens in monitoring and conducting species inventories. Maplewood currently has citizen-monitoring programs for bluebirds, frogs, and for the Neighborhood Preserves. Develop additional citizen-based inventory and monitoring programs to gather information throughout the year. In addition, consider hosting events such as "BioBlitz Day" to involve citizens in inventorying species on a single day.
- Provide training on natural resources management for staff.
- Collaborate with area schools to educate students on the local natural resources.

City Planning and Zoning

- Integrate natural resources (e.g., greenways and Local Habitats) into the city's comprehensive plan, zoning, ordinances, development review, daily operations, capital budgeting, and bonding initiatives.
- Investigate options to encourage preservation and management of Natural Area Greenways such as educational programs, zoning overlays, or incentive programs for private landowners to adopt certain approaches to construction and land treatment that improve natural resources in the greenway.
- Modify the city's operating procedures and annual budgets to implement feasible strategies identified above.
- Hold brain-storming sessions with city leadership to identify strategies for implementing the natural resources plan. Discussion should focus on three things: 1) integrating all public lands, across all uses and owners; 2) integrating the public and private use of land and waters, where feasible; and 3) integrating the existing stormwater infrastructure and management approach with the vision for natural resources. Ideas for stormwater may include:

- *Wetland and Floodplain Buffers.* Set water quality buffer width using best available science and incorporate in city ordinances and standards.
- *Stormwater Utility.* Incorporate in the city's stormwater utility the locations for stormwater management that benefit greenways and Local Habitats. Implementation is ongoing, but focus should include regional view and the integration of greenways and Local Habitats.
- Update the city's zoning and ordinances to implement win-win strategies such as:
  - *Conservation Design Ordinance.* Create an ordinance or zoning overlays that encourage low impact development and conservation design practices. Examples include City of Lino Lakes, rural residential cluster development ordinance of Chisago City and Marine on St. Croix, and St. Croix County, WI. Examples of conservation development designs and approaches are widely available.[5] This type of ordinance preserves large natural areas, manages stormwater ecologically, minimizes land clearing and grading, reduces infrastructure costs (sewers, curb and gutter, irrigated turf grass, pavement extent, utility run lengths), and promotes stewardship of natural resources. Incentives to landowners might include accelerated permitting, exemptions, and increased housing density.
  - *Alternative Stormwater Standards.* This tool is part of a conservation design ordinance or can stand alone. Its focus is to promote low impact development practices for stormwater management, and integrate those practices with existing stormwater management infrastructure operations and maintenance. Many examples of low impact practices exist, such as rain gardens, bioswales, porous pavement, and narrow streets.[6]

Protection and Restoration

Inventory and Evaluate Natural Resources

- Conduct land cover inventory for city using Minnesota Land Cover Classification System (MLCCS). At a minimum, MLCCS should be done for the greenways and for all city-owned Local Habitats.
- Identify parcels with high ecological quality that need protection.
- Identify areas in active parks that could be restored to natural habitat.
- Identify locations in active parks, golf courses, and recreational trails that are part of greenways and Local Habitats and their buffers.
- Identify locations in active parks, golf courses, and recreational trails useable for alternative, ecological stormwater management. These areas can manage runoff from the parks, golf courses, and trails, or can intercept and manage runoff from other land.
- Identify other locations on public land (e.g., school property, county land, City Hall) that benefit greenways and Local Habitats.
- Assess natural resources city-wide, identify opportunities, and prioritize conservation and management initiatives.

Protect Natural Areas

- Develop and adopt a land protection plan for Fish Creek Forests Greenway using strategies outlined in this section and the section below on Protect Natural Areas on Private Land.

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[5] Applied Ecological Services: http://www.appliedeco.com/ConservationDev.cfm; Urban Land Institute: http://minnesota.uli.org/Content/NavigationMenu18/ConservationDesign/ConservationDevelopmentFramework.pdf

[6] Low Impact Development Center, Inc.: http://www.lowimpactdevelopment.org; National Stormwater Center: http://www.stormwatercenter.org; USEPA NPDES Stormwater Program: http://cfpub.epa.gov/npdes/stormwatermonth.cfm; Minnesota Erosion Control Association: http://www.mnerosion.org; Applied Ecological Services: http://www.appliedeco.com/StormWaterMgt.cfm.

- Pursue protection options initiated in 2007-2008 for city-owned parks and natural areas, including: ordinances, no-net loss policy, zoning, conservation easements, and Comprehensive Plan. The Comprehensive Plan should define special land use conditions for the Maplewood Neighborhood Preserves, active parks, and other city open spaces. The Comprehensive Plan should also define conditions and policies such as no-net loss in Neighborhood Preserve acreage.
- Convene a budgeting session with city leadership to identify the strategies to fund protection and restoration of greenways, Local Habitats, and their buffers. Budget for the 5-year and longer term planning horizons. Strategies include:
  - *Park Dedication.* Transfer dedications from other parts of city to greenways and Local Habitats. Increase amount of park dedication required.
  - *Grants.* Seek grants for greenways. (E.g., Minnesota Department of Natural Resource's (MNDNR) Regional Park or Natural and Scenic Areas grant with 40% match for Regional Park or 50% for Natural and Scenic Areas[7]. MNDNR Environmental & Conservation Partnerships Grant program for up to $20,000, with 50% municipal in-kind/cash match.)
  - *Private Easements.* Encourage private landowners to enter into conservation easements with a group such as Minnesota Land Trust.
  - *Donation of Land or Easement.* Seek donation of land or donation of conservation easement. Trust for Public Land can be intermediary. Donations can reduce federal and state taxes. Identify key messages and incentives to landowners on tax benefits of donation.
  - *Acquisition.* Consider a bonding initiative for greenway and Local Habitat acquisition[8].
  - *Collaboration.* Collaborate with adjacent communities, county, and agencies in development and implementation of plans for Natural Area Greenways.

Protect Natural Areas on Private Land

Protecting natural areas on private land is complicated and requires a willing landowner. Each property needs a different approach. Implementing the natural resources plan will lay the groundwork for approaching landowners with ideas for protecting natural areas in greenways and Local Habitats. There are several tools for approaching landowners:

- Educate landowners about the resources on their particular site and in their neighborhood.
- Provide stewardship training to residents.
- Encourage landowners to enter into conservation easements with a group such as Minnesota Land Trust.
- Develop incentives for landowners to donate conservation land to city.
- Adopt zoning and development ordinances with incentives to protect open space.

Natural Resources Management Plans

- Develop and implement management plans for Natural Area Greenways and city-owned Local Habitats.
- Develop and implement site-specific management plans for each Maplewood Neighborhood Preserve.
- Develop and implement management plans addressing city-wide management issues such as invasive species.
- Develop and implement a Maplewood Tree Plan to cover boulevard trees, park trees, woodlots and forests.
- Modify park and trail operations to adopt environmentally friendly maintenance practices and to minimize edge effects to nearby greenways and Local Habitats.

[7] See http://www.dnr.state.mn.us/grants/land/natural_scenic.html
[8] See http://conservationcampaign.org

City-wide Natural Resources Issues

Stormwater Management

- *Alternative Stormwater Standards.* Discussed above.
- *Identify Target Locations.* Complete a study to identify and prioritize areas with existing conditions that create problems for downstream lakes, streams, and wetlands in the city.
- *Blue Stormwater Program for Existing Developments.* Create a program to deliver technical advice and assistance about low impact retrofit practices to improve ecosystem services involving stormwater (vegetation filtration, infiltration, recharge, and water level stability). These include rain gardens, bioswales, infiltration plantings (e.g., butterfly and botanical gardens, prairies), tree boxes, created wetlands, cisterns, and many more practices.
- *Inspection of structures.* Continue city's inspection program, which inspects all stormwater pollution control devices annually.

Street and Boulevard Design and Maintenance

- Investigate alternative road de-icing options. Options range from new formulations of calcium chloride to a solution containing sugar beet juice.
- Sweep streets on annual schedule. Currently the city sweeps most streets two times per year; streets in sensitive areas are swept more often.
- Identify erosion-prone street shoulders at lakeshores, streams, and wetland edges and take corrective action. This is being implemented, and will include a focus on Natural Area Greenways and Local Habitats.
- Develop guidelines for environmentally friendly street design such as plantings in cul-de-sac center islands, tree boxes in boulevards, and innovations such as Portland's Green Street program[9].
- Develop pedestrian and bicycle-friendly street designs.

Urban Tree Management

- Develop and implement an Urban Tree Management Plan for the city that addresses boulevard trees, park trees, and woodlands.
- Monitor tree disease and pest outbreaks and implement control program (Dutch elm, oak wilt, emerald ash borer, etc.). Expand to include other diseases and pests as they occur.
- Consider adapting the Minnesota Forest Stewardship whole-site planning model for the city[10].

Non-native Invasive Species Management

- Educate city staff and residents on threat of invasive species and management options.
- Develop a volunteer program to help monitor city-owned land for new invasions.
- Partner with adjacent cities and agencies in controlling invasive species regionally.
- Monitor developments in control methods for buckthorn, garlic mustard, reed canary-grass, Siberian elm, and other target species and revise outreach materials as needed.

[9] See http://www.portlandonline.com/BES/index.cfm?c=44407&
[10] http://na.fs.fed.us/stewardship/index.shtm

Urban Wildlife Management

- Educate residents about the value and stewardship of urban wildlife.
- Participate in Ramsey County's deer management program.
- Explore options to reduce populations of bird and mammal species that compete with or prey on native songbird populations (feral and free-roaming cats, raccoons, starlings, house sparrows, crows and grackles, etc.).

Mississippi River Critical Area Corridor and the Mississippi National River and Recreation Area

- Update city's planning, development review, zoning and ordinances to be consistent with guidelines for these areas.
- Identify parcels of land in these areas that have high ecological quality and need protection.
- Educate landowners in these areas about the designations and what they mean.

Implementation Schedule for Natural Resources Plan

The Natural Resources Plan proposes a new approach to managing Maplewood's natural resources. One of the first steps in achieving the goals is to gain a better understanding of Maplewood's resources. To do this, the implementation plan recommends that Maplewood conducts a land cover classification survey of the whole city. This work will lay the foundation for planning and management. It should be completed before the city attempts to prioritize protection and restoration projects. Therefore, the implementation schedule focuses on planning, not on specific restoration and management projects.

Category	Date	Key Activities	Cost Estimate
Planning	2009	1. Develop policies, zoning, and ordinances to implement natural resources plan	Staff
		2. Develop land protection strategies for south Maplewood	Staff
		3. Determine staffing needs for implementation of natural resources plan	Staff
		4. Determine role of Environmental and Natural Resources Commission (ENR) in implementation of Natural Resources Plan	Staff, ENR
		5. Conduct MLCCS inventory for entire city ($10,000 grant received)	$25,000
		6. Assess and prioritize protection and management projects	Staff
		7. Develop funding strategies	Staff
		8. Develop Maplewood Tree Plan	Staff
	2010	1. Develop management plan for each greenway	$40,000
		2. Develop general management plan for Local Habitats	$10,000
	2010+	1. Develop individual management plans for individual Neighborhood Preserves when funding is available to begin restoration at site	$30,000 total
		2. Develop programs that address natural resources city-wide (ex: wetland buffers, sustainable landscaping)	staff
Education, Outreach, Community Engagement	2008-2009	1. Develop natural resources workshop focusing on protection and stewardship of neighborhood resources	$5,000 grant
		2. Present natural resources workshop in four neighborhoods (two in 2008, two in 2009)	Staff
		3. Enhance natural resources section of website	Staff
		4. Present community-wide programs on sustainable landscaping and natural resources	Staff
		5. Conduct "BioBlitz" for one site	Staff
		6. Develop strategies for citizen-based inventory and monitoring programs	Staff
	2010	1. Present natural resources workshop for four neighborhoods	Staff
		2. Present community-wide programs on sustainable	Staff

		landscaping and natural resources 3. Conduct "BioBlitz" for one site 4. Implement one new citizen-based inventory or monitoring program	 Staff Staff
	2011	1. Present natural resources workshop for four neighborhoods 2. Present community-wide programs on sustainable landscaping and natural resources 3. Conduct "BioBlitz" for one site 4. Implement one new citizen-based inventory or monitoring program	Staff Staff Staff Staff
	2012	1. Present community-wide programs on sustainable landscaping and natural resources	Staff
	2013	1. Present community-wide natural resources programs	Staff
Restoration and Management	2009-2013	See Parks Chapter for restoration and management projects at Neighborhood Preserves. Natural resources management activities are contingent upon assessment and prioritization which is scheduled for 2009 (after MLCCS data compiled).	Staff
Land Protection and Acquisition	2009	1. Develop policies, zoning, and ordinances that help protect natural lands	Staff/ENRC
	2009-2013	1. Acquire non-buildable land for preservation 2. Acquire buildable land for preservation (Cost-share grants available for land in Mississippi Critical Area) 3. Acquire land through donation	$25,000-$100,000/acre $100,000-$300,000/acre $10,000/transaction
		General costs for restoration and management:	Per acre
		Buckthorn removal	$1000-$10,000
		Prairie restoration (including three years management)	$4000-$8000
		Woodland restoration	$2000-$20,000
		Wetland restoration	$2000-$8000
		Yearly maintenance of restored areas	$100-$250

5. Figures

6. Tables

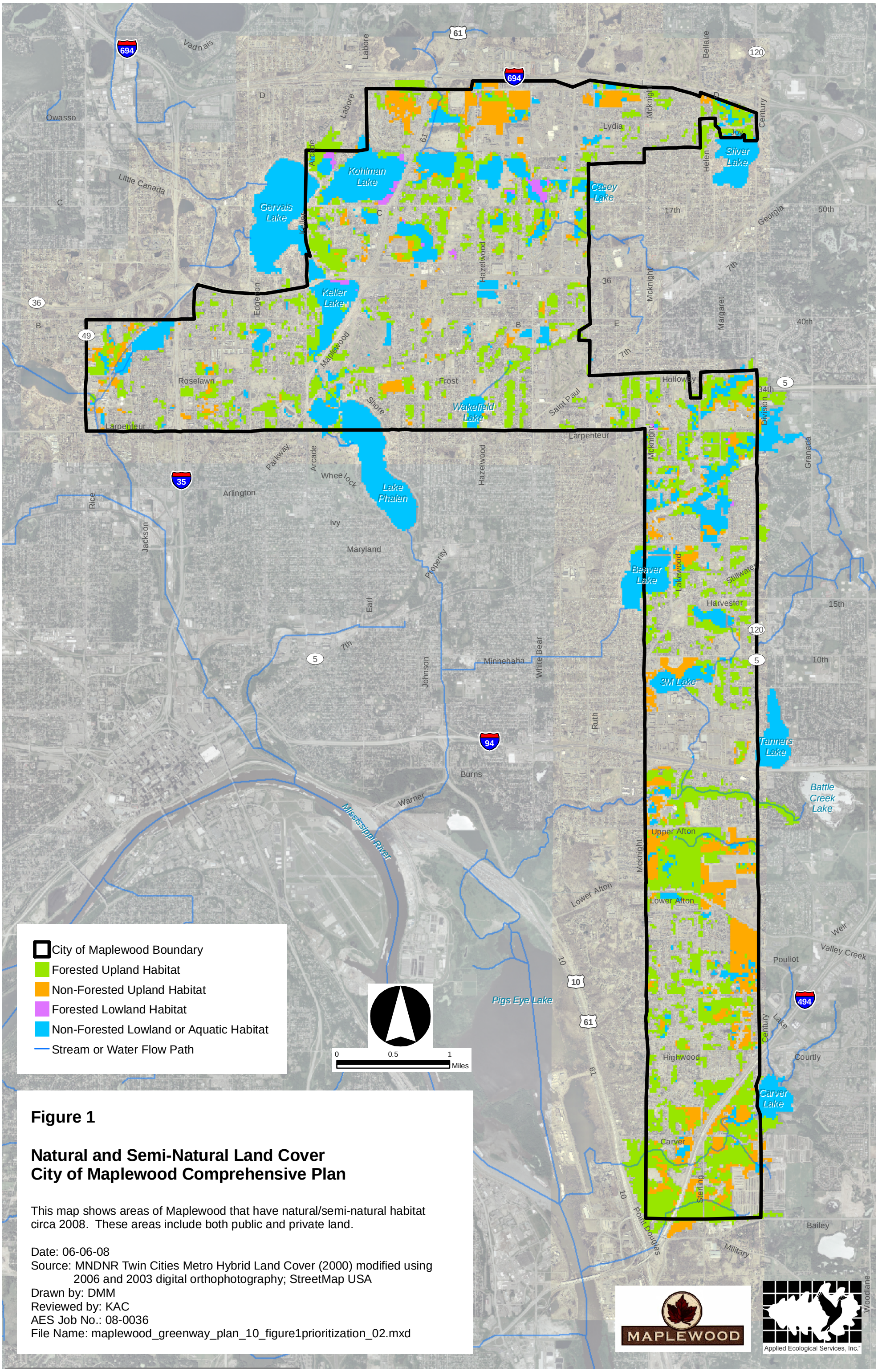

Figure 1

Natural and Semi-Natural Land Cover
City of Maplewood Comprehensive Plan

This map shows areas of Maplewood that have natural/semi-natural habitat circa 2008. These areas include both public and private land.

Date: 06-06-08
Source: MNDNR Twin Cities Metro Hybrid Land Cover (2000) modified using 2006 and 2003 digital orthophotography; StreetMap USA
Drawn by: DMM
Reviewed by: KAC
AES Job No.: 08-0036
File Name: maplewood_greenway_plan_10_figure1prioritization_02.mxd

Phalen-Casey Chain-of-Lakes

Holloway-Beaver Lake Wetlands

Battle Creek Forests

Fish Creek Forests

City of Maplewood Boundary
Natural Area Greenway
Upland System Constriction
Lowland/Aquatic System Constriction
Lake
Stream or Water Flow Path

0 0.5 1 Miles

Figure 2

Natural Area Greenways
City of Maplewood Comprehensive Plan

Natural Area Greenways include both public and private land.

Date: 06-06-08
Source: 2006 and 2003 digital orthophotography; City of Maplewood base data; StreetMap USA
Drawn by: DMM
Reviewed by: KAC
AES Job No.: 08-0036
File Name: maplewood_greenway_plan_10_figure2natlareagreenways_02.mxd

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3M Lake Wetlands

Highwood-Vista Hills Wetlands

City of Maplewood Boundary
Local Habitat
Local Habitat Concentration
Neighborhood Preserve
Lake
Stream or Water Flow Path

0 0.5 1 Miles

Figure 3

Local Habitats
City of Maplewood Comprehensive Plan

Local Habitats include both public and private land.

Date: 06-09-08
Source: 2006 and 2003 digital orthophotography; City of Maplewood base data; StreetMap USA
Drawn by: DMM
Reviewed by: KAC
AES Job No.: 08-0036
File Name: maplewood_greenway_plan_10_figure3localhabitats_02.mxd

MAPLEWOOD

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City of Maplewood Boundary
Natural Area Greenway
Local Habitat
Local Habitat Concentration
Neighborhood Preserve
City Park
Existing Regional Trail
Existing Road Trail
Existing Walking Path
Mississippi River Critical Area
Mississippi National River and Recreation Area
Lake
Stream or Water Flow Path

0 0.5 1 Miles

Figure 4

Natural Resources Plan Map
City of Maplewood Comprehensive Plan

Natural Area Greenways and Local Habitats include both public and private land.

Date: 04-28-08
Source: MNDNR Twin Cities Metro Hybrid Land Cover (2000); 2006 and 2003 digital orthophotography; City of Maplewood base data; StreetMap USA
Drawn by: DMM
Reviewed by: KAC
AES Job No.: 08-0036
File Name: maplewood_greenway_plan_10_figure4natlresourcesplan_02.mxd

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