

10. PROTECTED RESOURCES

Goal: Preserve, protect, and restore the community's natural resources, including open spaces, lakes, wetlands, other significant natural features, and historic resources.

To achieve this *protected resources goal*, the following policies are proposed:

- Identify and work to protect the sensitive natural resources within the City.
- Develop or enhance regulations to protect the City's natural resources, including trees, lakes, wetlands, and other unique or significant natural resources.
- Work with the appropriate agencies to assure that surface and ground water quality is protected.
- Support public educational opportunities to foster a better understanding of the natural environment as well as ways to restore and protect the natural environment.
- Work with the Arden Hills Army Training Site (AHATS) to protect the unique natural resources and open spaces as park and/or open space.
- Encourage the identification and protection of historically significant sites and structures.

10.1 INTRODUCTION

The beautiful lakes, diverse topography, and wooded character of Arden Hills provide exceptional residential, recreational, and business environments. The community has carefully guarded these resources in the past; however, they are constantly threatened by human activities. Protecting these areas requires diligence, including adherence to strong protection policies and requirements, studying the most up-to-date preservation methods, and educating the public on environmentally sound development and maintenance practices.

Lakes are a significant resource in the City and will continue to be if water quality can be enhanced and maintained. Lakes and their surrounding watersheds need to be managed as sensitive and limited resources, requiring purposeful planning and action. The lack of management of these limited resources can lead to diminished water quality and can negatively affect public health, recreational activities, wildlife, and fishing, community quality of life, and ultimately tax revenues through diminished property values.

Arden Hills is located entirely within the Rice Creek Watershed District (RCWD). The RCWD addresses water issues, administers regulatory programs, and undertakes projects to improve water quality. The City has a number of protective ordinances and policies in place that enhance RCWD activities; however, those policies require

monitoring to ensure that they are meeting community needs and effectively protecting the City's natural resources.

In addition to lake protection, several high-priority natural areas, endangered and protected species, and historic sites have been identified as significant in the City. These significant resources are highly valuable and have features that may require special levels of protection. Preserving the City's natural setting is of the utmost importance to residents of Arden Hills.

10.2 WATER RESOURCES

Covering nearly 550 acres in Arden Hills, the seven lakes and many wetlands have always been a focal point in the community (Figure 10.1). Early settlers and development took advantage of the recreational and scenic qualities of the lakes, and they continue to be an attractive characteristic for residents and visitors. Most of the shoreland development took place prior to the adoption of modern development regulations; and the City is experiencing redevelopment pressure along the City's shorelines.

The Minnesota Department of Natural Resources (DNR) requires communities to adopt shoreland ordinances, which typically regulate lot size, minimum shoreline width, lot coverage, and structure setbacks for development along water bodies. Development regulations vary depending on the lake classification set by the DNR:

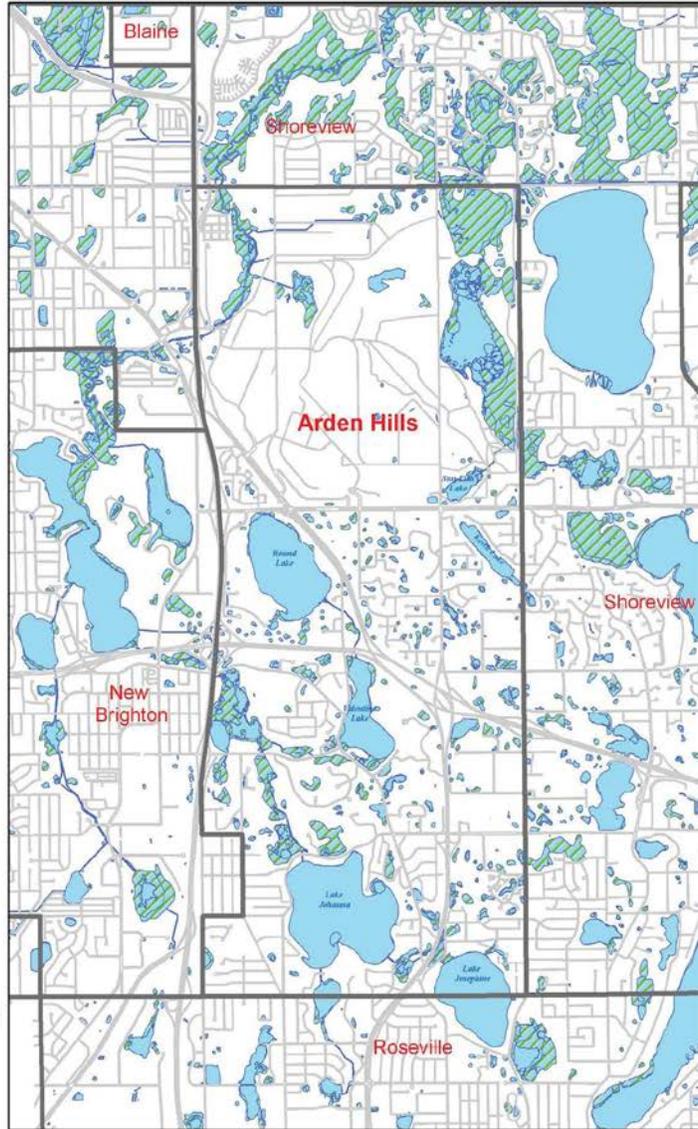
- Natural Environment Lakes and Streams (NE) – usually have less than 150 total acres, less than 60 acres per mile of shoreline, and less than three dwellings per mile of shoreline. They may have some winter kill of fish; may have shallow, swampy shoreline; and are less than 15 feet deep.
- Recreational Development Lakes (RD) – usually have between 60 and 225 acres of water per mile of shoreline, between three and 25 dwellings per mile of shoreline, and are more than 15 feet deep.
- General Development Lakes (GD) – usually have more than 225 acres of water per mile of shoreline and 25 dwellings per mile of shoreline, and are more than 15 feet deep.

10.2.1 Lakes and Water Bodies

As noted above, the City has seven lakes in or partially in Arden Hills. All water bodies in the City are highly valued and warrant continued protection.

Lakes and Wetlands

Figure 10.1



2030 Comprehensive Plan Update
Map Approved:
September 28, 2009

Source: City of Arden Hills,
Metropolitan Council

 City of Arden Hills
Comprehensive Plan Update

Heinington Koegler Group, Inc. 

Lake Johanna

Lake Johanna is the biggest lake in Arden Hills at 230 acres with a 4.25 square mile watershed. It is up to 41 feet deep and has an average depth of 17 feet. The lake is classified as a GD lake.

The land on the north, west, and east sides of Lake Johanna is largely developed with single family homes. Tony Schmidt Regional Park, located on the northwest side of the lake, includes a swimming beach and boat ramp. Presbyterian Homes, a senior housing facility, is located on the southwest corner. Northwestern College occupies the peninsula on the southern side of the lake.

A wide variety of recreational opportunities exist on Lake Johanna, including swimming, skiing, and fishing. Boats are restricted to five miles per hour within 250 feet of the shoreline, and there are restricted hours for speeds in the rest of the lake. A wide variety of fish exist in the lake, including Bass, Bluegills, Bullheads, Carp, Crappies, Muskies, Northern Pike, Perch, Sunfish, and Walleye.

Storm water flows into Lake Johanna from Little Lake Johanna via Ramsey County Ditch 4, which originates north of County Road C in Roseville. City storm water is also routed into Lake Johanna on its west and east sides. As part of the City's pavement management program, the City is working to provide stormwater treatment systems to improve the water quality of the stormwater that reaches Lake Johanna.

The Lake Johanna Improvement Society is an organization made up of lake area property owners. The group coordinates lake issues with the City, including the boat speed limits.

The Rice Creek Watershed District has noted that Lake Johanna has the potential to become impaired without additional protection and attention to water quality. The lake is listed on the impaired list for mercury contamination. Although the source and long-term impacts are unknown, fish in Lake Johanna were found to have elevated levels of the chemical perfluorooctane sulfonate (PFOS) in 2007. No additional fish consumption or swimming warnings have been issued.

Lake Josephine

Lake Josephine is approximately 114 acres in size with a subwatershed of 1.31 square miles. The northern 60 acres are located in Arden Hills while the southern 54 acres are located in the City of Roseville. The lake has a maximum

depth of 44 feet and an average depth of 20 feet. Lake Josephine is classified as a GD lake.

The land around the lake is fully developed with single family homes. There is a concrete boat access and public beach immediately south of the municipal border in the City of Roseville on the east side of the lake. The lake is used for boating swimming, and fishing. Bullheads, Crappies, Bluegills, Carp, Sunfish, Bass, Northern Pike, and Walleye can be found in the lake.

The outlet of Lake Josephine is located at the northwestern part of the lake and flow to Lake Johanna through a storm sewer and ditch system.

The Lake Josephine Improvement Association consists of lake area property owners. The City of Roseville and the City of Arden Hills have adopted joint regulations for Lake Josephine, which includes a maximum speed limit and a no wake zone of 150 feet from the shoreline.

The Rice Creek Watershed District has noted that Lake Josephine has the potential to become impaired without additional protection and attention to water quality. The lake is listed on the impaired list for mercury contamination.

The fish in Lake Josephine were tested for perfluorooctane sulfonate (PFOS) in 2007; however, the results of those tests were not available in time for the release of this Plan.

Little Johanna Lake

Little Johanna Lake is approximately 18 acres in size and has a maximum depth of 22 feet. The lake is classified as an NE and RD lake by the DNR and Ramsey County, but as a GD lake by the City. It is a non-swimming lake, there are no formal public access points, and recreational uses are limited.

The northern eight acres are within the City of Arden Hills, and the southern ten acres are within the City of Roseville. Northwestern College occupies much of the lake's eastern, northern, and southern shoreline and single family homes are on the west side of the lake.

Drainage into Little Johanna Lake comes from Ramsey County Ditch 4, which originates north of County Road C in the City of Roseville and flows out to Lake Johanna. Little Johanna Lake and the ditch function as a settling area for stormwater prior to flowing into Lake Johanna. During larger storm events, however, water flows through the water bodies rapidly, which allows little time for

unwanted nutrients to settle out of the water. As a result, the quality of Little Johanna Lake and Lake Johanna are compromised.

Valentine Lake

Covering approximately 74 acres with a 2.4 square mile watershed, Valentine Lake is an NE lake located just south of Interstate 694. Bethel University owns almost all of the lakeshore; however, the lake can be viewed from Old Highway 10 along the western shoreline. While there is not any formal boat or public access points, the lake is used for fishing by the public. In the future, it may be necessary to develop a formal agreement with Bethel University for public use and a parking lot for users.

The lake has a dominance of blue-green algae and has heavy algal blooms throughout the summer. Water flows southwest out of Lake Valentine into the County Ditch 12 and eventually into Long Lake in the City of New Brighton.

Round Lake

Round Lake is approximately 125 acres in size and has a subwatershed of 0.83 square miles. The United States Fish and Wildlife Service owns all of the land around the lake. Public use of the lake is prohibited and there are not any public access points due to contamination in the lake bed from operations on the former Twin Cities Army Ammunition Plant (TCAAP) property. There are single family homes on the east side of the lake, apartments and townhomes on the southeast side, and industrial development on the south and west sides. The north side of the lake is bordered by Highway 96. None of the adjacent property owners have access to the lake.

Karth Lake

Karth Lake is approximately 15 acres in size and is surrounded by single family homes. There is a City park on the south side of the lake; however, there are not any public boat launches to the lake.

Rice Creek Watershed District is conducting water quality monitoring for the lake. The immediate area drains into the lake, and there are also five (5) stormwater inlets draining approximately 170 acres to the lake. Prior to 2004, there was not an outlet for Karth Lake, and the water level steadily increased. The Karth Lake Improvement District was created in 2003 to manage the water level, and a pump was constructed in 2004 to control the lake level. Water that is pumped out of the lake flows through storm sewer and ditch systems to Valentine Lake.

Sunfish Lake

Located on the AHATS property, Sunfish Lake is approximately 11 acres in size. No water quality monitoring has been conducted for the lake. City Hall is southeast of the lake, and the joint Ramsey County/Arden Hills Public Works facility is west of the lake. There is not any residential development around the lake. The lake is not accessible to the public, and public access is not anticipated because the land is owned by the federal government and used for Minnesota National Guard training.

Marsden Lake

Covering more than 275 acres, Marsden Lake is a large wetland complex (wet meadow) that has been identified by the Minnesota DNR as an important natural community. The entire lake is within the federally owned property that is leased by the Minnesota National Guard. There are not any public access points to the lake. The lake is part of the critical habitat for the Blanding's Turtle, which is classified as "threatened" by the State of Minnesota.

Rice Creek

Rice Creek flows through the far northwest corner of the City and is the only natural watercourse in the City. There are a number of County drainage ditches connecting the major lakes and providing connections to Rice Creek.

Approximately 112 acres of land was transferred to Ramsey County along the creek, and the Rice Creek North Regional Trail has been constructed. The trail connects to adjacent cities, the regional park system, and likely to the TCAAP redevelopment property.

Wetlands

Arden Hills has many wetlands of various sizes and types spread throughout the City. The wetlands are an integral part of the natural environment and are important component of healthy lakes, streams, and animal habitat. Development impacts to wetlands are regulated by Federal and State laws. The U.S. Army Corps of Engineers – Saint Paul Office implements the federal wetland laws, and the Minnesota DNR and the Rice Creek Watershed District implement State wetland laws. Alterations to wetlands almost always require a permit, and the City seeks to protect wetlands wherever possible.

10.2.2 Rice Creek Watershed District & Water Quality Management

Arden Hills is located entirely within the Rice Creek Watershed District (RCWD). The RCWD requires permits for land development, site grading, wetland and shoreland alterations, and drainage plans and systems.

Water quality for Lake Josephine, Lake Johanna, Round Lake, and Valentine Lake is monitored by Ramsey County. The RCWD utilizes this data.

The City's Floodplain and Shoreland Ordinances govern development activities in areas that contribute storm water runoff to the City's lakes. In addition, the lake use ordinances on Lake Johanna and Lake Josephine help to control erosion and water quality. Unfortunately, water quality has decreased in recent years and additional efforts are needed to maintain and improve water quality.

10.3 PROTECTED SPECIES/HABITAT

The City is home to at least two species that have a legally protected status, and two habitats that have been identified by the DNR as in need of being protected (Figure 10.2). Blanding's Turtles have "threatened" species status in Minnesota, which means that the State has determined that the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota. While it is outside of the City's regulatory authority, Illinois Tick Trefoil is a rare plant that was identified in the AHATS area.

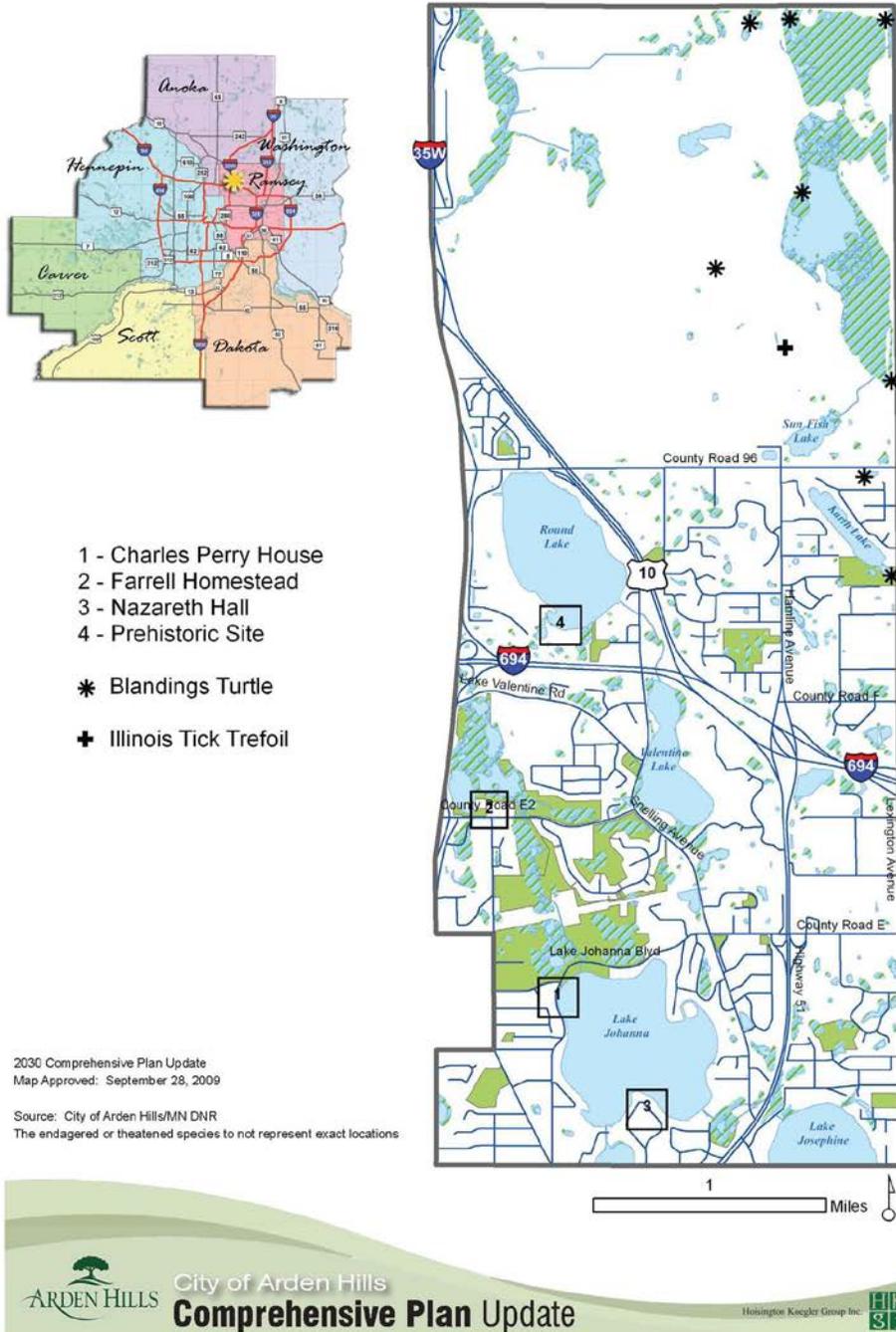
Both high value habitats are located on the AHATS property outside of the City's regulatory authority. Marsden Lake is a large wetlands complex (wet meadow) and has been identified by the Minnesota DNR as an important natural community. The kame, also located on the AHATS property, is a relict of the glacial landscape and has also been identified by the DNR as an important geological feature. The kame is the highest geographical point in Ramsey County.

10.4 CULTURAL RESOURCES

Although little information has been compiled regarding historic sites or buildings in Arden Hills the Minnesota Historical Society and Ramsey County Historical Society identified one structure that may be worthy of being placed on the National Register of Historic Places (Figure 10.2). The 1998 Comprehensive Plan identified two additional buildings and one site as historic and/or architecturally significant to the community.

Biological and Cultural Resources

Figure 10.2



Charles Perry House

The Charles Perry House, located at 3491 Lake Johanna Boulevard, has been identified by the Minnesota Historical Society and Ramsey County Historical Society as historically important. While there has been consideration of placing this house on the National Register of Historic Places, additional research and community interest is needed.

Farrell Homestead

The Farrell Homestead at 1963 County Road E2 is a large, Victorian farm home just north of the intersection of County Road E2 and New Brighton Road. The Homestead was constructed in 1874. John Farrell, of Irish descent, settled and farmed more than 500 acres. A friend once asked him why he brought such a hilly farm, to which John replied, “Because it reminds me of Ireland.”

An interesting side note is from Mary (May) Marston, granddaughter of John Farrell, who grew up on the farm in the 1890s. Ms. Marston stated that, “Across from the farm was a hill with Indian grave platforms and artifacts.”

Nazareth Hall on the Northwestern College Campus

Nazareth Hall was constructed in 1921-22 on the Northwestern College campus. It was constructed in the “Lombardic Romanesque” style from northern Italy. It faces east to overlook Lake Johanna. It includes six buildings constructed as one, with several courtyards styled after the Vatican. The building covers approximately 37,400 square feet of ground and was designed to fit into its natural lakeshore setting.

Round Lake Prehistoric Site

The Round Lake prehistoric site is located on a small knoll on a peninsula on the southwestern shore of Round Lake. Archaeological exploration has determined that the knoll on the peninsula is most likely of natural origin. Artifacts relating to the manufacture or maintenance of stone tools were observed on the site, and it appears that it may be eligible for the National Register of Historic Places. This site was threatened by development in 1997; however, the City was able to obtain a conservation easement over the peninsula to preserve it in its current condition. Further research, as well as community interest, is required before actual placement on the National Register of Historic Places.

10.5 NATURAL RESOURCE INVENTORY MAP

Although the portion of Arden Hills south of Highways 96 and 10 is considered fully developed, there is an abundance of mature trees, lakes, wetlands, open spaces, parks, and other natural amenities that give the City its highly valued natural and well-landscaped character. The southern two thirds of Arden Hills contain more than 363 acres of public parks and undevelopable open spaces. Northwestern College, Bethel University, and Mounds View High School also contain highly valued natural areas of varying character and quality.

The Arden Hills Army Training Site (AHATS) property is also home to some of the most significant natural resources in Arden Hills, including lakes, wetlands, woodlands, meadows, rolling terrain, and vistas. The kame, which is a geological formation made by retreating glaciers, is located in the central part of the property and is the highest point in Ramsey County. While some institutional development from the Minnesota National Guard may occur on the southern part of the AHATS property, much of that area is anticipated to remain as open space. The AHATS property is not open freely to the public, but the National Guard does allow some scheduled visits on the property.

Of the 585 acres on the TCAAP property that are anticipated to be sold to the City for redevelopment, preliminary plans include approximately 168 acres for use as open space in the form of parks, wetlands, stormwater areas, recreational areas, and a wildlife corridor.

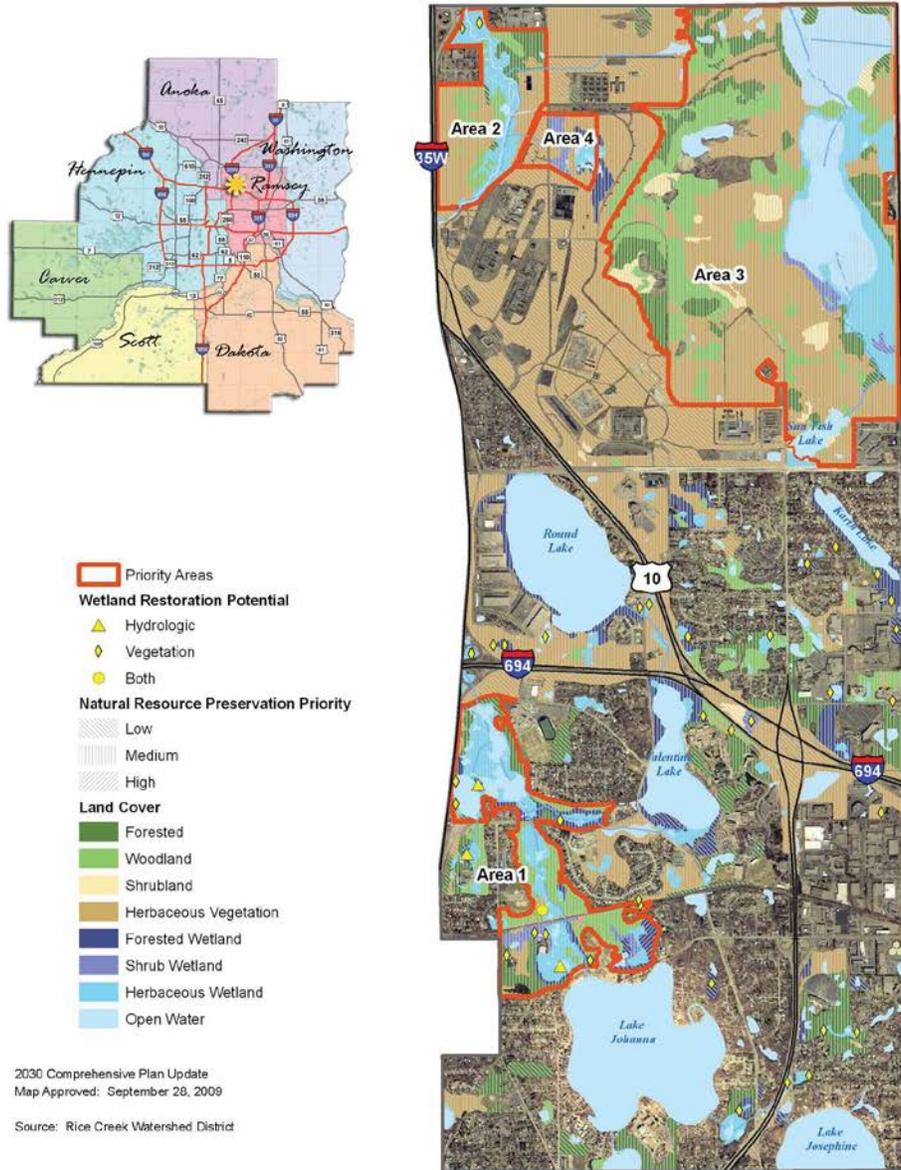
The Rice Creek Watershed District has compiled data and generated a resource protection map to show areas of significant natural resources (Figure 10.3). The map is only intended to be a guide and is not detailed enough for site specific planning as there may be inaccuracies due to the scale of the assessment. Additional information regarding feasibility and site condition should be collected before utilizing this information at a smaller scale.

This resource protection map has two primary purposes. First, it is meant to help develop regulations to protect significant natural resources where it is feasible to do so. Second, it is meant to help make more informed development decision in places where there may be significant resources. The map displays the following information:

- Remaining natural areas within your community
- Results of a natural resource assessment
- Results of a wetland restoration assessment
- Lakes and streams currently listed on the 303(d) list of impaired waters
- Results of lake water quality assessment

Natural Resource Inventory

Figure 10.3



1 Miles

City of Arden Hills
Comprehensive Plan Update

Hobington Koehler Group Inc.

10.5.1 Natural Resources Assessment

The Rice Creek Watershed District (RCWD) evaluated the natural areas within its jurisdiction, which includes all of Arden Hills, to determine the relative quality of remaining natural areas. The RCWD evaluated the natural resource data based on the following characteristics:

- Health of natural area: High quality areas with native vegetation were considered more important than areas with partial or total dominance by invasive species.
- Size: Large natural areas (five acres or greater) were considered more important than small natural areas (less than five acres).
- Rarity of community type within the watershed: Natural community types that are rare due to specific site requirements (fens, bogs, etc.), or have become rare due to historic land use changes or degradation (prairie, oak savanna, etc.) were considered more important than more common natural community types.
- Adjacency to other natural areas: Natural areas that are immediately adjacent to several other natural areas were considered to be more important than natural areas that are adjacent to one or no other natural areas.
- Proximity of healthy natural areas to other healthy natural areas: Healthy natural areas that are in close proximity to each other (within 1/8 of a mile) were considered more important than isolated healthy natural areas, healthy natural areas in close proximity to degraded natural areas, or degraded natural areas in close proximity to each other.

These natural resource characteristics were combined to form the overall natural resource assessment ranking for each area shown on Figure 10.3.

10.5.2 Wetland Restoration Assessment

All wetland areas within the RCWD were evaluated to determine their potential for vegetation and/or hydrologic restoration. A wetland's potential for either type of restoration was determined in the following manner:

- Vegetation Restoration: The Minnesota Land Cover Classification System (MLCCS) data includes information on whether or not a natural area is dominated by invasive species. Wetlands dominated by invasive species represent an opportunity to restore native vegetation. Taking this into account, wetland communities that were recorded in the MLCCS as

- dominated by invasive species and greater than two acres in size were included in this category and displayed on the map.
- Hydrologic Restoration: National wetland inventory (NWI) data and ditch inventory data were used to identify wetlands with the potential for hydrologic restoration. The location of partially drained wetlands in the NWI data and the location of known ditches were used to identify wetlands that have been partially drained and could be restored to more natural, flow through hydrology without necessarily changing the hydrologic regime. Only polygons one acre or larger were included and displayed on the map. Wetland areas with these characteristics that were in close proximity to existing infrastructure (homes, businesses and roads) were removed from consideration.

10.5.3 Lake Water Quality Assessment

Each lake located within the Rice Creek Watershed District was evaluated to determine its potential for water quality impairment due to excessive nutrients (Table 10.1). The lakes fell into one of three categories:

- No data: Not enough water quality data available for evaluation.
- Listed on 303(d) list of impaired waters: Lake is currently on the impaired waters list (TMDL list) for excessive nutrients. (Lakes that are on the impaired waters list only due to high levels of mercury, and not due to excessive nutrients, are not included in this category.)
- Potential to become impaired: Available water quality data suggest that the lake is currently not impaired. Due to development pressure or to borderline water quality conditions, this lake has the potential to become impaired in the near future.

Table 10.1 - Lake Water Quality (Rice Creek Watershed District)

Lake	No Data	Listed on the 303(d) list of impaired waters	Potential to become impaired
Johanna*			X
Josephine*			X
Karth	X		
Little Johanna		X	
Marsden	X		
Round			X
Sunfish	X		
Valentine		X	

*Listed on the 303(d) list of impaired waters for mercury

The 303(d) list is part of the federal Clean Water Act, which requires states to adopt water quality standards to protect waters from pollution.

10.5.4 Priority Areas

Area 1 – This area contains a relatively diverse assemblage of upland and wetland communities connecting Lake Johanna and Farrel’s Lake. Upland community types in this area include aspen forest, lowland hardwood forest, oak woodland, and mesic prairie. Wetland community types in this area include willow swamp, mixed emergent marsh, and cattail marsh. The majority of these communities were given a “medium” ranking in the natural resource assessment. There are also several potential opportunities for wetland restoration within this area, both hydrologic and vegetation. Lake Johanna has the potential to become impaired due to excess nutrients.

Area 2 – This area contains areas a mosaic of upland and wetland community types surrounding Rice Creek. Community types include forest, woodland, and emergent marsh. The majority of these communities were given a “medium” ranking in the natural resource assessment. The portion of Rice Creek within the City of Arden Hills is currently on the 303(d) list of impaired waters. A portion of this area near Interstate 35W on the west side of Rice Creek is included in the TCAAP redevelopment plans.

Area 3 – This area contains areas of forest, woodland, and emergent marsh surrounding Marsden Lake. All of the lake’s shoreline is in natural vegetation. This complex of natural areas is unique because of its large size and lack of fragmentation. The majority of these areas were given a “medium” ranking in the natural resource assessment. Marsden Lake does not have sufficient water quality information to determine its potential for water quality impairment due to excess nutrients.

Area 4 – As part of the TCAAP redevelopment, a 49 acre wildlife corridor will be designated to connect the Rice Creek corridor to the AHATS property. While the RCWD did not include the wildlife corridor in their analysis, the City and Ramsey County have identified it as a significant natural resource and as a priority area. Ramsey County will own and maintain the wildlife corridor.

10.5.5 Aggregate Resources

There are no accessible aggregate resources in Arden Hills.

10.5.6 Solar Resource Development and Protection

As part of further implementing a strategy of promoting a more environmentally sustainable community, the City will increase energy conservation where possible and the promote the development of distributed solar energy. In Arden Hills, the latter will largely be accomplished through the preservation of access to solar resource throughout the community. City has set the following goals that promote the adaptability of city resources and the ability for residents and developers to implement solar technology:

- a) Encourage residential solar development that maintains community character.
- b) Increase energy resilience of critical facilities such as police, fire, and emergency and hazard response centers.
- c) Fairly balance the development rights of land owners with solar resource with the community character rights of adjacent landowners.
- d) Protect access to solar resources in new developments and subdivisions, enabling individual land owners to choose to self-generate energy.

To accomplish this strategy, the City shall evaluate the zoning ordinance and other regulations for where amendments can be made to implement the above solar goals.

Solar Resource

Much like natural gas and oil, solar energy is a resource that can be quantified and measured geographically. In 2016 the University of Minnesota published a high-resolution map measuring solar insolation potential for the entire state of Minnesota. Using this data, the amount of solar energy available to Arden Hills has been calculated (see Gross Solar Potential figure 10.4).

Gross Solar Potential City of Arden Hills, Ramsey County

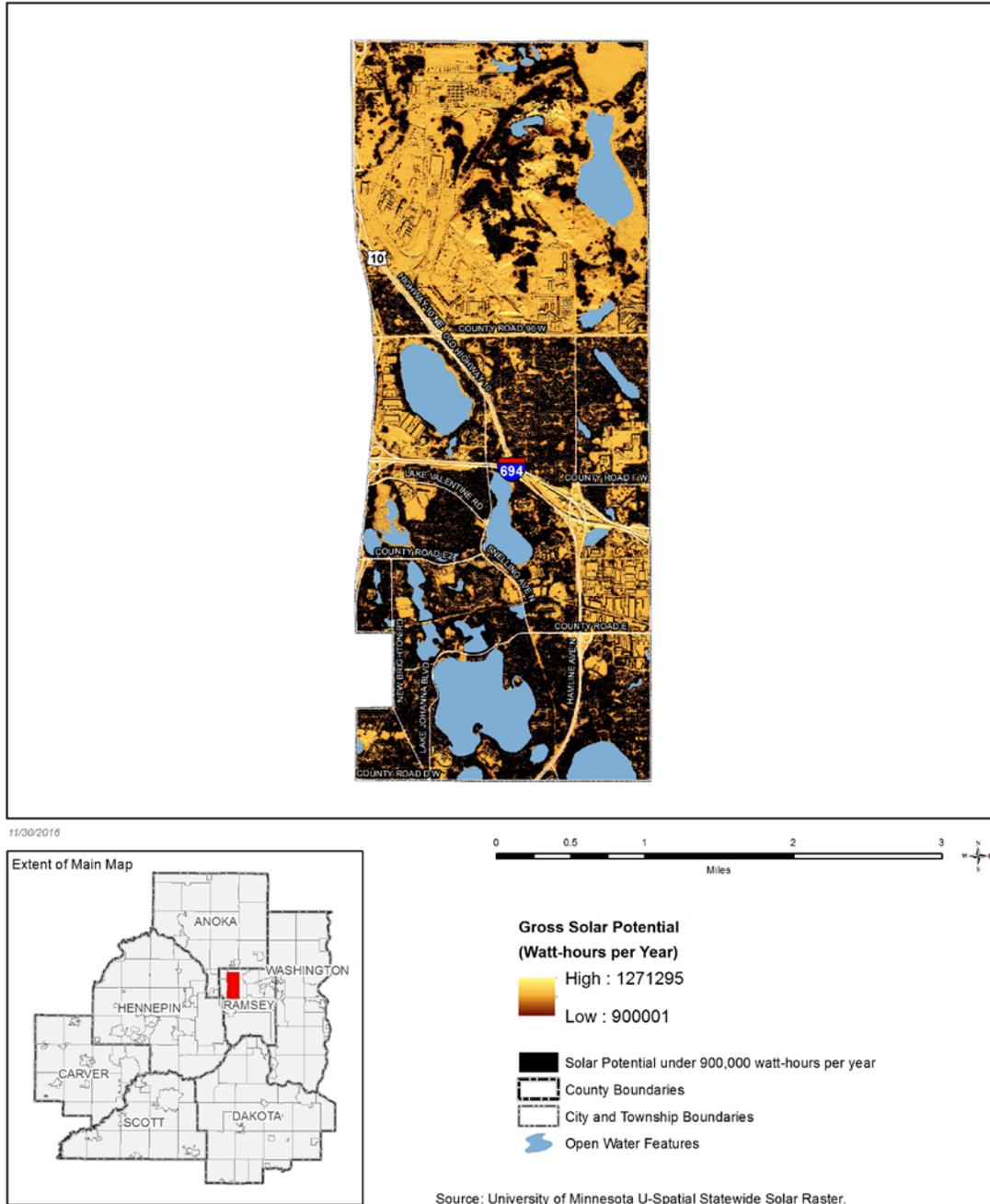


Figure 10.4 Gross Solar Potential

Calculation

The gross solar potential and gross solar rooftop potential are expressed in megawatt hours per year (mwh/yr), and these estimates are based on the solar map above. These values represent gross totals; in other words, they are not intended to demonstrate the amount of solar likely to develop within the community. Instead, the calculations estimate the total potential resource before removing areas unsuitable for solar development or factors related to solar energy efficiency. The gross solar generation potential and the gross solar rooftop generation potential are estimates of how much electricity could be generated using existing technology and assumptions on the efficiency of conversion. The conversion efficiency of 10% is based on benchmarking analyses for converting the Solar Suitability Map data to actual production, and solar industry standards used for site level solar assessment.

Gross Potential (mwh/yr)	Rooftop Potential (mwh/yr)	Gross Generation Potential (mwh/yr) ²	Rooftop Generation Potential (mwh/yr) ²
13,320,595	925,656	1,332,059	92,565

10.6 INVASIVE SPECIES

While many of the open spaces in Arden Hills are of high quality, invasive species such as buckthorn are a problem in many parks and open spaces throughout Minnesota. Unfortunately, a number of parks and open spaces in Arden Hills contain buckthorn. In cooperation with residents and service groups, the City has instituted a buckthorn removal program. The City plans to continue to control buckthorn on an ongoing basis as needed and as resources are available. The City will also continue to encourage the removal of buckthorn and other invasive species from private land.

10.7 IMPLEMENTATION STRATEGIES

In order to advance the protected resources goal, the below activities are proposed:

- Maintain tree preservation standards and landscaping requirements.
- Review existing and develop new policies or regulations to protect identified natural resource protection areas, including historical areas.
- Encourage new development to respect the natural features and to minimize damage to the natural environment.
- Update the shoreland and floodplain development regulations to be in compliance with Minnesota Department of Natural Resources regulations, Rice

Creek Watershed District regulations, and to encourage the protection of the City's water resources.

- Work cooperatively with private landowners and other governmental agencies to preserve and enhance open spaces.
- Explore the inclusion of an environmental library and/or education center on the TCAAP property.
- Support public educational opportunities to foster a better understanding of the natural environment.
- Work with the Rice Creek Watershed District to increase water quality and to complete Total Maximum Daily Load (TMDL) studies.
- Identify and adopt best management practices to protect the water quality of lakes, streams, wetlands, and groundwater.
- Work to reduce nonpoint pollution sources, including educating residents and using best management practices.
- City encourages development of distributed solar energy systems that are in keeping with the community's character and use community solar resources.
- City supports the development of zero net energy buildings and use of local renewable and energy efficiency resources.
- City sets a local renewable energy goal to meet 10% of community-wide electric energy use with on-site renewable energy.

The above strategies should not be considered all-inclusive. New opportunities and strategies should be identified to further advance the City's protected resources goal and policies.