

Chapter 2

Resource Inventory

The next step in the formulation of the Open Space Preservation Plan involved identifying the cultural and natural resources in the City of Red Wing. Numerous data already existed on resources in the area, and the resource inventory used this data as a starting point. The resource inventory involved collecting data found through every possible data source and converting the information into a Geographic Information Systems (GIS) digital format. Once in this format, it was easier to determine the areas already in some form of permanent conservation through Red Wing's previously mentioned history of preservation. Understanding the lands already in protection was crucial in helping to recognize which properties need protection in the future through the priority system discussed in the next chapter.

This chapter summarizes the City's data resources and compiles them into two different categories: cultural and natural. Each category assembles the resources into further groups discussing the resource's characteristics, size, location, value, and other relevant information. In addition, maps provide visual representation to where the resources exist in the

Community. The cultural resources category separates into seven different groups: active outdoor recreation, agricultural soils, archaeology, gateways, historic sites and districts, trails and pedestrian connections, and urbanized forest. The natural resources category separates into five different groups: biological, conservation easements, geological, hydrological and scenic views and vistas. Some of these groups are further divided into sub-groups.

Cultural Resources

Cultural resources form a tremendous asset base for the City of Red Wing. The City has a large and extensive system of parks, athletic facilities, and trails. Red Wing is home to one of the largest concentrations of archaeological sites in Minnesota, and is recognized as a significant 19th and 20th century historical base.

Active Outdoor Recreation

Recreational activities are abundant throughout the City. Barn Bluff provides some of the best opportunities for rock climbing and hiking in the Midwest. Recreational fishing abounds on the numerous rivers, streams and lakes in the City and region, including Spring Creek, Hay Creek and Bullard Creek (which are all designated trout streams). Red Wing Wildlife League lands, Billings-Tomfohr Conservation Area, and various other locales provide areas for hunting, with some limited to bow hunting. Biking and mountain biking are enjoyed in numerous locations, including the Cannon Valley Trail, Memorial Park, and Mississippi National Golf Links. Trails can also be used for cross-country skiing during the winter months. Memorial Park provides an opportunity to play disc golf on top of Soren's bluff. Bird watching is available in many areas within the City, including the chance to see bald eagles along the Mississippi River, especially near the mouth of the Cannon River and across from Colvill Park.



Disc Golf at Memorial Park.

It is important to expand the opportunities for active outdoor recreation. The City's parks and trails system are exceptional, a strong selling point for the community's effort to attract younger adults, families, and businesses. Trails serve as an important greenway connection between large patches. Many new developments do not have access to trails or parks where people can enjoy these activities, creating a need to distribute these opportunities evenly throughout the city. Areas where active outdoor recreation activities occur or could occur receive rankings in the priority system.

Archaeology

Red Wing's archaeology is a little-known resource to citizens in the Midwest, but is well-known to City staff and many professional archaeologists. Red Wing has one of the most extensive compilations of archaeological sites in the Midwest, if not the entire United States. These sites should be protected to understand our history and for future generations to enjoy.

According to archaeologists who have studied the area, Red Wing has been home to humans for 7000 to 9000 years. Little is known of the human inhabitants that time. The upper Mississippian Indian culture was present in the Red Wing area 700 to 1000 years ago. This final period is best known because it is the most recent and therefore easiest to interpret. The Mississippian people left more than 2,000 mounds and earthworks and several other smaller sites in present day Red Wing. During this era, Red Wing was the most populated area in the State of Minnesota.¹

The period was unique because most people living in the Americas prior to this time were nomadic groups of hunters. By contrast, the

¹ Dobbs, Clark A., *A Phase Two Evaluation of Ancient Native American Sites in Portions of the Spring Creek Valley: City of Red Wing, Goodhue County, Minnesota* (Institute for Minnesota Archaeology, 1990) 1.

Mississippians planted corn and settled permanently in the area. Red Wing maintained a connection with other Mississippian culture cities, and traded with the City of Cahokia, near present day St. Louis.

Several archaeological studies have been conducted in Red Wing over the last 150 years. Trained surveyors Alfred J. Hill and Theodore Hayes Lewis first studied the area in the late 19th century. They located more than 2,000 mounds in the Goodhue County and Pierce County area. J.V. Brower, an archaeologist, obtained records from Hill and Lewis and from a local doctor, Dr. Sweney, and continued the line of research. In 1903, Dr. Sweney published an archaeological chart of the Prairie Island area.

A great deal of archaeological work in the City of Red Wing has taken place over the last thirty years. The Minnesota Department of Transportation conducted an archaeological study in the early 1970's when searching for different options of expanding Highway 61. In 1984, Dr. Clark Dobbs from the Institute of Minnesota Archaeology began one of his extensive studies in the area. The first study examined portions of unreported archaeological sites and made recommendations for future work. The second study, performed in 1990, made recommendations for the City and provided more detailed information about the Spring Creek Valley area. Recently, Dr. Ronald Schirmer from Minnesota State

University-Mankato has been conducting field research in several locales throughout Red Wing.²

Cultivation, vandalism, urban development, and other acts have destroyed many of these precious records in our history. This trend has increased over the last thirty years as the City's population has spread and road construction expanded. There have been efforts to protect these areas before, as was evident in the Red Wing Archaeological Preserve, the Silvernale Mound excavations, and interest from local citizens. This Plan represents another step in that effort.

In the next chapter, the Plan will discuss the priority system for archaeology. This section will describe some areas where archaeology receives a ranking. First, a little background is given for the ranking. State law protects the destruction of burial mounds. It is the responsibility of the City of Red Wing to protect these sacred grounds. Since it is illegal to destroy the mounds, the system gives a low ranking to those areas where mounds are found because they are already protected by state law. Other areas where significant archaeological artifacts have been found are given low rankings, because they are areas already protected by a public

² Dobbs, Clark A., *A Phase Two Evaluation of Ancient Native American Sites in Portions of the Spring Creek Valley: City of Red Wing, Goodhue County, Minnesota* (Institute for Minnesota Archaeology, 1990) 5-6.

or non-profit entity (i.e. Silvernale, Spring Creek SNA). However, some places not protected include habitation sites, cairns, and petroglyphs. These sites often are located close to burial mounds, and they were given higher rankings. Another important factor relates to whether the site has been preserved or destroyed. If a site is preserved, it received a ranking, and vice versa for a destroyed site. Dr. Ronald Schirmer worked with the City to provide valuable information for developing a ranking system. He noted areas under potential threat from construction, and places where the archaeological integrity ranked high for need of protection.

Currently, there are more than 200 undisturbed archaeological sites in Red Wing, with more documented every year. Appendix A, Areas of Archaeological Concern, is a map showing the site numbers. The maps do not show exact locations, due in part to potential threats of site vandalism. The list below is a sample of sites with rankings in the priority system. The list has assigned numbers to the sites. This numbering system is specific to each county and the sites are assigned by a State archaeologist.

- Sites 96 and 163
 - Both sites are located close to site 44 containing 20 burial mounds. Site 96 is a village with over 10,000 artifacts collected from the 1990 study. Furthermore, site 96 was

identified in the 1990 study as potentially eligible for inclusion in the National Register of Historic Places. Site 163 contains scattered stone artifacts. Preserving the sites along Highway 19 fits the goal of keeping the road in rural character.

- Sites 39, 55, 95 and 124
 - Besides site 39, the other sites are all located in a valley below the Spring Creek Scientific Natural Area (SNA). Site 39 contains three rare stone cairns sitting on a bluff above the valley floor. Site 55 contains two mounds and a village and campsites. Site 95 contains a village, campsite and dwelling. Site 124 contains five mounds.

The area has high threat from a city east-west road connection. Thus, development along the road would likely ruin the integrity of the sites. However, if the sites were permanently protected along with the Spring Creek SNA, it would leave an area of over 250 acres for open space.
- Site 169
 - The site was identified in the 1990 study as potentially eligible for inclusion in the National Register of Historic

Places. The area is large consisting of 25 acres and was partially destroyed during the construction of Spring Creek Road. It contains a village, campsite and dwelling.

- Sites 91 and 187
 - The site is a habitation in a valley containing a village, campsite and dwelling sitting on 9 acres. Site 187 is above the valley containing a rare petroglyph. Both sites are adjacent to Spring Creek.
- Site 38
 - The site contains 20 serpentine shaped mounds with habitation containing a village and campsites. The site sits on 8 acres. It is partially included and adjacent to Spring Creek SNA.
- Site 42
 - The site contains 23 mounds. This leaves the area protected, but when discussing the area with Dr. Schirmer, he stated that the land adjacent to the site has a high probability of containing habitation sites, but it has never been surveyed. Moreover, the site's proximity to

conservation easements is important for the integrity of the site as well as the possibility of being large enough for a patch.

- Site 51
 - The site contains 26 mounds and scattered stone artifacts. The site is 30 acres and located adjacent to the Cannon River.

Gateways

In order for a community to distinguish itself, it is important to preserve gateways into the city. When preserved, gateways protect community identity and prevent sprawl developments from building in these areas. Gateways were recognized at the Open House as an important cultural resource in need of protection. Therefore, gateways receive a ranking in the priority system.

Highway 61 provides a gateway on the east and west side of the City. On the east, the 19th century buildings of the Minnesota Correctional Facility, Colvill Park, Memorial Park and Barn Bluff mark your entrance. On the

west, bluffs, steep slopes, and the Cannon River welcome visitors. From the south, four major roads enter the city: Highway 19, Spring Creek Road/County 53, Bench Street/County 1, and Highway 58. Highway 19 and Spring Creek Road are distinguishable for their agricultural land and archaeological significance. Bench Street winds next to Hay Creek and through steep slopes along both sides. Highway 19 enters next to agricultural land and a natural community. The Mississippi River represents the city's northern boundary. From the river, there are spectacular views of the bluffs, shoreland, and wildlife. It is important to leave the riverfront undeveloped, with the exception of areas in Prairie Island and downtown Red Wing.

Historic Sites and Districts

Historic sites and districts are important resources in green infrastructure because they are valued for their beauty and sense of place. Moreover, they are gathering places for people. Green infrastructure systems allow people to travel between sites or districts on trails, paths, and sidewalks from all areas of town. The City or private individuals should try to establish more historic sites or districts in different areas of the town.

There are 35 historical places listed in the National Register of Historic Places in or directly adjacent to the City of Red Wing. Some notable historic sites include the Sheldon Theatre, St. James Hotel, and Red Wing City Hall. There are four main historic districts in the old center of town: Historic West Residential District, Historic Mall District, St. James District, and Downtown District. Several of the historic sites on the National Register of Historic Places are not included as locally designated sites or districts, such as the Correctional Facility and the Red Wing Pottery Place.

Areas adjacent to historic sites or districts received rankings in the open space priority system. Additionally, areas adjacent to a historic site or district could be established in the future received a ranking. Two of these areas (in addition to the ones listed in the Archaeology section) include Old West Main and the Anderson Activity Center. Appendix B, Historic Districts and Historic Structures, is a map showing the location of locally designated sites.

Trails and Pedestrian Connections

One aspect studied in the Comprehensive Plan was the notion of walkability. The Plan defined the term as the ‘presence of walkways and reasonable distances that make walking a legitimate way to get somewhere’. The study found 21% of households were walkable to schools, 45% of households were walkable to neighborhood parks, and 50% of households were walkable to intensity zones and attractions. Schools and intensity zones located within a ½ mile of a household were considered walkable. Neighborhood Parks located within a ¼ mile of a household were also considered walkable.

In a green infrastructure system, it is important to increase these percentages. Currently, there are 67.4 miles of sidewalks with the majority existing in the older parts of the City, 12.6 miles of bike trails (excluding Cannon Valley Trail) and unknown number of hiking trails within the City. The Cannon Valley Trail extends 19.7 miles from Red Wing to Cannon Falls. The Comprehensive Plan mentions several areas around the City where trails should be constructed or connected to other trails, which includes a new Cannon Valley Trailhead as part of the Upper Harbor Redevelopment, a connection to Prairie Island, and a connection to Frontenac State Park. Areas in town where trails currently exist and where

trails could occur are given rankings in the priority system. Appendix C, Sidewalks, Bike Paths, & Parks, is a map showing the current location of these features.



Cannon Valley Trail

Urbanized Forest

For the purpose of this plan, urbanized forest is defined as those areas in platted developments where there are large amounts of trees. Urbanized forest extends into adjacent lands as well. Red Wing is blessed with many acres of urbanized forests. Parks, schools and golf courses are examples of them. In addition, there are many tree-filled parcels in town adjacent to developments yet to be developed. Appendix D, Urbanized Forest and Subdivisions Platted Since 1950, displays these areas.

- Parks

The park system in Red Wing is an urbanized forest because parks are accessible and located near residents offering a break from the built environment. The park system is one of the most important cultural resources and an important aspect in green infrastructure. The City has 37 parks (excluding Mississippi National Golf Links) totaling 686.72 acres or roughly 1.1 square miles. However, as mentioned in the last category, 45% of households are not within a ¼ mile of a neighborhood park. The majority of these households are located in the newer developments, especially in the southwestern portion of town. In addition, the newer developments where there are parks tend to be smaller parks than the older neighborhood parks.

The Comprehensive Plan addresses this problem through several policies to identify areas where new parks could be added. Focused efforts include new parks in downtown, upper harbor, historic neighborhoods, new neighborhoods, recreational areas, and areas connected to the green infrastructure system. These areas received rankings in the priority system. New parks where athletic fields/courts exist or could exist received rankings too. It is

important to make better connections to existing parks with trails and sidewalks.

- Schools

Schools are an important component to Open Space as they provide fields and parkland for nearby residents to enjoy. For example, Burnside Elementary School has been influential in preserving several archaeological sites.

However, as mentioned previously, 79% of households are not within ½-mile walking distance to the four schools in Red Wing. As the need arises, new schools in the future should locate closer to development. At the same time, more trails from schools should connect to development giving students alternative options to get to school. Areas where these connections can be made are given a ranking in the priority system. Areas located next to the schools probably are not given a ranking because residential development should grow in tandem with a good green infrastructure system.

- Golf Courses

Golf courses can have a negative or positive impact on green infrastructure. Golf courses destroy valuable resources, plant non-

native species, spray unhealthy herbicides and pesticides, and discourage wildlife from crossing the course, all of which create a negative impact. However, golf courses also provide urbanized forests, man-made wetlands and ponds, maintain and plant trees, and provide habitation areas for wildlife, which serve as positive impacts. Golf courses also provide beautiful views and a sport for residents to enjoy.

Currently, there are two golf courses in Red Wing: Mississippi National Golf Links and Red Wing Golf Club. Mississippi National is 140 acres in the eastern part of the city. Cross-country ski trails and hiking trails of over 3 miles cross the land. Red Wing Golf Club is 96 acres and has been located near in the center of the City since 1915.

Each recreational area is at risk, both the courses and the properties adjacent to them. Golf courses have been overbuilt over the last few decades in the United States. Consequently, many courses have been forced to sell their land to developers because they cannot sustain their business. The residents adjacent to the courses become upset because they expected the golf course to remain there permanently. Consideration could be given to placing

permanent easements on the land to eliminate the threat. Both golf courses received rankings because of this threat and the urbanized forest they provide.

- Cemeteries

The City of Red Wing owns and operates two cemeteries in the City: Oakwood and Burnside. It is important for cemeteries to be forested in order to provide a visual boundary and sound barrier from the city. Numerous other cemeteries exist, including St. John's Evangelical Lutheran Cemetery, Goodhue County Poor Farm Cemetery, Calvary Cemetery, Mount Carmel Cemetery, Prairie Island Community Cemetery, Prairie Island Cross of Christ, Prairie Island Lutheran, Cannon River Lutheran, and the hundreds of burial mounds.

Natural Resources

Often times, plants and animals are forgotten about when cities are planned. The natural resources inventory identifies important habitat areas for all species, so these areas can be protected in the future.

Biological

Healthy biology is one of the most important aspects of a green infrastructure system. This section will cover the natural communities, a 1998 Bonestroo resource inventory and rare and endangered plants and animals.

- Natural Communities

Natural communities are native plant communities that interact with the native plants in their natural environment and have not been greatly altered by human activity. All natural communities are important because they are rapidly disappearing across the country. Therefore, they receive rankings in the priority system. There are twelve significant natural communities in the City identified during the 1992 Minnesota County Biological Survey. It is important for the City to manage and preserve these areas and try to obtain more recent information on their locations and quality. A majority of the natural communities are located along the Cannon River and in northwest Red Wing in the Mississippi River floodplain. Other natural communities occur along Spring Creek (especially in the Scientific Natural Area), Billings-Tomfohr Conservation Area, Sand Hill, Oskey/Siewert Bluff, Memorial Park, Barn Bluff, and along Hay Creek in the southern

portion of the City. The following lists the twelve natural communities in the City with a description provided by the 1992 study. Appendix E, Natural Plant Communities, displays all natural communities in the city.

- Floodplain Forest
 - Lowland forests on seasonally flooded river bottoms; canopy dominated by silver maple or a mix of silver maple, cottonwood, and black willow, often with green ash, bur oak, American elm and red elm.
- Maple-Basswood Forest
 - Mesic forests on glacial till, alluvium, and loess on steep north to east facing slopes; canopy dominated by sugar maple, basswood, and northern red oak, with white ash, white oak, bur oak and bitternut hickory often present.
- Oak Forest-mesic subtype
 - Dry-mesic forests on loess, glacial till, outwash sands or alluvium; canopy most often dominated by one or more oak species, usually including northern red oak; other dominant or important oak species are bur oak, northern pin oak and white oak. Basswood, black cherry, quaking aspen and paper birch are common canopy associates and are sometimes co-dominant with oaks.
- Oak Forest-dry subtype
 - Dry forests on outwash sand and gravel; canopy dominated by one or more oak species, including northern pin oak, black oak, and bur oak.
- Oak Woodland-Brushland
 - Canopy cover 50-70%; dry to dry-mesic woodlands; on loess, alluvium, outwash sands, and glacial till; canopy dominated by bur oak, northern red oak and northern pin oak; black oak, red elm, paper birch, and red cedar are common canopy associates.
- Dry Oak Savanna-sand gravel subtype
 - Canopy cover 10-70%; on outwash sands on Mississippi River terraces; canopy dominated by bur oak with northern red oak sometimes present; shrubs patchy to dense; ground flora dominated by grasses and forbs typical of dry prairies.
- Dry Prairie-bedrock bluff subtype
 - Dry prairie on thin loess over bedrock on steep south to west facing bluffs; rock outcrops frequent; common

- species include little bluestem, big bluestem, Indian grass, side-oats grama, porcupine grass, prairie dropseed, plains muhly, birdfoot coreopsis, gray goldenrod, silky aster, prairie violet, and lead-plant.
- Dry Prairie-sand-gravel subtype
 - Dry prairie on alluvium, on river terraces; common species include little bluestem, big bluestem, side-oats grama, hairy grama, plains muhly, clammy-weed, silky aster, and pasque-flower.
 - Calcareous Seepage Fen
 - Open wetland on organic soils in areas of calcareous groundwater discharge; common species include *Carex stricta*, *Carex prairea*, *Carex interior*, *Carex comosa*, Virginia mountain-mint, marsh marigold, and great lobelia.
 - Emergent Marsh
 - Open wetland on mineral soils; in shallow basins or along stream margins; standing water present most of the year; dominant species vary but include cattails, bulrushes, and broad-leaved arrowhead.
 - Willow Swamp
 - Wet shrub community on mineral or organic soils; in shallow basins or along stream margins; standing water present most of the year; dominated by willows and red-osier dogwood; herbaceous species are those characteristic of emergent marshes.
 - Dry Cliff
 - Dry community on exposed south to southwest facing dolomite or sandstone cliffs; lichens are generally common; vascular plants are sparse, but include smooth cliff-brake, columbine, and harebell.
- Natural Resource Inventory

In 1998, Bonestroo, Rosene, Anderlik & Associates conducted a natural resource inventory covering an area of approximately 3000 acres within the City. The boundaries were Spring Creek to the west, Hay Creek to the east, the city boundary to the south, and Highway 61 to the north. In the inventory, there are nine different natural community types identified on some 1811 acres. The most extensive natural communities type is oak forest, followed by oak woodland-brushland and oak savanna. The rest of the study area consisted of agricultural and residential land uses.

In the inventory, there was a letter grade ranking system based on different ecological criteria. Bonestroo gave the natural communities with the highest grade the highest priority for future protection.

The following describes the grade system used by Bonestroo:

A= A community of excellent quality-approaches pre-settlement condition

B= Good Quality-minimal disturbance

C= Fair Quality-significant disturbance, but restorable

D = Poor Quality-high level of disturbance; restorable, but only with a lot of effort

This Open Space Plan gives rankings to the areas where Bonestroo gave high grades. Appendix F, Natural Resource Inventory, shows the area and the community ID for the study. **Table 2.1** shows the areas with the highest grades.

Table 2.1

Community ID	Community Type	Ranking
2C	Dry Prairie, SE Bedrock Bluff Subtype	B (ungrazed)

6E	Dry Prairie, SE Bedrock Bluff Subtype	B
7C	Dry Prairie, SE Bedrock Bluff Subtype	AB
8A	Oak Woodland-Brushland	BC
8B	Mesic Oak Forest	BC
8C	Dry Prairie, SE Bedrock Bluff Subtype	BC
10A	Mesic Oak Forest	BC
11A	Mesic Oak Forest	BC
12C	Dry Prairie, SE Bedrock Bluff Subtype	B
13B	Mesic Oak Forest	BC
13D	Mesic Oak Forest	BC

Conservation Easements

The City of Red Wing and other private organizations have used conservation easements regularly over the last twenty years to protect property from development. Usually, conservation easements are held in open space preservation forever. Chapter 4 presents more information on the process of obtaining a conservation easement.

Locating and mapping all existing conservation easements in town was important for the next chapter. Knowing easement locations helped

identify lands already in permanent preservation, and thus a low priority.

The process identified possible connections with other areas to create large patches with unprotected areas. However, conservation easements held in trust by the City are not as permanent as ones held in trust by a conservation organization.

Currently, there are 30 separate conservation easements on property located in the City of Red Wing which are held in trust by the City, Minnesota Land Trust, The Nature Conservancy, West Wisconsin Land Trust, or a private company. Appendix G, Publicly and Privately Owned Preserved Open Space, displays all conservation easements, deed restrictions, or publicly owned land in the city. Some conservation easements are for public purposes and some are owned privately. Conservation easements on privately owned land do not provide public access.

Geological

Bluffs and steep slopes are a characteristic of Southeastern Minnesota. Appendix H, Steep Slopes, displays the 30% slopes in the city.

- Steep Slopes

Red Wing is defined by its bluffland topography. There are roughly 3866 acres of 30% steep slopes in the city. This number is roughly 6 square miles or 1/7 of the city's total area. Slopes offer great opportunities for recreational activities, spectacular views, and a home for many plants and animals (including endangered species). However, often times, the views from the slopes attract homebuilders. Many problems can result from this occurrence. The views of the slope from below are harmed because of the building and the required clearing. Trees and other plants are removed, harming many natural communities present. The side of the slope erodes faster because trees and other plants no longer protect the soil. Water quality deteriorates because less plant life soaks up and cleans the water. The resulting water runoff picks up pollutants such as herbicides and pesticides in the homeowner's yard and then flows into a stream or river. Animals lose their home and are either forced to move or encounter problems with the homeowner. Erosion causes flooding in the city or in cities further down the streams or rivers. Red Wing has regulations to restrict development on slopes, but the regulations should tighten in the future to enforce greater setback from both the top and toes of bluffs. All 30% slopes received a ranking in the priority system.

Hydrological

Rivers, streams, lakes, wetlands, and aquifers are abundant in the City of Red Wing. It is important to protect and restore these hydrological areas in the future. Appendix I, Hydrology, displays the area's water features.

- Rivers and Streams

One of Red Wing's defining resources is the Mississippi River and tributaries. Throughout the Comprehensive Plan process, many residents expressed a desire to protect all of the city's waterfronts from development. The priority system emphasizes the need for protection.

The Mississippi River extends approximately 14 miles along Red Wing's northern border. Other major waterways' lengths in the city are the Cannon River (7.5 miles), Spring Creek (6.5 miles) and Hay Creek (2.1 miles). Spring Creek and Hay Creek are both designated trout streams. Overall, the city has over 72 miles of rivers and streams within its borders or on its boundaries. The majority of the rest of the total comes from intermittent streams, perennial streams, and river connectors.

- Springs

There are more than a dozen springs located just outside Red Wing. They are important because they form the trout streams of Spring Creek, Hay Creek, and Bullard Creek and unique habitats. In addition, there are about six springs within city boundaries. It is important for Red Wing to work with the county in protecting these springs.

- Floodplain

The City of Red Wing has adopted Flood Plain regulations as part of the Zoning Code and by reference the City has adopted the Flood Insurance Study prepared by the Federal Emergency Management Agency dated January 6, 1999, and the Flood Insurance Map dated January 6, 1999 as part of the Official Zoning Map. The Flood Plain Overlay District Regulations are found in Chapter 11, Division 52 of the City Code. In addition, the City has adopted special regulations for the Cannon River Management Overlay District in Chapter 11, Division 53; and Lake and Shoreland Management Overlay District regulations in Chapter 11, Division 50 of the City Code.

- Lakes

There are a number of lakes in Red Wing and the area. These lakes were formed from glacial expansion in the area 10,000 to 12,000 years

ago. South of Red Wing, Lake Pepin is one of the largest lakes in the area. Other lakes exist in Red Wing Wildlife League lands and towards Prairie Island. It is important to keep these lakes non-polluted as they offer hunting and fishing opportunities as well as important habitat for fish, wildlife and plants.

- Wetlands

Wetlands are areas where the soil is saturated a majority of the time, and provide habitat to plants and animals adapted to those environments. People generally think of wetlands as swamps or marshes. Wetlands are extremely important for a healthy environment.

In addition to creating sanctuaries for numerous wildlife species, wetlands act as a natural filtering system and a protective barrier for the City. Common fertilizers for lawns contain the nutrient nitrogen.

Increased nitrogen into the water causes eutrophication.

Eutrophication causes rivers and lakes to become greener because nitrogen causes excessive plant growth and weedy species usually dominate. This phenomenon is evident in many lakes and rivers in Minnesota and is due in large part to the role of nutrients in phosphorus and subsequent algal growth. However, wetlands reverse this cycle through denitrification. Denitrification converts the nitrogen liquid into gas and into the air without any environmental problems.

Wetlands also provide a barrier for the city when flooding occurs because of wetlands' ability to absorb excess water. Emergent Marshes identified in the Natural Communities map are wetlands.

- St. Lawrence-Franconia Edge aquifers

The following definition and concerns about the two aquifers in Red Wing have been copied from information provided by Minnesota Department of Natural Resources Regional Groundwater Specialist, Jeff Green. Appendix J, St. Lawrence Franconia Edge, was provided by Mr. Green as well.

The St. Lawrence and Franconia formations are defined as layers of shale, siltstone, and limestone that underlie the Prairie du Chien and Jordan formations. The St. Lawrence and Franconia are closest to the surface at the base of the wooded hillsides that form the blufflands along the Mississippi River and its tributaries. These formations lie one to twenty feet below the land surface. Water from the Prairie du Chien and Jordan formations and from the hilltop and side slopes moves down the hillside and discharges as springs from the St. Lawrence and Franconia. These springs form the trout streams that are tributary to the major rivers in southeastern Minnesota. Preliminary evidence indicates that some of the water moving through the edge

recharges the aquifer below the St. Lawrence and that this edge may remove nitrates in a manner similar to the Decorah Edge in Olmsted and Fillmore counties. The forests on the hillsides are a critical component of this landscape.

The St. Lawrence Edge is prominent in the blufflands area, and is an emerging issue with concerns being raised about groundwater recharge, water contamination, bluff stability, and cold water for trout streams. Ground water recharge can be impacted by surface activities, especially heavy equipment used in road construction and housing development. Clearing of the forests can alter the natural hydrology of the hill slope and change the groundwater recharge and discharge patterns. Homes built on top of the shale and siltstone units of the St. Lawrence Edge may experience wet and flooding basements. To date, there is no special recognition or protection of this unique area. Only minimal protection is afforded to the upper bluffland drinking water recharge areas, the natural water purification system and cold-water sources for trout streams. Communities can adopt zoning regulations that guide development in these areas.

Scenic Views and Vistas

Numerous areas in Red Wing provide chances to see some of the best views of the Mississippi River valley and the unique topography of Southeast Minnesota. Areas along any of the creeks, rivers, and other waterways are important for protection because of the views of nature they provide. Blufftops and the slopes protecting the bluffs provide views from the valley below and the land above. All of the areas are valuable resources and receive a ranking in the priority system.

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