

Environmental Stewardship

Introduction

Direct and indirect development impacts on natural resources makes it vital that full consideration is given in land use planning decision-making efforts. Natural resources found throughout the county are water, productive soil, sand and gravel, and Sioux quartzite. The protection of native flora and fauna along with the corresponding ecosystems in which all things live is as important as ever before to maintain ecological biodiversity. In the years ahead, runoff and soil erosion will be a major problem that needs to be addressed properly for agriculture to remain strong in a growing economy. Wildlife habitat is supported by the density, diversity, and productivity of land and water resources.

Soil can be considered the most important natural resource as it provides a growing medium for crops and for the grasses grazed by livestock. The importance of maintaining high quality soil conditions will be an integral task for all landowners. The entire county was once glaciated and in the eastern two-thirds of the county the glacial till is covered in most places by loess (NRCS).

Sand and gravel deposits can be found in the aquifer basins while the Sioux quartzite has been quarried since the county was settled. The county is fortunate to have available gravel and stone for many uses ranging from sub-grade material for roads to concrete aggregate for riverbank stabilization (NRCS). The County includes thousands of acres of protected land through the resources of various agencies and governments, see Map 5.2 on pg. 53. These protected lands and open spaces will grow in importance as population and demand for land and resources increases.



Land Resources

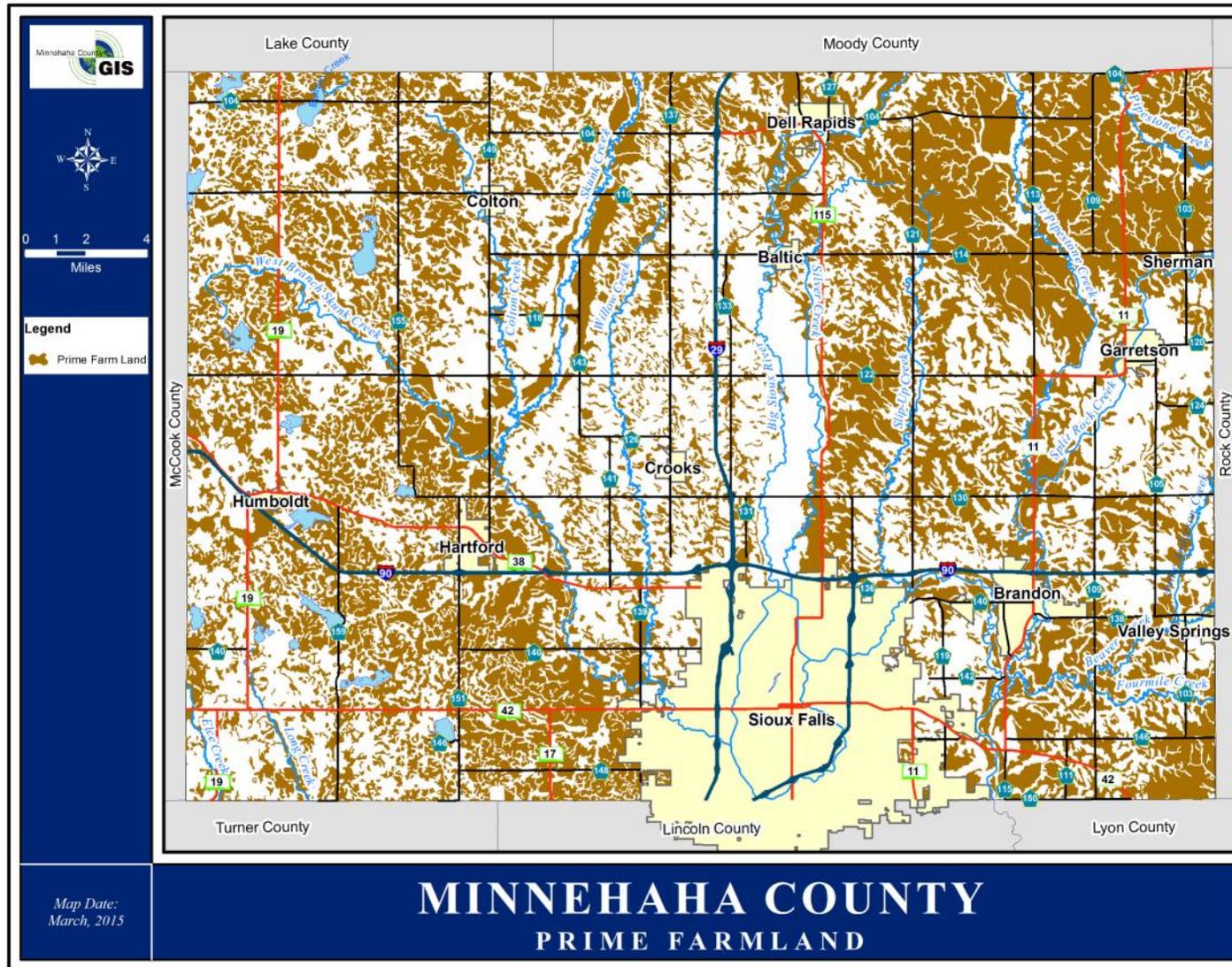
Soils

Soil is one of the most important natural resources in Minnehaha County because of the large presence of agriculture production. Before settlers came to the area, tall grass prairie dominated the landscape and assisted in creating some of the most fertile soils throughout the nation. Now, much of the prairie is gone and the hundreds of thousands of acres of fertile soil is utilized in producing crops. About 300,000 acres in Minnehaha County are considered 'prime farmland' by the U.S. Department of Agriculture, see Map 5.1 on pg. 45; and soil characteristics are the primary factor in the determination of prime farmland. Every year, development and land degradation threatens prime farmland. Sprawling and fragmenting land development should be avoided to protect this vital resource. Good farming practices are critical in preventing soil degradation. These practices are becoming more common as agriculture becomes more precise. The health of Minnehaha County soils is vital to maintain and improve in order to provide greater productivity for increasing local and global populations.

Managing for soil health, improved soil function, is mostly a matter of maintaining suitable habitat for the myriad of creatures that comprise the soil food web. Managing for soil health can be accomplished by disturbing the soil as little as possible, growing as many different species of plants as practical, keeping living plants in the soil as often as possible, and keeping the soil covered all the time.



Map 5.1 - Distribution of Prime Farmland



Prime Farmland - This map shows the land area that is considered to be prime farmland according to the USDA soil classification. The abundant area of prime farmland is important to protect as development encroaches into the unincorporated areas of the county.

Sand, Gravel, & Quartzite Deposits

Sand, gravel, and quartzite are among Minnehaha County's major natural resources. The mining industry is significant to the county and is likely to continue to be so in the future. Most of the sand and gravel deposits are found along river and stream beds where the porous material allows for groundwater to accumulate into shallow aquifers. Quartzite is the bedrock for the entire county and can be found sporadically near the surface in the eastern half of the county.

The process of extracting sand, gravel, and quartzite disturbs the land surface more than any other land use. This disturbance is evident in aerial photography of the area surrounding Skunk Creek to the west of Sioux Falls (below).



The vast disturbance of land through quarry operations necessitates a reclamation process for returning the land to a useable state. The proposed use of reclaimed land should match up with this plan. Naturalized reclamation areas should include provisions to create viable habitat such as slope alterations, soil replacement, vegetation, and wetland creation where applicable. Development may be done in some instances such as the Cherry Lake Reserve on the northwest corner of SD Highway 42 and Ellis Road in Sioux Falls.

Image Left: Lakes created by high groundwater in former gravel quarries. Active quarry sites can be seen in the approximate center of photo; while city annexed land is developing into a residential neighborhood along the bottom. Recreation is seen on the right side of the photo where Family Park is located and is operated by the City of Sioux Falls.



The potential for surface and ground water alteration and contamination is also a concern with gravel extraction. The permitting process for new and expanding quarry operations should continue to require a hydrologic study to ensure that no adverse effects will be made to surface and ground water. Extraction operations generate sizable amounts of truck traffic. Truck traffic problems are a key concern to county residents in regards to this industry. In some cases the hauling of mineral resources on County, State, and Township roads necessitates additional maintenance costs that can be mitigated by the company doing the extraction.

Noise and safety on public rights-of-way are also serious concerns associated with truck traffic. Some operations are restricted to certain roadways while other operations are required to spray gravel roads to reduce the limit of dust generated by the trucks.

Mining operations are regulated in Minnehaha County through the Zoning Ordinance. Mining is allowed in the agricultural and recreation/ conservation zoning districts through the conditional use permit process. This allows the public and other affected parties to have a voice in the permitting process. There are also State regulations which must be adhered to as well.



County Parks

Minnehaha County recognizes the value and importance in providing our citizens with opportunities for the use and appreciation of the county's natural resources. Our parks provide a place for healthy outdoor recreation, cultural education, and interaction with nature. Each of the County's three parks exist due to acts of generosity through the donation of land.

Wall Lake Park

Wall Lake Park is a 25-acre public use area and the county's oldest park. It lies adjacent to Wall Lake and has the county's only public swimming beach. In 1917 a sandy strip of land was dedicated for the beach.

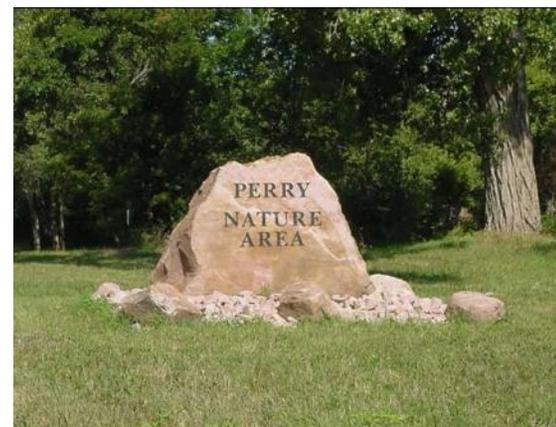
The park encompasses property that was willed to Minnehaha County in 1949 to be used for public parks and recreational purposes. It wasn't until 1985 that the county took steps to develop the park and improve the beach. Picnic tables and grills are provided at several sites and a picnic shelter overlooks the lake from a hilltop. Children can enjoy the playground equipment and a spacious open area is available for field sports. This is the busiest of the County parks in part because of the swimming beach. Future improvement considerations for this park should include potential activities for open spaces and demonstrations of sustainable practices such as beach front restoration.





Bucher Prairie

The tract of land that became Bucher Prairie was dedicated with the request that the park be a reflection of the prairie that would have been historically present on the site. Eastern South Dakota once was a tall grass prairie, the wettest prairie ecosystem. Grass and flowers of this ecosystem would have included bluestem, switch grass, Indian grass, pasque flower, goldenrod and purple coneflower. Many of these native plants have been re-introduced into the 20 acre park. The park includes a trail system, intermittent streams with pond, and a picnic shelter. This prairie restoration park provides a good opportunity to include educational materials of the native flora and fauna of Minnehaha County.



Perry Nature Area

The Perry Nature Area encompasses 23 acres of diverse ecosystems including woodlands, upland grasslands and riparian areas that are home to a wide variety of native plants and numerous species of wildlife. In addition to these natural features, the area is linked to a rich community history. The nature area is the former East Sioux Falls town site, a community established in the late nineteenth century in relation to the nearby quarrying of Sioux quartzite. The stone from these quarries was used in many historic buildings in the region. Perry Nature Area is dedicated to the preservation of the wonderful natural treasures of the site and the storied history of this once bustling city. The Perry Nature Area is currently operated in conjunction with the Mary Jo Wegner Arboretum and the City of Sioux Falls.

State Parks

Minnehaha County contains three state parks. All three are located in the diversified terrain found on the eastern side of the county. Each state park offers varied opportunities for recreation and education.

Beaver Creek Nature Area

Beaver Creek Nature Area was developed to increase environmental awareness of visitors and to highlight natural and historical resources in the vicinity. Pioneers named the creek for the numerous beaver they found along the winding spring-fed stream. The stream flows year-round, supplying numerous plants and animals with water, and in turn, supplying visitors with opportunities to observe nature up-close.

Big Sioux Recreation Area

Big Sioux Recreation Area lies on the banks of South Dakota's Big Sioux River near the City of Brandon. This park is popular among campers, canoers, history buffs, and archers. Volleyball courts and a disc golf course are also available.

Palisades State Park

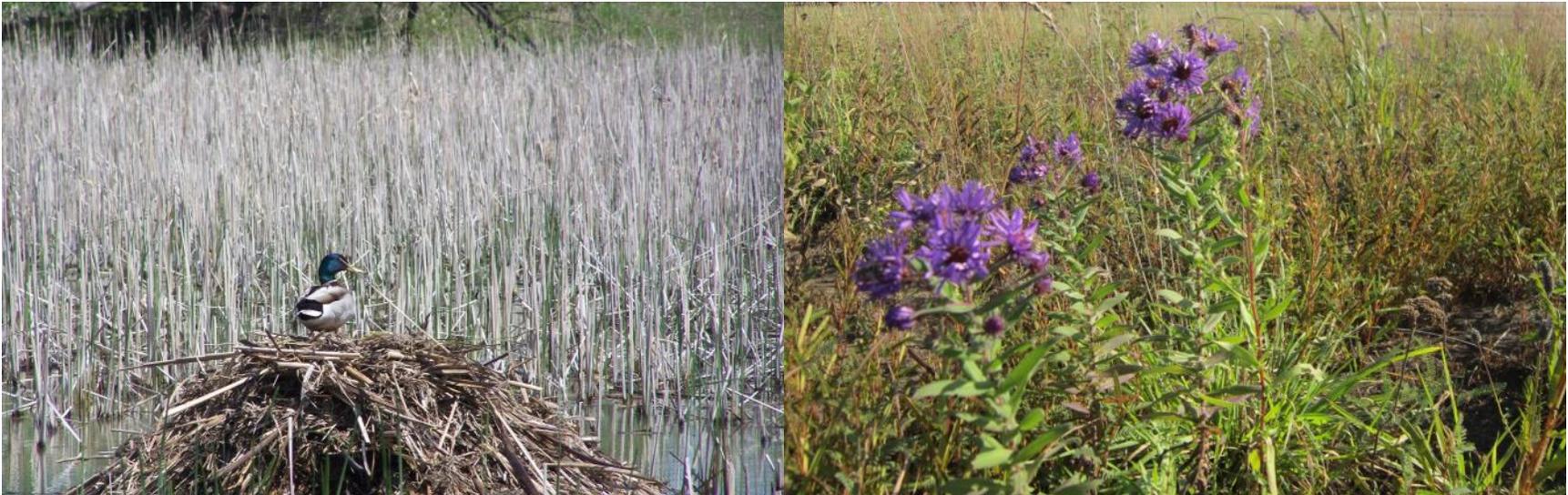
Palisades State Park is one of the most unique places in South Dakota. Split Rock Creek, which flows through the park, is lined with Sioux quartzite formations varying from shelves several feet above the water to 50-foot vertical cliffs. The quartzite cliffs differentiate Palisades State Park as perhaps the best rock climbing location on the east side of the state.



Public Lands

The South Dakota Game, Fish & Parks (GF&P) operates thirteen game production areas in Minnehaha County. This land encompasses 2,531 acres with the majority of it composed of water and various wetlands. In addition, the United States Fish and Wildlife Service preserves 4,202 acres of wetlands and associated uplands in Waterfowl Production Areas.

The preserved lands are predominately located in the western portion of the county which consists of many pothole lakes that are conducive for wetland and grassland dependent species. The primary focus of preserving this land is to provide opportunities for game production and for public hunting and fishing.



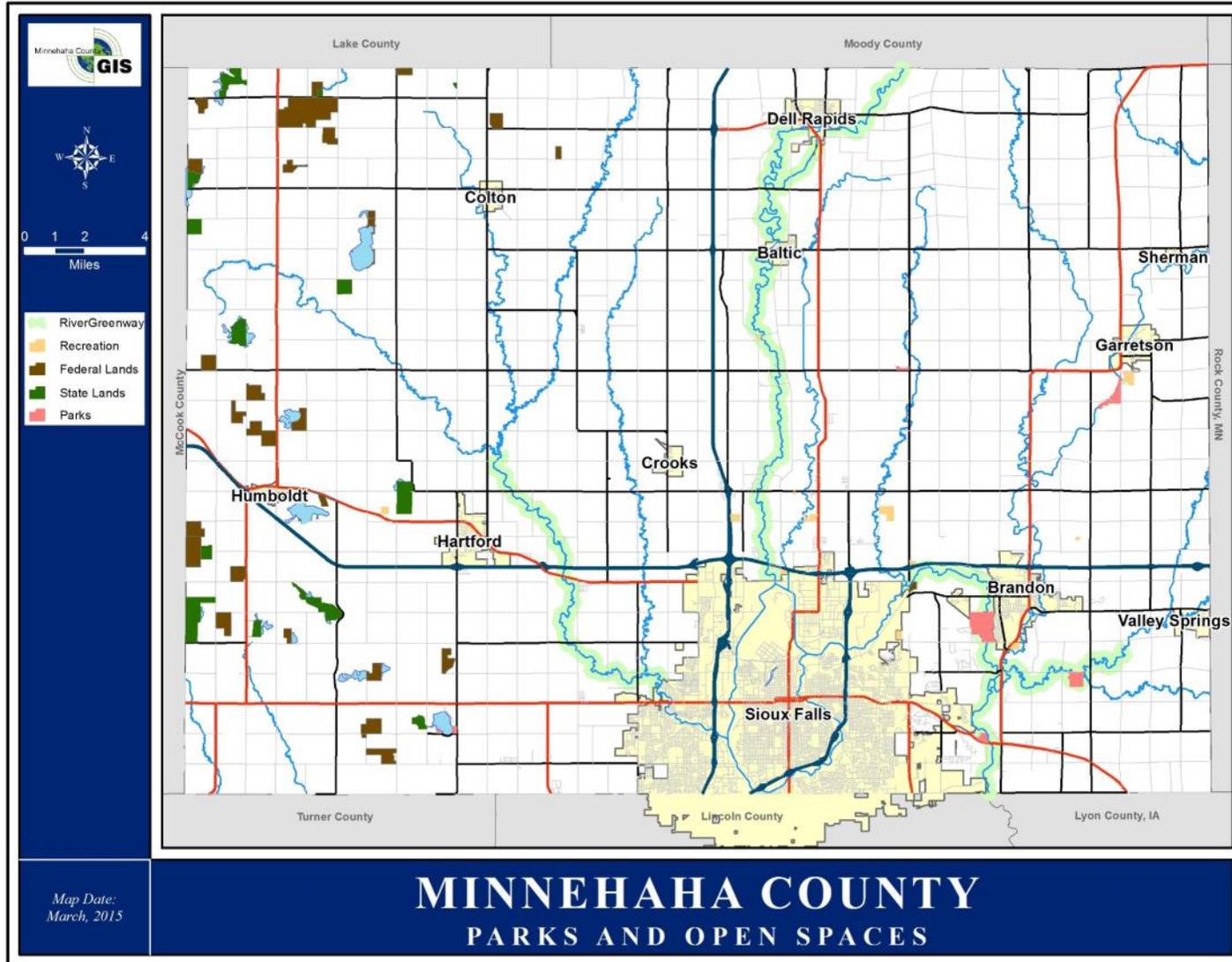
Greenways and Trails

Parks and conservation land provide valuable habitat for natural resources and recreation opportunities for the public; however many of these locations are spread out and fragmented making it difficult for wildlife to utilize multiple green spaces and difficult for the public to visit without a personal vehicle for transportation. Naturalized greenways consisting of natural landscapes with little to no development could be utilized to act as corridors for wildlife to move freely between the pockets of parks and conservation lands. The most appropriate places to locate greenways and multi-use trails would be to begin near rivers and streams where wildlife and ecosystems services are naturally present.

Greenways can provide benefits to the county through promoting ecosystem services, such as water filtration and flood control; greenways may also double in purpose by providing locations for activities such as multi-use trails. Trails can connect green spaces and communities with each other while providing for recreation and transportation benefits. These trails should interact with existing municipal greenways, municipal trails, and county non-motorized transportation and recreation routes to provide convenient access for members of the public. The non-motorized section of the Transportation chapter describes potential routes and trails in more detail as well as on Map 5.2 on pg. 53.



Map 5.2 - Parks and Open Spaces



Water Resources

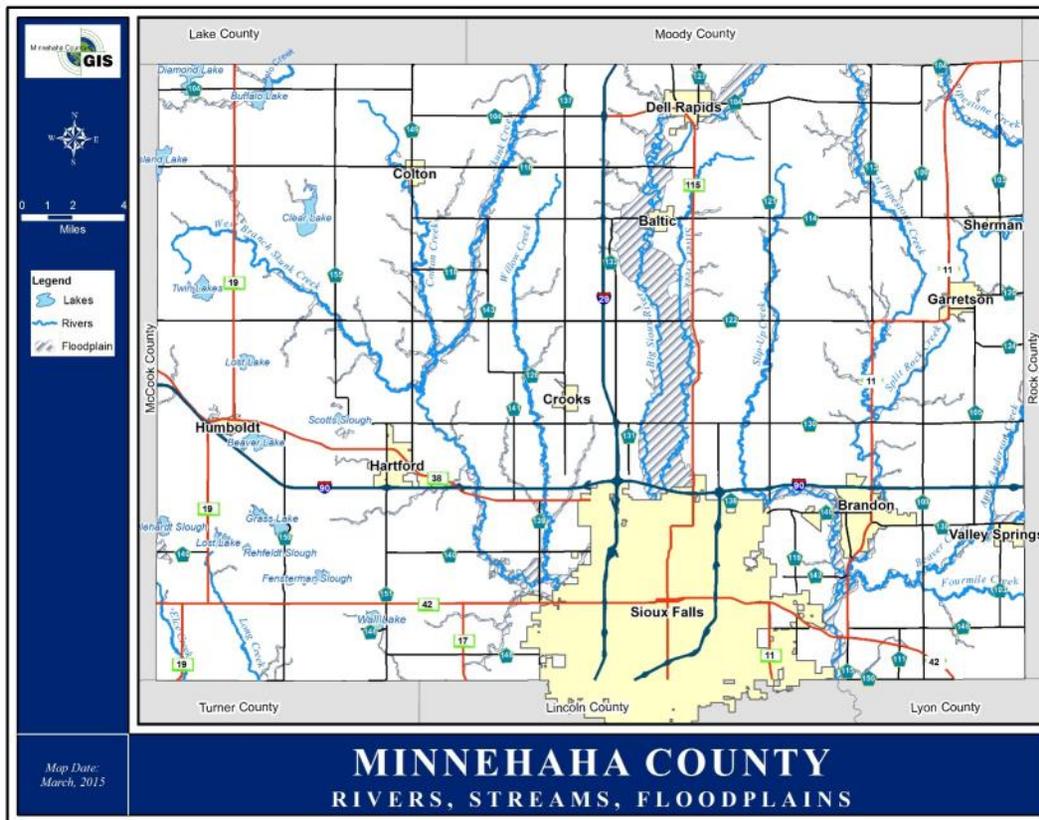
Rivers and Streams

The Big Sioux River, along with the Skunk and Split Rock Creek tributaries, form the major surface drainage features in the county. The Big Sioux begins in the northeast part of South

Dakota then flows through Dell Rapids, Baltic, loops around Sioux Falls, and near Brandon on its journey to the Missouri River. In the eastern two-thirds of the county the stream network is well defined. The remainder of the county has more

poorly defined drainage, and this is visible in Map 5.3 where lakes become common and large gaps separate named streams. Significant natural features are apparent in Garretson, Dell Rapids, and Sioux Falls. For example, the Dells of the Sioux is characterized by steep, vertical quartzite walls where it splits from the river. Dell Rapids, Garretson, and Sioux Falls utilized an essential natural resource to promote the area as a major public asset and tourist destination. Skunk Creek and its west fork tributary drain the western portion of the county, joining the Big Sioux in western Sioux Falls. Split Rock Creek, which drains into the Big Sioux south of Brandon, forms the dominant drainage feature in the eastern part of the county. The natural beauty of the stream is prominently displayed in Garretson within the city park and south of the city at Palisades State Park, where steep quartzite walls and ledges accent these recreational amenities.

Map 5.3 - Rivers, Streams & Floodplains



Floodplains

Minnehaha County maintains eligibility in the National Flood Insurance Program by enforcing the Floodplain Ordinance. This ordinance restricts residential structures in the floodways and requires specific construction measures in the floodplain. There are approximately 43,910 acres of floodplain designated on the November 16, 2011 & October 10, 2009 FEMA maps, of which 3,856 acres are in the floodway. Many homestead sites and small enclaves, such as the Village of Renner, have endured the spring floods for generations.

Floodplains offer some of the most beautiful landscapes, productive wetlands, fertile soils, significant plant and animal life, and valuable historical and archaeological features in the county. Water has long been critical to human survival, providing transportation and commerce, and settlement patterns largely influenced by natural systems. Since early development frequently encroached into flood prone areas, certain areas of the county may be subject to flooding hazards similar to the images shown at right.

The village of Renner has had a history of flooding. The images to the right include floods from 1960 and 2011
Images courtesy of : George Carlson of sodcity.com



Lakes & Wetlands

Numerous prairie lakes were created in eastern South Dakota by the last glaciation period. While they are most prevalent in the northeastern part of the state, a few prairie lakes were formed in the western portion of Minnehaha County. When the last glacier retreated from this area, glacial till filled many depressions formed by earlier glaciers leaving shallow pot holes and wetland areas rather than well defined, deeper lakes. Wall Lake, with a surface area of 220 acres, is the only significant lake in the county. The lake was dredged of silt nearly twenty years ago and now has a depth in excess of 20 feet. Other water bodies include, but are not limited to Grass, Beaver, Lost, Clear, Buffalo, and Diamond Lakes, which are exceptionally shallow and function primarily as large wetland areas.

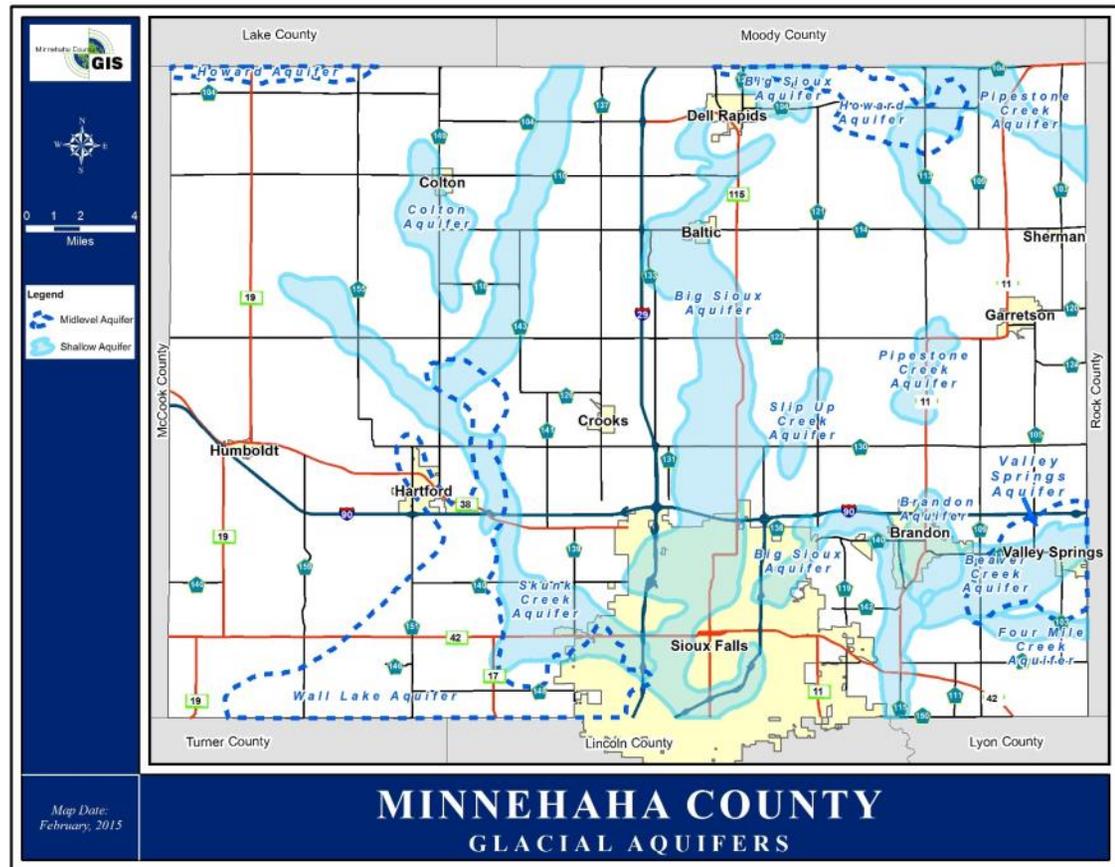
Wetlands are predominantly located in the western part of the county, but are incrementally disappearing due to the demands of certain agricultural and drainage tile practices. They perform several key functions by serving as natural water purifiers by filtering out pollutants; therefore, enhancing surface and ground-water quality, increasing wildlife and fish habitat, and providing recreational opportunities. Wetlands are also essential agents in reducing siltation and flood control by slowing runoff during rapid snow melt and heavy rainfall, releasing water gradually to minimize erosion and downstream flooding. It is important to note that Minnehaha County discourages the conversion of wetlands through enforcement of the Drainage Ordinance.



Map 5.4 - County Aquifers

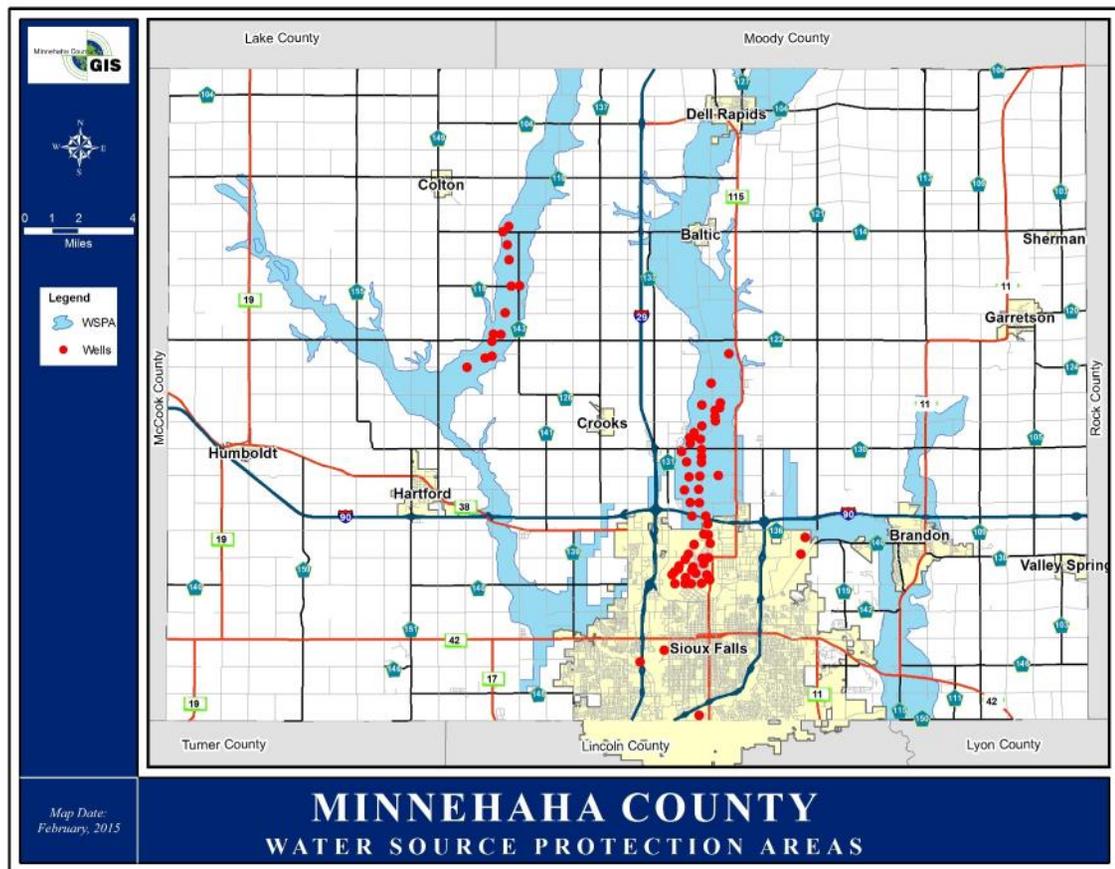
Groundwater Aquifers

There are nine major glacial aquifers in the county. The Big Sioux and Skunk Creek are water sources for Minnehaha County and its incorporated municipalities. The Split Rock aquifer has a substantial storage capacity consisting of 855,000 acre-feet. Hydrologic studies have identified the interrelationship of ground and surface waters where a stream is in contact with an aquifer, as is the case with the Big Sioux River and the outwash deposits along the Big Sioux valley. Depending on the relative water levels, water may move into or out of a stream. An influent stream supplies water to an aquifer while an effluent stream receives water from the aquifer. Groundwater discharge from aquifers into the Big Sioux forms the base flow of the river. This base flow is a significant part of the total flow during periods of low surface runoff but becomes a same fraction of the total flow when high surface runoff occurs. A comprehensive management program is important not only above the aquifer, but within the entire drainage basin because of the connection between ground and surface waters.



Shallow aquifers and streams are at risk of contamination by a variety of sources— inadequate wastewater treatment and disposal attributed to both on-site and municipal sources, mismanagement of waste from livestock facilities, overuse of fertilizers and pesticides, solid waste disposal sites, and sites for the storage and manufacture of regulated substances. To assist in the protection of the county’s aquifers and streams, a water source protection overlay district was established in the zoning ordinance to prohibit uses which pose a high risk of contamination to groundwater resources and regulate potentially damaging uses so that adverse environmental impacts are minimized. The overlay district protects 56,734 acres, of land located over these aquifers. There are a large number of public wells located over these aquifers. The Sioux Falls well field is concentrated within a five-mile segment of the Big Sioux aquifer north of the city along with an expansion into the Middle Skunk Creek aquifer south-east of Colton.

Map 5.5 - Water Source Protection Areas



Agricultural Drainage

Agricultural drainage is the removal of excess water from fields through the use of ditches and subsurface pipe often called "drainage tile". The installation of tile drainage is a very common land improvement practice in Minnehaha County. Corrugated plastic tubing, clay and concrete drain tile are installed beneath the surface of agricultural land to drain excess water from the crop root zone. If soils are too wet, there are more risks of soil compaction and reduced plant growth and crop yields. The relief of these problems through tile drainage increases crop productivity, farm efficiency, and protection of roads and property.

The South Dakota Legislature assigned the responsibility for drainage matters to counties in 1985. Drainage is governed by the Minnehaha County Drainage Board and administered by the Planning Department under the policies and regulations established by the Drainage Plan and the Drainage Ordinance. A community taskforce was enlisted to rewrite the ordinance in 2010.

Overall, the requirement for drainage permits has been well accepted by the agricultural community. Notification requirements prevent the outlet of water onto neighboring properties without warning and encourages adjacent landowners to work

together on drainage problems. Coordination between landowners has led to many new tile projects that drain hundreds of acres. The chart, below, shows a dramatic decline in the amount of drainage permits obtained for the previous two years, which might be correlated with a drop in crop yield prices and/or fewer remaining acres that have yet to be drained.

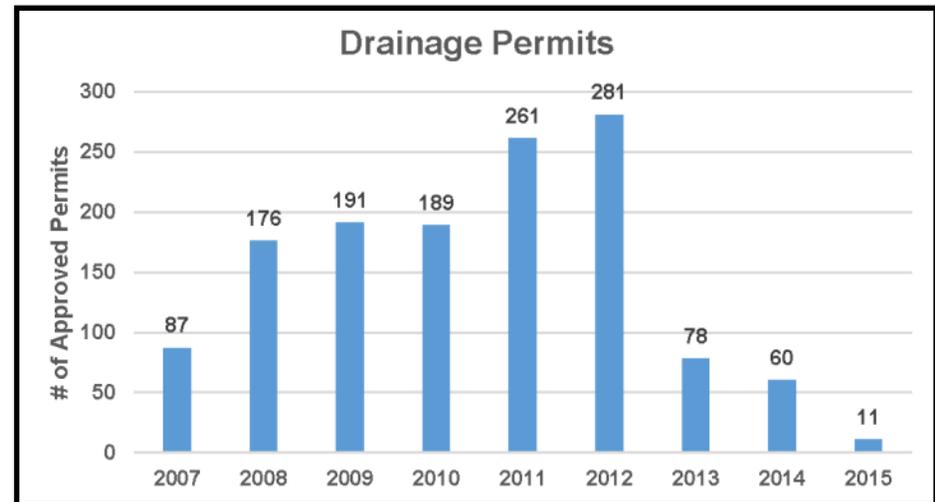


Figure 5.1 - Total Number of Drainage Permits Issues (2007–2014)

Source: Minnehaha County Planning Department

* Includes approved Drainage Permits up to April 15, 2015

Wastewater Treatment & Disposal

Central wastewater collection and treatment facilities serve municipal residents and limited rural population located within the four sanitary districts. A majority of rural residents and businesses utilize an on-site wastewater treatment (septic) system. Rural commercial and industrial uses, churches, and park facilities dispose of sewage by individual means, usually by septic system or holding tank in which the contents are routinely pumped and disposed off-site.

Much of the rural residential growth will continue to be served by individual systems with an importance on maintaining safeguards to protect public health and the environment. New central sewer facilities should not be proposed in the rural agricultural areas of the county because the residential densities associated with this growth are higher than density zoning allows; however, existing on-site systems are expected to be replaced as annexation occurs. Existing sanitary sewer districts should be encouraged to expand capacity of facilities to meet the demands of growth within their territories.

On-site wastewater systems pose the least risk to human health and the environment when used in low density, large acreage type settings. A system must be located where soils have an acceptable percolation rate, the seasonally high water table and bedrock are more than four feet below the drain field. A test hole should be dug in the area of the proposed absorption field at least four feet below the bottom of the trench. If the soil profile indicates a seasonally high water table, then adjustments to the trench depth are necessary.

Since soil type can change within the building site, percolation tests must be taken at the proposed location of the system to accurately calculate the proper sizing of the absorption field. Soils where the effluent is absorbed slowly will require a larger drain field. On the other hand, soils with a very rapid absorption rate are not acceptable because effluent will reach the groundwater before proper filtration occurs.

*

Stormwater Management

Stormwater Management Program

Minnehaha County was identified as meeting the Environmental Protection Agency's requirements for needing to address stormwater. Stormwater discharges are often a significant contributor to local water quality impairments as they can carry high levels of sediment, oil, toxins, pesticides, trash, and other pollutants that flow into local waterways.

As a result of this need to address stormwater, Minnehaha County is expected to develop a Stormwater Management Program (SWMP) by 2019, which should include milestones for implementing each aspect of the program and by the end of the first five-year MS4 permit term the program will need to be fully developed and implemented. The area of concern identified is located in one or more counties with unincorporated populations serving less than 100,000. The Clean Water Act, through development of national stormwater regulations, establishes an MS4 stormwater management program. The process for establishing the program is to select Best Management Practices (BMPs) including but not limited to vegetated filter strips, permeable pavement, riparian areas, and open space design that prevent stormwater pollution from entering our waterways.

Although overall awareness and interest in environmental protection exists at the local government and citizen level, the County's water resources continue to experience degradation from stormwater runoff. A concerted effort to establish a Stormwater Management Board, made up of citizens and trained MS4 operators, will be vital in protecting water resources.

Municipal Separate Storm Sewer (MS4)

Conveyance or system of conveyances

- Designed or used to collect or convey stormwater that discharges to waters of the state.

MS4 (Six Minimum Control Measures)

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
*detect/eliminate illicit discharges
4. Construction Site Runoff Control
*site plan review/inspections
5. Post Construction Runoff Control
*Best Management Practices (BMPs)
6. Good Housekeeping
*pollution prevention guidelines

Management of stormwater runoff and its contaminants constitute one of the major problems we face in development practices. While surface runoff has been controlled through the conventional ditch, gutter, and pipe method this approach is not entirely as effective as utilizing ecosystem services to the maximum extent. Stormwater Best Management Practices (BMPs) should be a major consideration in all land use planning and development decisions to fully balance economic development with the natural environment.

Water quality and the intensity, timing, and velocity of runoff events are closely related to stormwater management. Vegetated surfaces slow or capture runoff, but runoff is substantially increased when these are replaced by impervious surfaces such as roofs, driveways, parking lots, and streets.

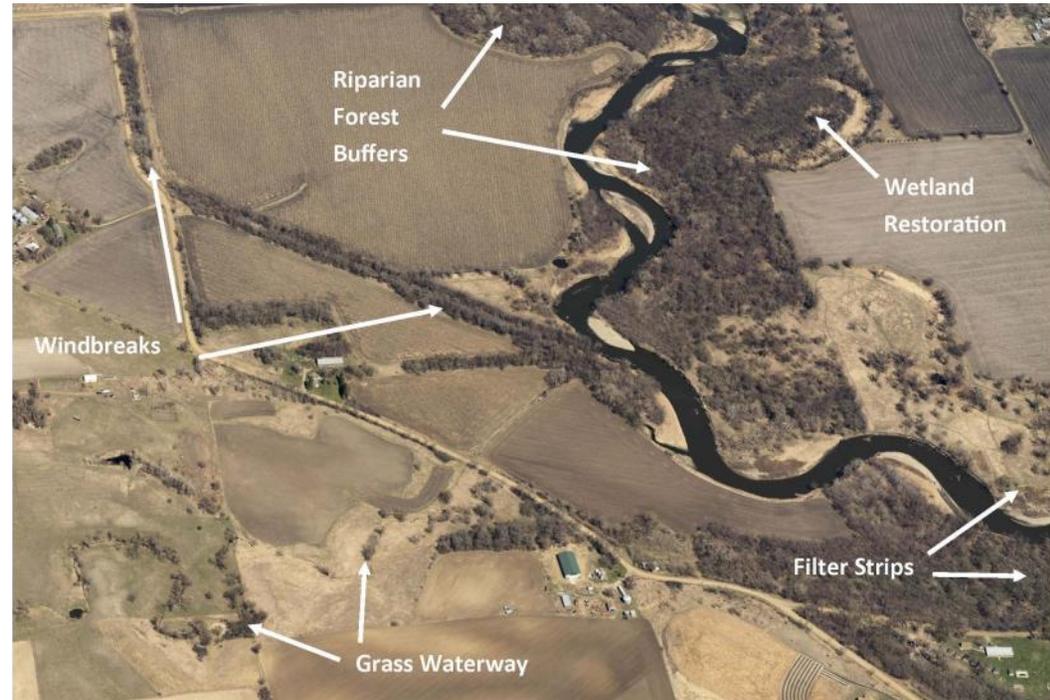


Figure 5.2 - Best Management Practices Diagram: Big Sioux River Watershed

Image Source: Pictometry, 2015

Development should not be allowed prior to completion of a drainage plan which defines natural drainage corridors and identifies the number and location of detention facilities needed to accommodate additional runoff from impervious surfaces. Developers should be encouraged to use natural areas for aesthetic, open space, wildlife habitat, and recreational purposes.

Low Impact Development (LID) offers several strategies to minimize the impact of surface runoff on downstream property owners, reduce the risk of flooding, and restore the hydrologic and ecological functions of our waterways.



Existing riparian area buffer protection along the Big Sioux River

LID Strategies to Minimize the Impact of Land Development

- Riparian area buffers (river/stream setbacks)
- Bioretention facilities (rain garden/bioswale)
- Vegetated filter strips (grass waterways)
- Permeable surfaces (porous concrete/gravel)

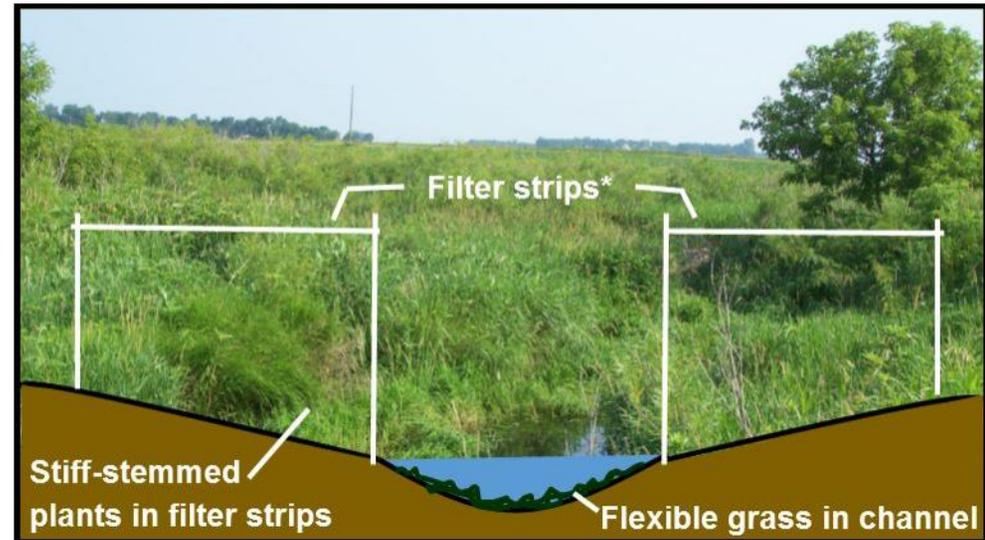


Figure 5.3 - Vegetated Filter Strip Diagram (Filter strips* trap sediment and slow down surface water runoff)

Natural Resources and Open Spaces - Goals & Actions

Goal 1. Preserve the quality of natural resources.

- Action 1.1 Enact setbacks to create buffers from development around water bodies and wetland areas.
- Action 1.2 Develop a joint program with the Game, Fish and Parks Department to enforce their permit requirement for repair or changing of shorelines.
- Action 1.3 Add setbacks to the zoning ordinance that distance residential houses from Game, Fish and Parks land.

Goal 2. Promote sustainable use of natural resources.

- Action 2.1 Preserve contiguous and connected open spaces through setbacks and greenways.
- Action 2.2 Encourage and support the restoration of degraded areas.
- Action 2.3 Utilize County Parks to educate and demonstrate sustainable land uses and ecological services.

Goal 3. Limit development in floodplains and above aquifers.

- Action 3.1 Enforce the requirements and restrictions of the Floodplain Development Ordinance.
- Action 3.2 Preserve the quality and quantity of water resources through enforcement in the Water Source Protection Area.
- Action 3.3 Promote the use of land in riparian areas to be used as greenways to prevent development and allow for flooding to take place naturally.

Goal 4. Maintain and enhance public access to public lands.

- Action 4.1 Support Federal, State, and County public lands and parks.
- Action 4.2 Utilize rivers as greenways for natural connections and public uses such as multi-use trails.
- Action 4.3 Ensure continued access to waterways and public lands through the subdivision and platting process.

Goal 5. Recognize that sand and gravel deposits within the County are an un-renewable natural resource and beneficial to the economy of the County and the welfare of its people.

Action 5.1 Require new mining operations to hold a public meeting with surrounding land owners.

Action 5.2 Require that appropriate post- excavation land uses be consistent with the County's land planning process.

Action 5.3 Minimize conflicts with existing neighborhoods from the impacts of adjacent extraction operations and the transportation of extracted mineral resources.

Action 5.4 Protect the natural environment from all sources of pollution resulting from mineral extraction.

Goal 6. Implement the Municipal Storm Sewer System (MS4) program.

Action 6.1 Develop and implement a Stormwater Management Program.

Action 6.2 Coordinate policies and procedures with the Department of Environment & Natural Resources, County Highway Department, and municipalities.

Action 6.3 Initiate education and outreach campaign.

Goal 7. Encourage the use of Low Impact Development (LID) strategies.

Action 7.1 Develop educational materials to promote the installation of Best Management Practices (BMPs) for stormwater management.

Action 7.2 Coordinate with Minnehaha Conservation District to seek funding opportunities to provide landowners with technical assistance and financial cost share to implement BMPs.

Goal 8. Support the use of drain tile in areas of agricultural production.

Action 8.1 Update the Minnehaha County Drainage Plan and Drainage Ordinance.

Action 8.2 Develop and maintain a database of installed drain tile in the county.

Goal 9. Collaborate with other agencies concerning drainage law and practices.

Action 9.1 Support actions to simplify codified drainage law.

Action 9.2 Coordinate with various entities to manage water resources effectively.

Action 9.3 Promote the use of best management practices to reduce the impact on downstream property owners.

