

## Natural Resources

### Introduction

Scandia's landscape is a mosaic of agricultural lands, residential and commercial development, lakes and streams, and areas with remnant natural vegetative cover. As development continues, plans to manage future growth should be based on a thorough understanding of the natural resources within the city's boundaries. The purpose of this background report is to summarize available information regarding natural resources in the City of Scandia and discuss the relationship between natural resources and land use planning. The report is organized into three major topic areas:

- Water Resources
- Geology and Topography
- Natural Areas

### Water Resources

This section of the background report describes the following information related to water resources:

- Public Waters Inventory
- Shoreland Management Lake Classifications
- Floodplain Areas
- Water Quality
- Watershed Boundaries

#### Public Waters Inventory

Public waters are all waterbasins and watercourses that meet the criteria set forth in Minnesota Statutes, Section 103G.005, subd. 15, that are identified on Public Water Inventory maps and lists authorized by Minnesota Statutes, Section 103G.201. Public waters wetlands include all type 3, type 4, and type 5 wetlands (as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971 edition) that are 10 acres or more in size in unincorporated areas or 2.5 acres or more in incorporated areas. Of the many wetlands and water bodies within the City's boundaries, 40 of them have been classified as public waters in accordance with the guidelines of the Minnesota Department of Natural Resources.

Public waters within Scandia range in size from 2 acres to nearly 2,000 acres of water surface and include several water bodies of regional significance. Table 1 - *Public waters within the City of Scandia*, provides information on all public waters and their acreage. The St. Croix River, a Federally-designated National Scenic Riverway, forms the eastern border of the City. Big Marine Lake, in the southwestern portion of the city, is the second largest lake in Washington County. Existing and future development in areas surrounding public waters should be carefully managed and planned to prevent adverse impact on water resources.

Table 1 - Public waters within the City of Scandia

Name	Public Water Inventory ID	Shoreland Management Classification	Acres
Alice	82-287 P	Natural Environment	26.03
Big Marine	82-052 P	Recreational Development	1902.59
Bone	82-054 P	Recreational Development	218.47
Clear	82-078 W	Natural Environment	35.28
Elwell	82-079 W	Natural Environment	18.86
Falls Creek (§1.6.7.12)		Wild and Scenic	-
Fish	82-064 P	Natural Environment	64.99
German	82-056 P	Natural Environment	151.20
Goose	82-059 P	Natural Environment	84.04
Sylvan	82-080 P	Recreational Development	108.25
Hay	82-065 P	Natural Environment	59.32
Long	82-068 P	Natural Environment	46.12
Nielson	82-055 W	Natural Environment	49.65
Pitzl Pond	82-282 W	Natural Environment	36.19
Rasmussen Pond	82-070 W	Natural Environment	18.24
Sand	82-067 P	Natural Environment	47.41
Sea	82-053 W	Natural Environment	51.67
St. Croix River	82-001 P	Wild and Scenic River	-
Washington	82-169 W	Natural Environment	22.34
White Rock	82-072 P	Natural Environment	80.88
Wojtowicz Pond	82-058 W	Natural Environment	16.80
Unnamed	82-057 W	Natural Environment	27.52
Unnamed	82-060 W	Natural Environment	26.26
Unnamed	82-061 W	Natural Environment	14.37
Unnamed	82-062 W	Natural Environment	17.44
Unnamed	82-066 W	Natural Environment	33.75
Unnamed	82-081 W	Natural Environment	41.29
Unnamed	82-171 W	Natural Environment	14.54
Unnamed	82-172 W	Natural Environment	26.95
Unnamed	82-173 W	Natural Environment	10.49
Unnamed	82-174 W	Natural Environment	26.49
Unnamed	82-210 W	Natural Environment	25.12
Unnamed	82-211 W	Natural Environment	10.84
Unnamed	82-212 W	Natural Environment	17.46
Unnamed	82-213 W	Natural Environment	10.88
Unnamed	82-280 W	Natural Environment	19.48
Unnamed	82-281 W	Natural Environment	7.46
Unnamed	82-283 P	Natural Environment	8.46
Unnamed	82-284 P	Natural Environment	2.08
Unnamed	82-285 P	Natural Environment	14.73
Unnamed	82-286 P	Natural Environment	5.17

## Shoreland Management

The Minnesota Department of Natural Resources' (DNR) Shoreland Management System was developed so that appropriate development standards could be applied to the different types of lakes found in Minnesota. This classification system includes public water basins (lakes) greater than ten acres in size in incorporated areas that have DNR-approved shoreland ordinances. Lakes are divided into the following classes:

- **Natural Environment Lakes** 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** usually have between 60 and 225 acres of water per mile of shoreline, between 3 and 25 dwellings per mile of shoreline, and are more than 15 feet deep.
- **General Development Lakes** 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. (Note: no lakes in Scandia have been given this classification)

Classifications for the lakes within the City of Scandia are shown on Map 1 - *Lake Classifications, Shoreland, and Floodplain Areas*, and listed in Table 1 - *Public waters within the City of Scandia*.

While the lakes in Scandia are one of the reasons that the city is an attractive place to live, residential development on these lakes can have detrimental effects on water quality and wildlife habitat. One of the primary concerns is the impact of impervious surfaces on water quality. In order to protect lakes from the negative impacts of development, the State of Minnesota requires cities and counties to adopt a shoreland management ordinance that provides for the orderly development and protection of shorelands. When New Scandia Township incorporated as the City of Scandia, the city developed and adopted its own Shoreland Management Ordinance in 2007.

The Shoreland Management Ordinance applies to land located within the following distances from lakes that have been given a lake shoreland management classification or rivers and streams that are considered public waters:

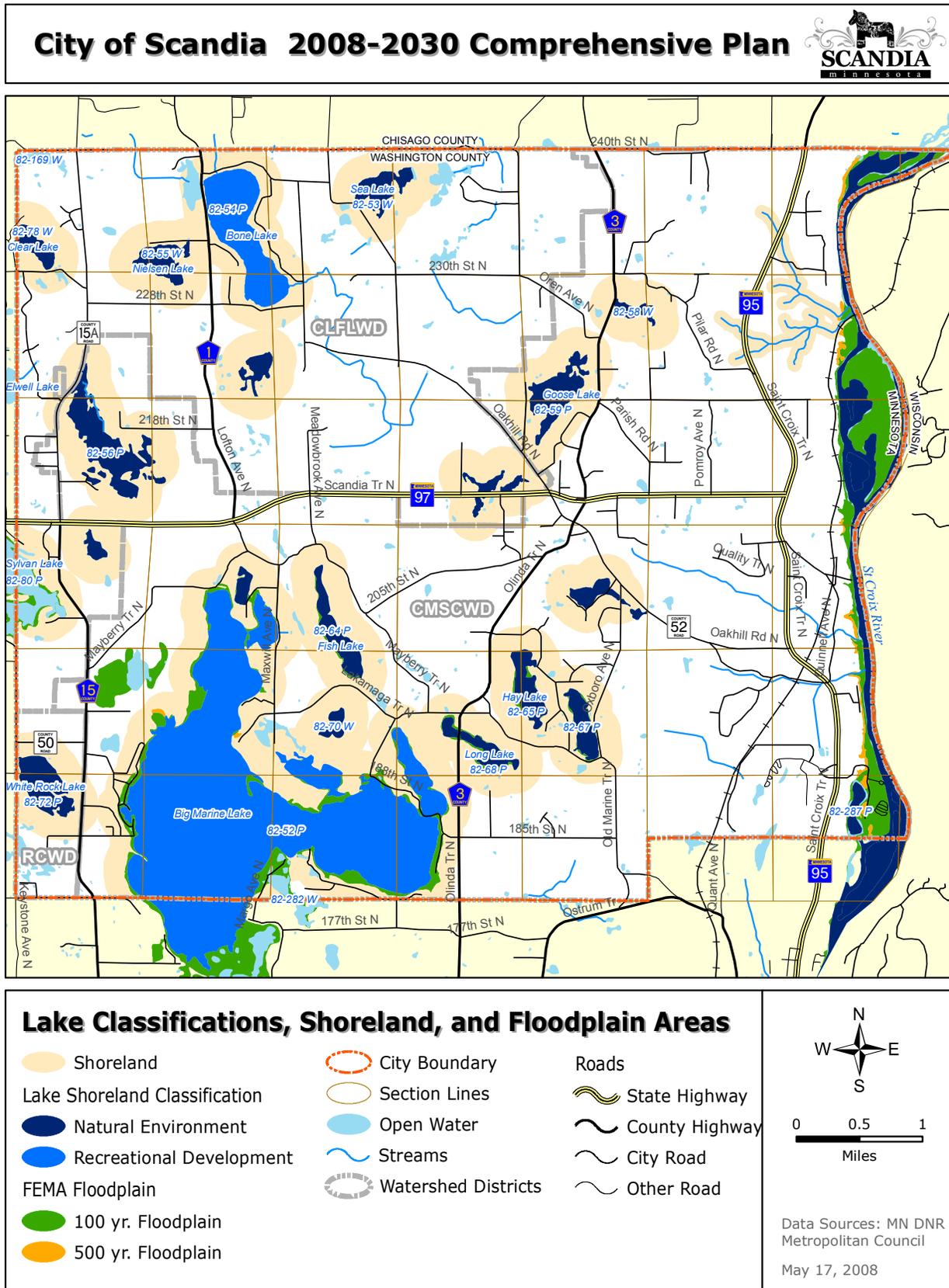
- 1,000 feet from the ordinary high water level of a lake, pond, or flowage
- 300 feet from a river or stream, or the landward extent of a floodplain designated by ordinance on a river or stream, whichever is greater.

Shoreland Areas within Scandia are shown on Map 1 - *Lake Classifications, Shoreland, and Floodplain Areas*.

## Floodplain Areas

The floodplains shown on this map were digitized from the Federal Emergency Management Agency Flood Insurance Rate Map for Washington County. Floodplains were delineated for the St. Croix River and some of the larger lakes in the City of Scandia including Big Marine Lake, Long Lake, Fish Lake and Hay Lake. Map 1 - *Lake Classifications, Shoreland, and Floodplain Areas*, shows the extent of the 100-year and 500-year flood plains for water bodies in the City of Scandia. Scandia adopted an updated floodplain ordinance in early 2008.

Map 1 - Lake Classifications, Shoreland, and Floodplain Areas



**Water Quality/Impaired Waters**

In 2006, 11 lakes in the City of Scandia were monitored as part of the Metropolitan Council’s Citizen-Assisted Monitoring Program (CAMP). Lakes are sampled every two weeks from mid-April through mid-October. During each sampling event, temperature, dissolved oxygen, and Secchi depth transparency are measured and recorded. A surface water sample is also collected and analyzed for total phosphorus, total Kjeldahl nitrogen, and chlorophyll-a. Total phosphorus is a key measure of lake nutrients, chlorophyll-a is a measure of algae abundance, and Secchi depth transparency is a measure of water clarity. Map 2 - 2006 Water Quality Grade, shows the 2006 water quality grades for lakes in the City.

The Metropolitan Council uses the monitoring data to assign each lake a water quality grade using an A through F grading system. The grading system uses percentile ranges for three water quality indicators-summertime average values for total phosphorus, chlorophyll-a, and Secchi depth transparency. An overall grade is calculated as the average grade for the three individual grades. The overall grade for 2006 is displayed on Map 2 - 2006 Water Quality Grade. The majority of monitored lakes in the City were given a “C” grade, including Big Marine Lake, Bone Lake, Goose Lake, Hay Lake, and Long Lake. White Rock Lake, Fish Lake and Jellum’s Bay on Big Marine Lake were given a “D” grade.

Under the federal Clean Water Act (33 U.S.C) the MPCA is required to set standards and assess Minnesota waters for impairments. The standards are set on a wide range of pollutants, including bacteria, nutrients, turbidity and mercury. A water body is listed as impaired by the MPCA if it fails to meet one or more water quality standards. If a water body is listed as impaired, a Total Maximum Daily Load (TMDL) must be established for the pollutant. A TMDL implementation plan will then be designed to reduce the pollutant loading to meet the TMDL. Scandia will be required to participate in TMDL plans for impaired water bodies within its borders. In Scandia the following water lakes are listed as impaired because of excessive nutrients; Big Marine, Bone, Fish, Goose, Hay, Long, and Sand. Big Marine Lake is also listed as impaired because of mercury pollution. The St. Croix River is listed as impaired for mercury and polychlorinated biphenyl (PCB).

**Watershed Boundaries**

The City of Scandia contains portions of three watershed management organizations: the Carnelian Marine-St Croix Watershed District (CMSCWD), the Comfort Lake-Forest Lake Watershed District (CLFLWD), and the Rice Creek Watershed District (RCWD). The northwest corner of the City is part of the CLFLWD and drains to the Sunrise River which

eventually drains to the St. Croix River. A very small area in the southwest part of the City drains to the RCWD and the Mississippi River. The remainder of the City is within the CMSCWD which drains to the St. Croix River in two ways:

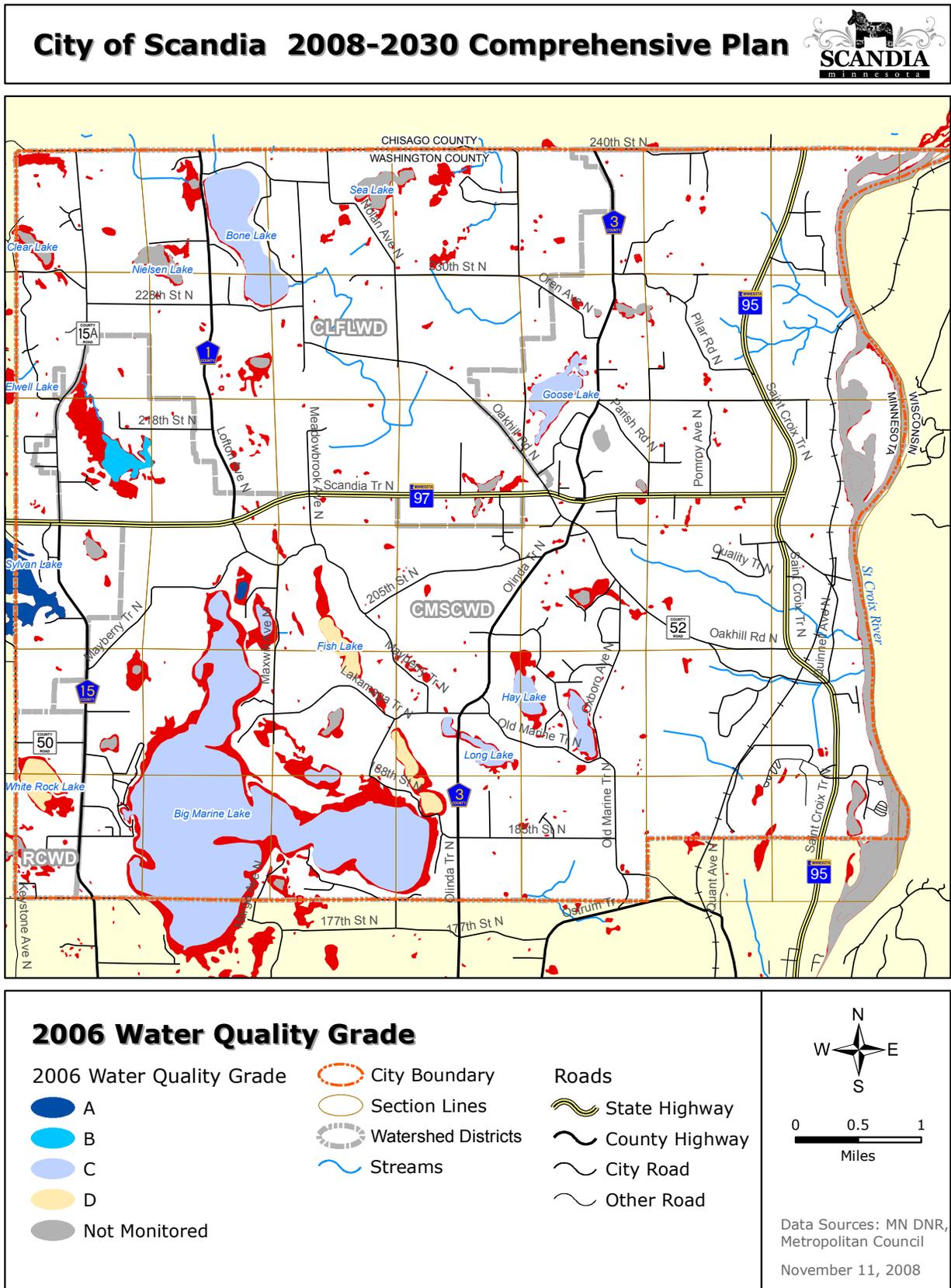
**Table 2 - Watershed Districts in the City of Scandia**

Watershed Name	Size (acres)	Percent of City
Carnelian Marine-St Croix Watershed District	17,488	78.0 %
Comfort Lake-Forest Lake Watershed District	4,443	19.8 %
Rice Creek Watershed District	495	0.2 %
<b>TOTAL</b>	<b>22,426</b>	<b>100.0 %</b>

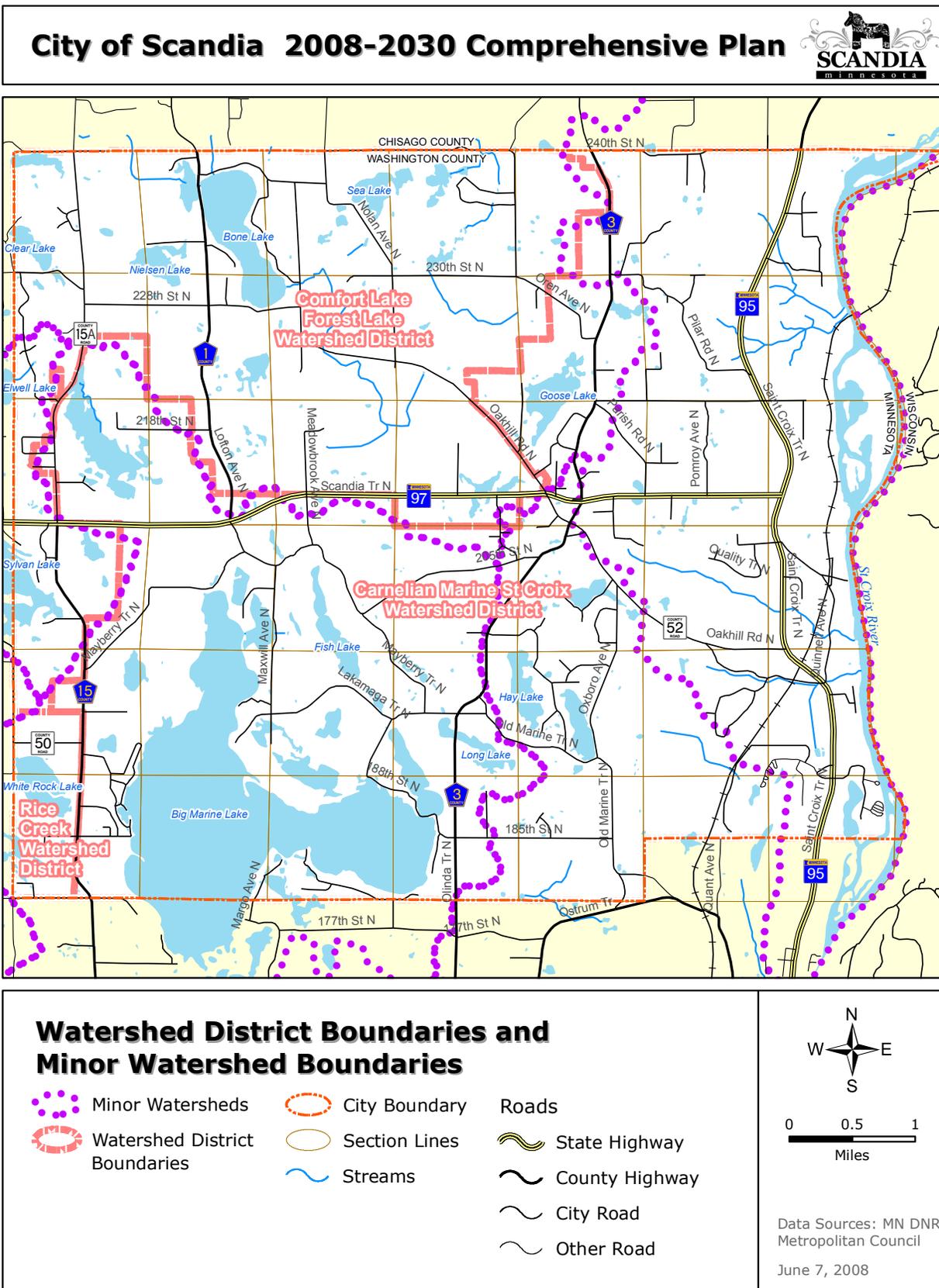
**Source:** Water and Soil Resources; Metropolitan Council



Map 2 - 2006 Water Quality Grade



Map 3 - Watershed District Boundaries and Minor Watershed Boundaries



- Land in the central and southern portions of the City, Big Marine Lake, Mud Lake, and Turtle Lake drain eventually to Little Carnelian Lake; a man-made outlet on the Lake connects to the St. Croix River.
- Land in the eastern portion of the City drains directly to the St. Croix River.

The boundaries of the watersheds are shown on Map 3 - *Watershed District Boundaries and Minor Watershed Boundaries*. Table 2 - *Watershed Districts in the City of Scandia*, summarizes the size of each watershed within the City.

Each watershed management organization is required by the State of Minnesota to update their Watershed Management Plan every 10 years. After a plan is approved by the Board of Water and Soil Resources, the watershed district requires each city or township within its boundaries to create and implement their own local water management plan consistent with the watershed's plan. Each city or township is then required to adopt, amend, or update its local controls to meet watershed district standards. Establishing relationships with these watershed districts prior to the development of their plans will help ensure that Scandia is involved in the development of any standards or other controls affecting land use and development within the city's boundaries.

## Geology & Topography

This part of the Current Conditions Section describes the following information related to geology and topography:

- Surficial geology
- Sensitivity to groundwater pollution
- Extent of known sand and gravel deposits
- Topography

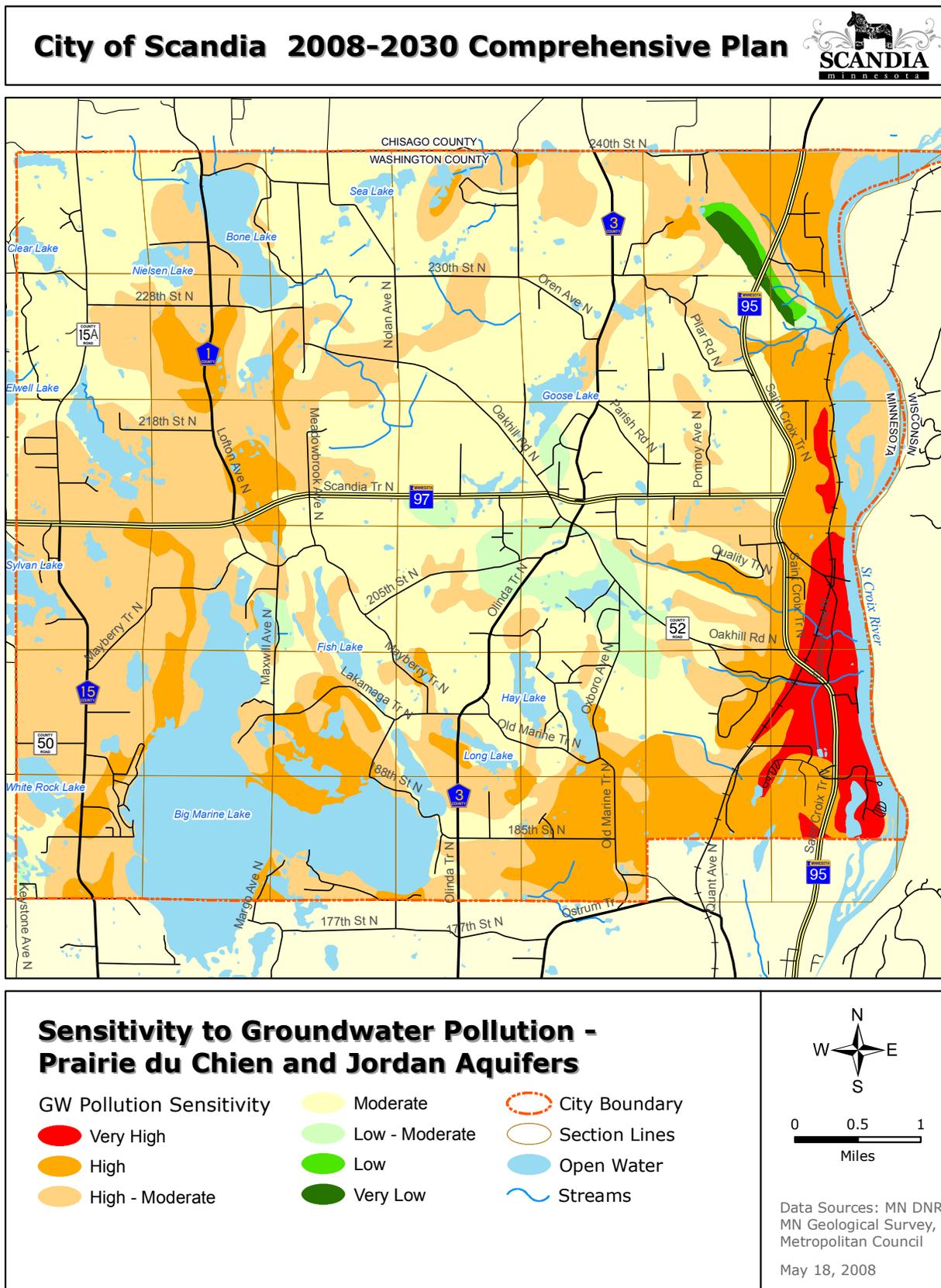
### Surficial geology

Materials present at the surface of the landscape in the City of Scandia were created by glacial and post glacial processes. Glacial materials present at the surface were deposited in two glacial episodes, the Wisconsin and the Des Moines. The Wisconsin Age ended about 25,000 years ago. Late in the Wisconsin Age, the Superior Lobe advanced south from the Lake Superior region, leaving moraine and outwash deposits in Washington County. The St. Croix end moraine has relatively high topography that extends northeast-southwest through the northern part of Washington County.

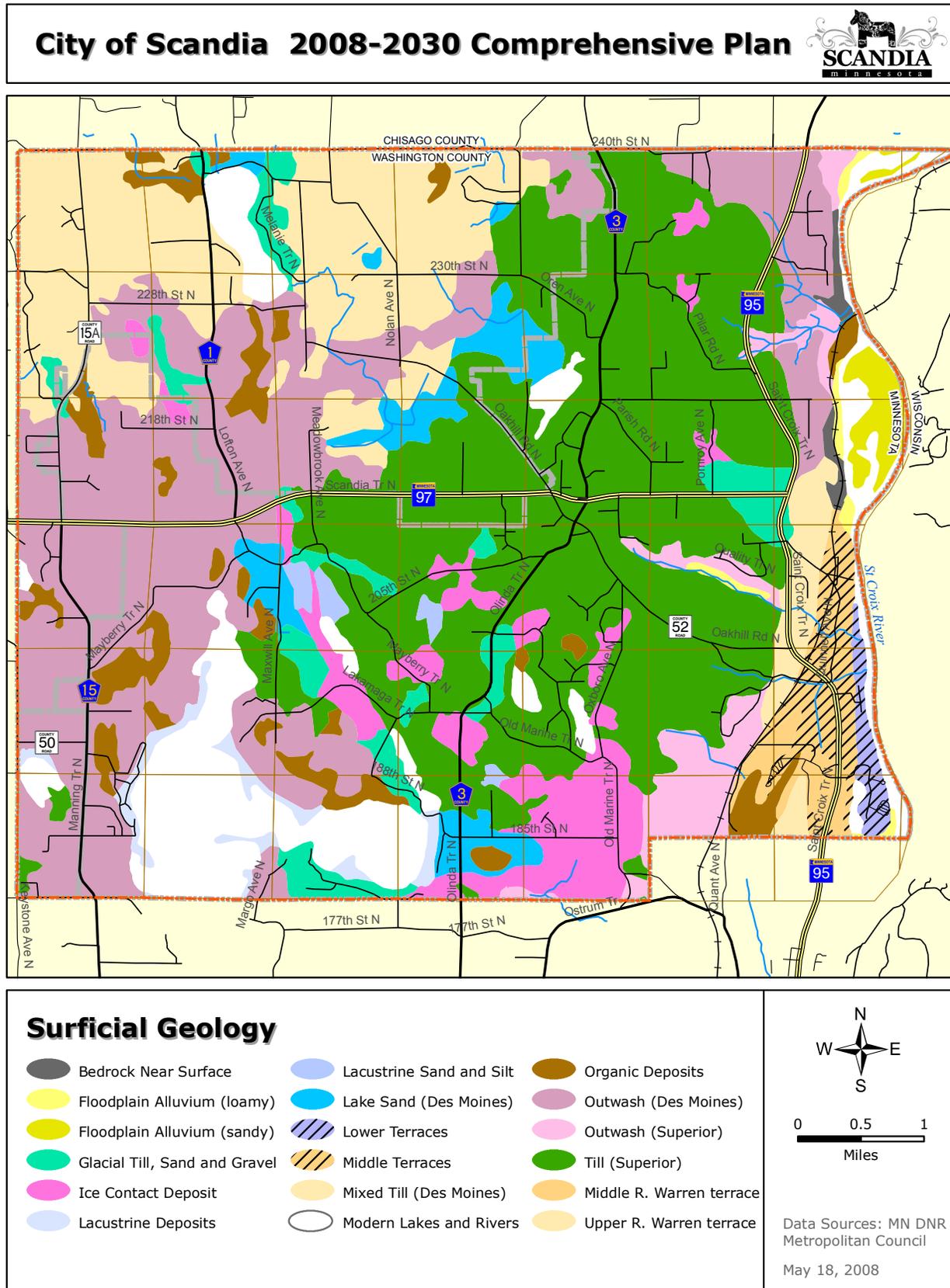
The Des Moines Lobe glaciation, the final glacial episode in Minnesota, ended about 10,000 years ago. The Grantsburg Sublobe of the Des Moines Lobe moved from southwest to northeast through the northwest corner of the Washington County, leaving deposits along the western edge of the City of Scandia. This unusual south to north moving glacier deposited a lateral moraine and outwash deposits. The tills related to the Des Moines Lobe glaciation are more compact, have more clay, and have lower hydraulic conductivity in general than the Superior Lobe tills. Map 5 - *Surficial Geology*, shows the surficial geology for the City of Scandia.

Geologic landforms and processes influence other important natural features including topography, soil characteristics like infiltration rates and nutrient content, sensitivity to groundwater pollution, and the development of plant communities.

Map 4 - Sensitivity to Groundwater Pollution - Prairie du Chien and Jordan Aquifers



Map 5 - Surficial Geology



**Sensitivity to groundwater pollution**

The 1990 Washington County Geology Atlas identifies areas of sensitivity to groundwater pollution. Map 4 - *Sensitivity to Groundwater Pollution - Prairie Du Chien and Jordan Aquifers*, shows areas that are susceptible to groundwater pollution in Scandia. The areas of highest sensitivity are located along the St. Croix River and near some lakes in the western portion of the city. The classifications are derived both from the type of material overlying the aquifer as well as the amount of material. Areas that are more sensitive to pollution may have less material overlying the aquifer or the materials are fractured or structured in a way that allows surface water to reach the aquifer more quickly than in other areas. Map 4 - *Sensitivity to Groundwater Pollution - Prairie Du Chien and Jordan Aquifers*, shows the sensitivity of wells in the Prairie Du Chien and Jordan Aquifers to groundwater pollution.

Groundwater provides all of the drinking water for the City of Scandia. Land uses that have the potential to generate pollutants should be limited to areas where the sensitivity to groundwater pollution is low.

**Extent of known sand and gravel deposits**

In 2000, the Metropolitan Council, the Department of Natural Resources and the Minnesota Geological Survey collaborated on an aggregate resource inventory of the seven-county metropolitan area. The inventory identified and categorized likely areas of dolostone deposits, and sand and gravel deposits. Areas identified as “dolostone” represent significant potential deposits of Prairie du Chien dolostone suitable for crushed aggregate with less than 10 feet of overburden. The sand and gravel deposits are classified into three categories according to type and quality (based on percent of gravel content), thickness of deposit, amount of overlying material, relationship to water table, and reliability of the mapping. Map 6 - *Extent of Sand and Gravel Deposits*, shows the extent of known sand and gravel deposits and the location of dolostone deposits within the City of Scandia. Table 3 - *Acreage of known sand and gravel deposits*, summarizes the estimated area of the dolostone deposits and the categories of sand and gravel deposits found in the City of Scandia.

**Table 3 - Acreage of known sand and gravel deposits**

Deposit Type	Size (acres)
Dolostone	62
Sand & Gravel Deposit, good to excellent quality	649
Sand & Gravel Deposit, moderate to good quality	254

Source: Metropolitan Council

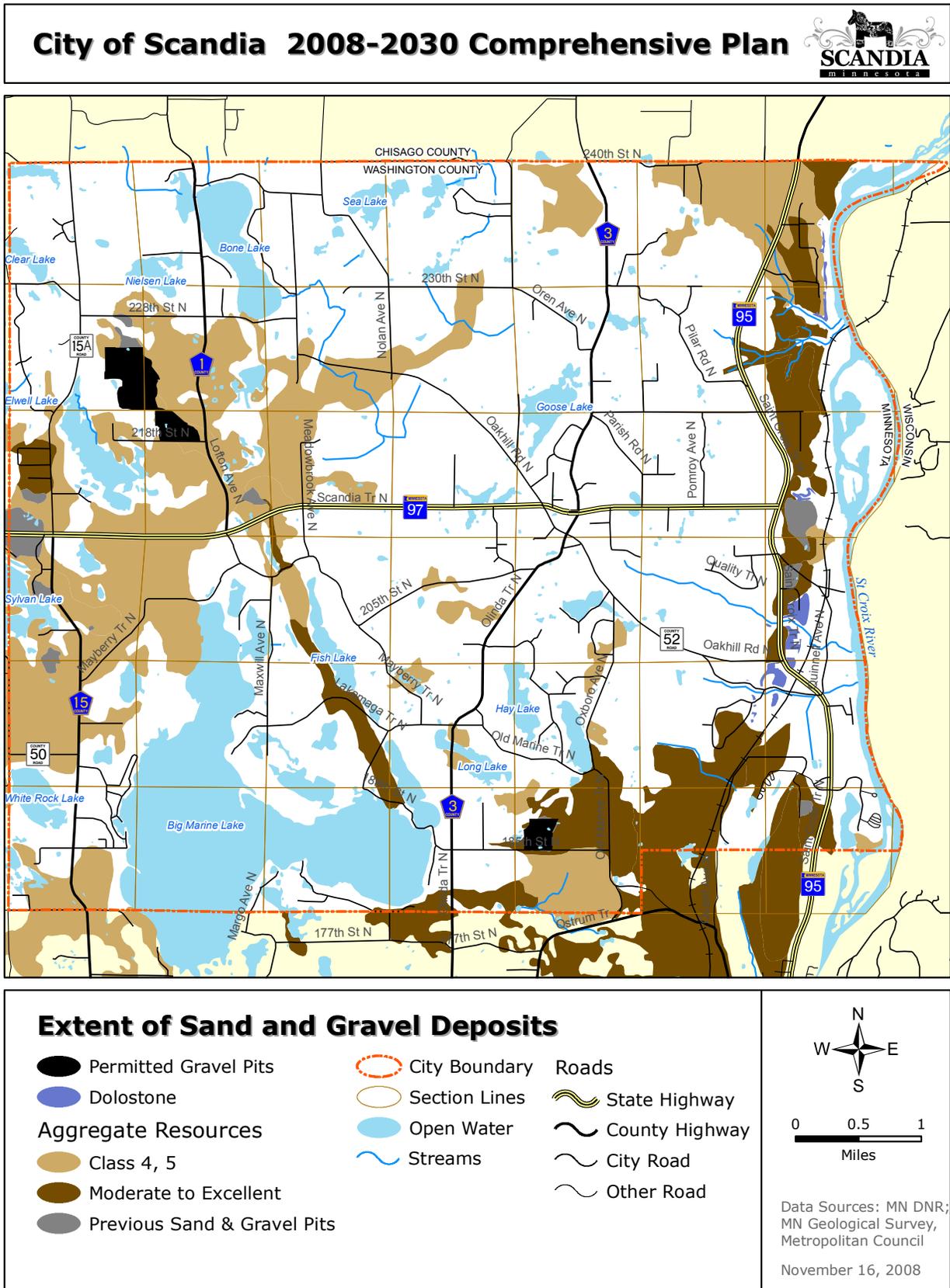
Natural Areas

This part of the Current Conditions Section describes the following information related to natural resources:

- Original Vegetation
- Natural areas
- High-quality natural areas
- Regionally significant natural areas
- National Wetland Inventory
- Wetland Assessment Status



Map 6 - Extent of Sand and Gravel Deposits



**Original Vegetation**

Scandia’s original vegetation was the result of glacial processes that created the topographic landscape features and soil types. For example, along the St. Croix River, rich alluvial soils and periodic flooding led to the development of floodplain forests. As the landscape was modified during European settlement, most natural communities on soils suitable for crop production were cleared for planting. Natural areas on steep slopes, hydric soils, and poor soils were left alone or used as pasture. As a result, Scandia’s landscape today is a mosaic of agricultural lands, residential and commercial development, and remaining areas of natural cover.

**Existing Natural Areas**

Existing land cover in the City of Scandia was mapped using the Minnesota Department of Natural Resources’ (MN DNR) Minnesota Land Cover Classification System (MLCCS). MLCCS combines the Minnesota Natural Heritage native plant community types with a cultural classification system to distinguish among different types and amounts of land cover, vegetation and impervious surfaces. Information on the location, type, size, and quality of remaining natural areas is included in the MLCCS. Approximately 58% of the land cover in the City of Scandia is classified as some form of natural area. Map 7 - *Natural Areas*, shows remaining natural areas within the City and Table 4 - *Acreage of natural areas*, summarizes the acreage of each type of natural area within the City.

Additional development within the City of Scandia has the potential to further impact the patchwork of remaining natural areas by fragmenting habitat and introducing invasive species.

**Table 4 - Acreage of natural areas**

Natural Area Type	Size (acres)
Forest	3,720
Woodland	1,720
Shrubland	1
Grassland	1,761
Sparse Vegetation	3
Forested Wetland	879
Shrub Wetland	315
Herbaceous Wetland	1,643
Sparse Wetland Vegetation	14
Open Water	3,051
<b>TOTAL</b>	<b>13,107</b>

**Source:** City of Scandia MLCCS

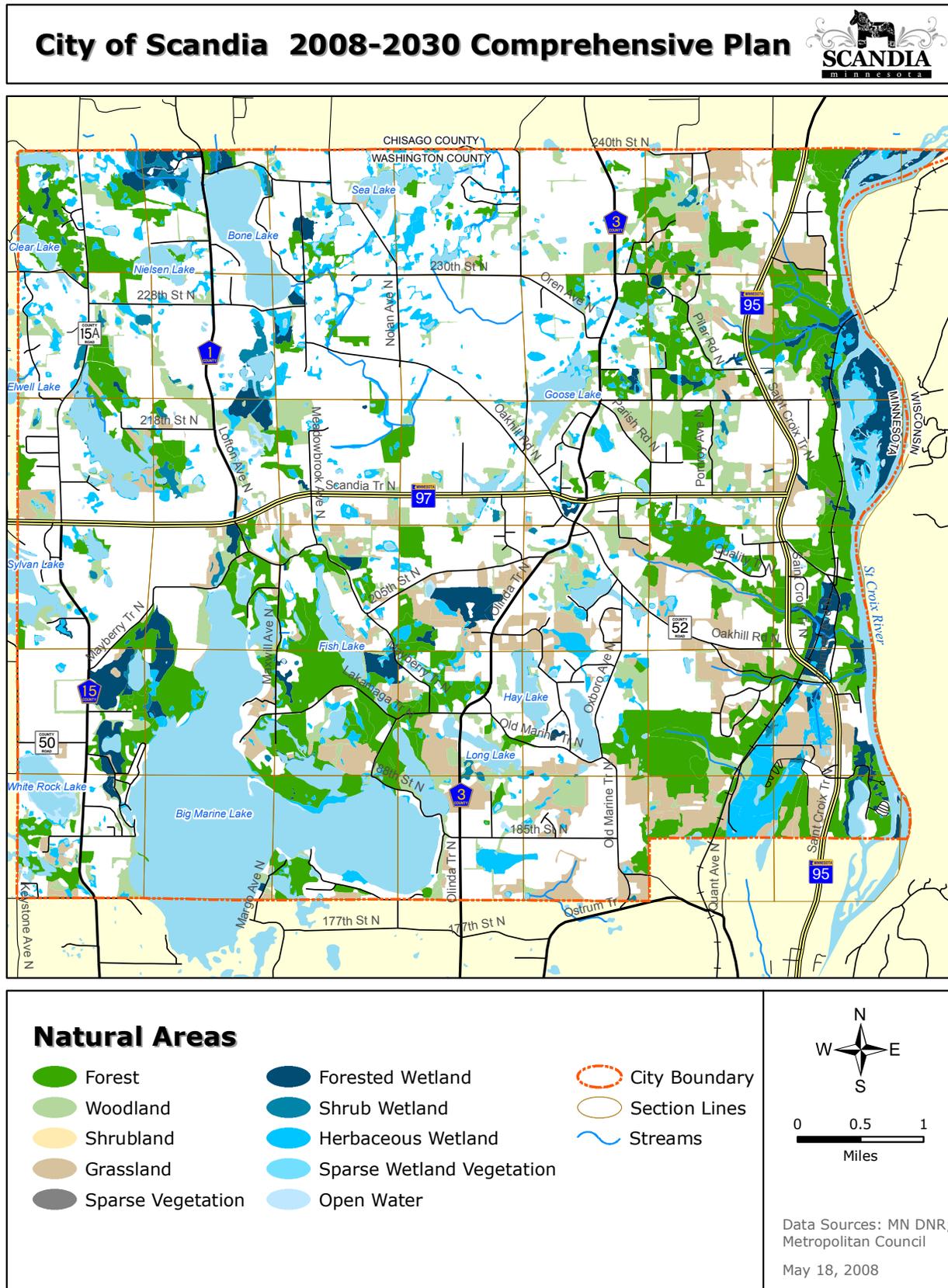
**Quality of Natural Areas**

There are two different measures of high-quality natural areas:

- Natural area quality grades included in the MLCCS
- Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance



Map 7 - Natural Areas



Natural area quality grades using an A through F grading system are collected as part of the MLCCS. Natural areas given a grade of A, AB, B, or BC are considered high quality and are displayed on Map 8 - *High-Quality Natural Areas*. There are approximately 1,270 acres of high-quality areas within the City of Scandia using this measure.

MCBS Sites of Biodiversity Significance are also displayed on Map 8 - *High-Quality Natural Areas*. This data layer, generated by the MN DNR, represents areas with varying levels of native biodiversity that may contain high-quality native plant communities, rare plants, rare animals, and/or animal aggregations. A biodiversity significance rank is assigned on the basis of the number of rare species, the quality of the native plant communities, size of the site, and the site’s context within the landscape. The classifications displayed on the map are described below:

- **Below** sites lacking occurrences of rare species and/or natural features that meet MCBS standards for an Outstanding, High, or Moderate rank
- **Moderate** sites containing significant occurrences of rare species and/or moderately disturbed native plant communities and landscapes that have a strong potential for recovery
- **High** sites containing very good quality occurrences of the rarest species, high-quality examples of the rarest native plant communities, and/or important functional landscapes
- **Outstanding** sites containing the best occurrences of the rarest species the most outstanding examples of the rarest native plant communities, and/or the largest, most intact functional landscapes present in the state

Table 5 - *Sites of Biodiversity Significance*, summarizes the acreage of the four categories of sites of biodiversity significance found within the City of Scandia.

**Table 5 - Sites of Biodiversity Significance**

Natural Area Type	Size (acres)
Below	309
Moderate	933
High	332
Outstanding	343
<b>TOTAL</b>	<b>1,917</b>

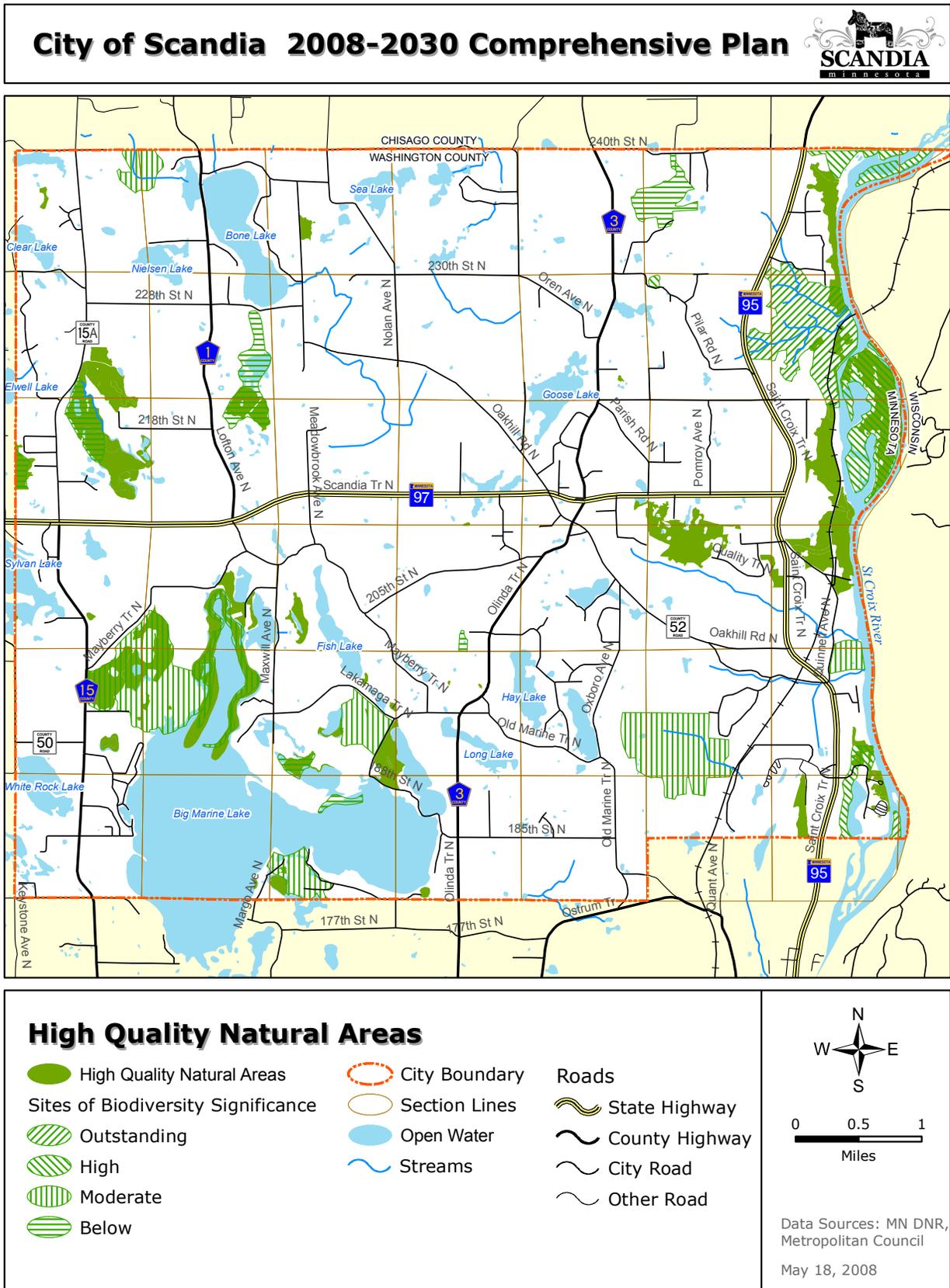
**Source:** Minnesota County Biological Survey

**Regionally Significant Natural Areas**

The MN DNR completed an analysis of regionally significant Terrestrial and Wetland Ecological Areas in the seven county metropolitan area in 2004. The analysis assessed remaining forest, grassland, and wetland areas. The scores were determined by examining important ecological attributes of the natural areas, including size, shape, cover type diversity, and adjacent land use. Map 9 - *Regionally Significant Ecological Areas*, displays Regionally Significant Ecological Areas, as determined by the MN DNR. Table 6 - *Regionally Significant Ecological Areas*, summarizes the acreage for each category of Regionally Significant Ecological Areas found within the City of Scandia.



Map 8 - High Quality Natural Areas



Map 9 - Regionally Significant Ecological Areas

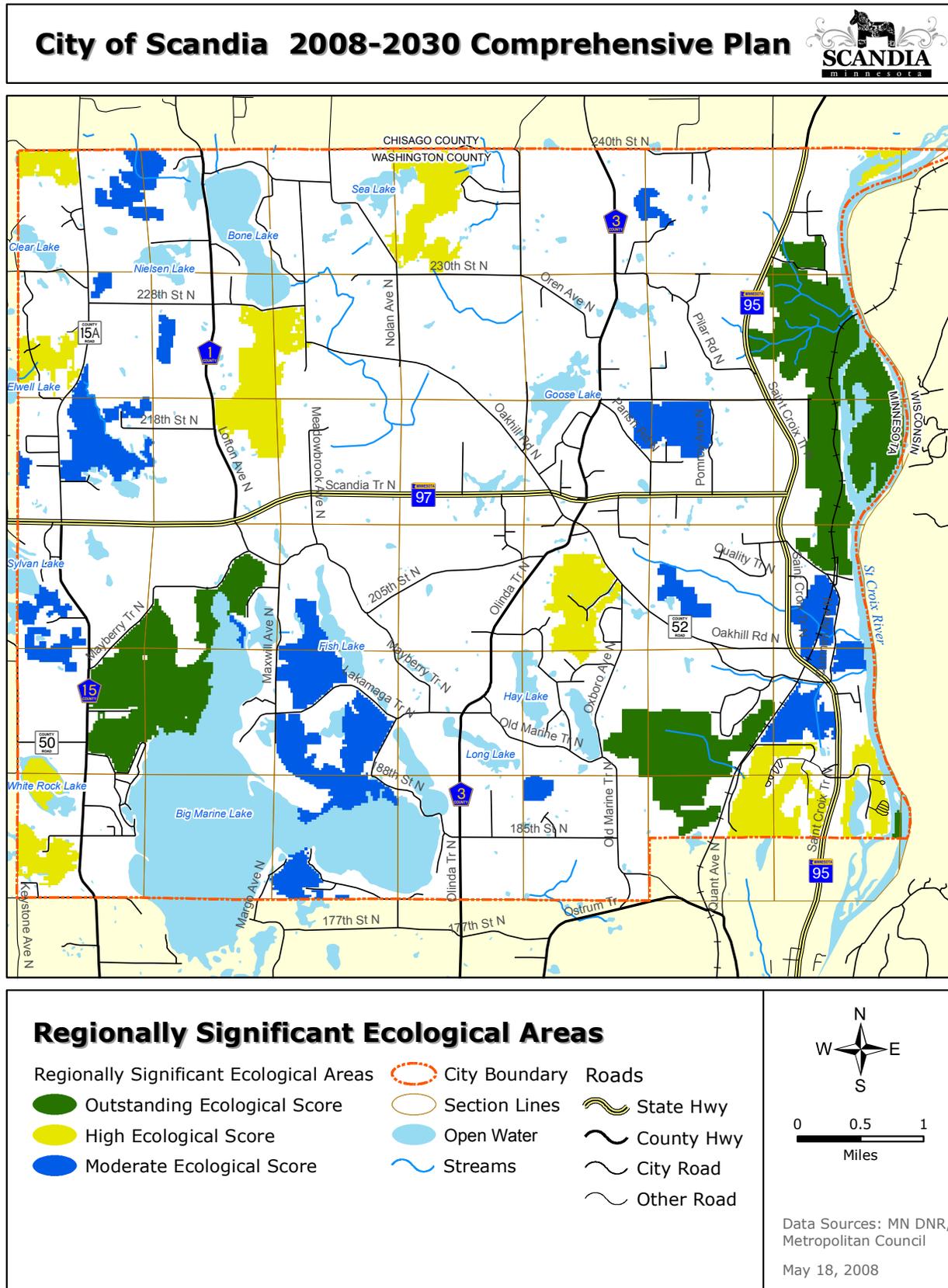


Table 6 - Regionally Significant Ecological Areas

Natural Area Type	Size (acres)
Moderate	1,490
High	1,328
Outstanding	1,890
<b>TOTAL</b>	<b>4,708</b>

Source: Minnesota Department of Natural Resources

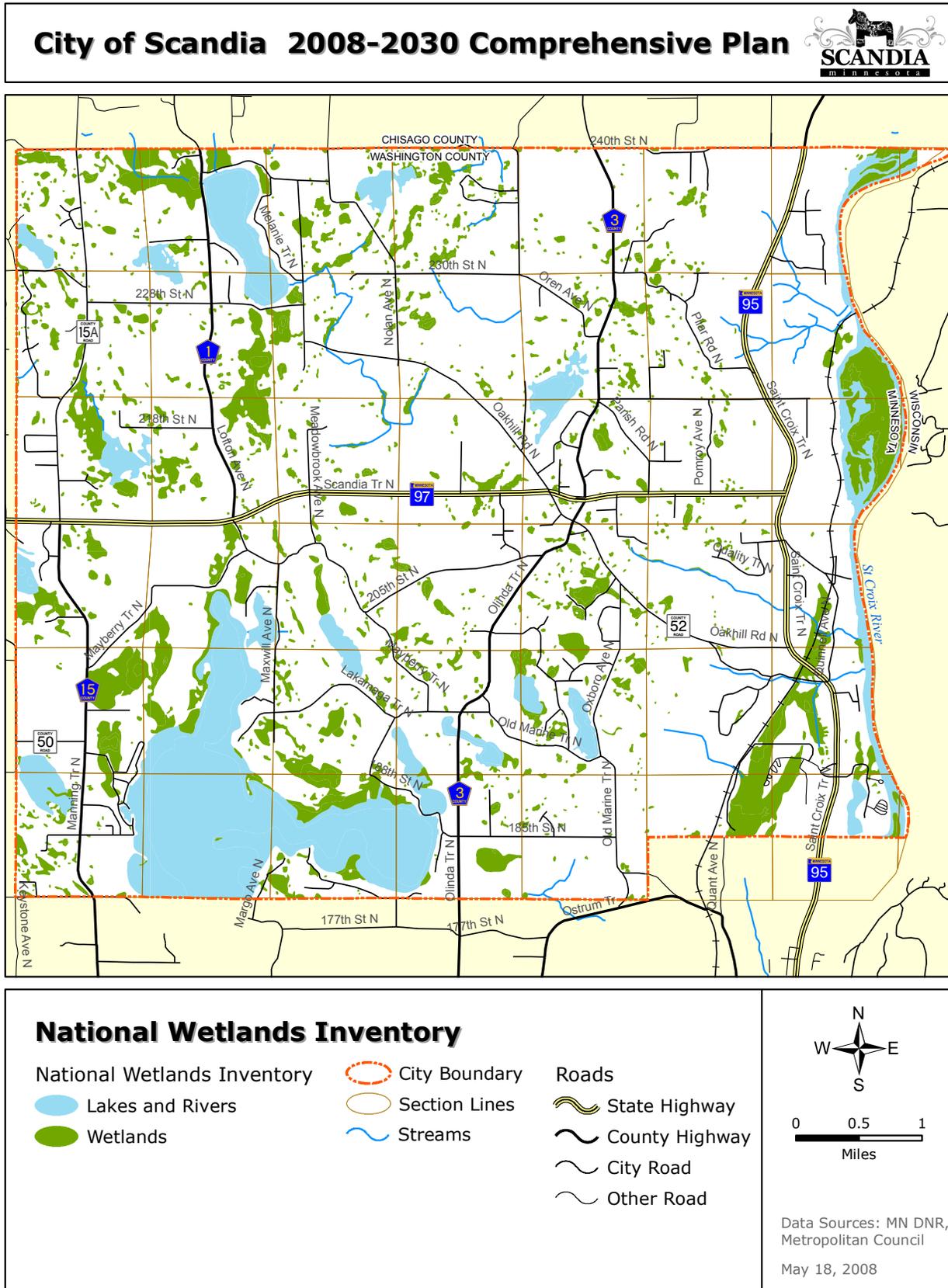
**National Wetland Inventory**

The National Wetlands Inventory (NWI) is a national program sponsored by the US Fish and Wildlife Service (USFWS). Based on the NWI data, the City of Scandia has approximately 5,492 acres of wetland. Map 10 - *National Wetlands Inventory*, displays wetland area features mapped as part of the National Wetlands Inventory (NWI).

**Wetland Assessment Status**

The Carnelian Marine St. Croix Watershed District (CMSCWD) has completed a wetland assessment for a portion of the watershed. The wetland assessment contains more complete and more accurate data than the NWI. A wetland assessment categorizes wetlands by importance, quality, and need for restoration. The CMSCWD plans to complete the wetland assessment for the remainder of the watershed in 2008. The Comfort Lake-Forest Lake Watershed District and the Rice Creek Watershed District have not completed wetland assessments. Map 11 - *Wetland Assessments*, displays the Wetland Assessments that have been completed within the City of Scandia.

Map 10 - National Wetlands Inventory



Map 11 - Wetland Assessments

