

## NATURAL RESOURCES

The Town of Emerald and Village of Deer Park have a rich natural history, which is the basis for their present physical characteristics. Over 100 years of human settlement and resource use have altered these physical characteristics of the landscape. The people who reside in it value the natural environment and the physical influences that make up the rural landscape. Natural features are important to consider when planning for future uses. The rural character of Deer Park and Emerald is an important consideration as well. This inventory of the physical features of the town and village describes the impacts of development on those features, and provides an analysis of systems that might be employed to mitigate the impacts of possible development on the landscape.

### RESOURCE ASSESSMENT

#### GEOLOGY

##### *SURFACE GEOLOGY AND PHYSIOGRAPHY*

The surface geology of northern St. Croix County has been influenced by several periods of glaciation. Landforms produced by glacial deposition include end moraine, ground moraine and outwash plains. The first glacier covered the entire county, including all of Emerald and Deer Park, while the second, the Wisconsin Stage, covered only the land northwest of the Willow River, the Village of Deer Park.

End moraines are formed by deposition at the margin of a glacier during a standstill of the glacial front, when the rate of melting equals the rate of glacial advance. They form either at the point of maximum ice advance or during the recession of the glacier. The area north of the Willow River is covered by end moraine from the Superior lobe of the Wisconsin Age of glaciation. This end moraine consists of unsorted glacial material ranging in size from clay to boulders. Typically, the topography is rugged to rolling or hummocky with deep stream gorges and kettles (pits), which may contain lakes or marshes.

The majority of the rest of the county is covered by ground moraine deposited previous to the Wisconsin stage of glaciation. The material deposited was unsorted and results in a gently rolling topography.

Much of the Town of Emerald is covered in ground moraine. Ground moraine is deposited under glacial ice as a blanket of unsorted rock debris, which ranges widely in size. Early-Wisconsin or pre-Wisconsin Age glaciers deposited the ground moraine. A gently rolling topography, meandering streams and few lakes characterize this ground moraine. The topography here is a gently undulating plain with moderate relief and no definite alignment of undulation.

Immediately adjacent to the leading edges of the end moraine deposited by the Superior lobe (south of the Willow River) is a pitted outwash plain of stratified layers of sand, gravel, silt, and clay. The outwash plain was deposited by running water from melting glaciers. Kettles developed in the plain from the melting of buried blocks of ice. The St. Croix River Valley, along the western extreme of the county, was a major glacial drainageway as the glaciers melted and receded.

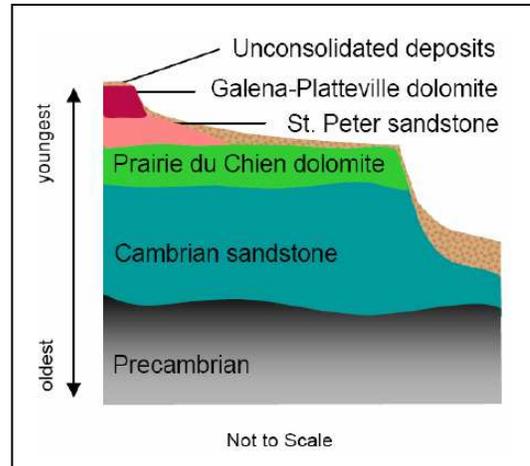
## ***BEDROCK GEOLOGY***

Geology is very similar to a layered cake, with each layer representing a different geological material and different geologic period. Starting from the oldest and lowermost geologic material, then working our way forward through time:

Precambrian Rocks are the bottommost layer of bedrock that can be found throughout St. Croix County and the entire State of Wisconsin. These rocks were formed around 4,000 to 600 million years ago and consist of some very old sedimentary rocks, as well as igneous and metamorphic rock types, primarily granite and basalt. This rock unit or layer is commonly referred to as crystalline bedrock.

Cambrian Sandstones are sedimentary rocks that were formed from about 600-425 million years ago.

During this time period eroded sands were deposited in layers on the ocean floor. These layers formed a loosely cemented sandstone rock which is between 300-500 feet thick and are present under the entire county. They are primarily sandstone but include subordinate shale, siltstone and dolomite. Predominant formations of the Cambrian include Mt. Simon, Eau Claire, Galesville, Franconia and Trempealeau.



Ordovician Rocks are sedimentary rocks which are the uppermost bedrock layer in St. Croix County consisting of sandstones, shales and dolomites. These are further defined as the Prairie du Chien group, St. Peter Sandstone Formation, Galena-Platteville Formation.

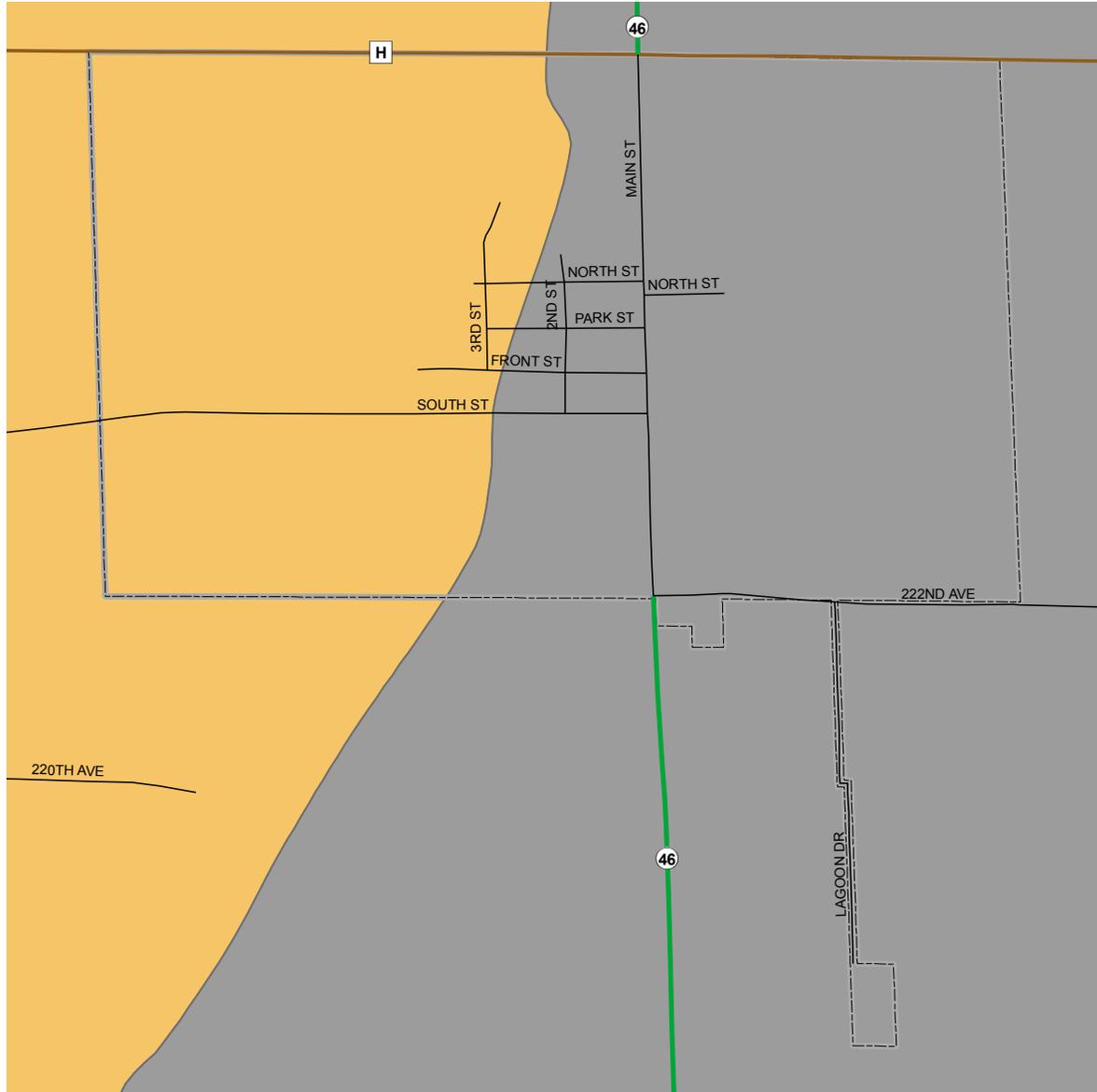
Ordovician Rocks are sedimentary rocks which are the uppermost bedrock layer in St. Croix County consisting of sandstones, shales and dolomites. These are further defined as the Prairie du Chien group, St. Peter Sandstone Formation, Galena-Platteville Formation.

Emerald is underlain by dolomite bedrock called Prairie du Chien. Dolomite is soluble in water. As water travels through the cracks, existing and new fractures develop in the dolomite. The growing fractures form karst features on the land surface creating conduits for polluted surface runoff to enter the groundwater. Karst features are found on the land surface throughout the town and include: sinkholes, exposed or shallow bedrock, springs, disappearing streams and ponds and bedrock outcroppings.

Unconsolidated materials of mainly till and sands, were deposited by glaciers (glacial drift) and are found overlying the bedrock throughout almost the entire county. The thickness around Emerald is between 50-100 feet.

The Bedrock Geology of Deer Park and Emerald are depicted in the maps on the following pages.

# Bedrock Geology VILLAGE OF DEER PARK

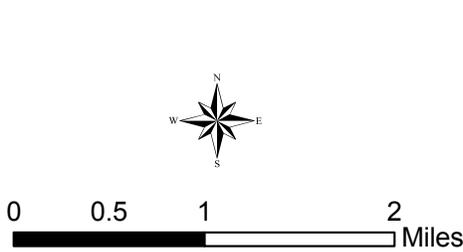
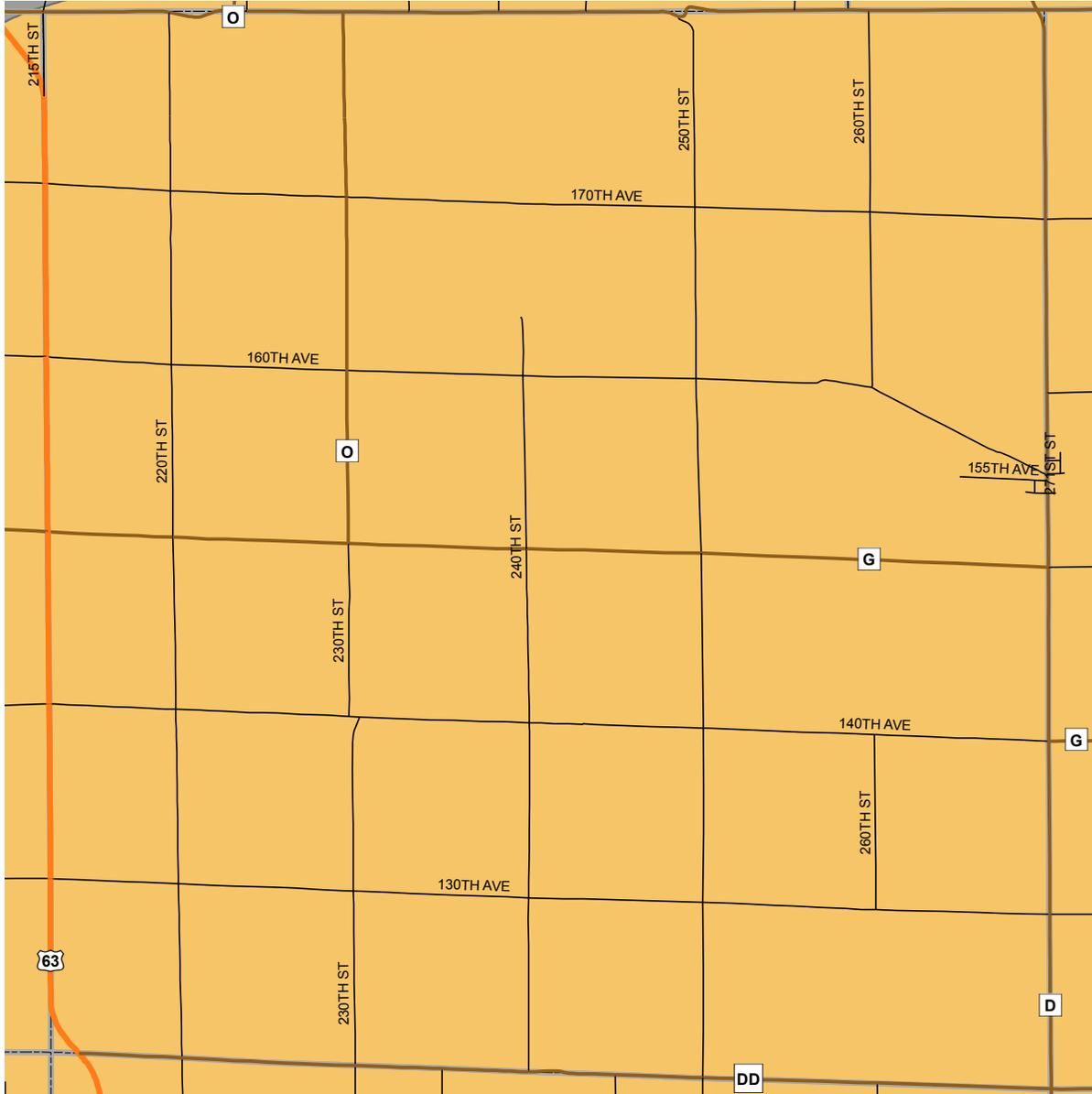


**BEDROCK GEOLOGY**

- Eau Claire Formation
- Trempealeau Group, Jordan and St. Lawrence Formations
- Tunnel City Group
- Wonewoc Formation
- Ancell Group, St. Peter Formation
- Prairie du Chien Group
- Sinnipee Group, Platteville Formation

SOURCE: Bedrock Geology of Wisconsin Map

# Bedrock Geology TOWN OF EMERALD



BEDROCK GEOLOGY	
	Eau Claire Formation
	Trempealeau Group, Jordan and St. Lawrence Formations
	Tunnel City Group
	Wonewoc Formation
	Ancell Group, St. Peter Formation
	Prairie du Chien Group
	Sinnipee Group, Platteville Formation

SOURCE: Bedrock Geology of Wisconsin Map

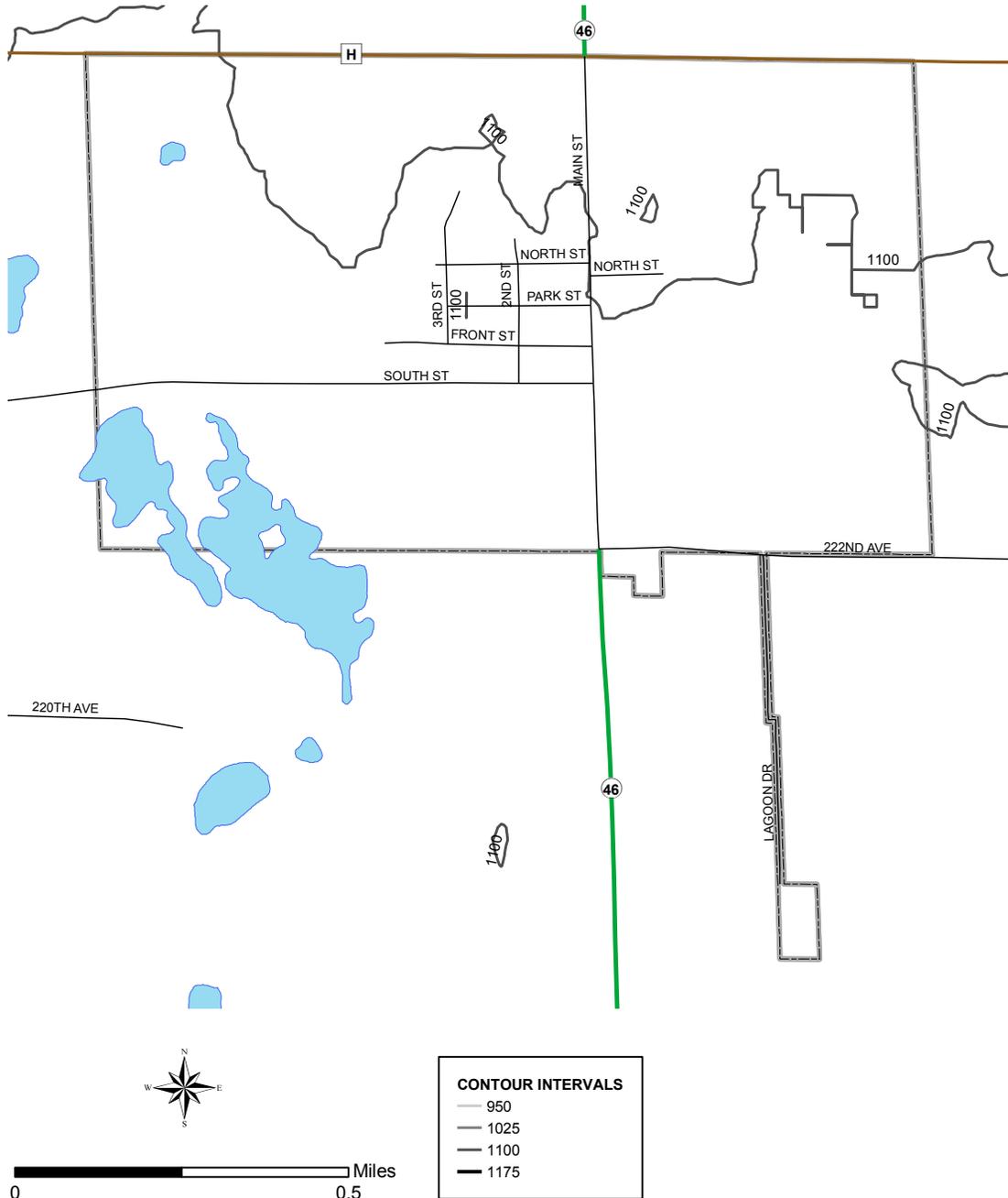
## *TOPOGRAPHIC FEATURES*

The Town of Emerald and Village of Deer Park are part of larger geographic structures sharing some common characteristics or conditions. Physically, St. Croix County is part of the "western upland" region of Wisconsin. This region extends parallel to the Mississippi and St. Croix Rivers from Polk County to the Illinois border and to the east from 30 to 75 miles. Surface topography in the western upland ranges from gently rolling to very steep with ridges separating deeply incised stream valleys. The southern two-thirds of the region is characterized by rugged topography, while the northern third tends to have a smoother surface in most areas. The western upland is higher in elevation than the central plain region to the east, but is lower in elevation than the northern highland region that extends northward from Polk County.

The topography ranges from gently rolling to hilly and rough. Areas of more rugged topography are found along the South Fork of the Willow and Hutton rivers drainage systems in the Town of Emerald. The Topographic Elevation of Emerald and Deer Park are depicted in the Elevations Maps on the following pages.

# ELEVATIONS: Contour Intervals of 75 Feet VILLAGE OF DEER PARK

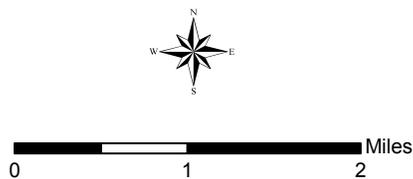
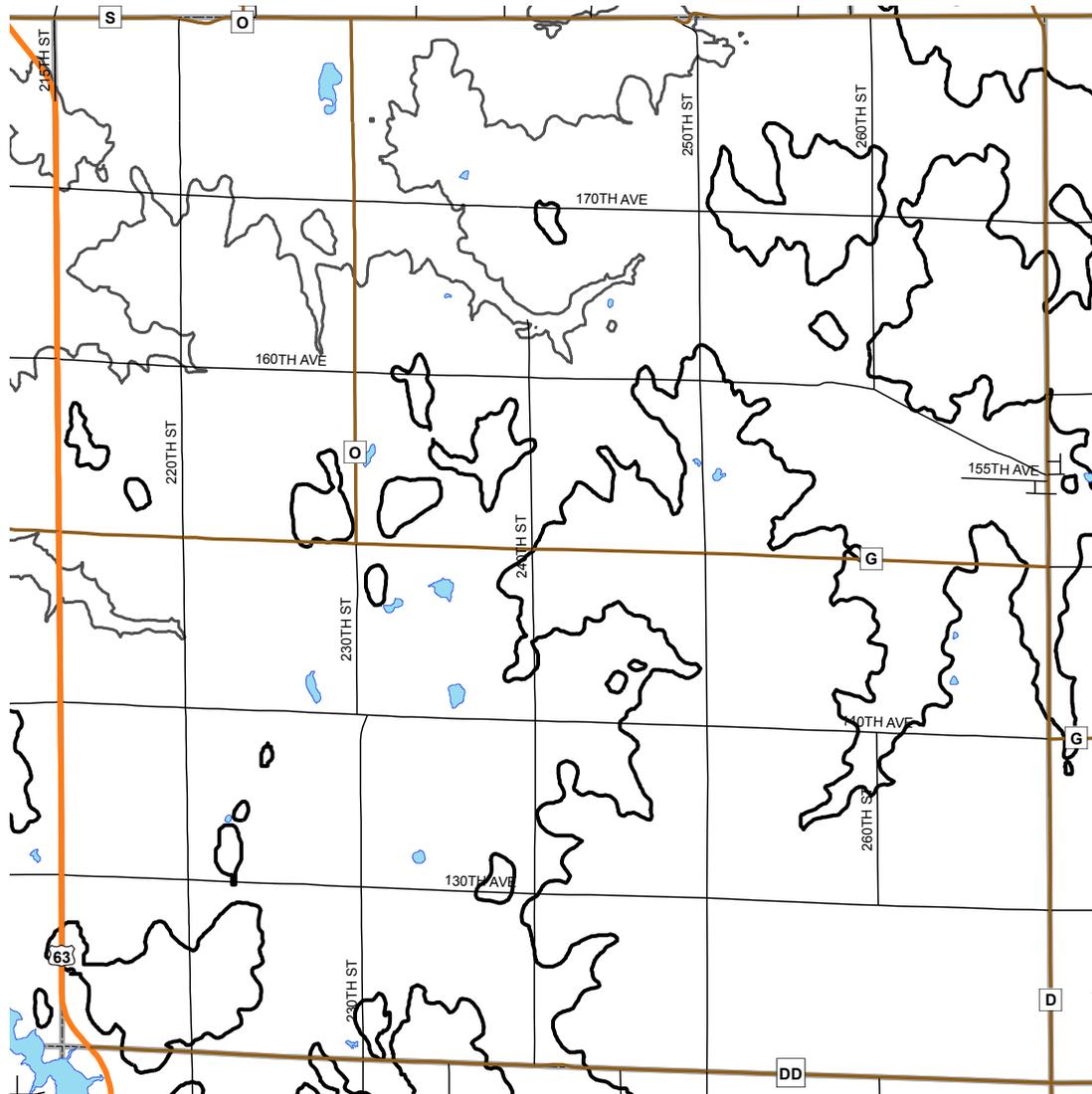
Map 3



SOURCE: NRCS Soil Survey of St. Croix County.

# ELEVATIONS: Contour Intervals of 75 Feet TOWN OF EMERALD

Map 4



CONTOUR INTERVALS	
—	950
—	1025
—	1100
—	1175

SOURCE: NRCS Soil Survey of St. Croix County.

## *SOILS*

Soil properties are an important factor in how land is used. They indicate how productive farmland is, where sand and gravel is, and limitations for development. Indeed, the types of soils in an area often dictate the best use of the land. Hence, soil suitability interpretations for specific urban and rural land uses are essential for physical development planning and determining the best use of the soils on a site.

St. Croix County through the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) produced a digital soil survey that provides detailed soils mapping for the county at a scale of one-inch equals 1000 feet. In addition, the survey has produced information on the physical, chemical and biological properties of the soils, and provided soil property interpretations for agricultural, engineering, planning and resource conservation activities.

## *MAJOR SOIL ASSOCIATION GROUPS*

St. Croix County has a wide variety of soils ranging from heavy, poorly drained to light and droughty. Soils that are generally excessively drained and well drained are found in the western half of the county. The moderately drained and somewhat poorly drained soils predominate in the county's eastern half. However, both extreme soil conditions are found throughout much of the county, making management difficult.

Widely varying soil types and complex slopes make the application of some best management practices troublesome. There are many areas with poorly drained soils on relatively steep slopes, which combine erosion with drainage problems.

The General Soil Map shows the soil associations in Deer Park and Emerald. Soil associations are landscapes that have distinctive patterns of soils in defined proportions. They typically consist of one or more major soils and at least one minor soil, and are named for the major soils. The General Soils of the Village of Deer Park and Town of Emerald are depicted in the map on the following pages. Each provides general soils information for the community and is not intended to provide information for site-specific applications.

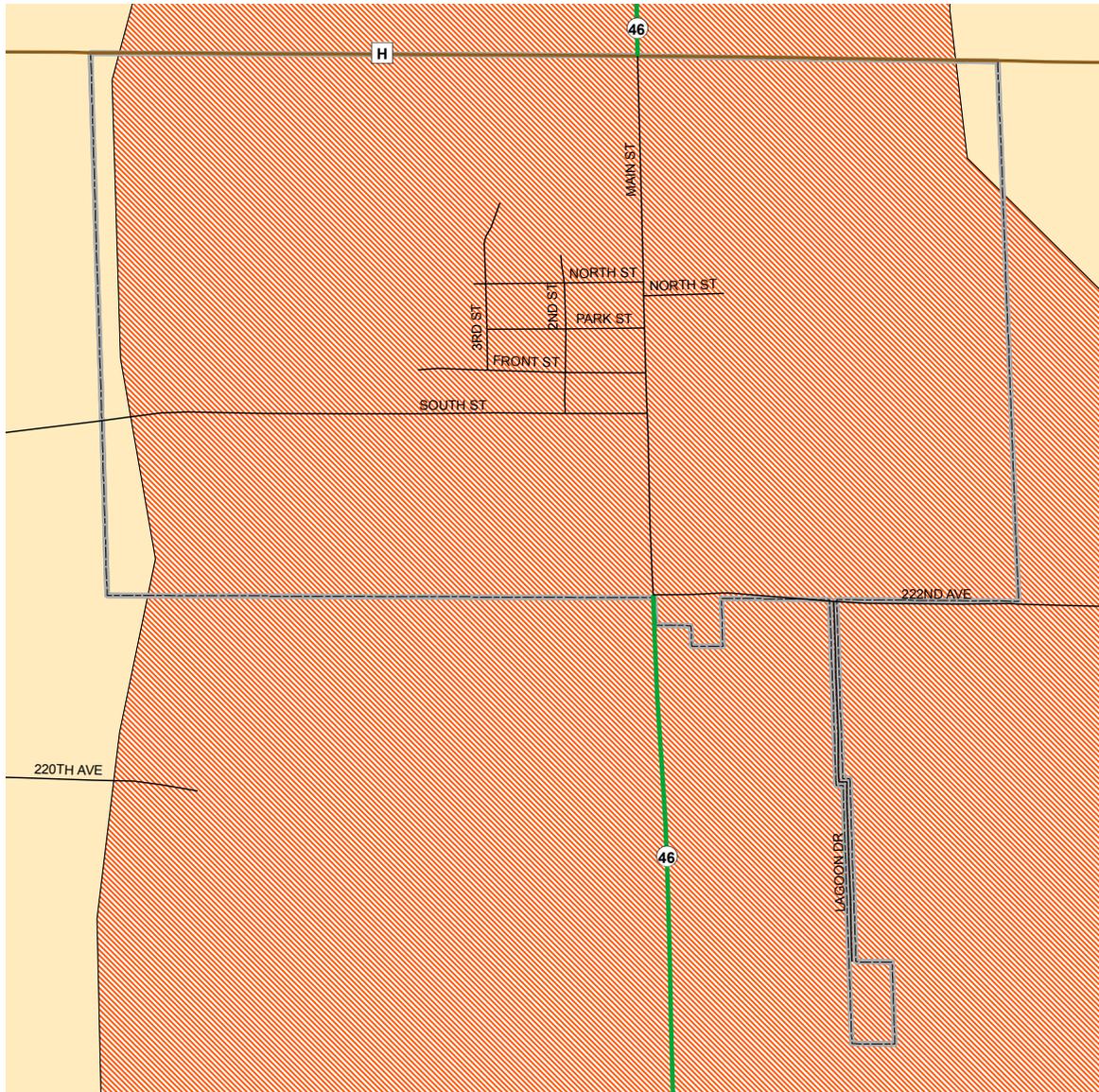
## *RADON TESTING*

Radon is a colorless, odorless gas produced by the decay of radium (which is produced by the decay of uranium). Deposits of radium and uranium are common in rock and soil. Studies have shown that exposure to radon gas and its decay products can increase the risk of lung cancer. The risk of developing lung cancer is related to the concentration of radon in the air and the length of time an individual is exposed.

Radon has been identified in numerous homes throughout St. Croix County and in some homes in Emerald. Radon tests were taken by individual landowners using kits obtained through St. Croix County. Radon levels can vary greatly from home to home, the only way to identify elevated radon levels is to test your home. Radon test results do not predict the radon levels in neighboring homes. They do show, however, that elevated radon levels can occur anywhere. Please see map on the following pages. Additional information on radon, testing and health impacts, is available at the following website: [www.dhfs.state.wi.us/dph\\_beh/RadonProt](http://www.dhfs.state.wi.us/dph_beh/RadonProt).

# General Soils VILLAGE OF DEER PARK

Map 5



**SOIL ASSOCIATIONS**

**MODERATE TO SLOW PERMEABILITY**

- Santiago-Otterholt-Arland
- Ritchey-Derinda-Whalen
- Santiago-Jewett-Magnor
- Viasaty-Skyberg

**MODERATE TO VERY RAPID PERMEABILITY**

- Amery-Cromwell
- Burkhardt-Chetek-Sattre
- Sattre-Pilot-Antigo
- Plainfield-Boone

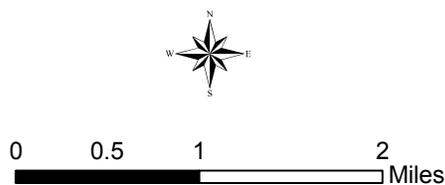
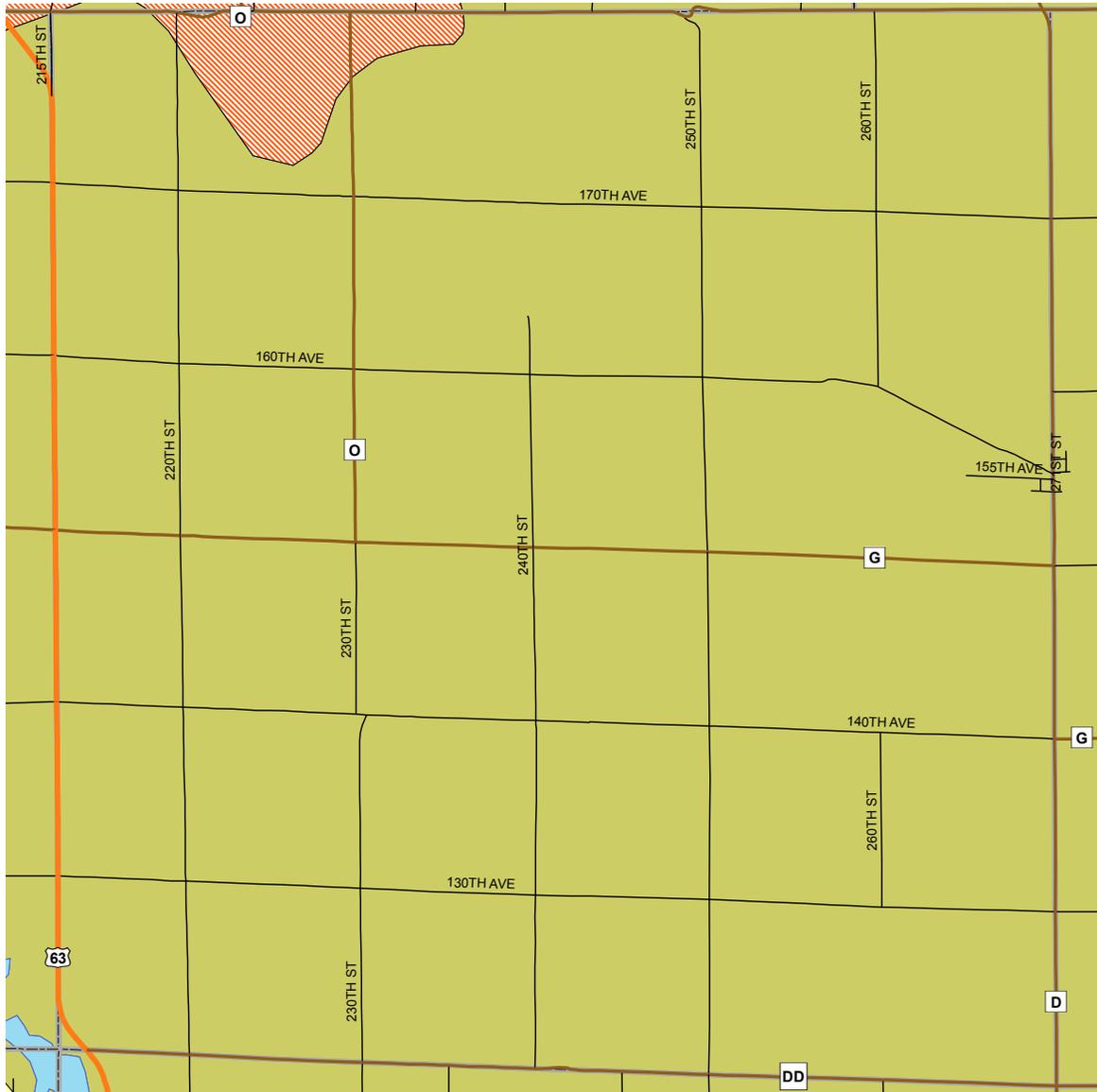
**WATER**

- Lakes & Rivers

SOURCE: Soil Survey of St. Croix County, 1978.

# General Soils TOWN OF EMERALD

Map 6

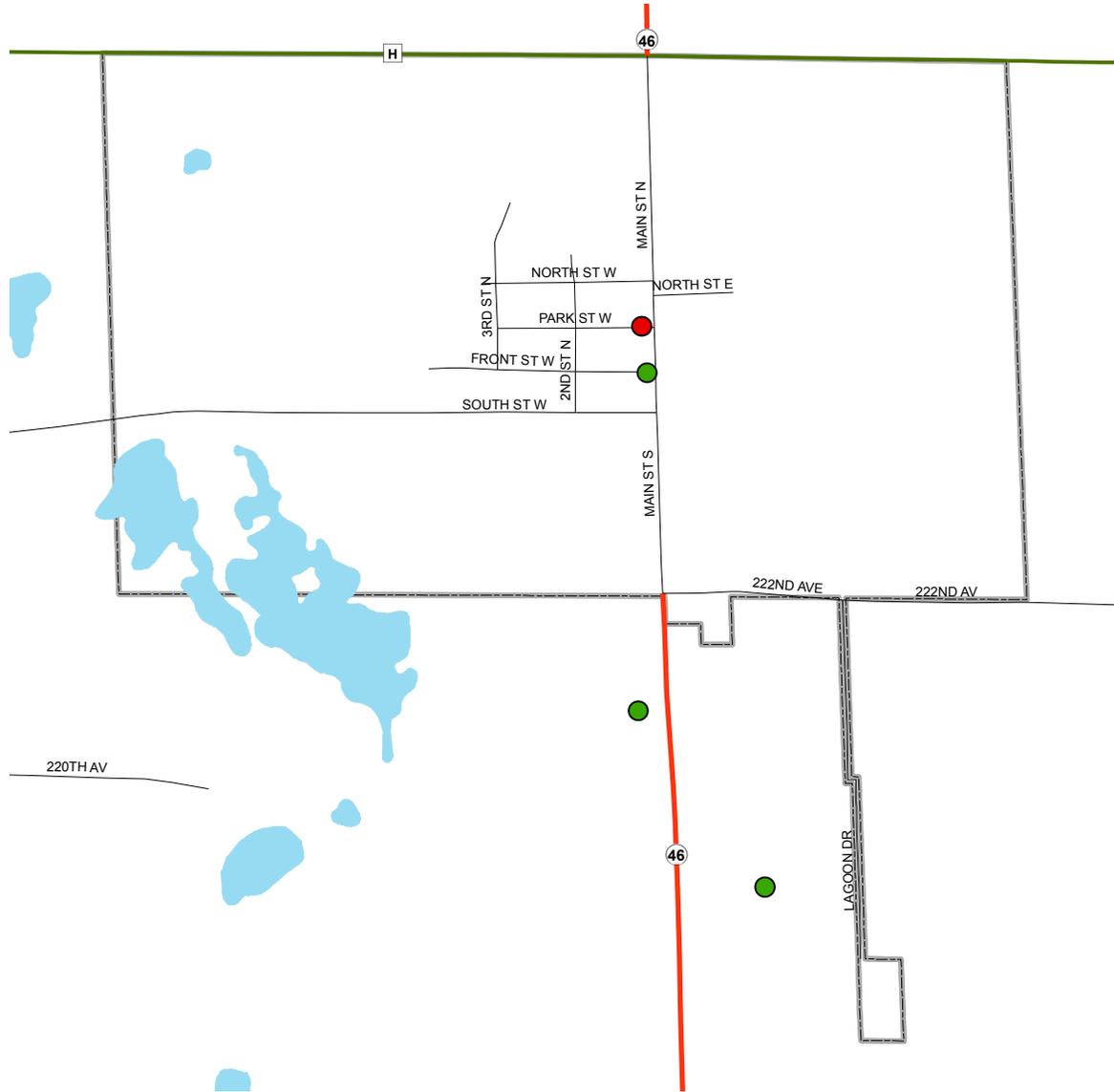


SOIL ASSOCIATIONS	
<b>MODERATE TO SLOW PERMEABILITY</b>	
	Santiago-Otterholt-Arland
	Ritchey-Derinda-Whalen
	Santiago-Jewett-Magnor
	Viasaty-Skyberg
<b>MODERATE TO VERY RAPID PERMEABILITY</b>	
	Amery-Cromwell
	Burkhardt-Chetek-Sattre
	Sattre-Pillot-Antigo
	Plainfield-Boone
<b>WATER</b>	
	Lakes & Rivers

SOURCE: Soil Survey of St. Croix County, 1978.

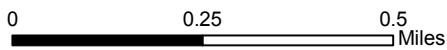
# Radon Test Levels VILLAGE OF DEER PARK

Map 20



### Radon Tests Reading Level in PPM

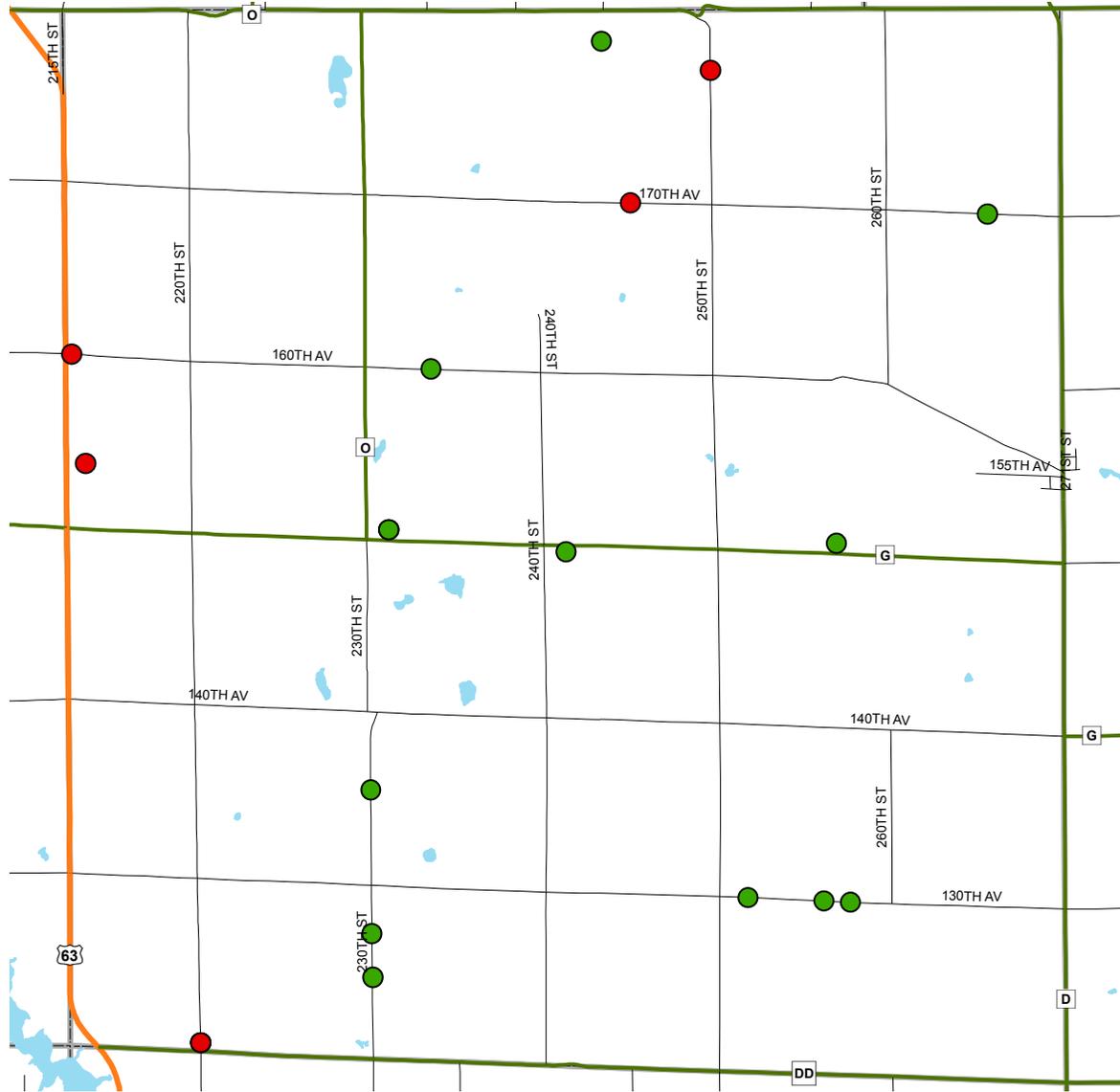
- 0.0 - 3.9
- Greater Than 4



SOURCE: Home Owner Test Kits collected by St. Croix County Public Health, 2008.

# Radon Test Levels TOWN OF EMERALD

Map 21



**Radon Tests**  
**Reading Level in PPM**

- 0.0 - 3.9
- Greater Than 4

SOURCE: Home Owner Test Kits collected by St. Croix County Public Health, 2008.

## ***SOIL SUITABILITY INTERPRETATIONS***

The soil survey provides important information about the suitability of land for different rural and urban uses. The interpretation of soils involves assessing the characteristics of soils that affect a specific use and predicting the various limitations those soils place on a land use. In the Town of Emerald, the available soil suitability interpretations of importance are those regarding septic tank absorption fields, agriculture, potential sand and gravel deposits, bedrock at or near the surface, and water table depth.

### ***SUITABILITY FOR PRIVATE ONSITE WASTEWATER TREATMENT SYSTEMS***

Private Onsite Wastewater Treatment Systems (POWTS) are subsurface systems of perforated pipe, which distribute effluent from septic tanks to the soil. Soil between 18 inches and six feet is evaluated for properties that affect absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to bedrock and water table, and susceptibility to flooding. The layout and construction of a system is affected by soil conditions related to slope, erosion potential, lateral seepage, and downslope flow of effluent. Soils with characteristic large rocks and boulders present additional problems, and increase the costs of system construction.

The state requirements for septic system siting are specified in COMM 83 of the Wisconsin Administrative Code. This code relies heavily on the ability of the soil to effectively treat the effluent discharged from the POWTS drainfield. The original soil survey suitability interpretations for St. Croix County were reviewed and updated by County staff to include information on suitability for POWTS based on COMM 83 soils criteria, public sanitary sewer or alternative treatment. The NRCS soil interpretations for septic tank absorption fields consider most excessively drained soils occurring over fractured bedrock or high water tables a severe limitation to septic system development because effluent in these situations can be readily transported to the groundwater and be detrimental to groundwater quality.

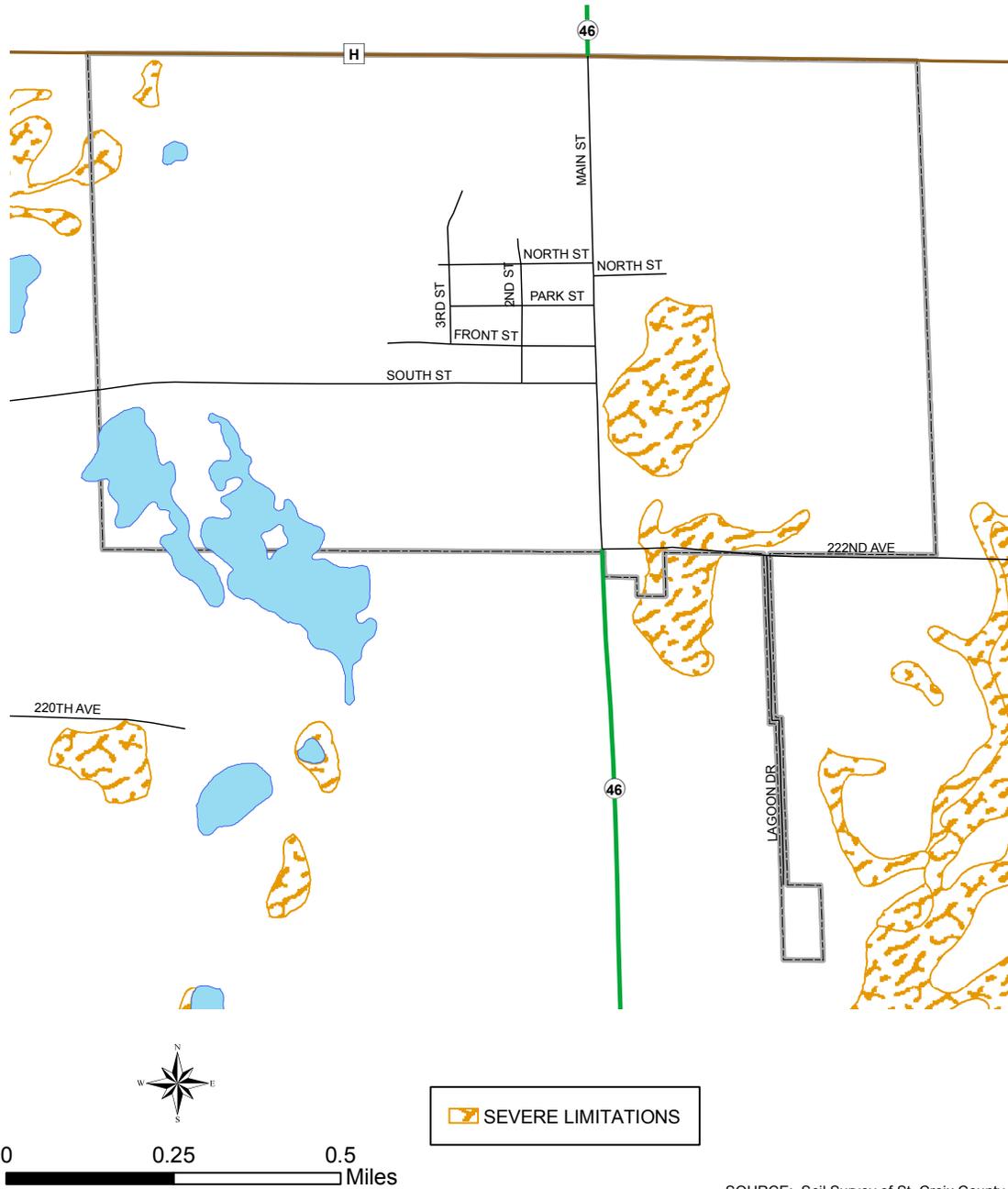
The maps on the following pages, Limitations for Septic Systems, depicts those soils in the Town of Emerald with severe limitations based on the updated interpretation for POWTS.

### ***SUITABILITY FOR EXTRACTION OF MINERALS (NON-METALLIC)***

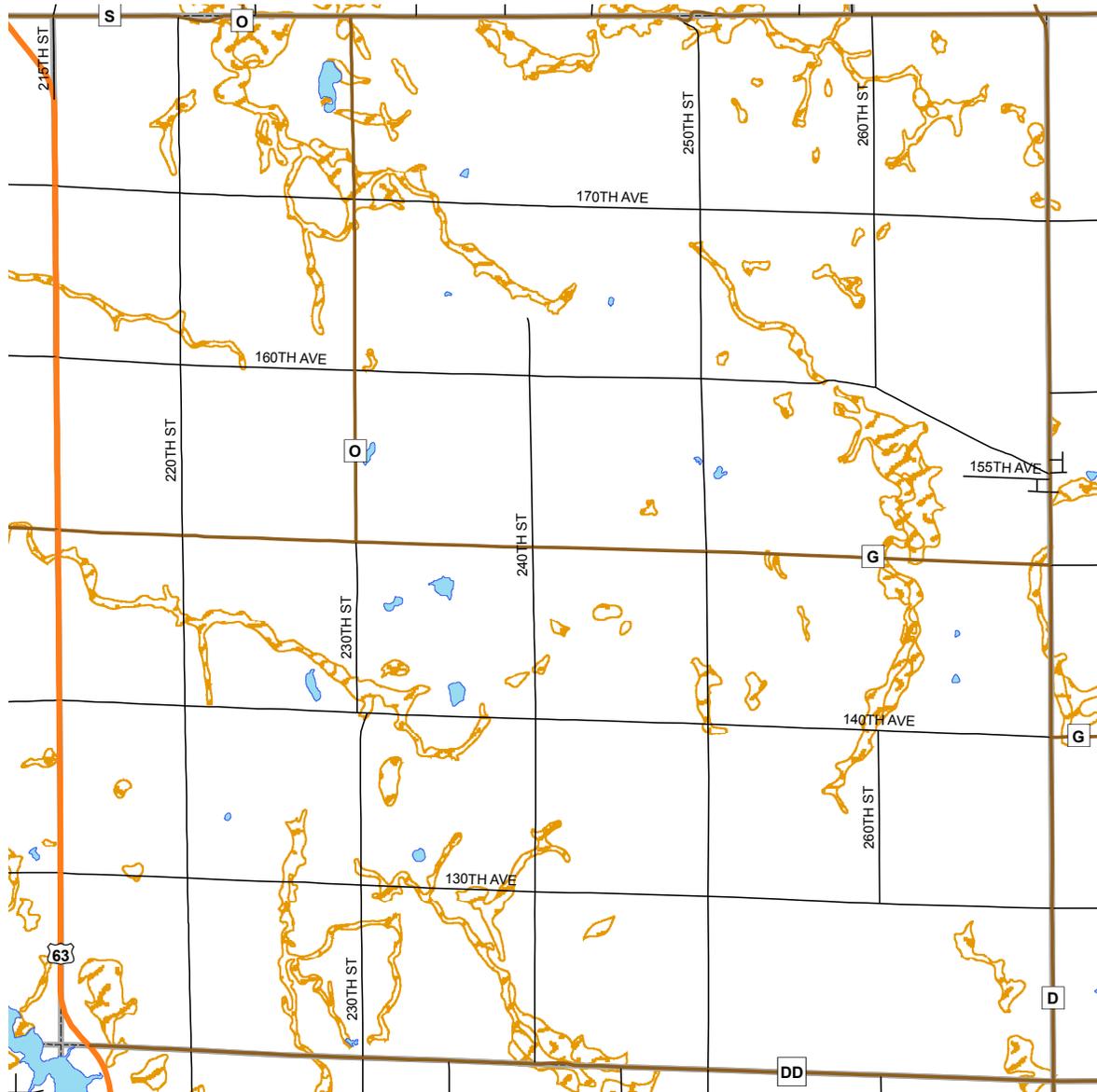
The Town of Emerald and Village of Deer Park have supplies of sand and gravel. The soils amongst glacial outwash are the most likely source for sand and gravel as the melting waters of the glacier were most active in sorting and depositing high-quality sand and gravel in this area. Where the bedrock is at or near the surface of the ground are areas which are probably most suited for quarrying stone.

The maps on the following pages, Potential Sand Deposits and Potential Gravel Deposits, show probable locations for sand and gravel deposits in the Town of Emerald and Village of Deer Park.

# Limitations for Septic Systems VILLAGE OF DEER PARK



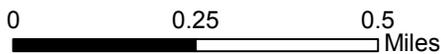
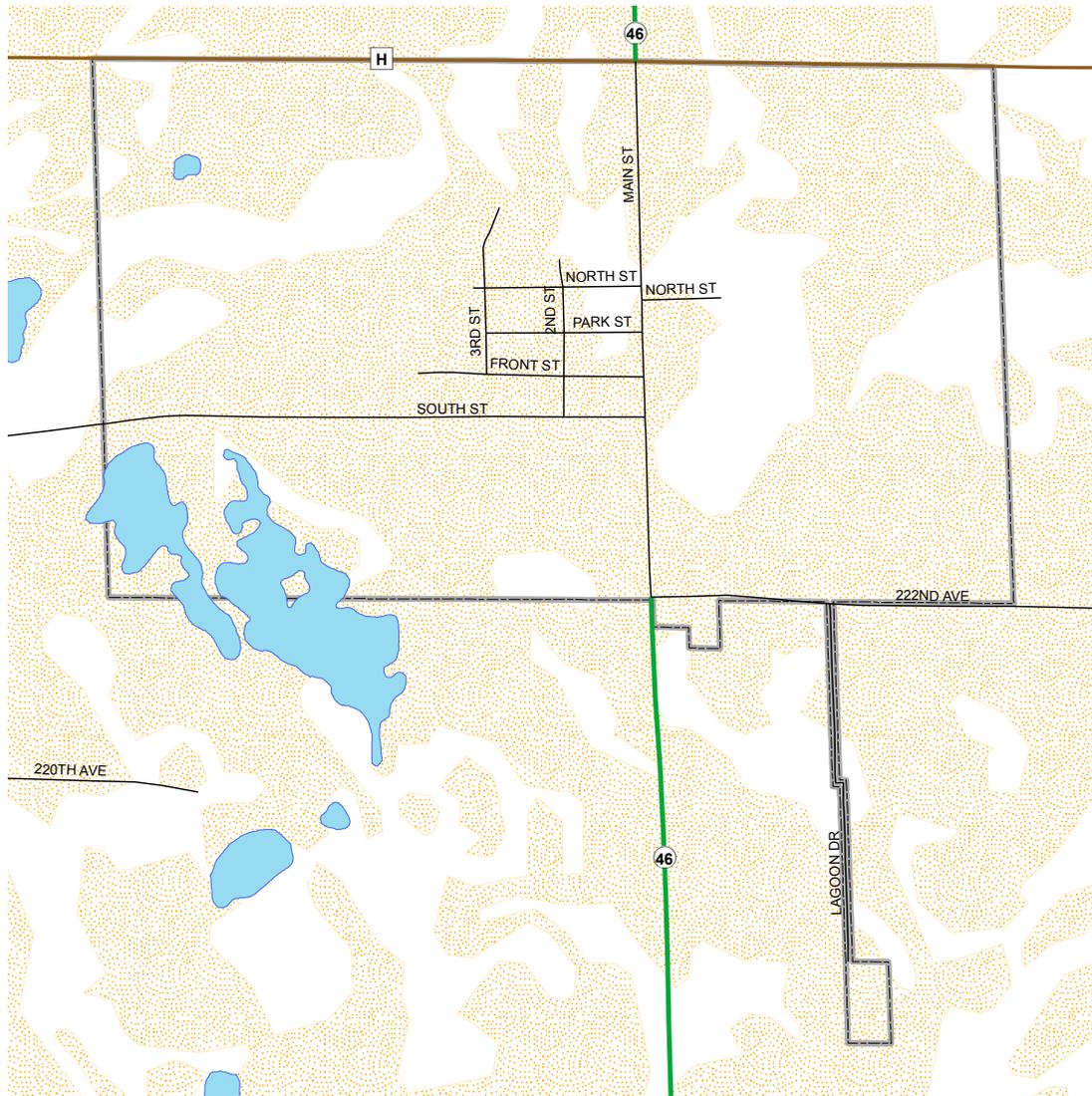
# Limitations for Septic Systems TOWN OF EMERALD



SOURCE: Soil Survey of St. Croix County, 1978.

# Potential Sand Deposits VILLAGE OF DEER PARK

Map 7

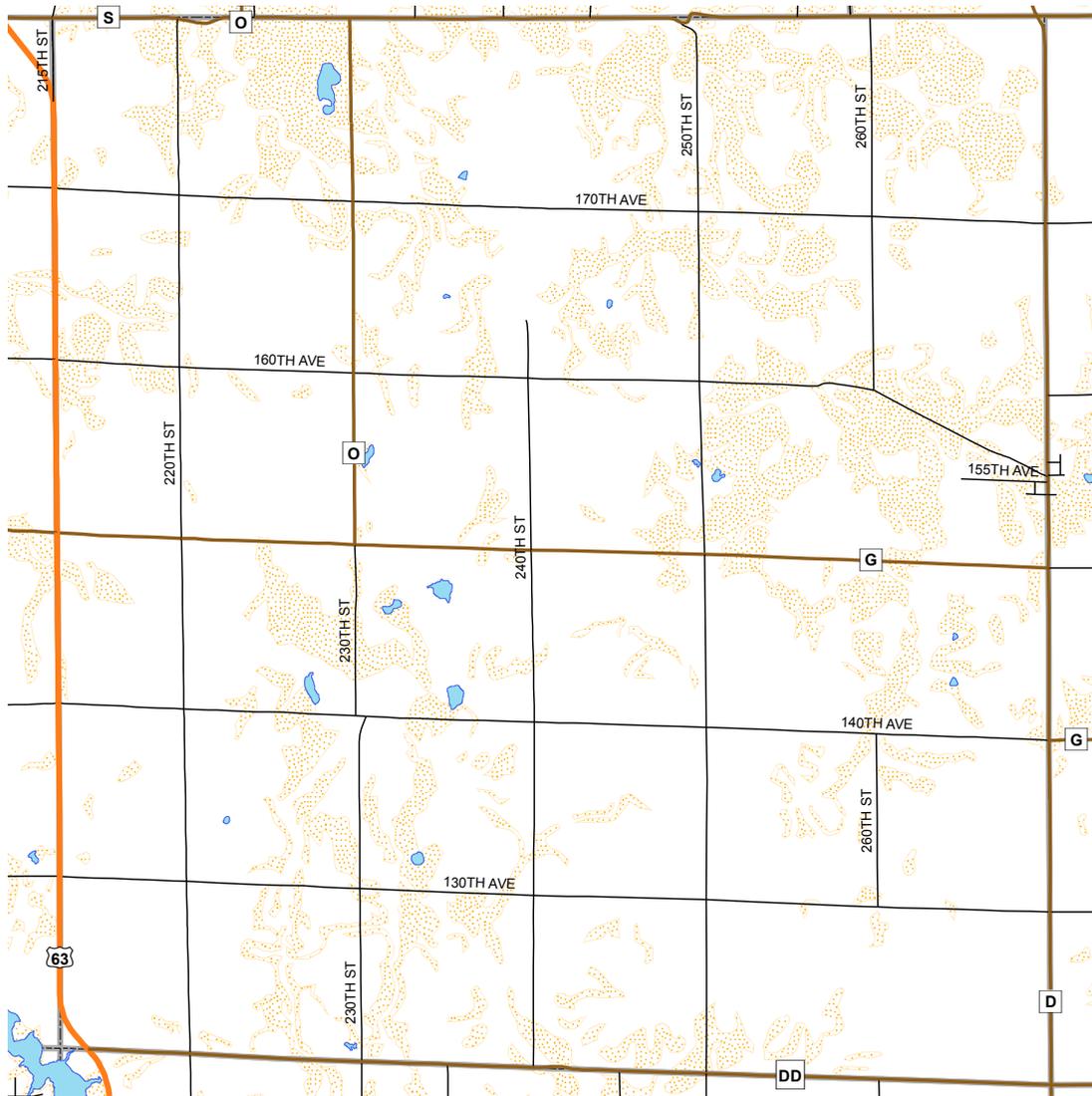


PROBABLE SAND DEPOSITS  
AVAILABLE FOR EXTRACTION

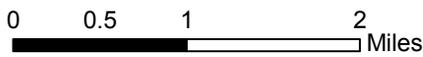
SOURCE: NRCS Soil Survey of St. Croix County.

# Potential Sand Deposits TOWN OF EMERALD

Map 8



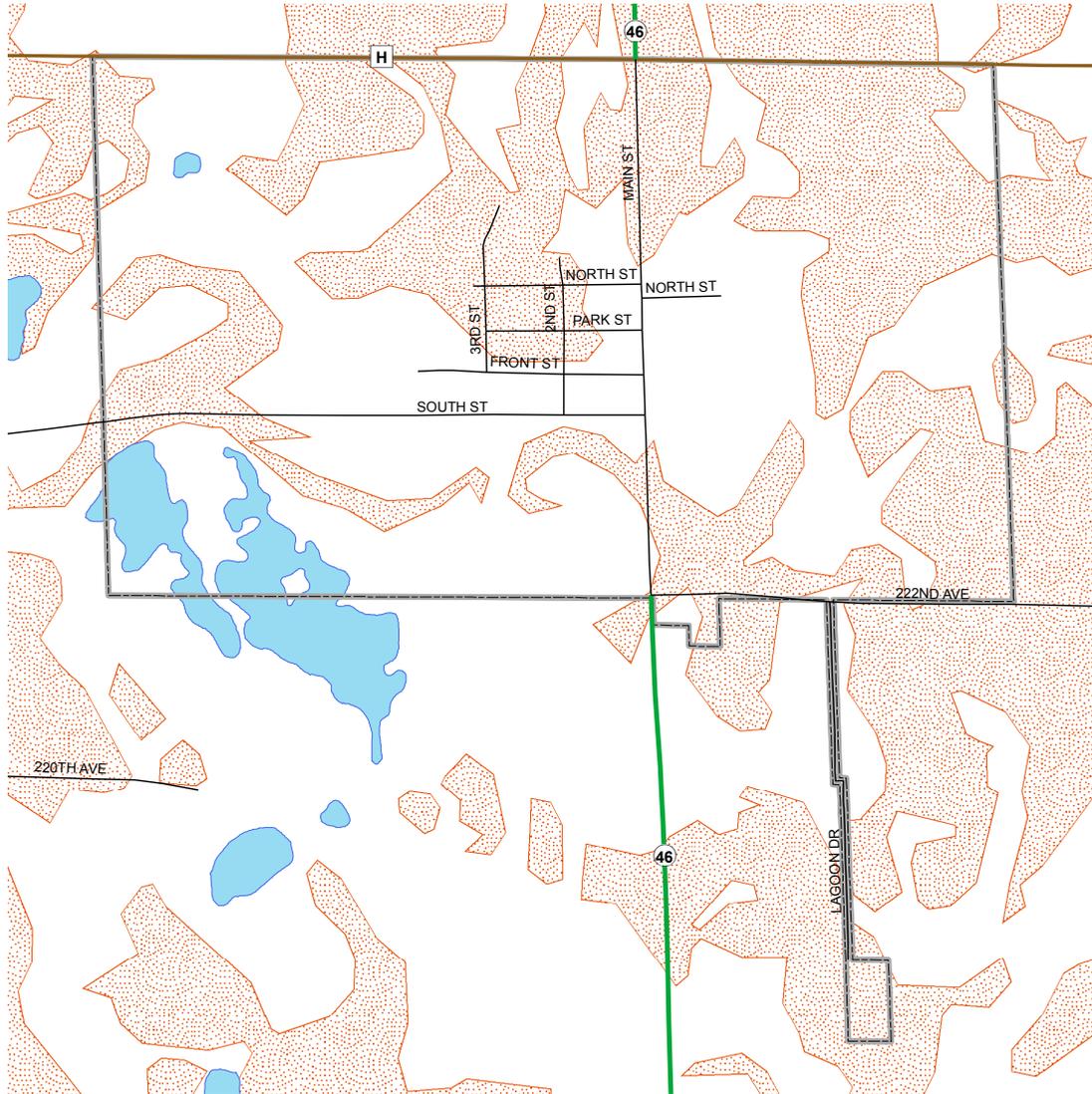
PROBABLE SAND DEPOSITS  
AVAILABLE FOR EXTRACTION



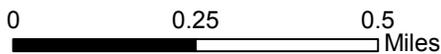
SOURCE: NRCS Soil Survey of St. Croix County.

# Potential Gravel Deposits VILLAGE OF DEER PARK

Map 9



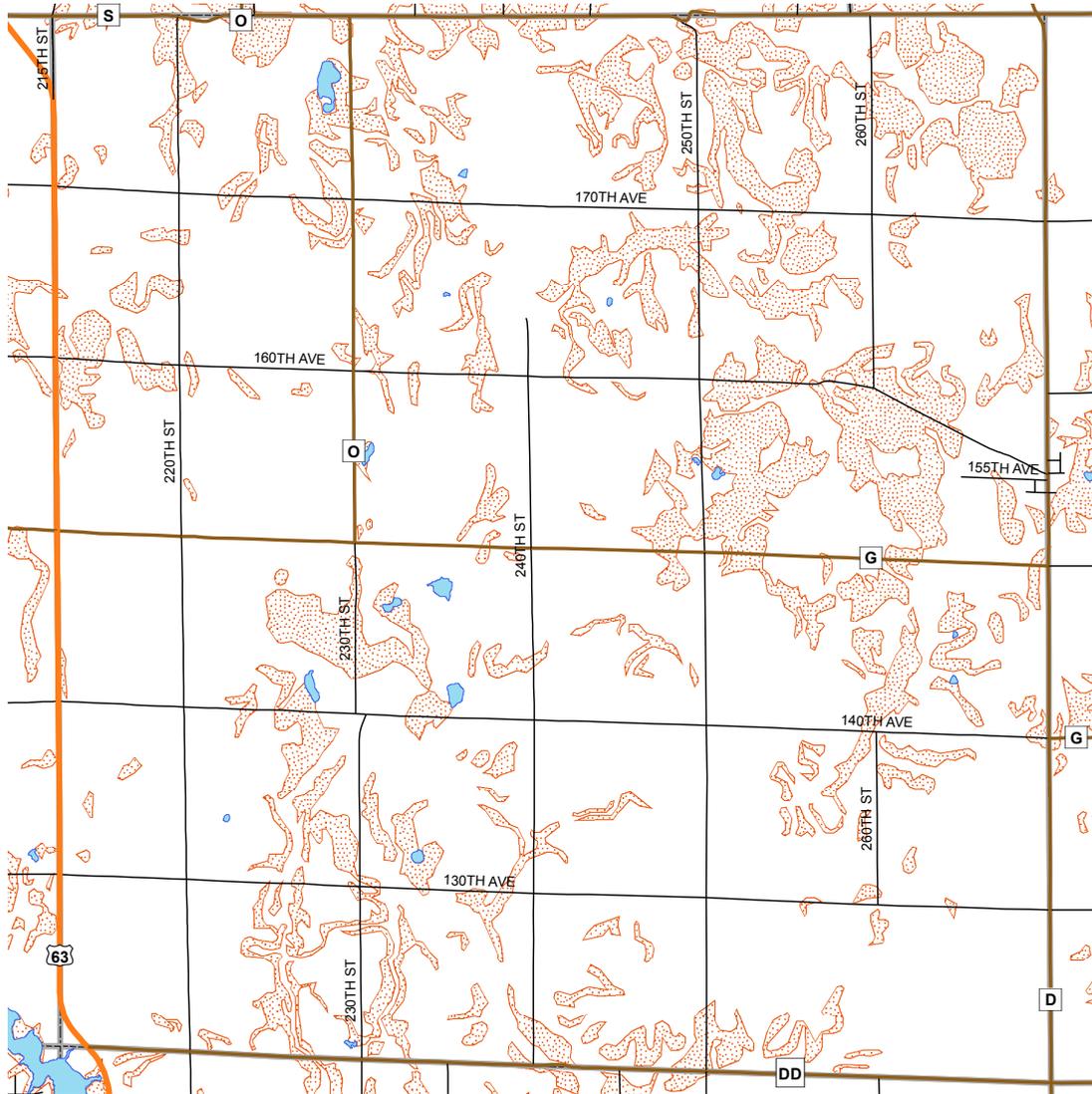
PROBABLE GRAVEL DEPOSIT  
AVAILABLE FOR EXTRACTION



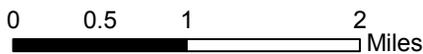
SOURCE: NRCS Soil Survey of St. Croix County.

# Potential Gravel Deposits TOWN OF EMERALD

Map 10



PROBABLE GRAVEL DEPOSIT  
AVAILABLE FOR EXTRACTION



SOURCE: NRCS Soil Survey of St. Croix County.

## ***WATER RESOURCES***

### ***SURFACE WATER***

Lakes, ponds, rivers, streams, and intermittent waterways and natural drainageways make up the surface waters of the Town of Emerald and Village of Deer Park. These resources are all water bodies, standing still or flowing, navigable and intermittent, including natural drainageways that collect and channelize overland rainwater or snowmelt runoff. Natural drainageways are characterized by intermittent streams, threads, rills, gullies and drywashes that periodically contribute water to first-order streams. There are also many artificial drainageways where the natural drainageways have been altered by human activity. All of these features have the ability to transport sediment and pollutants, and are affected by their watersheds, the land that surrounds them.

The surface waters of Emerald and Deer Park occupy two major drainage systems of northwestern Wisconsin. The St. Croix River basin which is part of the Mississippi River basin, covers the western two-thirds of the County. Lower Chippewa River basin is also part of the Mississippi River basin. The Willow River, Apple River, Trout Brook, and Kinnickinnic River are within the St. Croix River basin. The Lower Chippewa River Basin includes the Eau Galle River. The Rush River flows directly into the Mississippi River Basin. There are also wetlands, intermittent streams or dry runs and other surface drainage features that carry water only during spring runoff or during extreme storm events.

Although the entire county was subjected to glacial action, the topography has since been eroded and worn so that it is now a well-drained area. The most recent glaciation (Wisconsin Stage) only covered the land northwest of the Willow River. Here, the end moraine left many kettle hole lakes, but these have all but disappeared and are now seen as wet depressions. Most of the remaining surface waters are some relatively larger lakes, streams and artificial impoundments.

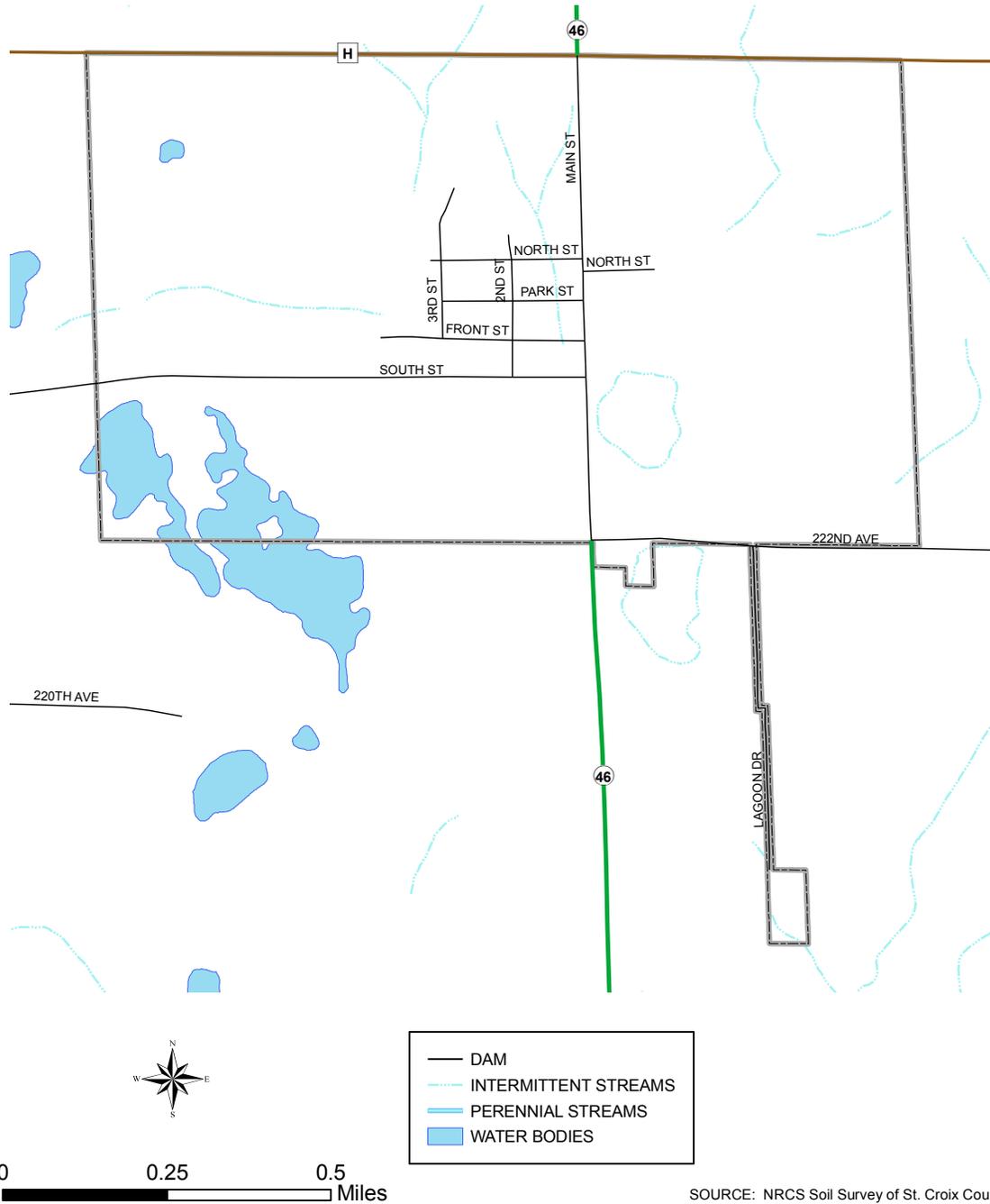
Emerald's water resources include: the South Fork of the Willow River, Hutton Creek, Carr Creek and Fleming Creek and numerous intermittent streams, ponds and wetlands. Deer Park's water resources include large ponds and wetlands and intermittent drainage. The maps on the following pages, Water Bodies and Drainage, depict the water resources of the communities.

### ***WATERSHEDS***

The lakes, rivers and wetlands of the town and village are impacted by land use practices in the watersheds that drain to them. Most of the pollutants that enter surface water resources are carried in runoff from many diffuse or nonpoint sources. The major pollutants of concern are sediment carried from areas with bare soil such as crop fields and construction sites and phosphorus attached to soil particles or dissolved in water from fertilizers and livestock operations and private onsite wastewater treatment facilities. Deer Park is in the Upper Willow River watershed and Emerald is in the Upper Willow River and Rush River watersheds. Please see the Watershed map below.

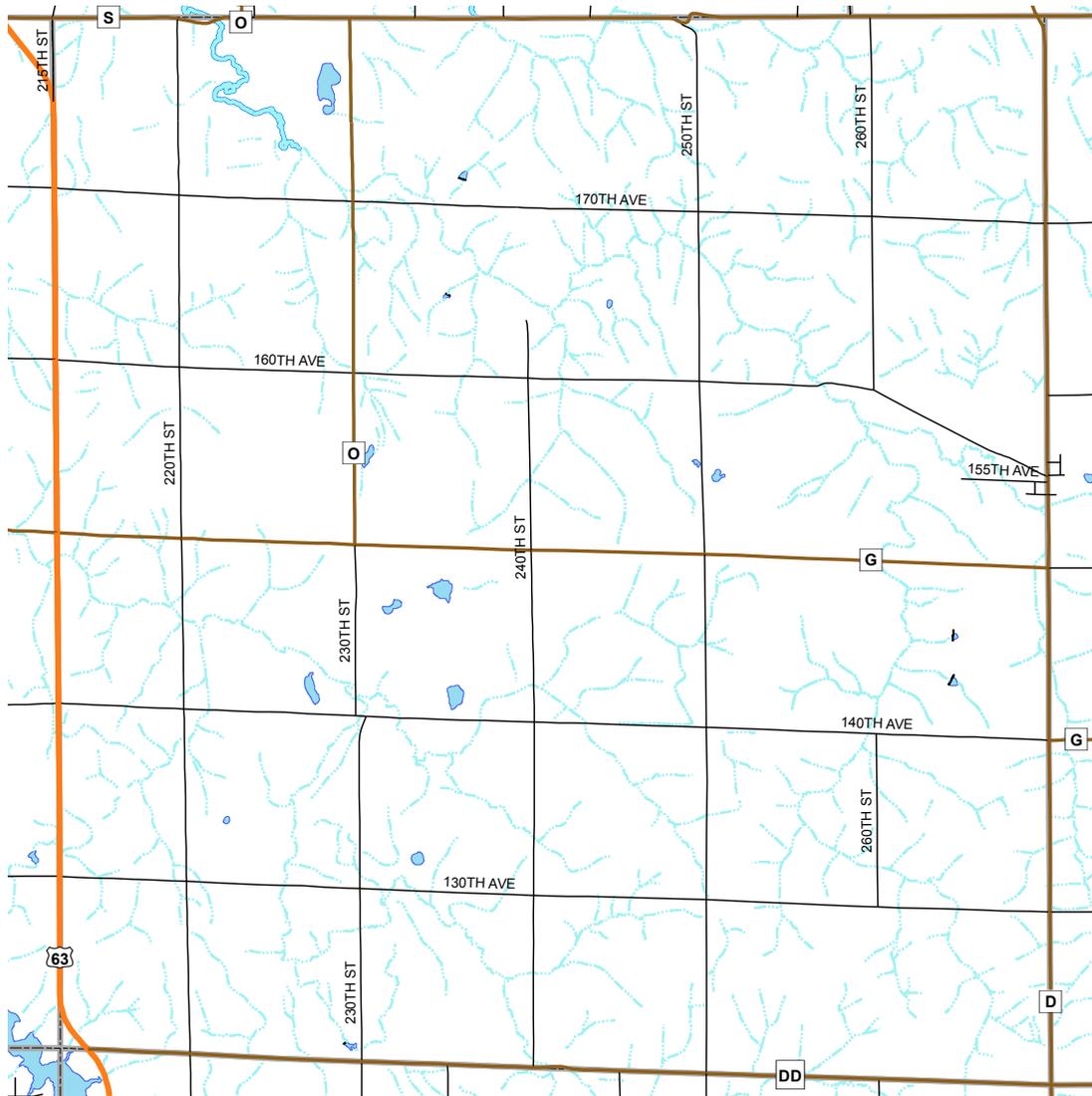
# Water Bodies and Drainage VILLAGE OF DEER PARK

Map 11



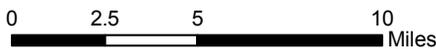
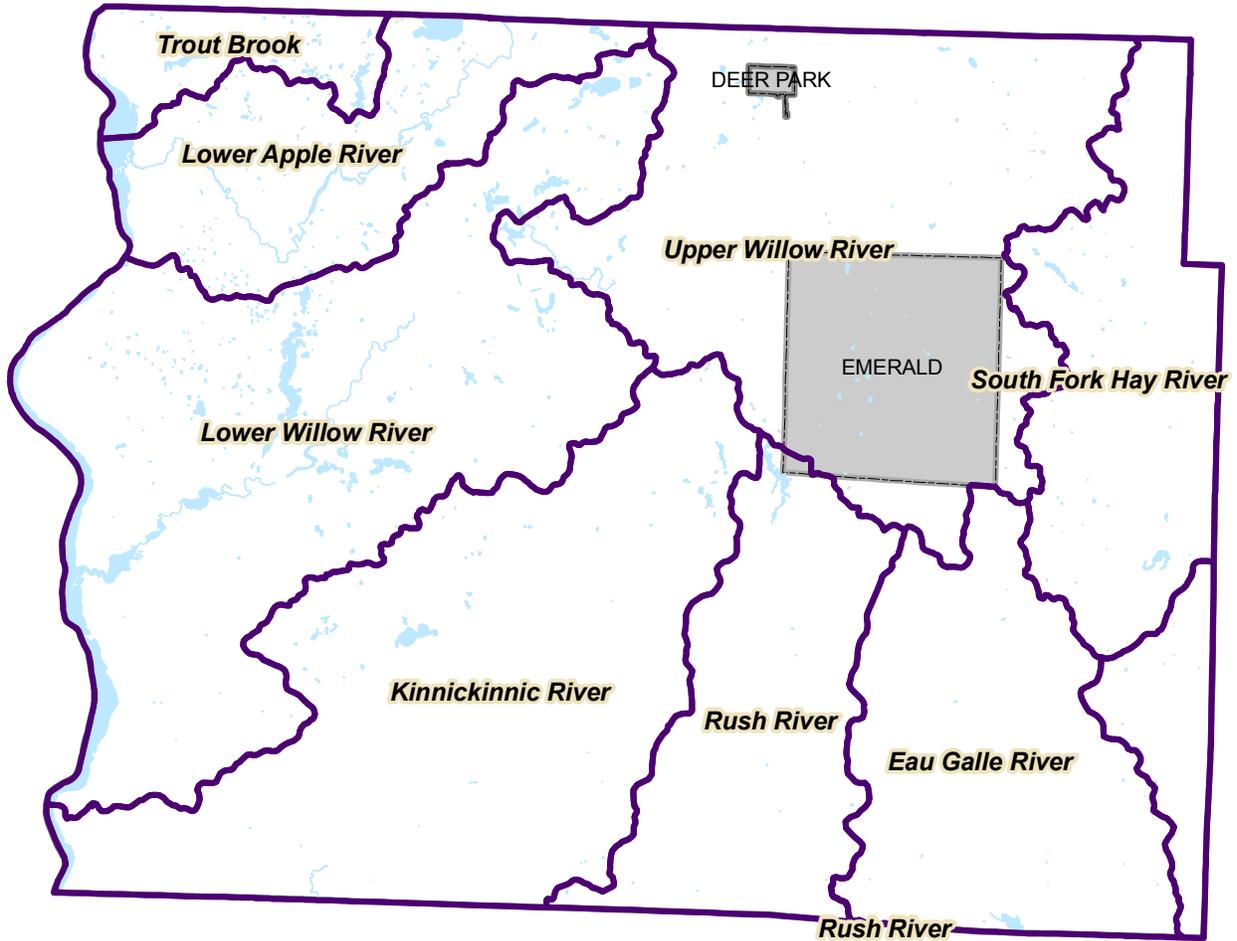
# Water Bodies and Drainage TOWN OF EMERALD

Map 12



SOURCE: NRCS Soil Survey of St. Croix County.

# Watersheds ST. CROIX COUNTY



SOURCE: St. Croix County Planning / Land Information

***SURFACE WATER QUALITY***

- The streams and rivers in the county meet fish and aquatic life and recreational use standards.
- In general, water quality in the St. Croix River Basin, which includes the Willow River, and the Lower Chippewa River Basin, which includes the Rush and Eau Galle rivers, is good.
- Water quality and aquatic habitat in the town's water bodies are threatened by non-point source pollution from agricultural land use, construction sites and rural residential development.
- Issues in the Upper Willow River Watershed include sedimentation, groundwater contamination by surface water entering through sinkholes, livestock waste entering streams and spring runoff or other heavy rain events that turn dry runs into temporary rivers.
- 5.3 miles of the South Fork of the Willow River are classified as a Class II Trout stream, 10.7 miles are not classified.
- One mile of Hutton Creek is classified as a Class II Trout stream, two miles are classified as a warm water fishery, 10 miles are not classified.
- The Wisconsin Department of Natural Resources (WDNR) has an Outstanding Resource Waters (ORW) list and an Exceptional Resource Waters (ERW) list. Outstanding and Exceptional Resource Waters are protected through WDNR regulation. These waters may not be lowered in quality due to WDNR permitted activities such as wastewater treatment plants. There are no ORW or ERW designated waters in the Town of Emerald or Village of Deer Park.
- The WDNR also has an impaired water list, known as the 303(d) list. This list identifies waters that do not meet water quality standards. The WDNR uses the list as the basis for establishing strategies to improve water bodies using total maximum daily loads. The priority watershed program uses conservation practices to improve the water body. There are no impaired waterbodies in the Town of Emerald or Village of Deer Park.
- The effects of polluted runoff from barnyards and feedlots, stream bank grazing and flooding threaten the many trout streams in the Eau Galle watershed.
- The Eau Galle River is threatened by turbidity, natural erosion and stream bank grazing.

## ***GROUNDWATER***

Major aquifers in St. Croix County include sand and gravel deposits and dolomite and sandstone bedrock. These aquifers are the source of all potable (drinkable) water in the Town of Emerald Village of Deer Park and St. Croix County. The sand and gravel aquifer consists of unconsolidated sand and gravel in glacial drift and alluvium. These deposits occur throughout about one-fourth of the county, either at the land surface or buried under less permeable drift. The sand and gravel aquifer can yield sufficient water yield for private residential water supplies. The sandstone aquifer includes all sedimentary bedrock younger than the Precambrian age. The sandstone aquifer is continuous over the county and includes, from youngest to oldest rock formations, the Galena-Platteville unit of the Ordovician age, St. Peter Sandstone, the Prairie du Chien Group, and sandstones of the Cambrian age.

The Prairie du Chien dolomite and the Cambrian sandstones are the major water-yielding rocks in much of the county. The Prairie du Chien is the uppermost-saturated bedrock and is used extensively for private residential water supplies. The ability of the Cambrian sandstone to store and yield water, and its generally great thickness makes it the principal source of municipal water supplies. The Galena-Platteville unit is mostly unsaturated; the St. Peter Sandstone is found in a small area and is partly saturated and yields some water to wells.

The source of all groundwater recharge in St. Croix County, including Emerald and Deer Park, is precipitation. Between one and ten inches of precipitation per year infiltrates and recharges the groundwater aquifers. The amount infiltrated depends mainly on the type of rock material at the land surface. Most groundwater moves through the unconsolidated material and bedrock units and then discharges to surface waters.

The groundwater elevation map on the following pages shows the elevation of the top of the zone of saturation. The elevation of the water table ranges from more than 1,100 feet in several places in the eastern quarter of the county to just over 675 feet along the St. Croix River. The water table is under the glacial drift and within the bedrock in about half of St. Croix County.

### ***AREAS WITH HIGH RELATIVE SUSCEPTIBILITY TO GROUNDWATER POLLUTION***

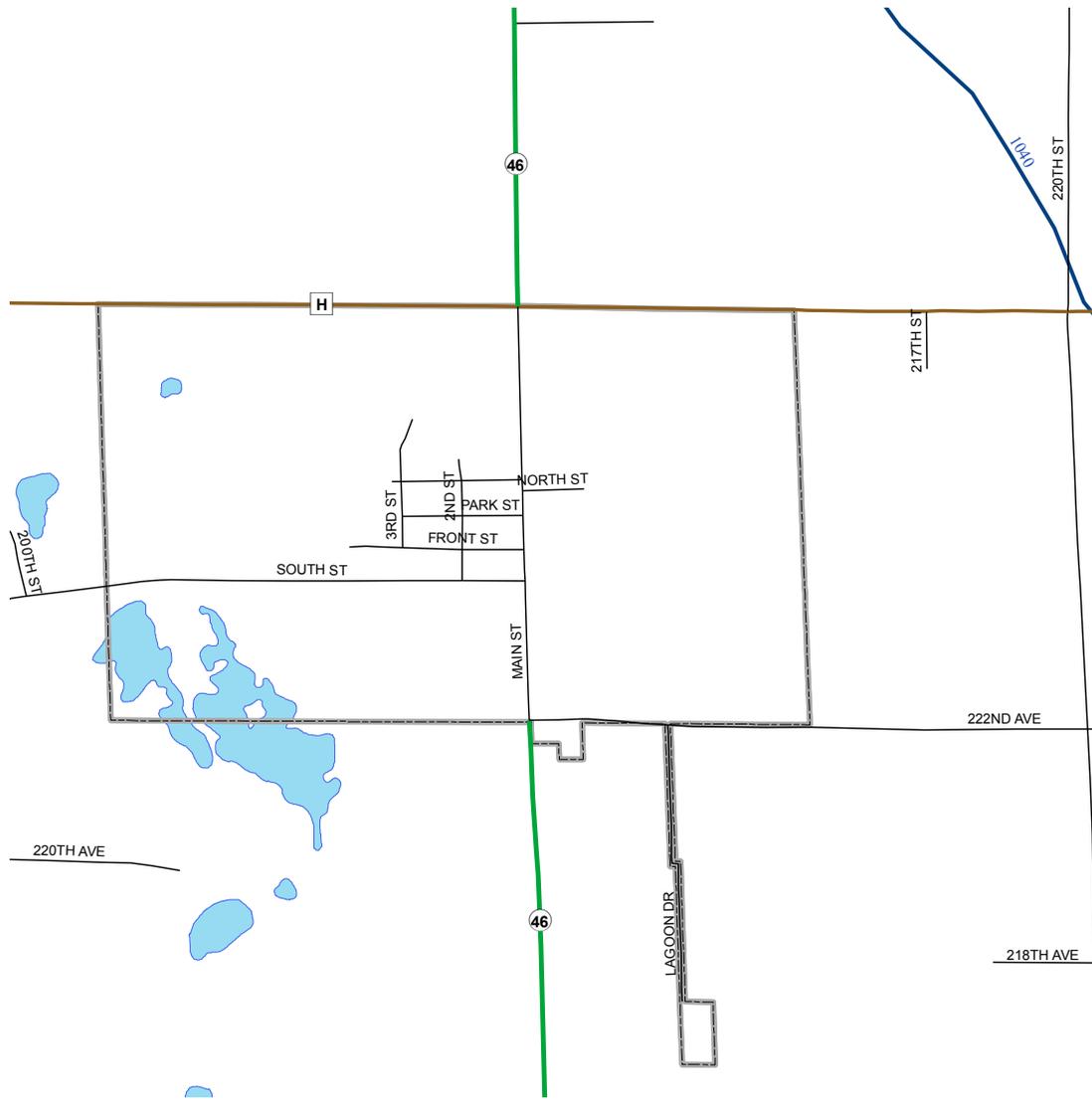
Groundwater supplies potable (drinkable) water to the residents of Emerald and Deer Park. Some land areas, because of inherent physical resource characteristics, do not attenuate (lessen the impact of) pollutants very well, which may be introduced into the environment. These areas should be protected from certain high-risk land uses and have best management practices and monitoring established, especially when in proximity to any wells that supply drinking water.

Groundwater can be adversely affected when contaminants are released into or spilled upon the ground. Some factors influencing an aquifer's susceptibility to pollution are depth to groundwater and bedrock, type of bedrock, sub-surface permeability, and the soil's ability to lessen the impact of pollutants. The Depth to Groundwater of the Town of Emerald and Village of Deer Park are depicted in maps on the following pages.

High-risk activities, such as industries using hazardous materials, pose serious threats to groundwater and should be kept out of the immediate recharge areas of public and private wells. Point sources of groundwater contamination can include chemical spills, landfills, failing septic systems, abandoned wells, etc. However, non-point pollution of groundwater from agricultural run-off, lawn fertilizers, contaminants in stormwater and improper disposal of household chemicals (e.g. bleach, used motor oil, paints, etc.) can also cause groundwater pollution.

# Groundwater Elevation VILLAGE OF DEER PARK

Map 16

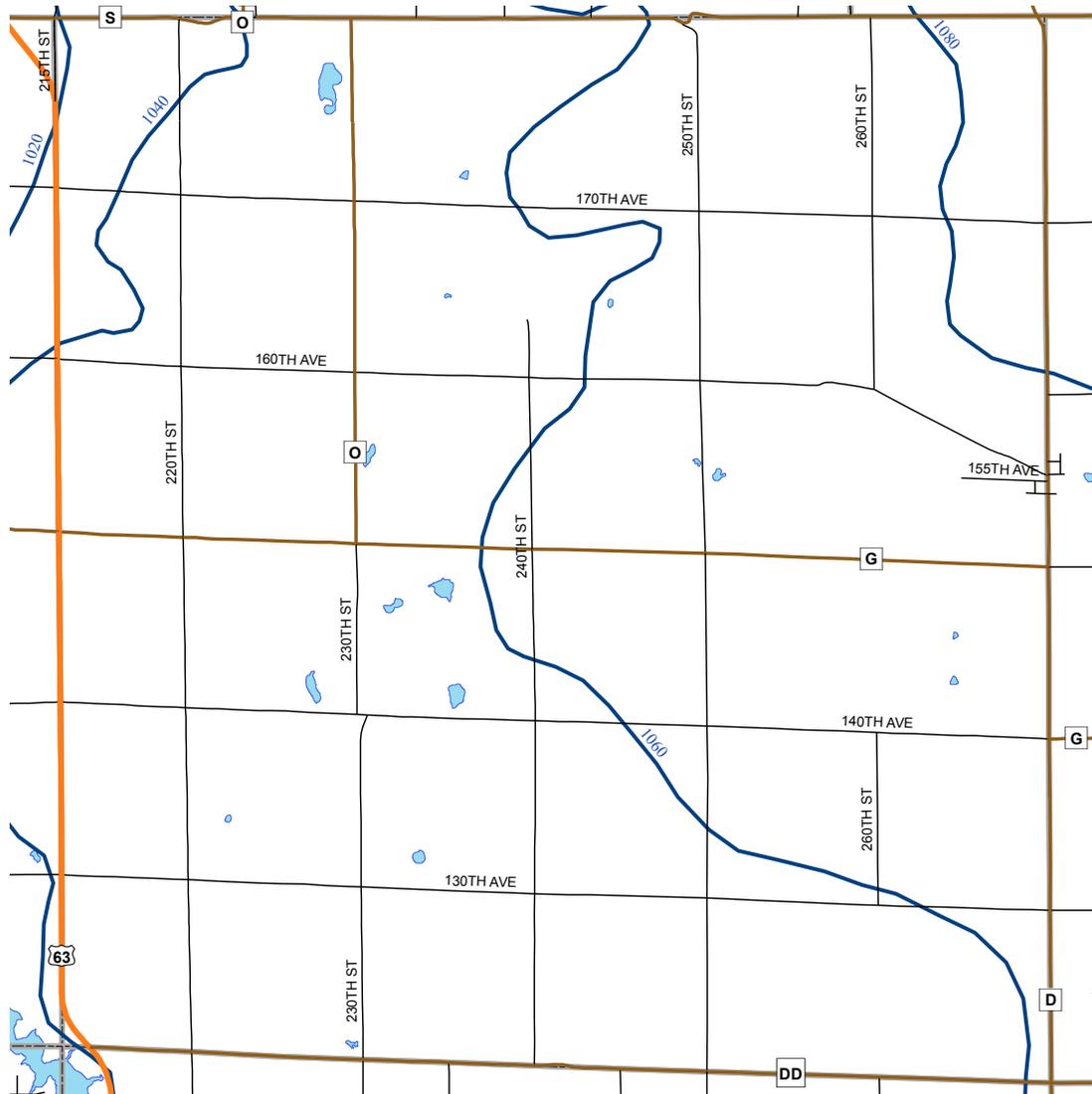


**Water Elevation at  
20' Intervals**  
— Water Elevation

SOURCE: UW Extension 1985.

# Groundwater Elevation TOWN OF EMERALD

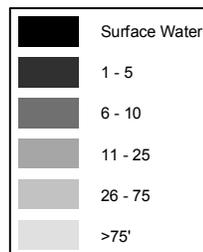
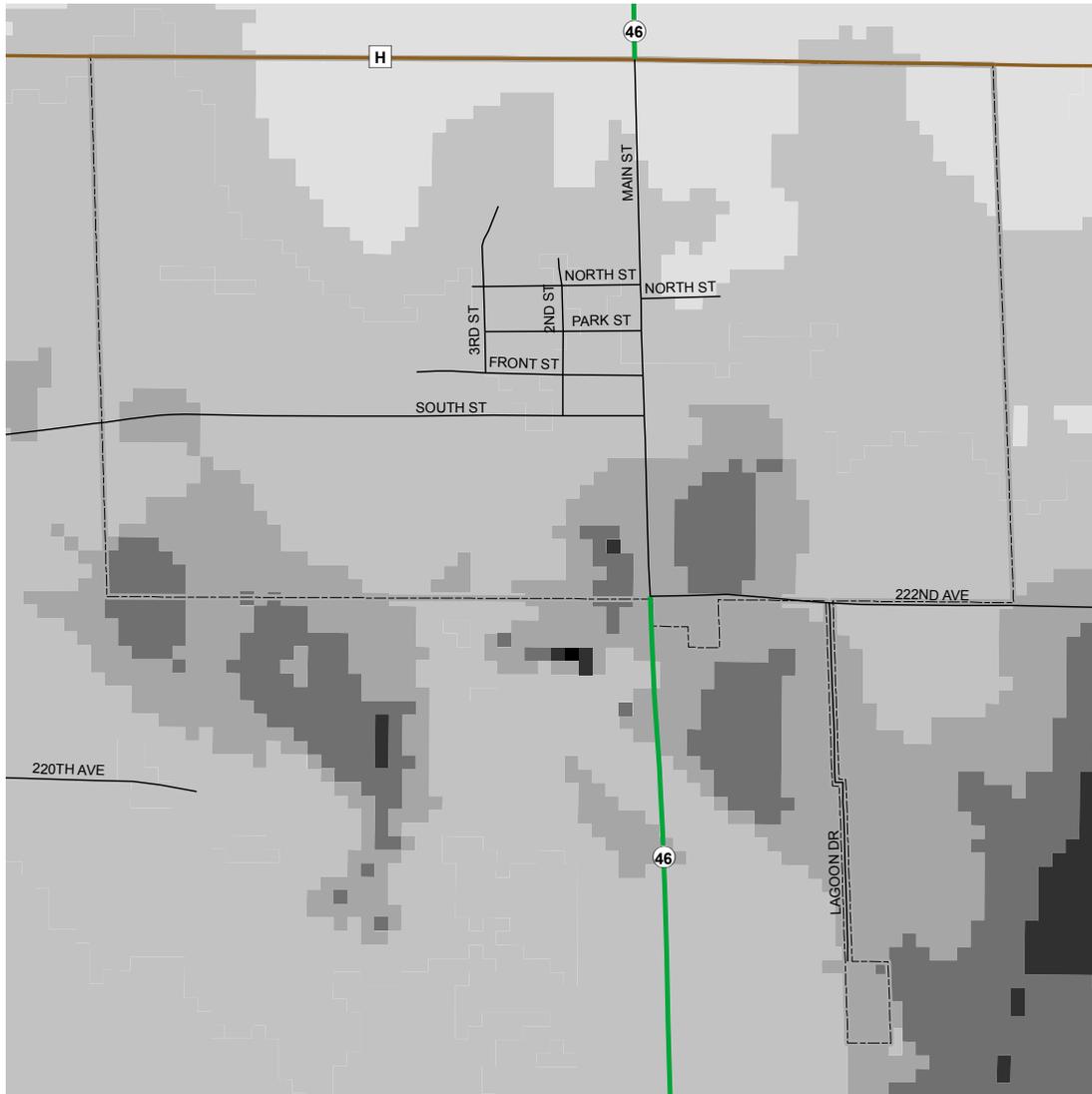
Map 17



SOURCE: UW Extension 1985.

# Depth to Groundwater VILLAGE OF DEER PARK

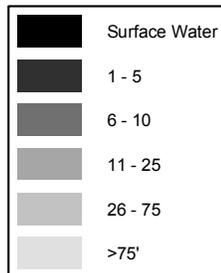
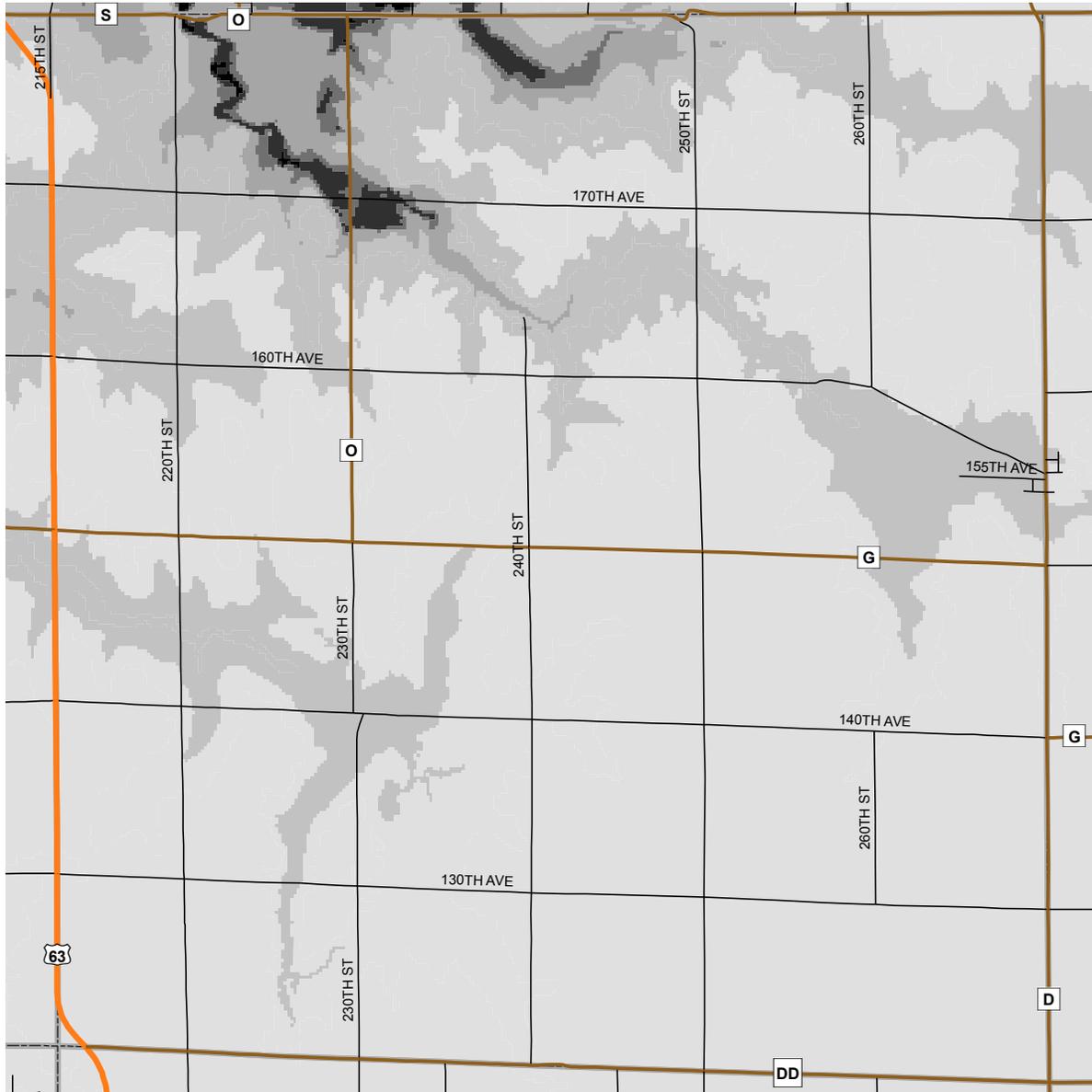
Map 14



SOURCE: USGS

# Depth to Groundwater TOWN OF EMERALD

Map 15



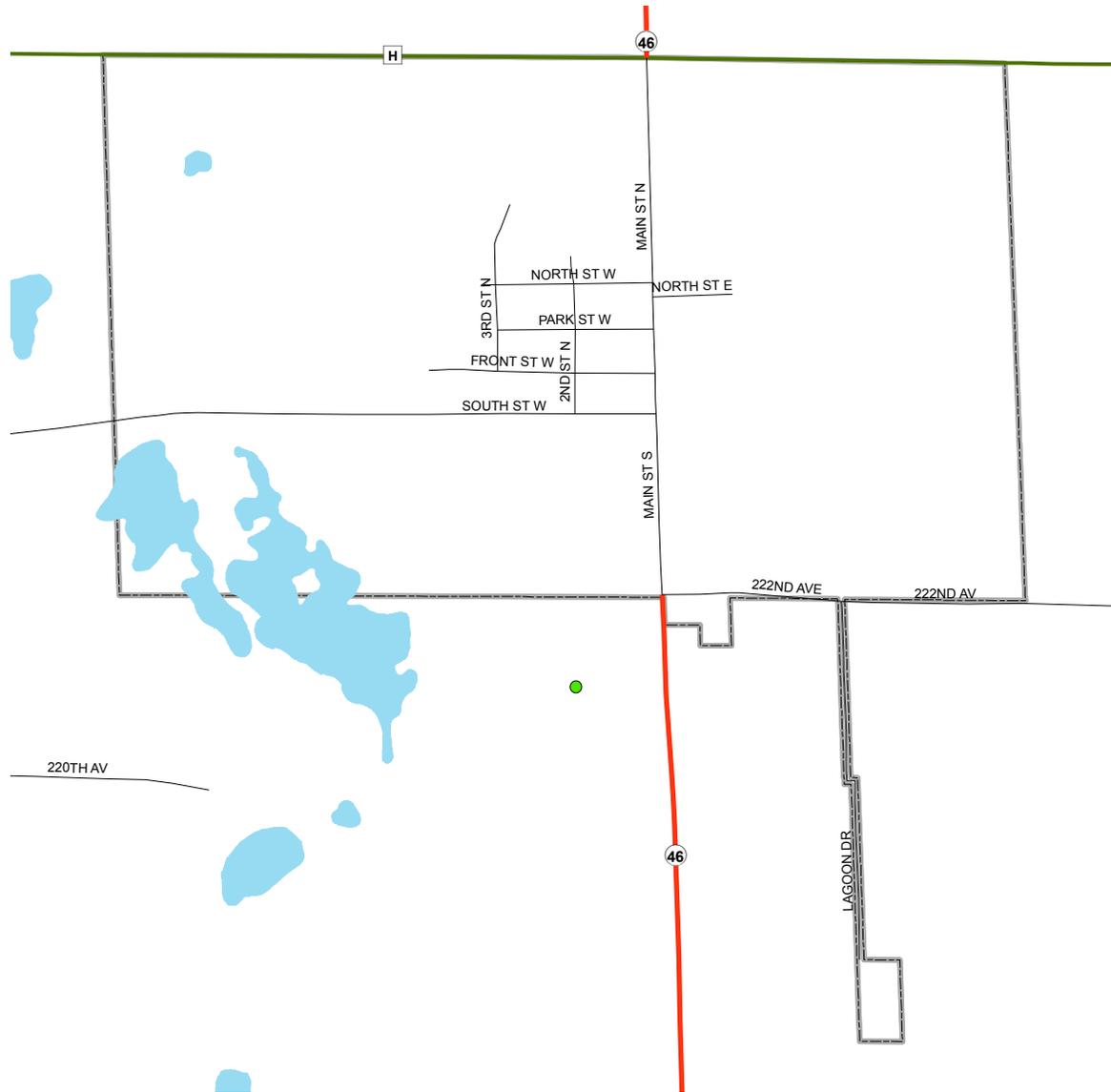
SOURCE: USGS

## ***GROUNDWATER QUALITY***

- The dolomite aquifer underlies all of St. Croix County and is the principal source of water for residential, municipal and industrial supplies.
- The quality of groundwater in St. Croix County is generally good. However, some water has chemical characteristics that make it objectionable or unsuitable for domestic or industrial uses.
- Groundwater in St. Croix County is classified as hard or very hard due to the presence of calcium and magnesium.
- Iron and manganese are found in water from all of St. Croix County's aquifers. Concentrations greater than the recommended limits are common.
- Nitrate concentrations in the water are localized but are becoming more of a problem throughout the county. Nitrates greater than 10 parts per million have not been identified in wells in Deer Park or in Emerald. Please see the Nitrates in Groundwater map on the following pages.
- The Town of Emerald has had poor water quality for several decades. Many residents refer to these as isolated incidents of "brown water" in private wells which commonly occur during the spring thaw and after heavy rain events.
- Old, unused wells and karst land features such as sinkholes, exposed bedrock, springs and disappearing streams and ponds can act as direct conduits for polluted runoff to enter the groundwater. Agriculture is the major land use in Emerald and most cropland receives applications of animal waste and commercial fertilizers. These applications contribute to groundwater quality problems, as do other land use activities on the surface of the land.
- Past drinking water programs sponsored by the Land & Water Conservation Department and UW-Extension, through volunteer water testing, found unsafe levels of nitrate and bacteria in residential wells.
- As of June 2009, the Wisconsin DNR has established two "special areas of well compensation eligibility" in Emerald. Wells located in those areas were found to contain Rhodococcus bacteria, an ecoli-positive bacteria. This type of bacteria is indicative of grazing animal waste contamination, which includes waste from livestock.
- Residential well owners within these designated areas may be eligible, depending on income, for a grant to help pay for the cost of a replacement well and for sealing their existing contaminated well.
- Based on the susceptibility of the groundwater supply for the Town of Emerald, the WDNR recommends that all new or replacement wells within the town be cased to a depth below the Prairie du Chien aquifer.
- Microbial-source testing (which determines the specific type of bacteria) is available through the Wisconsin-DNR for those wells that have both obvious odors or smells and tested positive for e-coli bacteria.
- There are now four Atrazine (a pesticide) prohibition areas within St. Croix County. One on the edge of Star Prairie and Stanton; one in Erin Prairie; one in Springfield; and one at the junction of the towns of Hammond, Warren, Pleasant Valley and Kinnickinnic.
- A report entitled "An Introduction to Groundwater in St. Croix County" completed in May 2006 by the UW-Extension and UW-Stevens Point provides a more complete analysis of St. Croix County's groundwater. The report looks into a broader range of water quality measurements such as coliform bacteria, arsenic, nitrates, triazine, arsenic, chloride, hardness and pH. The report may be access on St. Croix County's website, under the Land and Water Conservation Department's Drinking Water program, [www.sccwi.us/lwcd](http://www.sccwi.us/lwcd) choose Drinking Water Testing.

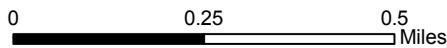
# Groundwater Quality VILLAGE OF DEER PARK

Map 18



### NITROGEN LEVELS IN PPM

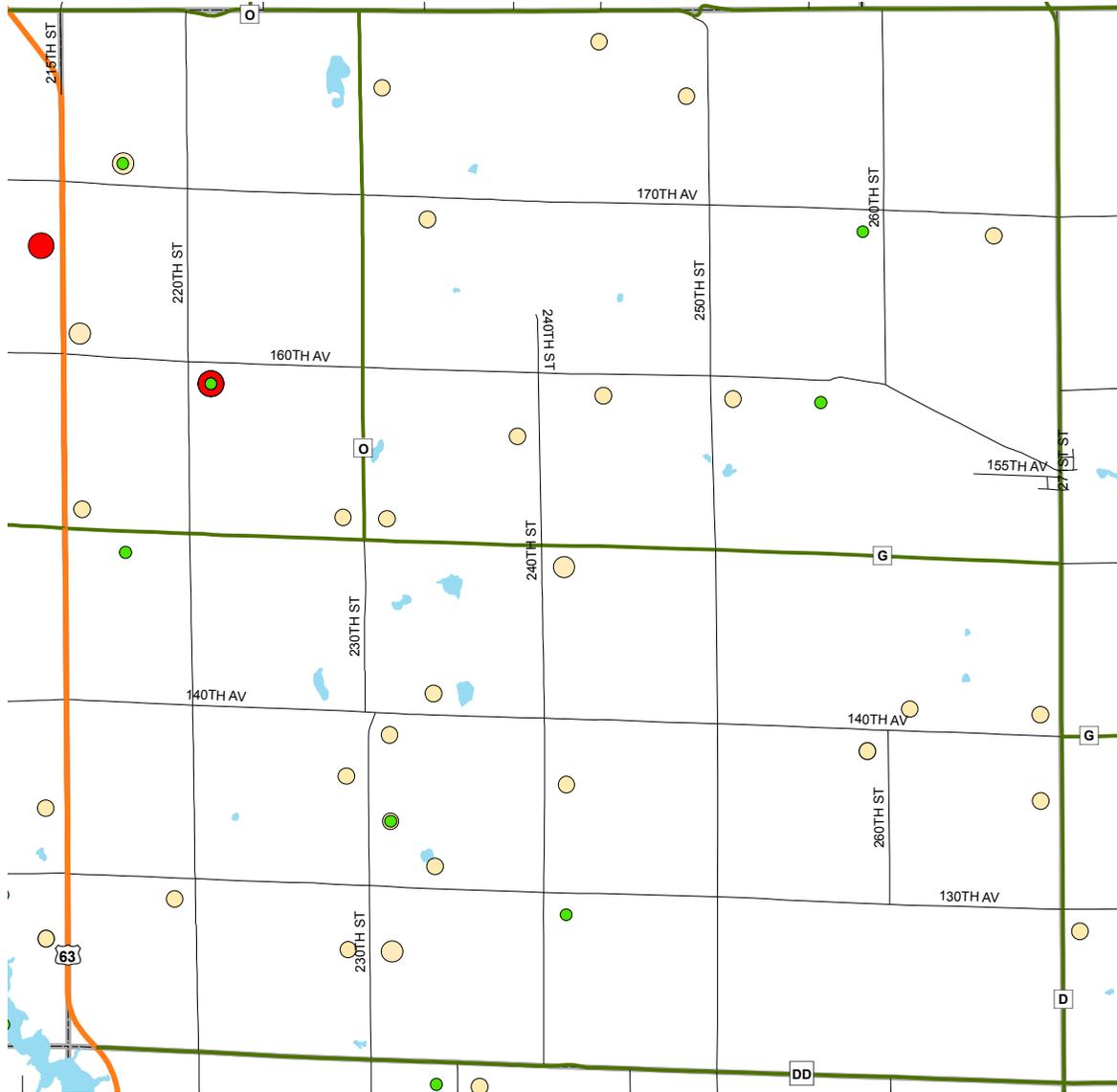
- 0.0 - 2.2
- 2.3 - 5.6
- 5.7 - 10.0
- 10.1 - 21.1
- 21.2 - 53.4



SOURCE: Drinking Water Program,  
UW Extension and St. Croix County  
Private Well Data, 2007

# Groundwater Quality TOWN OF EMERALD

Map 19



### NITROGEN LEVELS IN PPM

- 0.0 - 2.2
- 2.3 - 5.6
- 5.7 - 10.0
- 10.1 - 21.1
- 21.2 - 53.4

SOURCE: Drinking Water Program,  
UW Extension and St. Croix County  
Private Well Data, 2007

### ***ISSUES AFFECTING SURFACE & GROUNDWATER QUALITY***

- Agricultural runoff into the lakes and streams of the county has contributed to the degradation of water quality in some areas.
- The internally drained closed depressions and their corresponding high water tables are very sensitive to runoff and septic system effluent.
- The increased number and density of Private Onsite Wastewater Treatment Systems (POWTS) can lead to nitrates in the groundwater, if these systems are improperly installed or are not maintained. All POWTS are required to be inspected every three years, and most will need to be pumped at that time. Improper use of a system could lead to premature failure of the system, expensive repairs and water contamination. St. Croix County reminds residents of the septic system inspection requirement on a three-year rotational basis and requires proof that the system has been inspected.
- Along with rural residential development come problems such as storm water control and soil erosion.
- Increased lakeshore development has occurred in St. Croix County, causing increased runoff into the lakes, which can lead to water quality degradation.
- Landowners should test their drinking water annually or at least once every three years. Water testing kits are available at the County Planning and Zoning Department, Hudson; Land & Water Conservation Department, Baldwin; Public Health Department, New Richmond; or through private labs. A fee may apply.

#### ***WELLHEAD PROTECTION AREAS***

Municipal water suppliers are required by state administrative code to establish wellhead protection measures for new wells. It is also appropriate to establish protection measures for existing public water supply wells to protect the public health, safety and welfare, and to reduce public costs should a pollution event occur. Because it is difficult to adequately react to a pollution event that occurs in proximity to a well, strict prohibitions of certain high-risk land uses should be established for that area (within the 30-day time of travel of contributing groundwater to a well). Certain high-risk land uses should be limited and best management practices and monitoring established in the area between the 30-day and five-year time of travel of contributing groundwater to a public water supply well.

## *ENVIRONMENTALLY SENSITIVE RESOURCES*

### *FLOODPLAINS*

Wisconsin Statute 87.30(1) (59.692) requires counties, cities and villages to implement floodplain zoning. The purpose of Wisconsin Administrative Code NR 116, Floodplain Management Program, is the protection of property and public investments from the effects of flooding. Federal Emergency Management Agency 100-year floodplain maps are usually used to delineate flood hazard areas. Counties are required to adopt reasonable and effective floodplain zoning ordinances within one year after hydraulic and engineering data adequate to formulate the ordinance becomes available. St. Croix County has adopted and implemented a floodplain ordinance into the county zoning ordinance. This ordinance was revised in 2009. This ordinance is effective in all towns. Each community's floodplains are depicted in the maps on the following pages.

### *SHORELANDS*

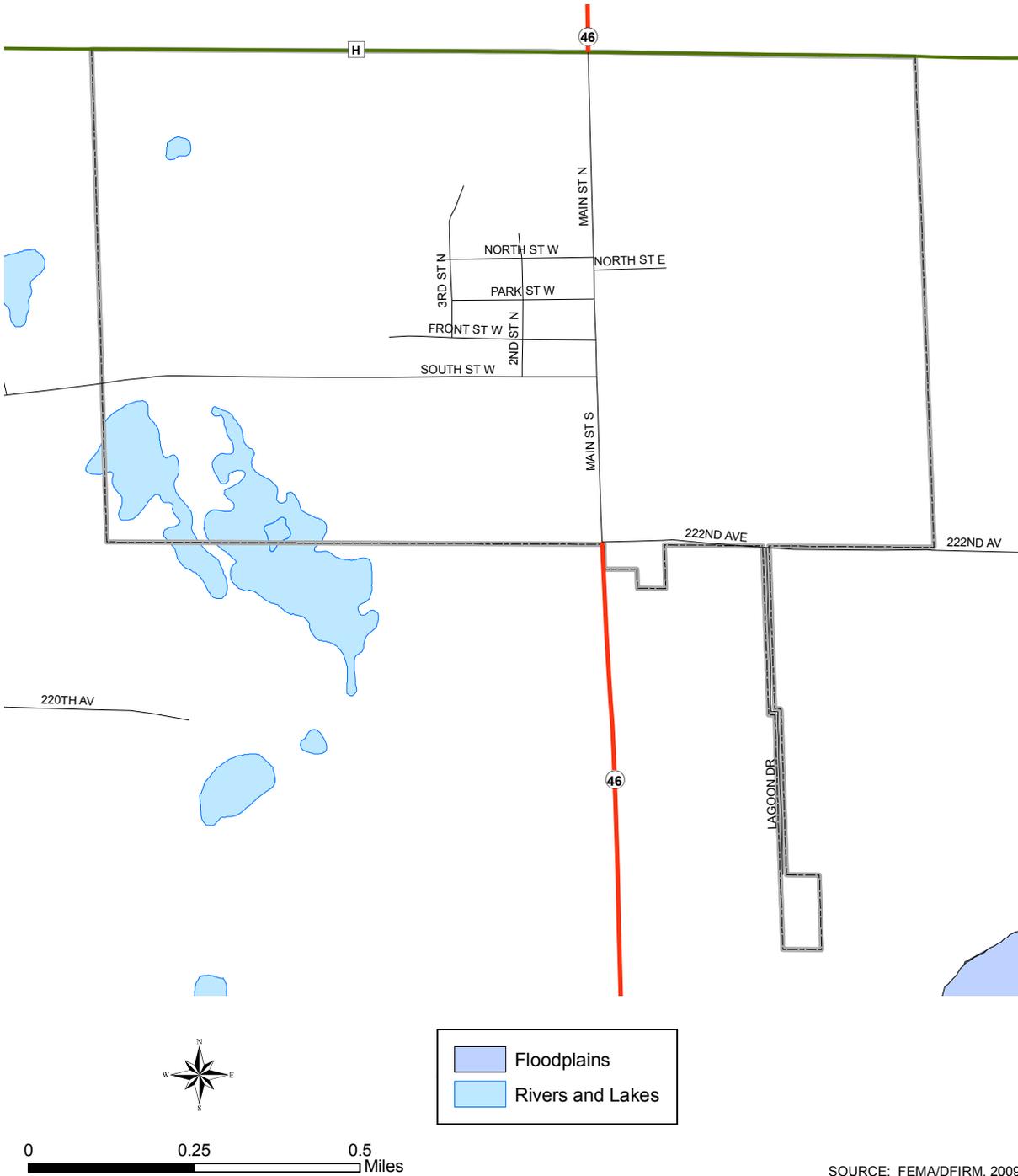
Lands within 1000 feet of the ordinary high water mark of a lake or pond and 300 feet past the ordinary high water mark or landward edge of the floodplain, whichever is greater, of a river or stream are designated shorelands. Shorelands are usually considered prime residential building areas because of their scenic beauty. However, shorelands provide valuable habitat for both aquatic and terrestrial animals and vegetation. Shorelands also act as buffers and thus serve to protect water quality.

Wisconsin requires counties to protect and prevent the loss and erosion of these valuable resources by adopting and enforcing a shoreland ordinance. The authority to enact and enforce this provision comes from Wisconsin Statutes 59.971 and 144.26. Wisconsin Administrative Code NR 115 dictates the shoreland management program. County ordinances can be more, but not less, stringent than NR 115. Town approval is not required. Counties may permit only certain uses in wetlands of five acres or more within the shoreland zone.

The state requirement of shoreland zoning were adopted by St. Croix County and incorporated as part of the county's zoning ordinance. Shoreland zoning requirements in St. Croix County's ordinance permit only certain uses in wetlands of three acres or more within the shoreland zone. This ordinance is effective in all towns. The shorelands are shown in the maps on the following pages. Site investigation of all floodplains and shorelands is required to ensure compliance with federal and state regulations.

# Floodplains VILLAGE OF DEER PARK

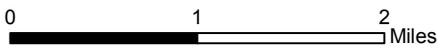
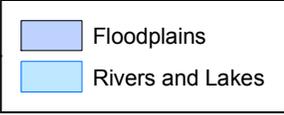
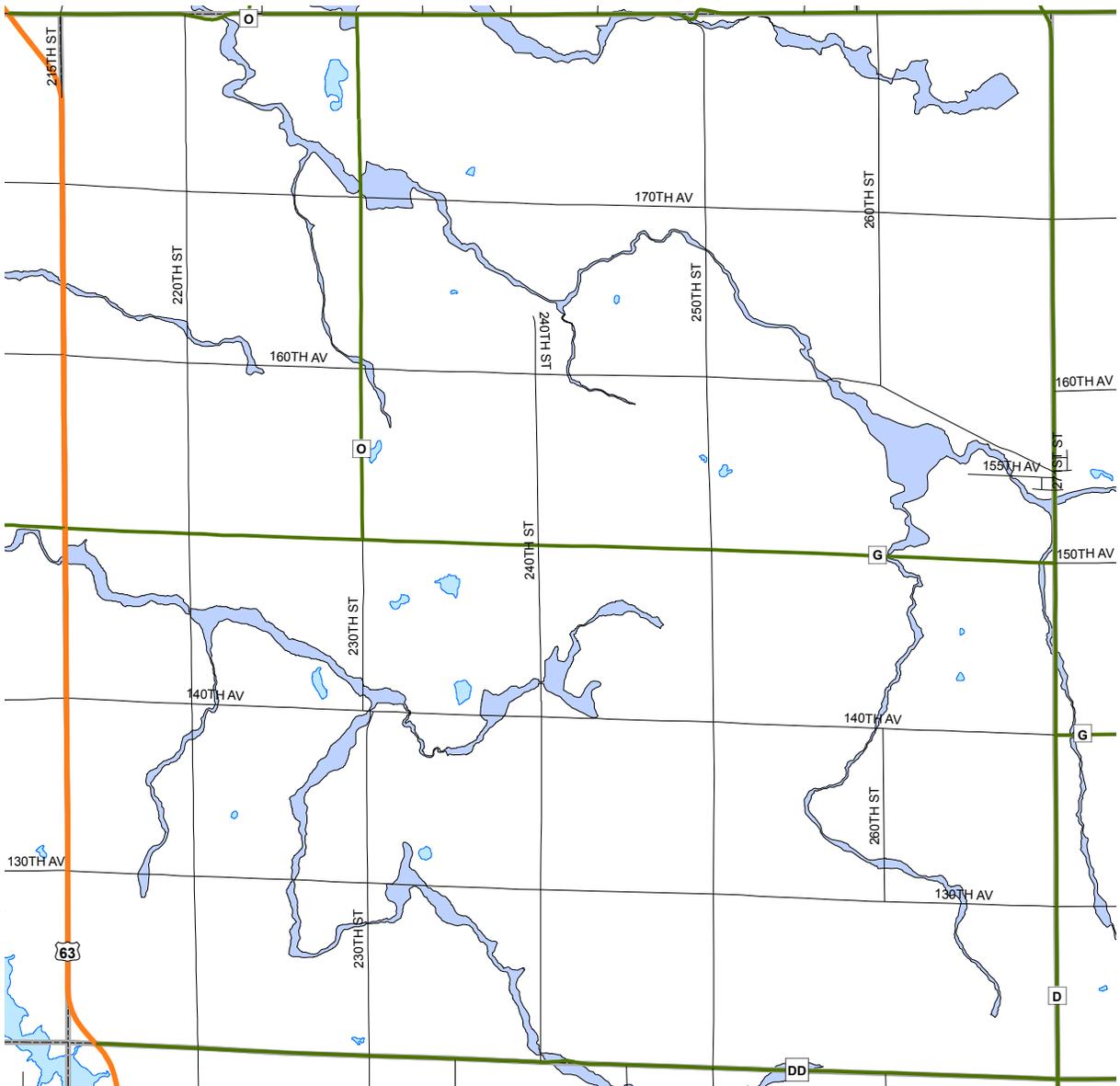
Map 24



SOURCE: FEMA/DFIRM, 2009

# Floodplains TOWN OF EMERALD

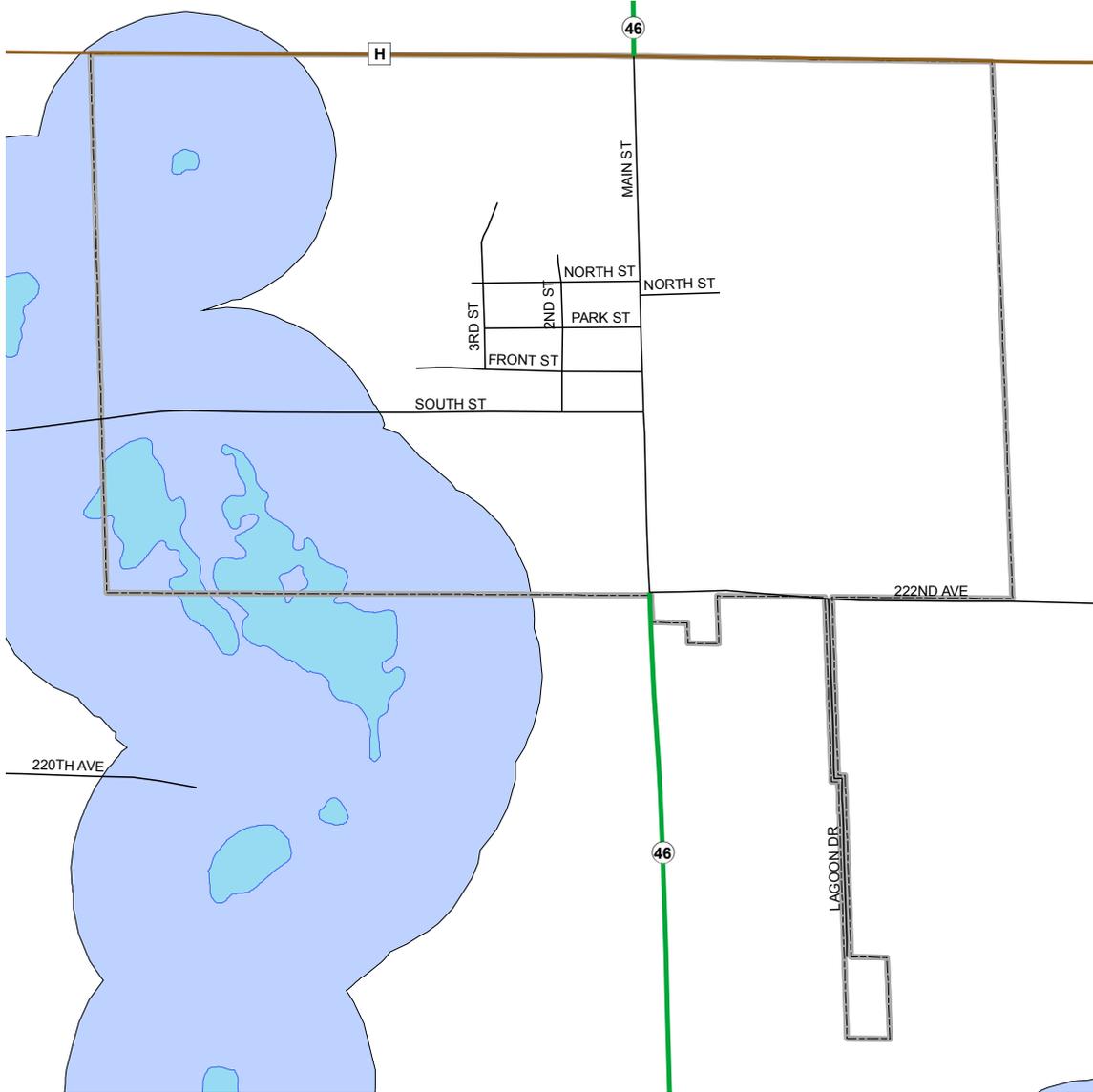
Map 25



SOURCE: FEMA/DFIRM, 2009

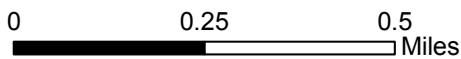
# Shorelands VILLAGE OF DEER PARK

Map 26



Lakes & Ponds Buffered 1000 Ft.  
Rivers and Streams Buffered 300 Ft.

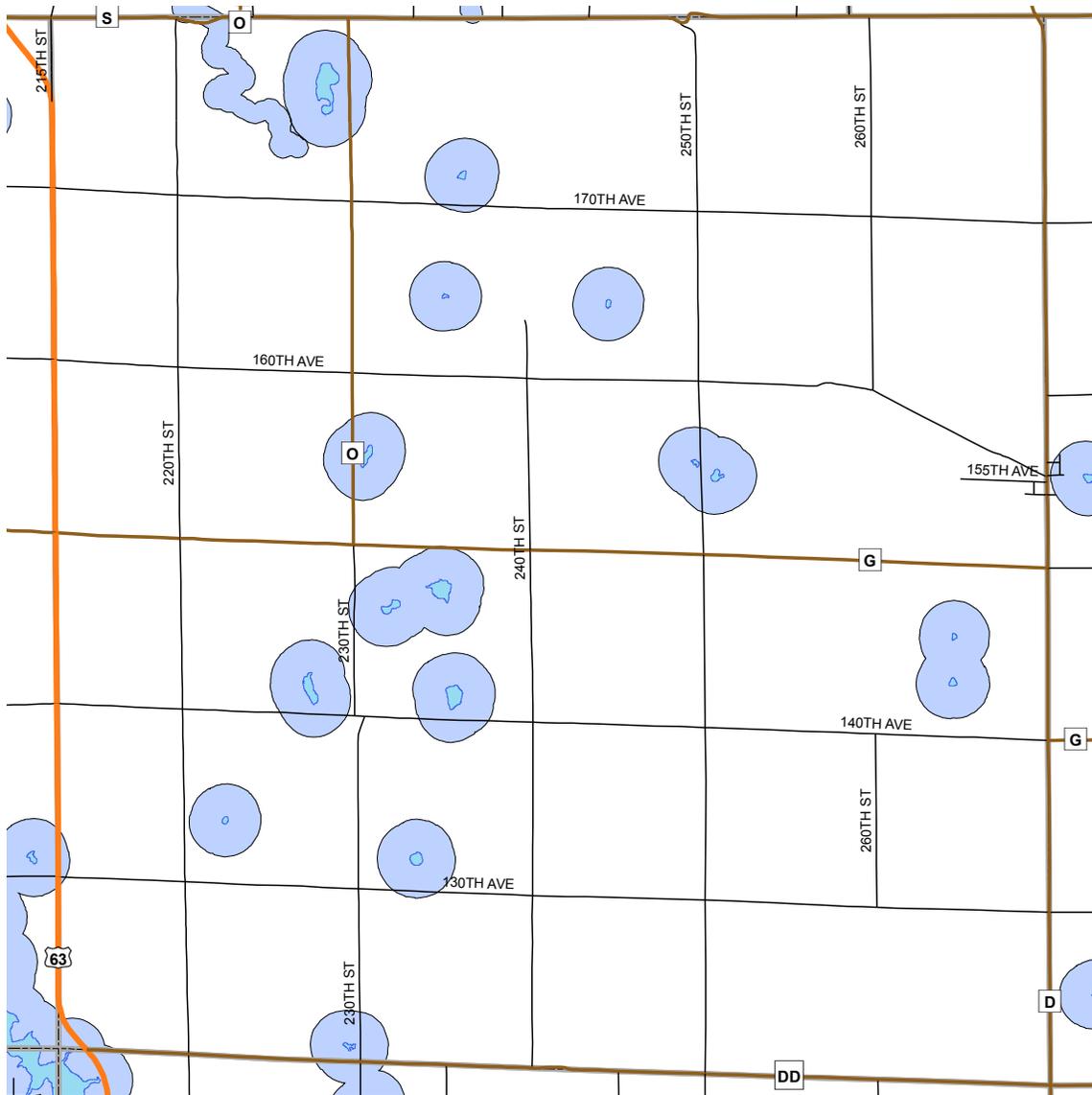
- Rivers and Lakes
- Shoreland



SOURCE: 1990 Tiger Files hydrology, NRCS streams and buffered by WCWRPC.

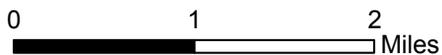
# Shorelands TOWN OF EMERALD

Map 27



Lakes & Ponds Buffered 1000 Ft.  
Rivers and Streams Buffered 300 Ft.

- Rivers and Lakes
- Shoreland



SOURCE: 1990 Tiger Files hydrology, NRCS streams and buffered by WCWRPC.

## WETLANDS

Wetlands are defined by State Statute as "an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic (water-loving) vegetation and which has soils indicative of wet conditions." Wetlands may be seasonal or permanent and are commonly referred to as swamps, marshes, or bogs. Wetland plants and soils have the capacity to store and filter pollutants ranging from pesticides to animal wastes. Wetlands can make lakes, rivers and streams cleaner, drinking water safer and also provide valuable habitat for both aquatic and terrestrial animals and vegetation. In addition, some wetlands can also provide the replenishment of groundwater supplies. Groundwater discharge is common from wetlands and can be important in maintaining stream flows, especially during dry months. Groundwater discharged through wetlands can contribute to high quality water in lakes and streams.

The federal government and the DNR restrict development in wetlands through Section 404 of the Clean Water Act and NR103, respectively. If landowners and developers are not notified of or do not follow these restrictions, wetlands can be damaged, resulting in costly fines and/or restoration.

Even though the DNR has an inventory of wetlands of two acres and larger, all wetlands, no matter how small, which meet the state definition, are subject to DNR regulations. Even if state regulations do not apply, federal regulations may, making it necessary to review all wetlands against these regulations before their disturbance. Particular attention must be given wetlands within shorelands to ensure protection from development.

Development in wetlands by either draining or filling removes their natural functions of storing and filtering pollutants, cleaning lakes, rivers and streams, making drinking water safer, providing valuable habitat for both aquatic and terrestrial animals and vegetation, replenishing groundwater supplies and the groundwater discharge from wetlands, which maintains stream flows, especially during dry months.

The wetlands of the Town of Emerald and Village of Deer Park are depicted in the maps on the following pages. Site investigation is required to ensure compliance with federal and state regulations.

## CLOSED DEPRESSIONS

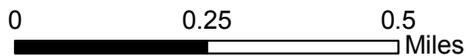
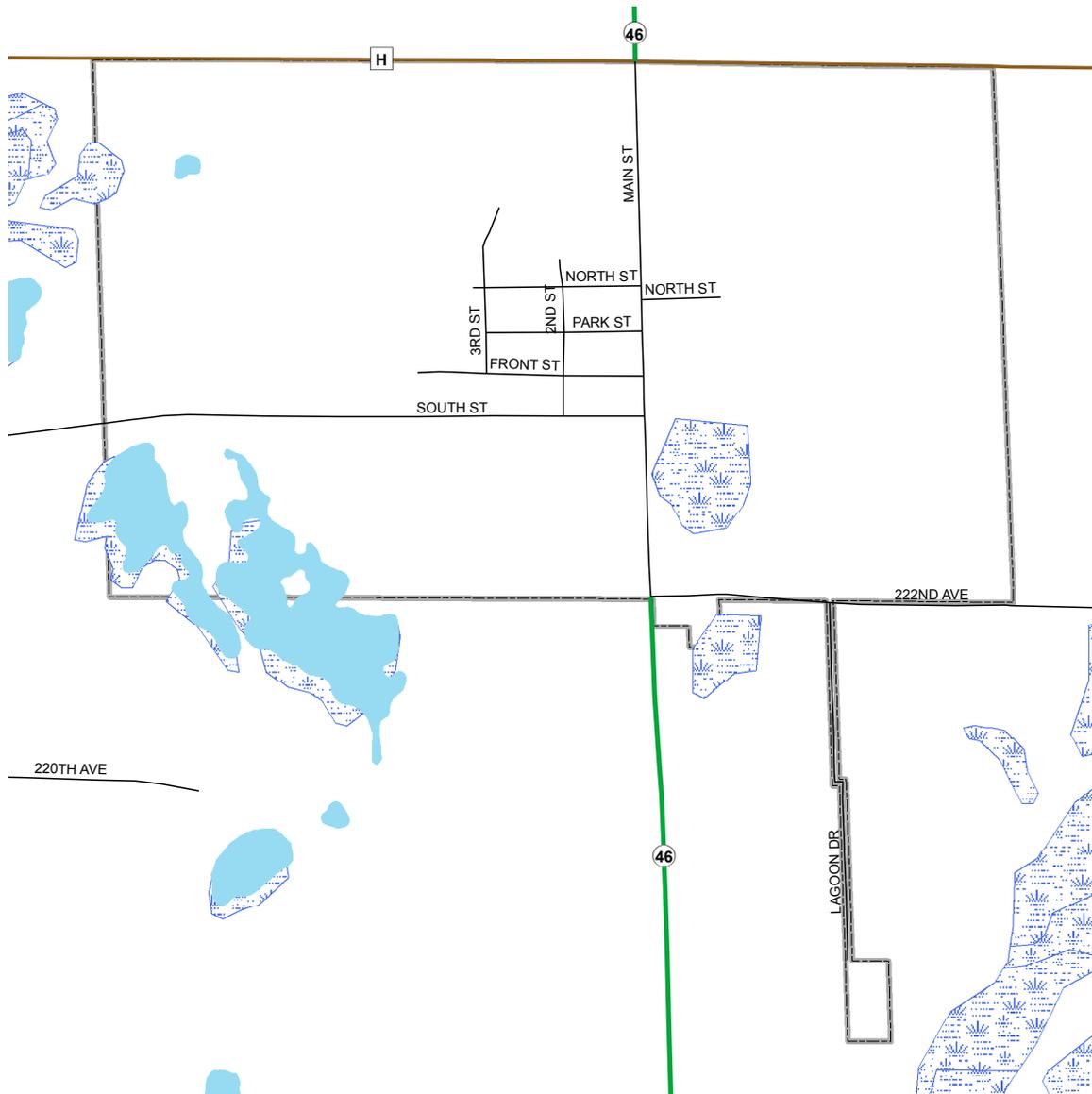
Closed depressions are extremely sensitive land features because of their close association with the groundwater. The release of pollutants into or near closed depressions is almost certain to reach groundwater immediately. The Closed Depressions of Deer Park and Emerald are depicted in the Closed Depression maps on the following pages.

*Closed depressions are common features in St. Croix County. They have formed through two quite different geological processes: karst development and glaciation. Karst development occurs in regions with highly soluble bedrock and results in distinctive landforms such as sinkholes. St. Croix County is covered by several rather thick, soluble carbonate units, and has particularly well developed karst, especially in the eastern half of the county. Glacial action can also result in topography marked by closed depressions known as kettles or kettleholes. Kettles develop when large blocks of glacier ice are buried within glacial deposits and subsequently melt. Many of the depressions in the western and northwestern portions of the county are kettles that developed in the St. Croix moraine after it was deposited during the Wisconsinan glaciation.*

Baker, Hughes, Huffman and Nelson, Closed Depression Map of St. Croix County, Wisconsin, 1991

# Wetlands VILLAGE OF DEER PARK

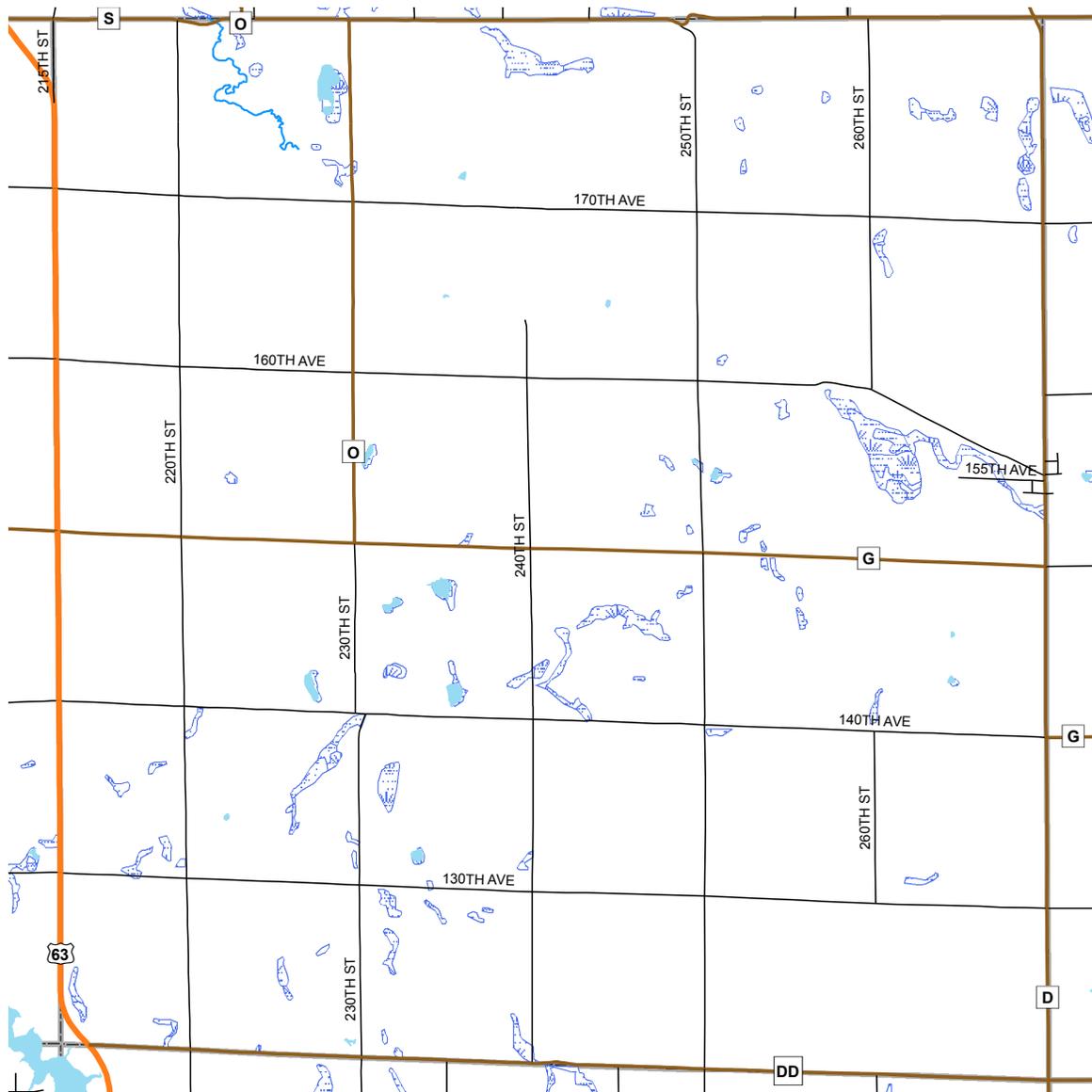
Map 28



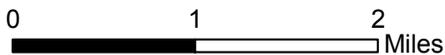
SOURCE: DNR.

# Wetlands TOWN OF EMERALD

Map 29



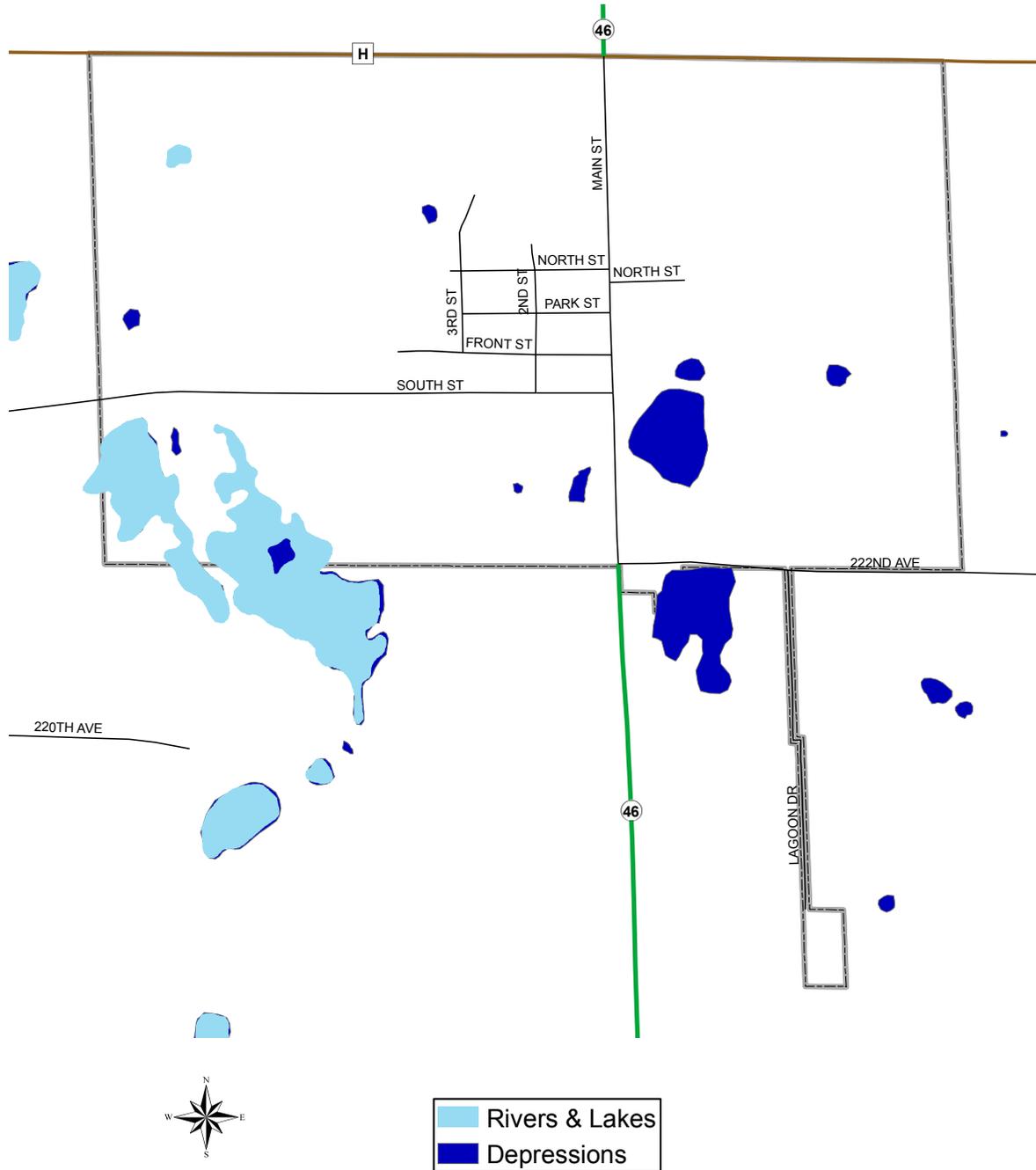
	WETLANDS
	Rivers & Lakes



SOURCE: DNR.

# Closed Depressions VILLAGE OF DEER PARK

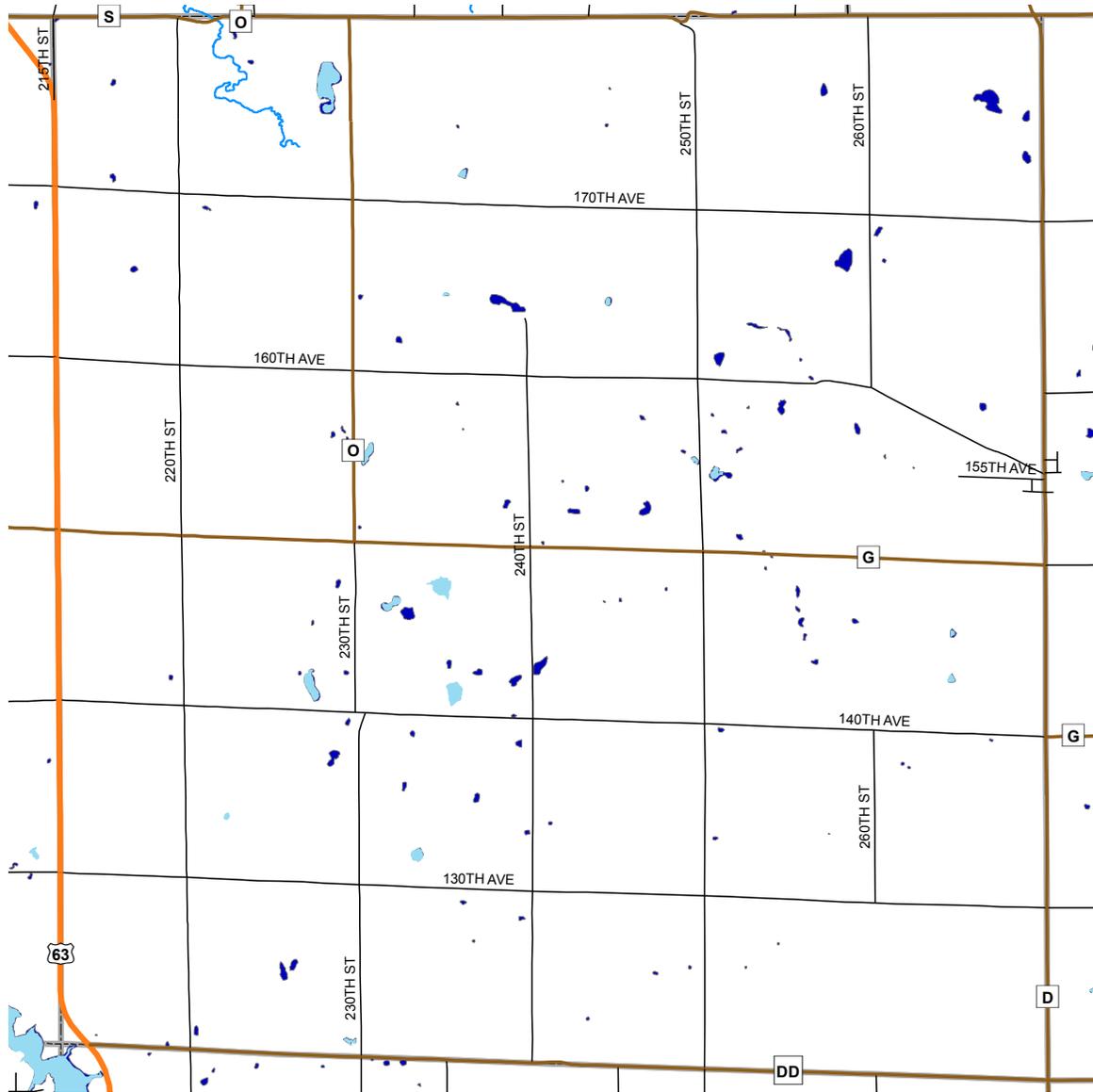
Map 30



SOURCE: Department of Plant and Earth Science, UW-RF.

# Closed Depressions TOWN OF EMERALD

Map 31



Light Blue: Rivers & Lakes  
Dark Blue: Depressions



SOURCE: Department of Plant and Earth Science, UW-RF.

### *STEEP SLOPES*

Steep slopes are any area where the gradient of the land is 12 percent or greater (each percent of slope is measured as one unit in elevation for every 100 horizontal units). One category of steep slope is 12 percent to less than 20 percent slope, of any soil type. It has been demonstrated that 12 percent slope is a threshold at which impacts from development become apparent. To allow development on these slopes one should avoid direct runoff into streams or rivers; follow state approved construction site erosion control standards; and institute best management practices, monitoring and maintenance to control on-site runoff and pollution. Steep slopes of 20 percent or greater are subject to erosion impacts even from slight land cover disturbances. Development on these slopes results in high construction costs and severe erosion with resultant negative impacts to surface waters. Therefore, development on slopes, 20 percent or greater, should be prohibited. Steep Slopes of the Village of Deer Park and Town of Emerald are depicted in the maps on the following pages.

### *WOODLANDS*

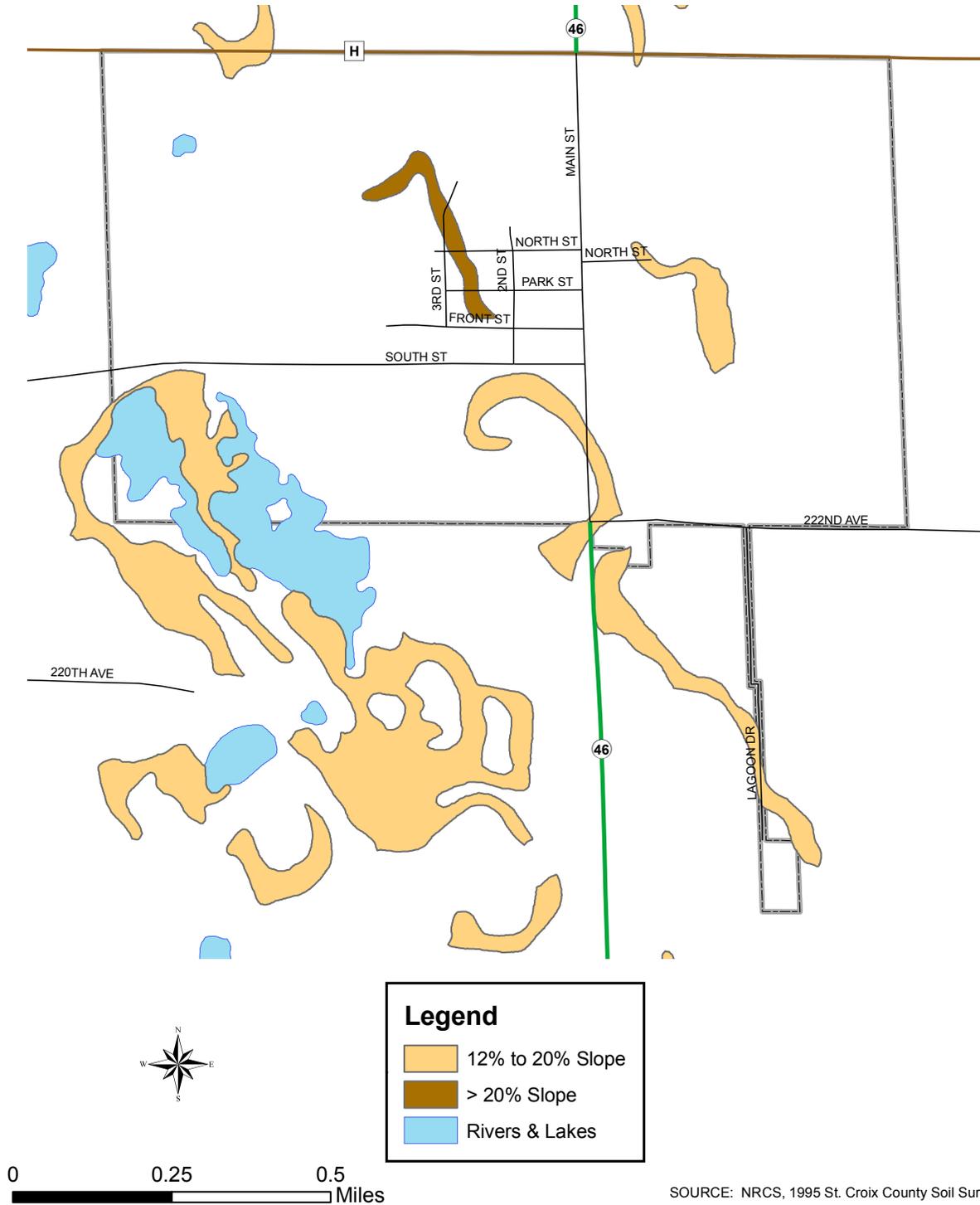
Woodlands provide habitat for a variety of plants and animals, as well as adding scenic beauty to the landscape. The largest, continuous blocks of forested land are important habitat for a variety of plants and animals.

Woodlands should be protected from conversion to other uses. Woodlands managed according to approved forest management practices can support varying and sometimes complementary objectives, such as timber production or wildlife habitat. On the other hand, strict preservation of a woodland would be unusual and reserved for the most rare and unique stands in the county, if they even exist. Pine plantations, which are cultivated and managed, offer little in the way of natural habitat. However, they are important in providing wood products, windbreaks and erosion control.

Development can destroy a woodland's capacity to provide wood products, habitat for a variety of plants and animals, and scenic beauty. Because of their value for habitat, production and scenery, woodlands should be protected from conversion to other uses. Considerations for open space when development occurs can accomplish the preservation of woodland values while managing how that development occurs. The woodlands of Emerald and Deer Park are depicted in the maps on the following pages.

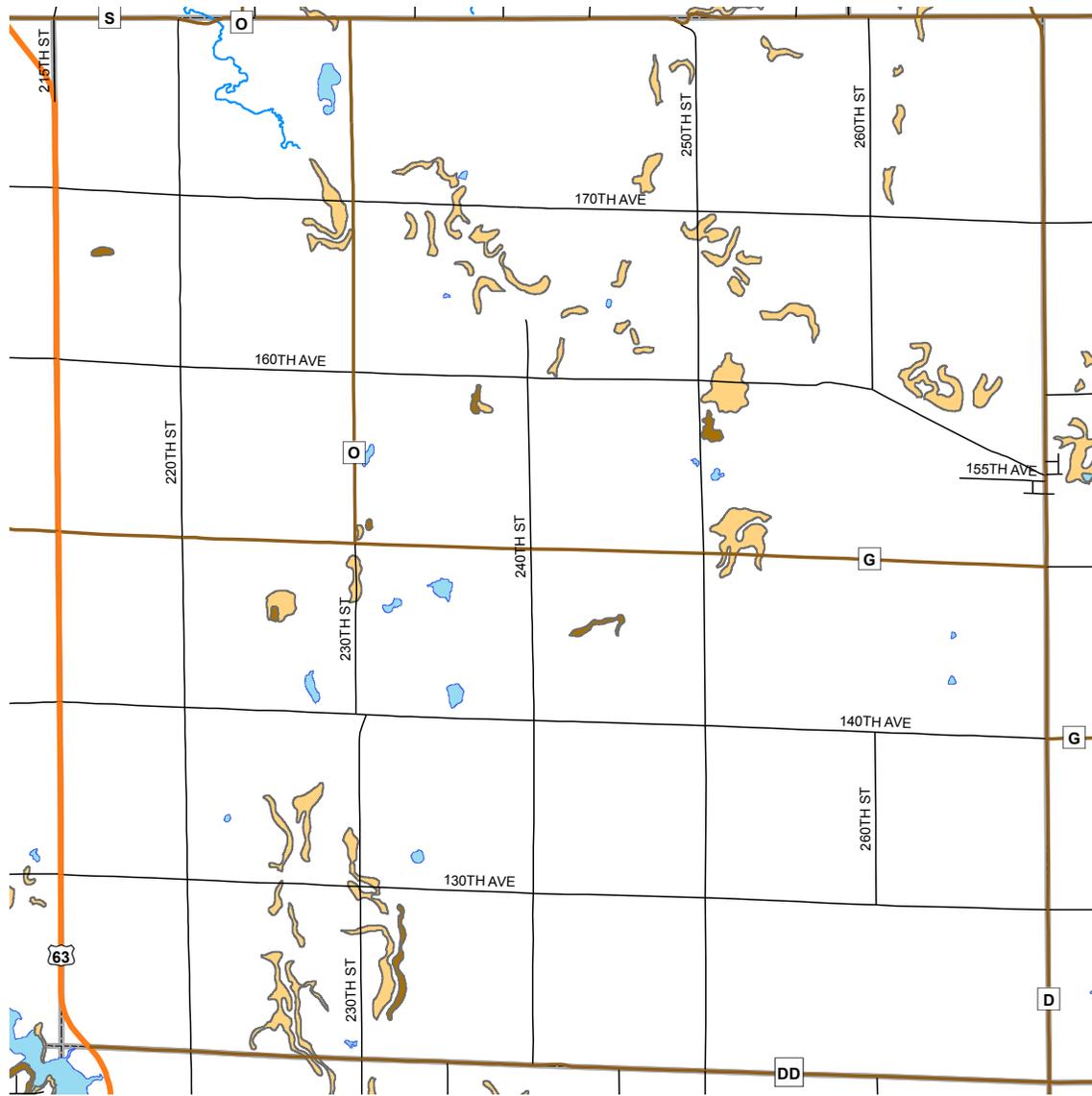
# Steep Slopes VILLAGE OF DEER PARK

Map 32



# Steep Slopes TOWN OF EMERALD

Map 33



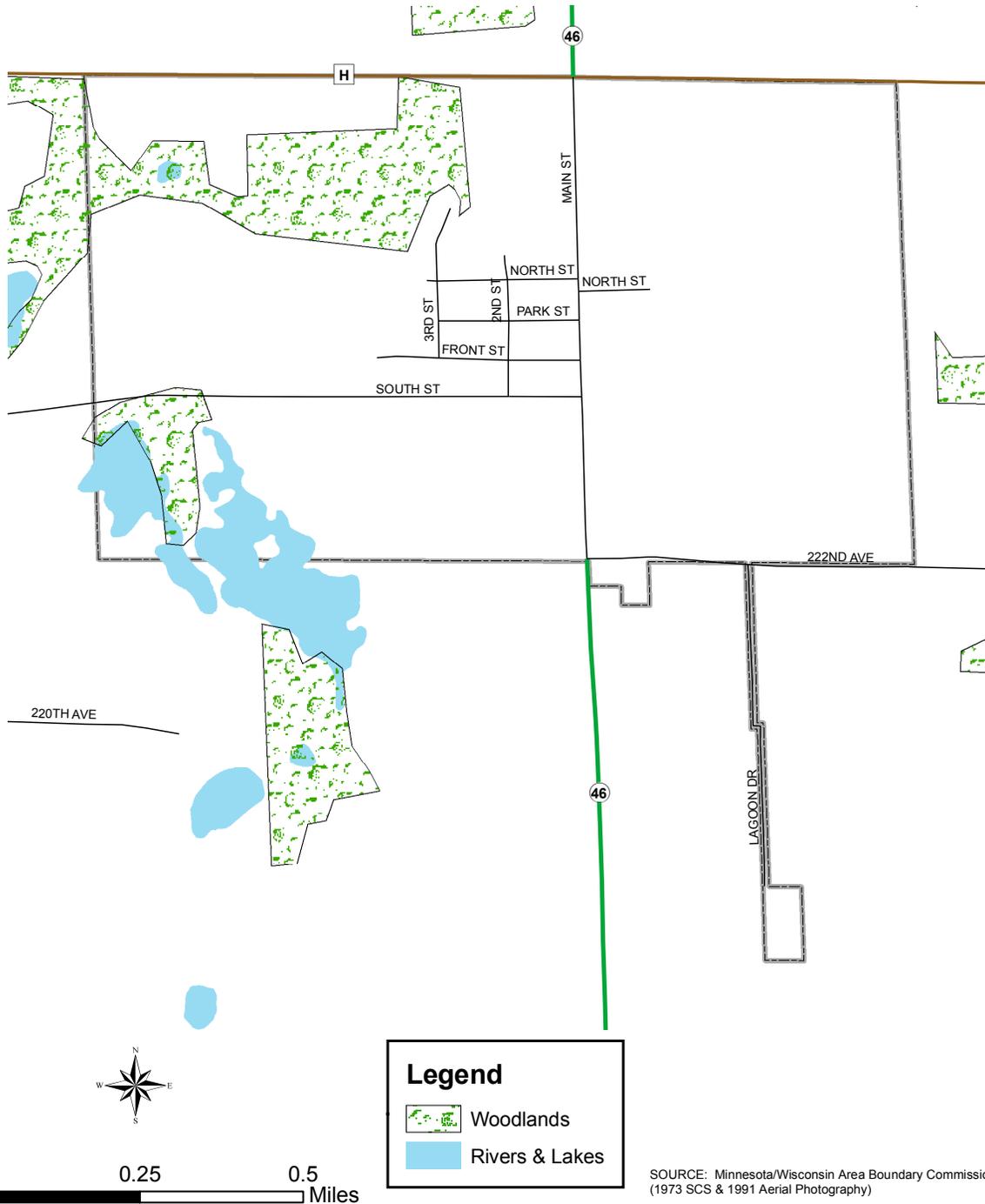
**Legend**

- 12% to 20% Slope
- > 20% Slope
- Rivers & Lakes

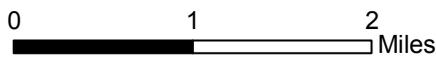
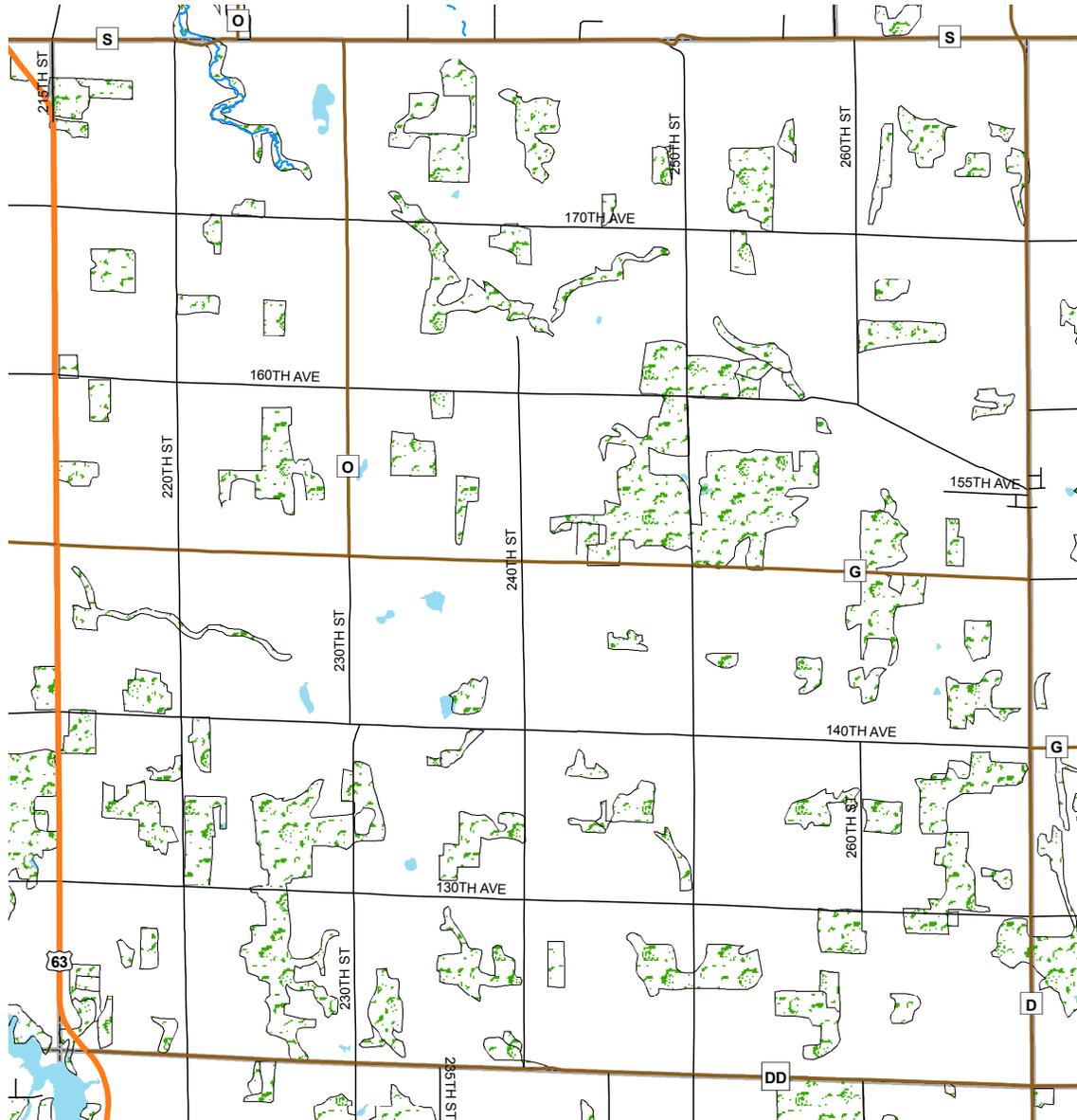


SOURCE: NRCS, 1995 St. Croix County Soil Survey.

# Woodlands VILLAGE OF DEER PARK



# Woodlands TOWN OF EMERALD



**Legend**

-  Woodlands
-  Rivers & Lakes

SOURCE: Minnesota/Wisconsin Area Boundary Commission. (1973 SCS & 1991 Aerial Photography)

## *PRAIRIE AND OTHER GRASSLANDS*

The Town of Emerald was originally Emerald prairie, scattered wetlands and forest land, most of which does not remain today. Deer Park was prairie with some forest transition. Prairie is the term used to describe the grassland type that predominated in Wisconsin prior to Euro-American settlement. Prairies, which are dominated by grasses and forbs (flowers), lack trees and tall shrubs, and are home to a rich variety of plants and animals. The grasses and forbs create a very diverse environment that not only supports the many birds etc. that we can see in prairies but also a tremendous diversity of insects/invertebrates that contribute to the diversity higher up the food chain. Within the prairie designation there are variations due to soils and climate.

The drastic changes in prairie habitat over the past 150 years have had negative impacts on many plants and animals because of direct loss of the ecosystem and indirect impacts due to fragmentation of remaining parcels from development and related disturbances. Prairies continue to be a threatened plant community in Wisconsin, as only about 13,000 acres (0.5 percent) of the original 3.1 million acres remain. The decimation of prairie in Wisconsin means that an estimated 20 percent of the original grassland plants are considered rare in the state. Many species of plants associated with Wisconsin prairies are endangered, threatened or of special concern, and two are known to no longer exist in the state. Many grassland birds face similar circumstances as indicated by a growing list of special concern species and the declining numbers of birds once considered common in the state, such as several species of sparrows and the meadowlark.

Although the majority of prairie mammals have been able to adapt to the loss of prairie habitat, some are no longer present in the state, some are of special concern and there are others that will most likely not adapt to continuing changes in agricultural practices and land use. Prairie-associated reptiles and amphibians have been affected as well. About half have apparently adapted to the loss of prairie, while three reptiles are on the state's endangered species list. One is listed as threatened, and two are of special concern. Little is known about the invertebrates of Wisconsin's native prairies. Indeed, there are probably many grassland insects that are extinct, no longer found in the state, or have not yet been discovered.

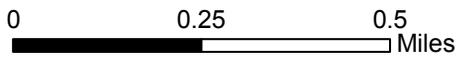
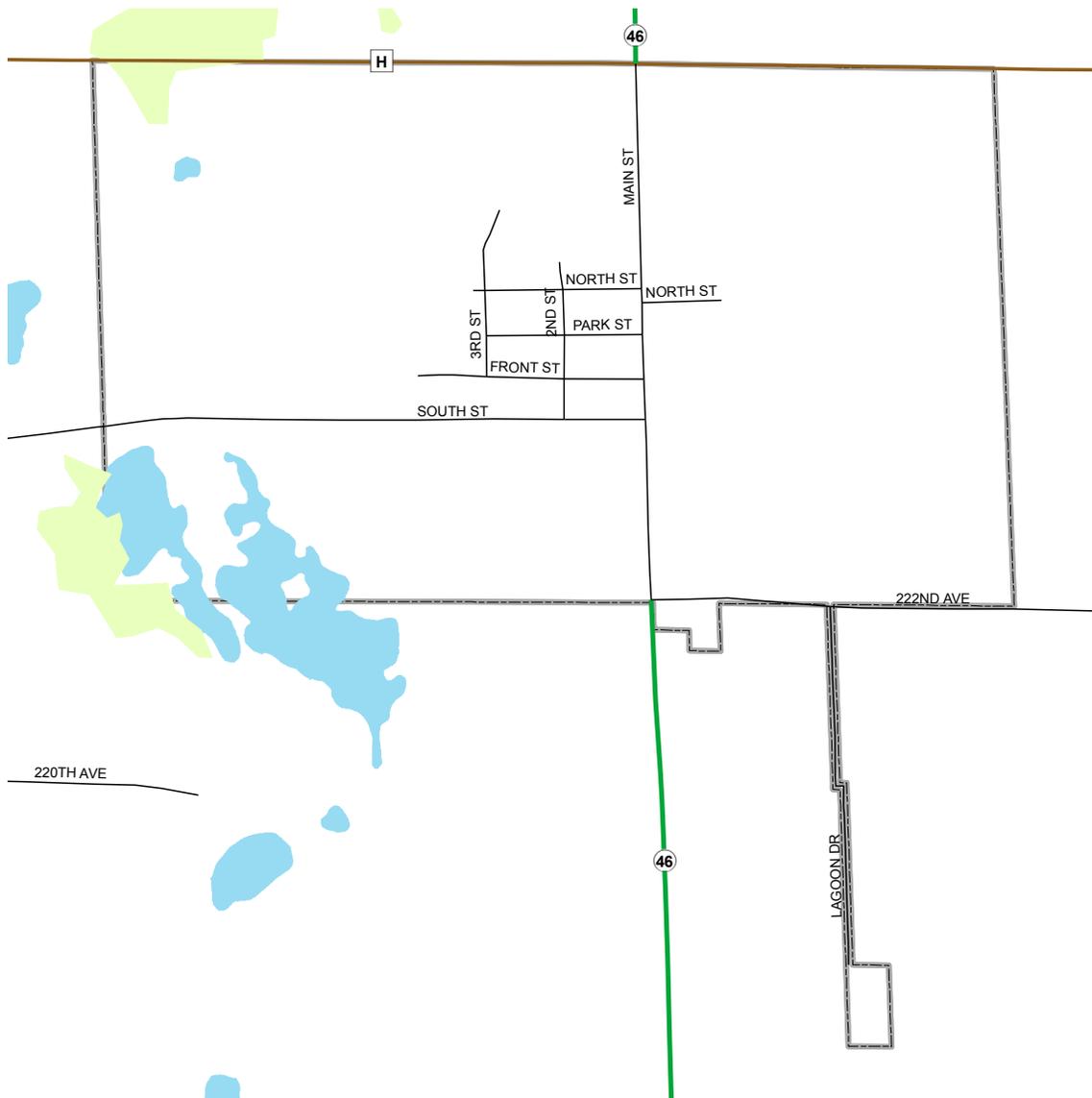
Degraded areas that were once prairie can often be restored with moderate effort to yield a habitat suitable for most of the associated plant and animal species. Even certain managed agricultural and livestock practices can accommodate the maintenance of the open habitats needed by many grassland species. Historically, prairies were naturally maintained by frequent fires that swept across the landscape. Today, human development and suppression of fire has created a need for prescribed burns to maintain these habitats for wildlife.

Grasslands can be restored and maintained through preserving a certain amount of open space for this type of cover as development occurs. It is estimated that restoration of a minimum of three percent to four percent of the original prairie acreage may be required to maintain the biodiversity of grassland ecosystems. Hence, development can occur in such a way that it can maintain sufficient grasslands for its habitat value while preserving the rural landscape.

The scarcity of prairie makes any further loss to development, critical. The Western Prairie Habitat Restoration Area (WPHRA) was established by local citizens and the Wisconsin Department of Natural Resources (WDNR) to protect and restore 20,000 acres of grassland, prairie, and wetlands in western St. Croix and SW Polk counties. The WDNR will buy land or easements from willing sellers, as well as accept donated lands, to fulfill the habitat needs of grassland wildlife. Lands acquired under this program will remain on the tax roles to provide state revenues to local towns and counties. Please see the maps on the following pages.

# Grasslands & Prairie Remnants VILLAGE OF DEER PARK

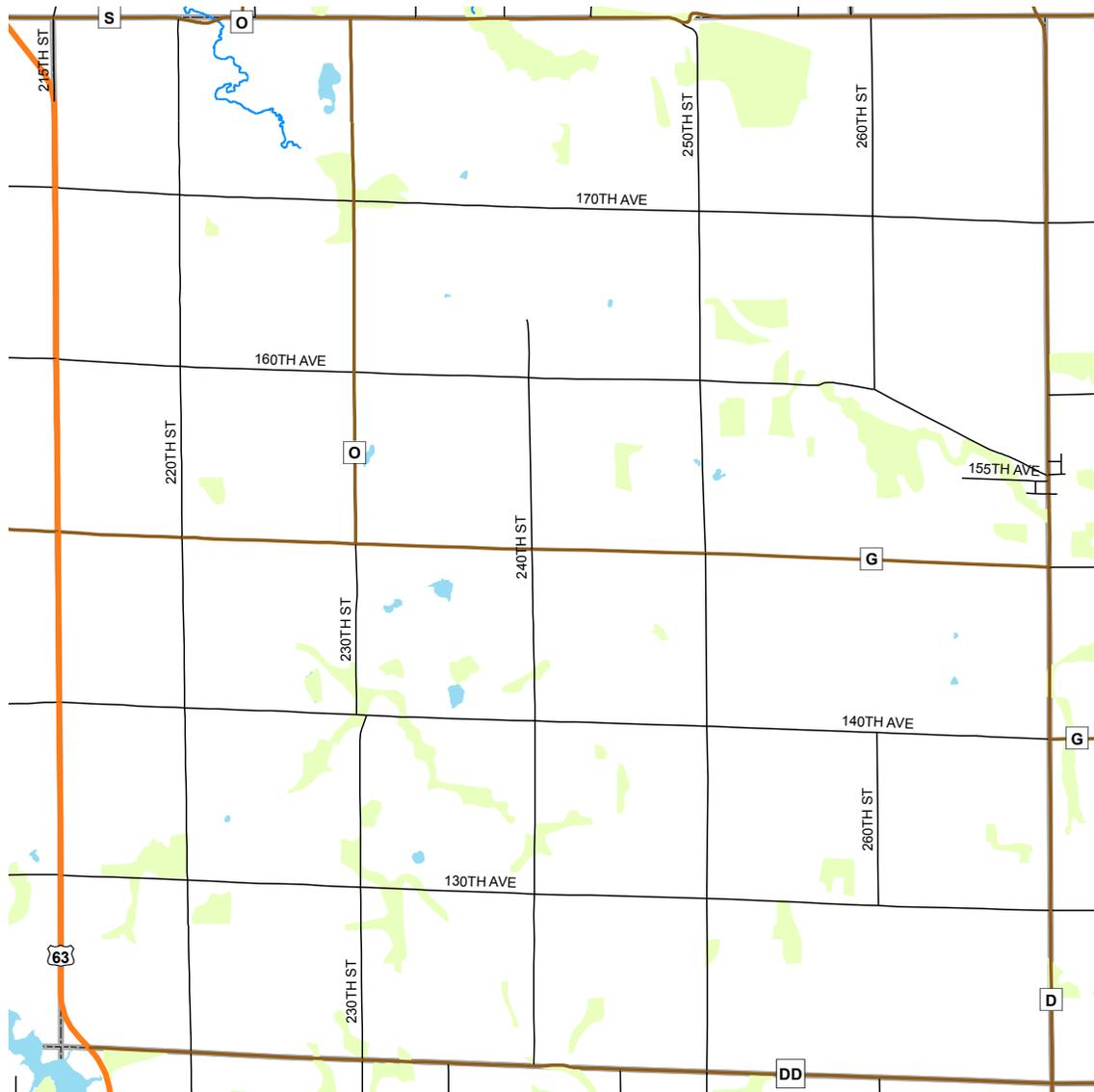
Map 36



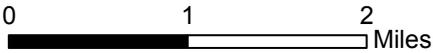
SOURCE: Minnesota/Wisconsin Area Boundary Commission.  
(1973 SCS & 1991 Aerial Photography)  
DNR and Heritage Areas of St. Croix County by UW-Extension

# Grasslands & Prairie Remnants TOWN OF EMERALD

Map 37



<span style="color: green;">■</span>	Prairie
<span style="color: lightgreen;">■</span>	Grasslands
<span style="color: lightblue;">■</span>	Rivers & Lakes



SOURCE: Minnesota/Wisconsin Area Boundary Commission.  
 (1973 SCS & 1991 Aerial Photography)  
 DNR and Heritage Areas of St. Croix County by UW-Extension

## OAK SAVANNA

Some oak savanna may have originally existed in the Town of Emerald and Village of Deer Park but only scant remnants of the complete ecosystem exist today. Oak savanna is the ecosystem that historically was a part of a larger complex bordered by the prairies of the west and the forests of the east. Savannas, considered to be the middle of the continuum between prairie and forest, were a mosaic of plant types maintained by wildfire and possibly large ungulates such as bison and elk.

Oak savanna was home to an abundant variety of plants and animals, and was probably optimum habitat for many game species, as well as songbirds. However, presently oak savanna is one of the most threatened plant communities in the world. In Wisconsin, less than 500 acres is listed in Wisconsin's Natural Heritage Inventory as having a mix of plants similar to an original oak savanna.

Any identified oak savanna remnants should be protected. There has been no inventory of oak savanna remnants in St. Croix County. However, some of the identified grasslands have the potential for savanna restoration by the Department of Natural Resources and conservation groups. Certain marginal agricultural lands which were once oak savanna can be restored economically and often still accommodate light to moderate cattle grazing.

## WILDLIFE AND FISHERIES HABITAT OR AREAS

All existing federal, state and local wildlife and fisheries areas, including private conservancy areas are mapped. These areas are managed to provide important feeding, breeding, nesting, cover and other habitat values to a wide variety of plant and animal species. They also provide a recreational and open space function to local communities.

- The Deer Park Waterfowl Production Area consists of 153 acres within the village limits on the southwest and west sides and an additional 200 acres immediately adjacent to the village to the south and west. This U.S. Fish and Wildlife Service land is managed for wetlands, prairie and oak savanna. It is open for hunting, fishing, environmental education and interpretation and wildlife observation and photography. Motorized vehicles, horseback riding and dogs off leash (except when hunting) are not allowed.
- The Emerald Valley Western Prairie Habitat Restoration Area is 155.7 acres consisting of grassland, wetland (lake), and hardwood woodlot located in section 9 of the Town of Emerald. Emerald Valley was purchased by the Kinnickinnic Chapter of Pheasants Forever in 2004 as a way to provide wildlife habitat and public recreational land with an emphasis toward ring-necked pheasant management. In 2005 the Kinnickinnic Chapter donated this property to the Wisconsin Department of Natural Resources. Since then, the agricultural ground that was not already in CRP has been converted over to warm season grasses. Much woody vegetation management has also been done to improve the open grassland character of the property. The three dry runs which cross the property may have associated wetland restoration to provide additional wildlife habitat. The site is open to citizens for passive outdoor recreation including hunting, trapping, hiking, cross-country skiing, wildlife viewing, bird watching, berry picking, etc. The WDNR hopes to expand the site to the north and east as restoration occurs on an existing nonmetallic mining site.
- One site that has been identified for future acquisition as a waterfowl production area is the future Klatt-Lyons Wildlife Preserve in sections 13 and 14. The site could be between 40 and 80 acres and encompasses a very large waterfowl nesting area with

wetlands, potholes, wooded land and additional habitat. This area is a backwater to Hutton Creek and is west and north of the unincorporated community of Emerald.

- A second possible site for future public land is located in sections 5, 9, 10 and 11 and includes the headwaters of Hutton Creek and an extremely large wetland complex west of CTH O known as Emerald Lake. This site would include wetland and prairie restoration.
- Additional wetlands in sections 16, 21, 28 and 29 are also possible sites for future waterfowl production and wildlife habitat.

WPA lands are purchased with duck stamp dollars and therefore the primary purpose is to provide waterfowl production habitat which consists of large tracks of grassland interspersed with numerous wetlands. Management on WPAs includes ongoing wetland and prairie restoration, water level manipulation, prescribed fire, tree removal, mowing and sometimes grazing. They are open to the public for hunting, fishing, environmental education and interpretation, and wildlife observation and photography. Motorized vehicles, mountain bikes, horseback riding and dogs off leash (except when hunting) are not allowed in WPAs.

### *NATURAL AND SCIENTIFIC AREAS*

All existing federal, state and local natural and scientific areas are mapped. The WisDNR, Bureau of Endangered Resources conducts data searches for natural and scientific areas of national, state or local significance. The Bureau urges special notice be taken to protect any and all natural or scientific areas from development.

### *RARE OR ENDANGERED SPECIES AND COMMUNITIES*

Rare or endangered species and communities are very sensitive to certain kinds of encroachment in their surroundings. Development on or near the locations of rare or endangered species can further threaten their status and survival.

The WisDNR, Bureau of Endangered Resources conducts data searches for endangered plants and animals. The Bureau urges special notice be taken to protect any and all endangered resources from development. To protect them from disturbance, the exact locations of the endangered resources can only be used for analysis and review purposes. Therefore, these locations will be incorporated as environmental resources, but will not be specifically revealed.

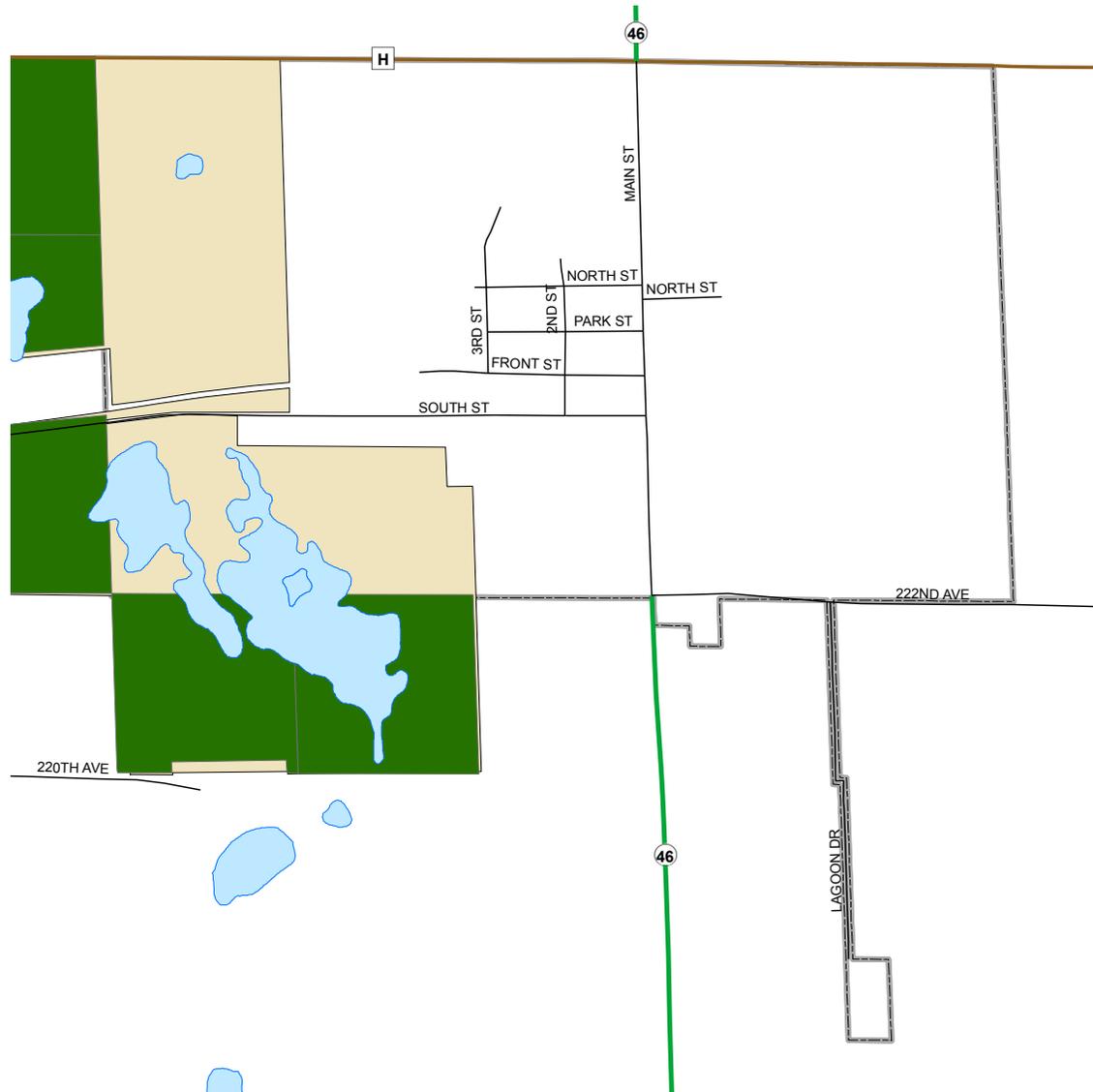
### *RECREATION AND OPEN SPACE*

Recreation and open space areas provide natural resource based recreation, open space and scenic amenities. They also are valuable to preserve unique physical features, certain plant communities and quality wildlife habitat for natural interpretation. Natural resource based outdoor recreation, park, open space and scenic areas are designated for low intensity uses. The uses do not include golf courses, ball diamonds, soccer fields, high intensity or service campgrounds, etc., as these uses are better suited to previously disturbed uplands which can be converted.

The Fisheries, Wildlife Areas, Rare and Endangered Resources, and Recreation, Scenic and Open Space Areas of Emerald and Deer Park are shown on the maps on the following pages.

# Fisheries and Wildlife Areas Rare and Endangered Resources VILLAGE OF DEER PARK

Map 38

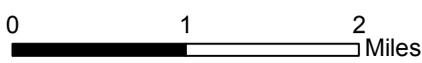
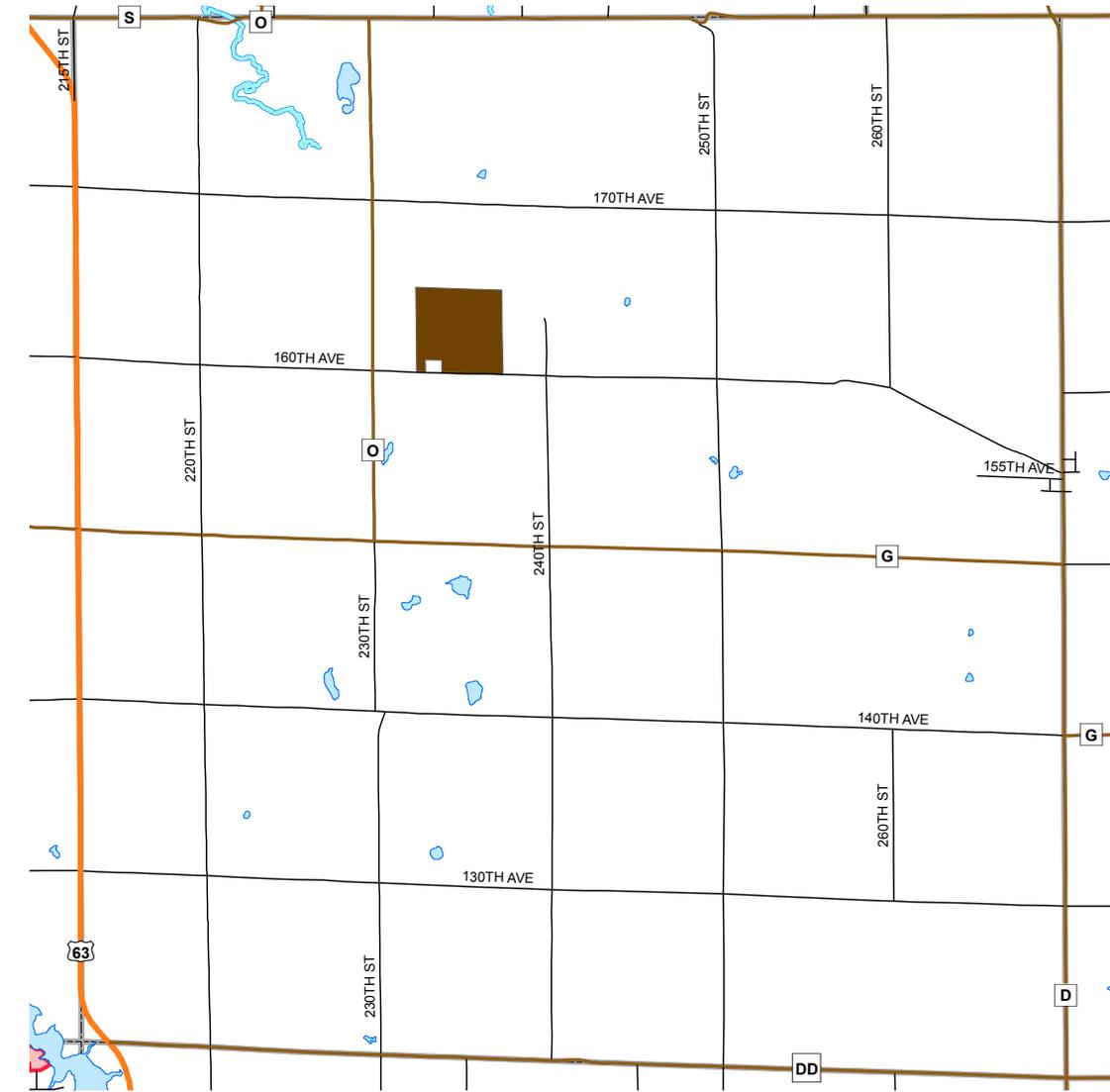


	PERENNIAL STREAMS
	Lakes and Ponds
	U. S. Fish and Wildlife Service
	Water Fowl Production Areas

SOURCE: DNR  
US Fish and Wildlife Service.

# Fisheries and Wildlife Areas Rare and Endangered Resources TOWN OF EMERALD

Map 39



	D N R
	PERENNIAL STREAMS
	Lakes and Ponds
	Scenic, Recreation and Open Space

SOURCE: DNR  
US Fish and Wildlife Service.

## *THE IMPACTS OF DEVELOPMENT ON ENVIRONMENTAL RESOURCES*

Several of the previously described resources are involved in the impacts of development on surface water quality and quantity. Lakes, ponds, rivers, streams, intermittent waterways and natural drainageways; wetlands; shorelands; floodplains; steep slopes; and wildlife and fisheries areas are directly affected by surface water impacts.

Urbanization, development and other human activities disrupt the natural course of water as it moves across a watershed. Removing vegetation and constructing impervious surfaces such as roads, parking lots, driveways, sidewalks, rooftops and to some extent lawns greatly increases the amount and rate of stormwater runoff. As this increased stormwater runoff crosses the urbanized or developed landscape, it also picks up contaminants and sediments which affect water quality.

In rivers and streams the changes brought by development are: increased water level fluctuations manifested by lower base flow and increased stormwater flow which can lead to flooding; decreased oxygen levels; increased water temperatures; greater channel erosion; muddying of waters from increased sediment; and pollution from fertilizers, pesticides, debris, salt, oil, grease and toxic substances. In effect, urbanization and development can turn a clear, cool, brisk-running trout stream, which does not breach its banks every spring, into a muddy, warm, slow-moving stream which swells over its embankment with every heavy rain.

Lakes, ponds and reservoirs can also be impacted by development. All lakes decline in water quality over time, if left in their natural state. However, development can accelerate the decline in lake water quality, so what once took thousands of years can occur in decades. As with rivers and streams, the detrimental impacts from development to lakes are caused by stormwater runoff, erosion and pollution.

Shorelands and the vegetation they contain are the natural buffer which helps protect surface waters from overland runoff and contaminants. If they are disturbed, their ability to slow runoff and filter contaminants is reduced. Shoreland is also critical habitat for a variety of plants and animals and preserves the aesthetic quality of water bodies, if left undisturbed.

Development within areas that are prone to flooding can cause adverse impacts on not only the waterway but also on the development itself. Altering the floodplain landscape by filling or building levees or structures can exacerbate flooding conditions. The filling of wetlands in floodprone areas has been proven to increase the likelihood of flooding. Wetland alterations divert water from where it flowed or was stored during spring runoff or storm events, which usually increases the area of the floodplain. The accumulation of development in floodplains can cause more severe flooding in other areas within the floodplain or newly created floodplain. In addition, development within floodplains is always subject to damage from flooding.

Development on steep slopes causes erosion by introducing impervious surfaces to areas where water does not infiltrate readily. Increased erosion impacts surface waters by increasing runoff quantity and the sediment it carries. Development on these slopes results in high construction costs as special construction techniques must be employed for structures, hillsides are cut and filled, and attempts are made to stabilize hillsides through building terracing. Terraces may appear to stabilize these slopes, but, if they are not rigorously maintained, the forces of gravity and water eventually deteriorate them.

## ***ENVIRONMENTAL CORRIDORS***

Environmental corridors are significant areas of environmental resources characterized by continuous systems of open space, physical features, environmentally sensitive lands and natural or cultural resources which can be adversely impacted by development. These areas are often evident to people in the area and they identify with them as significant natural areas in their surroundings. Independent resources are non-continuous open space, physical features, environmentally sensitive lands and natural or cultural resources that also can be adversely impacted by development.

The adverse impacts caused by development in these areas can create undue costs on society in the attempt to alleviate those problems. Managing development in these areas either eliminates or reduces the adverse impacts from development. Management cannot overcome the impacts of developing in some of these areas, and in those areas it is prudent to prohibit development. In managing the development in those areas that can accommodate it, the costs associated with the adverse impacts of development can be shifted from society as a whole to those who choose to develop in them. This is accomplished by ensuring development occurs using engineering, site design, construction and management practices that address potential adverse impacts.

## ***ENVIRONMENTAL CORRIDOR CRITERIA***

This system of identifying environmental corridors was developed as part of the St. Croix County Development Management Plan. The system was created with a great deal of input and consideration from similar systems in the state. It is a way to inventory and organize environmental features. The environmental corridors incorporate the following environmental and historical resources: Lakes, Ponds, Rivers, Streams, and Intermittent Waterways and Natural Drainageways; Wetlands; Shorelands; Floodplains; Steep Slopes; Geologic Formations and Physiographic Features; Highly Erodible Soils; Wet, Poorly Drained Organic Soils; Closed Depressions; Wellhead Protection Areas; Woodlands; Prairie; Rare or Endangered Species and Communities; Historical and Archeological Sites; and, Scenic Areas.

The following are the criteria used to designate environmental corridors and resources:

### ***PRIMARY ENVIRONMENTAL CORRIDOR***

- Linear in nature, often arising from a dominant feature or focal point, such as a waterbody or geologic feature
- At least three environmental resources present
- At least 400 acres in size
- At least two miles long
- At least 200 feet wide

### ***SECONDARY ENVIRONMENTAL CORRIDOR***

- At least two environmental resources present
- At least 100 acres in size
- Approximately one mile long or longer
- No minimum width

### ***INDEPENDENT ENVIRONMENTAL RESOURCES***

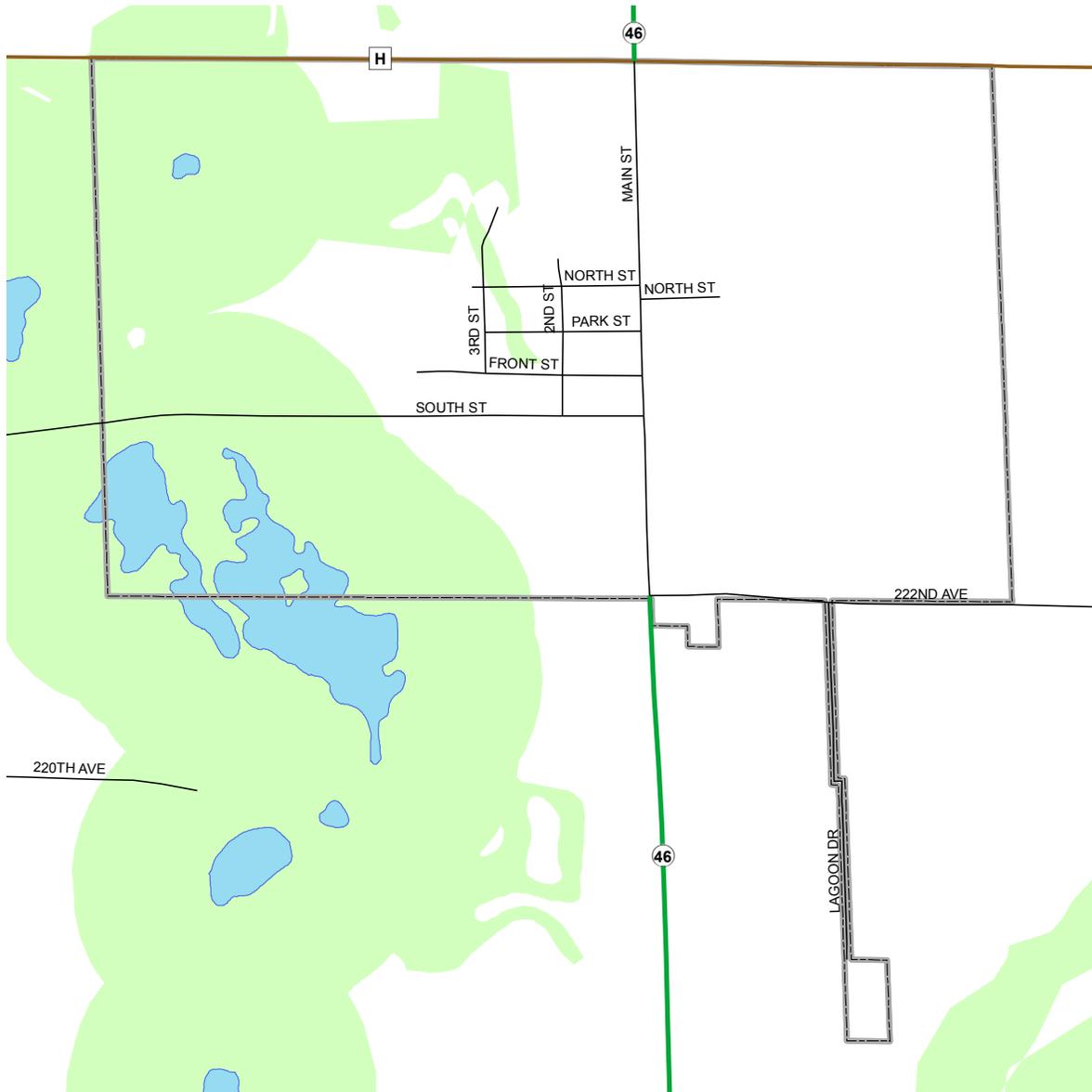
- At least one valued resource present
- No minimum size

- Separated from environmental corridors by intervening land or small, narrow features abutting environmental corridors

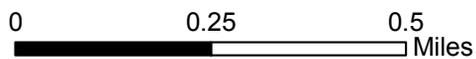
The Primary Environmental Corridors of the Village of Deer Park and Town of Emerald are depicted in the maps on the following pages. The Primary Environmental Corridors map identifies the areas in the town and village with the most significant environmental features. Residents are most likely to identify these areas as significant environmental areas.

There are environmental resources throughout the communities, not just in primary environmental corridors, which should be considered when determining the impacts of development.

# Primary Environmental Corridors VILLAGE OF DEER PARK

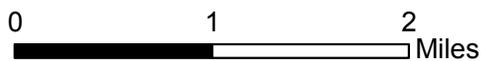
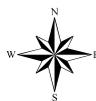
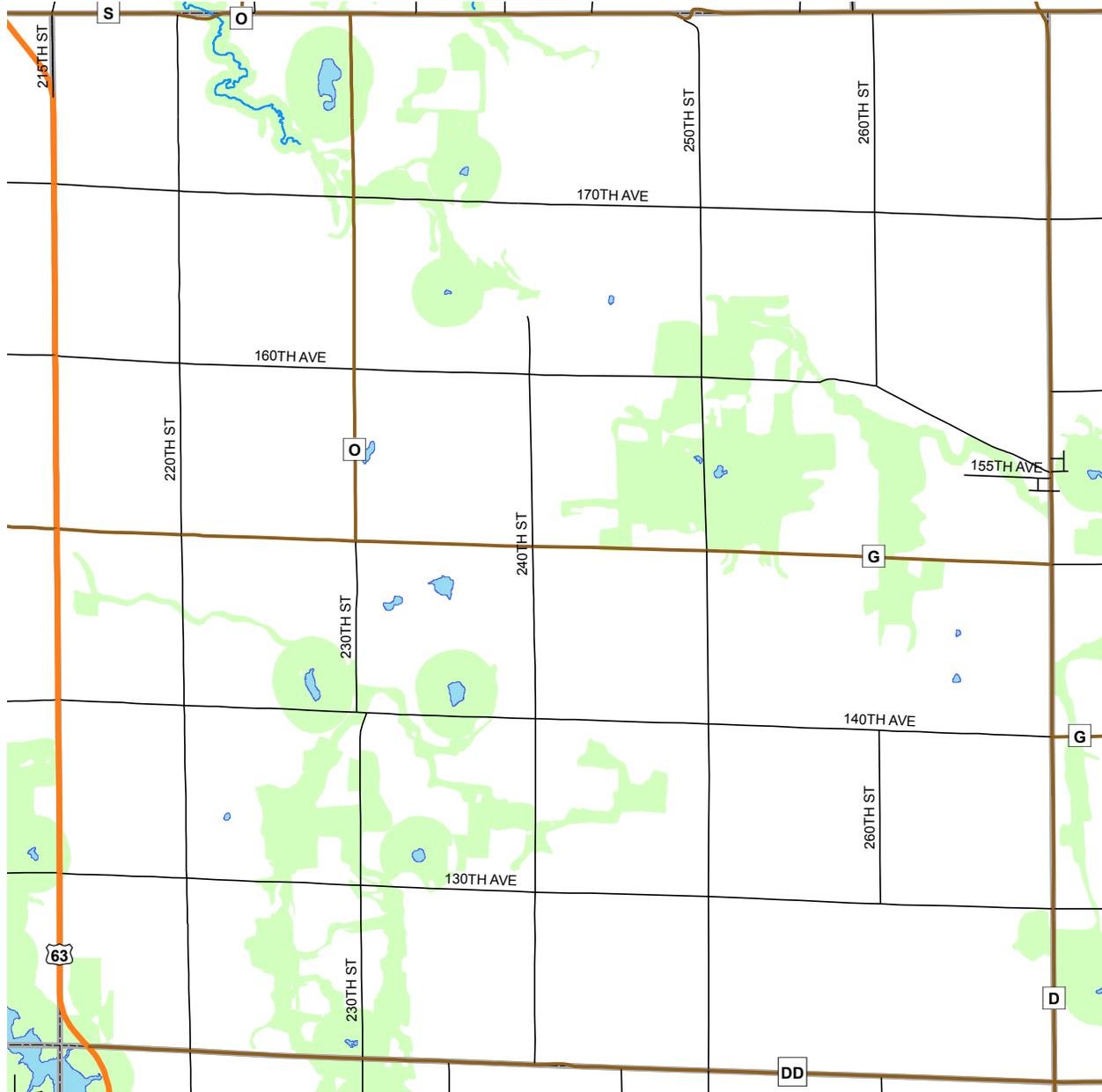


- Rivers & Lakes
- Primary Environmental Corridors



SOURCE: WCWRPC.

# Primary Environmental Corridors TOWN OF EMERALD



SOURCE: WCWRPC.

## ***INVASIVE SPECIES***

Non-native species from other regions and continents displace native species, disrupt ecosystems, hamper boating and harm recreational activities such as fishing and hiking. The Wisconsin Department of Natural Resources has identified invasive species and documented the harm they cause to commercial, agricultural and aquaculture resources on their website: [www.dnr.wi.gov/invasives/](http://www.dnr.wi.gov/invasives/).

Because they lack the predators and competitors they faced in their homelands, invasive species can spread rapidly and aggressively. Controlling invasive species is difficult and getting rid of them is often impossible. Human prevention of the spread of invasive species is critical, since humans often unwittingly introduce them to their favorite waters and lands.

Invasives like knapweed, leafy spurge and buckthorn are not good for wildlife and they also have negative impacts on agriculture - for example spotted knapweed (the pretty purple flower found along roadways) and leafy spurge can have a very detrimental effect on the quality of grazing land.

Some industries negatively affected by invasive species include sport and commercial fishing, forestry and raw water users (power companies and utilities). These expenses are passed on to consumers (for example, in the form of higher water and electric bills). Invasive shrubs such as buckthorn and honeysuckle prevent the regeneration of young trees, causing a long term but very serious impact on forestry. Control of buckthorn alone has been estimated at \$500-\$2,000 per acre over multiple years.

Zebra mussels and Eurasian water milfoil have altered the environment of many waterways. Tiny zebra mussels - with huge appetites for microscopic plants and animals - rapidly reproduce and through their large numbers are capable of severely altering their environment by reducing the food supply for native organisms and by enhancing conditions for the rapid growth of blue-green algae and aquatic vegetation. Eurasian water milfoil chokes out plants needed by native fish and can clog boat motors.

In woodlands, garlic mustard can completely cover the ground with first- and second-year plants in a matter of years. This European garden herb not only steals most light and nutrient resources from native wildflowers, it is also thought to secrete a chemical into the soil that inhibits growth of other plants.

There are also health risks associated with invasive species. The sharp zebra mussel shells can cut the feet of unsuspecting swimmers and waders. Simply rubbing against wild parsnip with bare skin can cause burned and blistering arms and legs. This roadside and grassland invasive is spreading rapidly in Wisconsin, but few people know of its dangerous impacts.

### ***PREVENTION & MANAGEMENT***

While some invasives are here to stay and the only solutions are manual or biological control, others can be prevented. Here are things you can do:

#### ***Boaters, Sailors, Anglers & Paddlers***

- Inspect your boat, trailer and equipment and remove visible aquatic plants, animals and mud.
- Drain water from your boat, motor, bilge, live wells and bait containers.
- Dispose of leftover bait in the trash, not in the water or on land. Never move live fish, including minnows, from one water to another.

- Buy your minnows from licensed Wisconsin bait dealers or catch your own and use it to fish the water you caught it from.
- Wash your boat and equipment with high pressure or hot water, or let it dry for 5 days

### ***Campers***

- Leave firewood at home. Buy it within a 50-mile radius of your campsite.
- Burn all wood during your trip.
- Inspect clothing and equipment for seeds, insects, etc. before leaving your camping area.

### ***Landowners & Gardeners***

- Use native plant species whenever possible.
- Dispose of seeds in the trash.
- Be on the lookout for invasive species. Identify and report populations of target weed species identified by WDNR.
- Respond aggressively to rid your land of new invasive species.
- Leave native trees and plants alone; natural landscapes offer the best defense.
- Eliminate or contain populations before they spread.
- Coordinate long-term monitoring of occurrence sites.
- Become a Wisconsin Weed Watcher and join Wisconsin landowners, sport and recreation enthusiasts, naturalists, park employees, educators, gardeners, resource professionals and other citizens as they help nip new plant invasions in the bud.

### ***Hikers, Bikers, ATV Riders & Other Recreational Users***

- Clean your clothes, bicycles, ATV's, etc before leaving a site that is infested with invasive plants.

## ***COMPREHENSIVE ENVIRONMENTAL RESOURCE PROTECTION***

Environmental corridors offer a mechanism to identify, evaluate and devise protection or management strategies for the most apparent valued resources in the county. However, considering environmental corridors does not address the overall natural resource base of the county including surface or ground water quality, fisheries, wildlife, manageable forests and the diversity of plants and animals.

The environmental corridors mechanism does not address retaining agriculture and rural character, managing stormwater better, preserving or creating a sense of place, and reducing infrastructure costs.

Rural residential development has the potential for creating the greatest impacts on the landscape of the Town of Emerald. There are development patterns which are sensitive to the environmental resources and unique landscape contained in potential development sites which can address other issues, such as retaining agriculture and rural character, preserving or creating a sense of place, and reducing infrastructure costs.

Existing subdivision controls and zoning only provide for the distribution of roughly equal sized lots, which consume virtually the entire site, leaving no open space. Conventional subdivisions developed under these existing regulations are typically characterized by houses with mostly views of other houses.

Open Space or Conservation Design Subdivision is an alternative site design technique which takes into account the individual environmental and landscape characteristics of the site, provides the same number of housing units built on smaller lots, and accommodates a variety of desirable objectives, including setting aside substantial amounts of open space, protecting environmental features and wildlife habitat, preserving rural character and scenic views, accommodating better

stormwater management, preserving agricultural land, allowing shared wells and on-site wastewater treatment, creating a sense of place, and reducing the amount of roads and other infrastructure.

Through the management or, where necessary, prohibition of development in environmental corridors, and the flexibility of open space or conservation site design, there is the potential to dramatically reduce the negative impacts of development on the towns' natural resource base, scenic quality and rural character.

## *DEER PARK NATURAL RESOURCES GOALS, OBJECTIVES & POLICIES*

**Goal:** Preserve, conserve and protect natural resources in the Village of Deer Park.

**Objectives:**

1. Recognize the environment as an integrated system of land, water and air resources; the destruction or disturbance of which can immediately affect the community by creating hazards, destroying important public resources and habitat, or damaging productive lands and property.
2. Protect and improve the quality of the surface water, groundwater and shoreline within the village.
3. Identify and protect unique natural resources such as floodplains, wetlands, steep slopes, woodlands and prairies.
4. Encourage the use of soil conservation practices and the management of woodlands.
5. Encourage development that protects and incorporates environmentally sensitive areas, natural resources and forest lands.
6. Encourage the use of natural buffers between proposed development and existing features such as residential areas, parks and highways.
7. Preserve the village's scenic beauty, heritage and archeological resources.
8. Utilize intergovernmental cooperation to protect natural resources.

**Policies:**

1. Guide the location and design of development to minimize any adverse impact on the quality of surface waters, aquifers, wetlands, steep slopes, woodlands and prairie.



The U.S. Fish and Wildlife lands on the western side of Deer Park provide open space for residents, protection of resources and scenic views. Photo by Carolyn Mertz.

2. Preserve and protect natural landscape features such as wetlands, floodplains, streams, lakes, steep slopes, woodlands, prairies and oak savannas as essential components of the hydrologic system, valuable wildlife habitat and focal points of natural beauty and recreation.
3. Development shall only be allowed where best management practices for erosion and sediment control and storm water management can be implemented successfully.

4. Direct proposed development in areas where soil characteristics are compatible with the proposed development.
5. Discourage and, where possible, prevent the filling or developing of wetlands and floodplains. Consider restoring degraded resources, such as wetlands and woodlands, where possible.
6. Promote development and agricultural practices, which protect surface and ground water quality, including proper erosion control, manure management, and storm water management strategies.
7. Encourage the management of woodlands in an effort to promote further value for timber and wildlife.
8. Before approving any changes in land use, consider the impacts on wildlife habitat, potential locations of rare plant and animal species and archeological sites.
9. Prioritize the use of incentives and acquisition (land or easements) to protect environmentally sensitive areas, relying on regulations where necessary.
10. Protect and encourage restoration of natural shoreline areas and natural landscaping, utilizing native plant species and minimizing turf to protect and enhance surface and groundwater quality.
11. Consider protection and enhancement of sensitive natural resources, open and recreational space, large blocks of forestland and scenic vistas when reviewing development proposals and making public expenditures.
12. Work with US Fish & Wildlife Service (USFWS) to improve the safety of village residents near the USFWS land during hunting season. Educational signage would be one option.



U.S. Fish & Wildlife manages a significant amount of land adjacent to and within the Village limits. The Village hopes to improve communication about managing the land for the safety of Village residents. Photo by Carolyn Mertz.

13. Consider implementing a buffer zone around public lands to mitigate conflicts between property owners and citizens utilizing public lands for recreation.

14. Coordinate and work with other governmental agencies, such as

the WDNR and US Fish & Wildlife Service, to protect natural resources, especially those that cross political boundaries such as the Willow River and its watershed.

**EMERALD NATURAL RESOURCES GOALS, OBJECTIVES & POLICIES**

**Goal:** To preserve, protect, enhance and carefully use precious natural resources in the Town of Emerald.

**Objectives:**

1. Recognize the environment as an integrated system of land, water and air resources, the destruction or disturbance of which can immediately affect the community by creating hazards, destroying important public resources and habitat, or damaging productive lands and property.
2. Preserve Emerald’s most important and sensitive natural resources and areas.
3. Protect and improve the quality of the surface water and groundwater within the town.
4. Identify and protect unique natural resources such as floodplains, wetlands, steep slopes, and woodlands and encourage the use of soil conservation practices.
5. Allow development that protects environmentally sensitive areas, natural resources and productive forest lands.
6. Preserve the town’s scenic beauty, heritage and archeological resources.
7. Engage in intergovernmental cooperation to protect natural resources.

**Policies:**

1. Guide the location and design of development to minimize any adverse impact on the quality of surface waters, aquifers, wetlands, steep slopes, woodlands, prairie and agriculture.
2. Preserve and protect natural landscape features such as wetlands, floodplains, streams, lakes, steep slopes, woodlands, prairies and oak savannas as essential components of the hydrologic system, valuable wildlife habitat and focal points of natural beauty and recreation.



Sinkholes, such as this one on the west side of 230<sup>th</sup> St. south of CTH G, are found throughout the Town of Emerald. They are caused by the town’s karst topography and need to be protected because they are a direct conduit to the town’s groundwater. Photo by Barbara Nelson.

3. Consider protection and enhancement of sensitive natural resources, open and recreational space, large blocks of forestland and scenic vistas when reviewing development proposals and making public expenditures.
4. Encourage and support projects involving citizens and government or private organizations such as Wisconsin Department of Natural Resources, US Fish & Wildlife Service, Pheasants Forever, etc., to protect waterfowl and wildlife habitat in the Town of Emerald through acquisition. Areas such as the future Klatt-Lyon Wildlife Preserve on Hutton Creek, Upper Willow River wetlands, Emerald Lake, Yankee Pond and Carr Creek wetlands and native prairie sites provide surface and groundwater protection, are open to the public for some open space recreation and hunting activities and will improve and expand scenic amenities for town residents.



This scenic area is typical of many wetland pond sites in Emerald. It is located on the future Klatt-Lyons Wildlife Preserve. Photo by Barbara Nelson.

5. Promote development and agricultural practices, which protect surface and ground water quality, including proper erosion control, manure management, and storm water management strategies.
6. Discourage and, where possible, prevent the filling or developing of wetlands and floodplains.
7. Protect and encourage restoration of natural shoreline areas, wetlands and woodlands with natural landscaping, utilizing native plant species and minimizing turf to protect and enhance surface and groundwater quality.

8. Consider the impacts on wildlife habitat, potential locations of rare plant and animal species and archeological sites prior to approving any changes in land use.
9. On steep slopes with a grade from 12 to 20 percent allow development only where best management practices for erosion and sediment control and storm water management can be implemented successfully.
10. Promote use of the forestry “best management practices” as minimum standards for logging and encourage forest landowners to enroll in the State’s Managed Forest Land Program to promote further value for timber and wildlife.
11. Delineate, refine and protect “environmental corridors” as a composite of Emerald’s most sensitive natural areas.
12. Work with St. Croix County and state agencies to promote the proper approval process, placement and monitoring of new on-site wastewater systems and water wells, appropriate maintenance and replacement of failing older systems and wells as a means to protect public health and ground water quality.
13. Encourage and support a buffer zone around public lands to mitigate conflicts between property owners and citizens utilizing public lands for recreation.
14. Coordinate and work with other governmental agencies, such as the Willow River Rehabilitation District and WDNR, to protect natural resources, especially those that cross political boundaries such as rivers.



The Emerald Valley Prairie Habitat Restoration Area is an example of the many valuable natural resources found in the Town of Emerald. Photo by Rene' Speer.



Scenic resources are important to Emerald's rural character. Photo by Barbara Nelson.