

## A4. NATURAL FEATURES INVENTORY

**T**he identification of the natural features that presently exist in the City of Adrian is an important step in the Master Plan process. Although many of the natural features that existed long ago have been altered by decades of development, some still exist, and may be preserved and/or enhanced for the benefit of current and future City residents. With an awareness of the City’s existing natural features, decision-makers can make informed proposals for their preservation and protection.

### TOPOGRAPHY

The City of Adrian lies within an area that was covered and uncovered by glaciers and glacial lakes as ice ages came and went. The last glacier to affect Lenawee County was during the Late Wisconsinan period, around 9,000 years ago. At this time, the Saginaw lobe (extension of the glacier) retreated northward. Glaciers can have several different effects on the land as they retreat. For example, they may act as “steamrollers” across the land, flattening it as they go; they may create large depressions that later fill with water; or, as they pause in their movement, they may drop large quantities of glacial till—rocks, soil, and other debris caught up in the ice.

In general, the area around Adrian—the River Raisin watershed—consists of level plains and gently rolling hills. These areas were essentially “ironed out” by the advance and retreat of the glacier.

An area where a glacier paused in its retreat for a significant amount of time, long enough to drop large deposits of glacial till, is called a moraine. The result on the topography of the land is level ground or gently rolling hills. The Irish Hills to the northwest of Adrian are part of the Kalamazoo Moraine. The lakes in and around the Irish Hills are “kettle lakes,” formed when giant blocks of ice left behind by glaciers finally melted, creating depressions that then filled with water.

The City of Adrian’s topography is generally very flat. The height above sea level varies about 75 feet from the lowest point to the highest point. The lowest areas of about 750 feet above sea level are located at the bottom of the River Raisin riverbed, and the highest areas of 820-824 feet are located at the western edge of the City. USGS Quad Map A4-1 illustrates the City’s topography.

## **QUATERNARY GEOLOGY**

The patterns of soils found in an area can generally be explained by the type of surface geology found below the soil. The quaternary geology of the City of Adrian is shown on Map A4-2. The City is divided into southwest/northeast-running bands of three different types of geology. The middle band consists of glacial outwash sand and gravel and post-glacial alluvium. As glaciers melt, fast-flowing streams form. These streams, along with slower melting processes, deposit rocks and debris caught up in the glacier, sometimes relatively far from the glacier itself. Glacial outwash sand and gravel and postglacial alluvium is typically fine to coarse sand alternating with layers of small gravel to heavy cobbles. Due to the larger size of these materials, these areas are often quick to provide groundwater recharge. This correlation is evident in Map A4-4, Groundwater Recharge.

Two bands of end moraines of fine-textured glacial till run along the southeastern and northwestern edges of the City of Adrian. A large area of fine-textured glacial till covers the northwest-central portion of the City. Fine-textured till is grayish brown or reddish brown, nonsorted glacial debris that was left as glaciers retreated from the area. An end moraine is a ridgelike deposit formed at the edge of an active glacier.

## **SOILS**

Map A4-3, Soils, shows the locations of the various soil compositions in the City of Adrian. Like the quaternary geology, the soil variations generally run in a northeast/southwest pattern. From northwest to southeast, the major bands are as follows: Blount loam, Morley loam, Cadmus and Blount loams, Ionia loam, Nappanee loam, Nappanee silt loam, and Hoytville clay loam and silty clay loam. Loam soils exhibit the properties of sand, silt, and clay equally.

## **GROUNDWATER RECHARGE**

Water recharge areas are highly permeable areas where water on the surface travels rapidly through the soil into the groundwater. Map A4-4 illustrates the groundwater recharge areas within the City. As the map illustrates, areas with high and moderate groundwater recharge potential run through the center of the City generally on either side of the River Raisin. Existing and planned development within recharge areas should include safeguards against negative impacts, as pollution of these areas could have a significant detrimental effect on the area's groundwater.

## **WATERSHEDS**

All runoff water in the City of Adrian eventually enters the River Raisin. Along the north and northwest edges of the City, runoff water first flows into Wolf Creek, and from there into the River Raisin. Throughout the rest of the City, water flows directly into the south branch of the River Raisin. These subwatersheds are illustrated on Map A4-5. The management of stormwater runoff by City of Adrian government and residents can have a direct effect on the health of the River Raisin.

## **WETLANDS**

As illustrated on Map A4-6, the City of Adrian has only a few small wetland areas. Nevertheless, wetlands are valuable natural resources within the City. They may serve as

storm water holding areas to reduce flooding; provide for the settling of sediments and pollutants from surface water runoff; reduce stream bank erosion caused by storm water runoff; and provide unique habitat for fish and wildlife. Those which are five acres or more, as well as smaller wetlands hydrologically connected to large wetlands, fall under the jurisdiction of the Michigan Department of Environmental Quality. However, the City itself is in the best position to monitor the health of its wetlands, regardless of size.

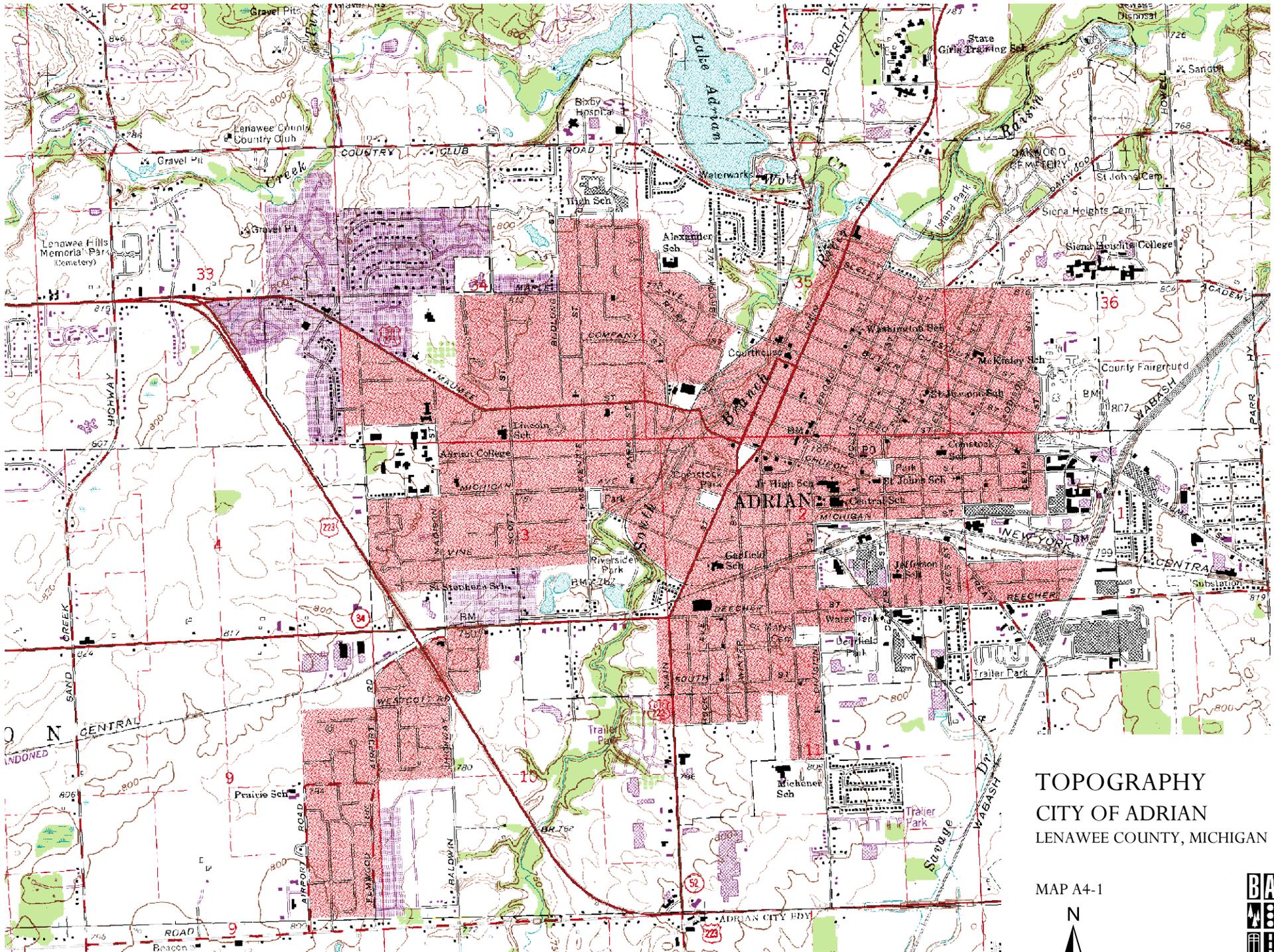
The pace of development can impact natural resources - such as wetlands - in several ways. The most immediate loss caused by development is the reduction of open space and associated wetlands and woodlands. Water quality and flora and fauna habitat areas are directly affected by development.

Although the City of Adrian is largely built out, there are still development projects occurring just inside the City limits and in the surrounding townships. It is important to preserve as many naturally occurring wetlands as possible.

## **WOODLANDS**

Prior to settlement of southeast Michigan, the area that is now the City of Adrian was almost entirely covered by forests. As shown on Map A4-7, after more than two centuries of agricultural and urban development, the natural woodlands in the City cover a much smaller area. This map is based on the 1978 Statewide Land Use Land Cover layer and does not include individual trees or small stands of trees planted by homeowners, business owners, or the City. It would be useful for the County to update the woodlands layer, especially for the benefit of rural townships.

The remaining woodlands and individual trees in the City of Adrian are valuable natural features which serve as windbreaks, aid in the absorption of rainwater, replenish oxygen, create natural beauty and character, and provide wildlife habitat. Often, woodlands and wetlands are found in conjunction with each other, forming an even more diverse habitat for plants and animals. Preservation of these areas is important, and the effects of development on existing woodlands throughout the City of Adrian should be minimized. Additionally, it is possible to eventually create new wooded areas as part of new development or redevelopment projects.



TOPOGRAPHY  
 CITY OF ADRIAN  
 LENAWEE COUNTY, MICHIGAN

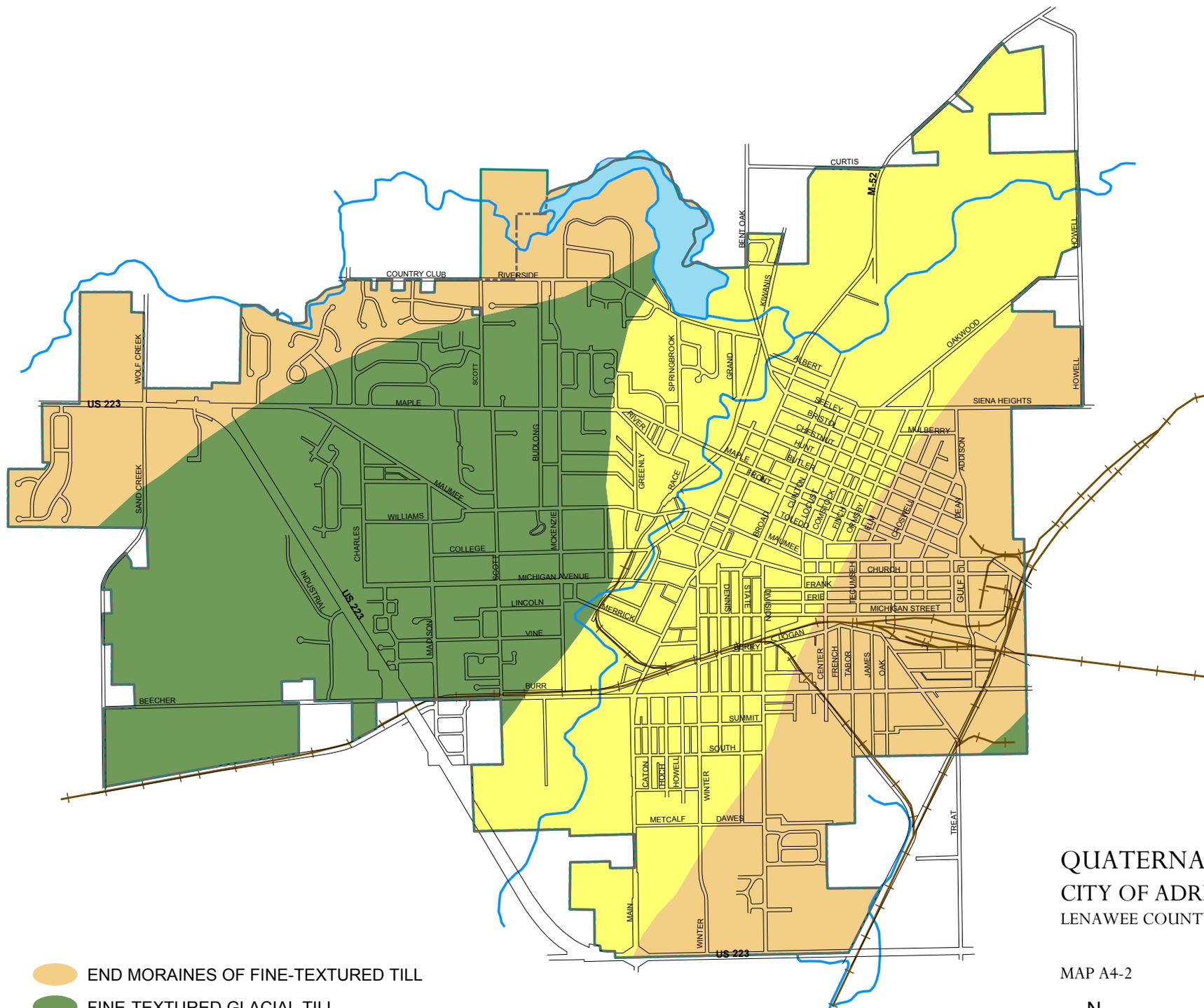
MAP A4-1



Source: USGS



BIRCHLER ARDYO  
 ASSOCIATES, INC.



- END MORAINES OF FINE-TEXTURED TILL
- FINE-TEXTURED GLACIAL TILL
- GLACIAL OUTWASH SAND AND GRAVEL AND POSTGLACIAL ALLUVIUM

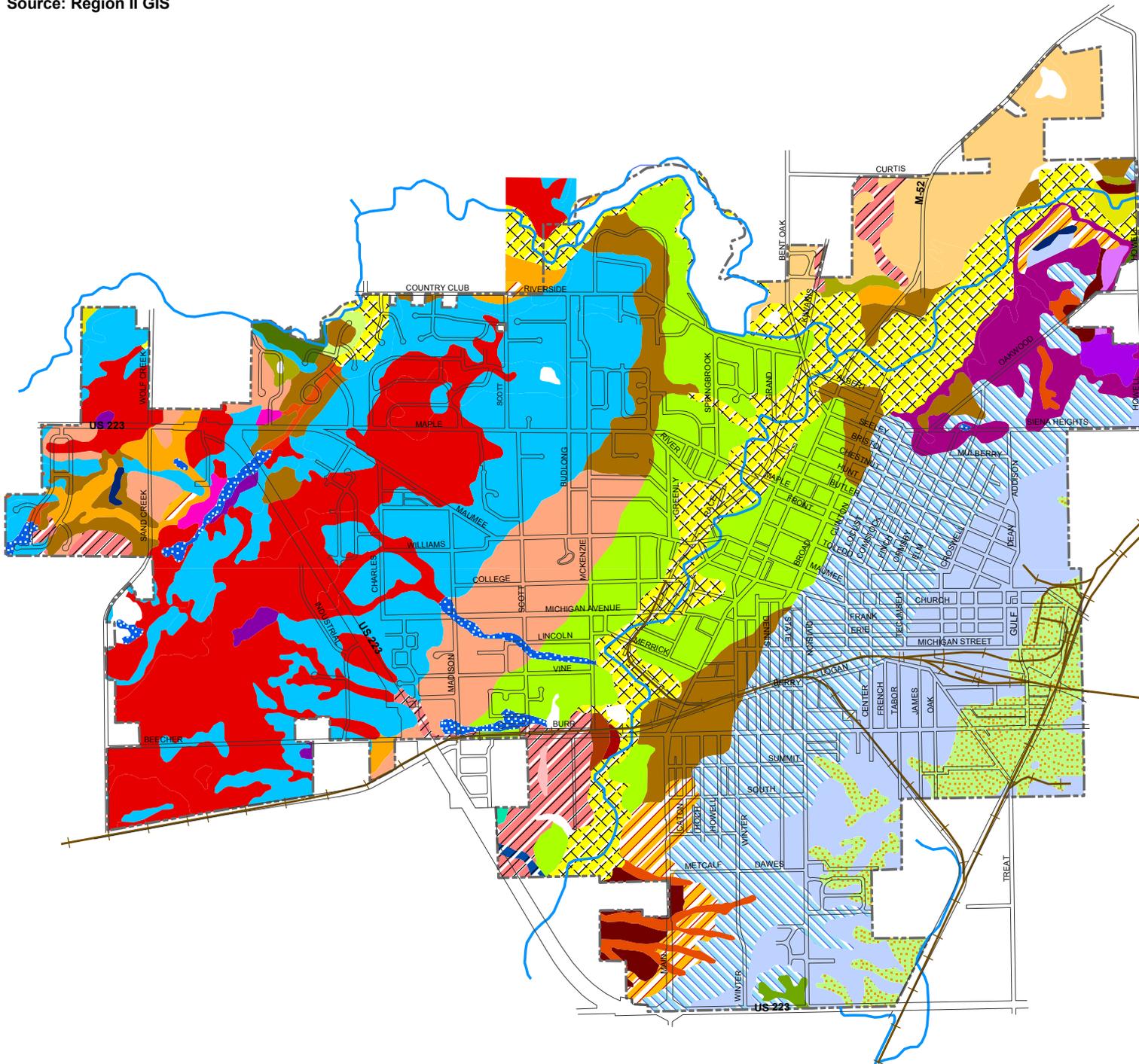
# QUATERNARY GEOLOGY

## CITY OF ADRIAN

LENAWEE COUNTY, MICHIGAN

MAP A4-2



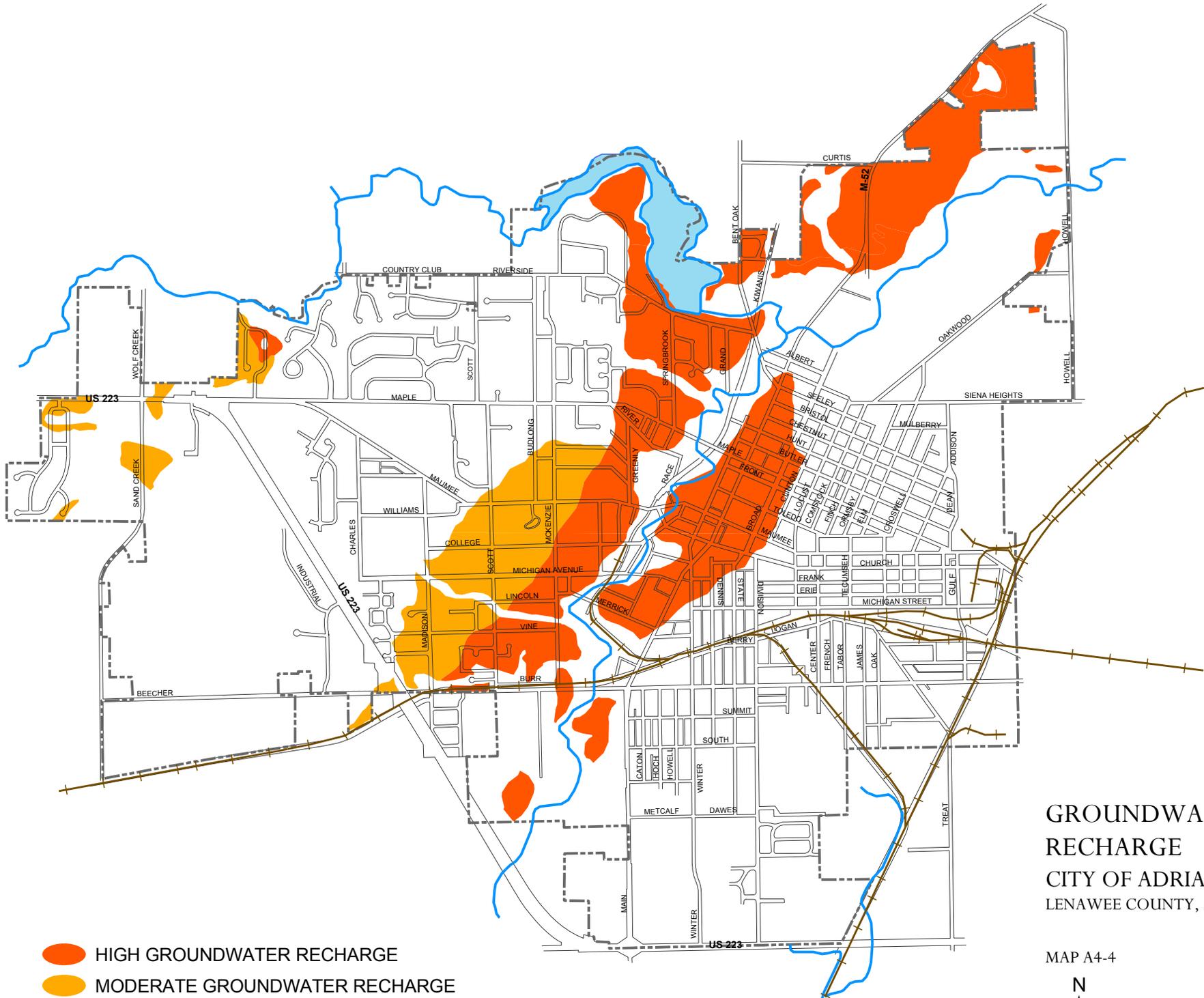


- Berrien sandy loam
- Berville loam
- Blount loam
- ▨ Brady and Macomb loams
- Brady and Macomb sandy loams
- Bronson sandy loam
- Brookston loam
- Cadmus and Blount loams
- Cadmus loam
- ▨ Cadmus sandy loam
- Conover loam
- Fox loam
- Fox sandy loam
- Genesee and Eel loams
- Genesee sandy loam
- ▨ Griffin and Genesee loams
- Griffin and Sloan loams
- Griffin and Sloan sandy loams
- Hoytville and Wauseon loams
- ▨ Hoytville clay loam and silty clay loam
- Ionia loam
- Kendallville loam
- Kendallville sandy loam
- ▨ Kerston muck and loams
- ▨ Kokomo, Barry, and Walkill loams
- Linwood muck
- Morley loam
- ▨ Nappanee loam
- ▨ Nappanee silt loam
- Pewamo clay loam
- Plainfield and Berrien loamy sands
- Plainfield and Ottawa loamy sands
- St. Clair loam
- Willette muck

**SOILS**  
**CITY OF ADRIAN**  
LENAWEE COUNTY, MICHIGAN

MAP A4-3





- HIGH GROUNDWATER RECHARGE
- MODERATE GROUNDWATER RECHARGE

Source: Region II

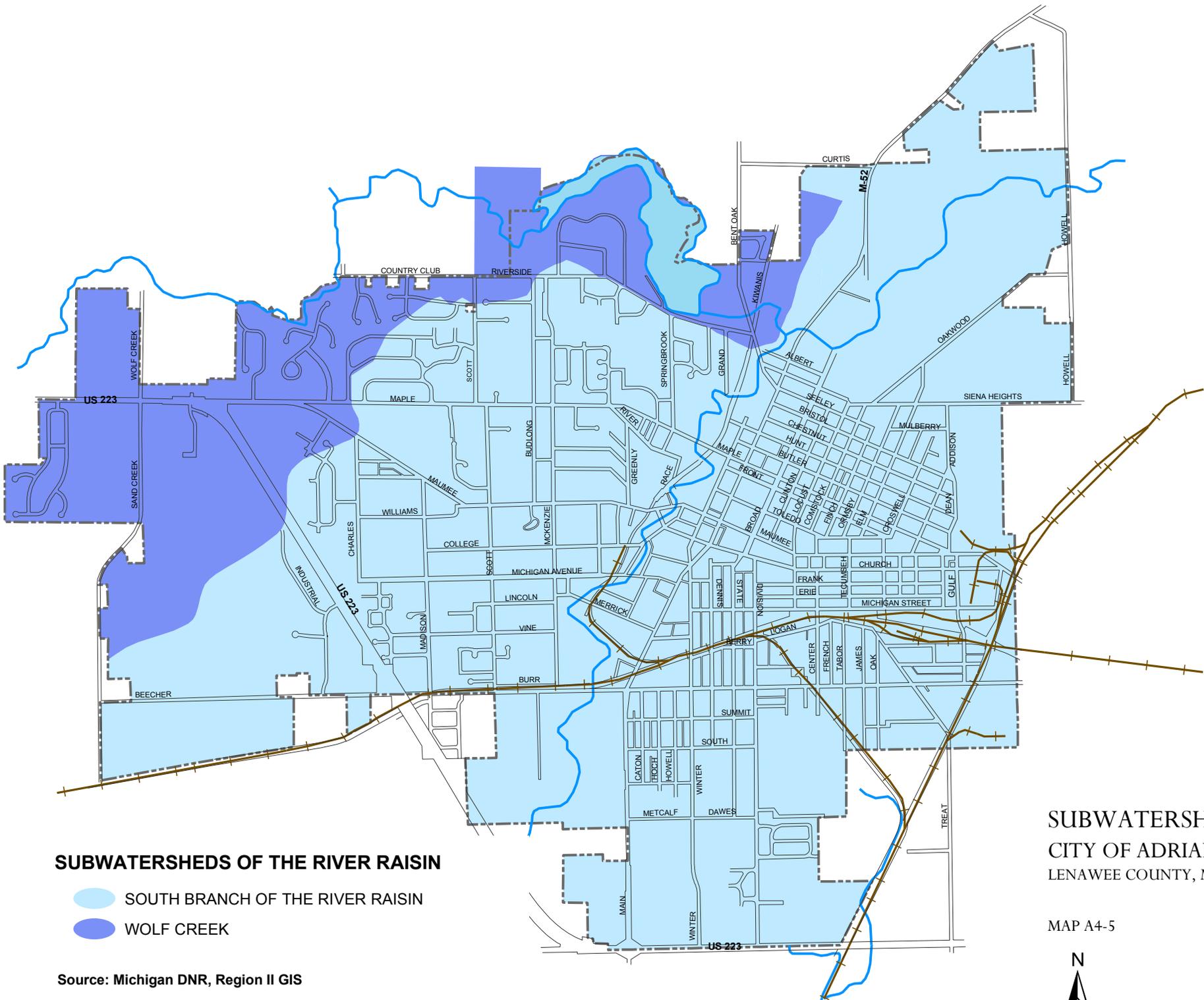
# GROUNDWATER RECHARGE

## CITY OF ADRIAN

LENAWEE COUNTY, MICHIGAN

MAP A4-4





**SUBWATERSHEDS OF THE RIVER RAISIN**

- SOUTH BRANCH OF THE RIVER RAISIN
- WOLF CREEK

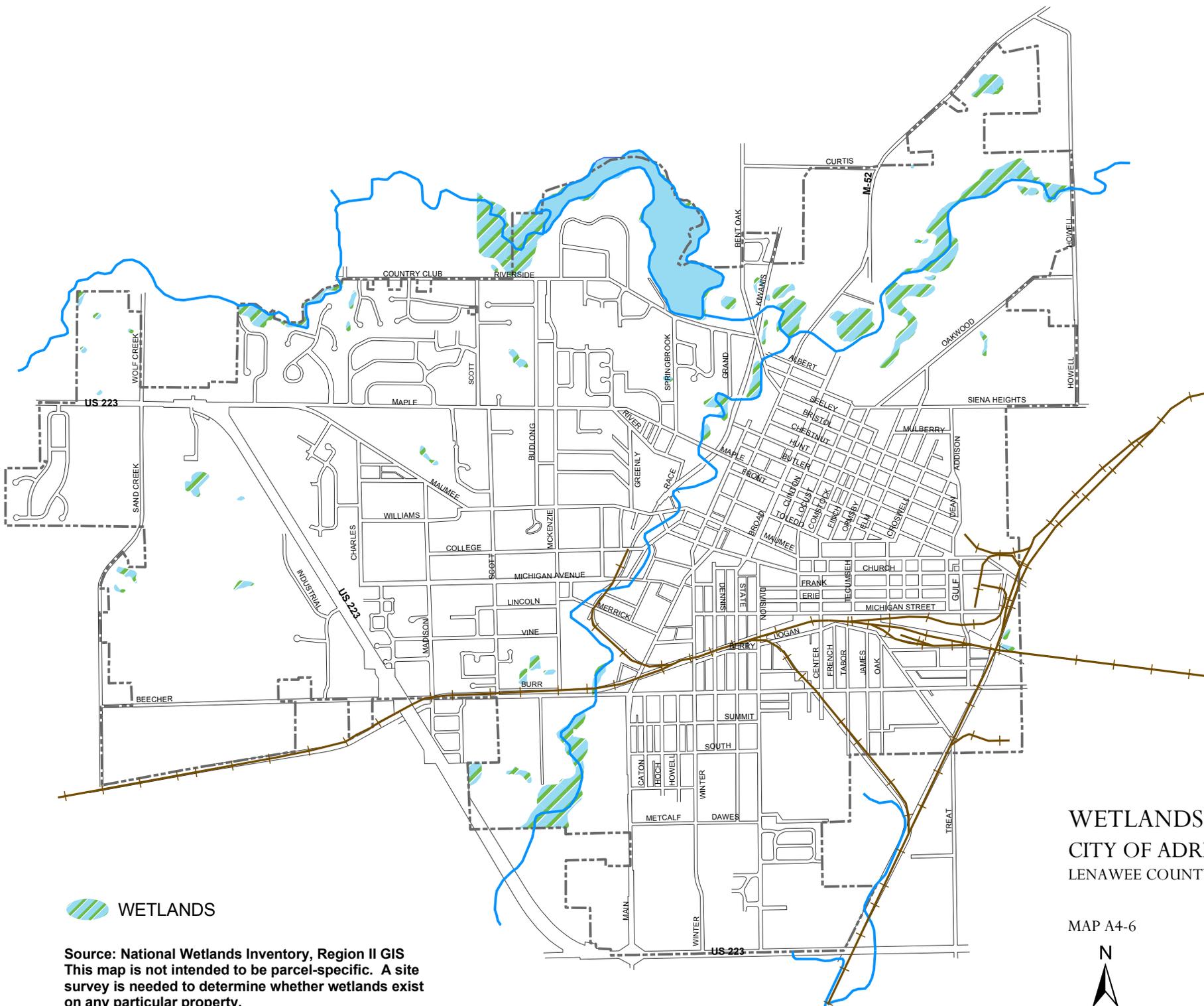
**SUBWATERSHEDS  
CITY OF ADRIAN  
LENAWEE COUNTY, MICHIGAN**

MAP A4-5



Source: Michigan DNR, Region II GIS





 WETLANDS

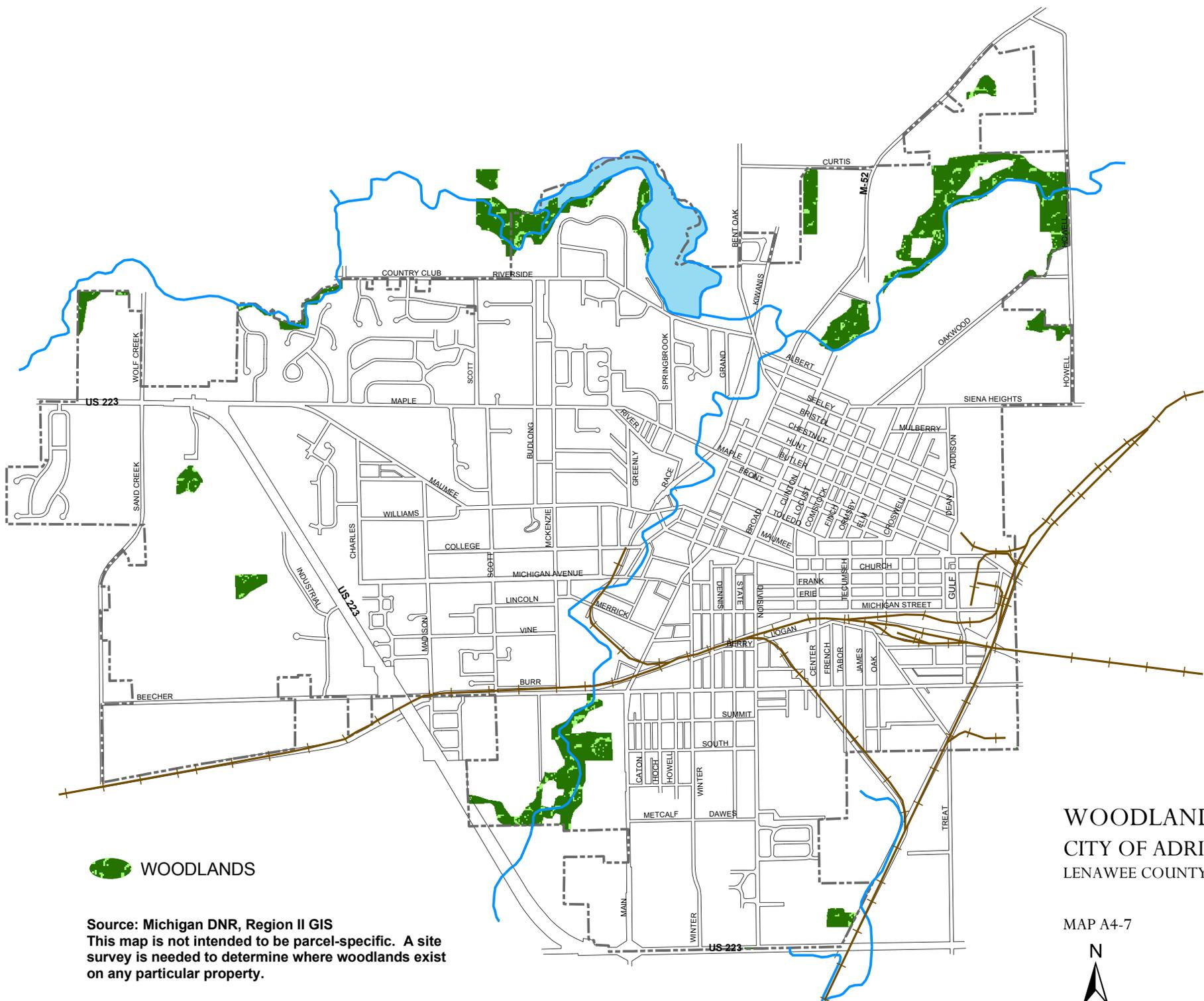
Source: National Wetlands Inventory, Region II GIS  
 This map is not intended to be parcel-specific. A site survey is needed to determine whether wetlands exist on any particular property.

WETLANDS  
 CITY OF ADRIAN  
 LENAWEE COUNTY, MICHIGAN

MAP A4-6



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Source: Michigan DNR, Region II GIS  
 This map is not intended to be parcel-specific. A site survey is needed to determine where woodlands exist on any particular property.

**WOODLANDS**  
**CITY OF ADRIAN**  
 LENA WEE COUNTY, MICHIGAN

MAP A4-7



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