

# CREP Prioritization: Mapping Sediment Loading Risk in the Saginaw Bay Basin

## Background

Michigan State University Extension (MSUE) is collaborating with the State of Michigan and local stakeholders to re-establish the Conservation Reserve Enhancement Program (CREP) in Michigan. To aid in prioritizing lands eligible for CREP enrollment, the Institute of Water Research (IWR) at MSU developed township-scale maps of sediment loading risk for the Saginaw Bay basin. This book organizes those maps at the township scale.

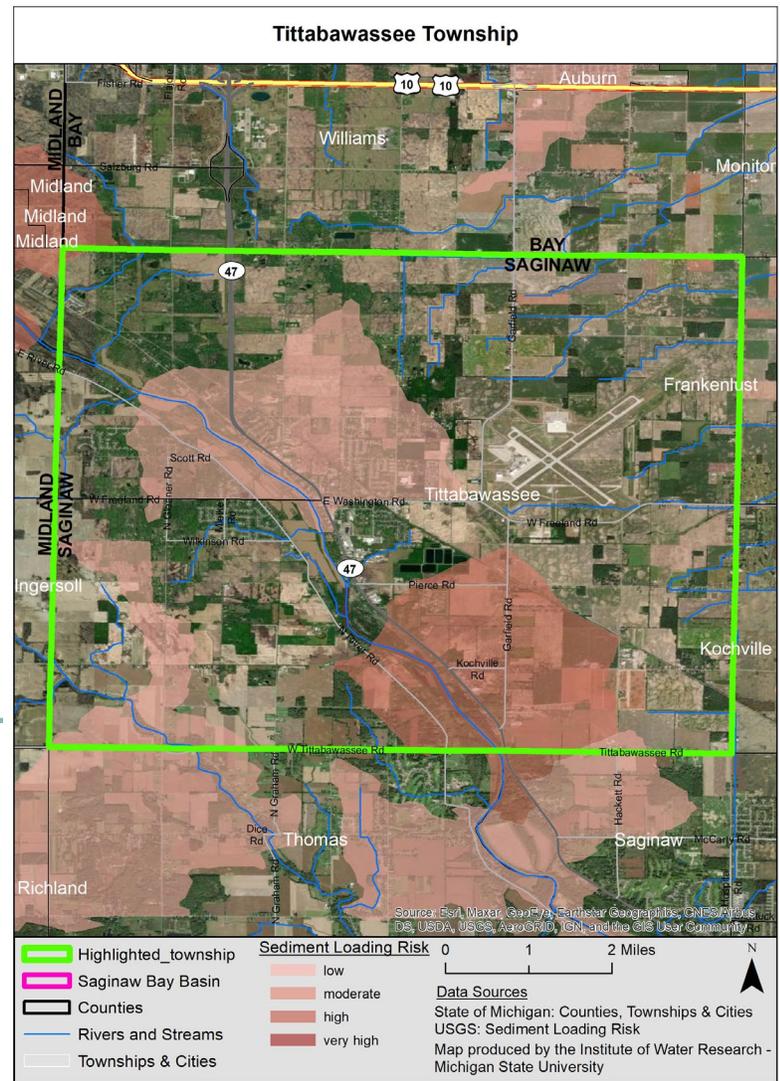
## Data

The maps are based upon data from the United States Geological Survey's (USGS) SPATIally Referenced Regression On Watershed attributes (SPARROW) model\*. The model uses observations, land use characteristics, and statistical relationships, among other variables, to estimate pollutant loads to streams and rivers. The data in this map book represents incremental sediment load contribution for each small catchment in the basin (see image at right), i.e. the amount of sediment load that originated in a particular area (not the total, accumulated amount moving through the stream in that area).

## Contacts

Please direct questions about MSUE's project to:  
**Sarah Fronczak**  
 Environmental Management Educator  
 Michigan State University Extension  
[froncz3@msu.edu](mailto:froncz3@msu.edu)

Please use the URL below to learn more about the SPARROW model, and direct questions about the maps to:  
**Glenn O'Neil**  
 Environmental Scientist  
 Institute of Water Research - Michigan State University  
[oneilg@msu.edu](mailto:oneilg@msu.edu)



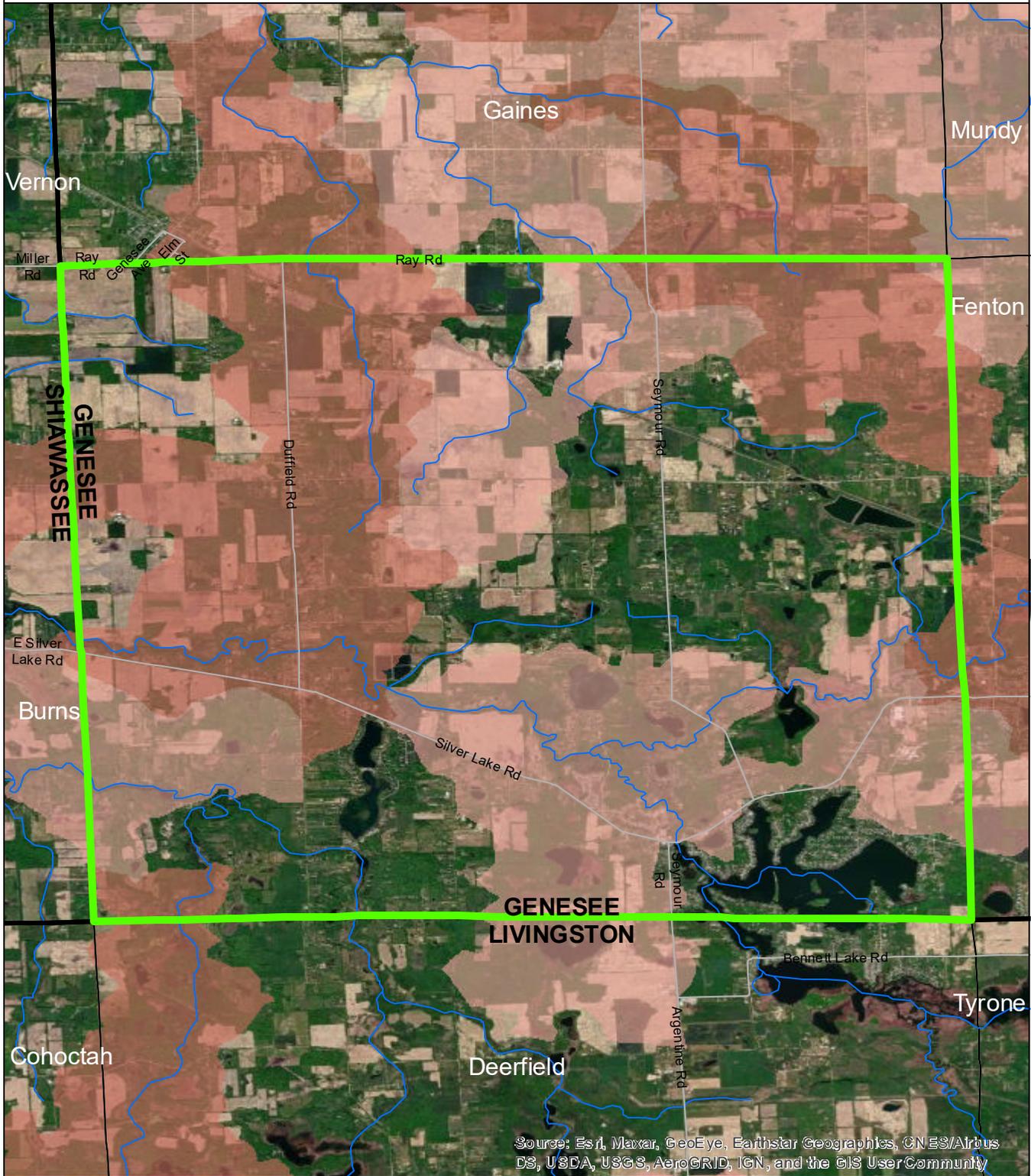
\* <https://www.sciencebase.gov/catalog/item/5cbf5150e4b09b8c0b700df3>

# Table of Contents

---

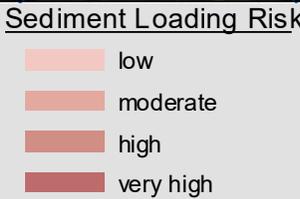
Argentine Township . . . . .	3
Atlas Township . . . . .	4
City of Burton . . . . .	5
Clayton Township . . . . .	6
City of Clio . . . . .	7
Davison Township . . . . .	8
City of Davison . . . . .	9
Fenton Township . . . . .	10
City of Fenton . . . . .	11
City of Flint . . . . .	12
Flint Township . . . . .	13
Flushing Township . . . . .	14
City of Flushing . . . . .	15
Forest Township . . . . .	16
Gaines Township . . . . .	17
Genesee Township . . . . .	18
Grand Blanc Township . . . . .	19
City of Grand Blanc . . . . .	20
City of Linden . . . . .	21
Montrose Township . . . . .	22
City of Montrose . . . . .	23
Mt Morris Township . . . . .	24
City of Mt Morris . . . . .	25
Mundy Township . . . . .	26
Richfield Township . . . . .	27
City of Swartz Creek . . . . .	28
Thetford Township . . . . .	29
Vienna Township . . . . .	30

# Argentine Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS UserCommunity

- Argentine Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

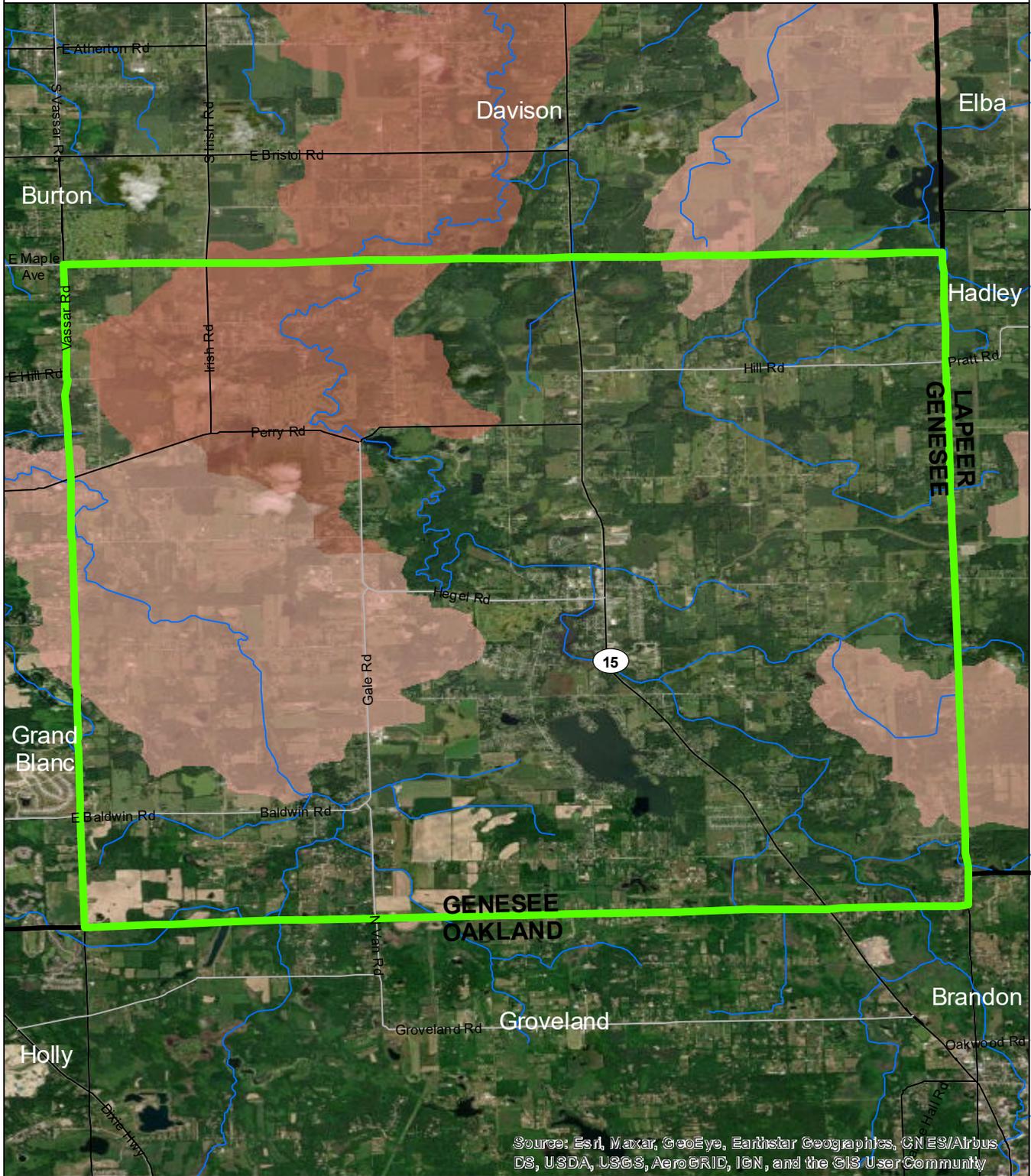


Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University



# Atlas Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Atlas Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high

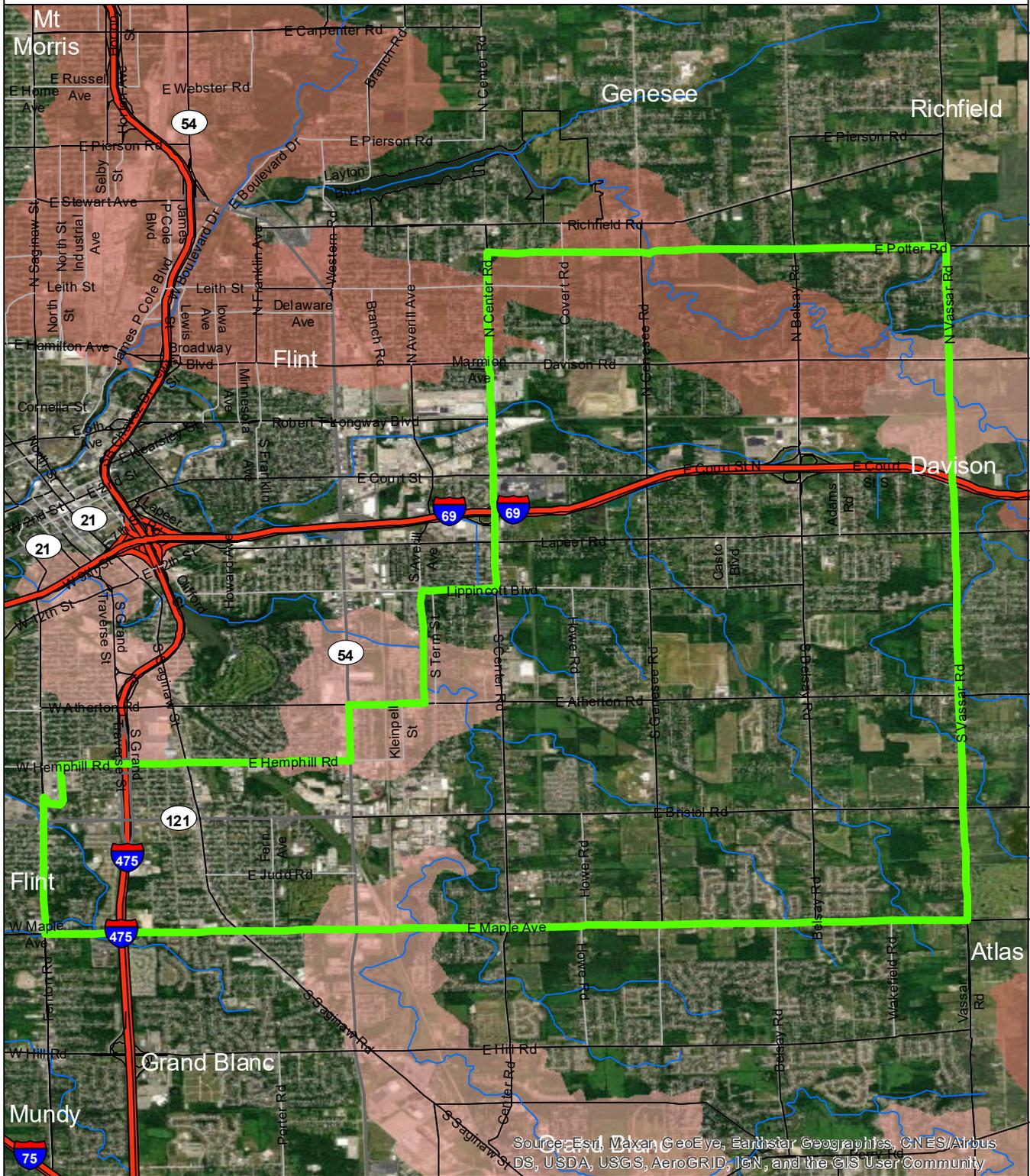


**Data Sources**

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University



# City of Burton



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- City of Burton
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

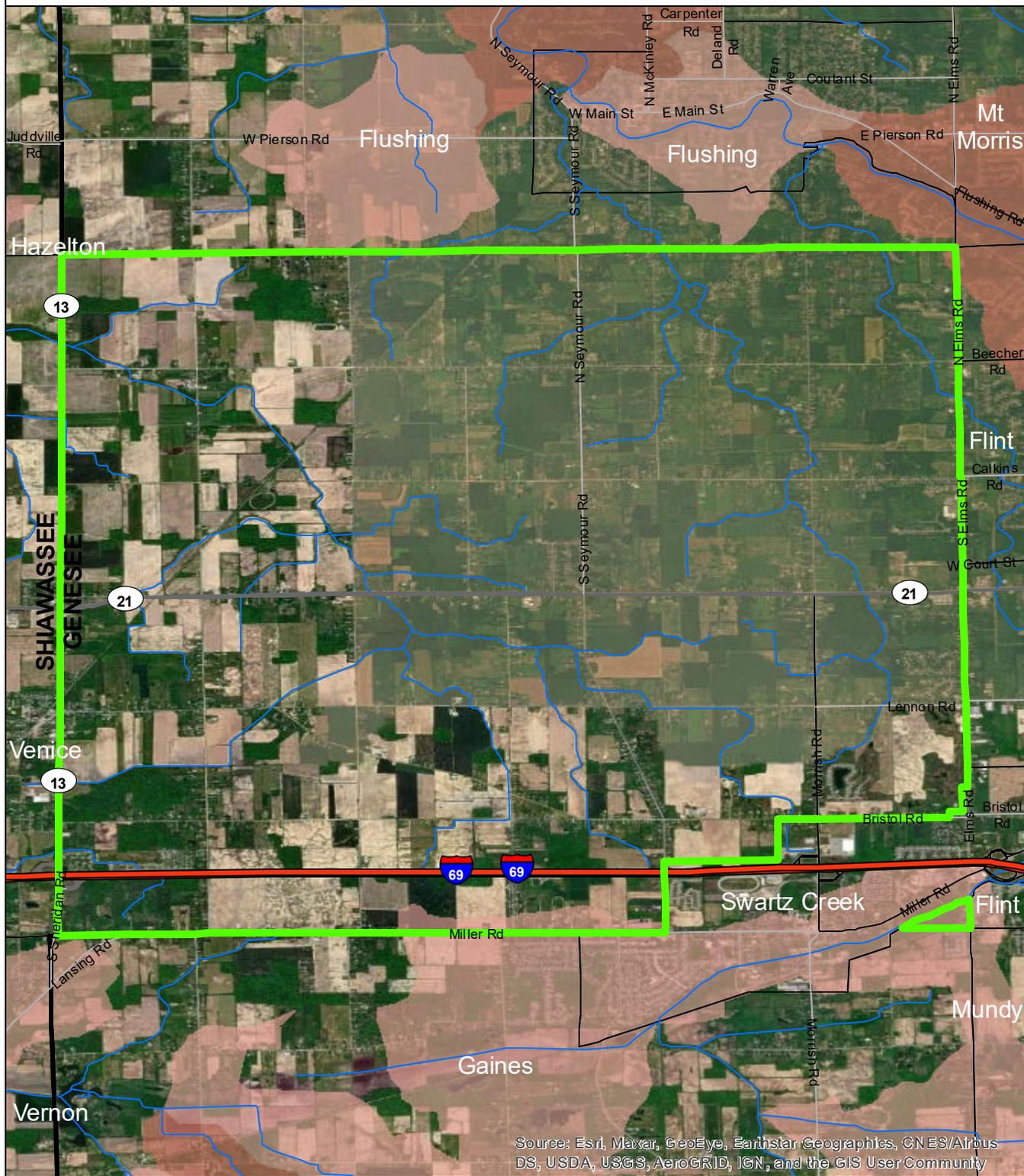
- low
- moderate
- high
- very high



### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# Clayton Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Clayton Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high

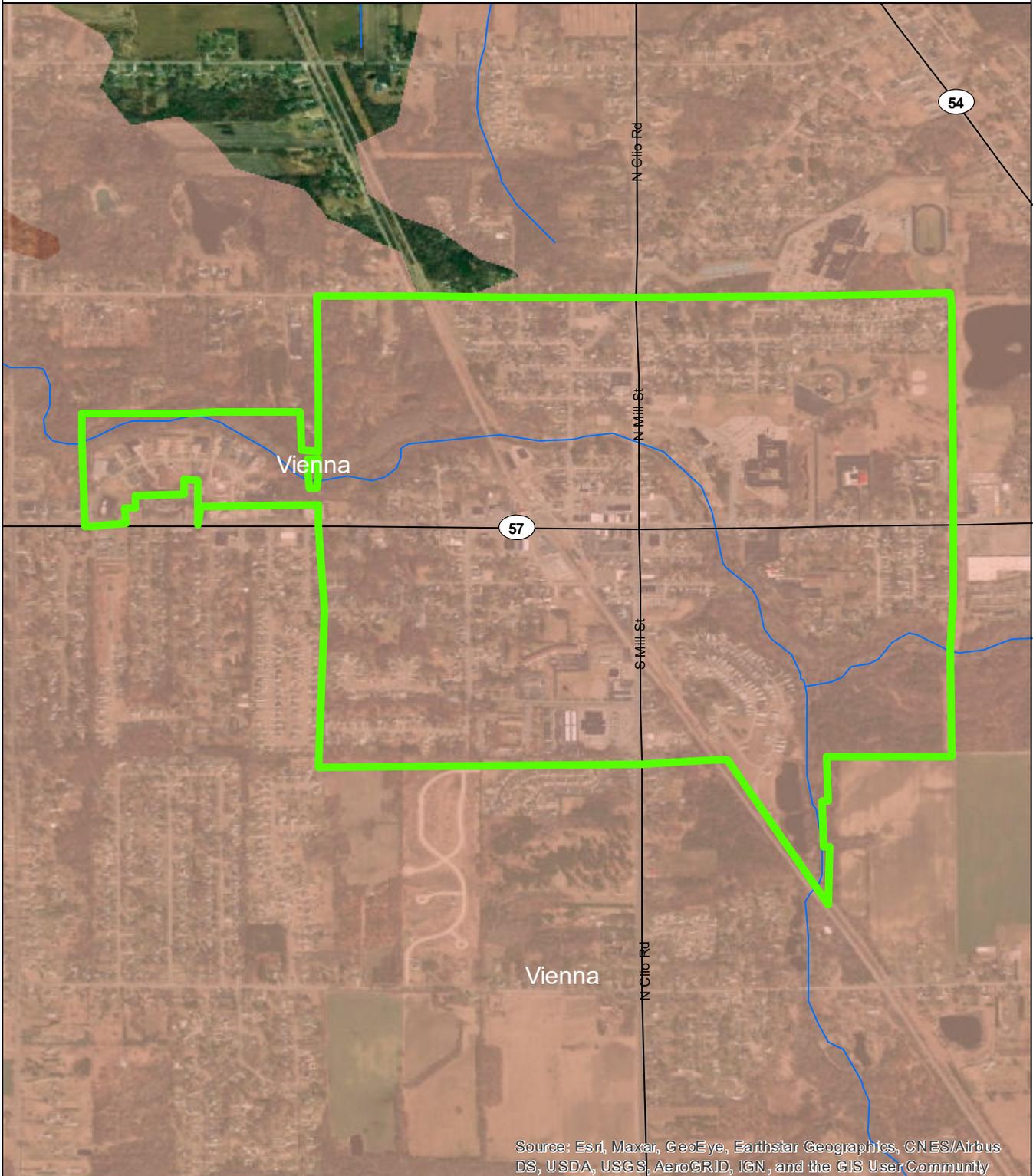


**Data Sources**

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University



# City of Clio



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS UserCommunity

- City of Clio
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

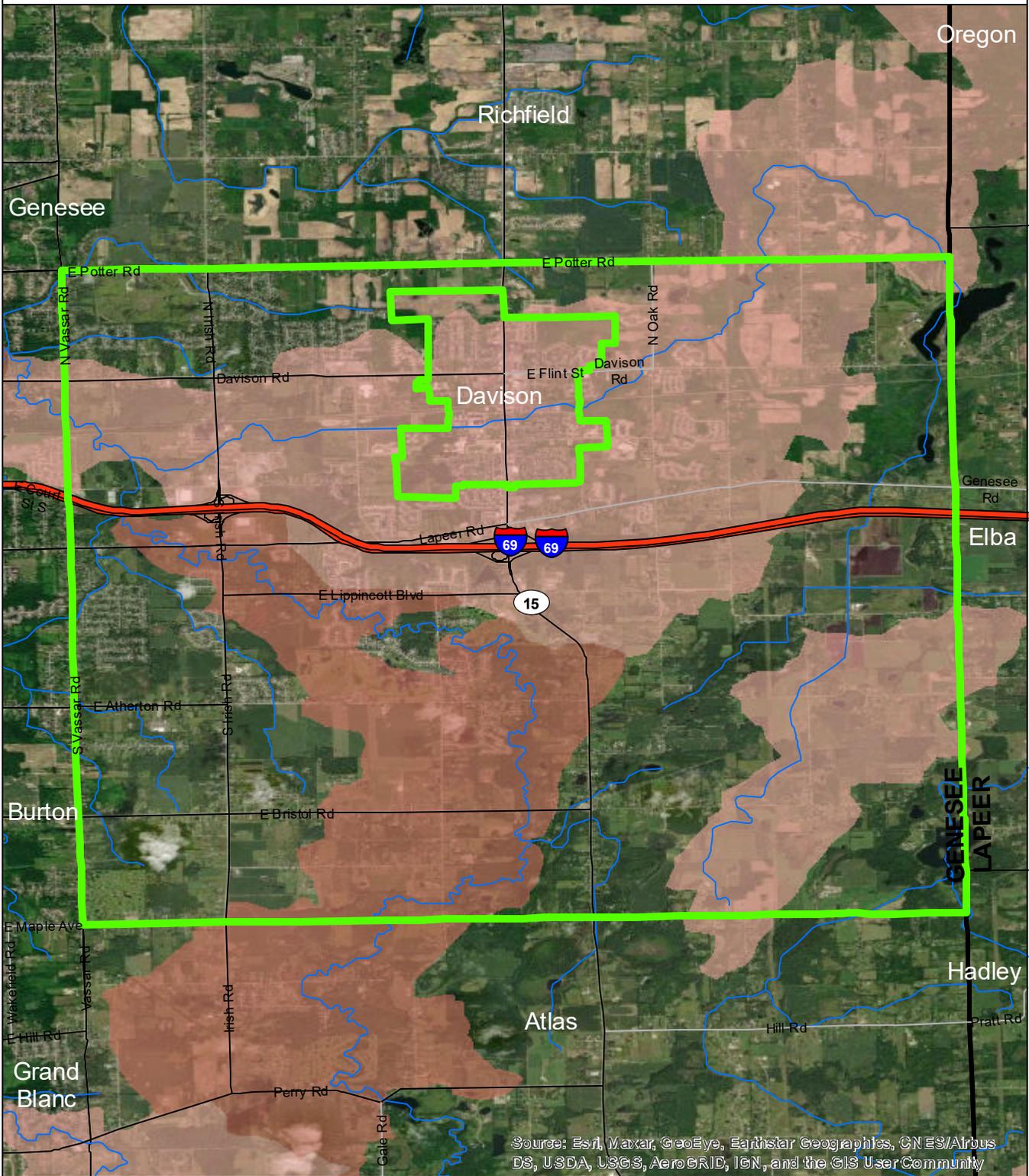
- low
- moderate
- high
- very high



### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# Davison Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CN ES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Davison Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

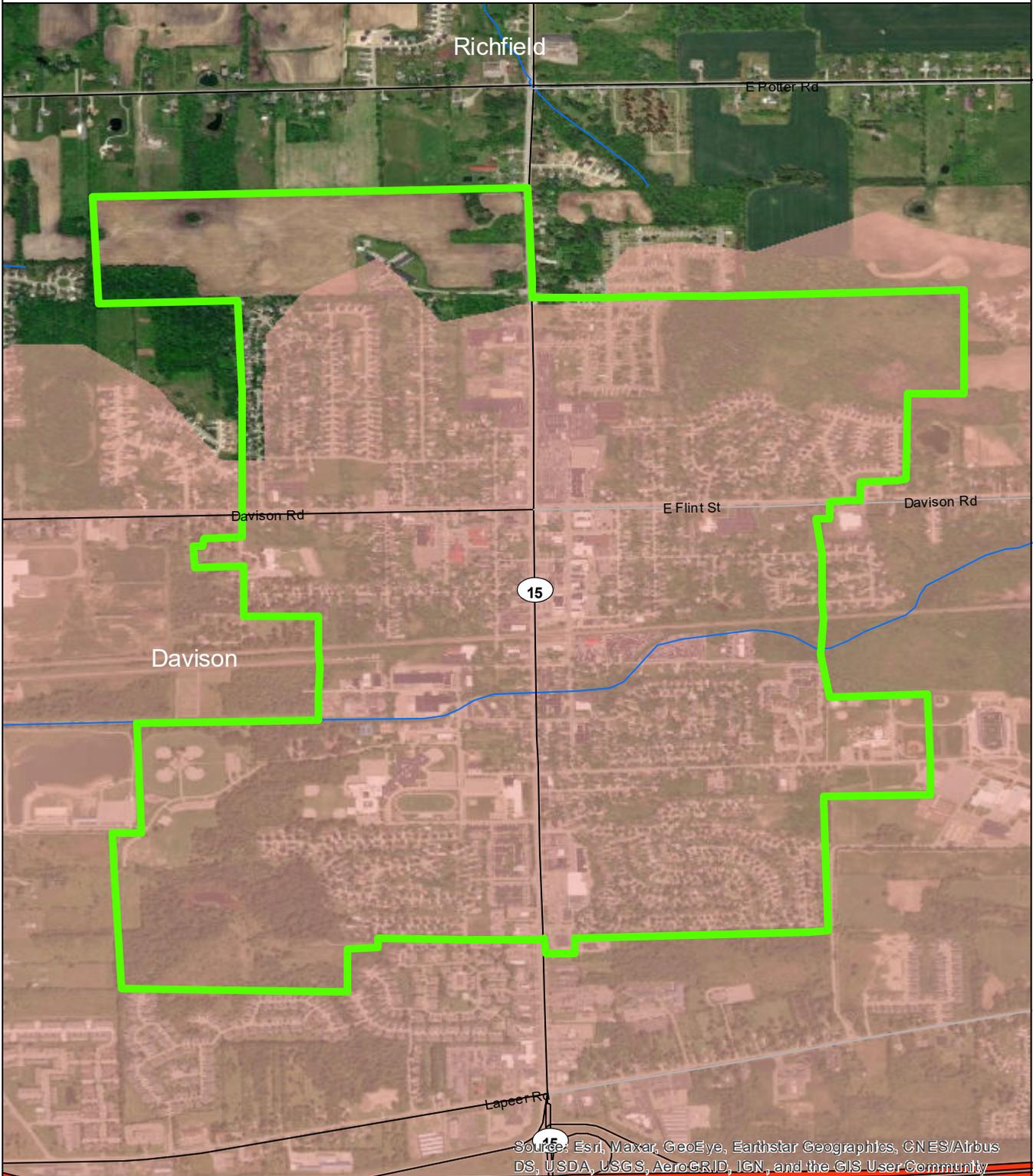


### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University



# City of Davison



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- City of Davison
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

0

**Data Sources**

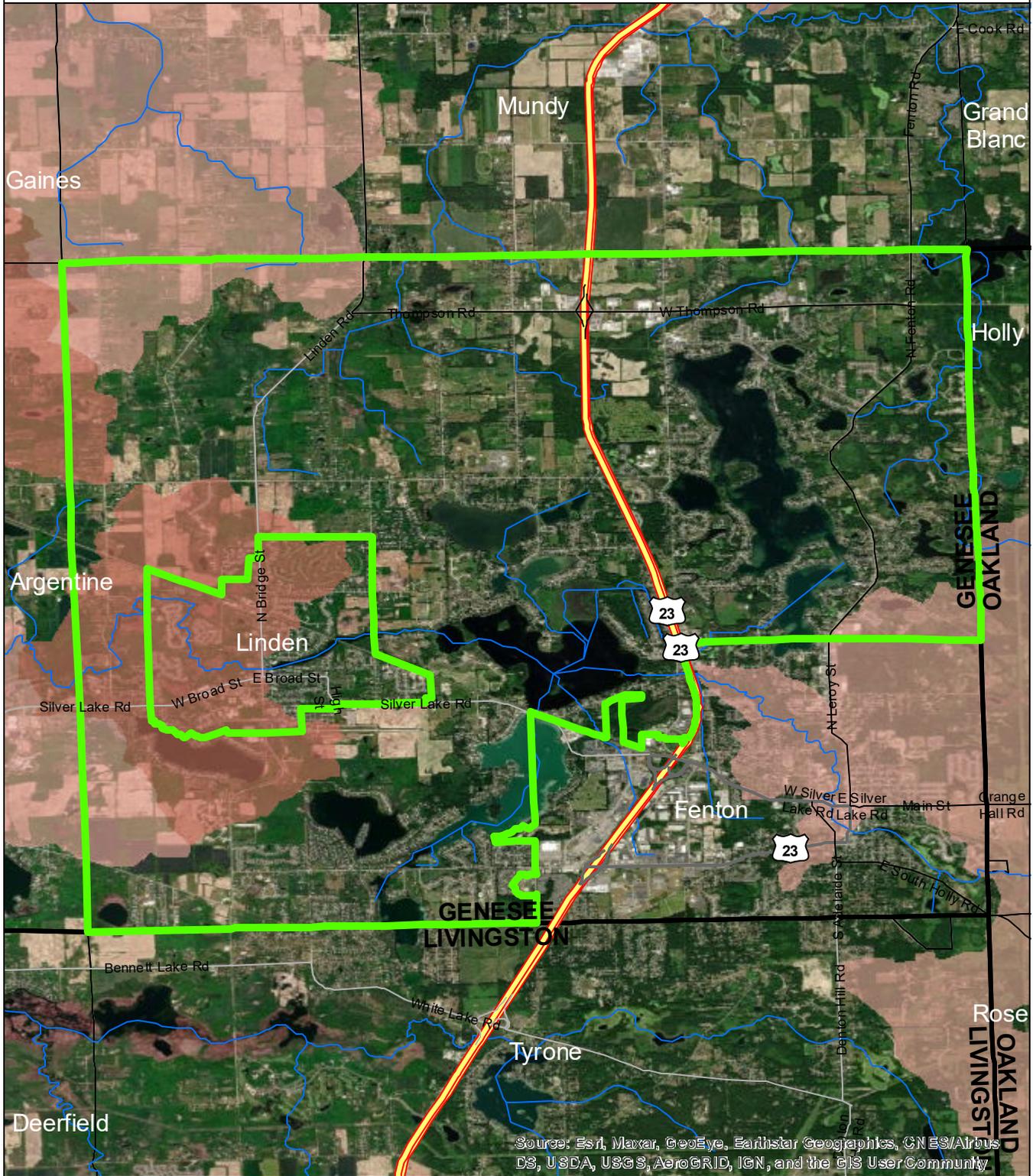
State of Michigan: Counties, Townships & Cities

USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University



# Fenton Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Fenton Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high



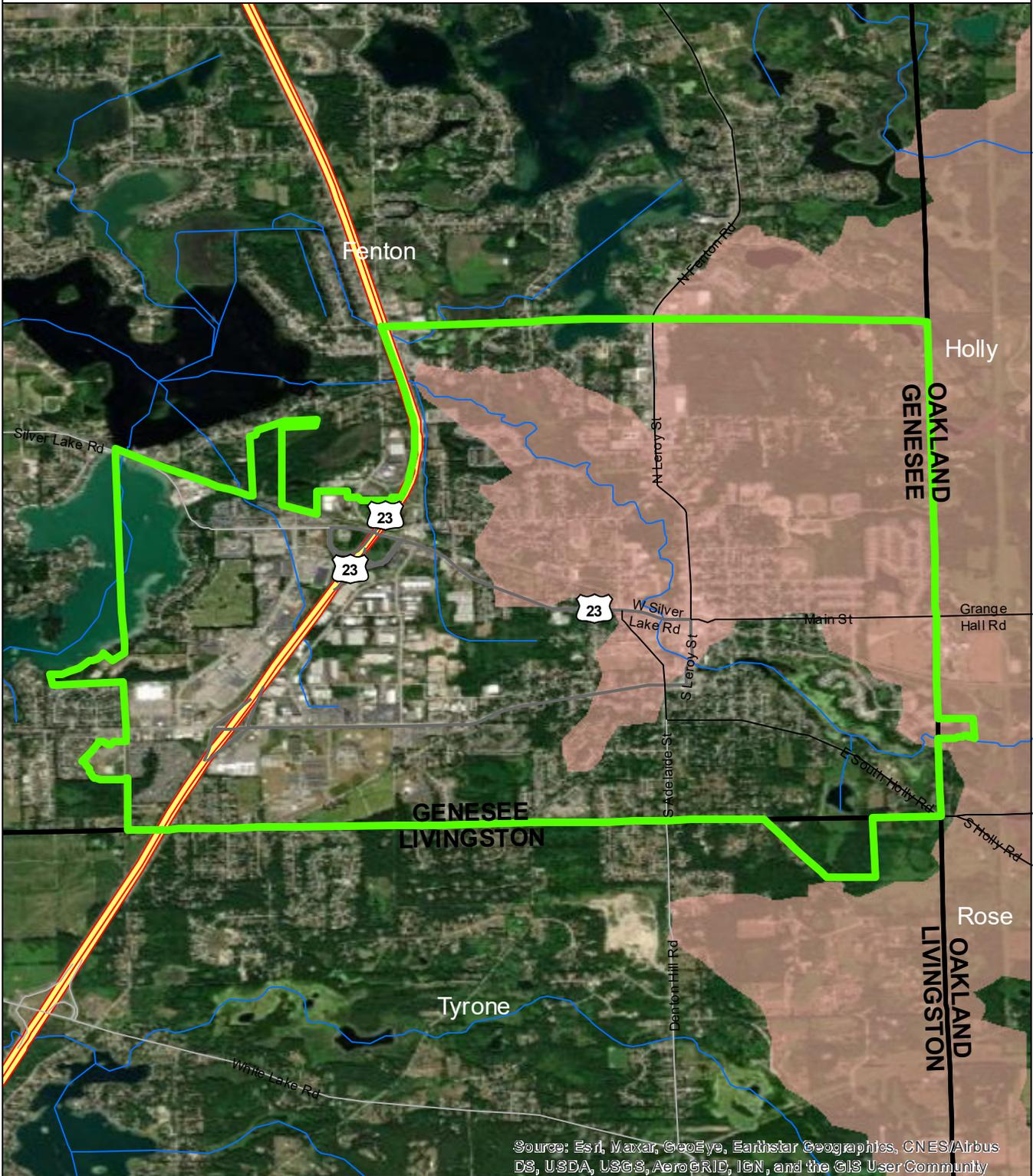
### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University



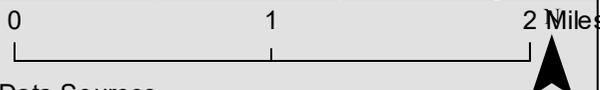
# City of Fenton



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

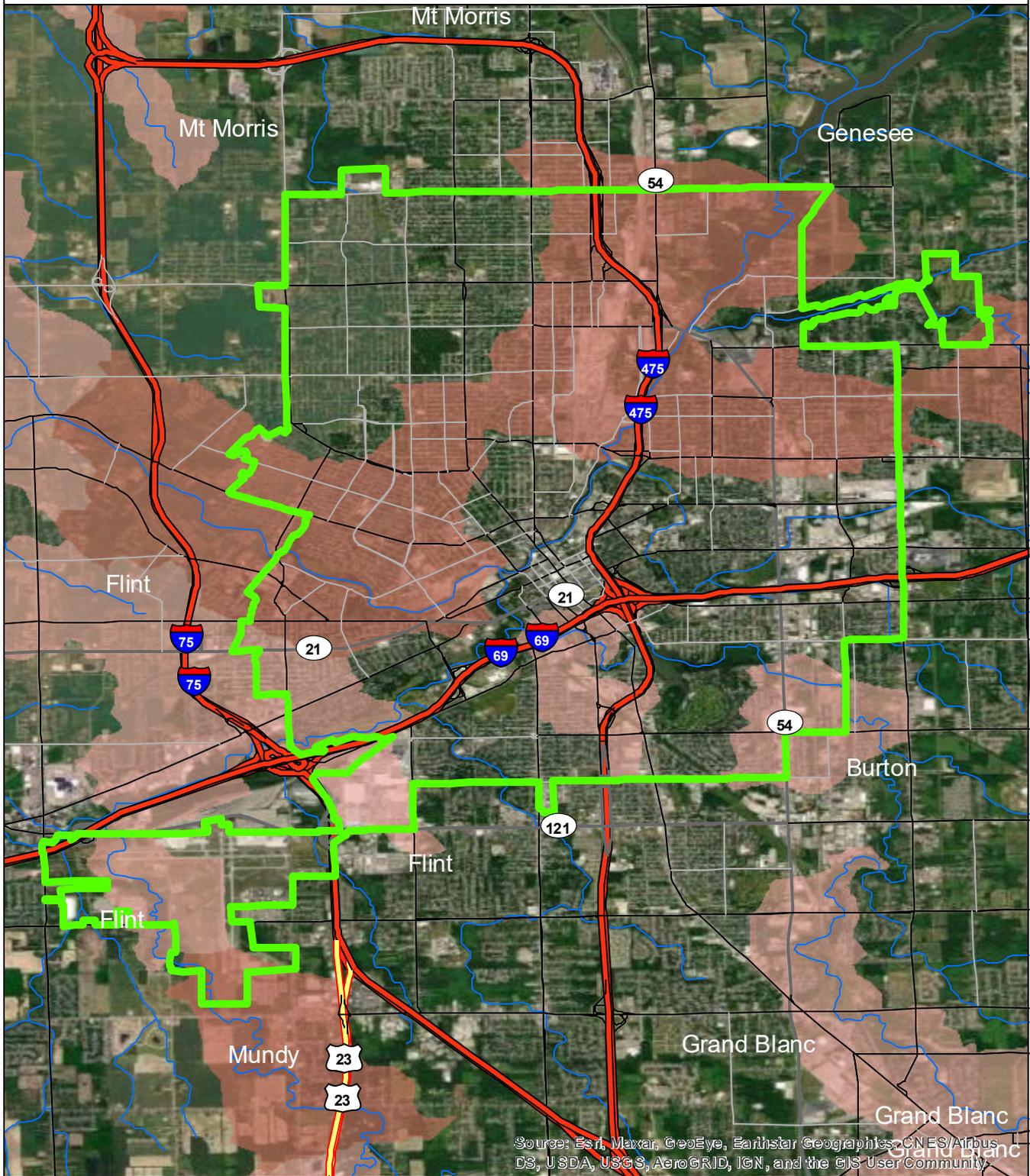
- City of Fenton
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high



**Data Sources**  
 State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# City of Flint



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- City of Flint
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high

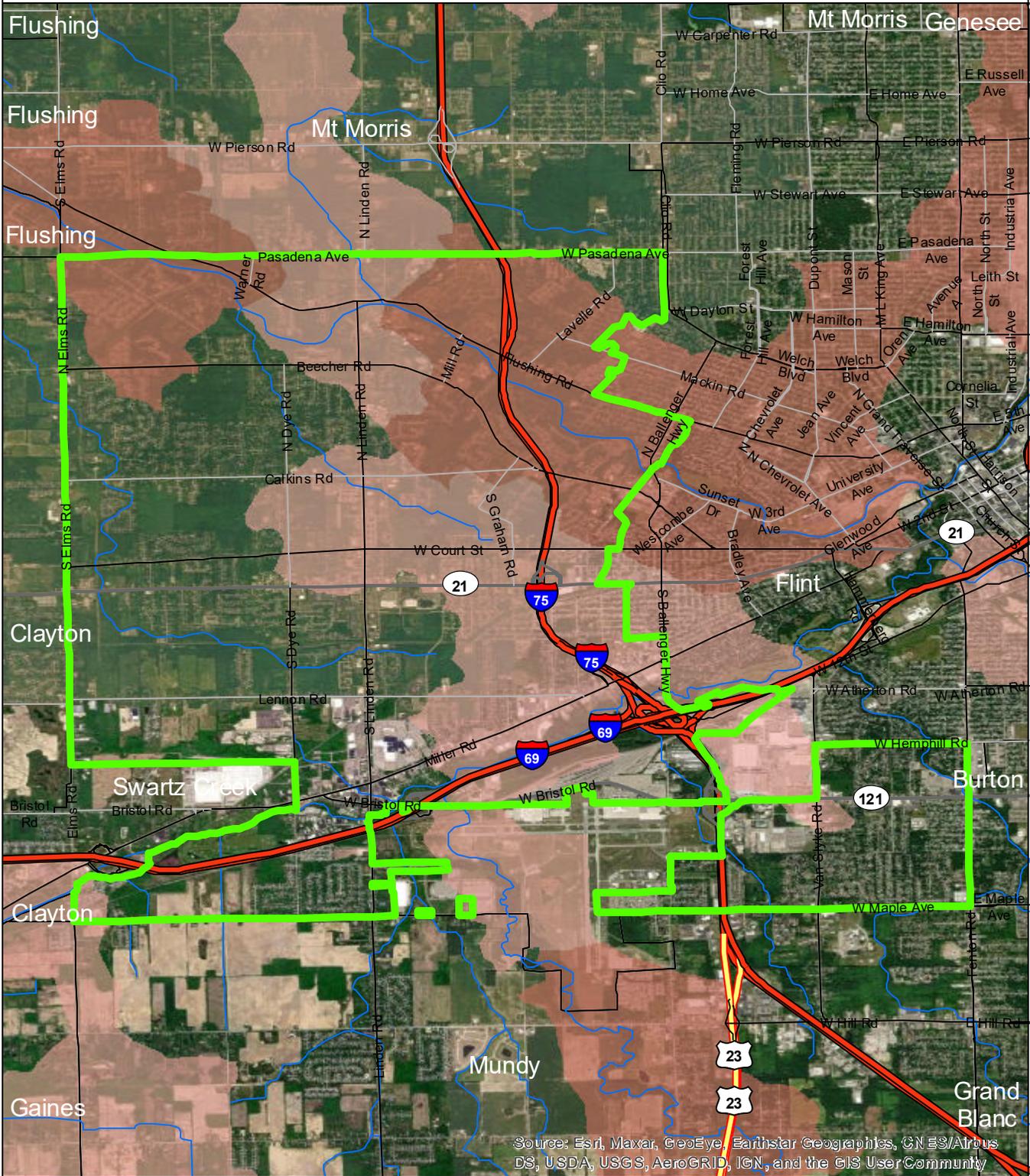
0 1 2 Miles

Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University



# Flint Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CN ES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Flint Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

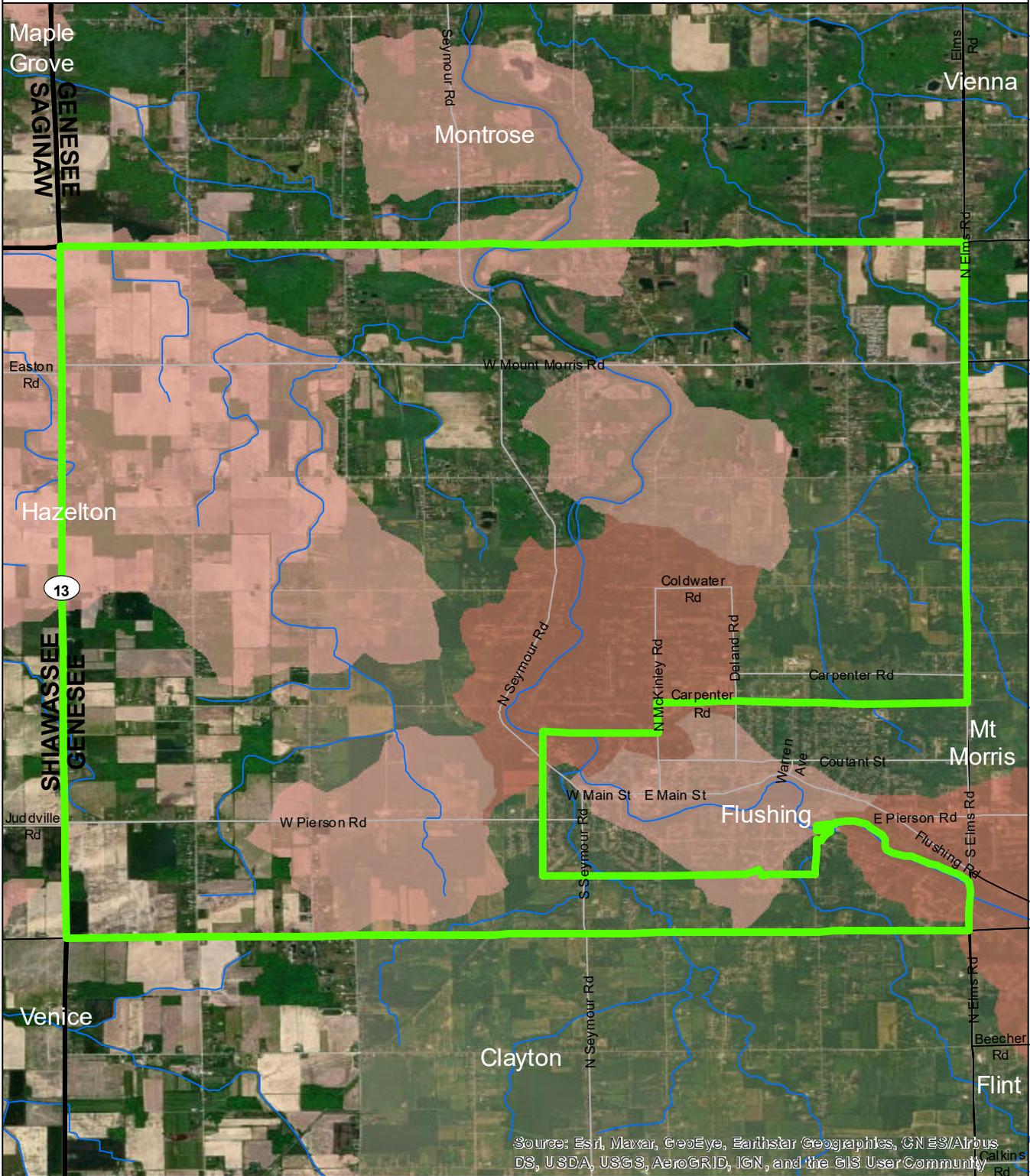


### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

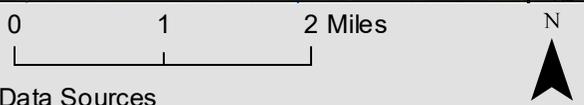
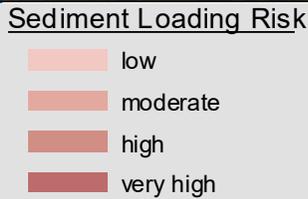


# Flushing Township



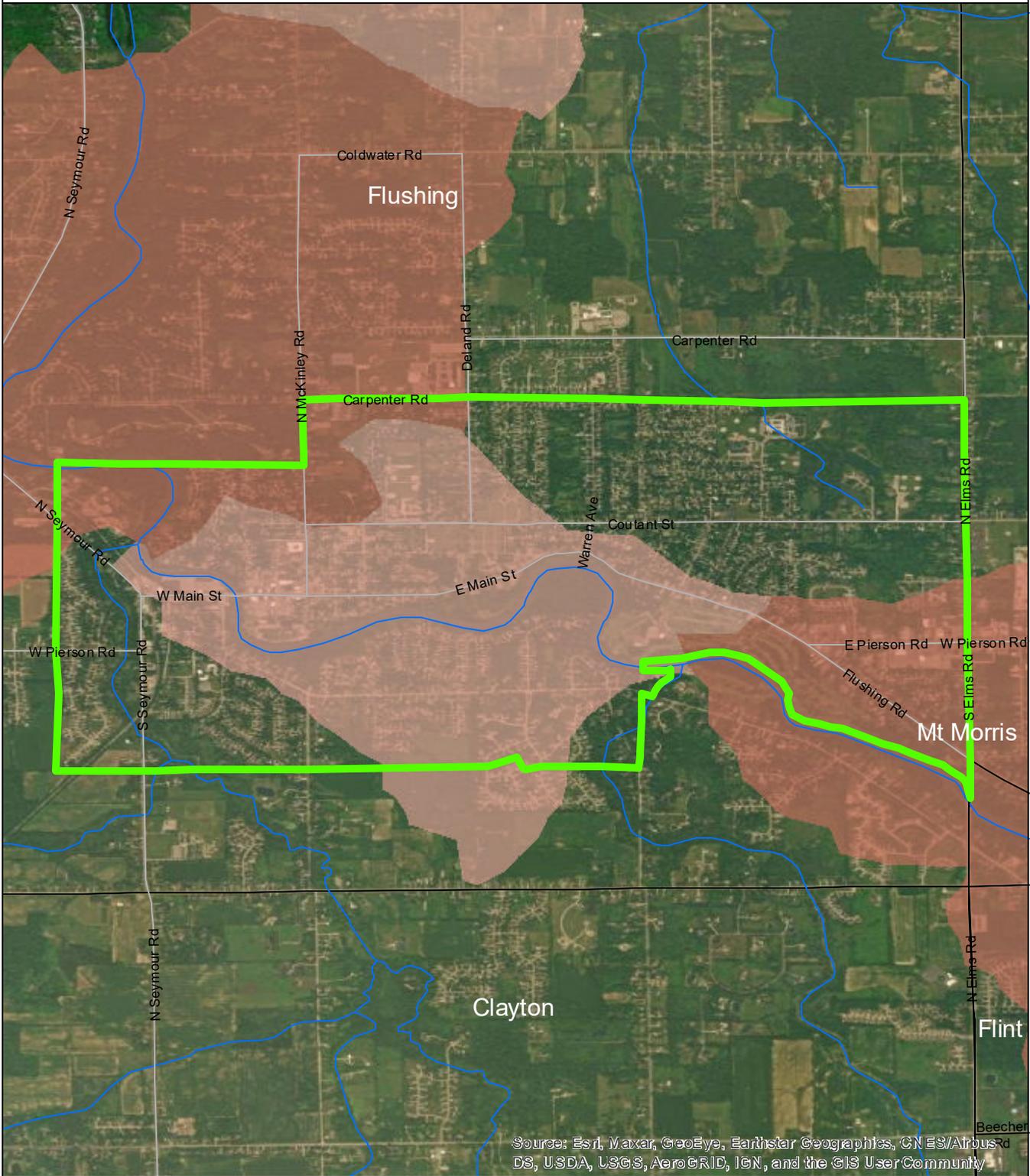
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Flushing Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities



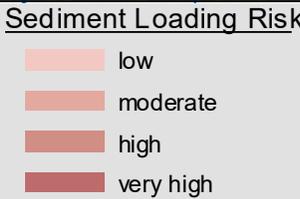
Data Sources  
 State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# City of Flushing



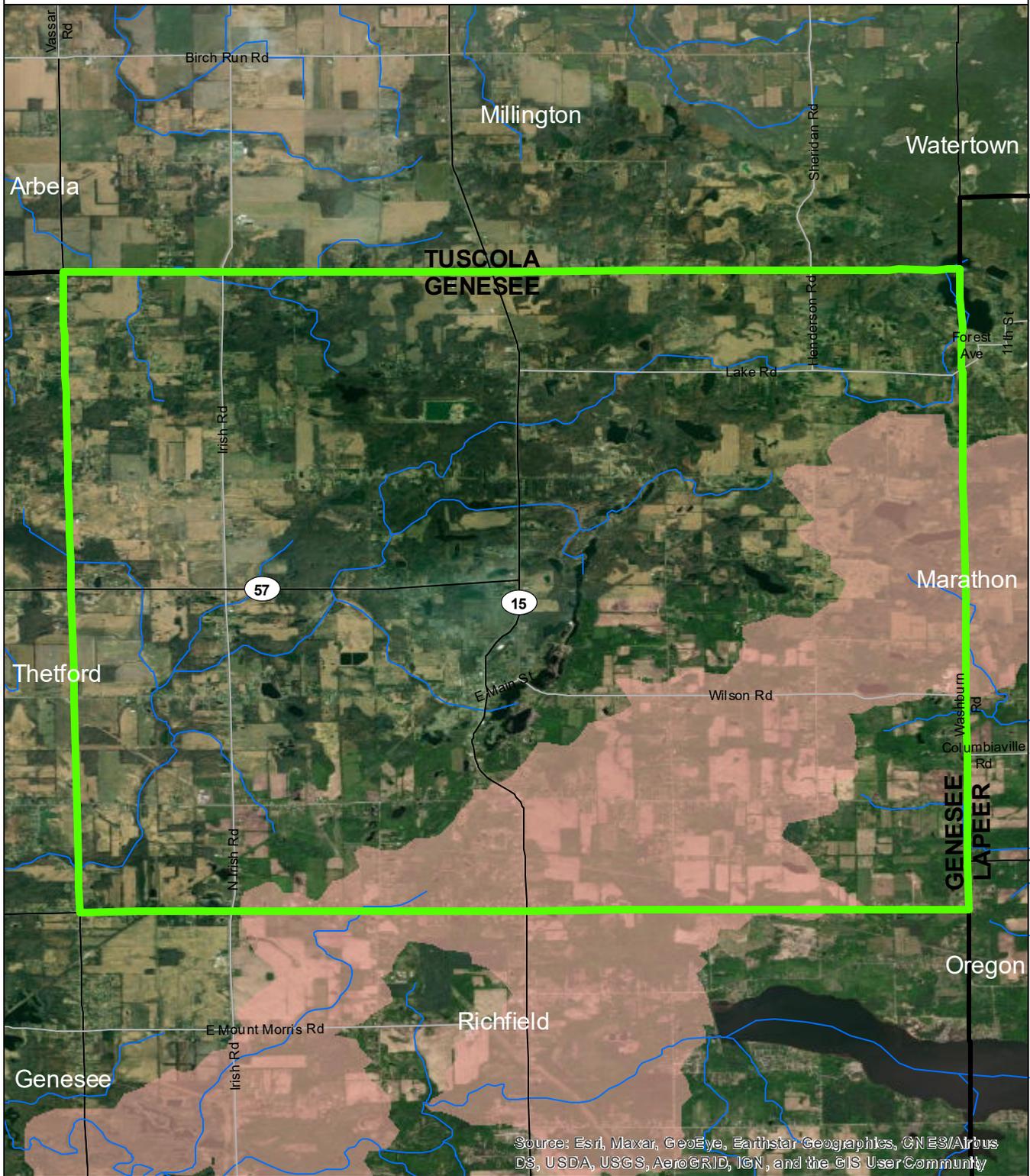
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CN ES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- City of Flushing
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities



**Data Sources**  
 State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# Forest Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Forest Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high



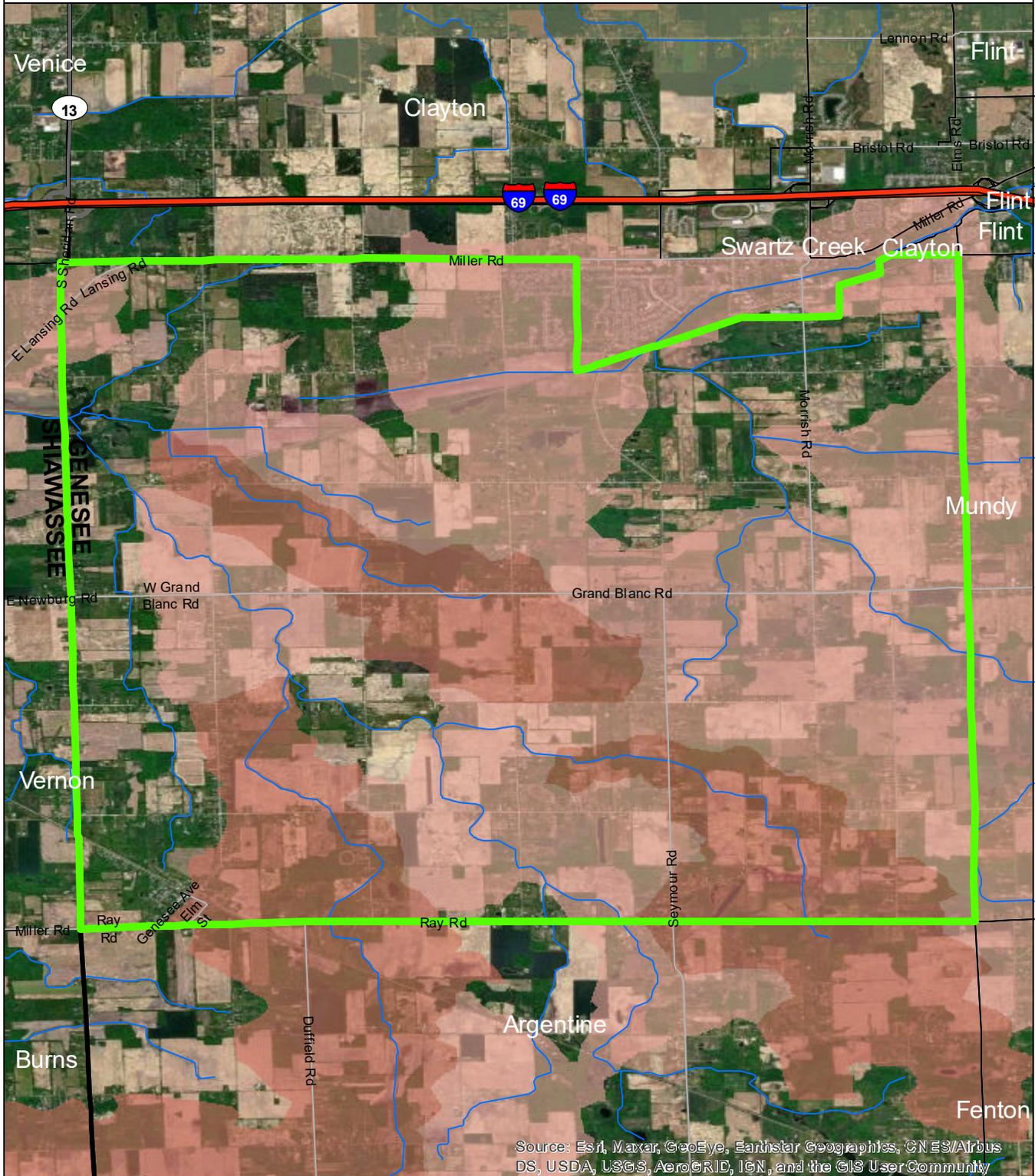
### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University

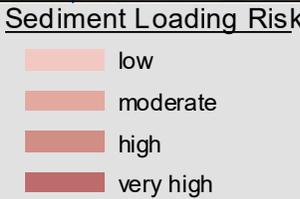


# Gaines Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CN ES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Gaines Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

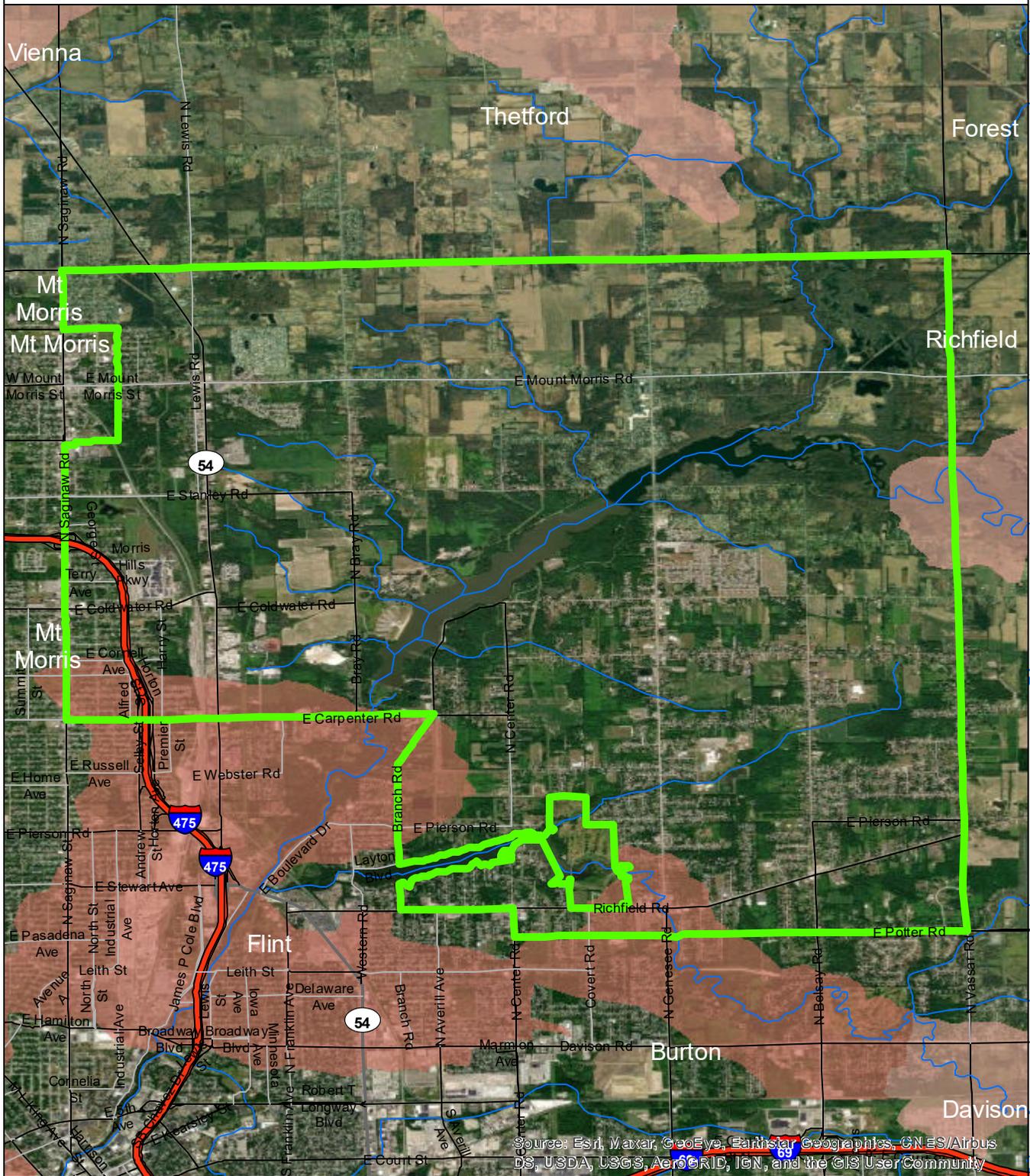


**Data Sources**

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University



# Genesee Township



Source: Esri, Maxar, GeoEye, Earthstar, GeoGraphics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Genesee Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

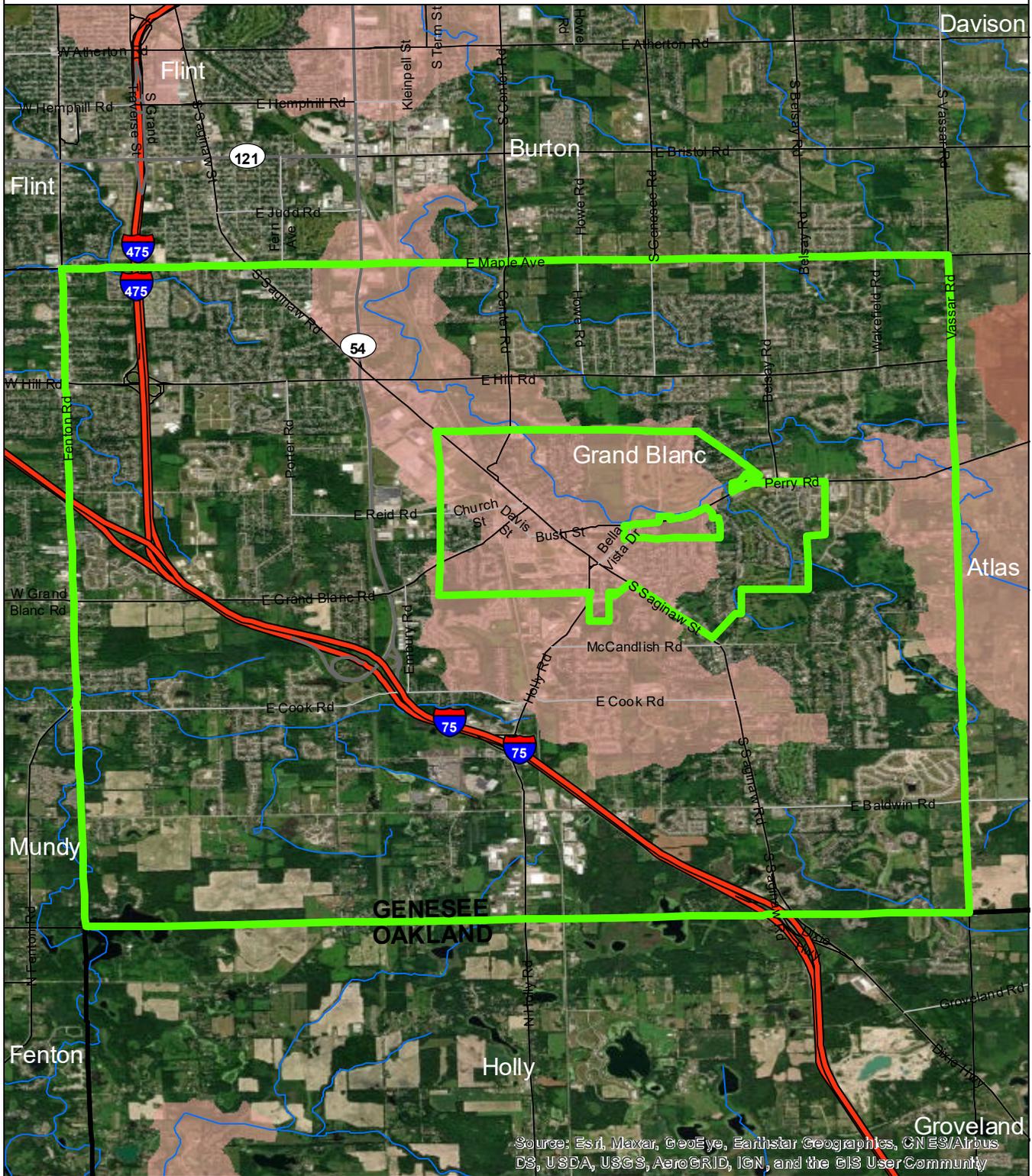
- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high



**Data Sources**

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# Grand Blanc Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Grand Blanc Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high



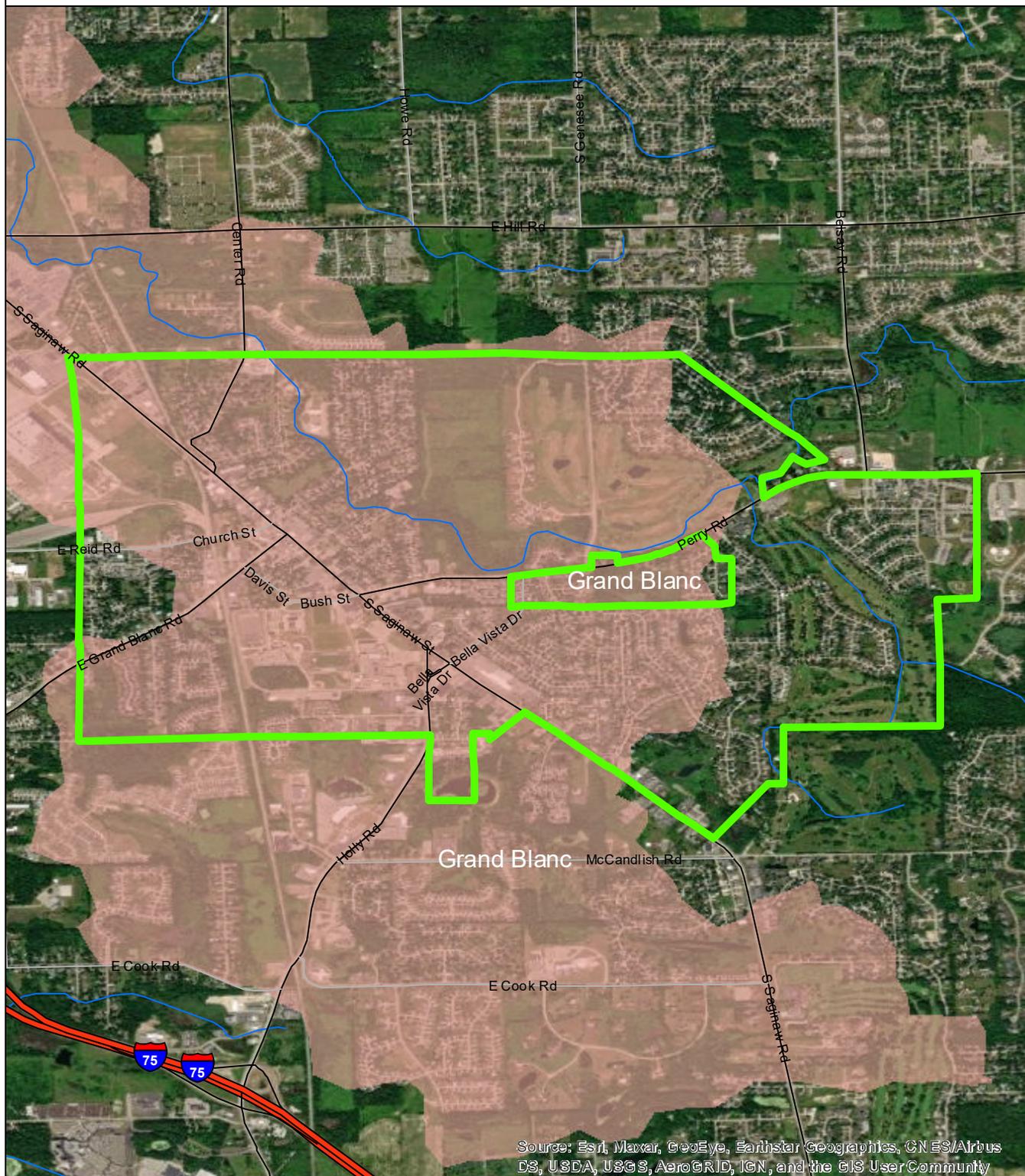
**Data Sources**

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University



# City of Grand Blanc

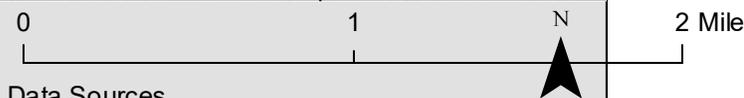


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- City of Grand Blanc
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

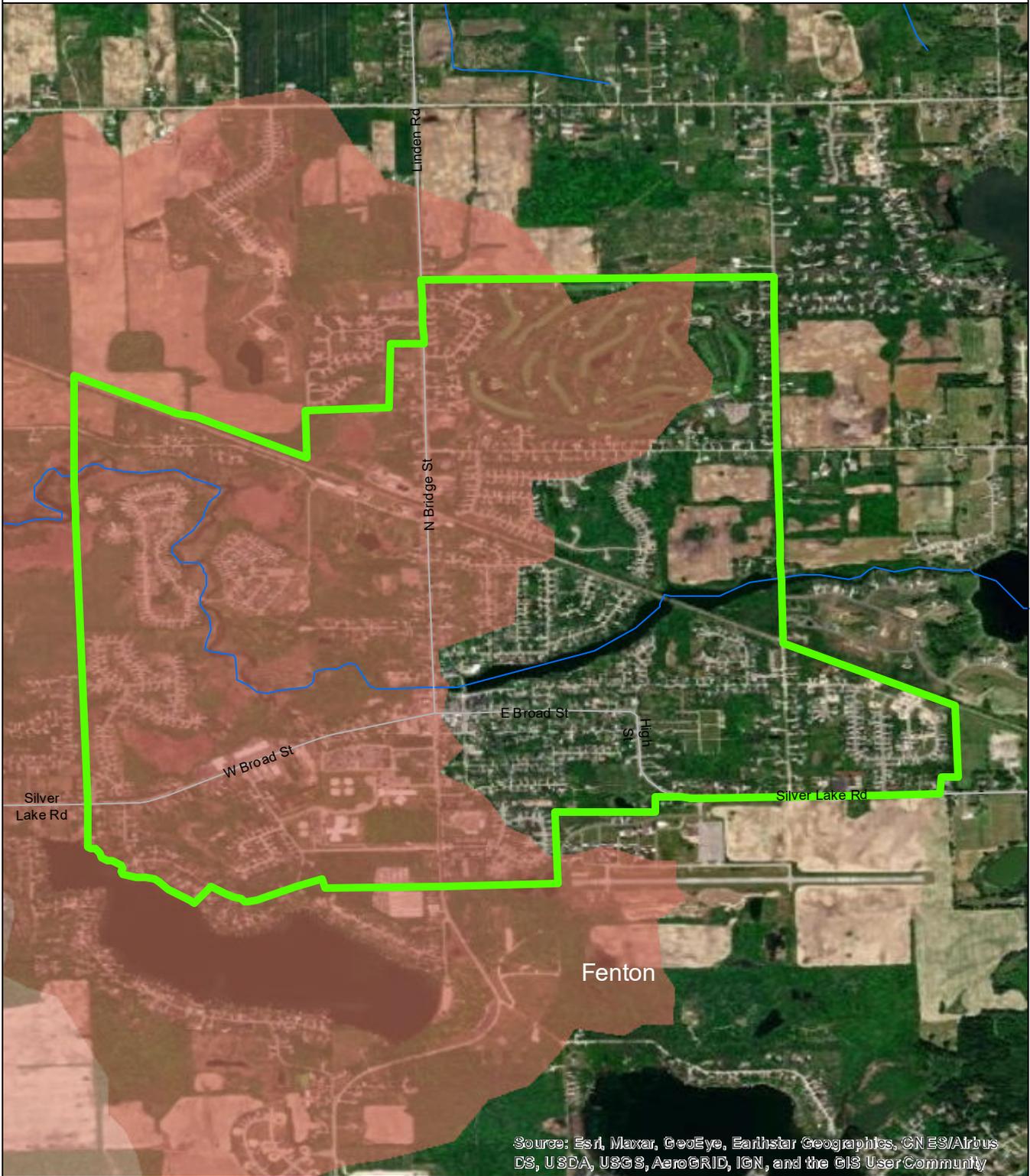
- low
- moderate
- high
- very high



### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# City of Linden



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS UserCommunity

- City of Linden
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high

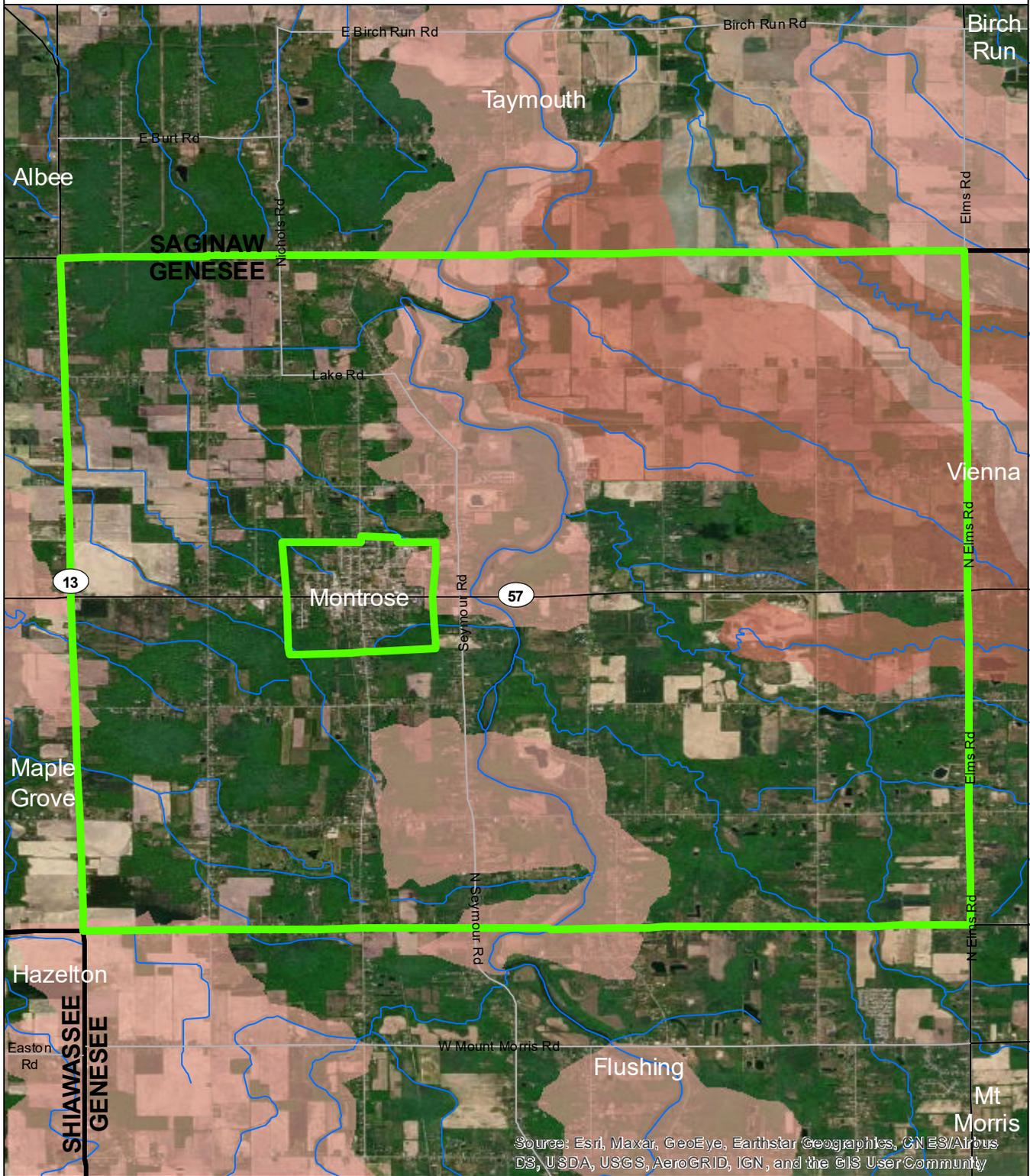


**Data Sources**

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University

# Montrose Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Montrose Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high



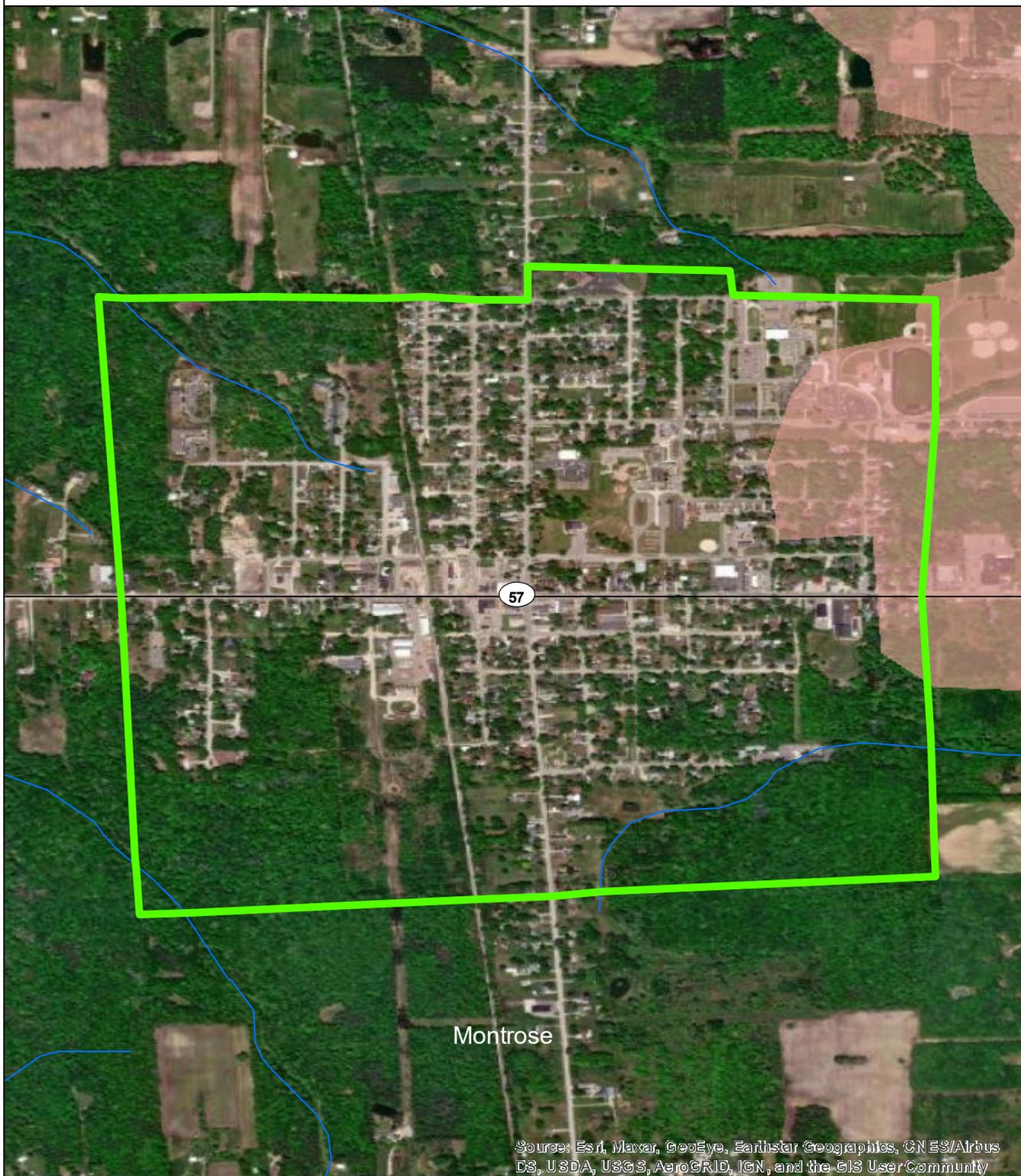
### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University



# City of Montrose



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS UserCommunity

- City of Montrose
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

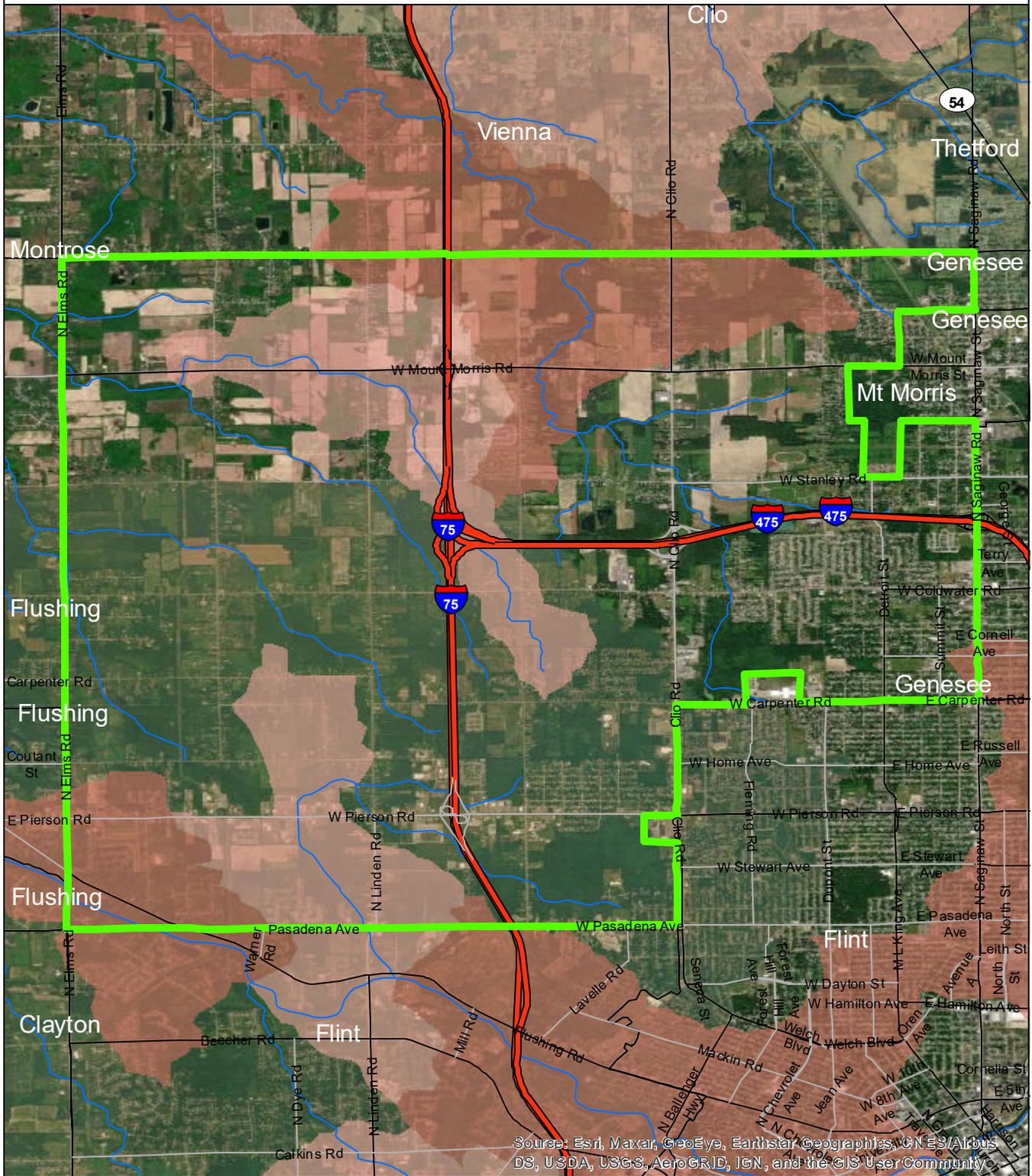


### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University

# Mt Morris Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Mt Morris Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

## Sediment Loading Risk

- low
- moderate
- high
- very high



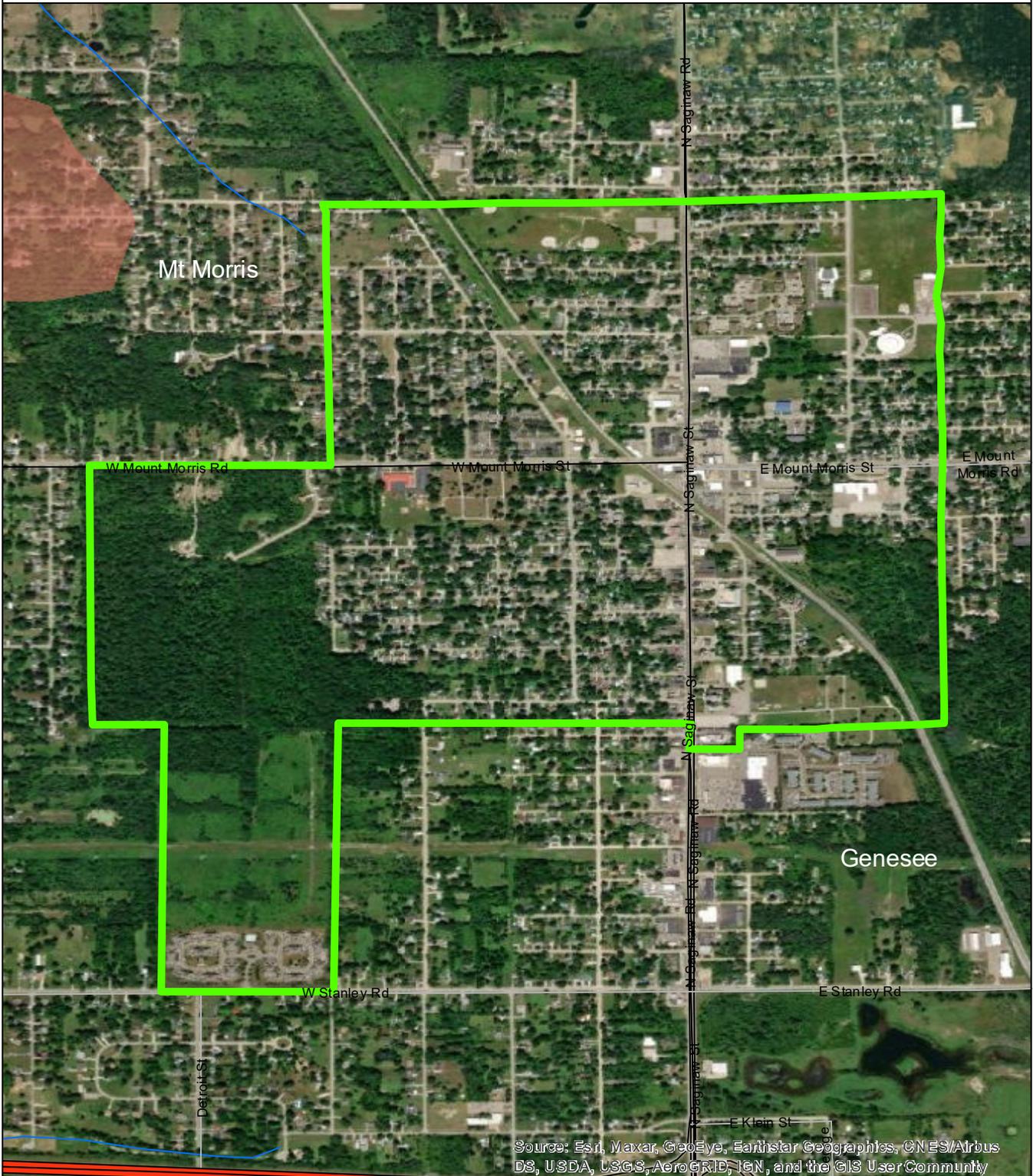
## Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University

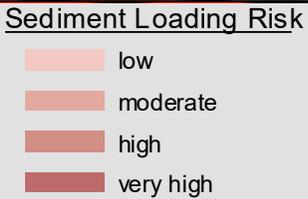


# City of Mt Morris



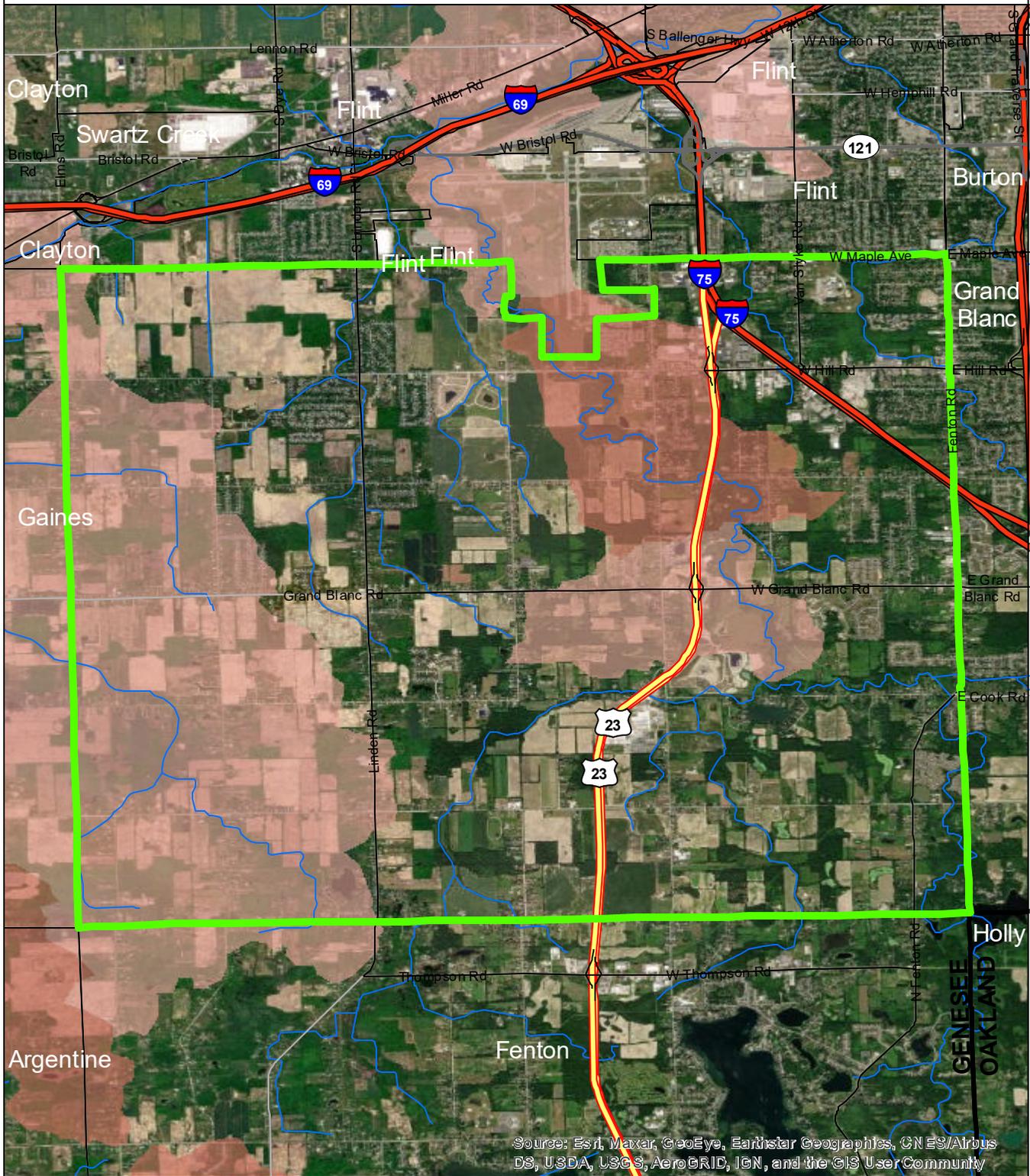
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

-  City of Mt Morris
-  Saginaw Bay Basin
-  Counties
-  Rivers and Streams
-  Townships & Cities



State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# Mundy Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Mundy Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

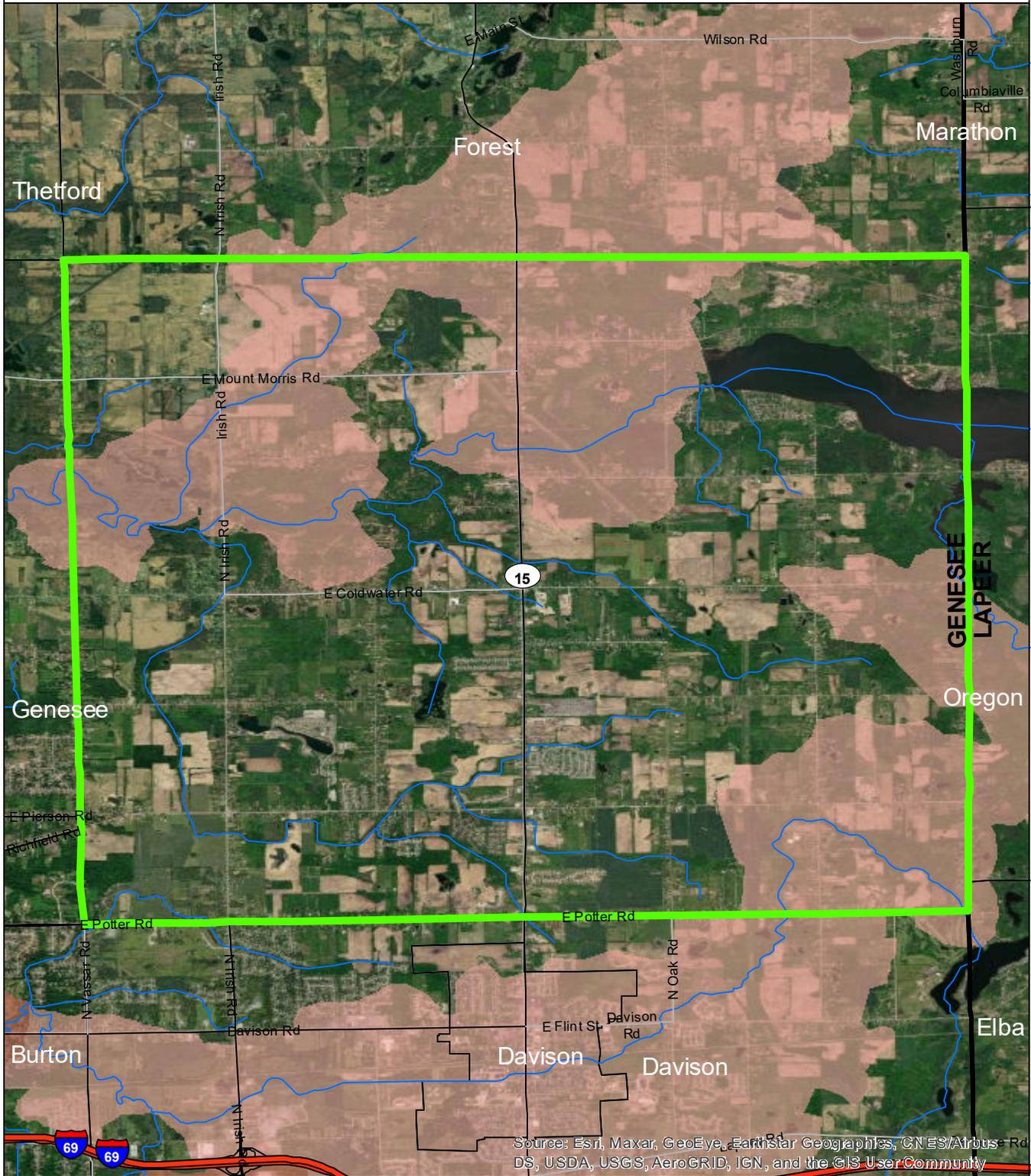


### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University



# Richfield Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Richfield Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

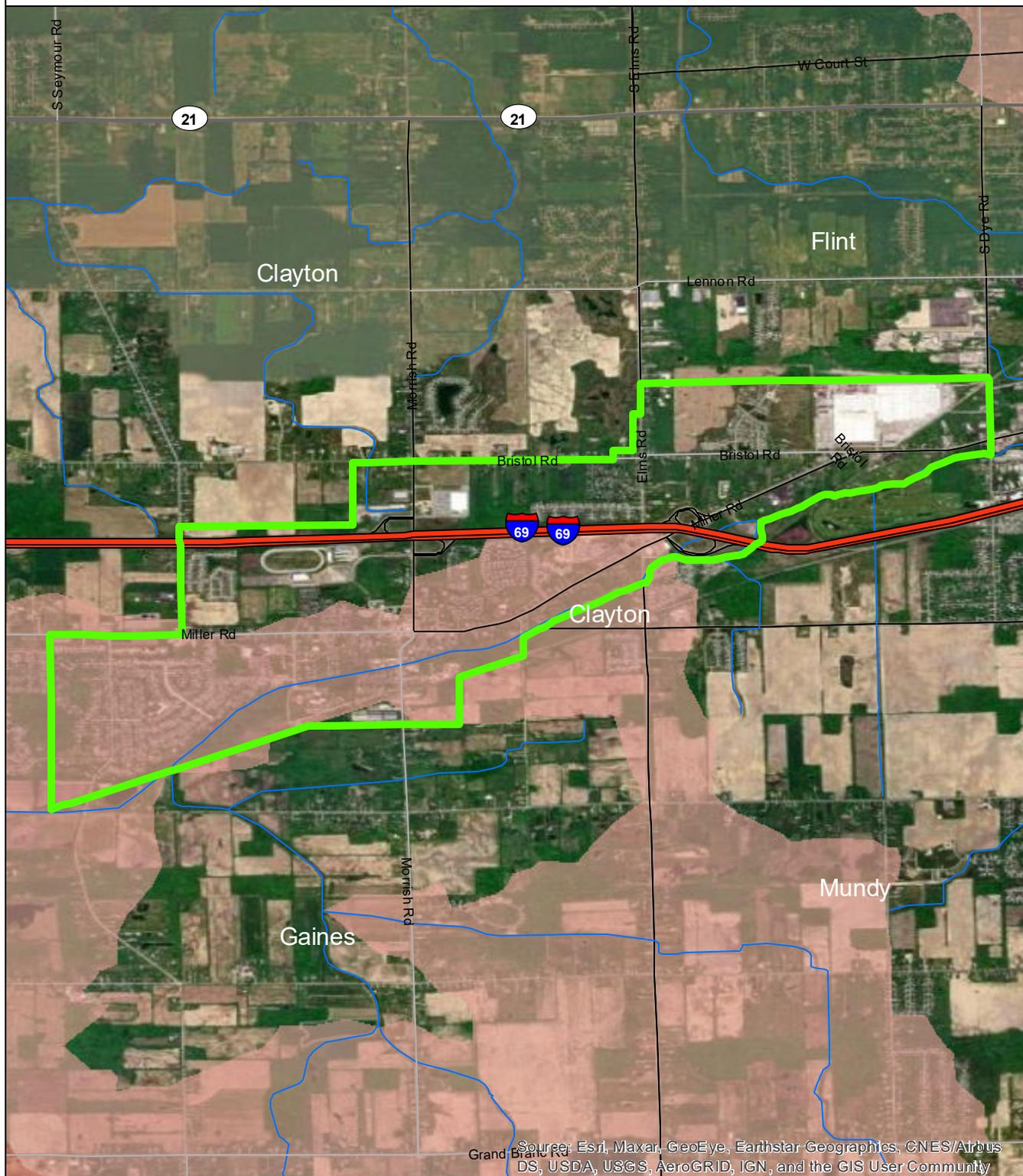
- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high

0 1 2 Miles

**Data Sources**  
 State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University

# City of Swartz Creek



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- City of Swartz Creek
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

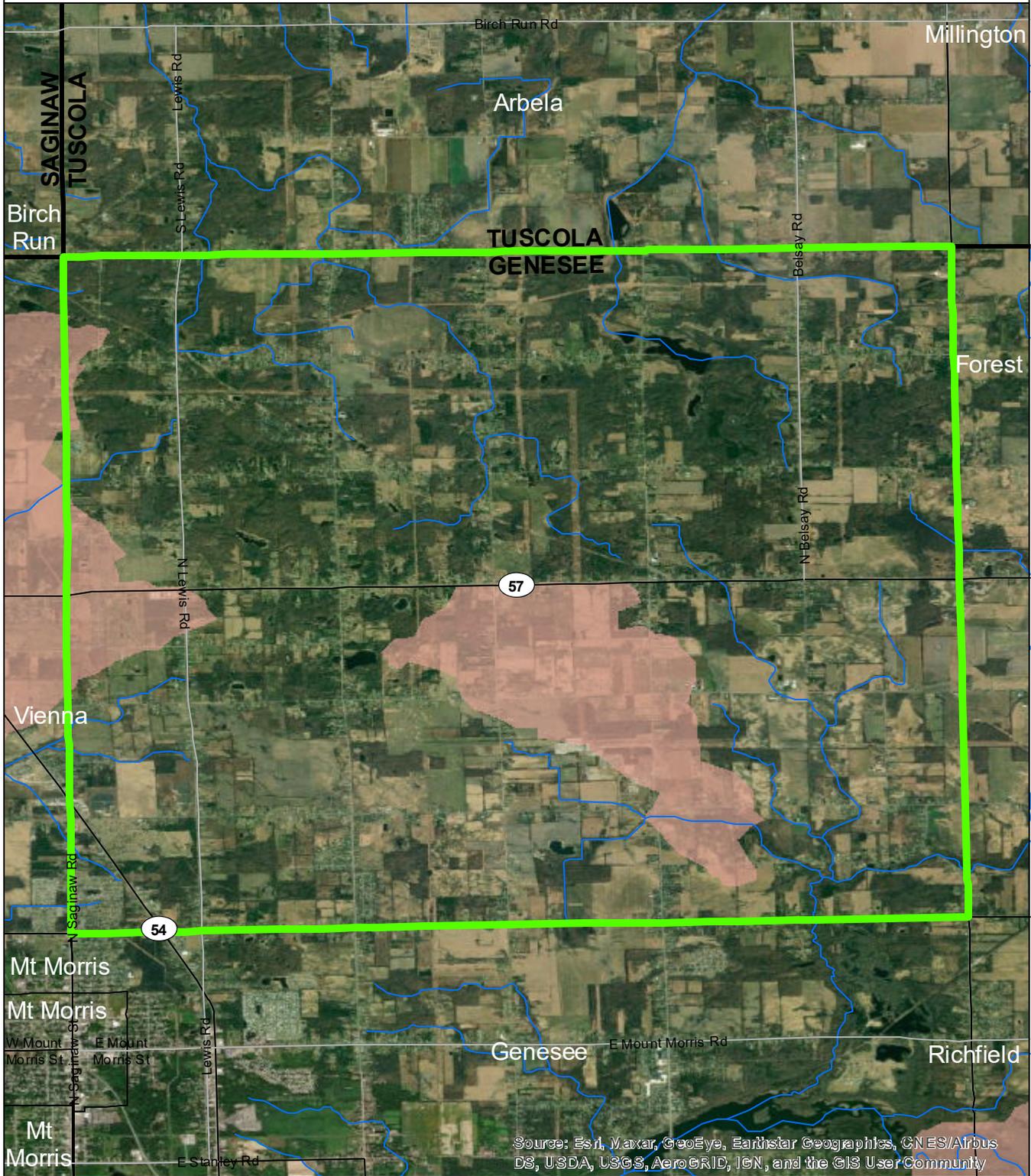


### Data Sources

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

Map produced by the Institute of Water Research - Michigan State University

# Thetford Township



- Thetford Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

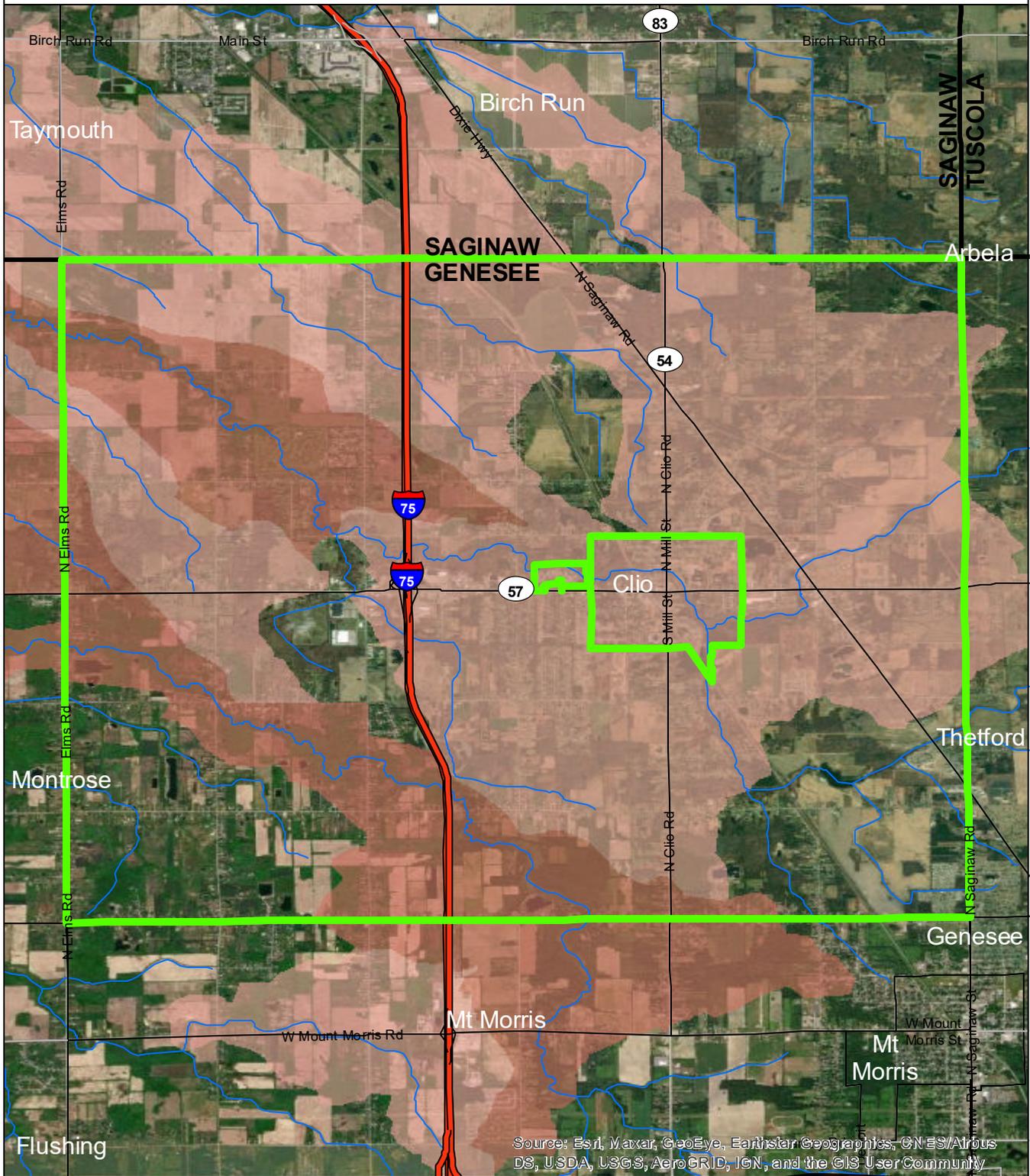
- low
- moderate
- high
- very high



### Data Sources

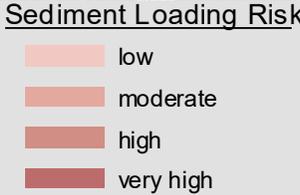
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University

# Vienna Township



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Vienna Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities



**Data Sources**

State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
 Map produced by the Institute of Water Research - Michigan State University