

# 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.

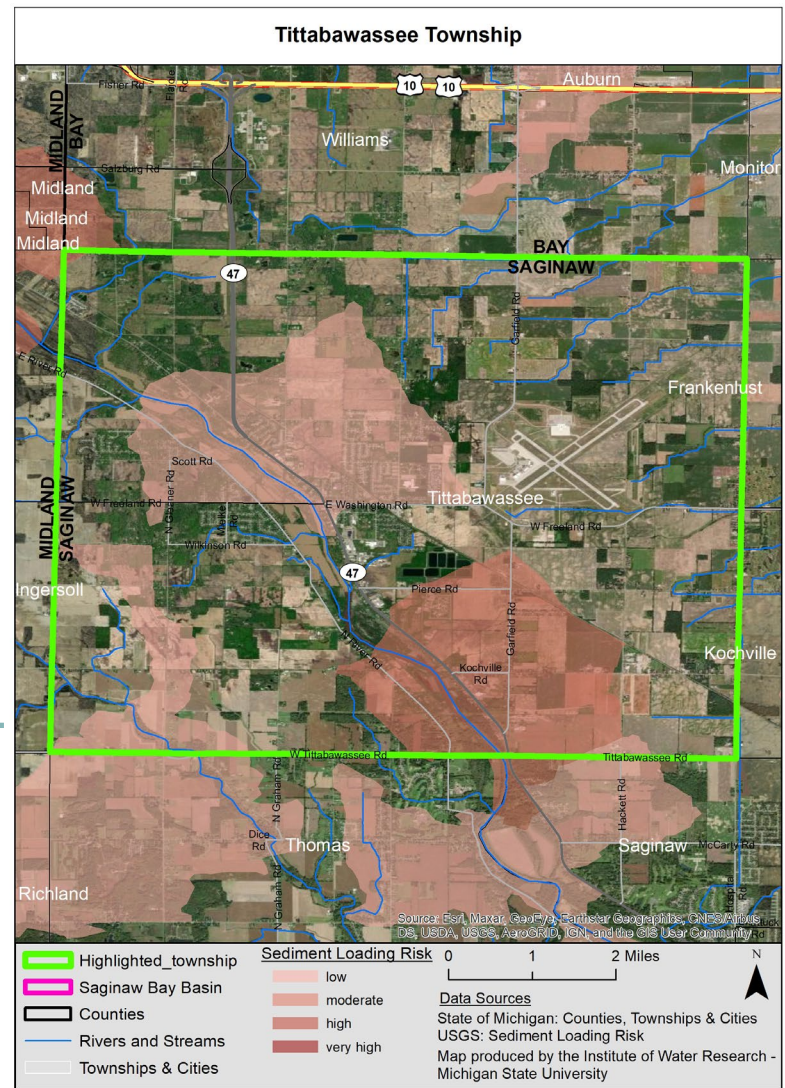
## Data

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)



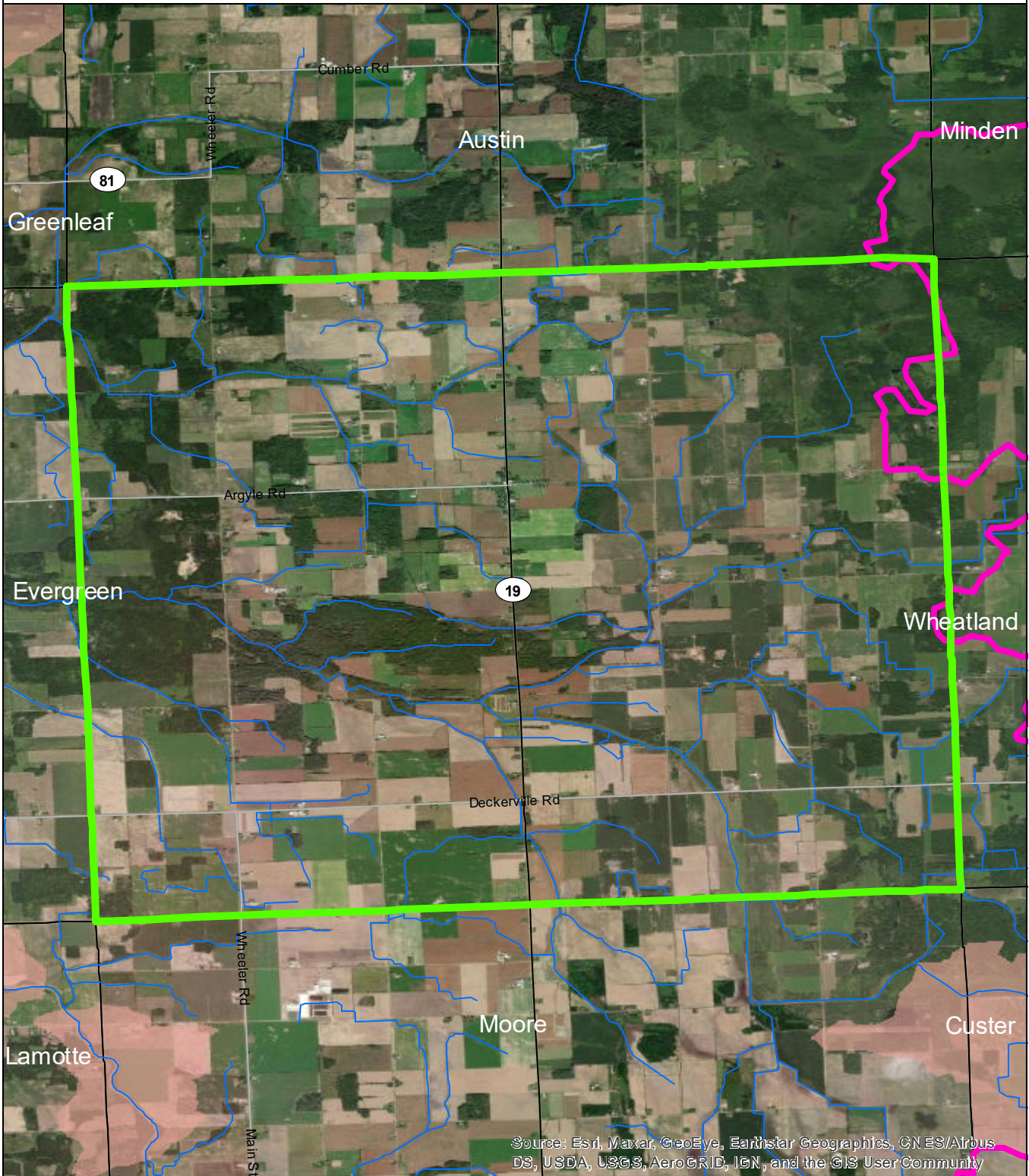
\* <https://www.sciencebase.gov/catalog/item/5cbf5150e4b09b8c0b700df3>

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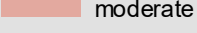
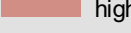

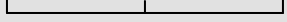





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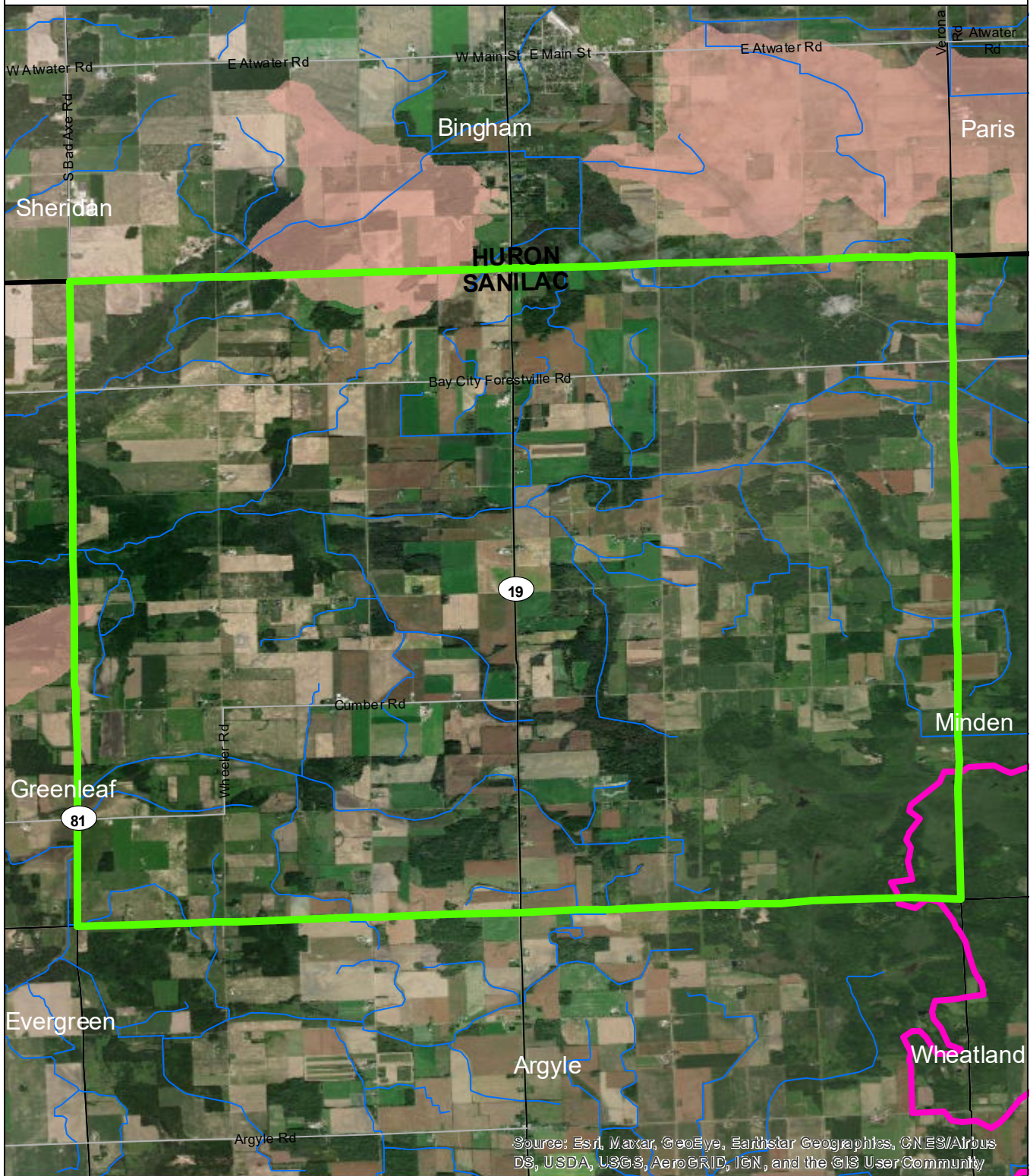
# Argyle Township







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


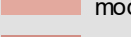
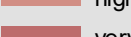
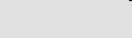
	Argyle Township	<b>Sediment Loading Risk</b>  low  moderate  high  very high	0      1      2 Miles 	N 
	Saginaw Bay Basin			
	Counties			
	Rivers and Streams			
	Townships & Cities	<b>Data Sources</b> State of Michigan: Counties, Townships & Cities USGS: Sediment Loading Risk Map produced by the Institute of Water Research - Michigan State University		

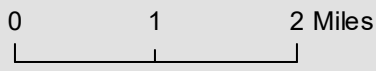
# Austin Township



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

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

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



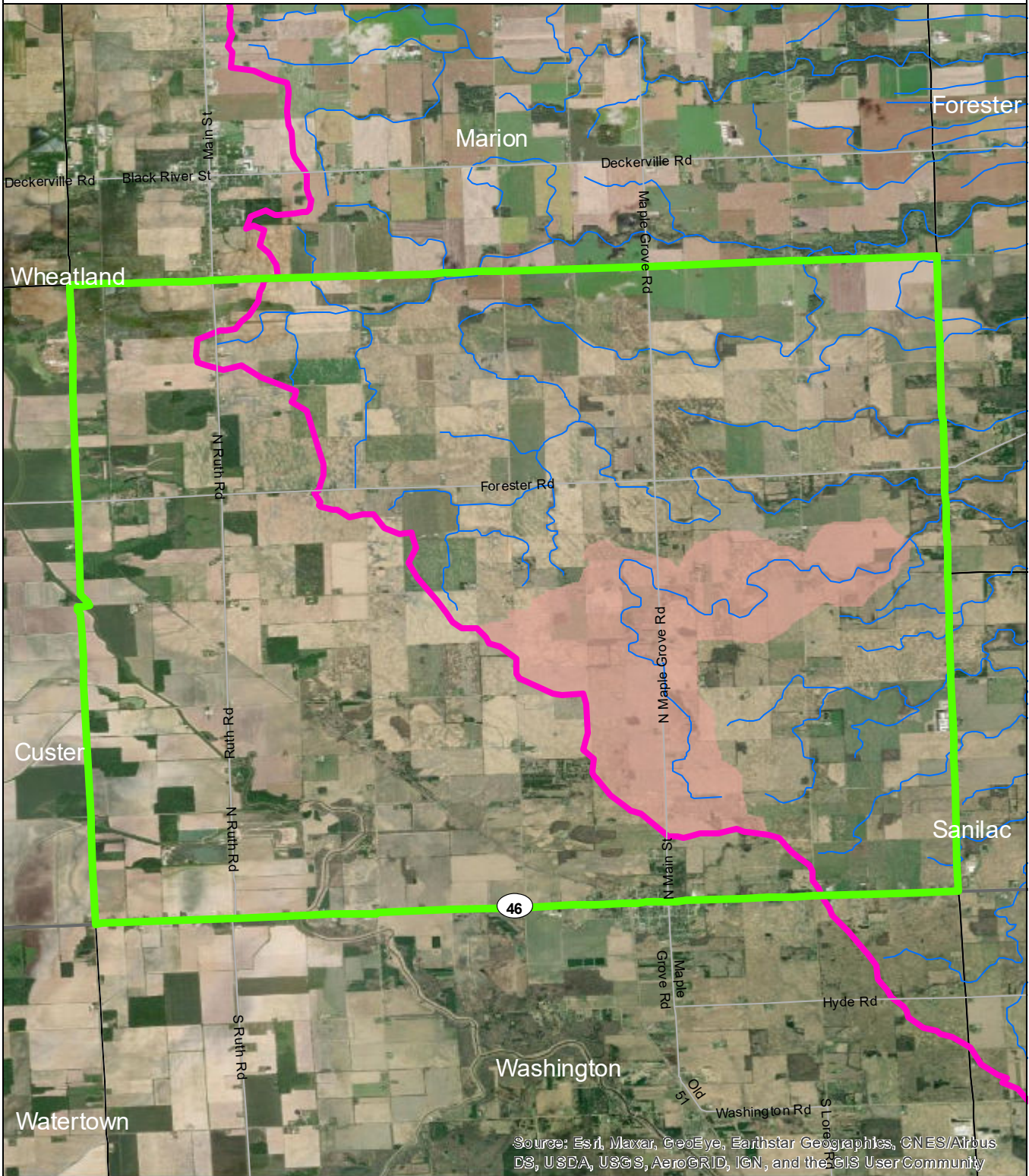
**Data Sources**

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

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



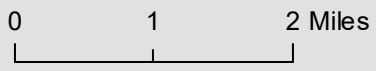
# Bridgehampton Township



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

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

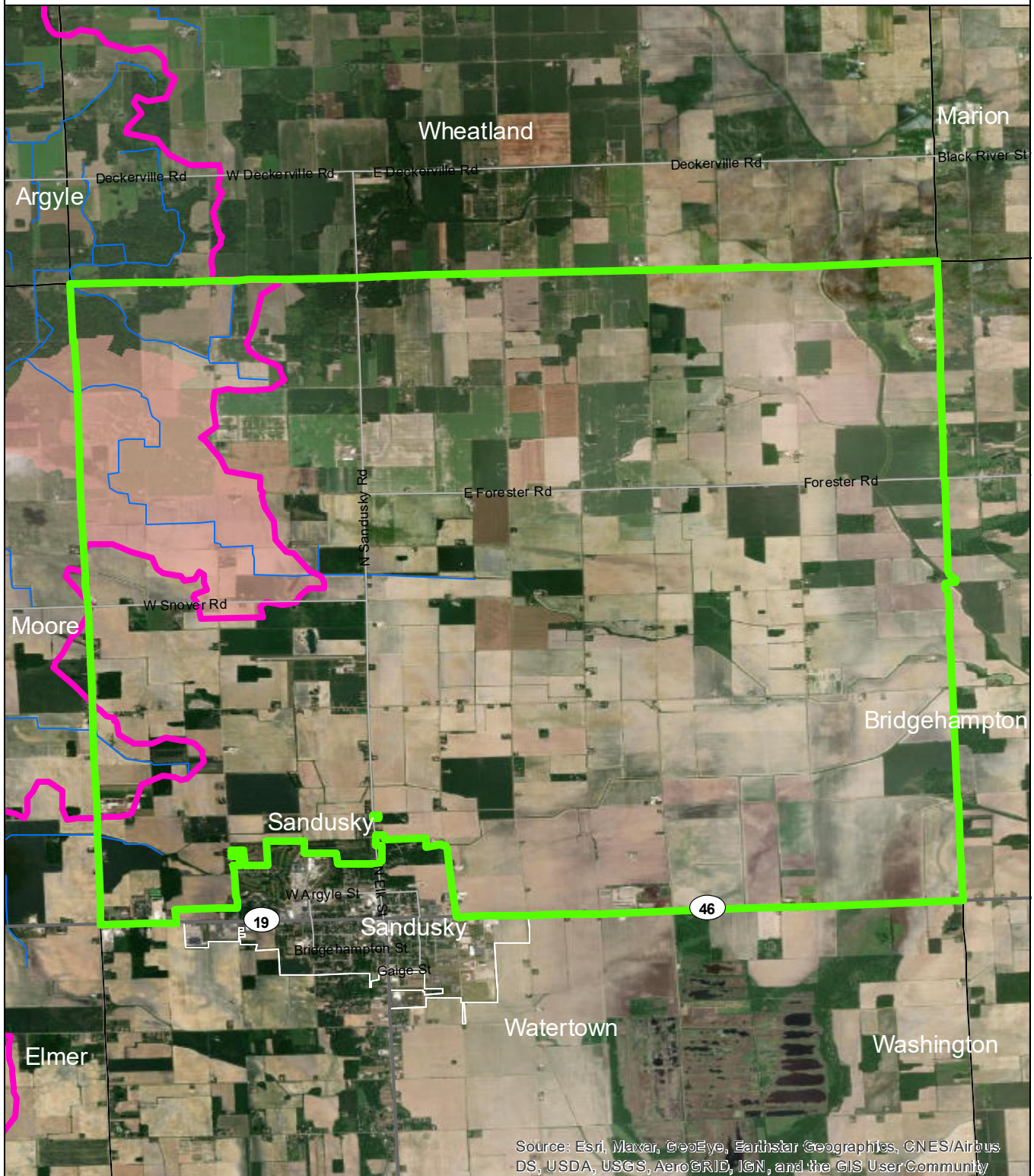
- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high



**Data Sources**

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

# Custer Township



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

### Sediment Loading Risk

- low
- moderate
- high
- very high



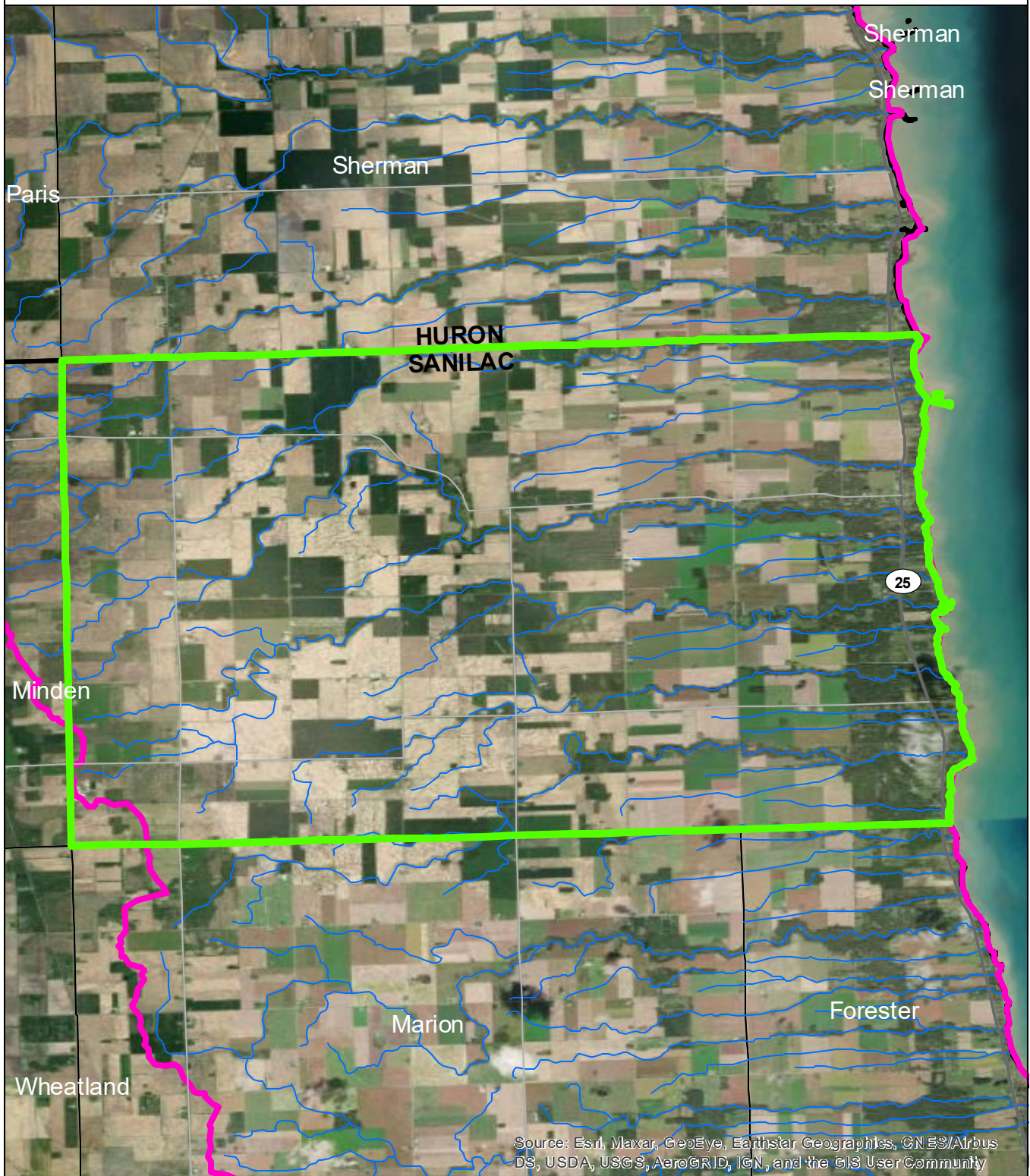
### Data Sources

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

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



# Delaware Township

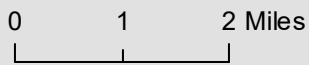


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



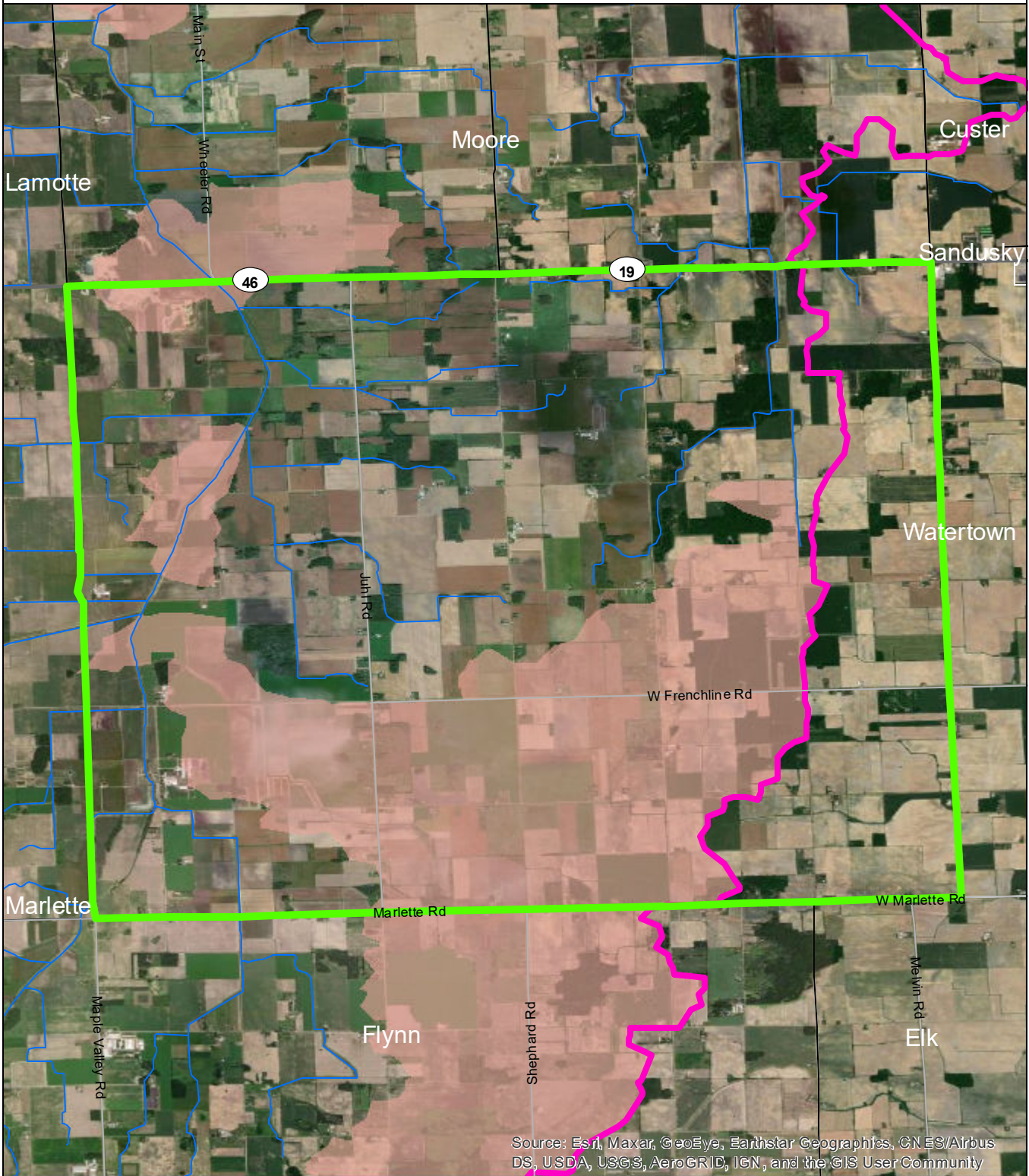
### Data Sources

State of Michigan: Counties, Townships & Cities  
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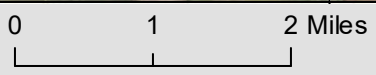
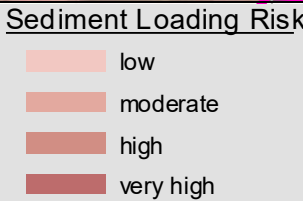


# Elmer Township



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

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

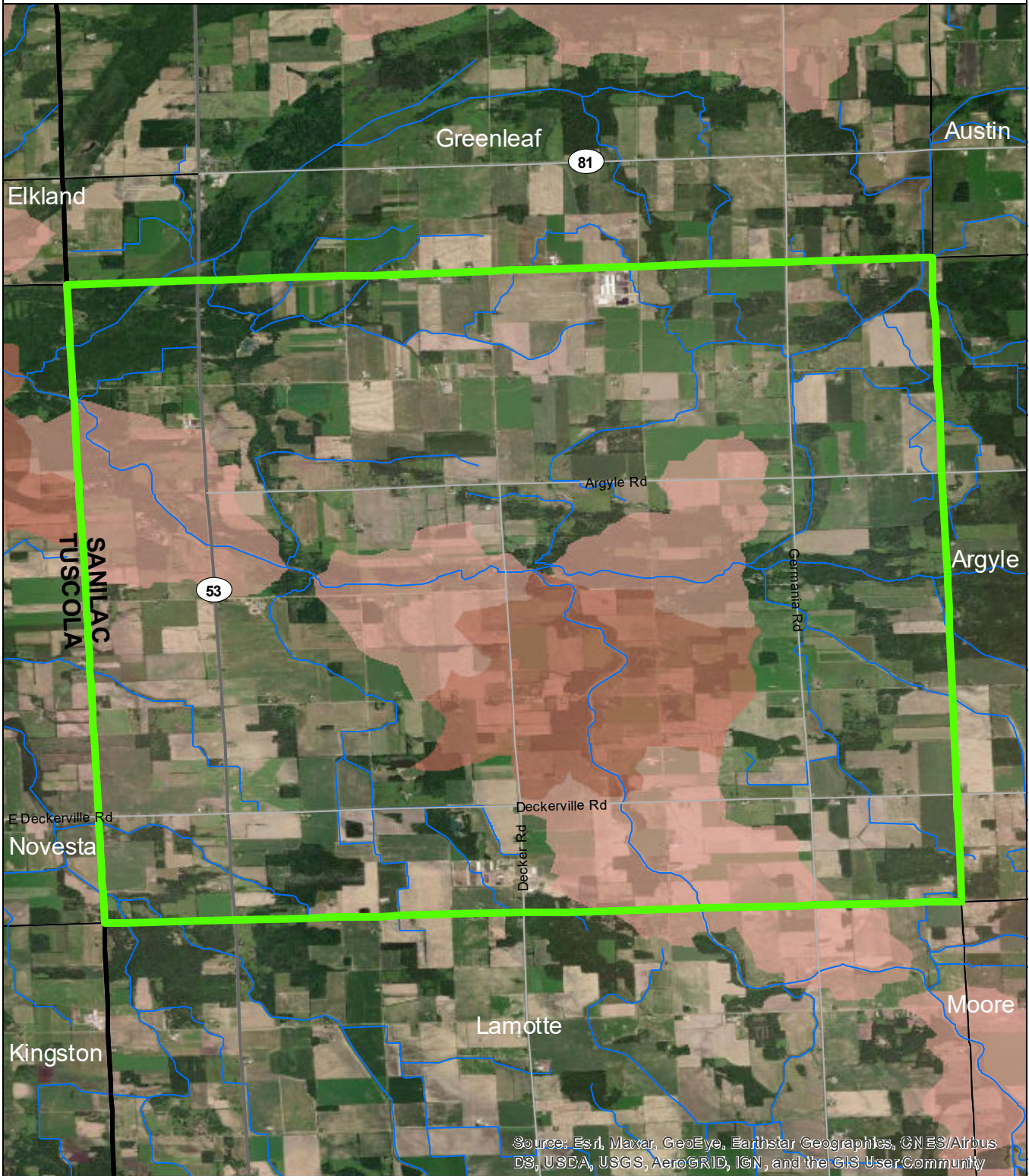


Data Sources




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







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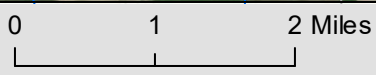


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

-  low
-  moderate
-  high
-  very high



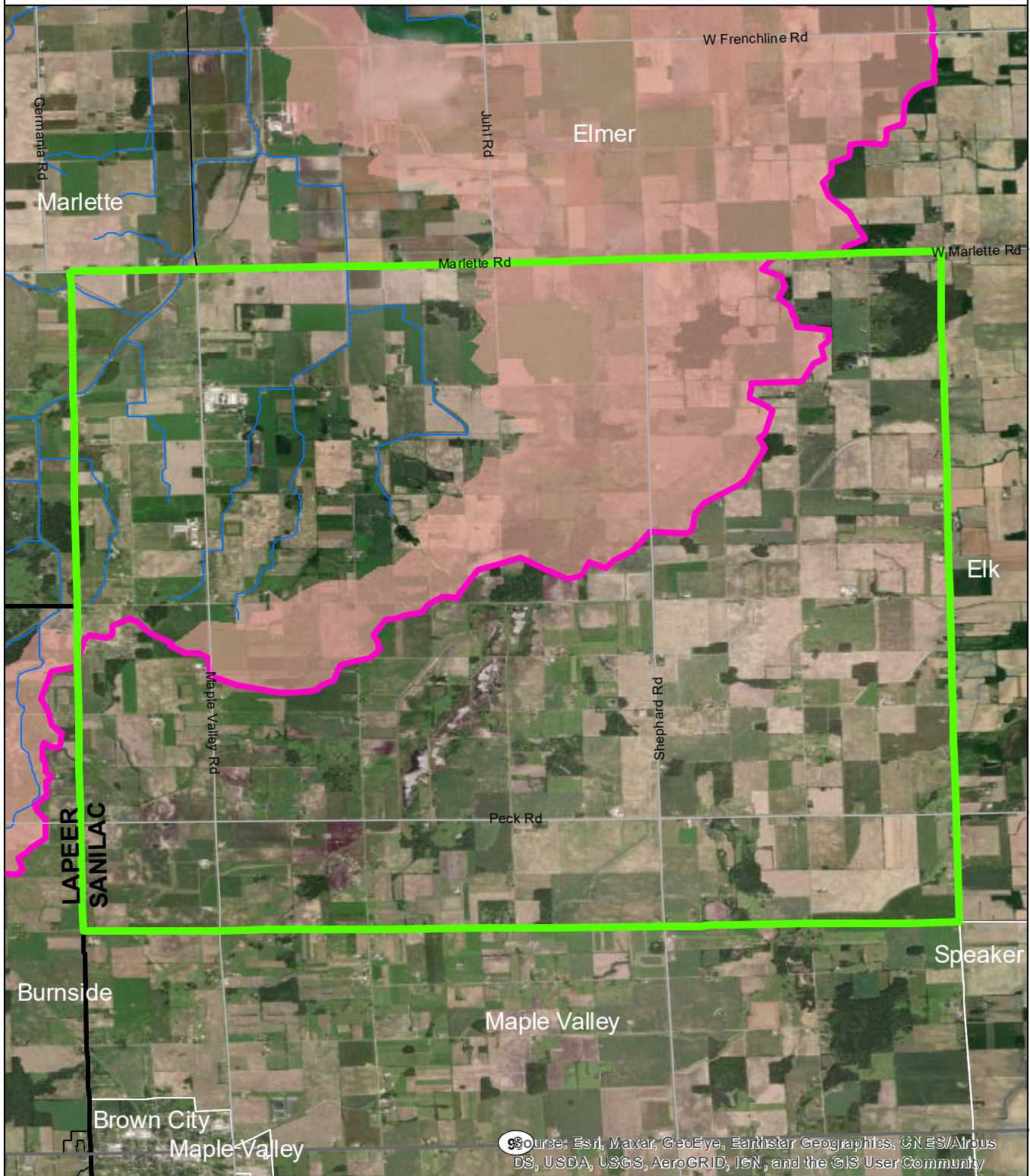
### Data Sources

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

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

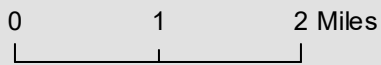
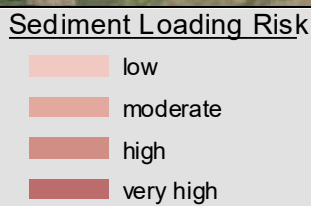


# Flynn Township



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

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



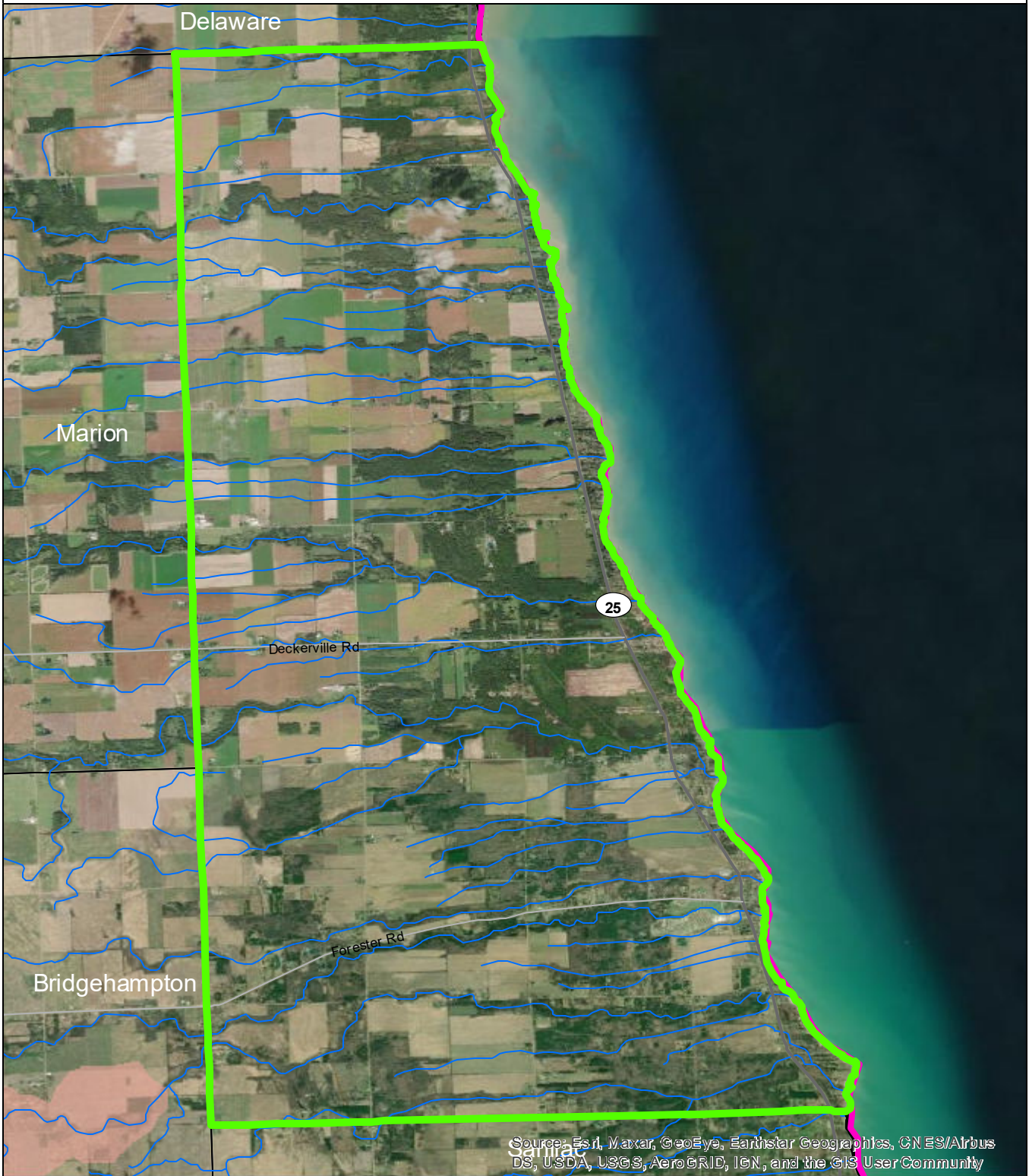
**Data Sources**

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

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



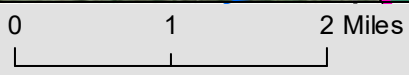
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- Forester Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

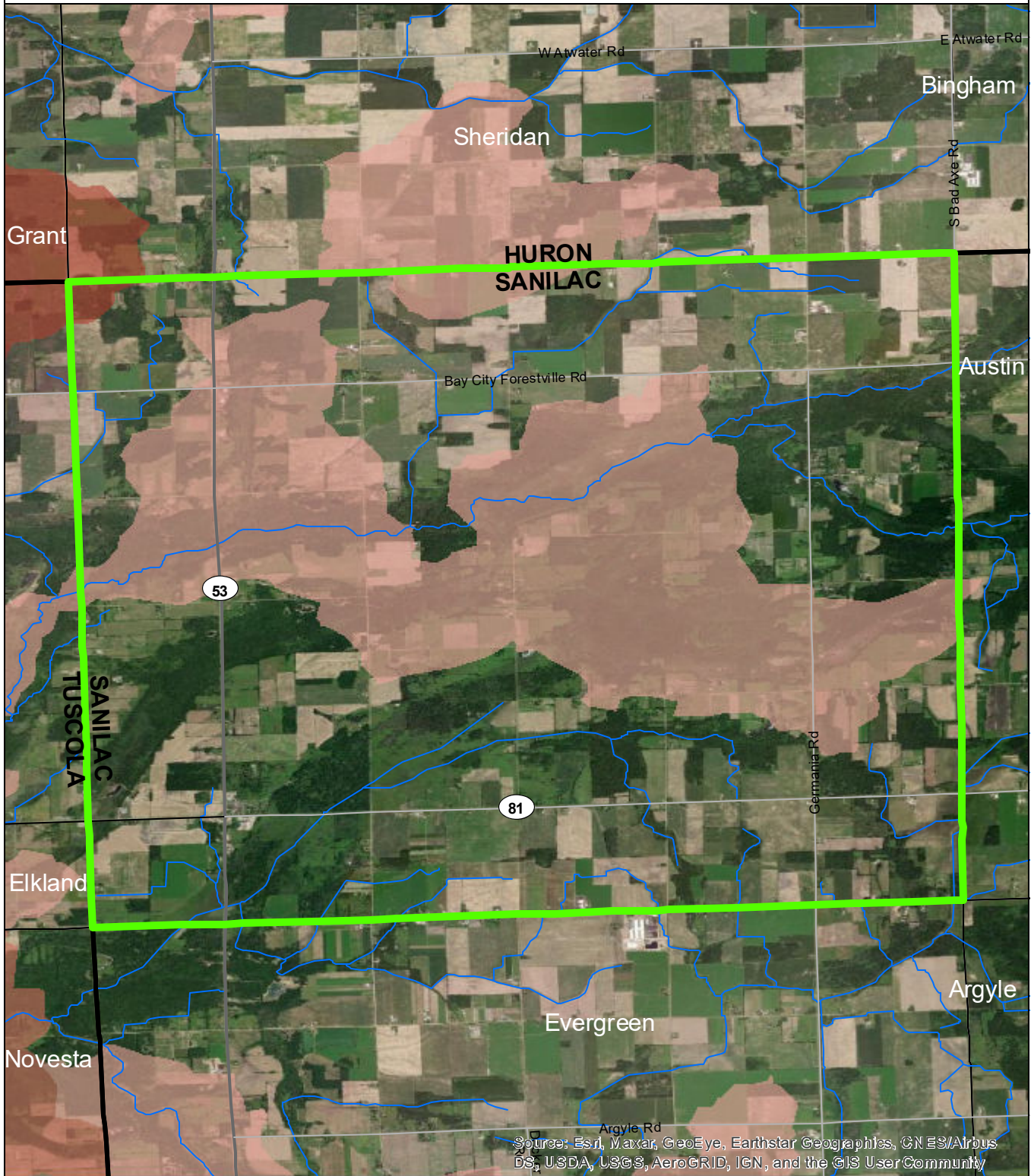


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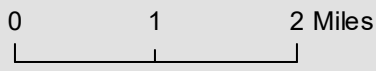
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- Greenleaf Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

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



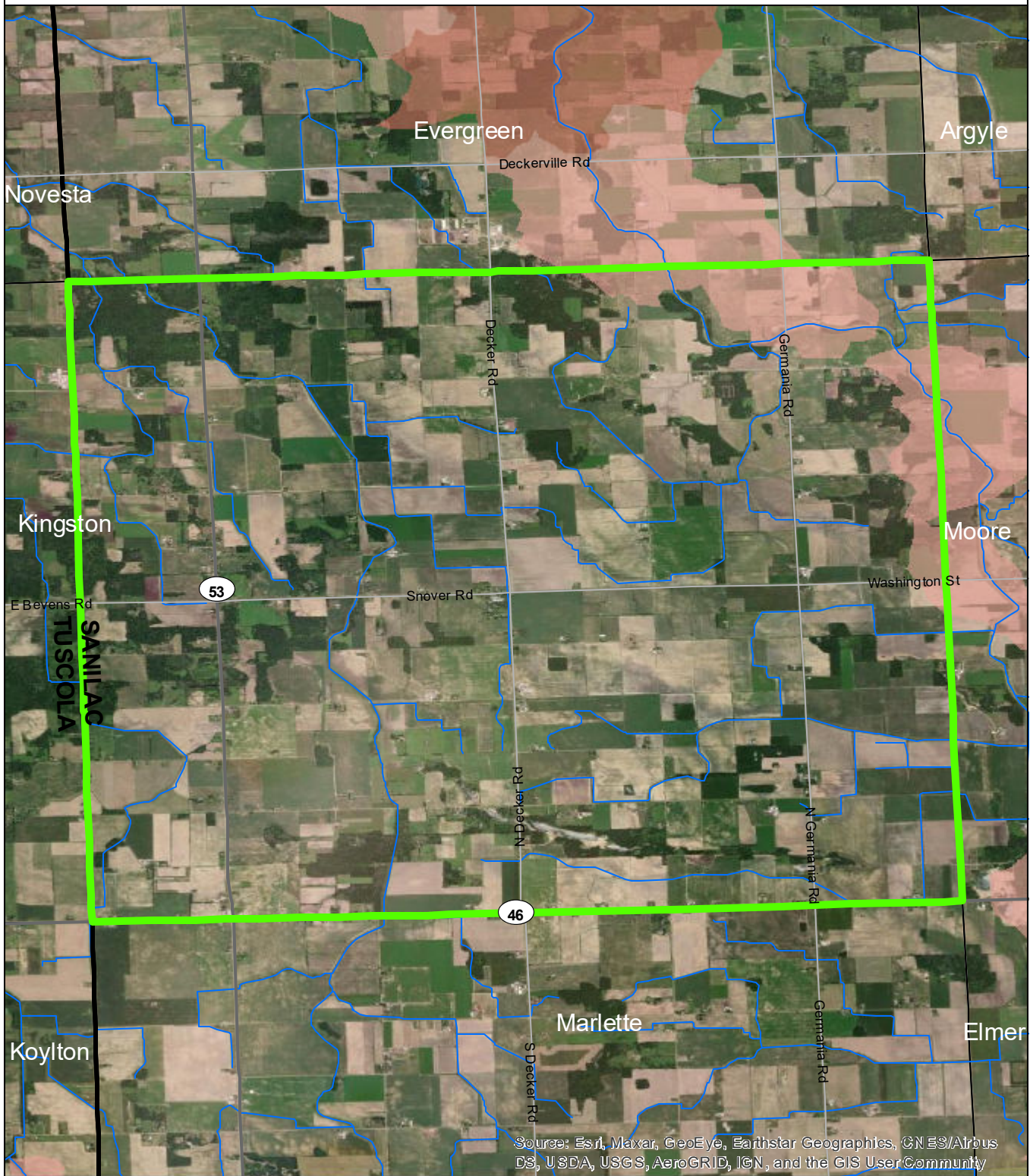
**Data Sources**

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

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

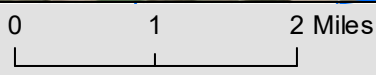
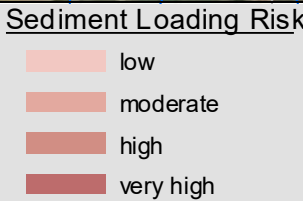


# Lamotte Township



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

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

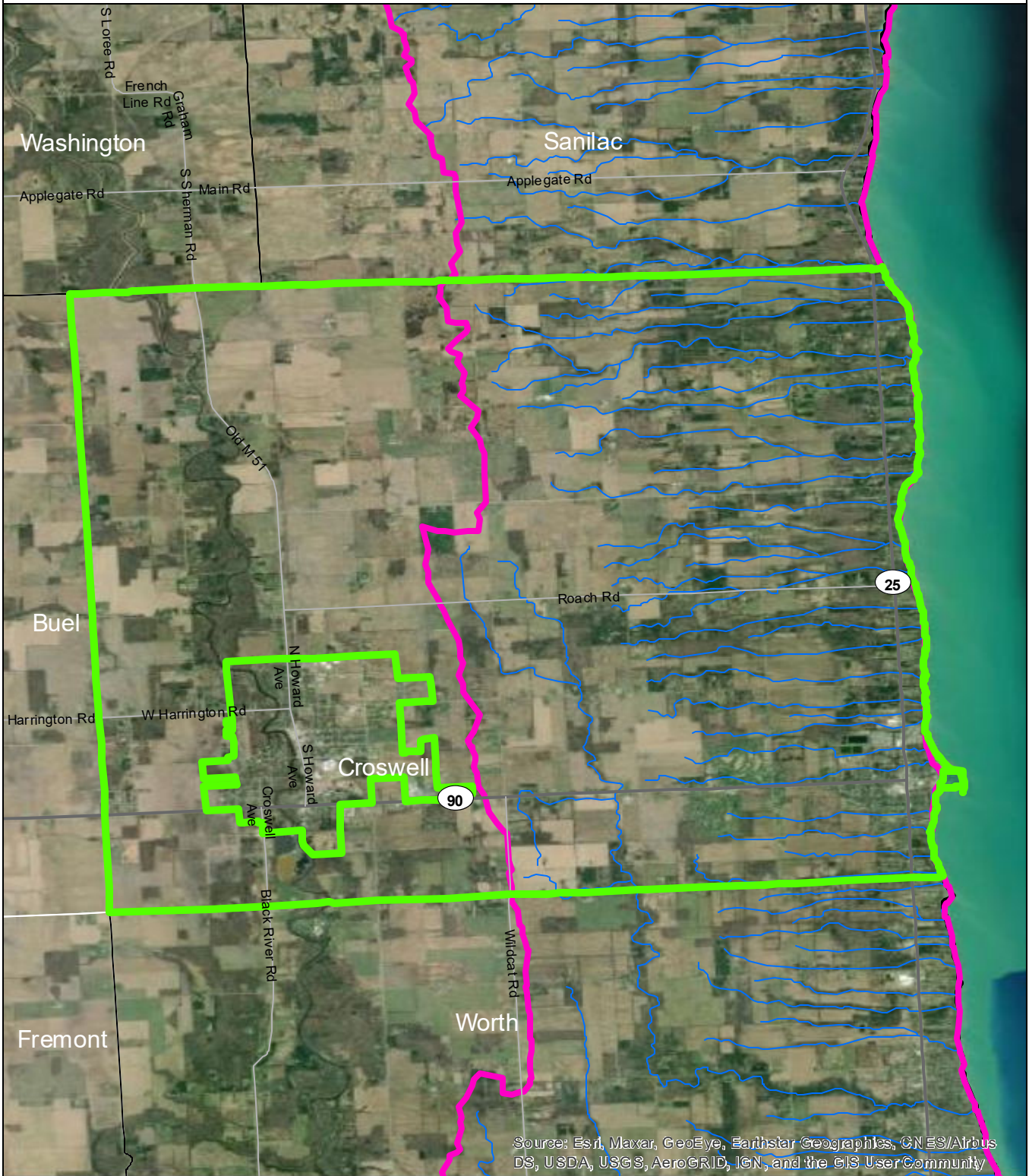


Data Sources

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



# Lexington Township

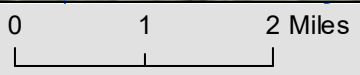


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS UserCommunity

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

### Sediment Loading Risk

- low
- moderate
- high
- very high

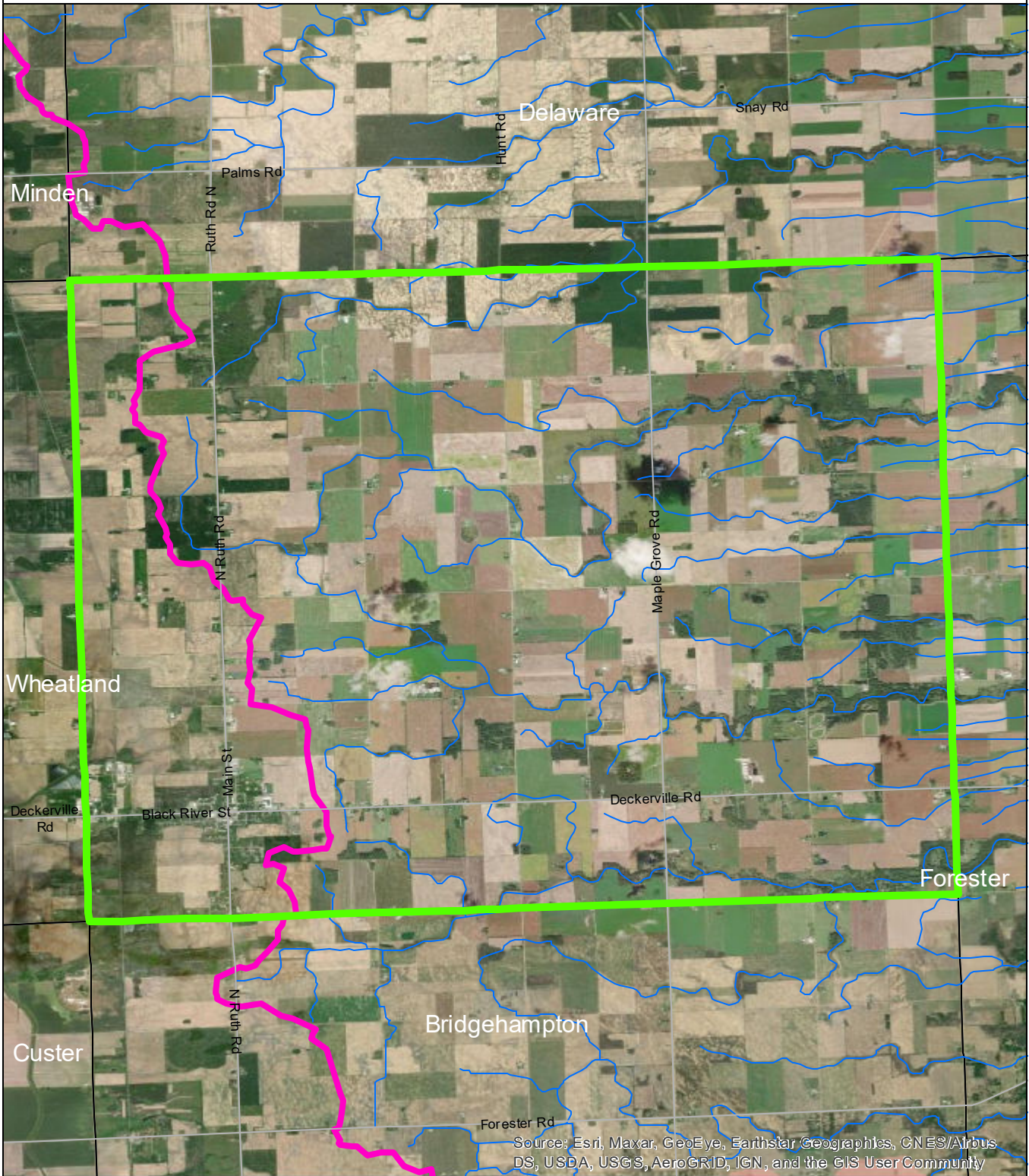


### Data Sources

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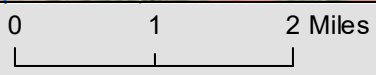
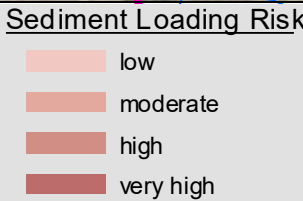


# Marion Township



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

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

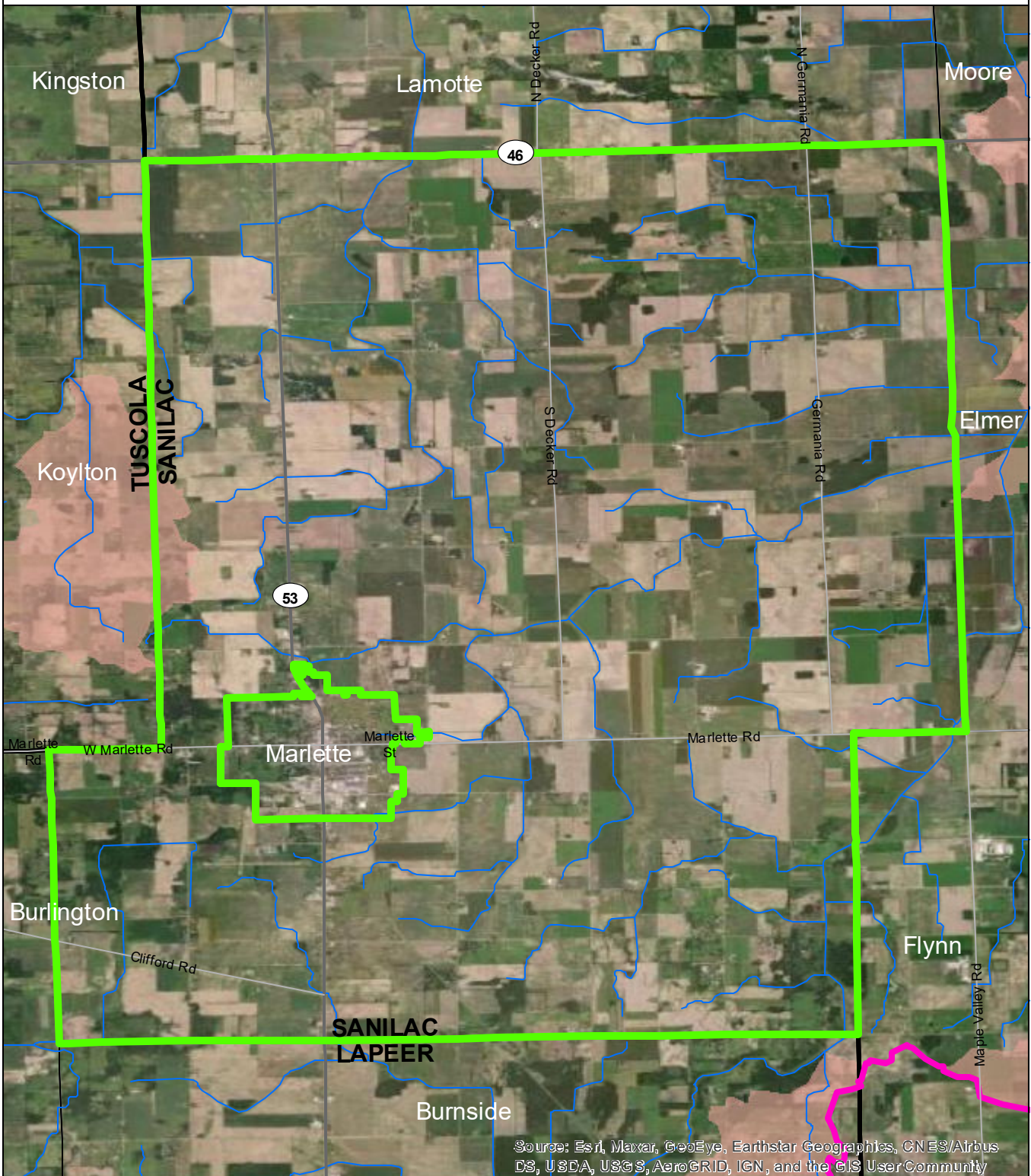


Data Sources

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



# Marlette Township

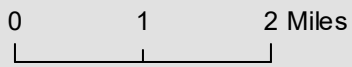


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



### Data Sources

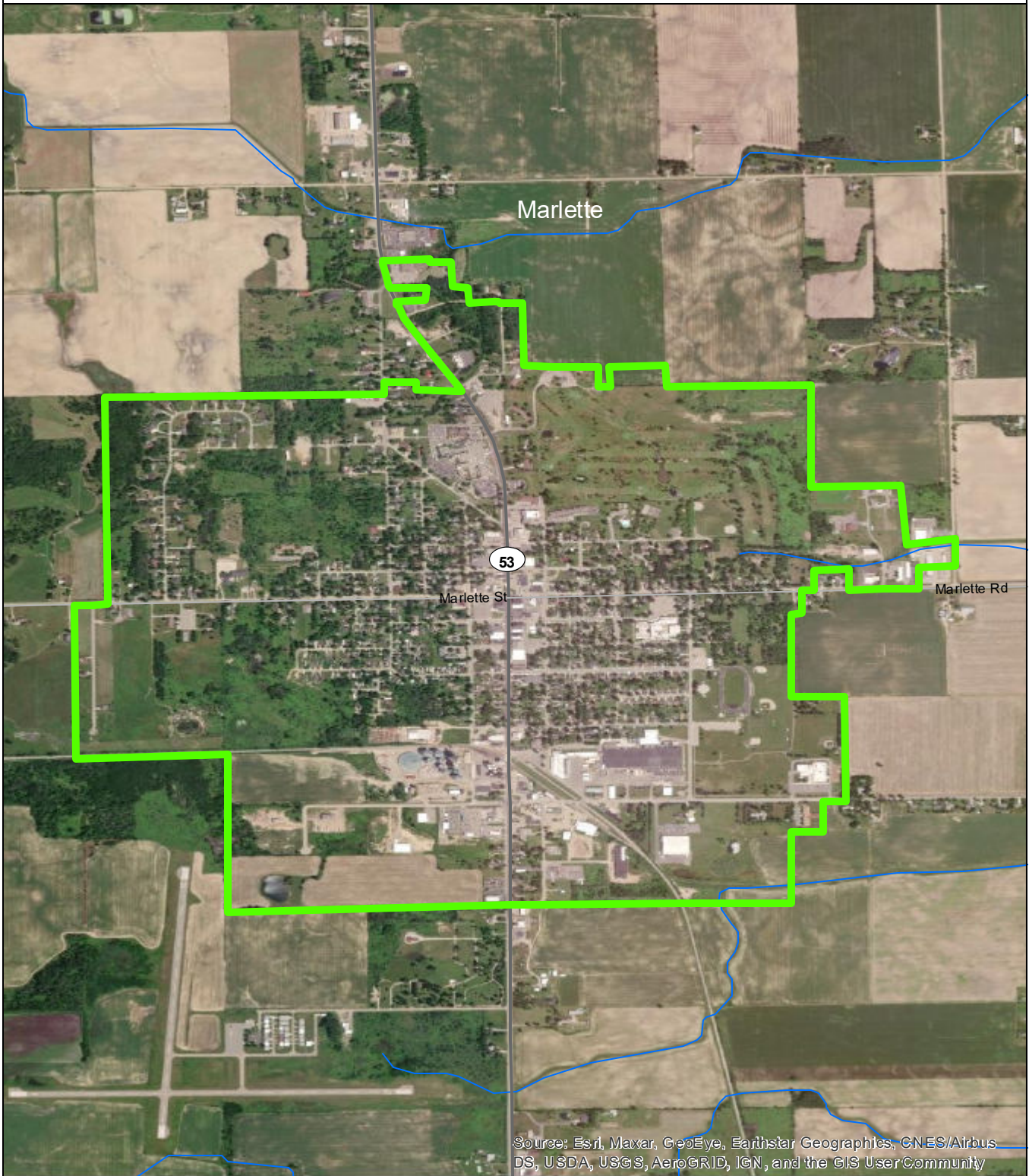
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

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





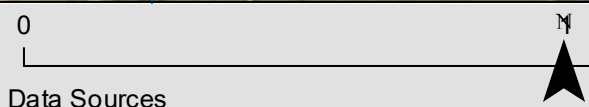
# City of Marlette



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

### Sediment Loading Risk

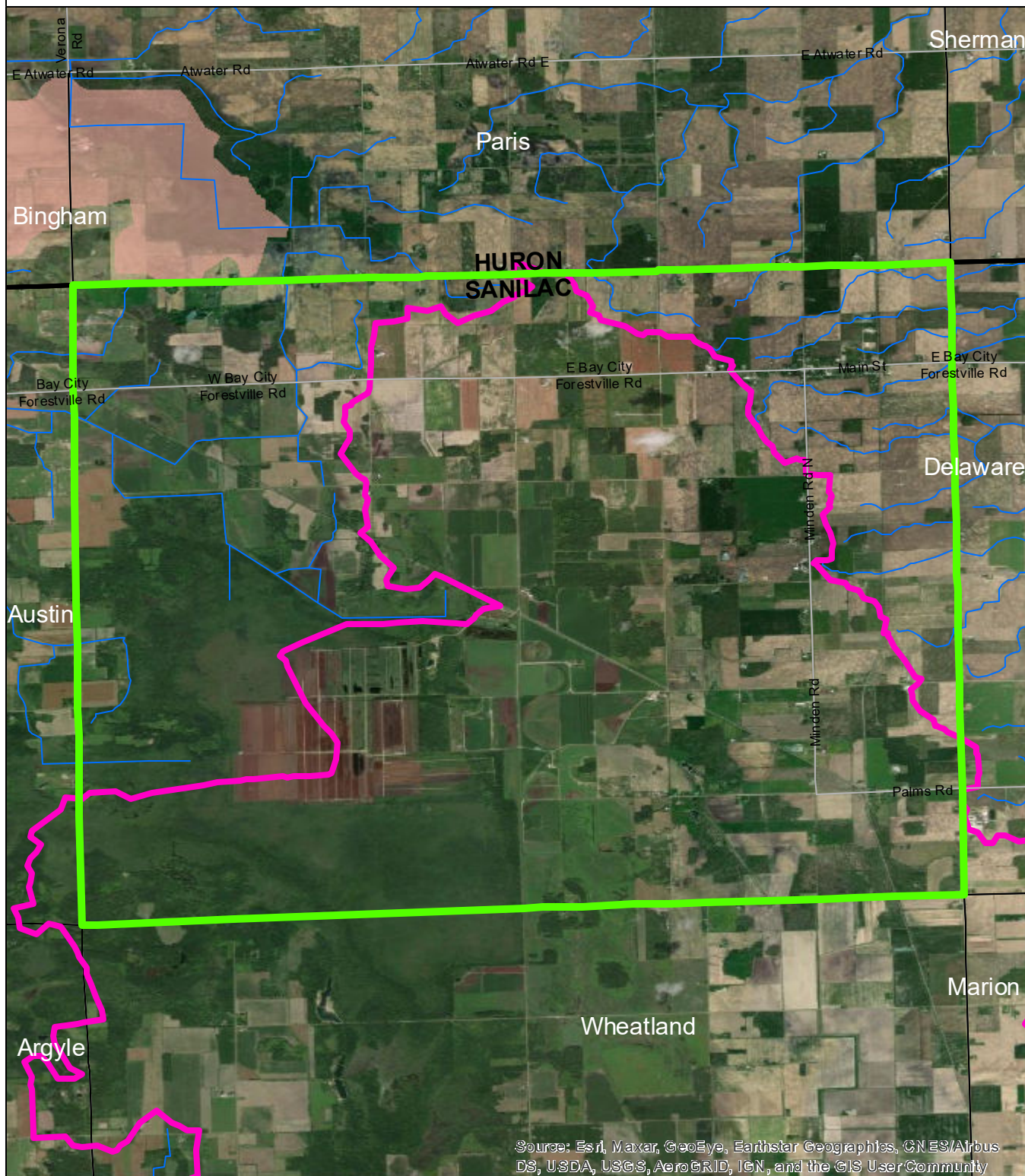
- low
- moderate
- high
- very high




### Data Sources

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


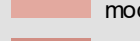
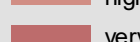
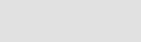
# Minden Township



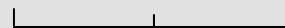
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

-  low
-  moderate
-  high
-  very high

0 1 2 Miles



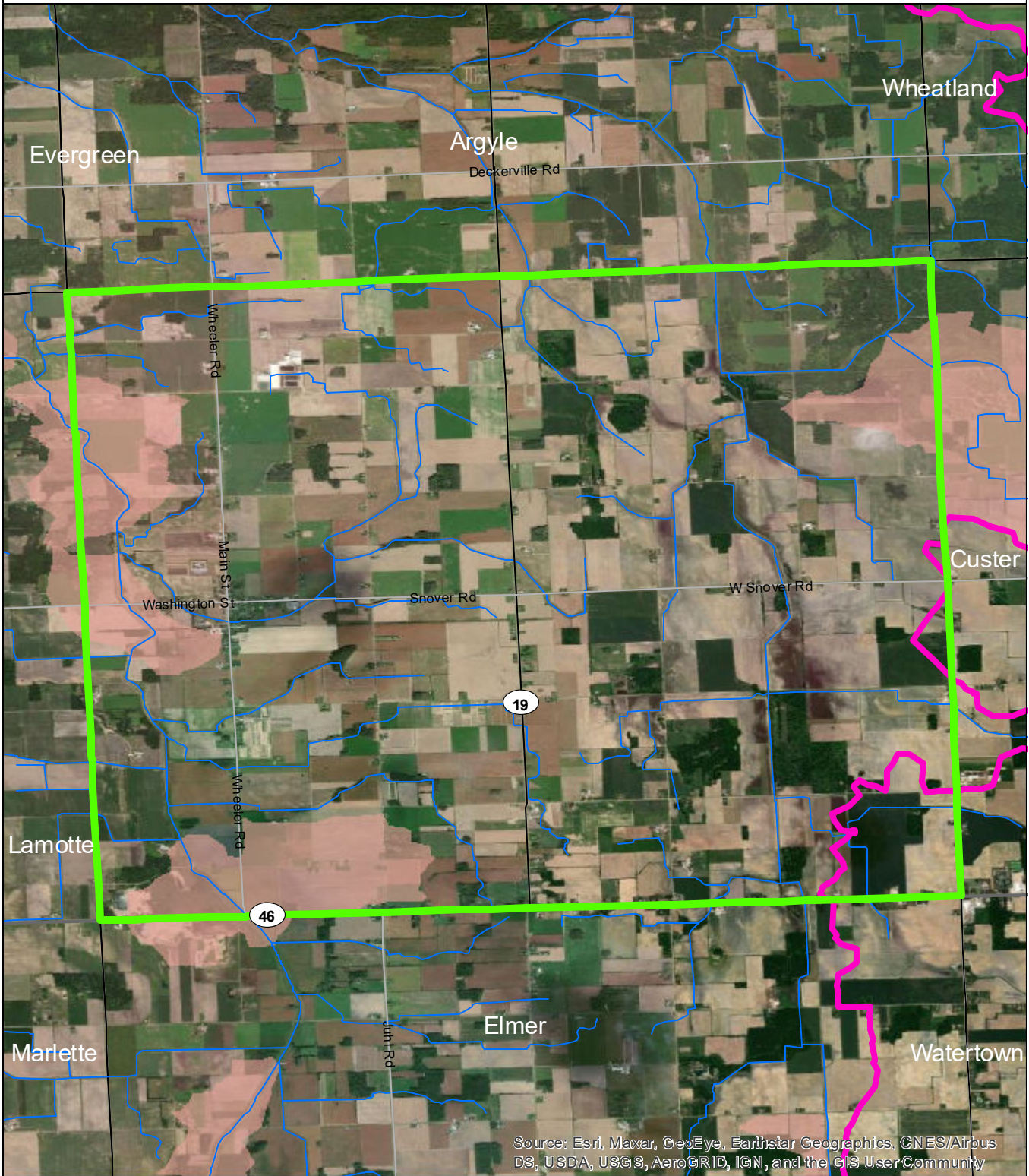
### Data Sources

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

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



# Moore Township

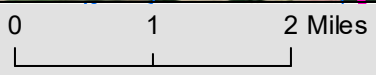


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high

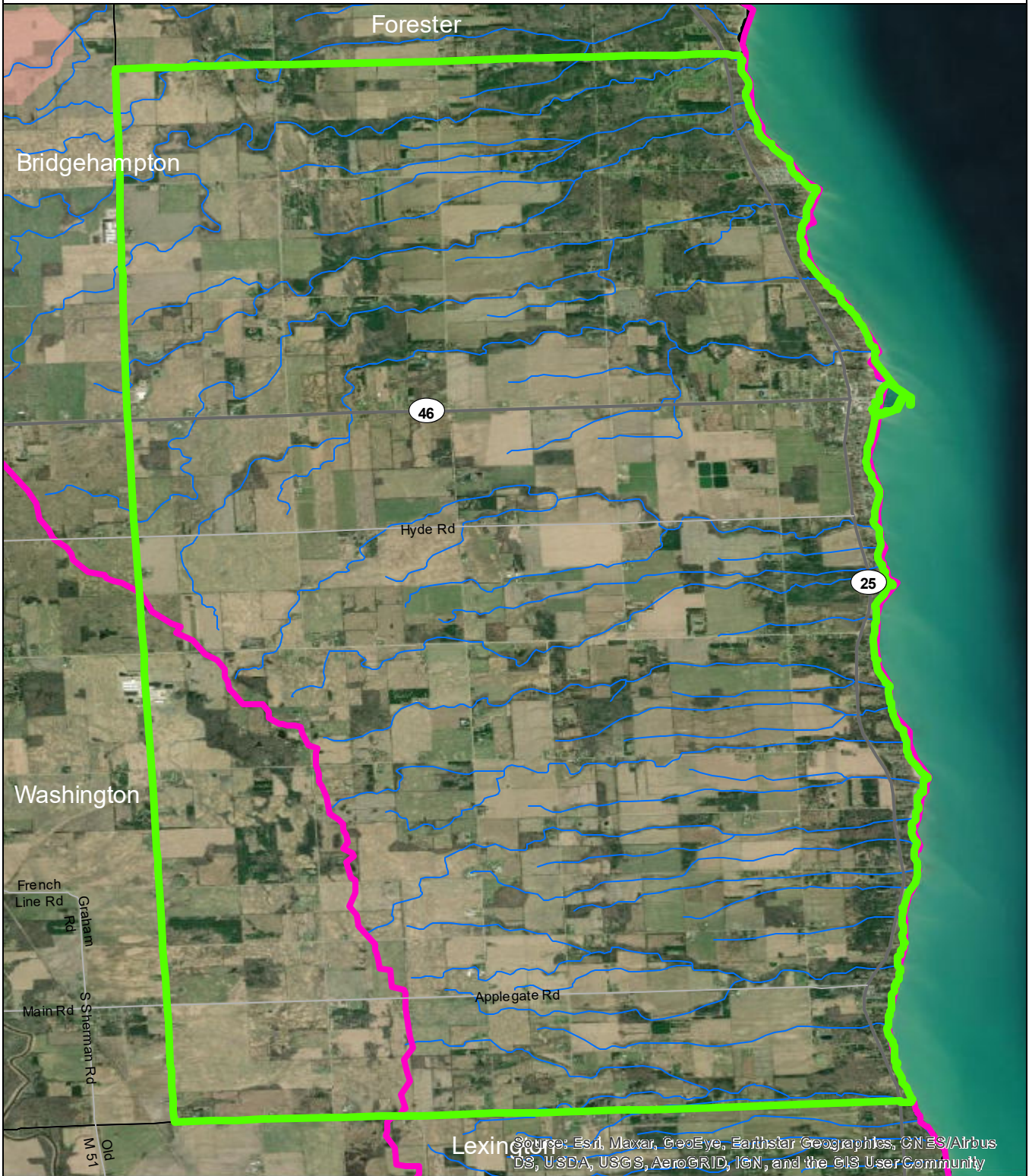


### Data Sources

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



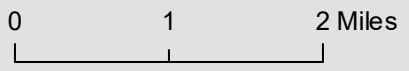
# Sanilac Township



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

### Sediment Loading Risk

- low
- moderate
- high
- very high



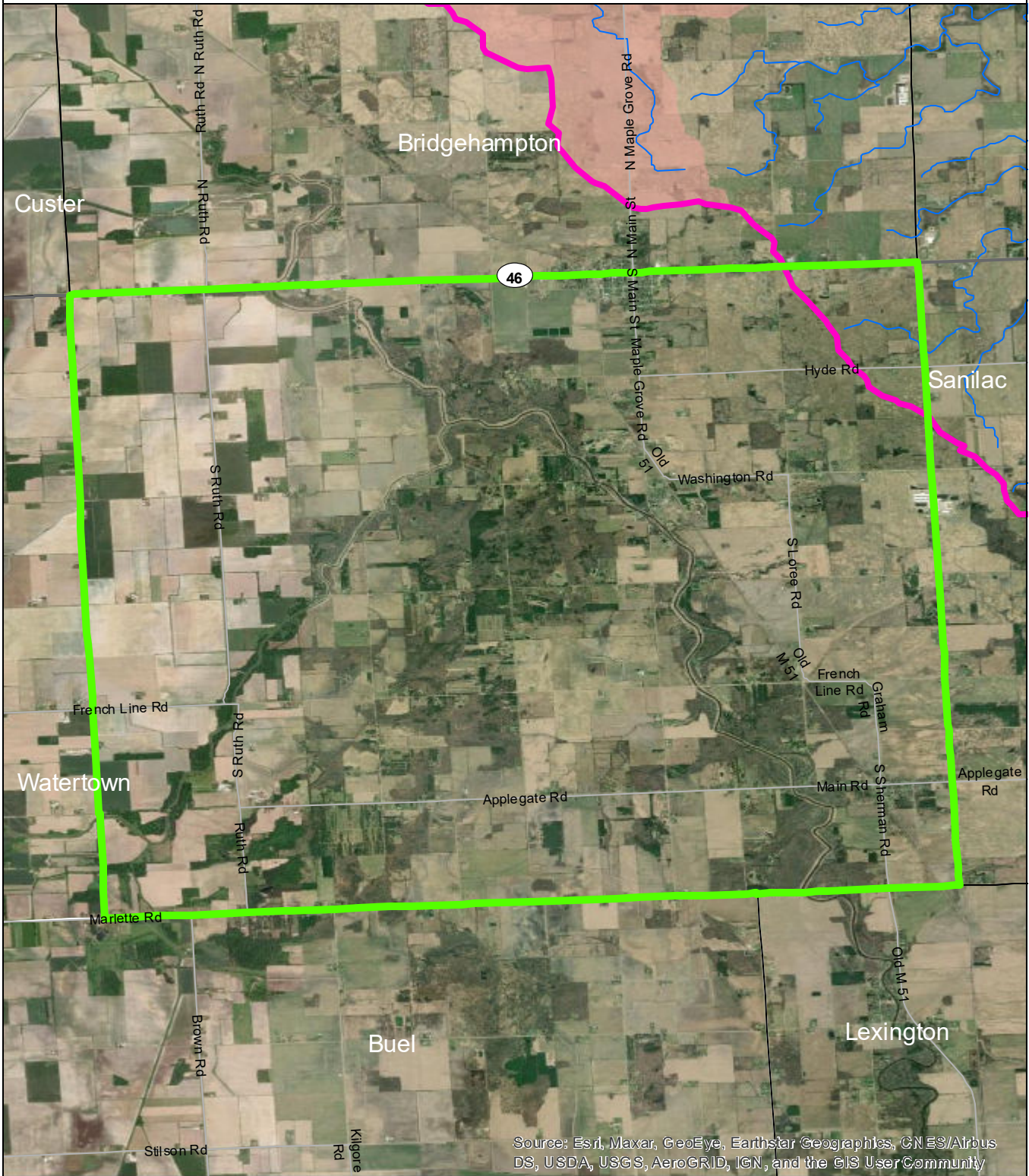
### Data Sources

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

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



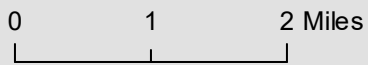
# Washington Township



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

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

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



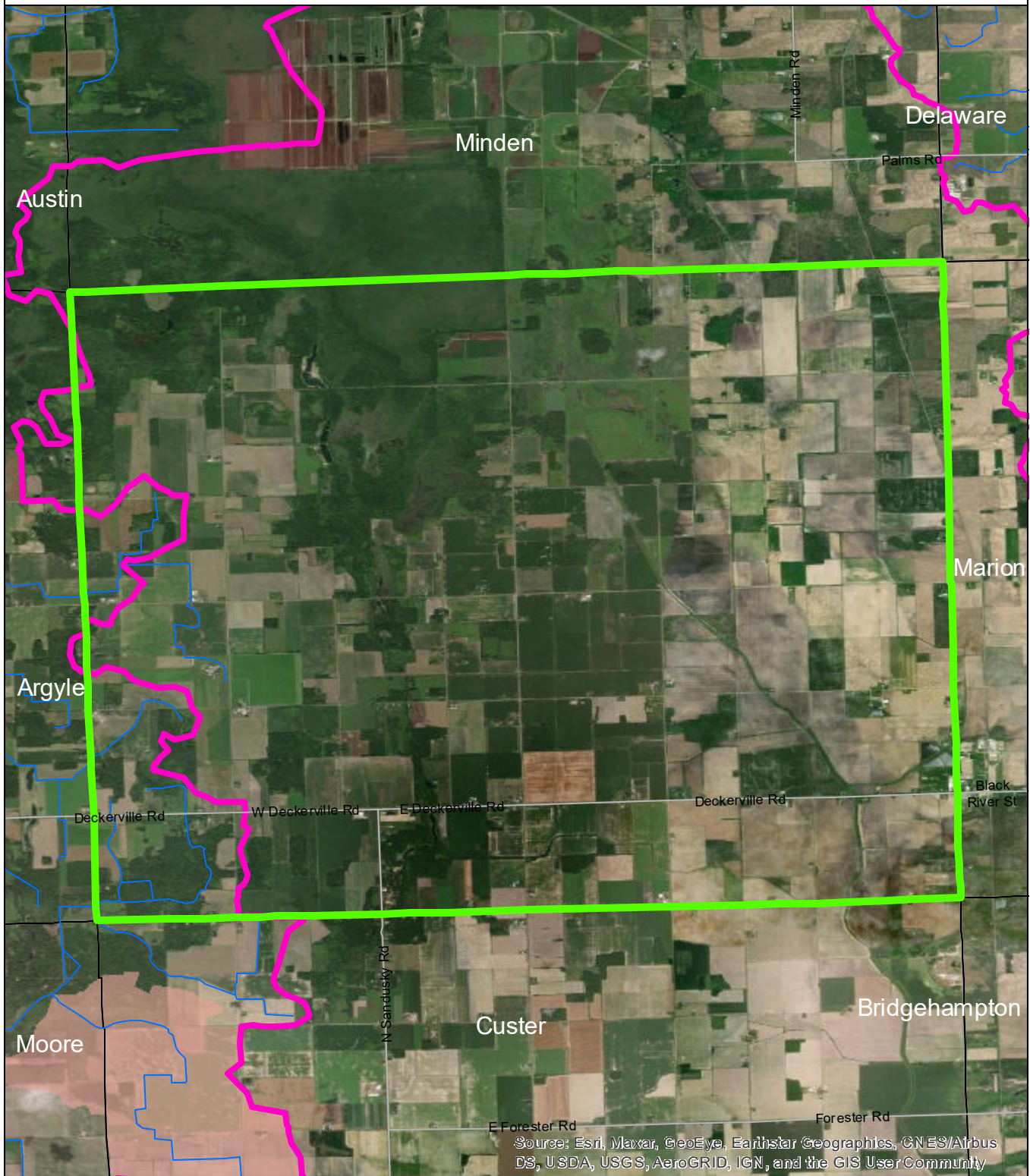
Data Sources

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

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



# Wheatland Township



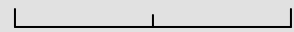
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles



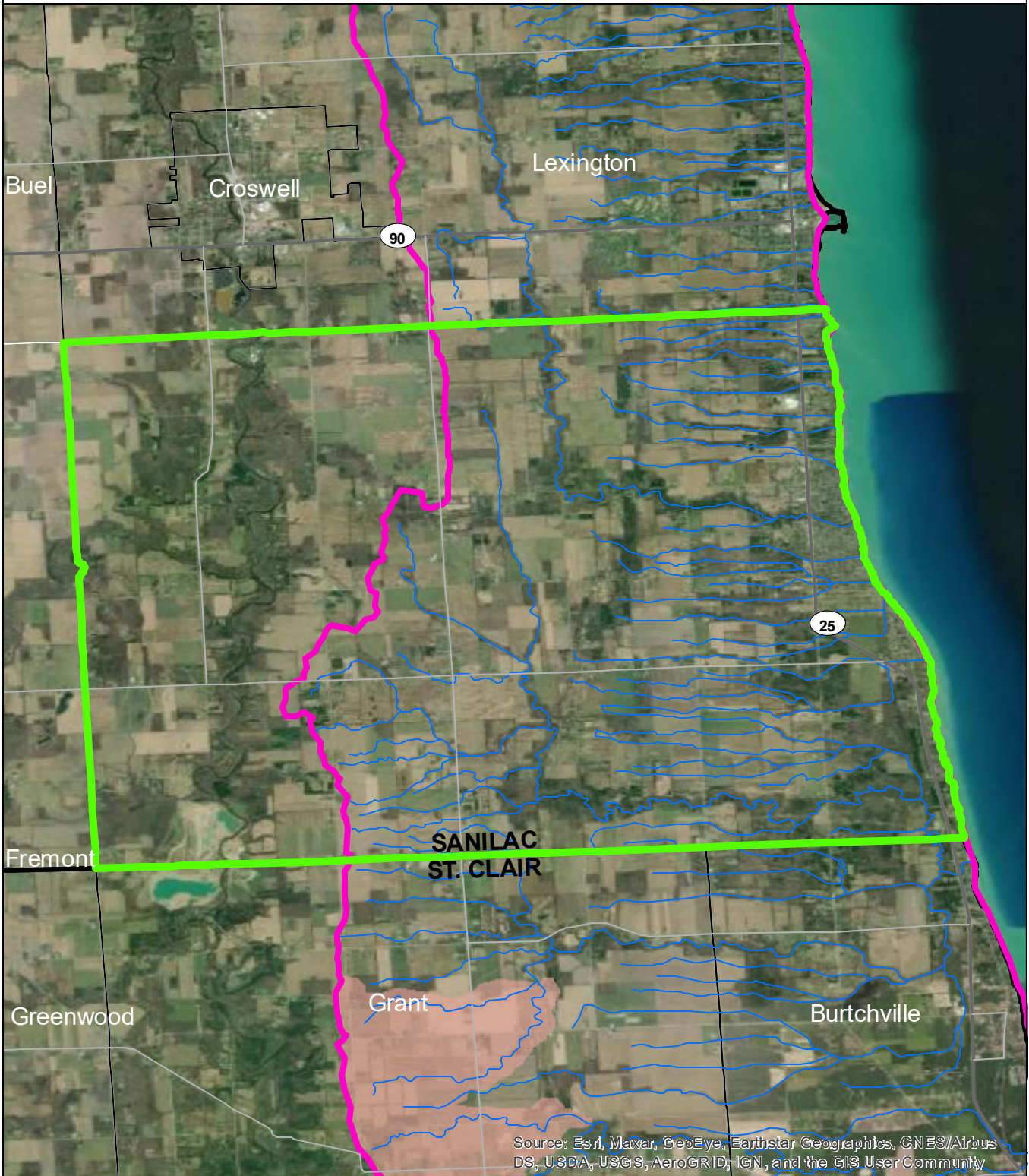
### Data Sources

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

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# Worth Township



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

- Worth 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  
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