

# 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.

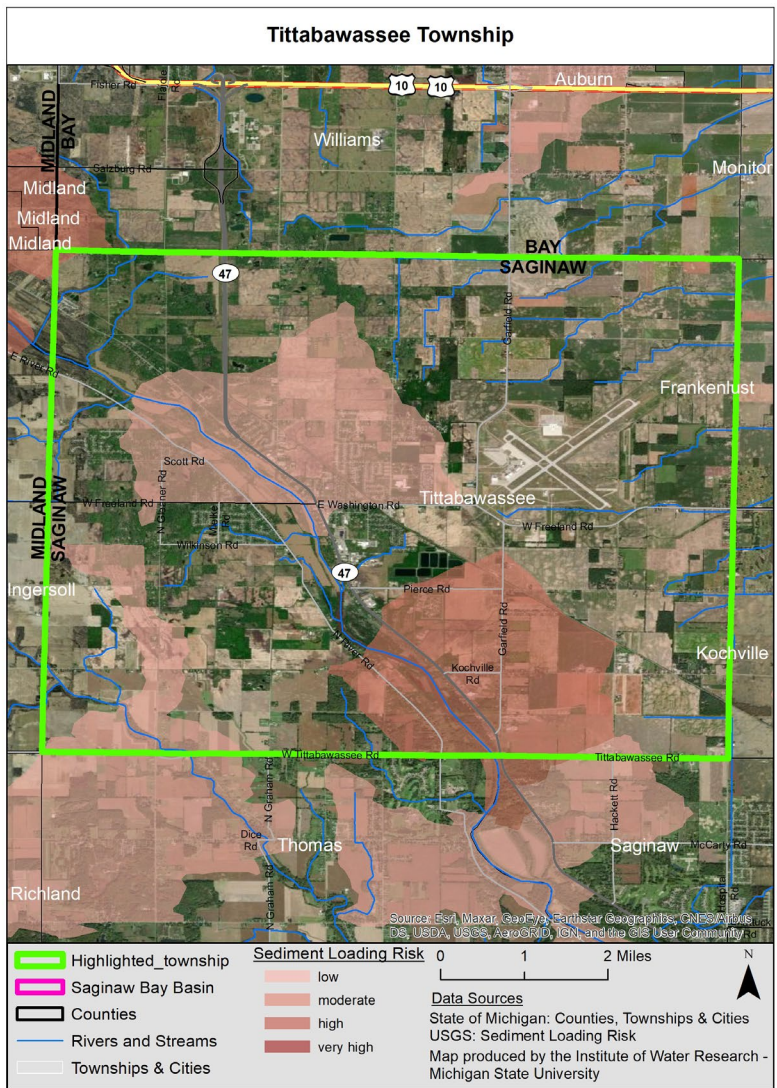
## Data

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>

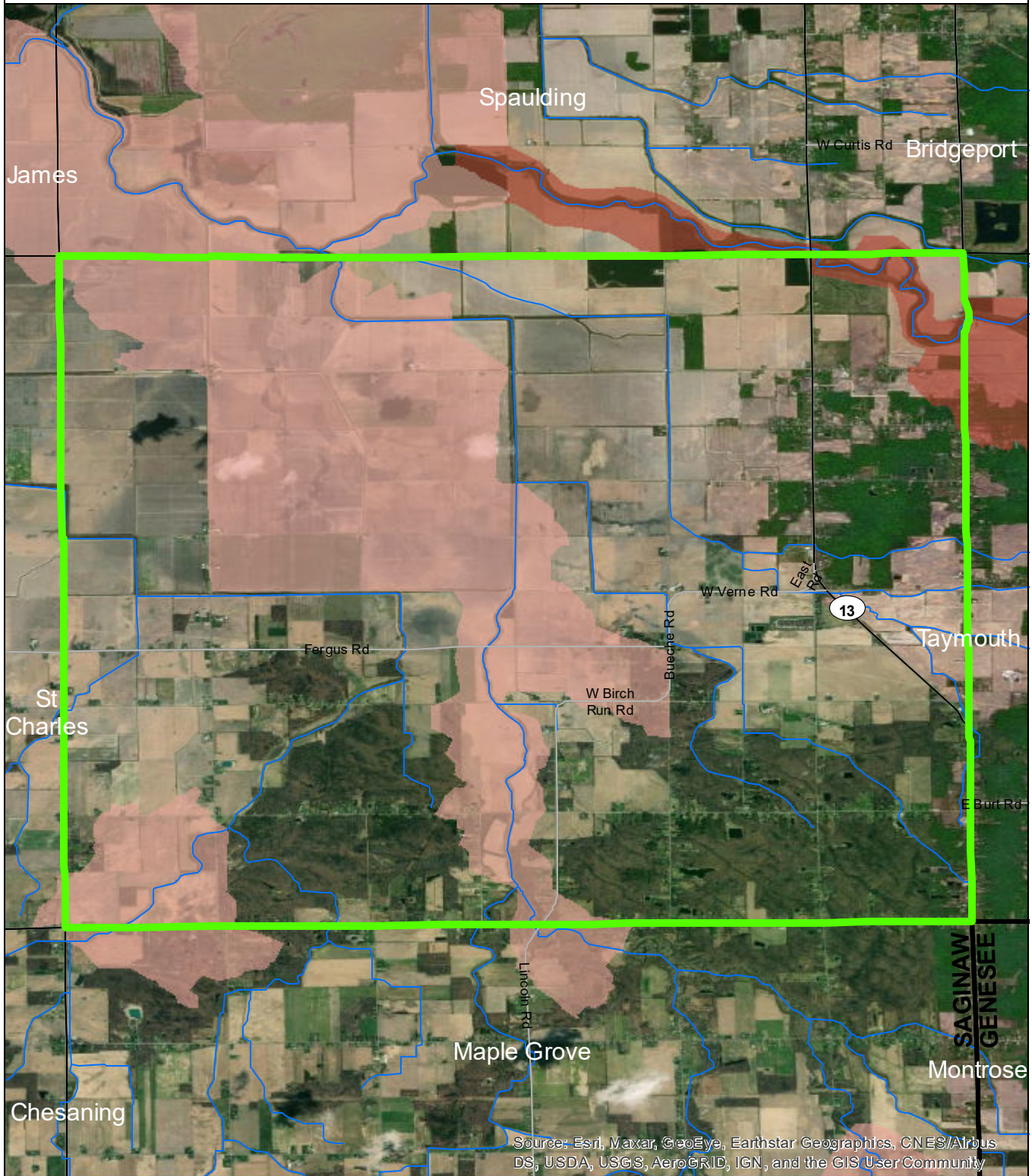
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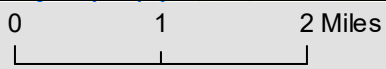
# Albee Township



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

### Sediment Loading Risk

- low
- moderate
- high
- very high

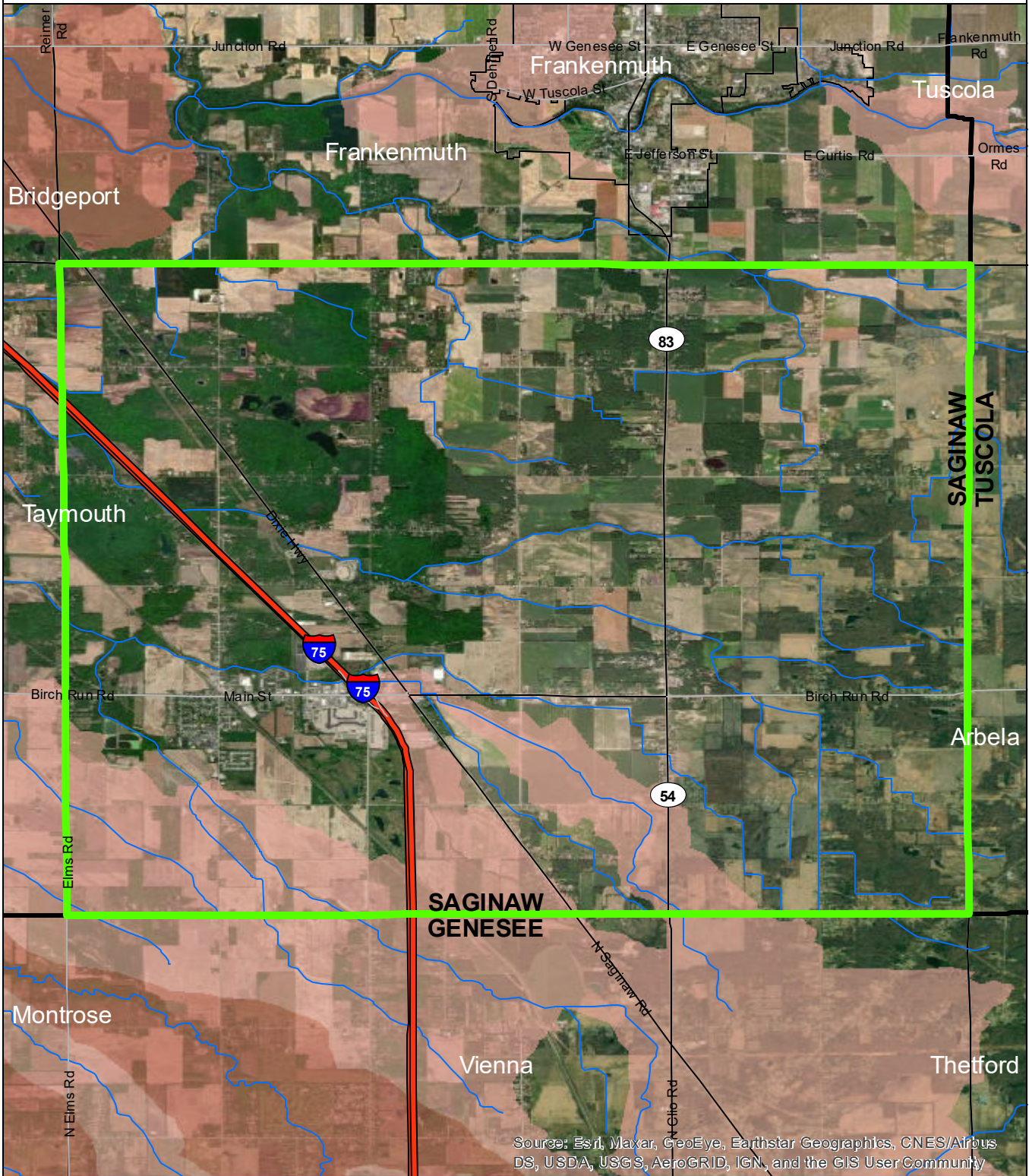


### Data Sources

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



# Birch Run Township

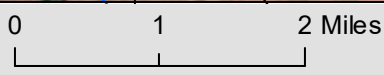


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



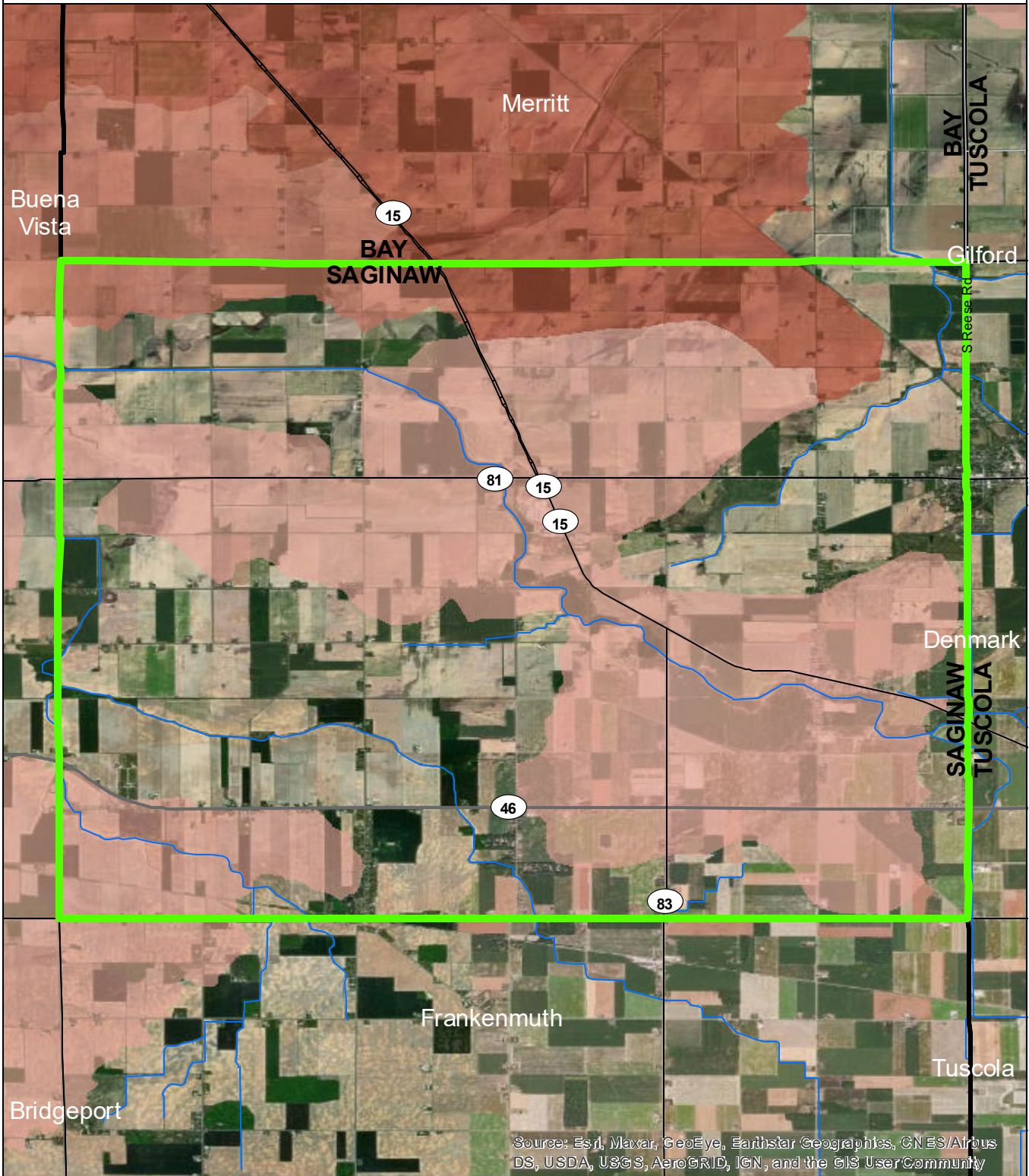
### Data Sources

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





# Blumfield Township

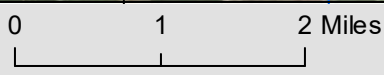


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS UserCommunity

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



### Data Sources

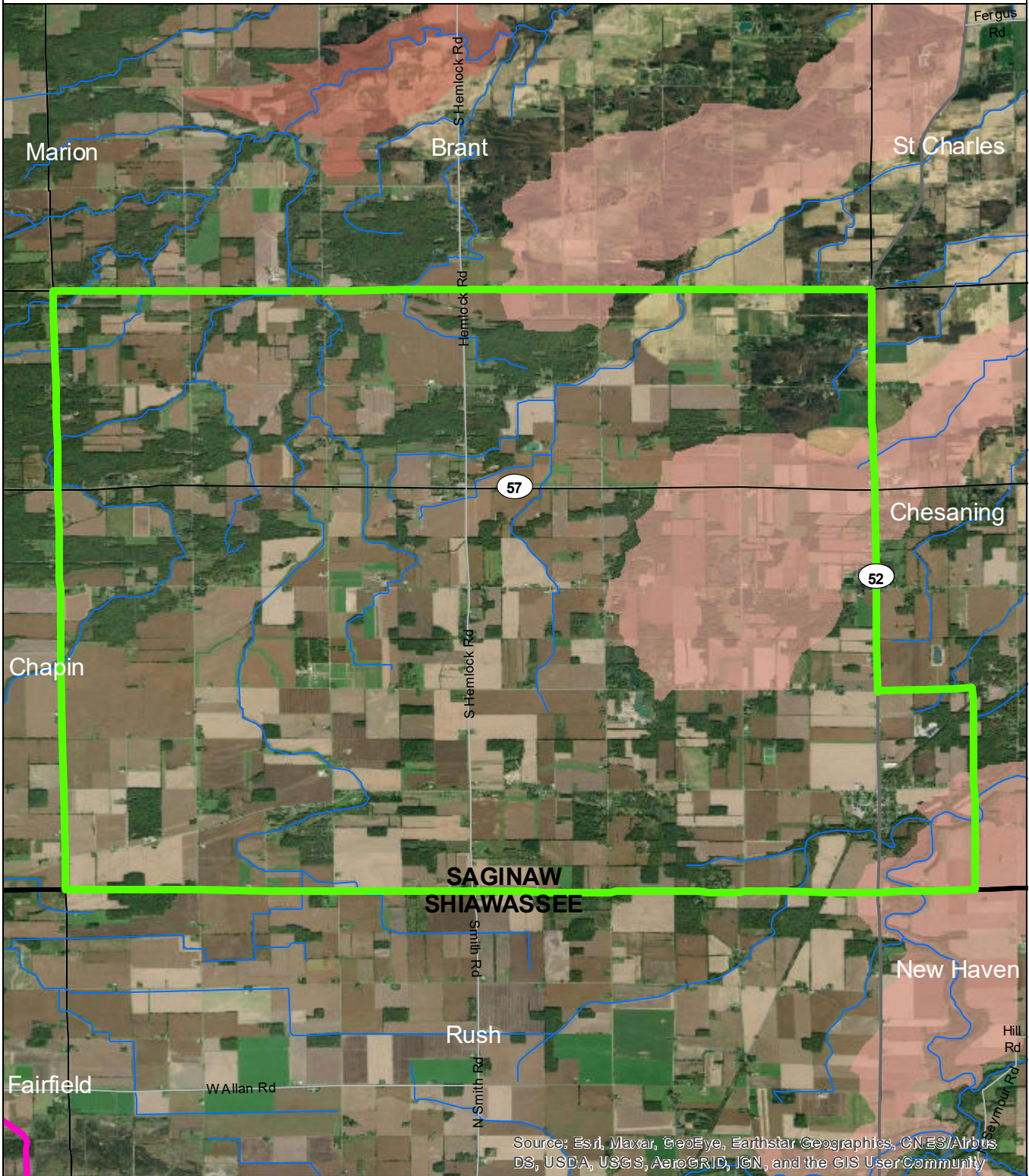
State of Michigan: Counties, Townships & Cities  
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# Brady Township

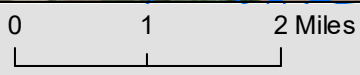


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



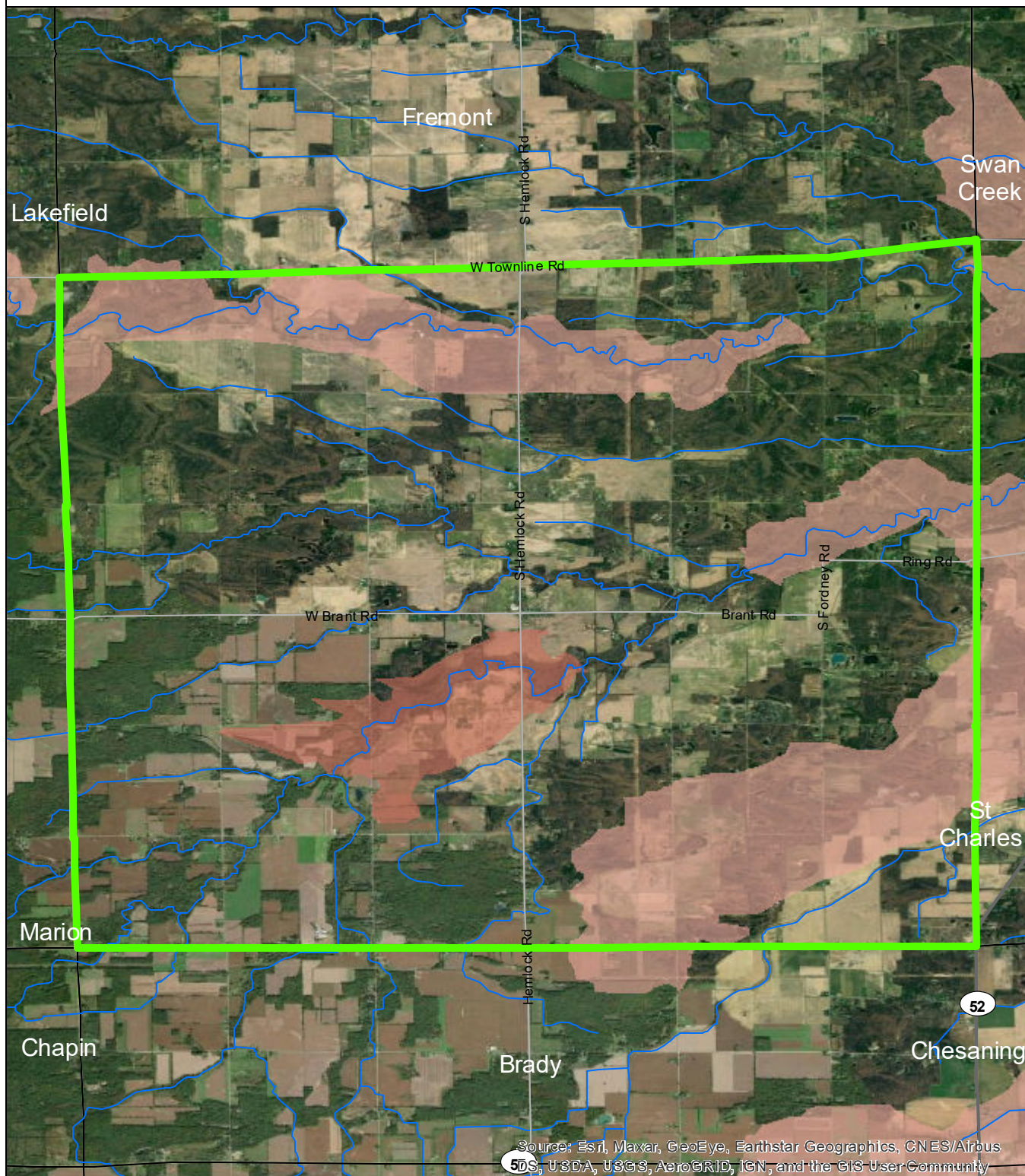
### Data Sources

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

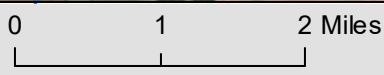


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus 50S, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



### Data Sources

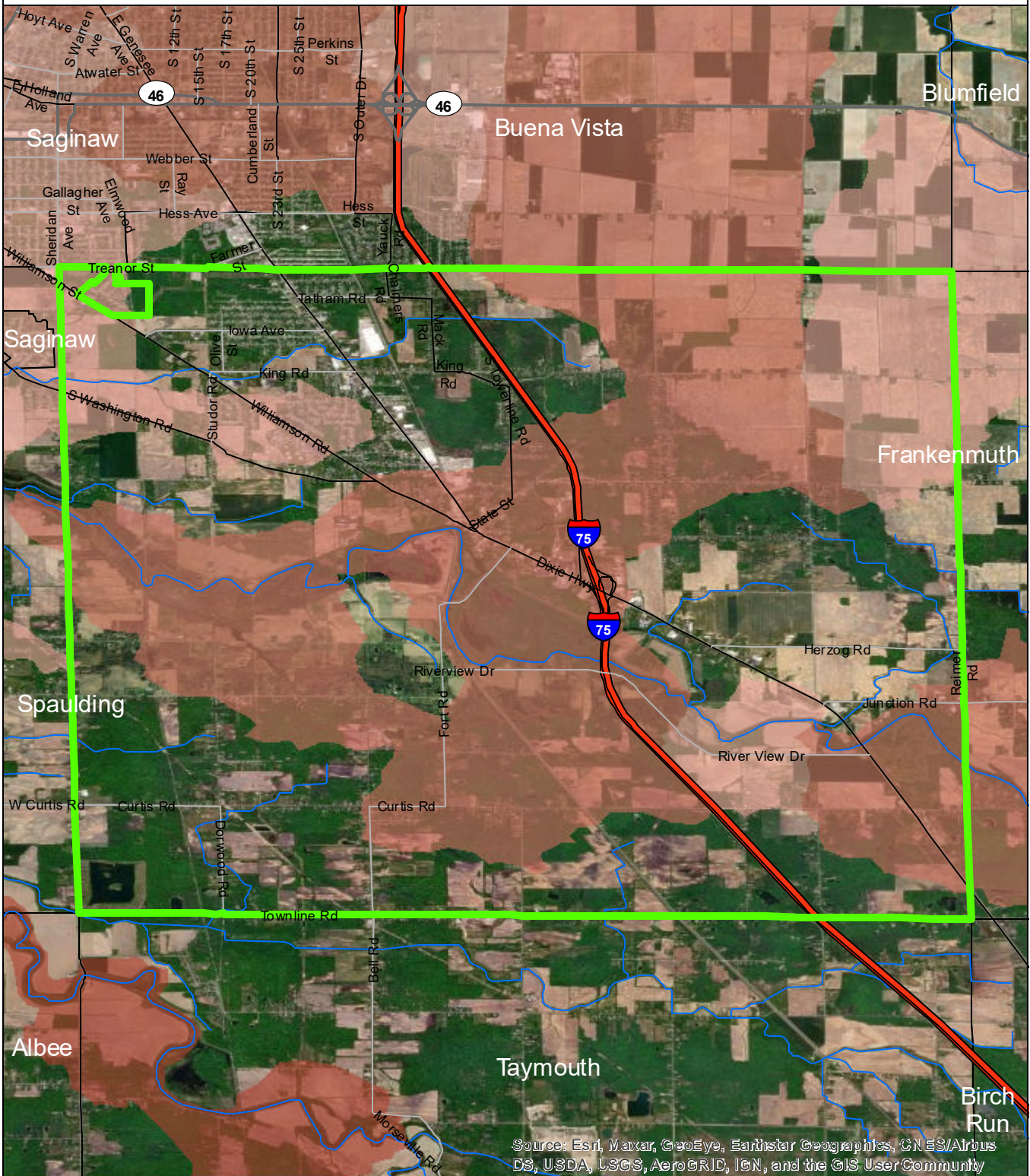
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

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# Bridgeport Township

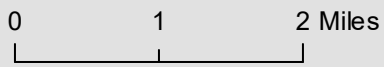


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



### Data Sources

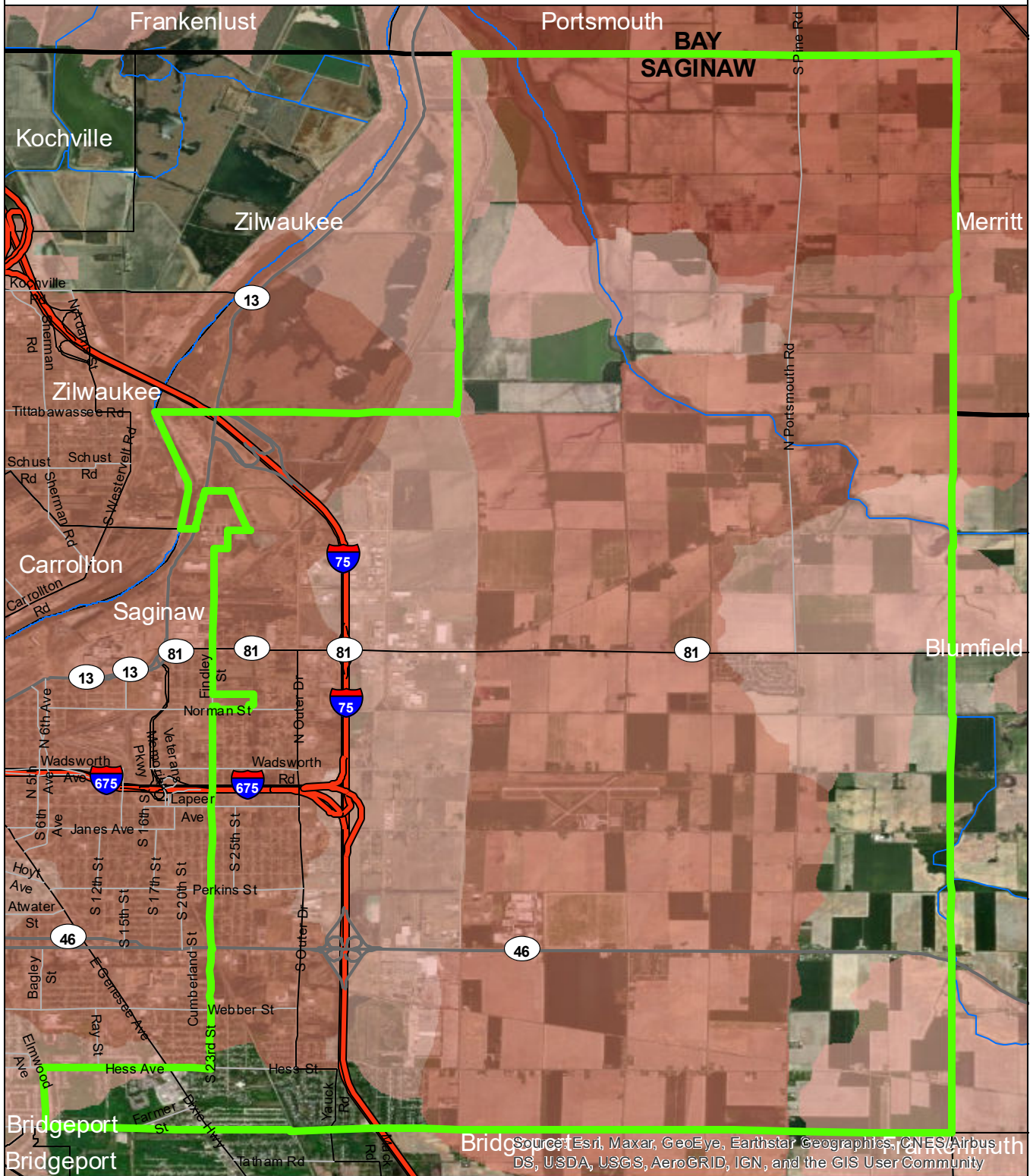
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

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# Buena Vista Township

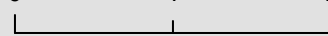


- Buena Vista Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles



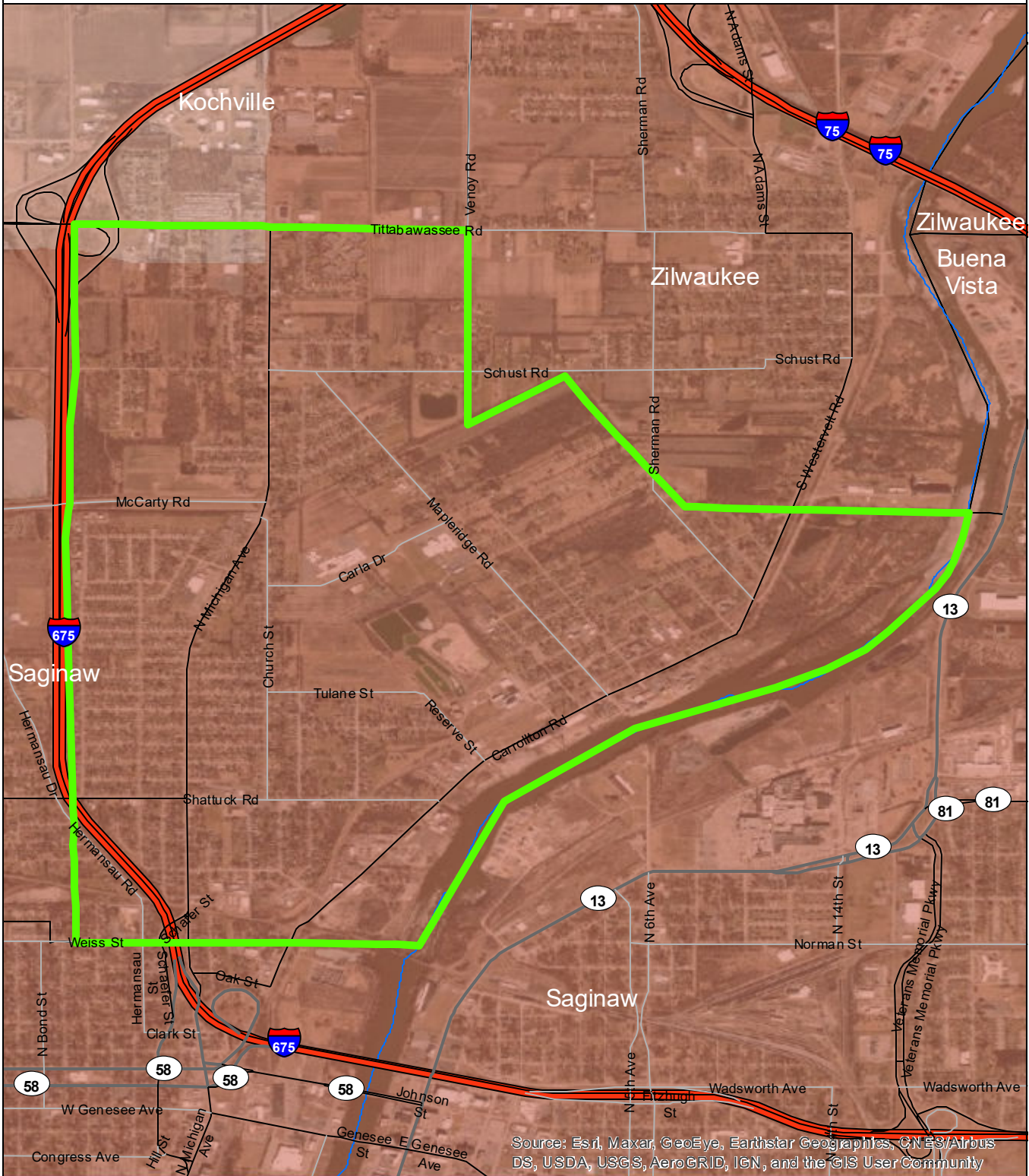
### Data Sources

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

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# Carrollton Township

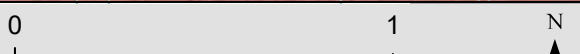


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high

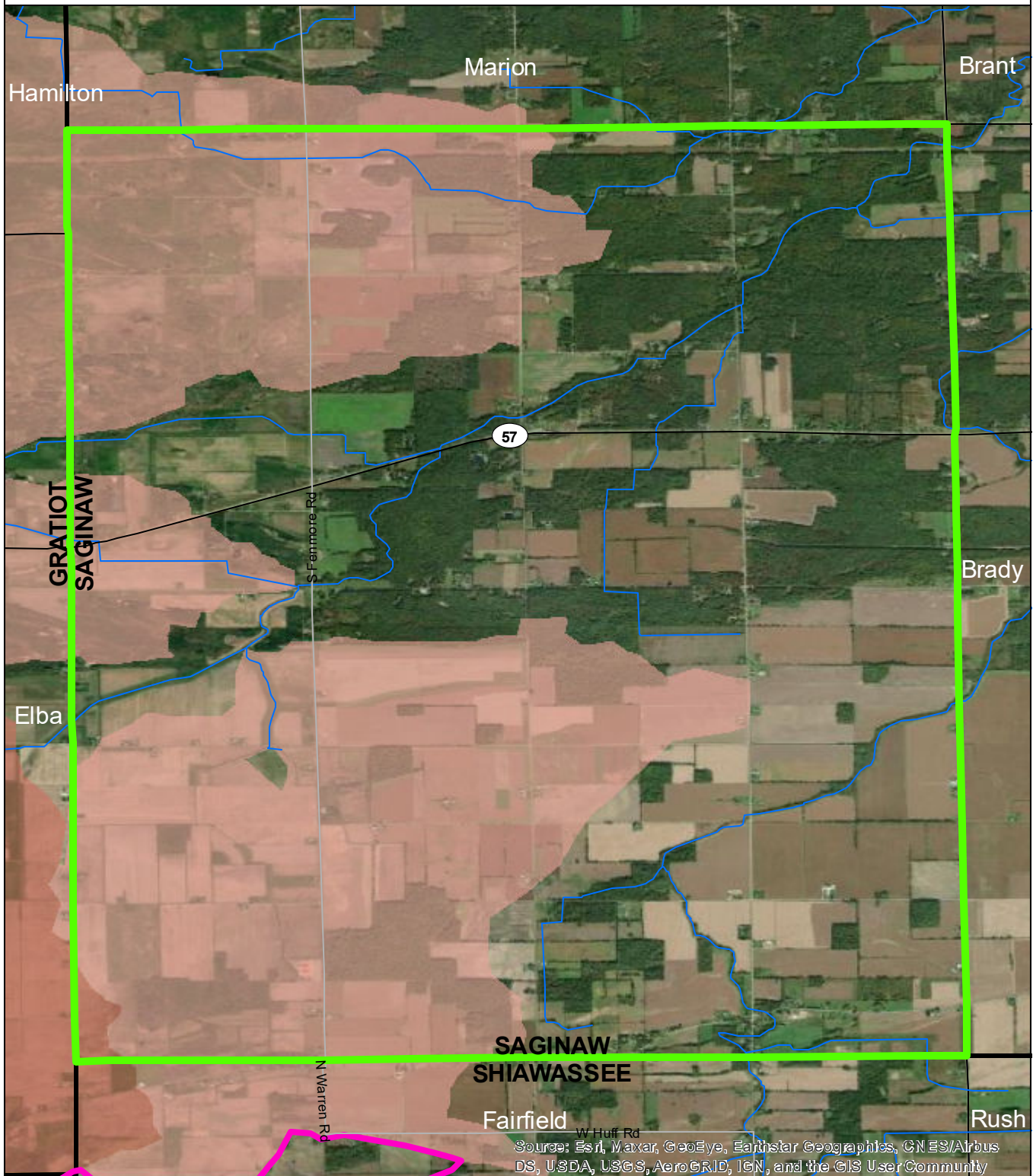




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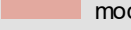
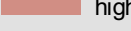
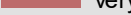
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 USGS: Sediment Loading Risk  
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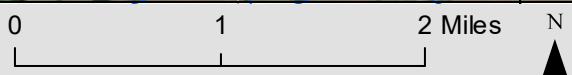


# Chapin Township



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

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



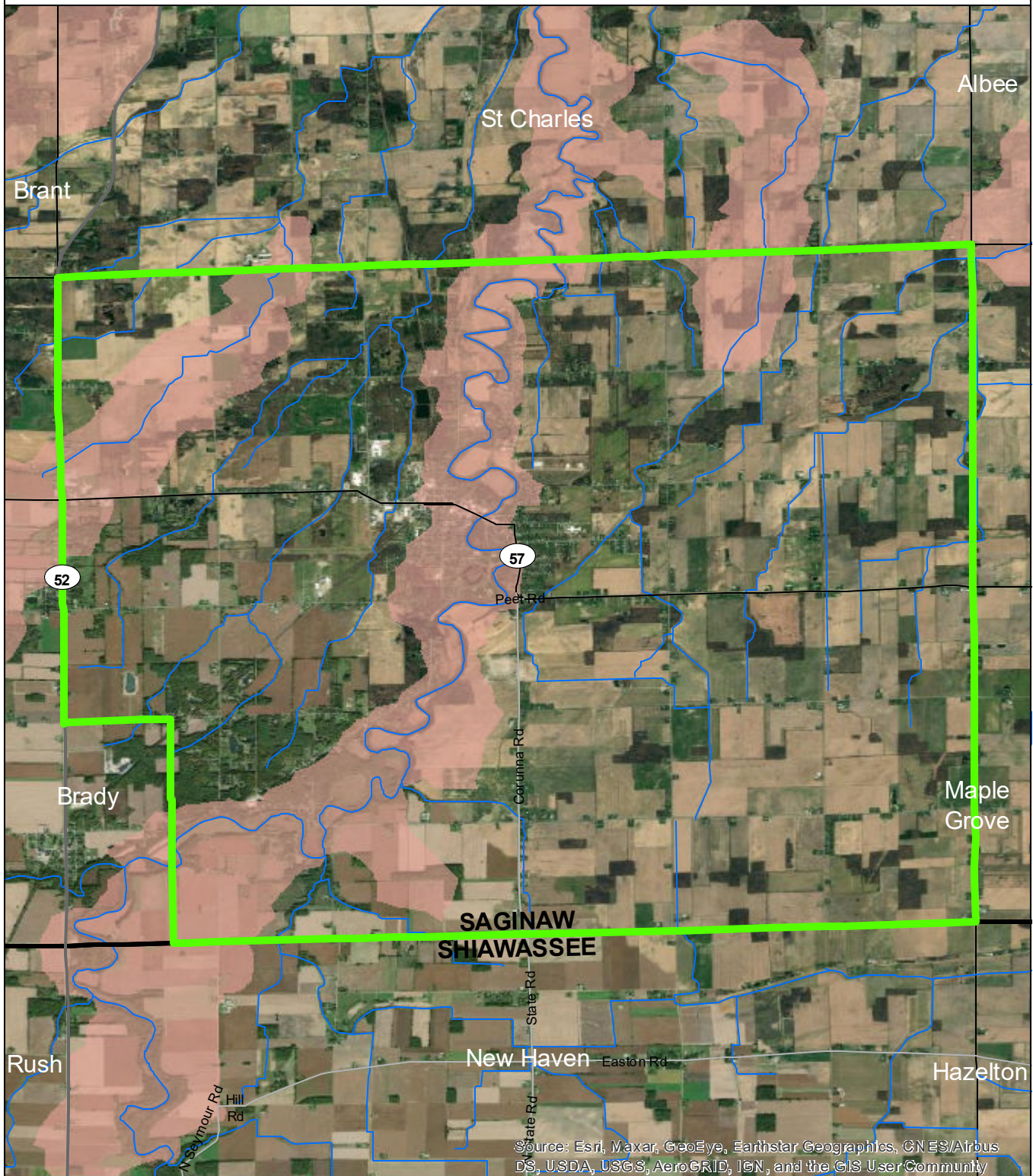
**Data Sources**

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

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



# Chesaning Township



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

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



### Data Sources

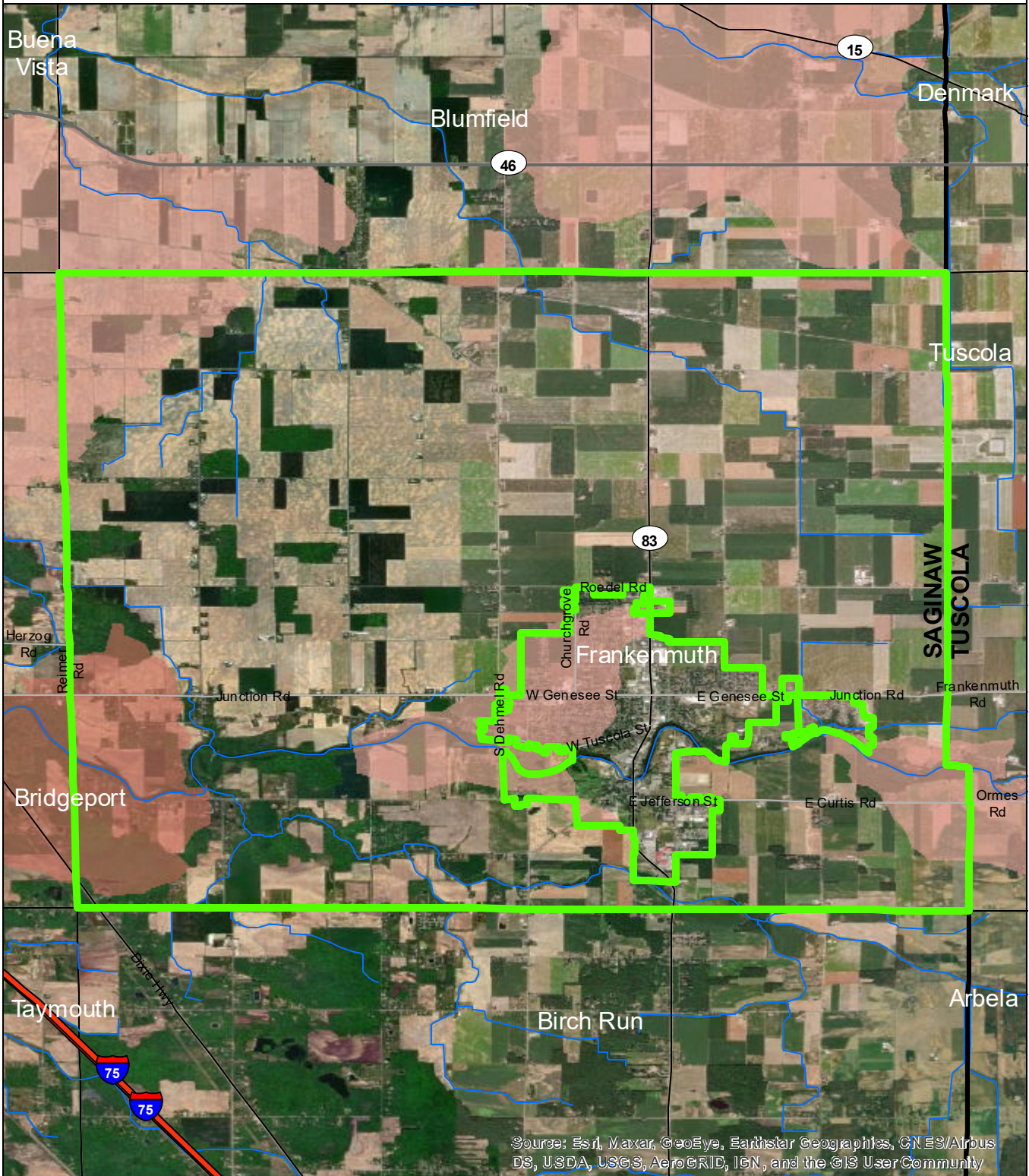
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

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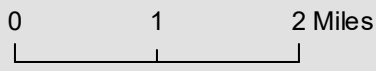
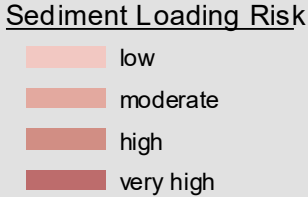


# Frankenmuth Township



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

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



Data Sources

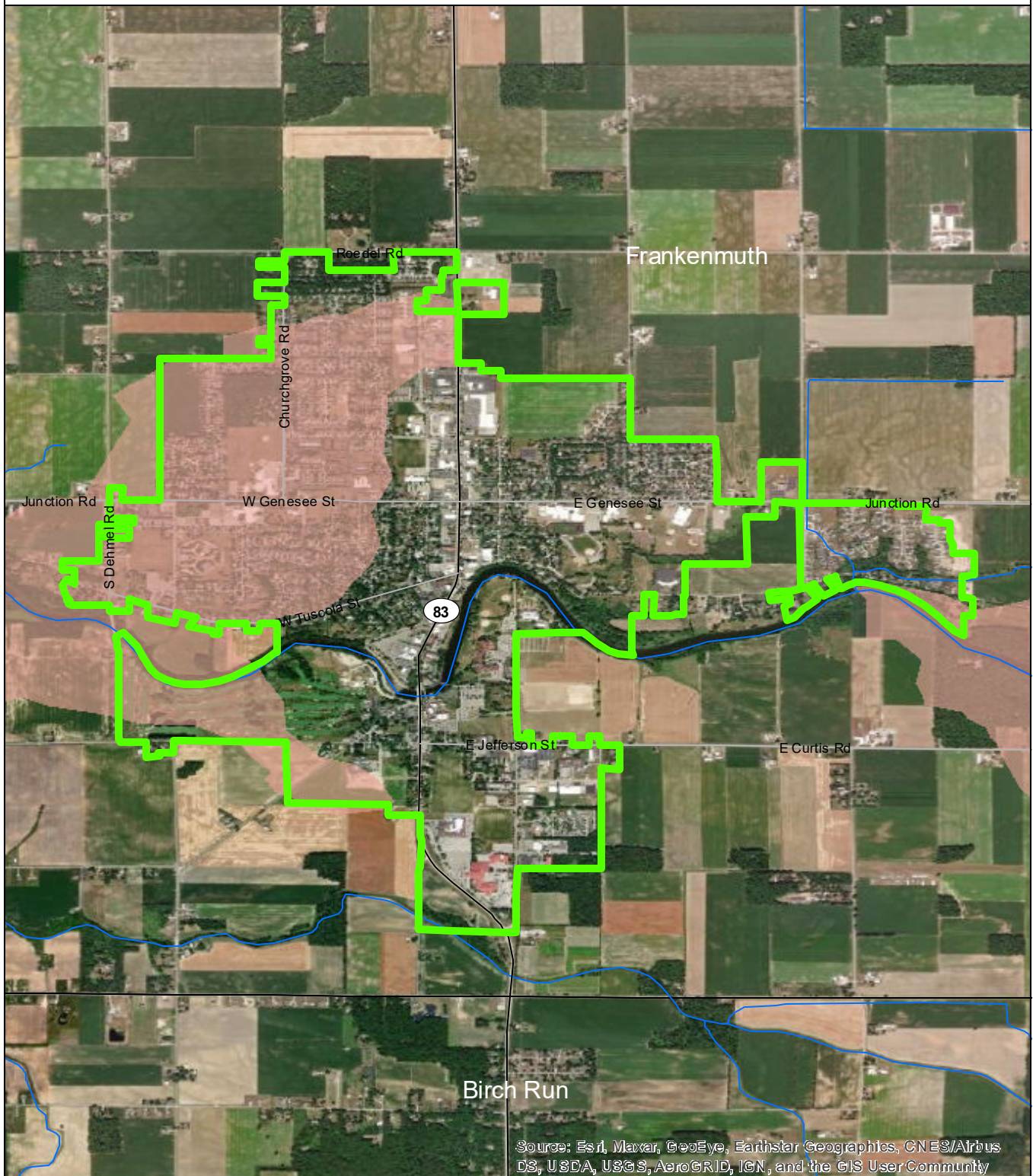
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

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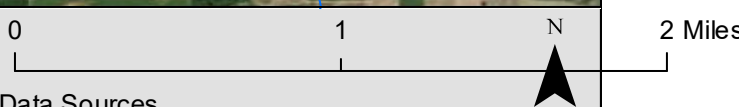
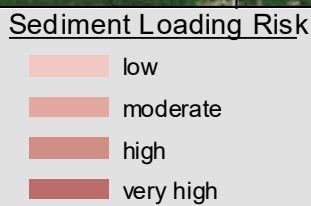


# City of Frankenmuth



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

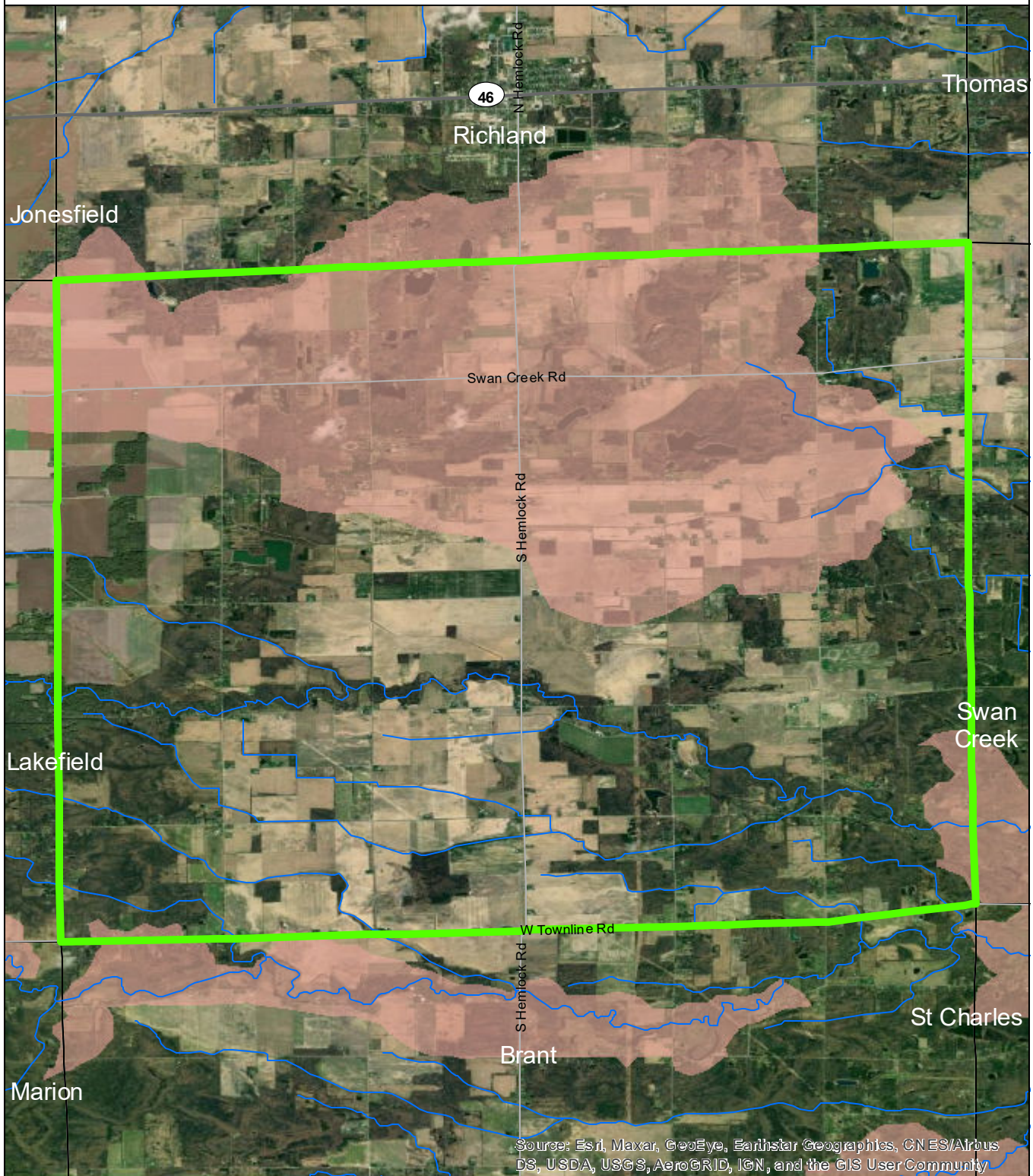
- City of Frankenmuth
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities



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

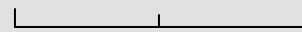


- Fremont Township
- Saginaw Bay Basin
- Counties
- Rivers and Streams
- Townships & Cities

### Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles



### Data Sources

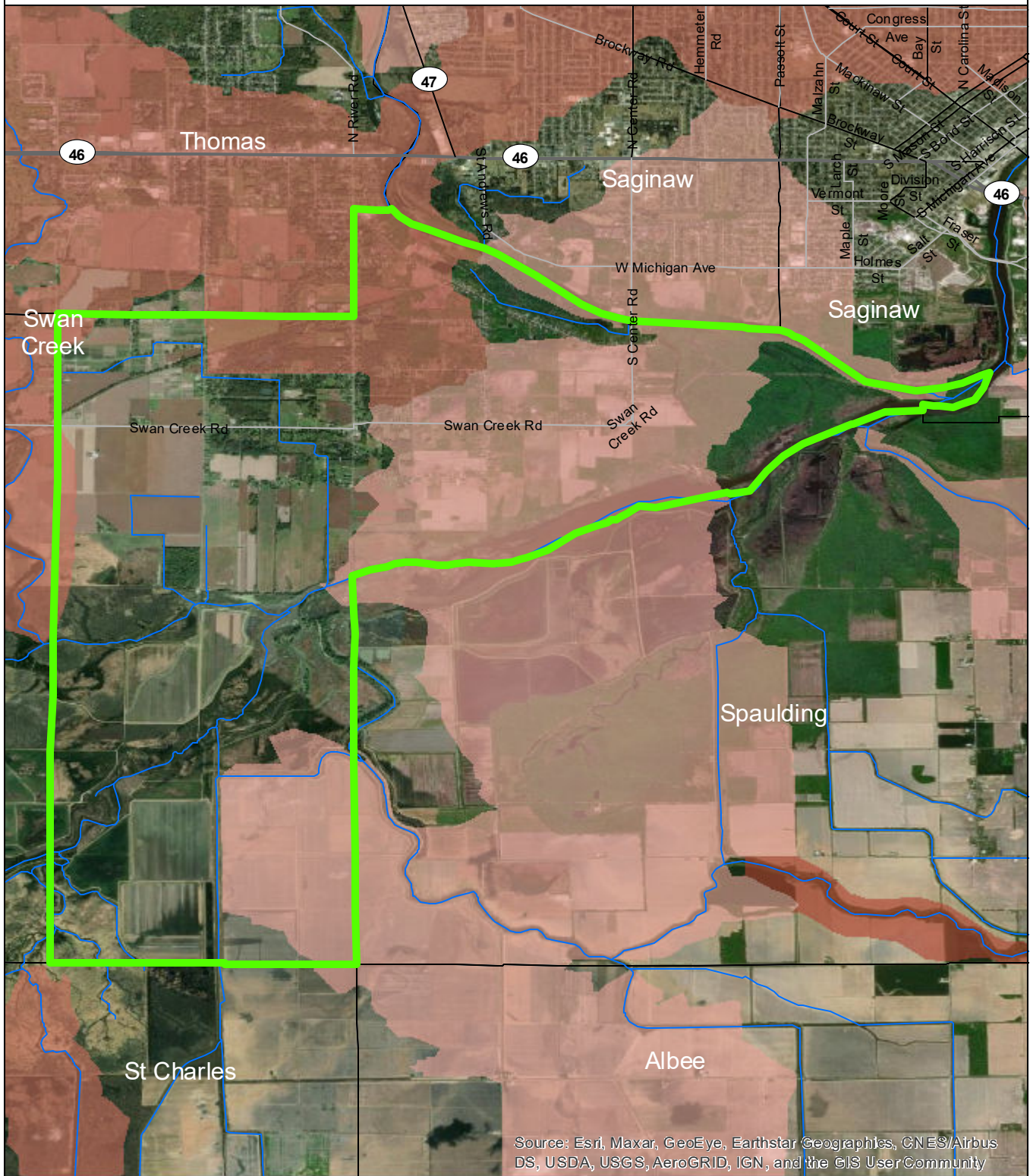
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

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# James Township

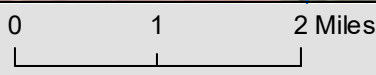


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high

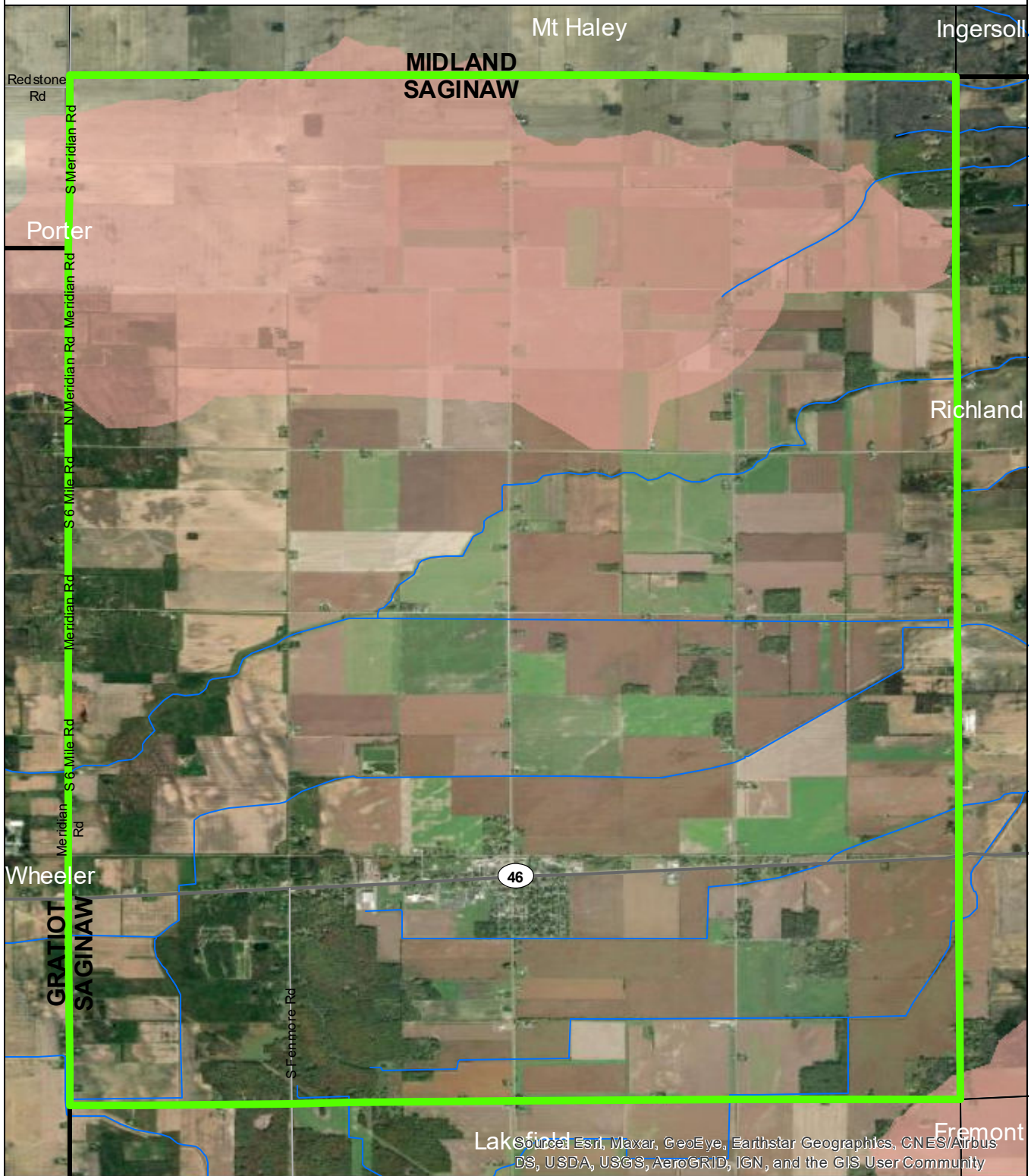





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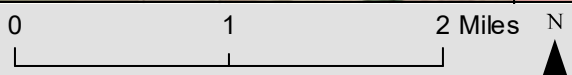
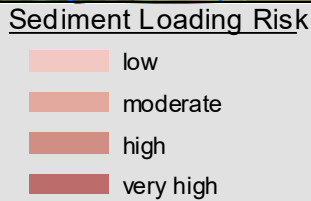
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk  
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# Jonesfield Township



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



**Data Sources**

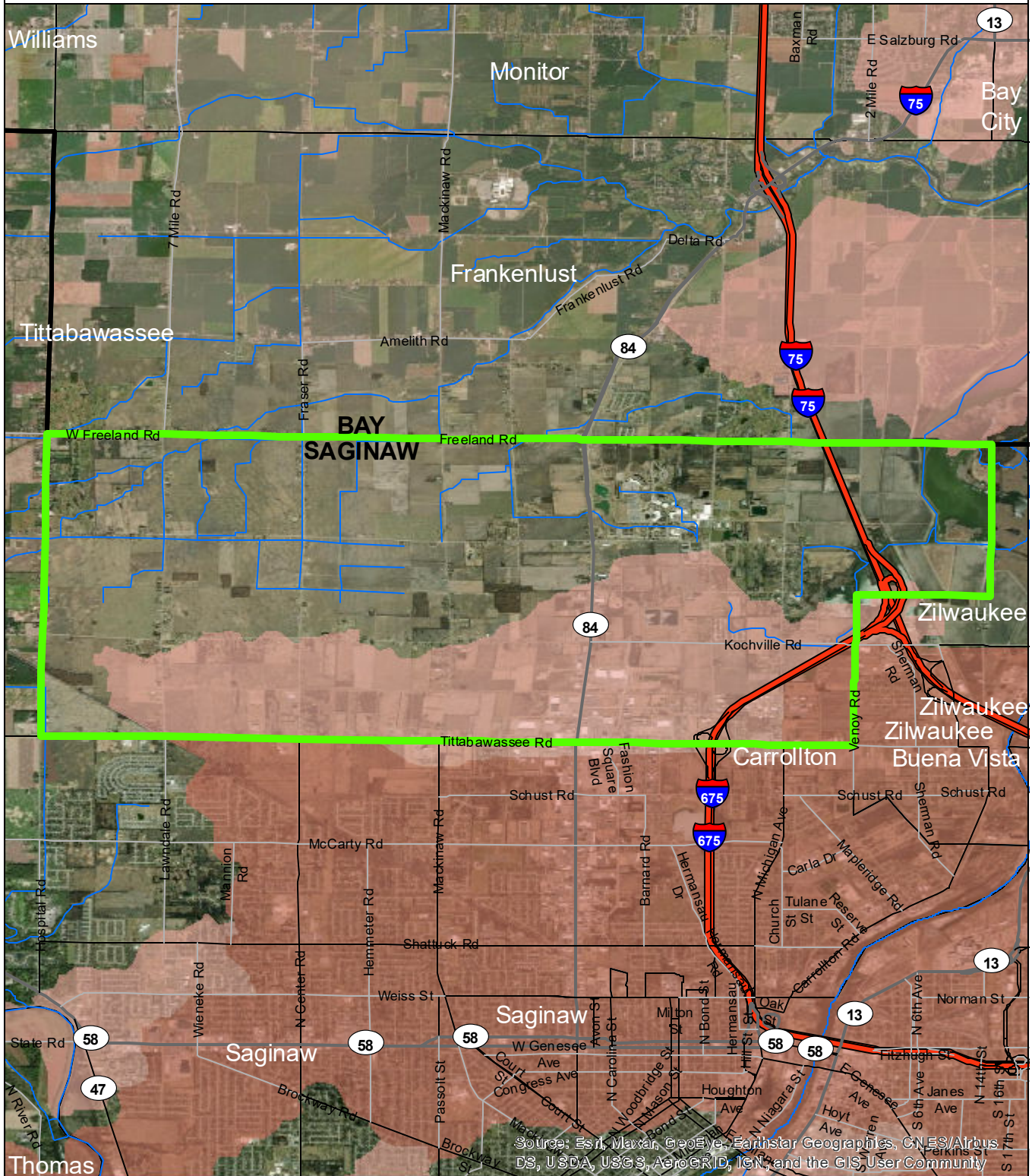
State of Michigan: Counties, Townships & Cities  
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# Kochville Township

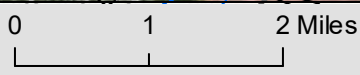


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high

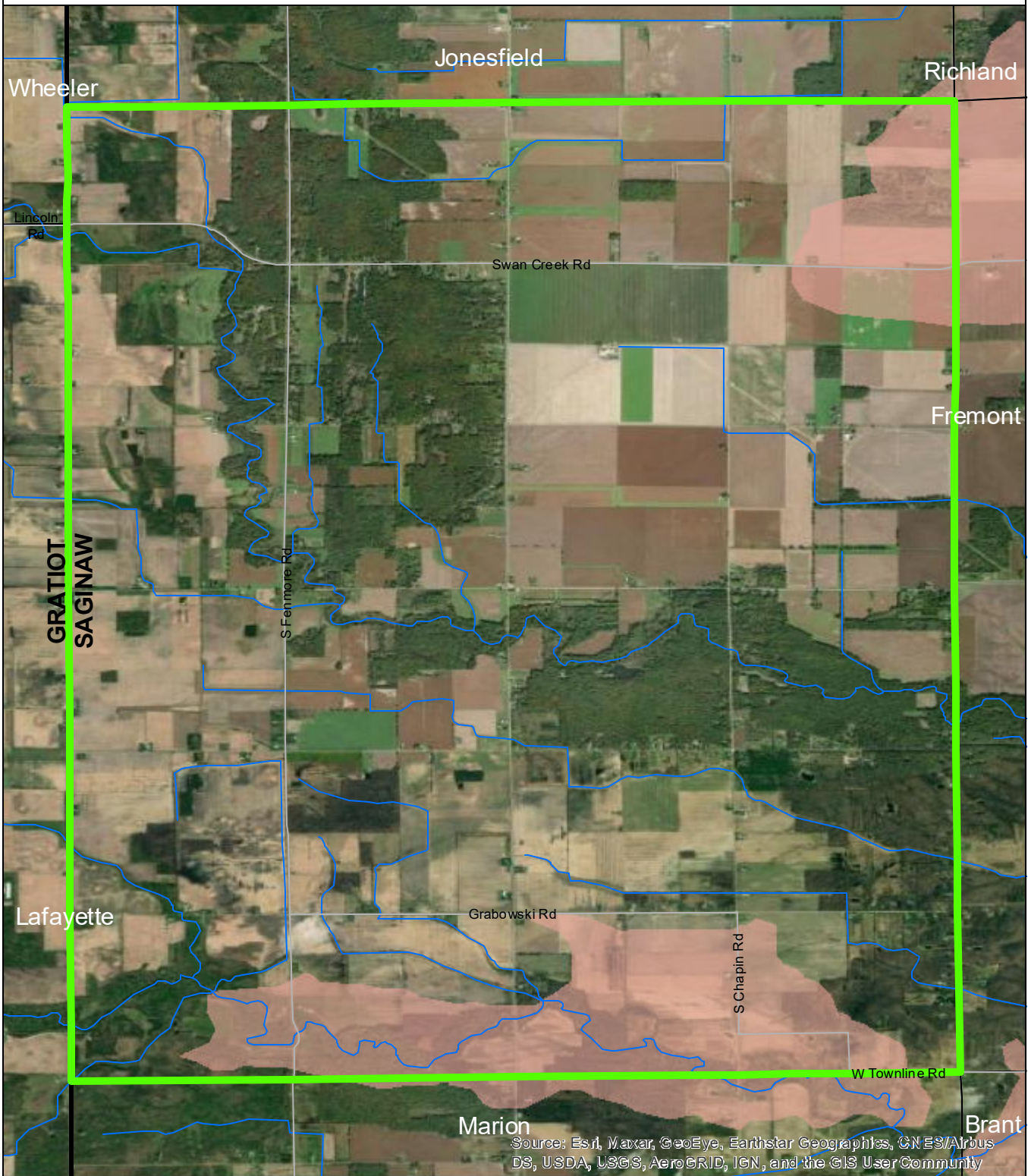


### Data Sources






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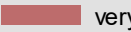


# Lakefield Township



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

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

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

0 1 2 Miles 

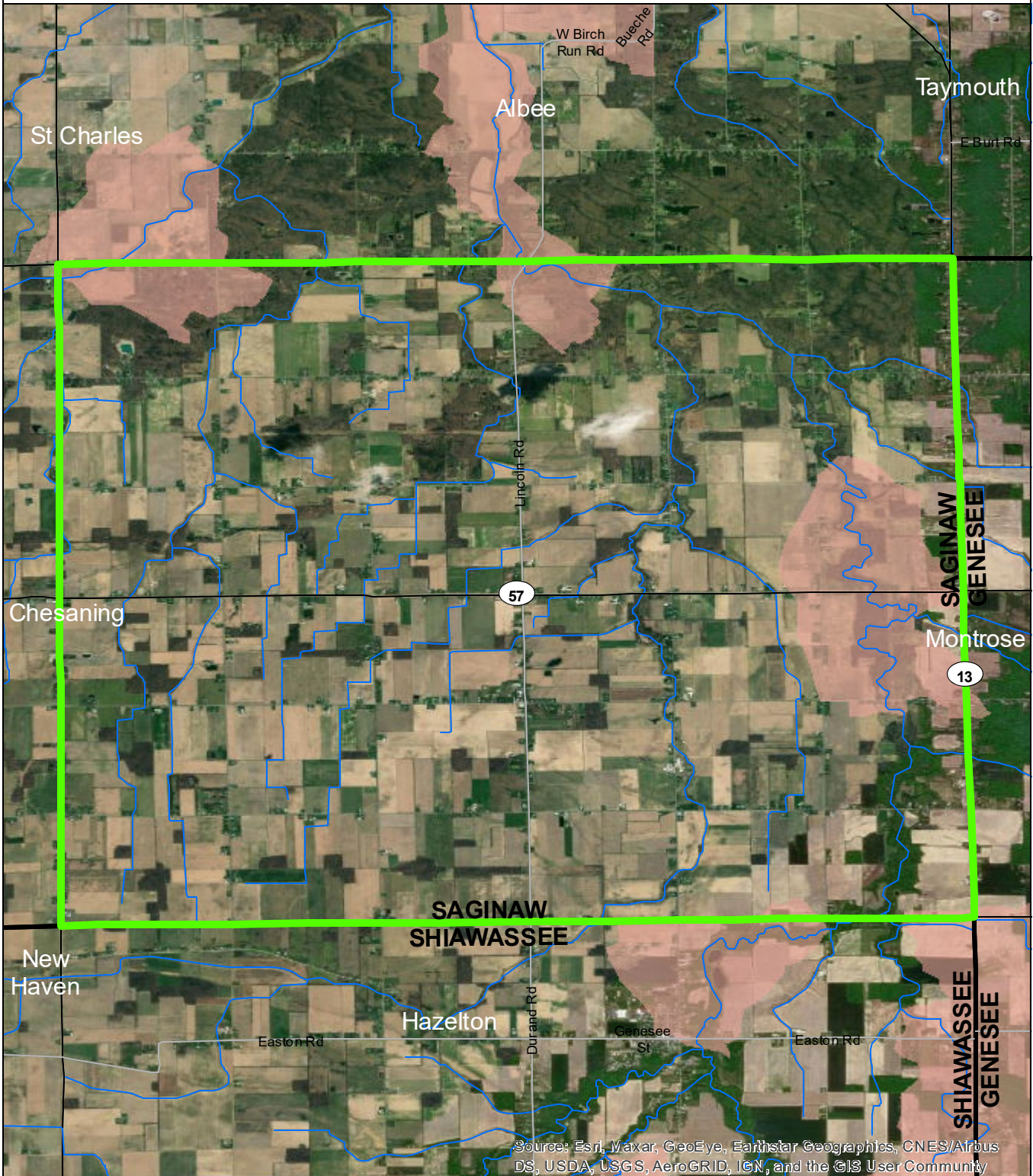
**Data Sources**

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

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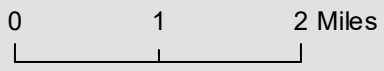


# Maple Grove Township



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

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



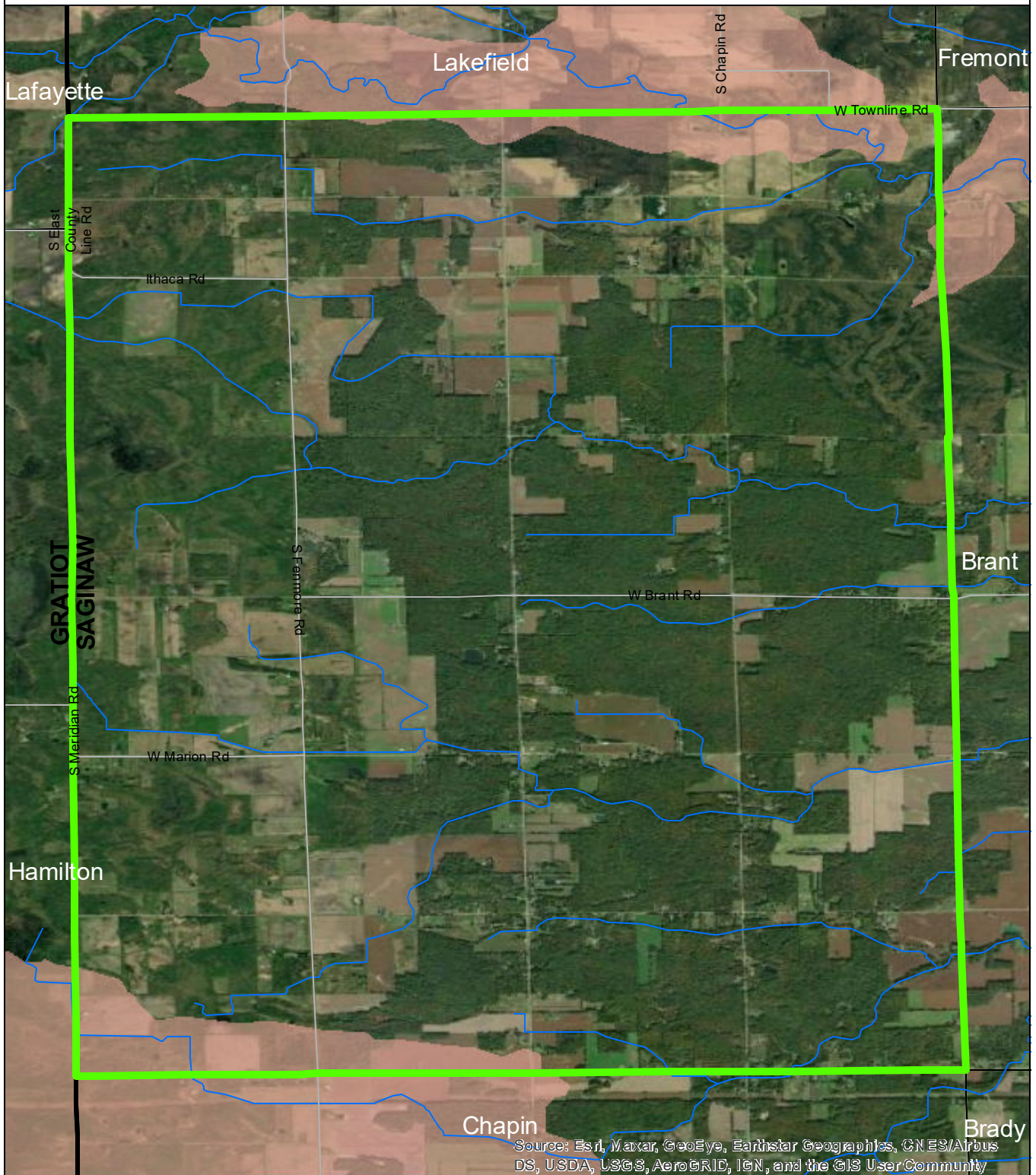
**Data Sources**

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





# Marion Township



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

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

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

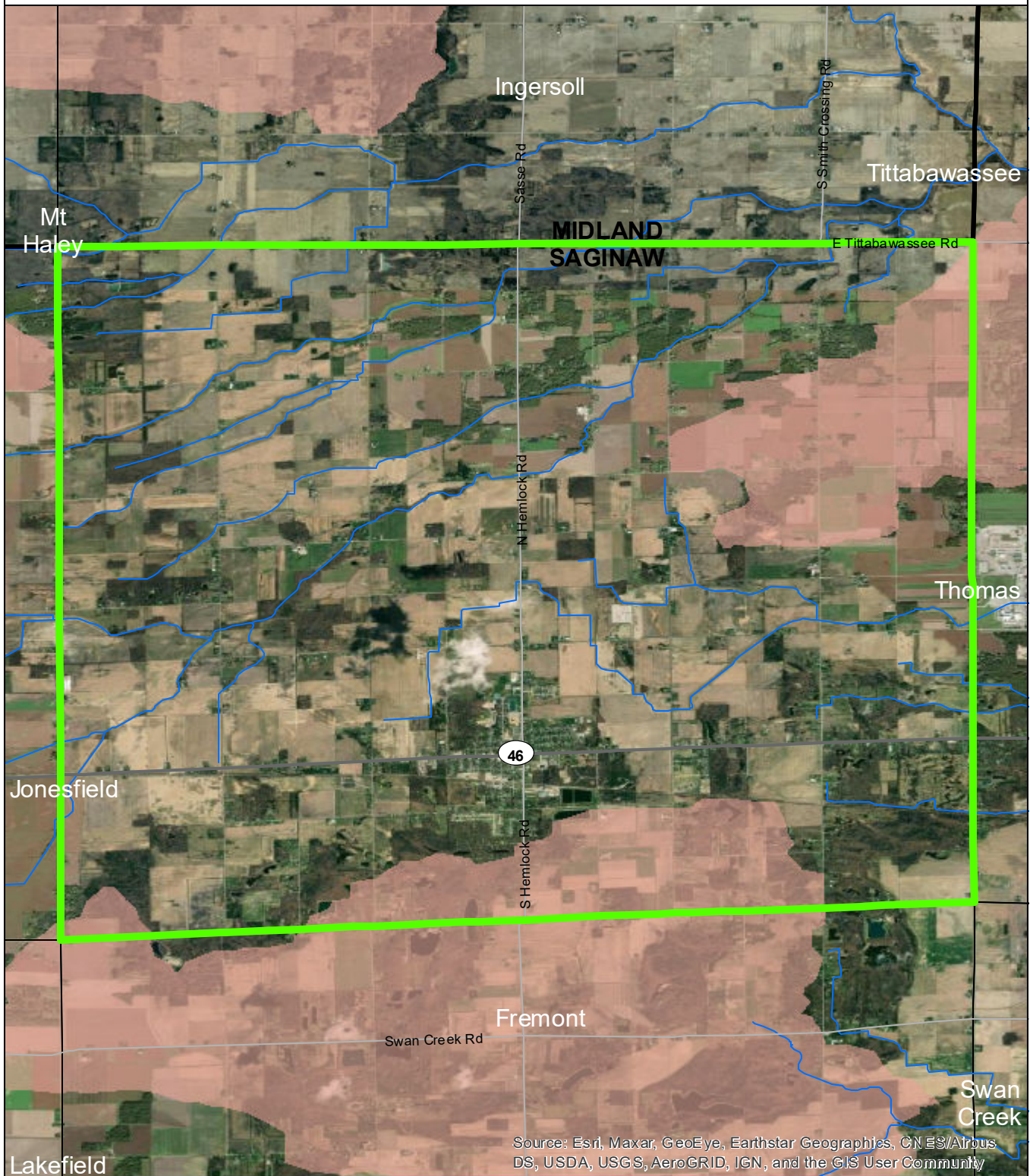


**Data Sources**

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



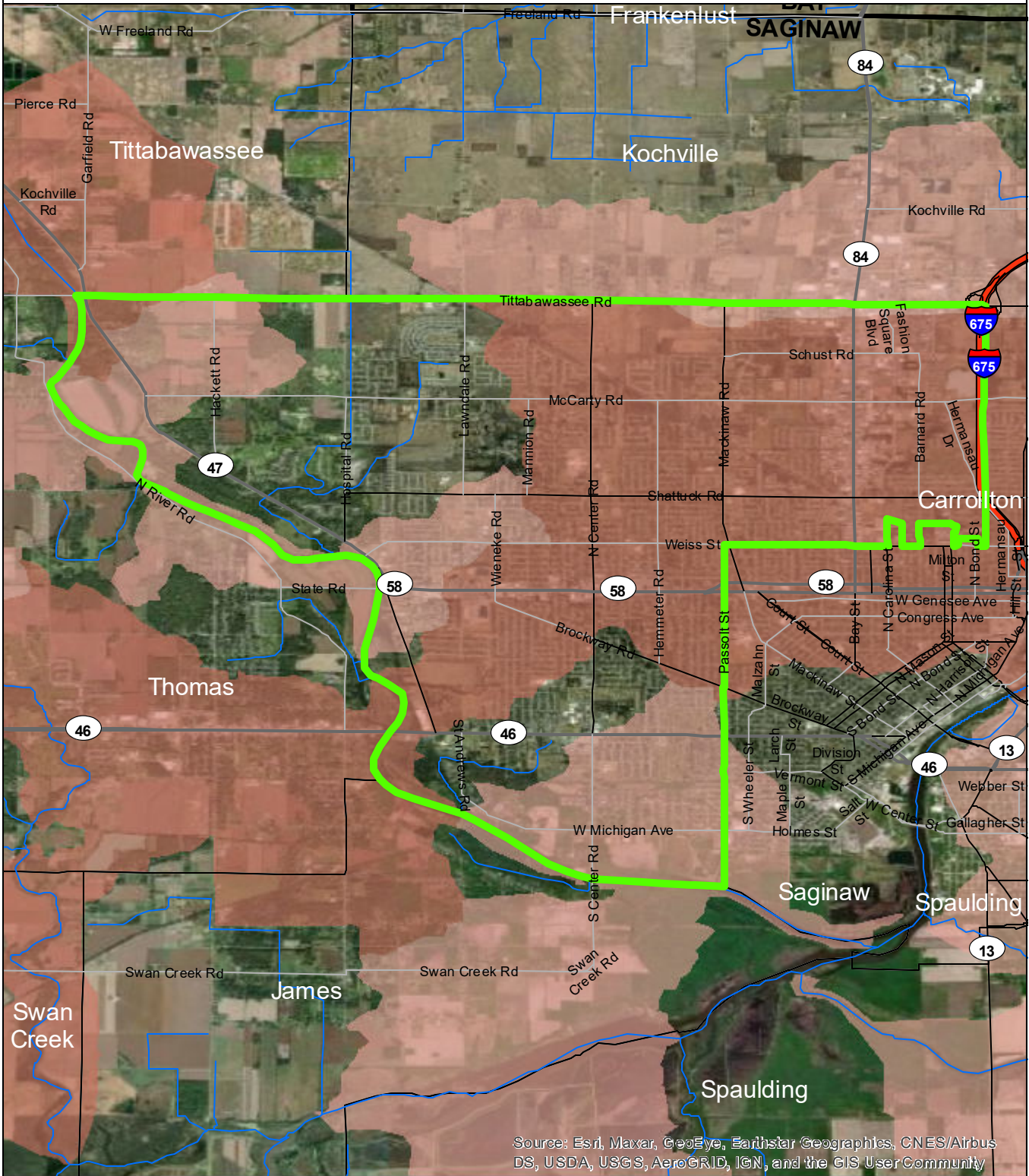
# Richland Township



<ul style="list-style-type: none"> <li><span style="border: 2px solid green; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Richland Township</li> <li><span style="border: 2px solid pink; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Saginaw Bay Basin</li> <li><span style="border: 1px solid black; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Counties</li> <li><span style="border-bottom: 1px solid blue; display: inline-block; width: 20px; margin-right: 5px;"></span> Rivers and Streams</li> <li><span style="border-bottom: 1px solid gray; display: inline-block; width: 20px; margin-right: 5px;"></span> Townships &amp; Cities</li> </ul>	<p><b>Sediment Loading Risk</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #f08080; margin-right: 5px;"></span> low</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #e06666; margin-right: 5px;"></span> moderate</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #c04040; margin-right: 5px;"></span> high</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #a02020; margin-right: 5px;"></span> very high</li> </ul>	<p>0      1      2 Miles</p> <p><b>Data Sources</b>          State of Michigan: Counties, Townships &amp; Cities          USGS: Sediment Loading Risk          Map produced by the Institute of Water Research - Michigan State University</p>	<p>N</p>
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# Saginaw Township



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

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

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

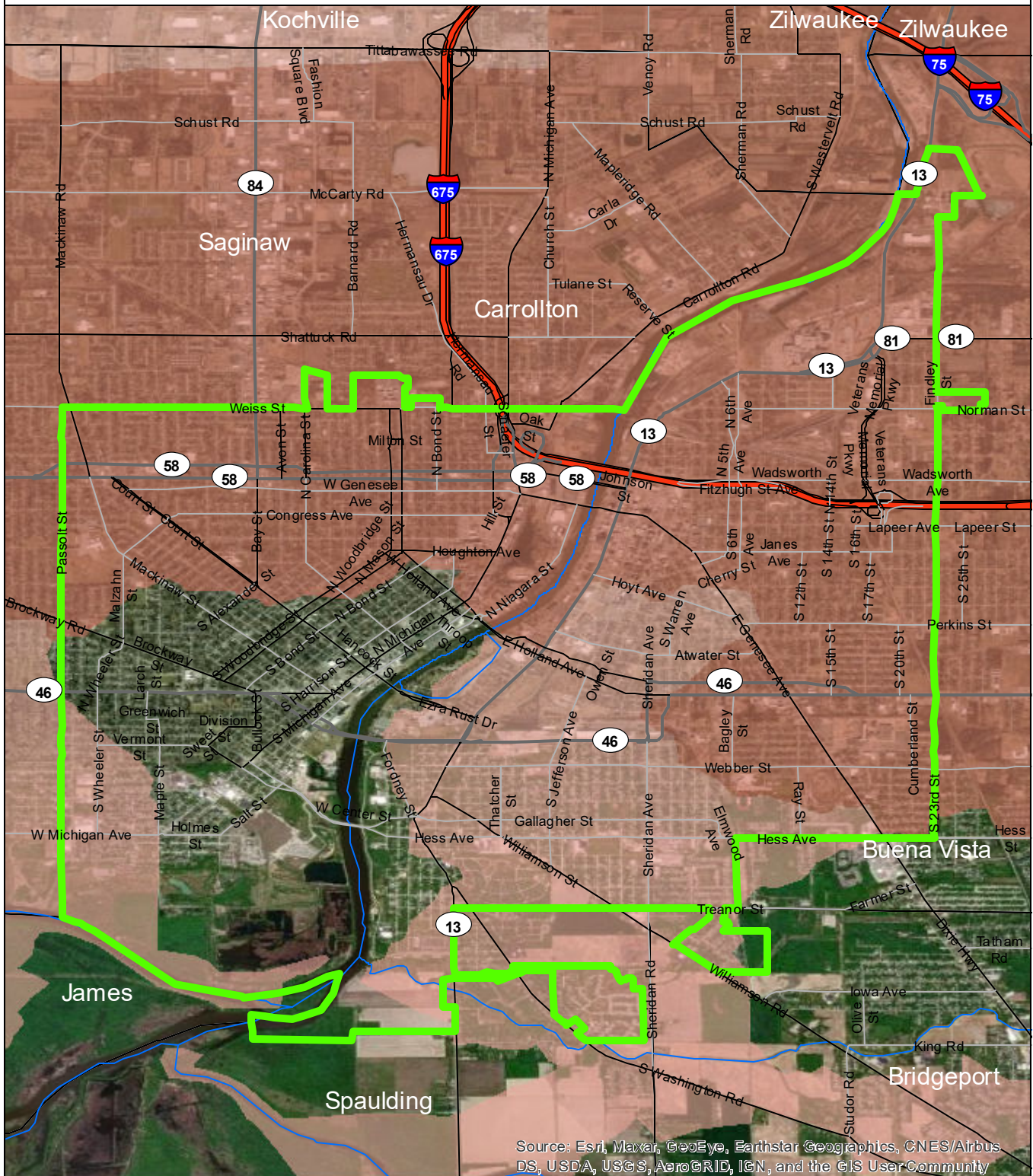
0 1 2 Miles

**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 Saginaw



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

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

### Sediment Loading Risk

- low
- moderate
- high
- very high

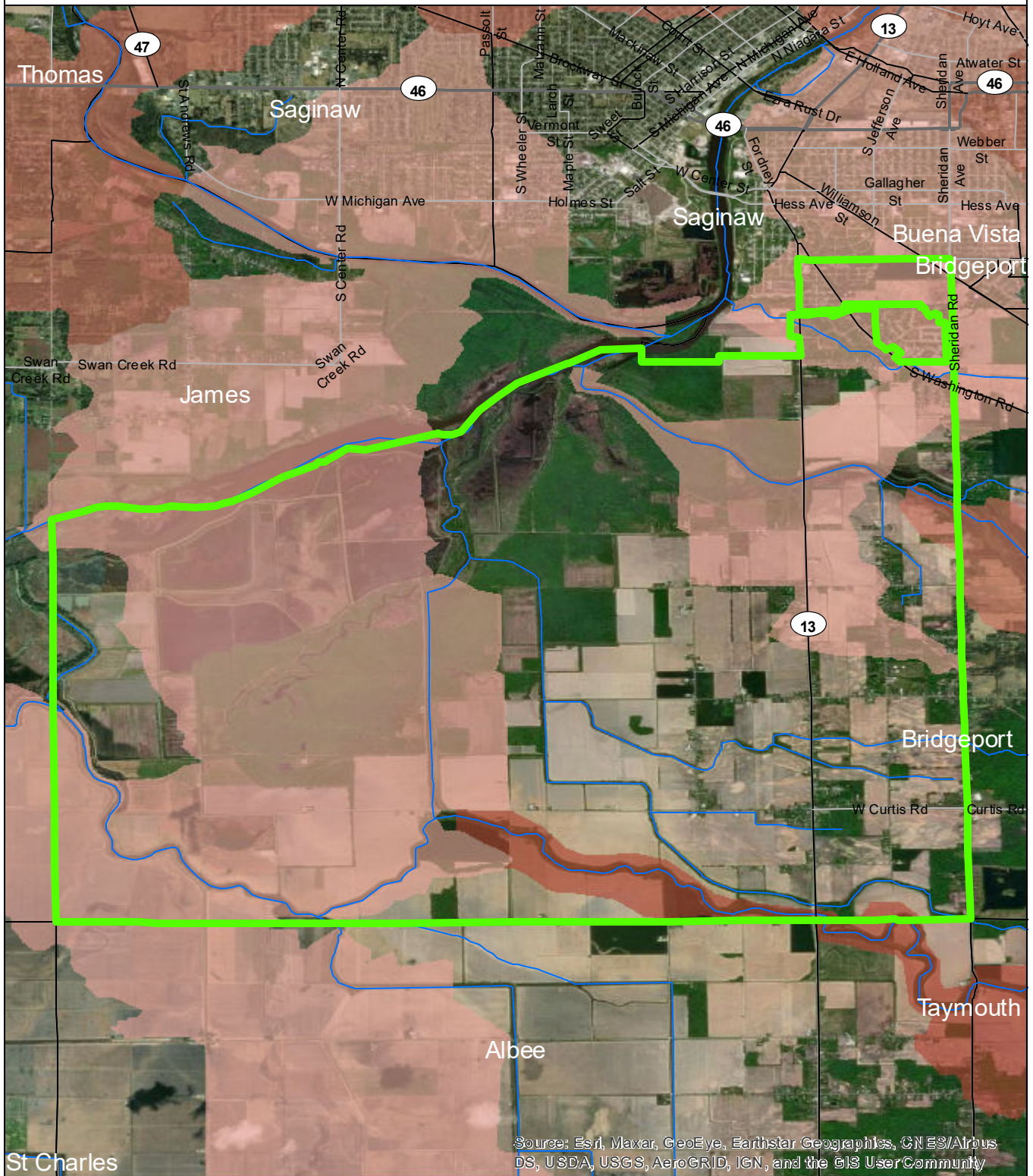


### Data Sources

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



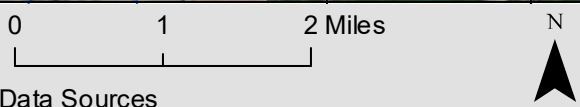
# Spaulding Township



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

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

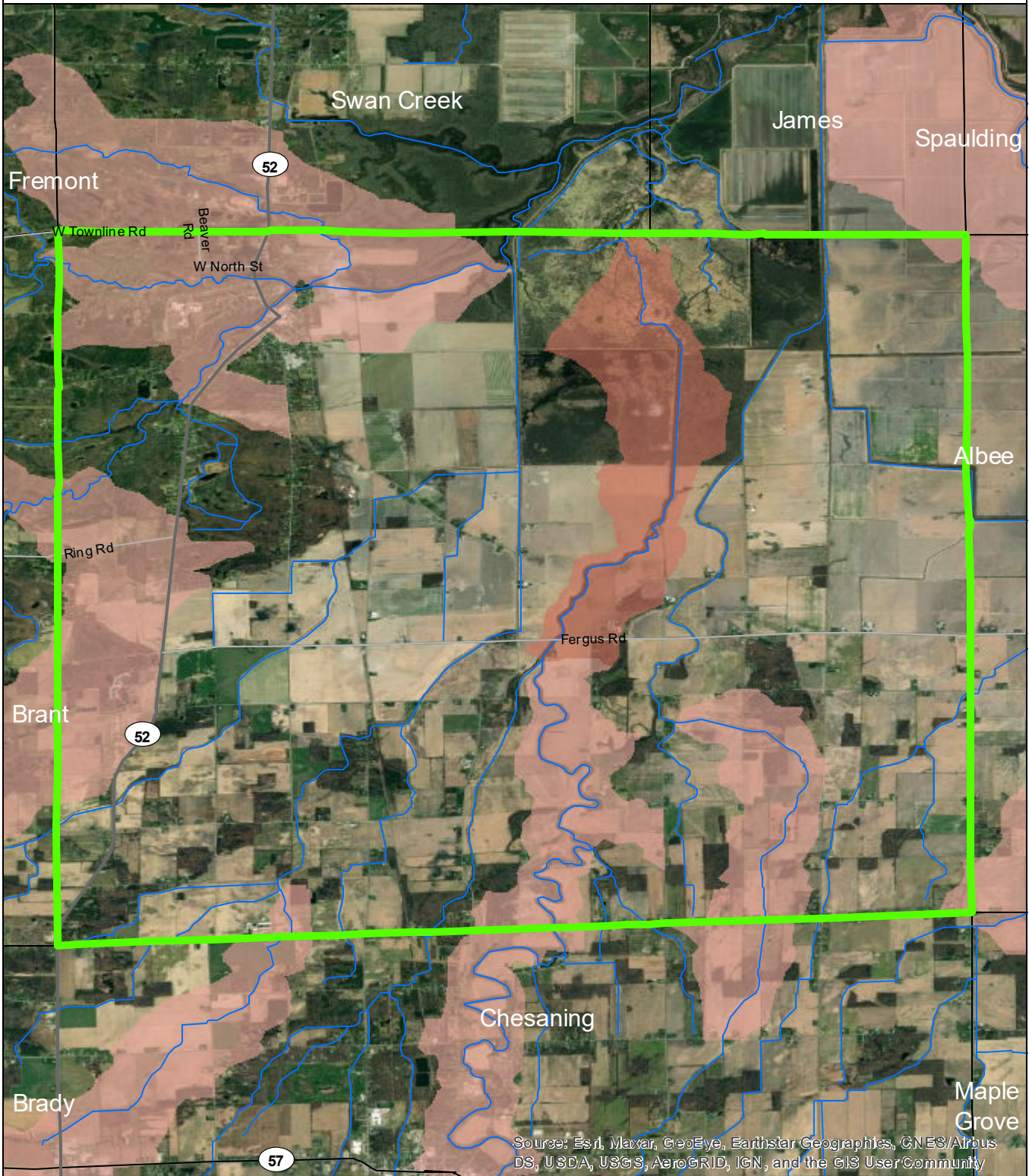
- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high



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



# St Charles Township

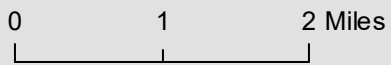


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



### Data Sources

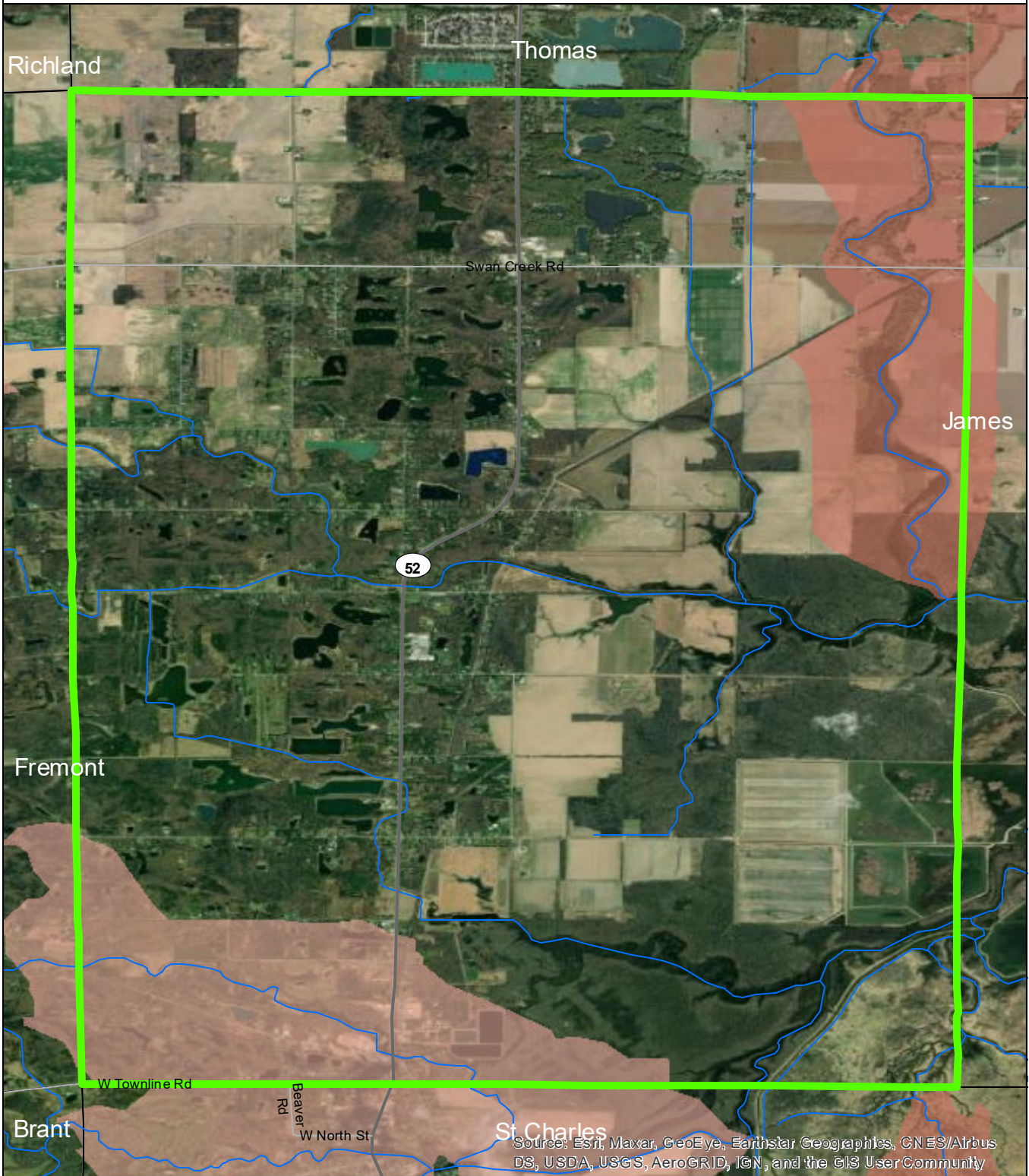
State of Michigan: Counties, Townships & Cities  
 USGS: Sediment Loading Risk

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





# Swan Creek Township



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

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

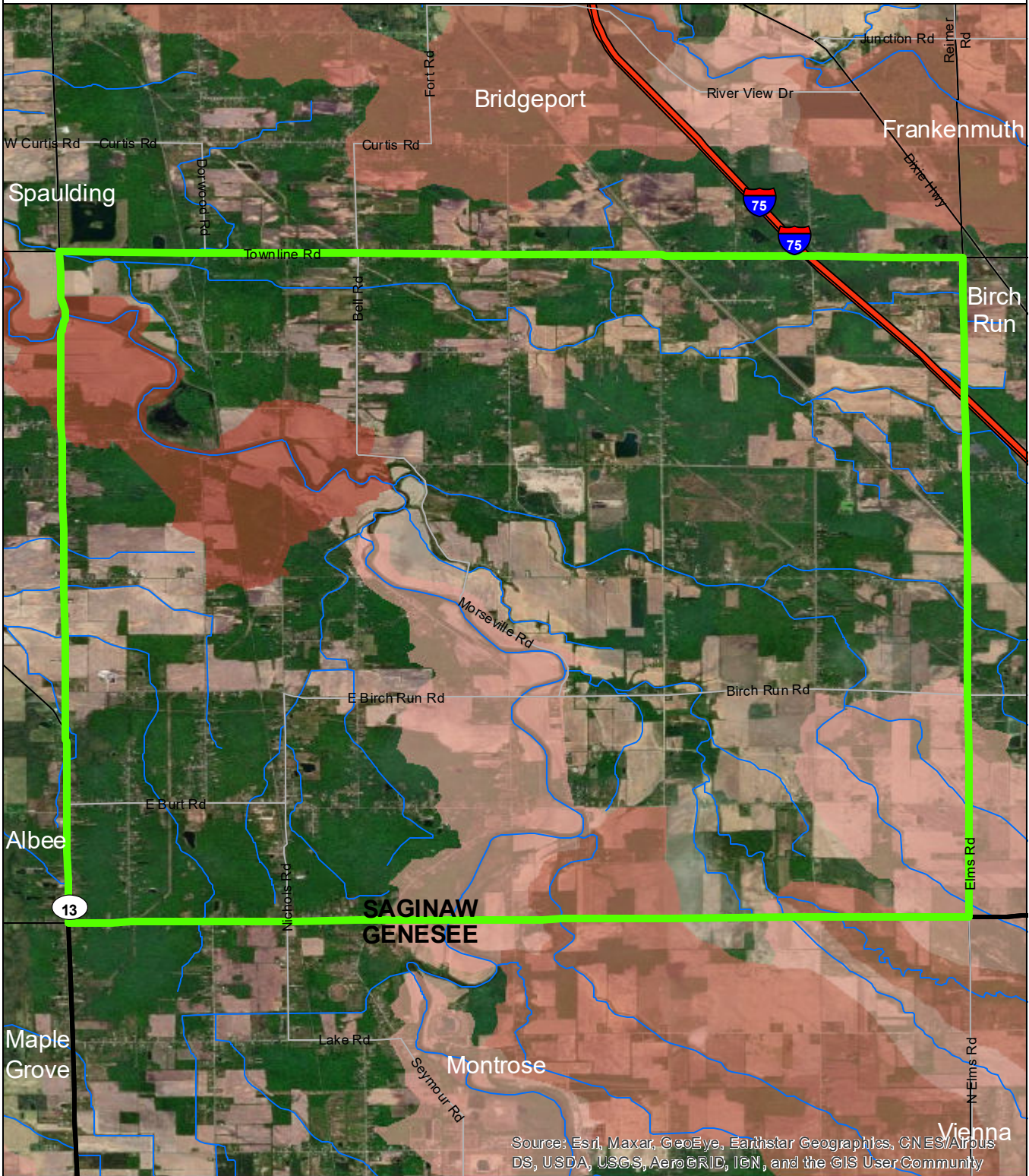
- Sediment Loading Risk**
- low
  - moderate
  - high
  - very high



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



# Taymouth Township



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

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

### Sediment Loading Risk

- low
- moderate
- high
- very high



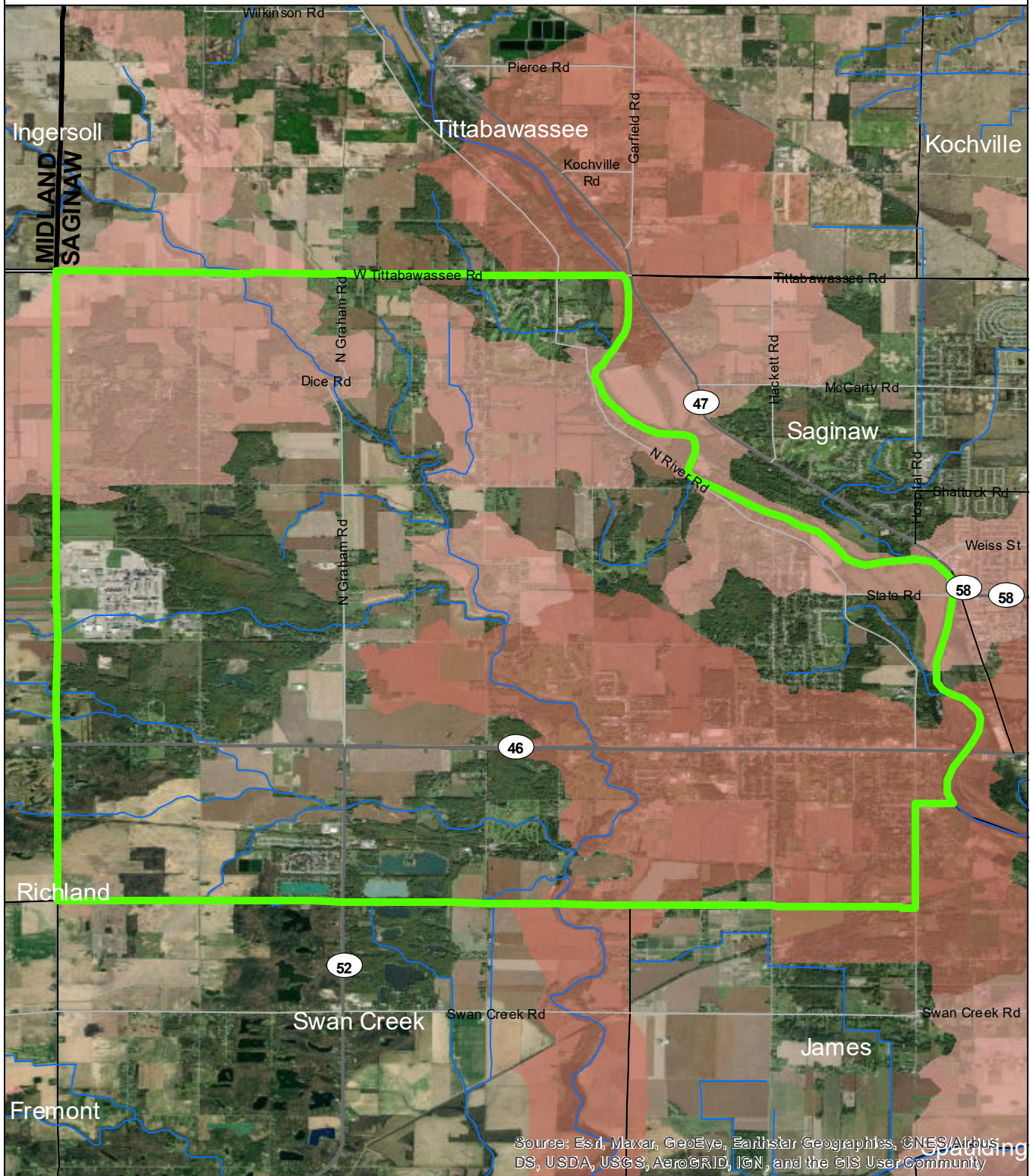
### Data Sources

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








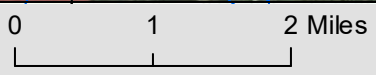
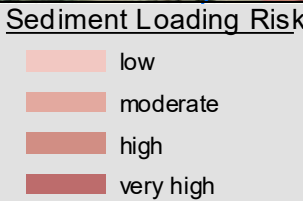


# Thomas Township



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

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



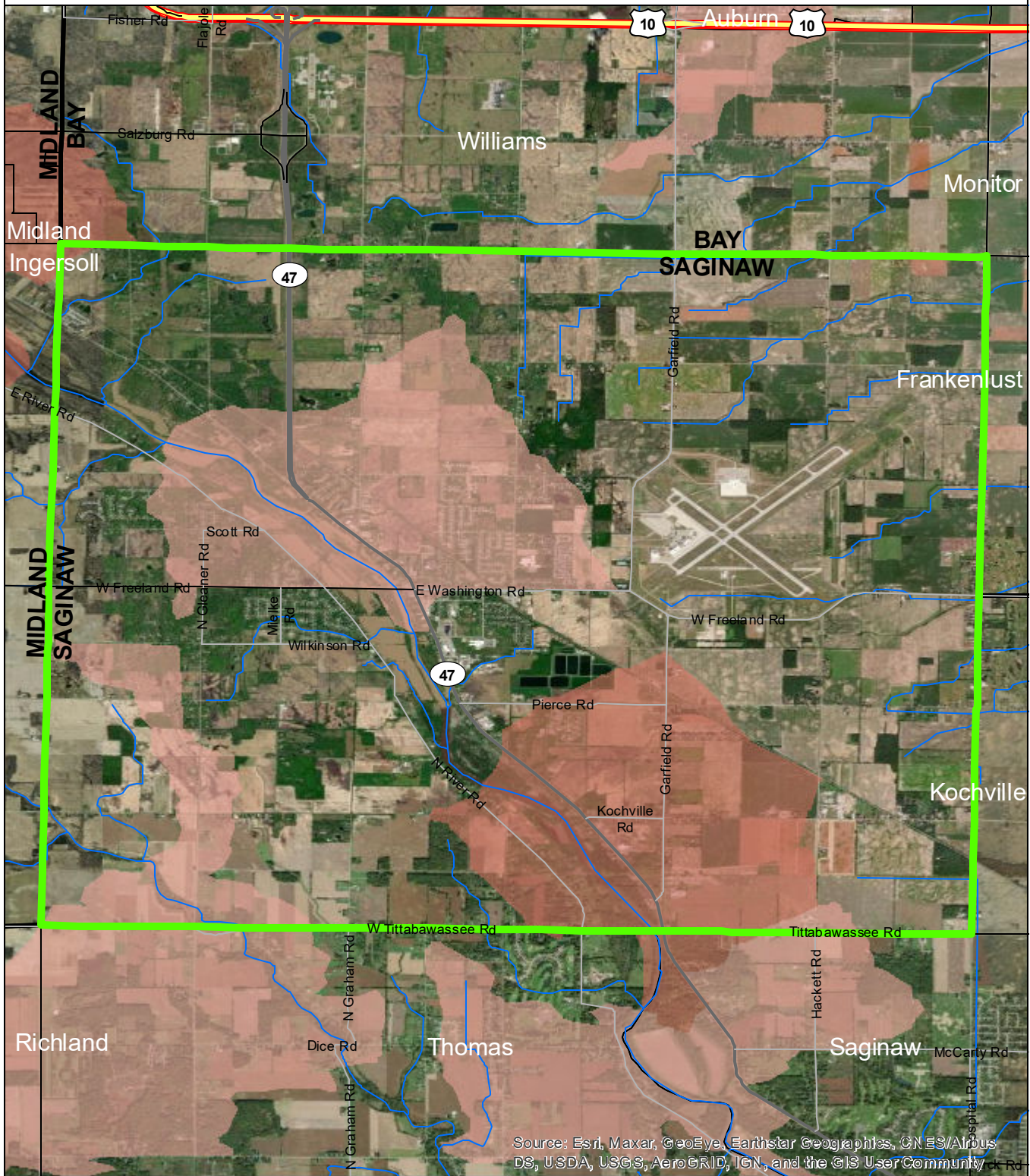
Data Sources

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





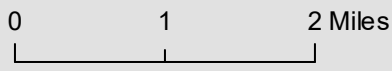
# Tittabawassee Township



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

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

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

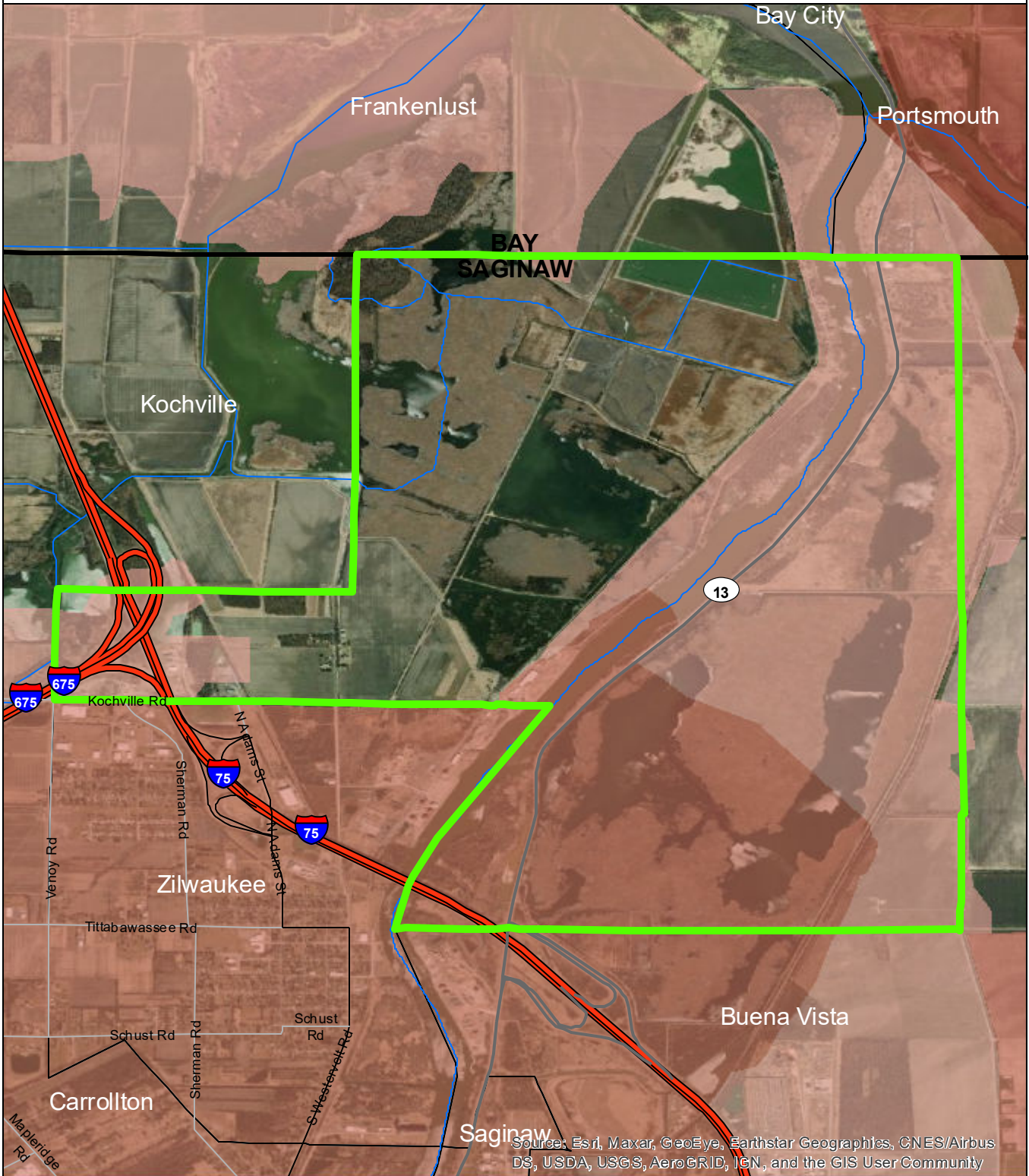


**Data Sources**

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

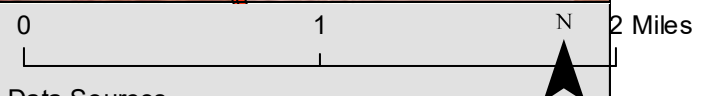


# Zilwaukee Township



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

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



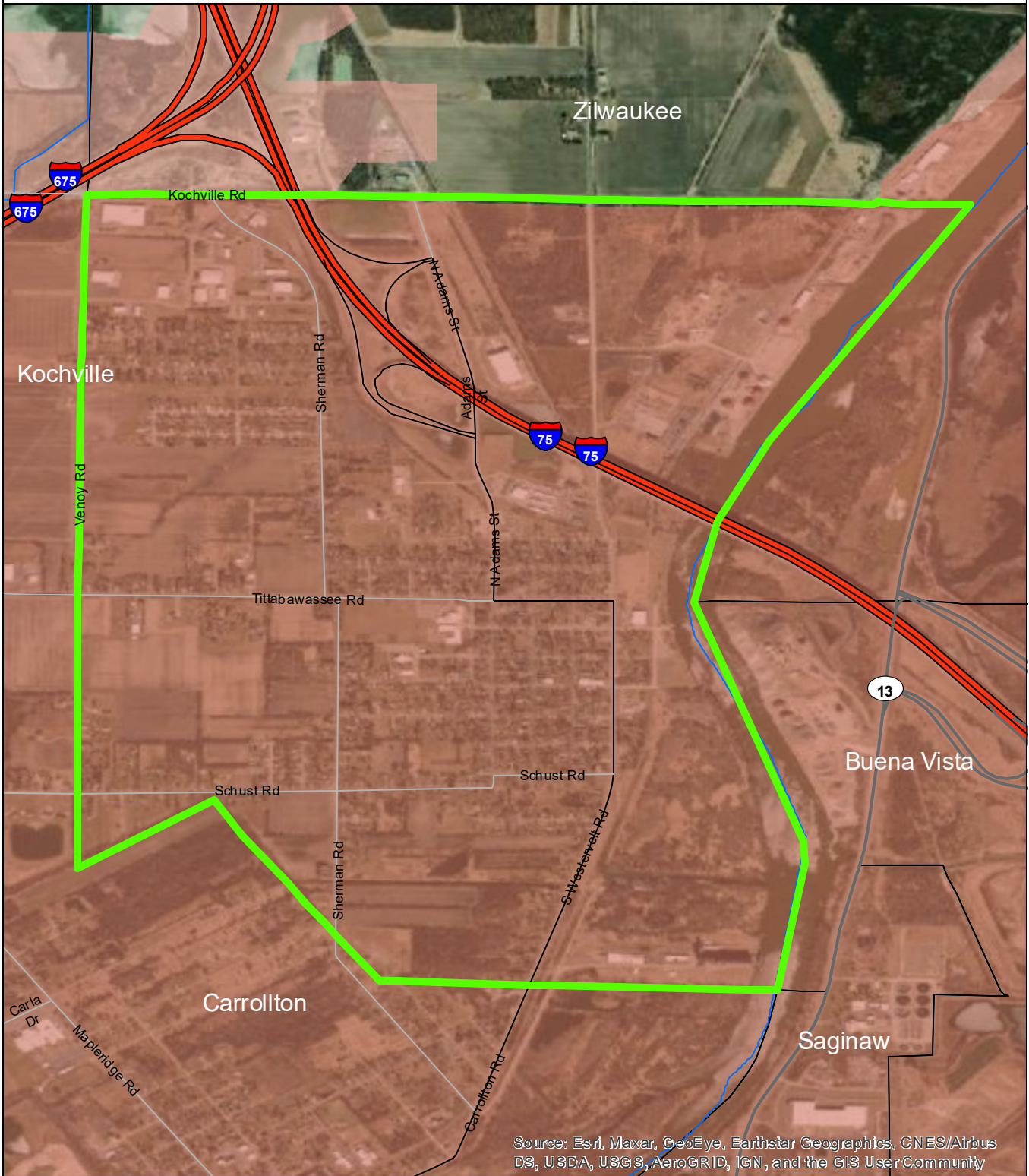
Data Sources

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

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

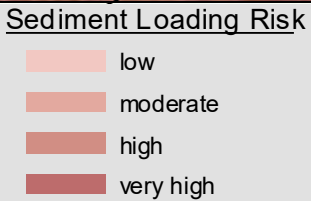


# City of Zilwaukee



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

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



0 1N

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