

# 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)

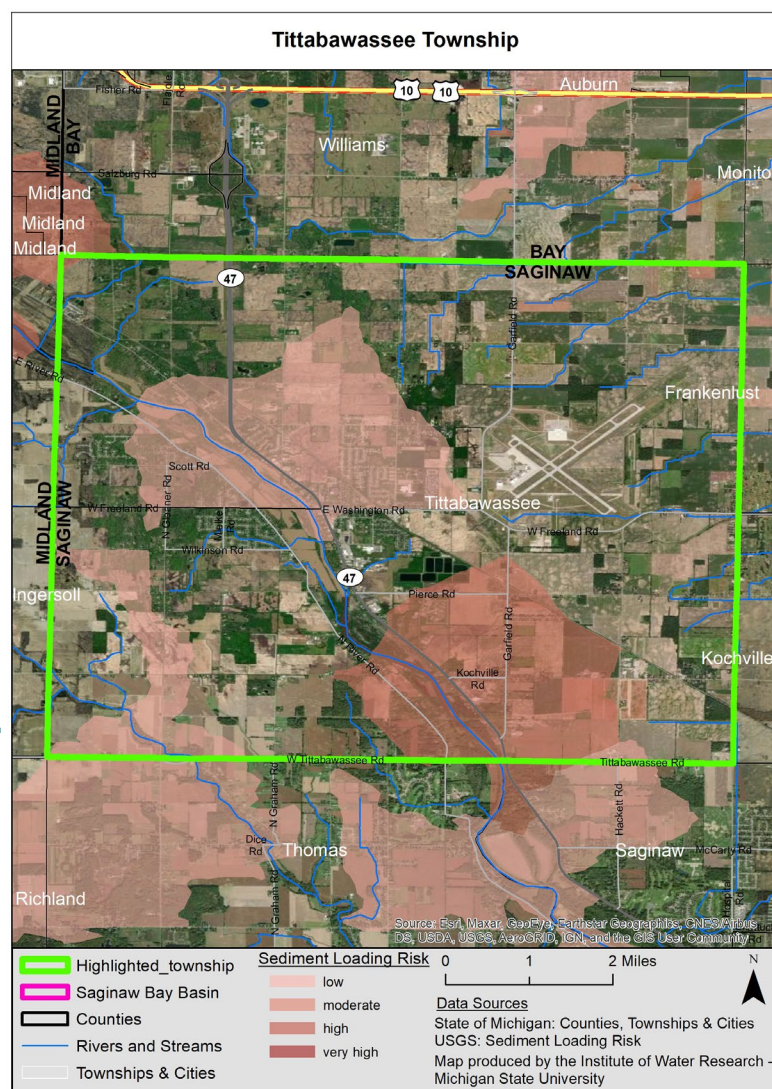
Please use the URL below to learn more about the SPARROW model, and direct questions about the maps to:

**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

---

City of Bad Axe . . . . . 3

Bingham Township . . . . . 4

Bloomfield Township . . . . . 5

Brookfield Township . . . . . 6

City of Caseville . . . . . 7

Caseville Township . . . . . 8

Chandler Township . . . . . 9

Colfax Township . . . . . 10

Dwight Township . . . . . 11

Fairhaven Township . . . . . 12

Gore Township . . . . . 13

Grant Township . . . . . 14

City of Harbor Beach . . . . . 15

Hume Township . . . . . 16

Huron Township . . . . . 17

Lake Township . . . . . 18

Lincoln Township . . . . . 19

McKinley Township . . . . . 20

Meade Township . . . . . 21

Oliver Township . . . . . 22

Paris Township . . . . . 23

Pointe Aux Barques Township . . . . . 24

Port Austin Township . . . . . 25

Rubicon Township . . . . . 26

Sand Beach Township . . . . . 27

Sebewaing Township . . . . . 28

Sheridan Township . . . . . 29

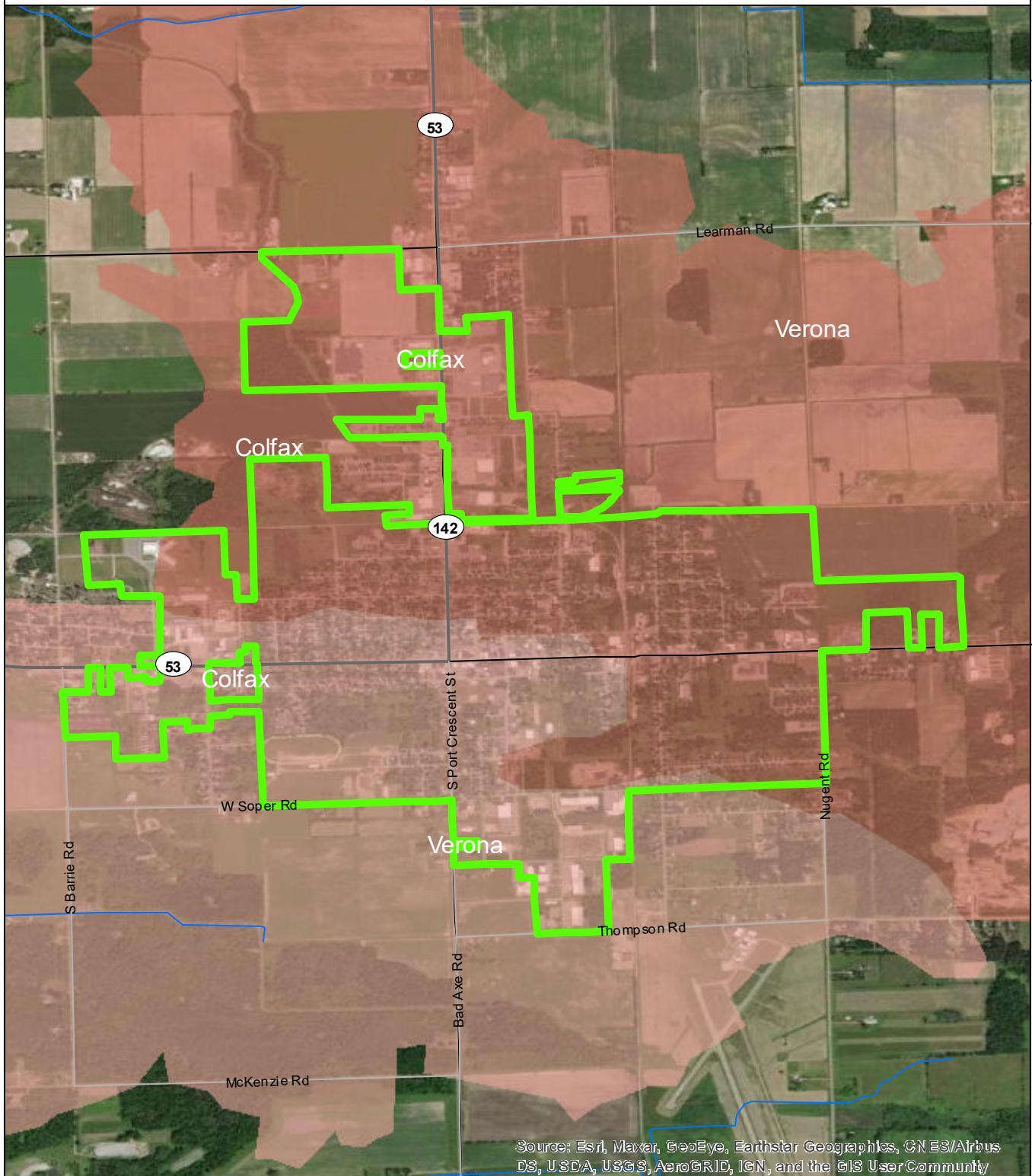
Sherman Township . . . . . 30

Sigel Township . . . . . 31

Verona Township . . . . . 32

Winsor Township . . . . . 33

# City of Bad Axe



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

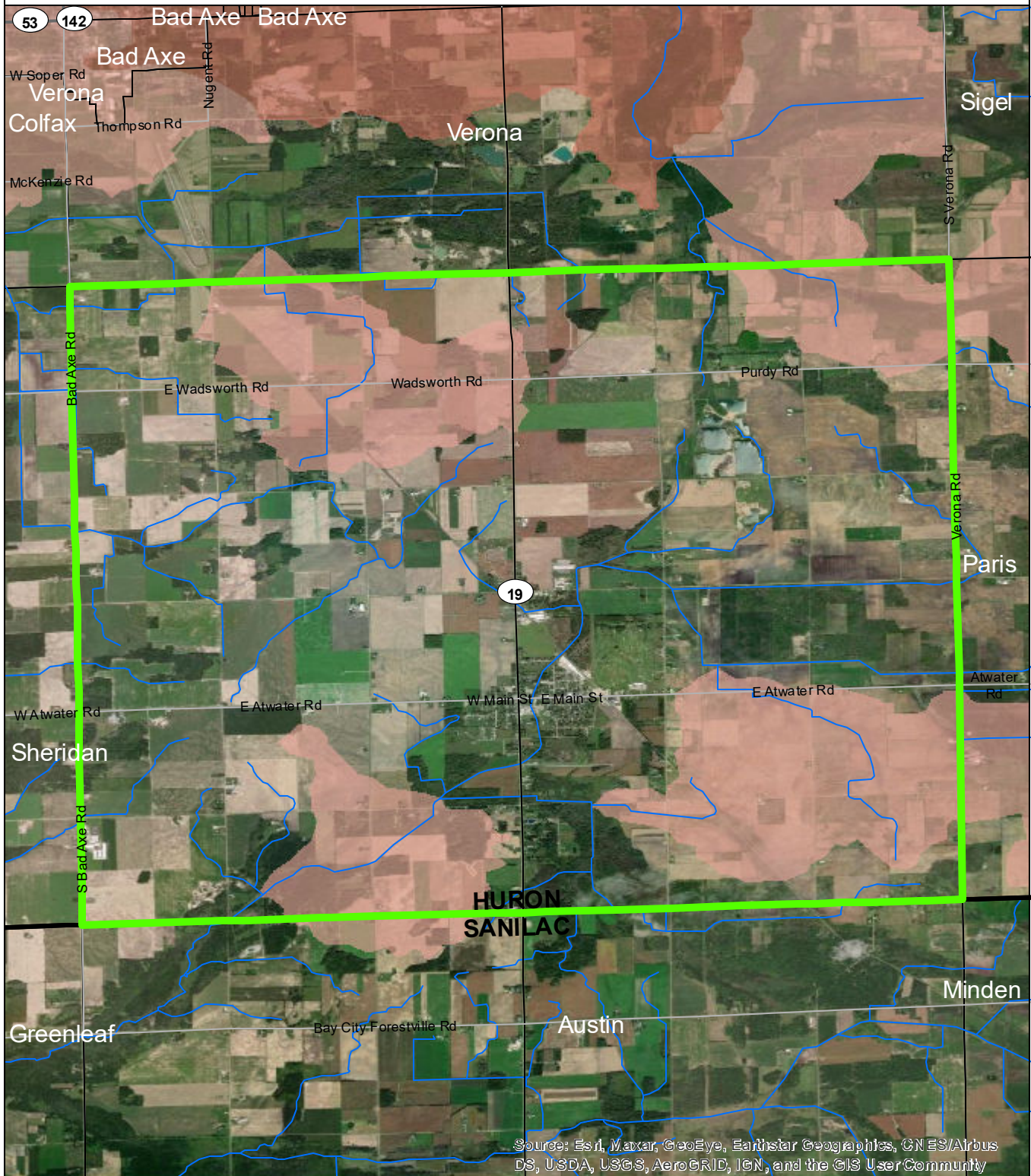


## Data Sources

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



# Bingham Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

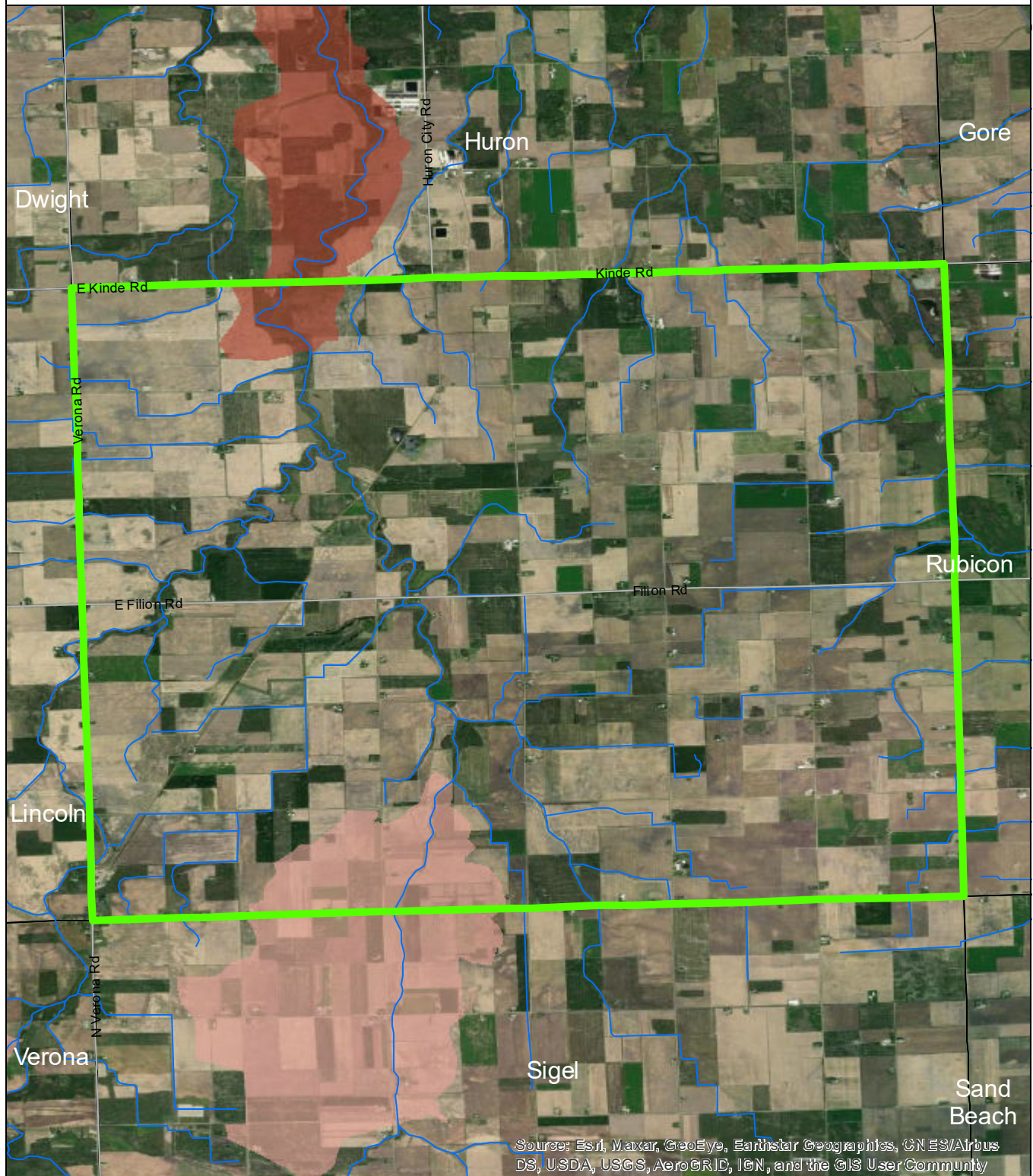
## Data Sources

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

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# Bloomfield Township



- Bloomfield 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

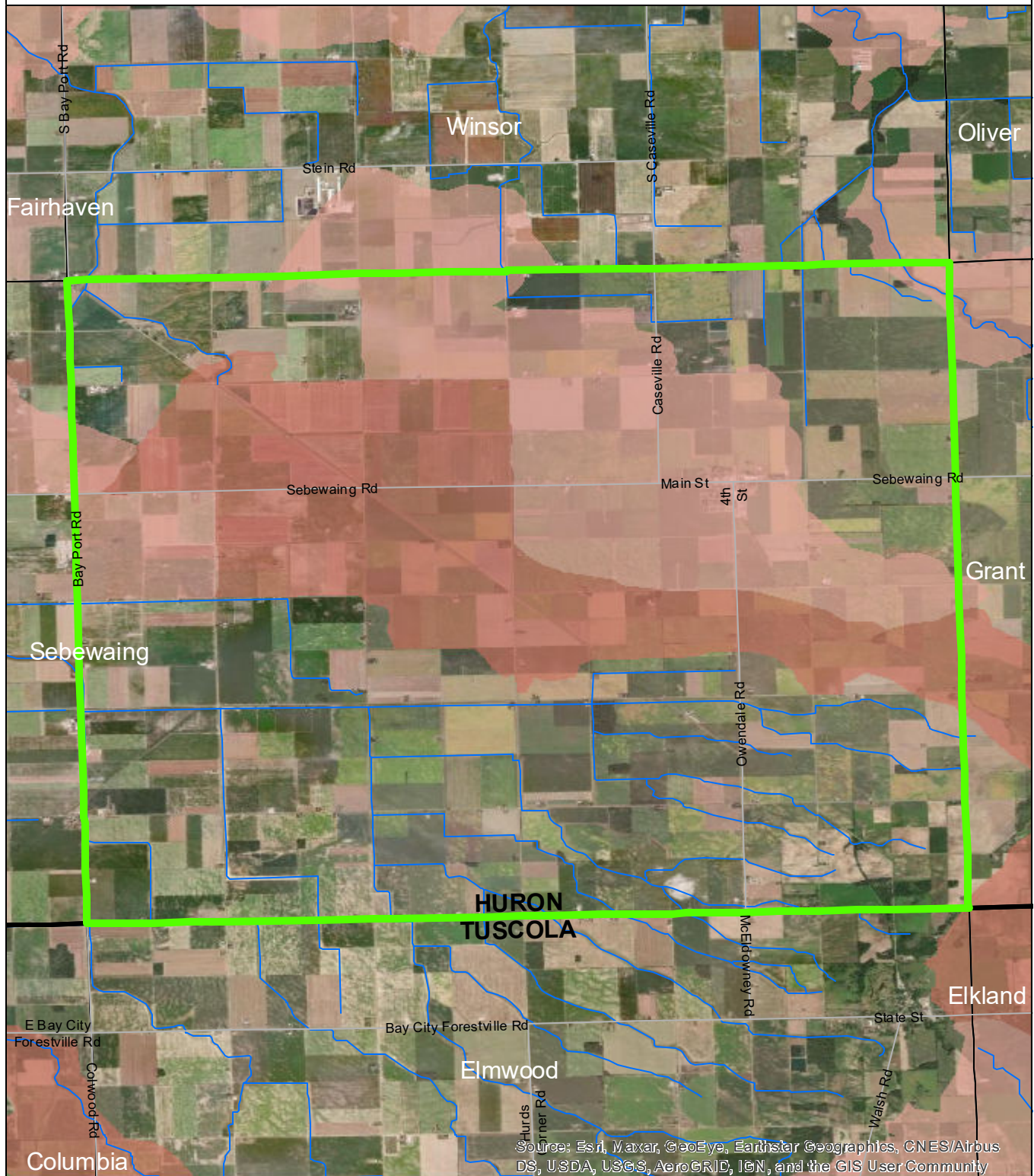
Map produced by the Institute of Water Research - Michigan State University

N





# Brookfield Township



- Brookfield 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

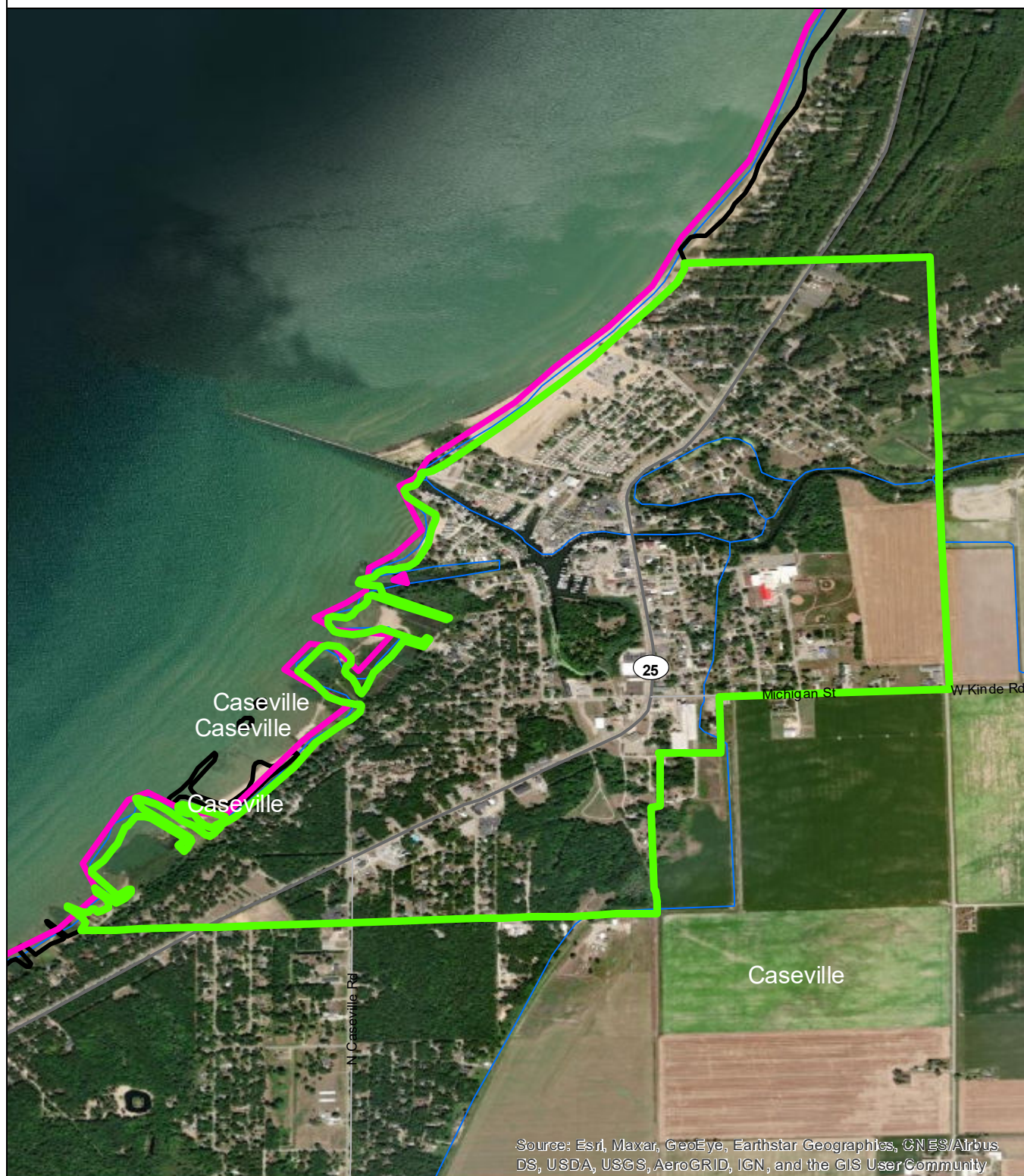
USGS: Sediment Loading Risk

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# City of Caseville



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

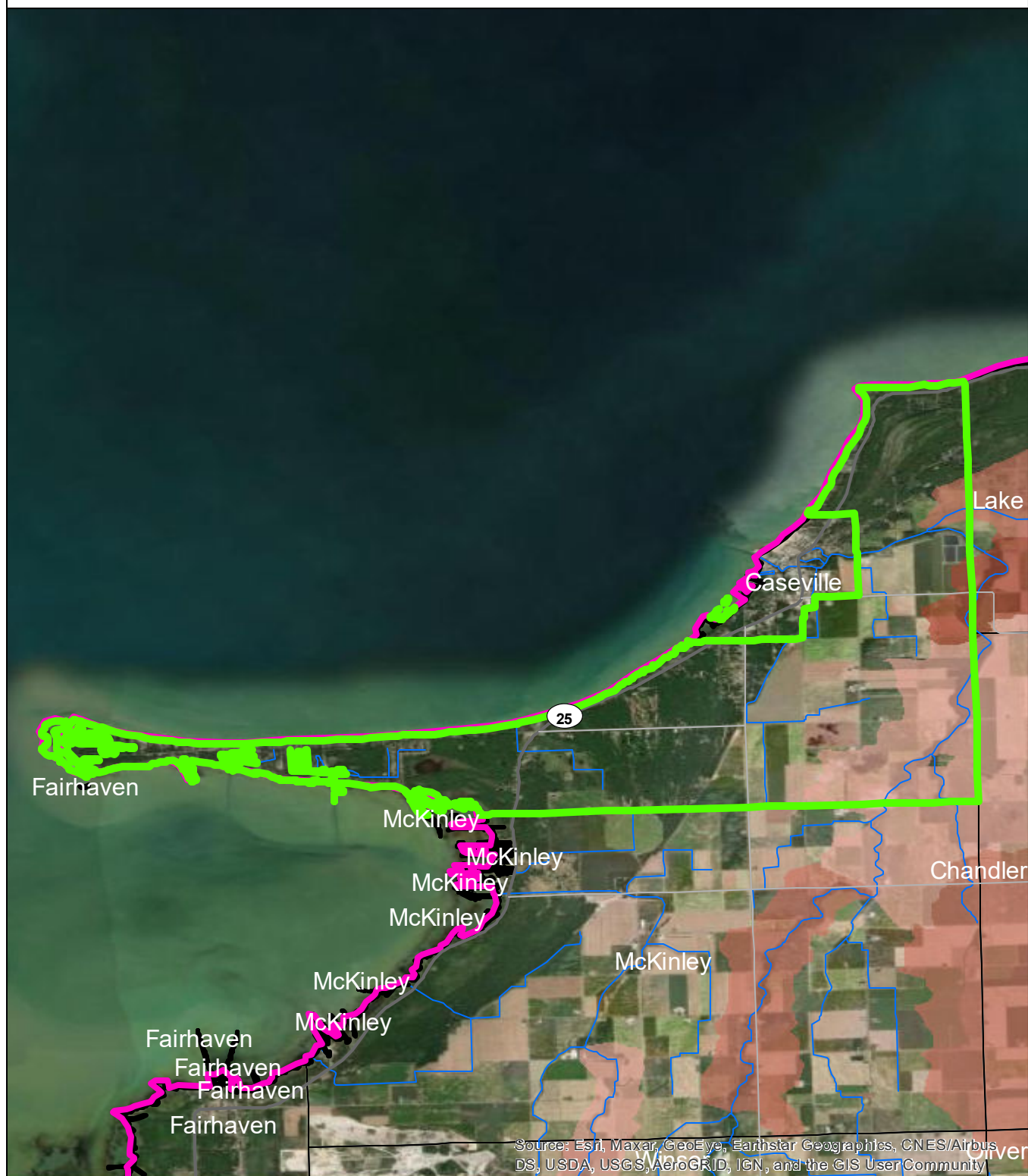
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N

## Data Sources

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

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

# Caseville Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

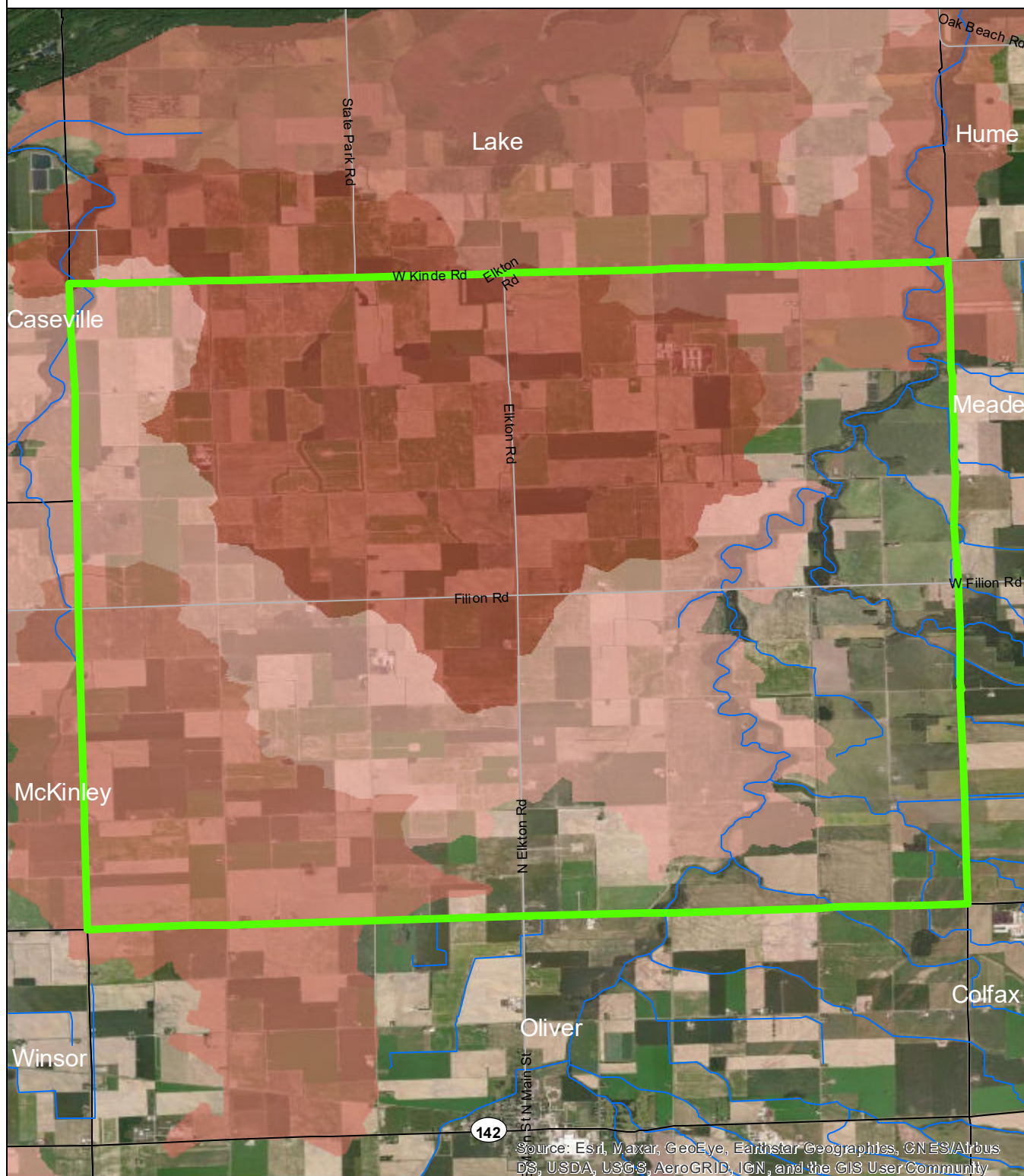
State of Michigan: Counties, Townships & Cities  
USGS: Sediment Loading Risk

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# Chandler Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

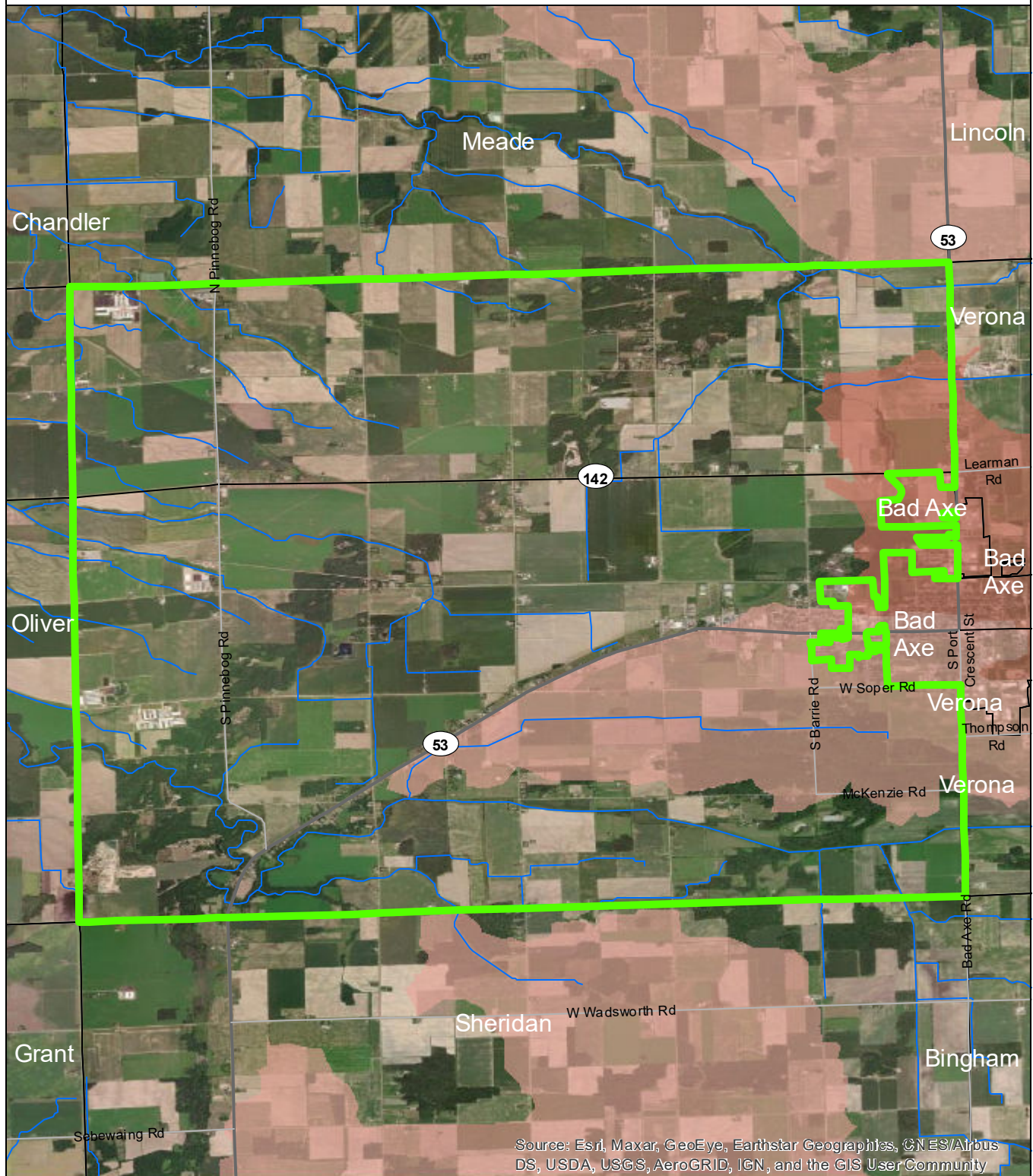
## Data Sources

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

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



# Colfax Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

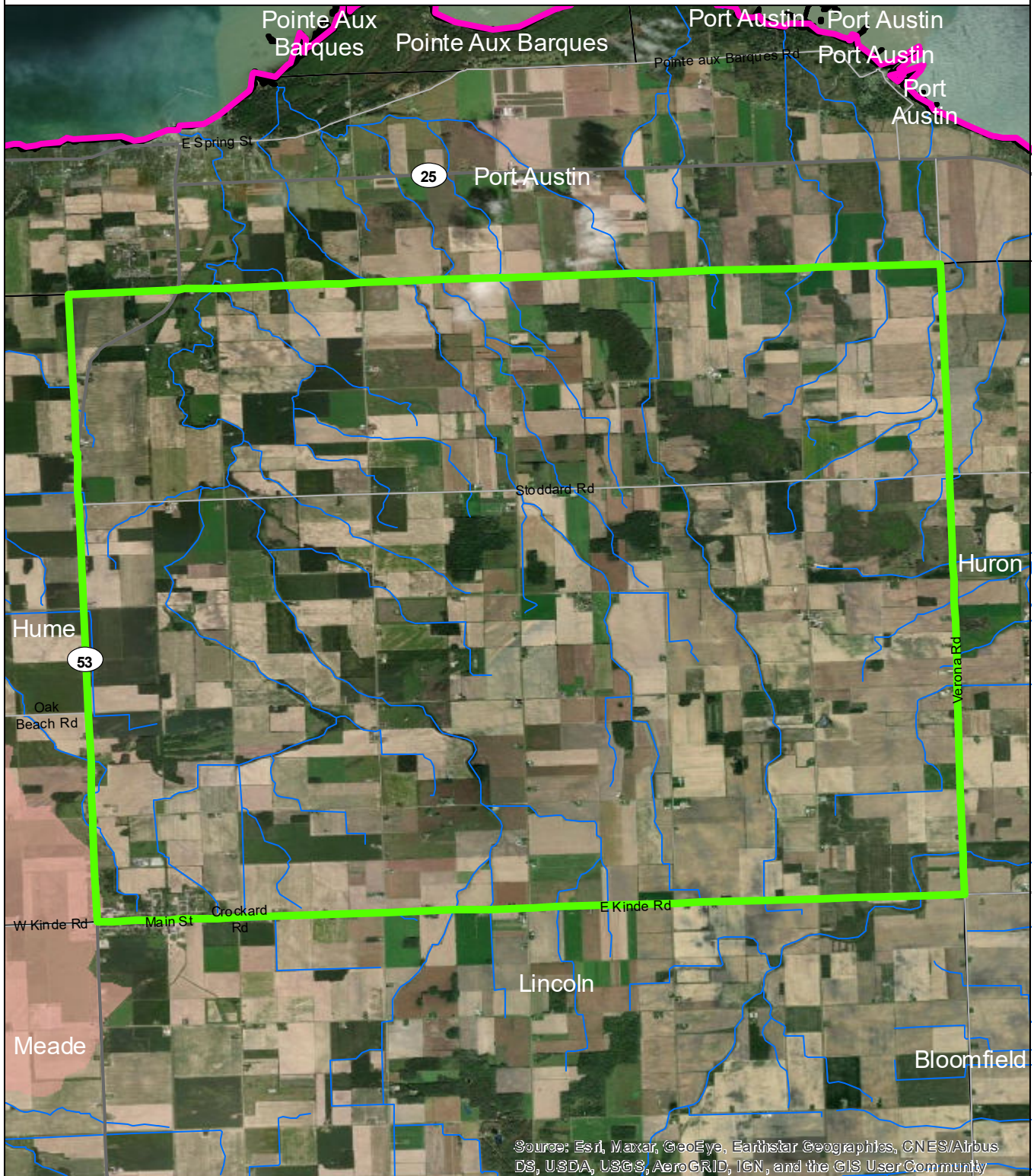
State of Michigan: Counties, Townships & Cities

USGS: Sediment Loading Risk

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



# Dwight Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

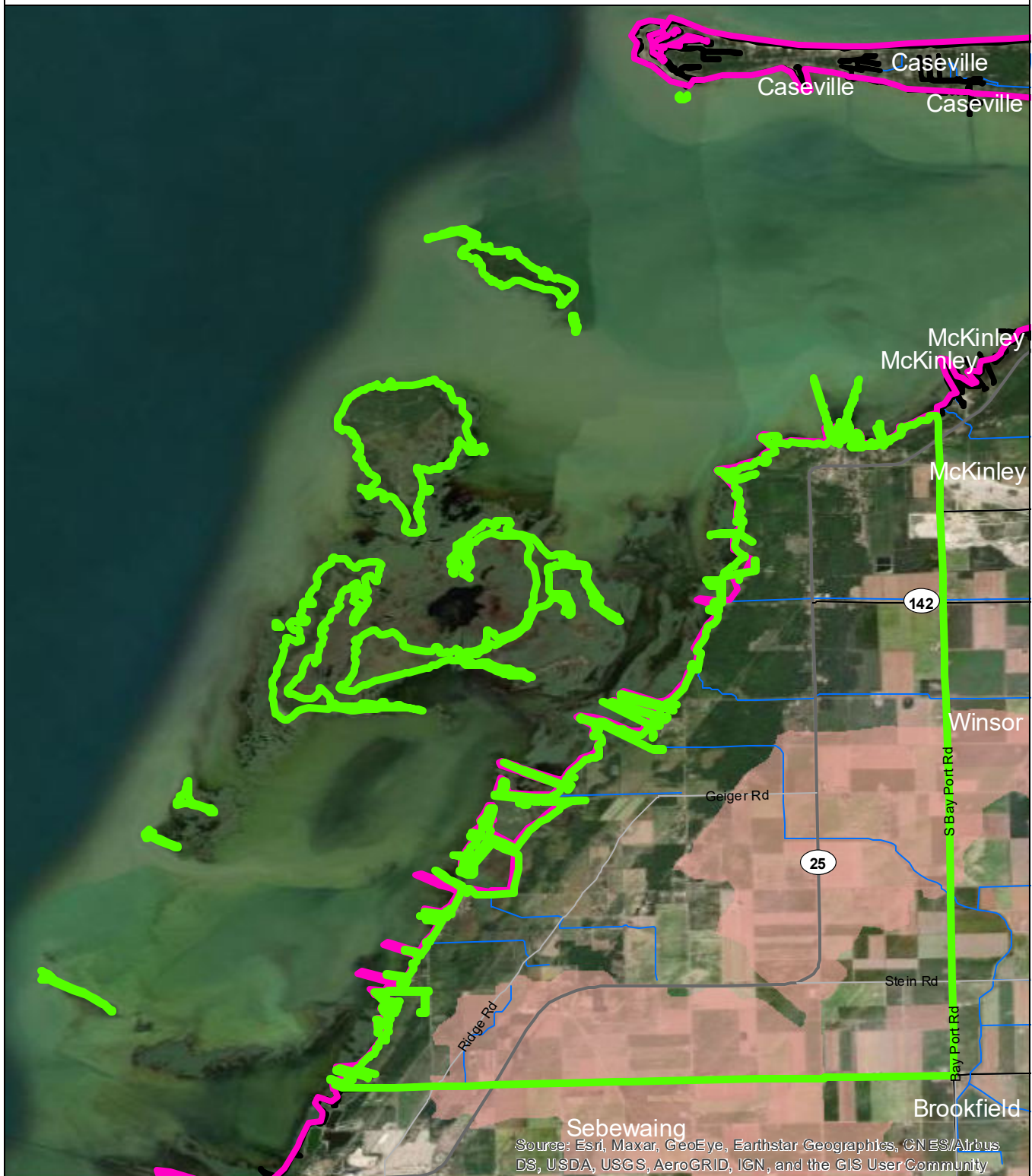
0 1 2 Miles

## Data Sources

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

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

# Fairhaven Township



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

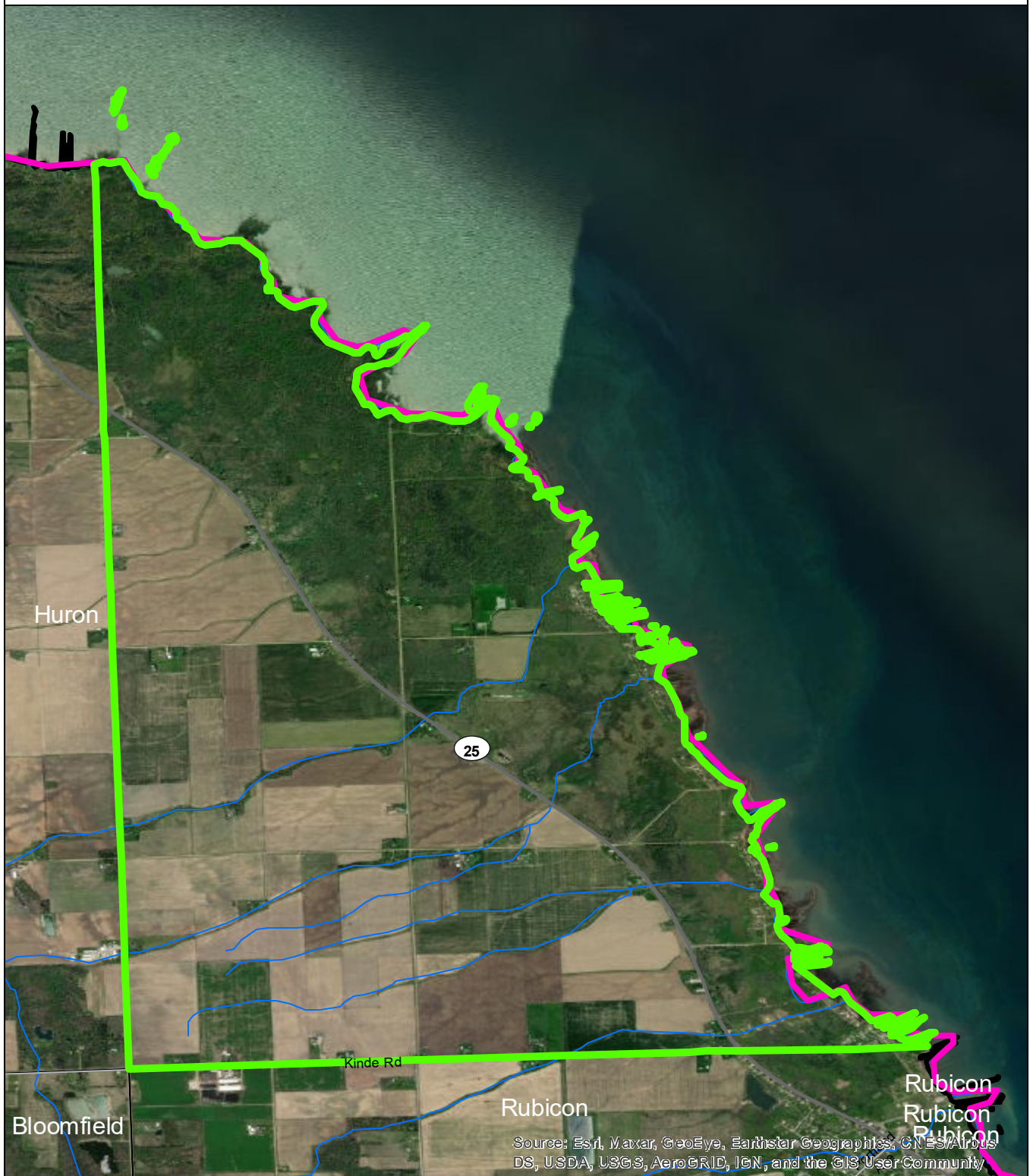
State of Michigan: Counties, Townships & Cities

USGS: Sediment Loading Risk

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



# Gore Township



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

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

## Sediment Loading Risk

- ▬ low
- ▬ moderate
- ▬ high
- ▬ very high

0 1 2 Miles

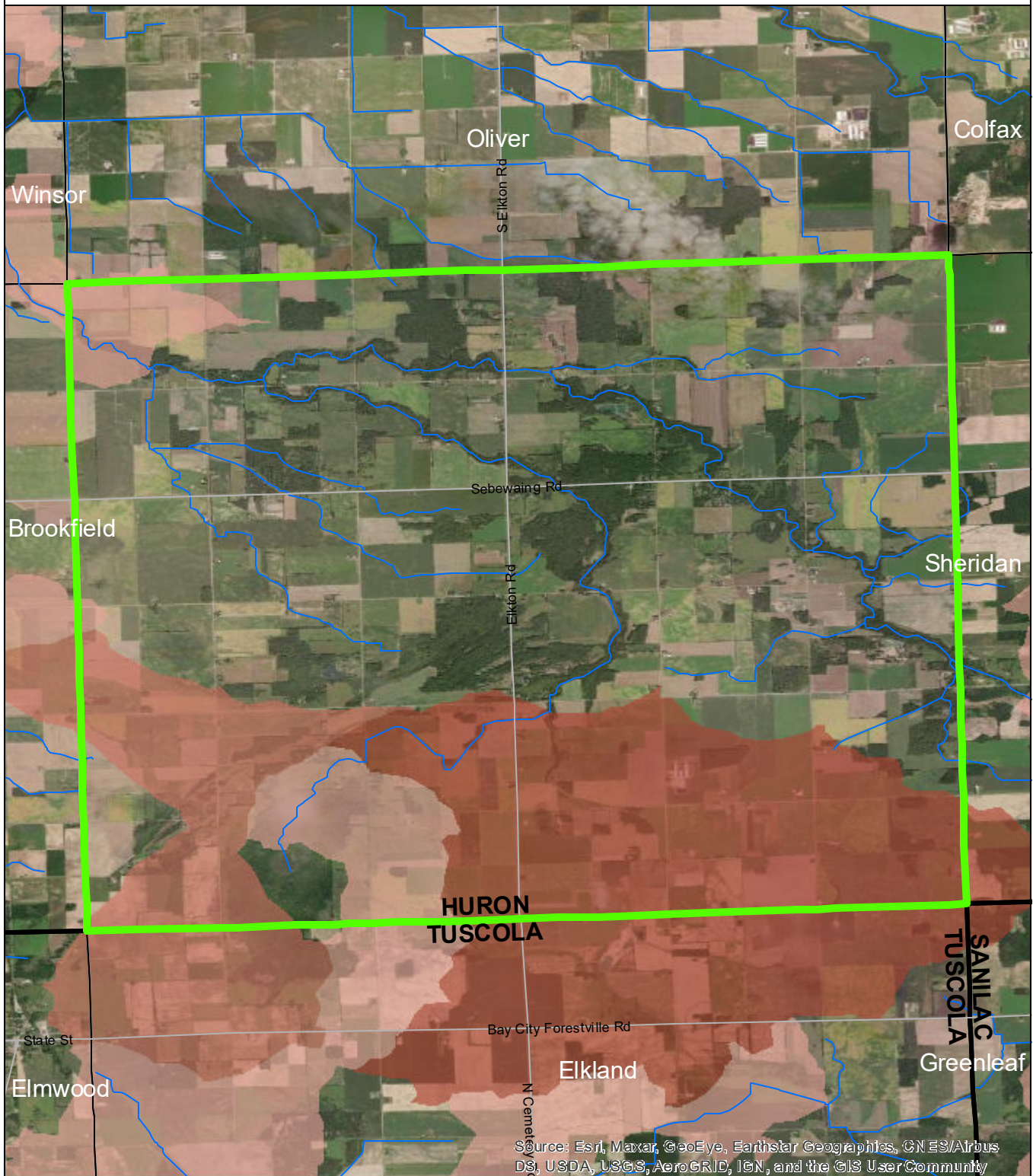
## Data Sources

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

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



# Grant Township



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

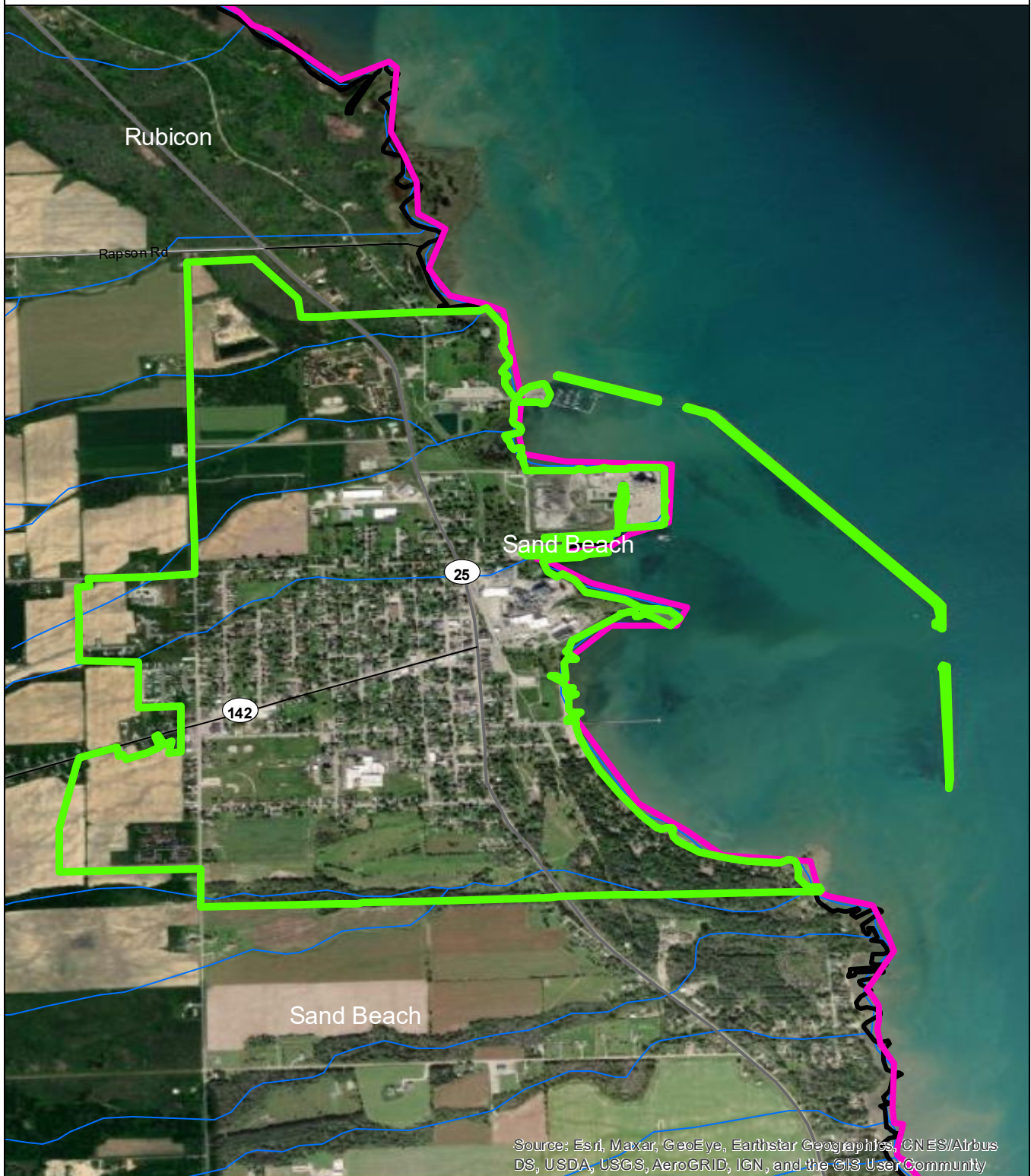
## Data Sources

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

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



# City of Harbor Beach



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

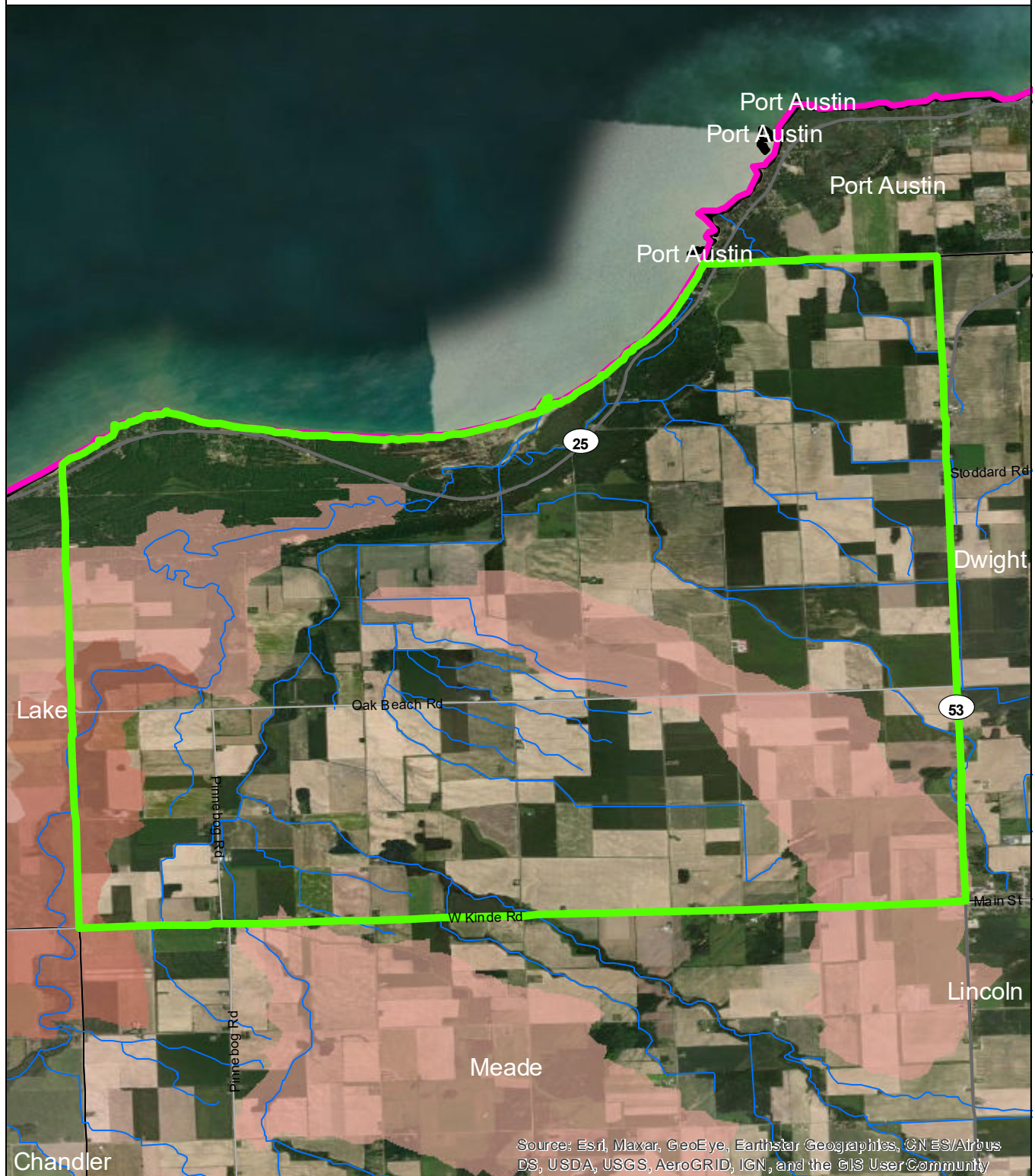
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## Data Sources

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

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# Hume Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

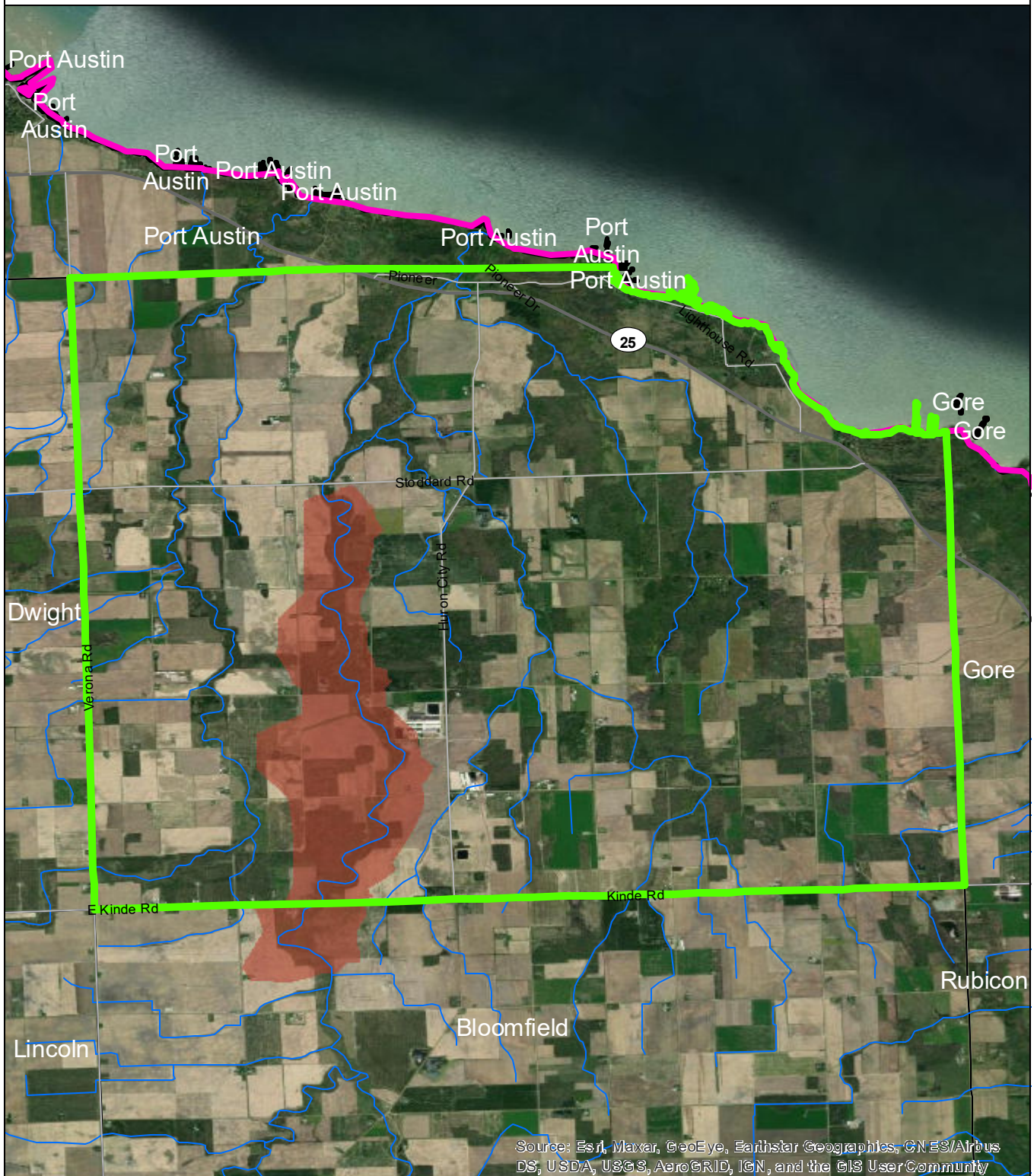
## Data Sources

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

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# Huron Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

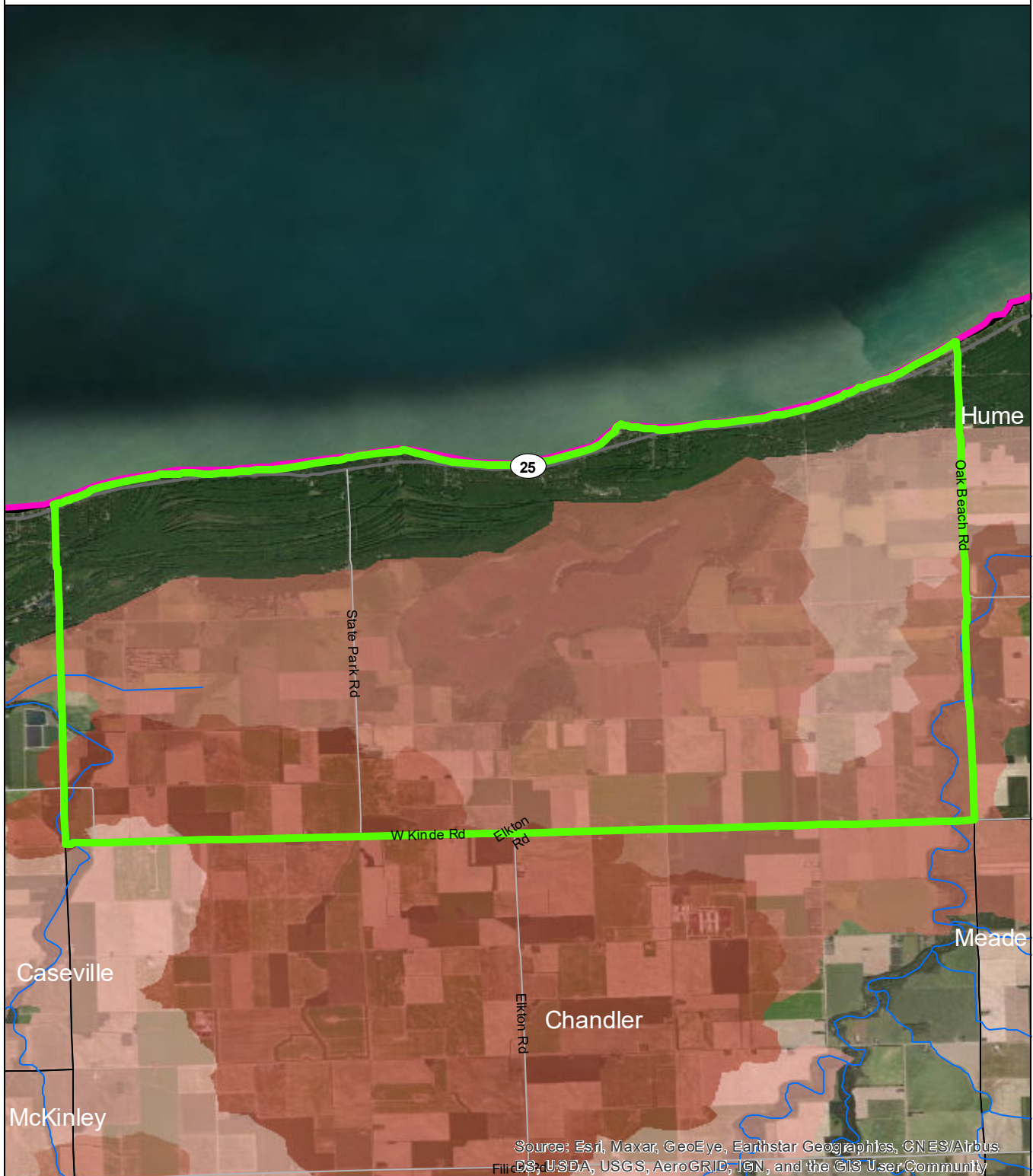
0 1 2 Miles

## Data Sources

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

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

# Lake Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

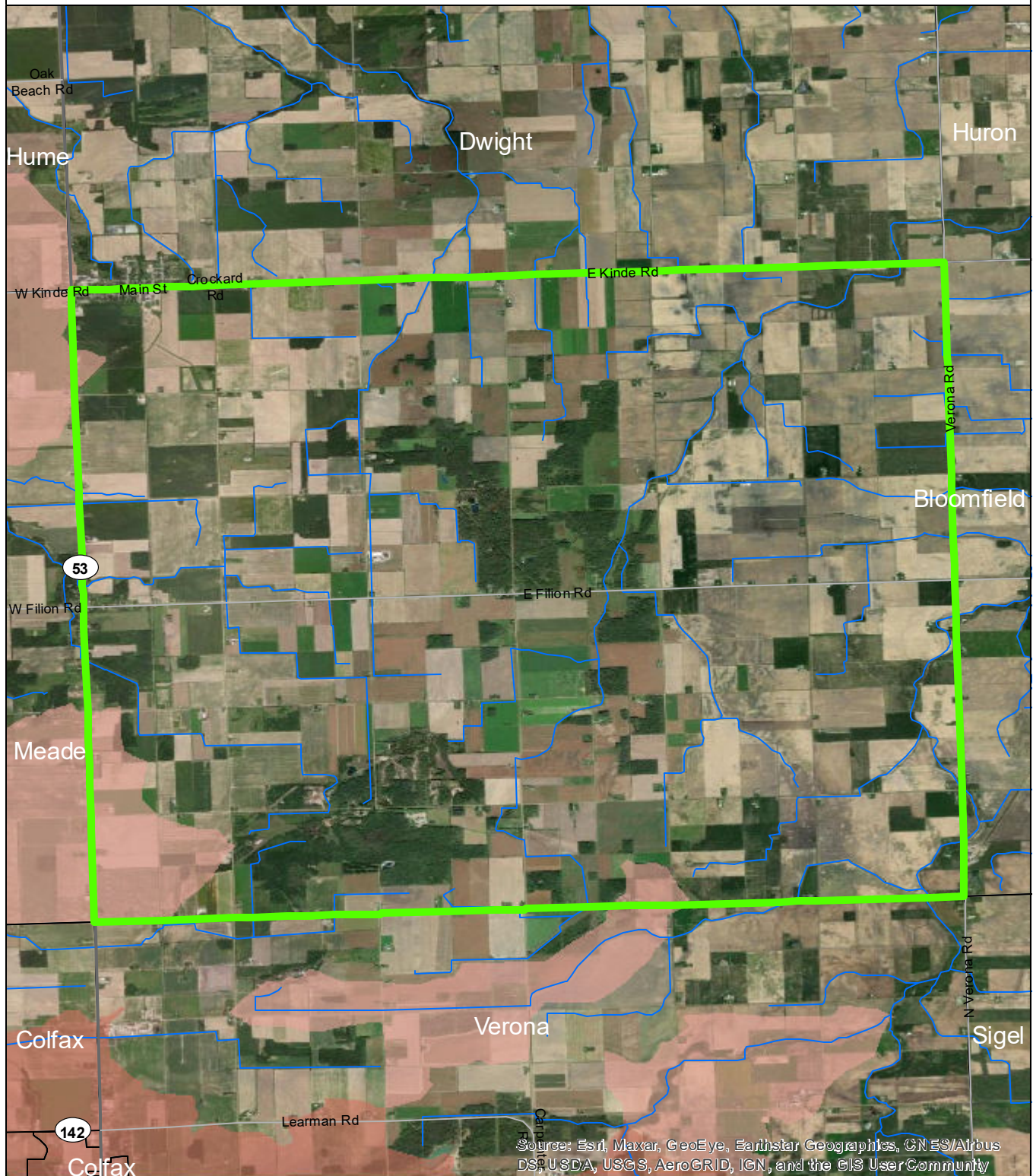
State of Michigan: Counties, Townships & Cities  
USGS: Sediment Loading Risk

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





# Lincoln Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

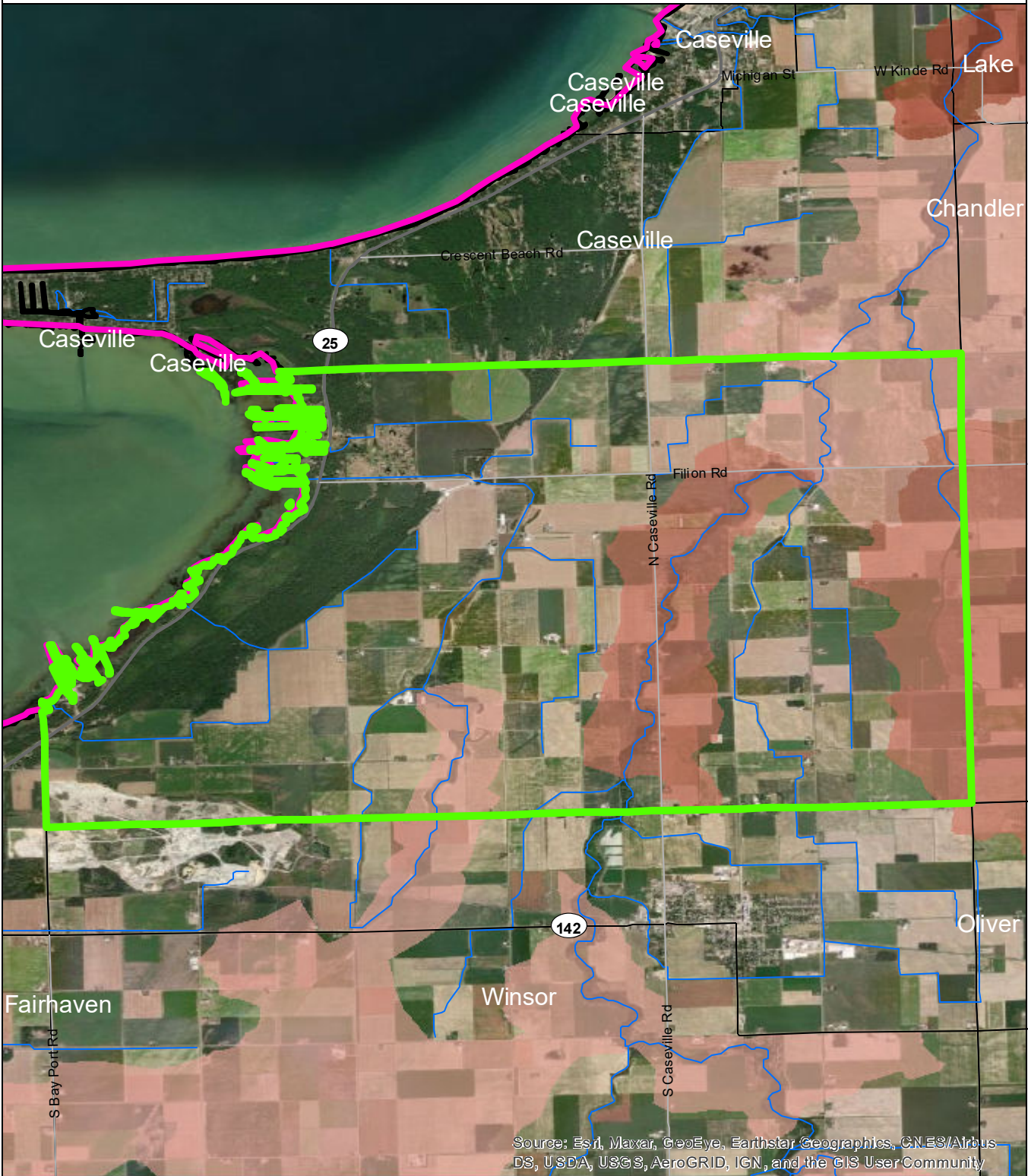
## Data Sources

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

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



McKinley Township



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

Sediment Loading Risk

- low
- moderate
- high
- very high

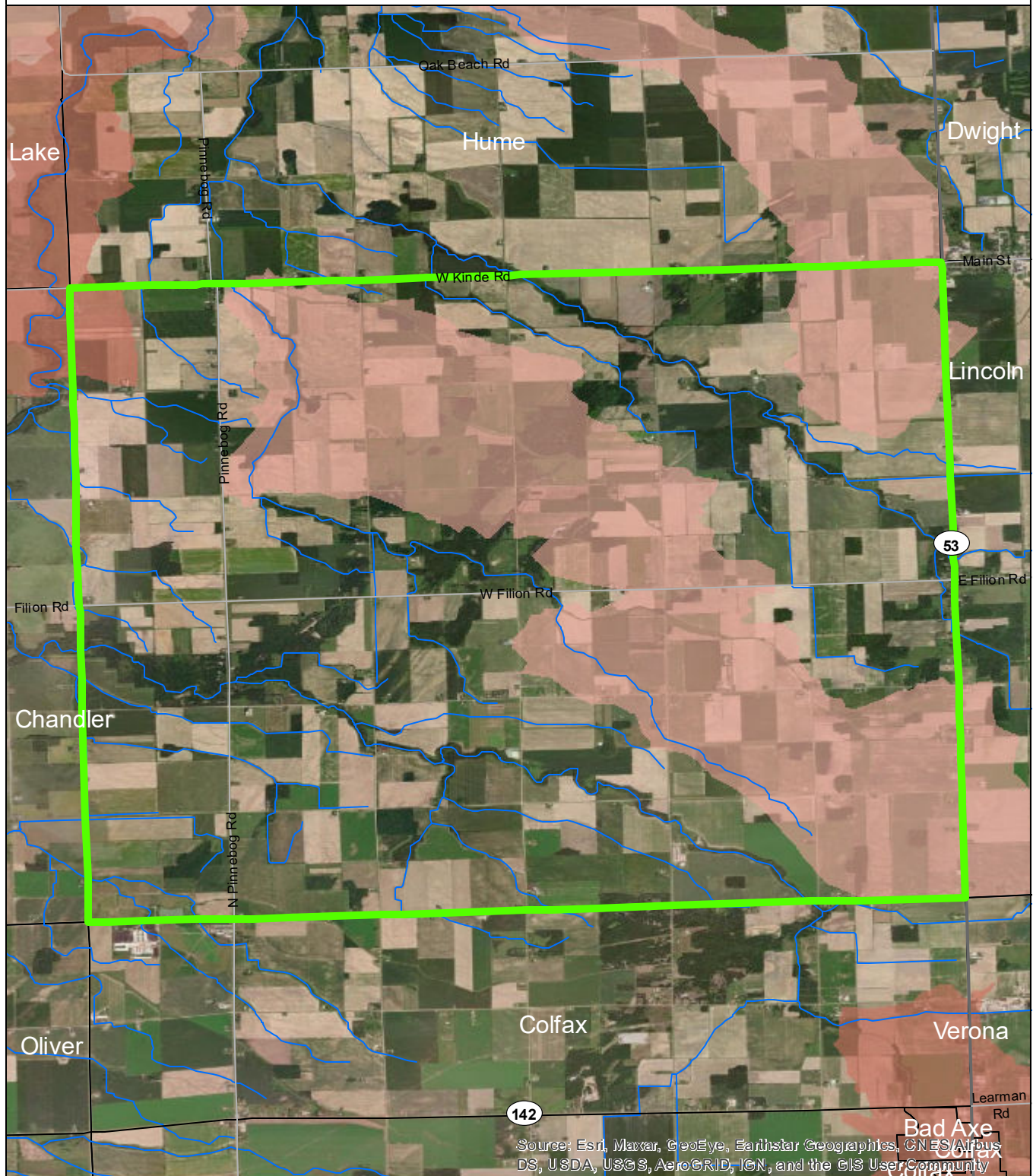
0 1 2 Miles

Data Sources

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



# Meade Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

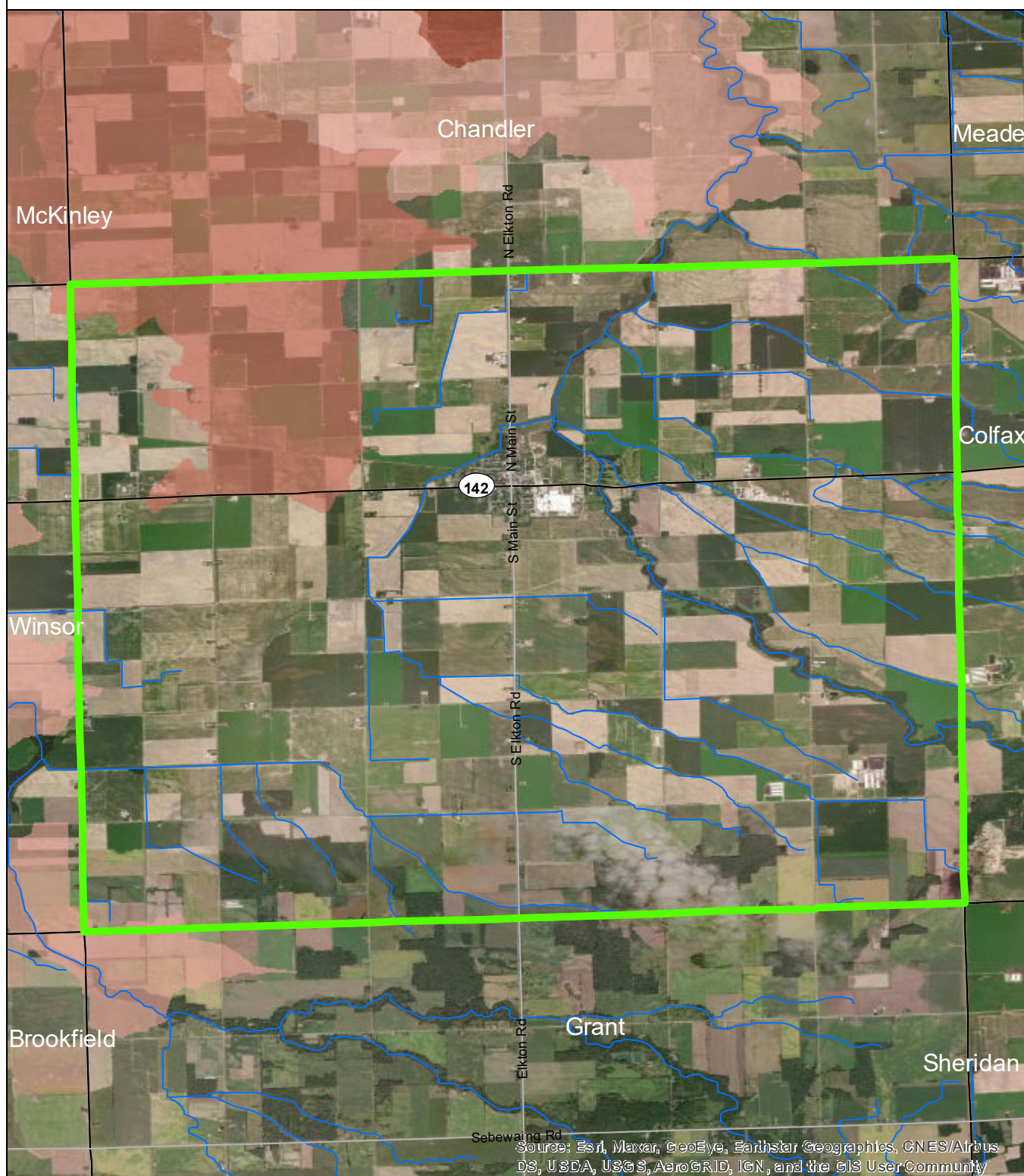
## Data Sources

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

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



# Oliver Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

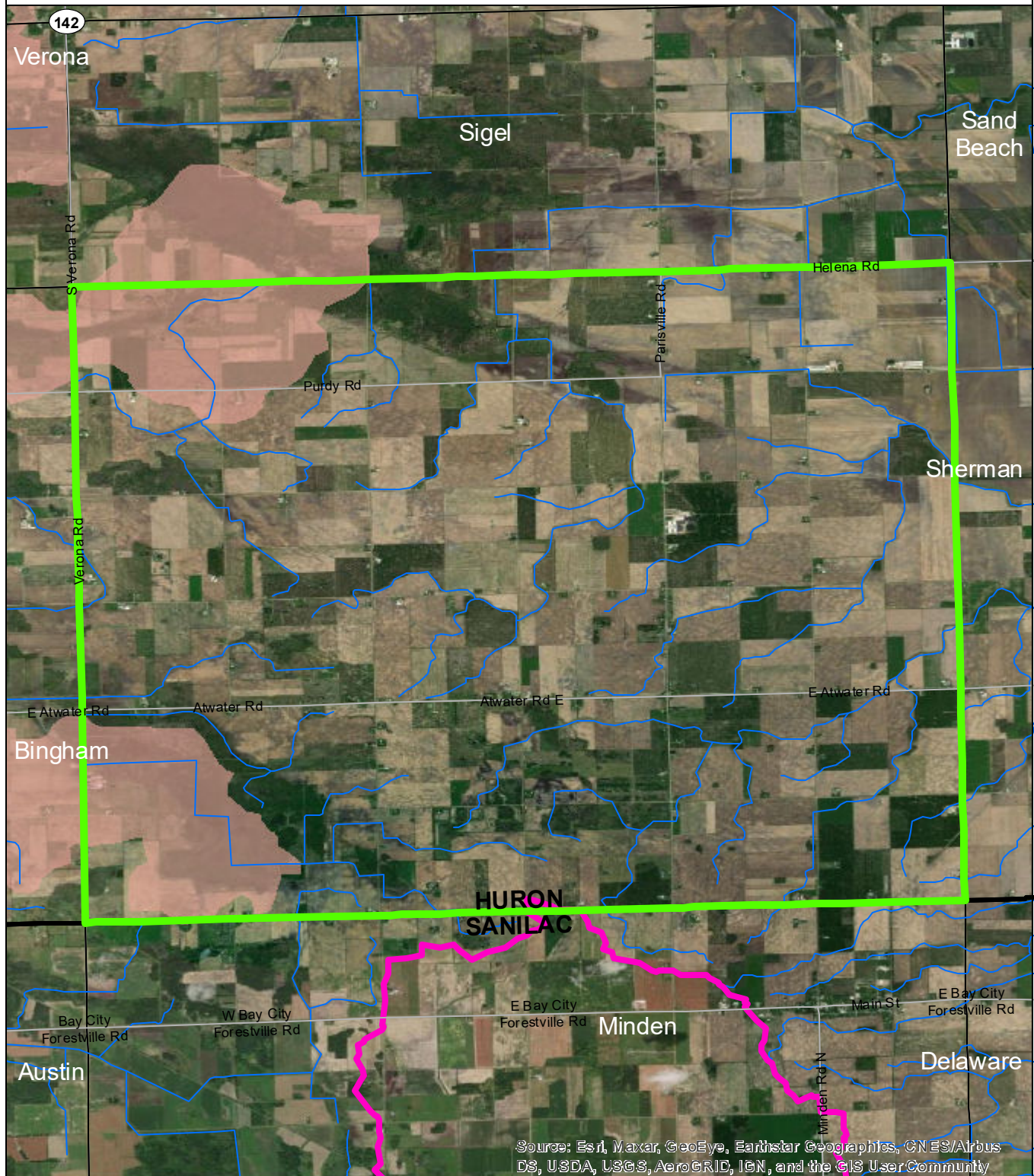
## Data Sources

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

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



# Paris Township



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

- Paris 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

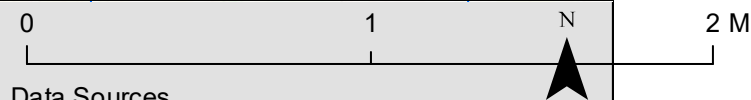
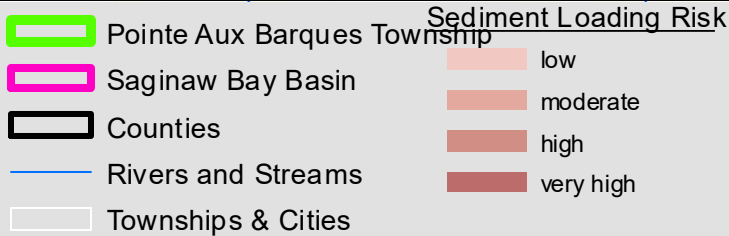
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# Pointe Aux Barques Township



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



## Data Sources

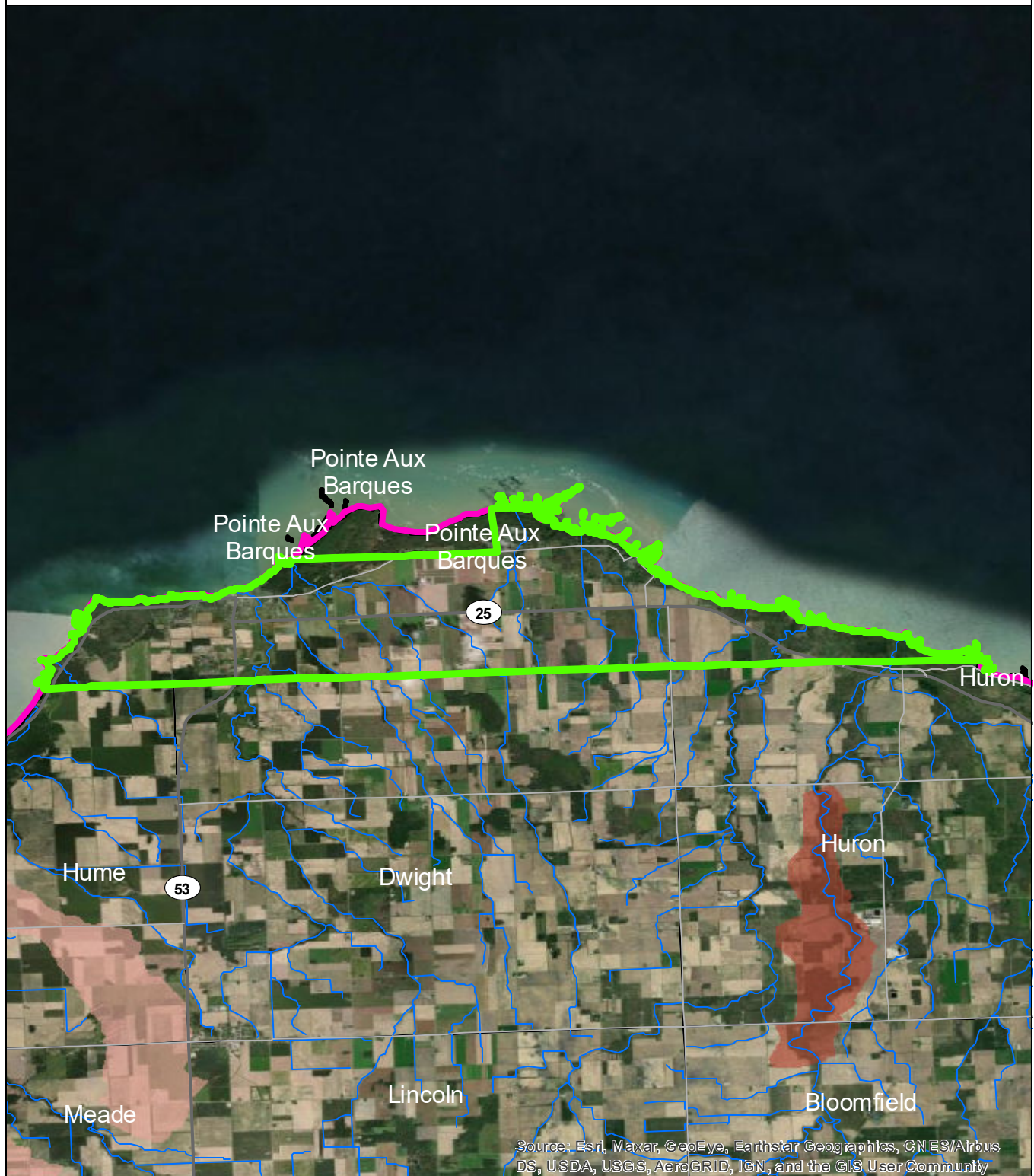
State of Michigan: Counties, Townships & Cities

USGS: Sediment Loading Risk

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# Port Austin Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

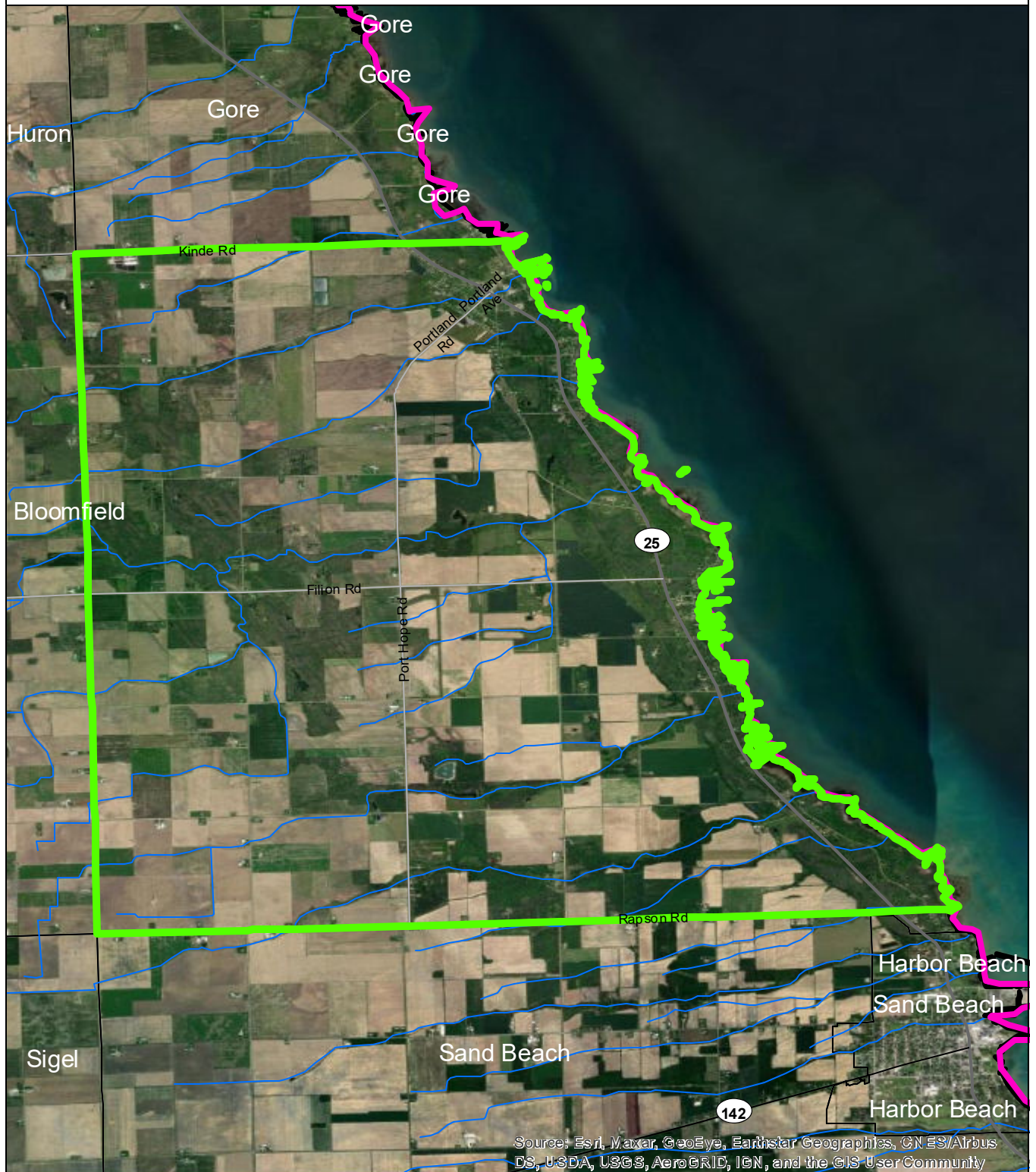
0 1 2 Miles

## Data Sources

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

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

# Rubicon Township



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

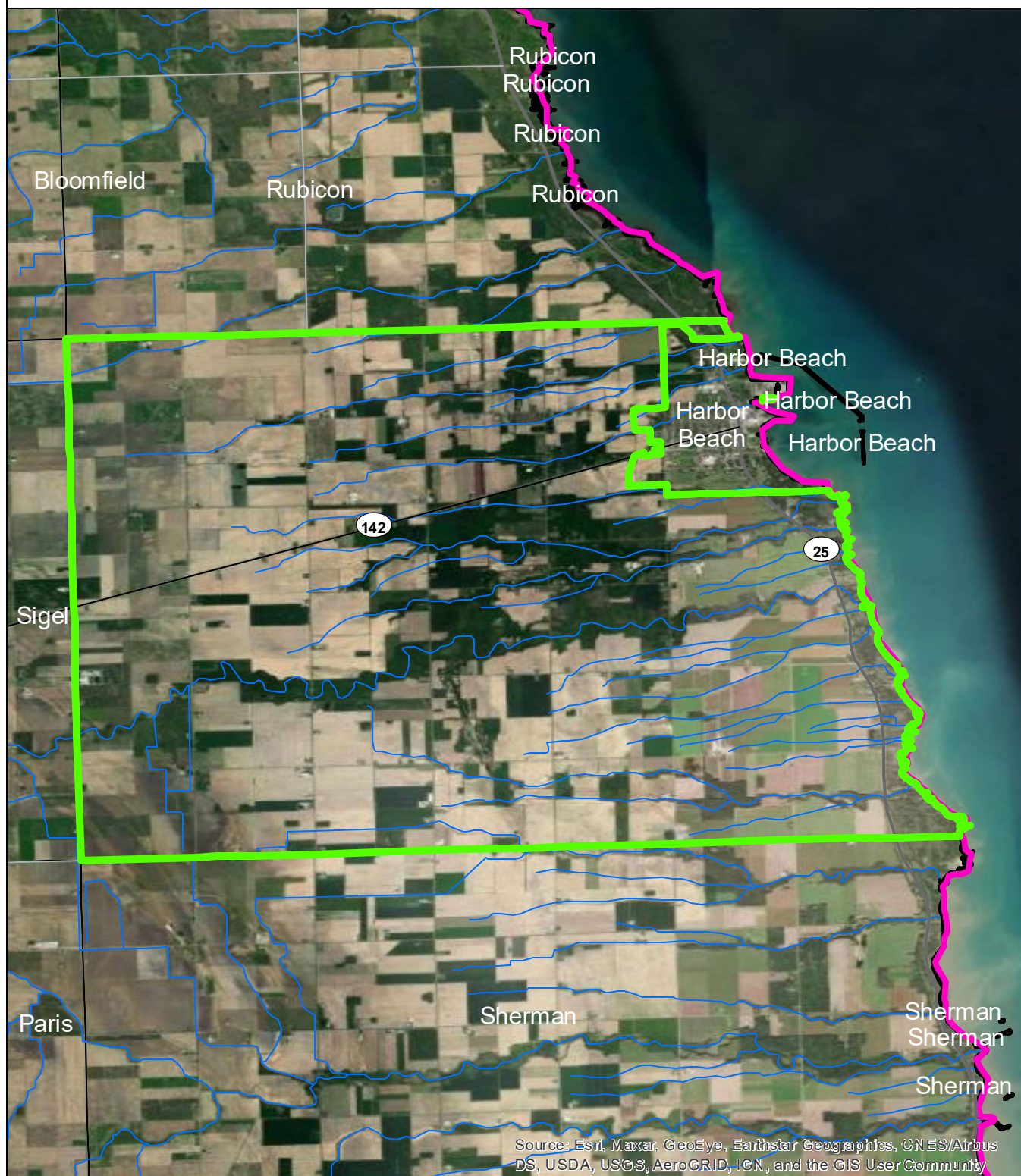
## Data Sources

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

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



# Sand Beach Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

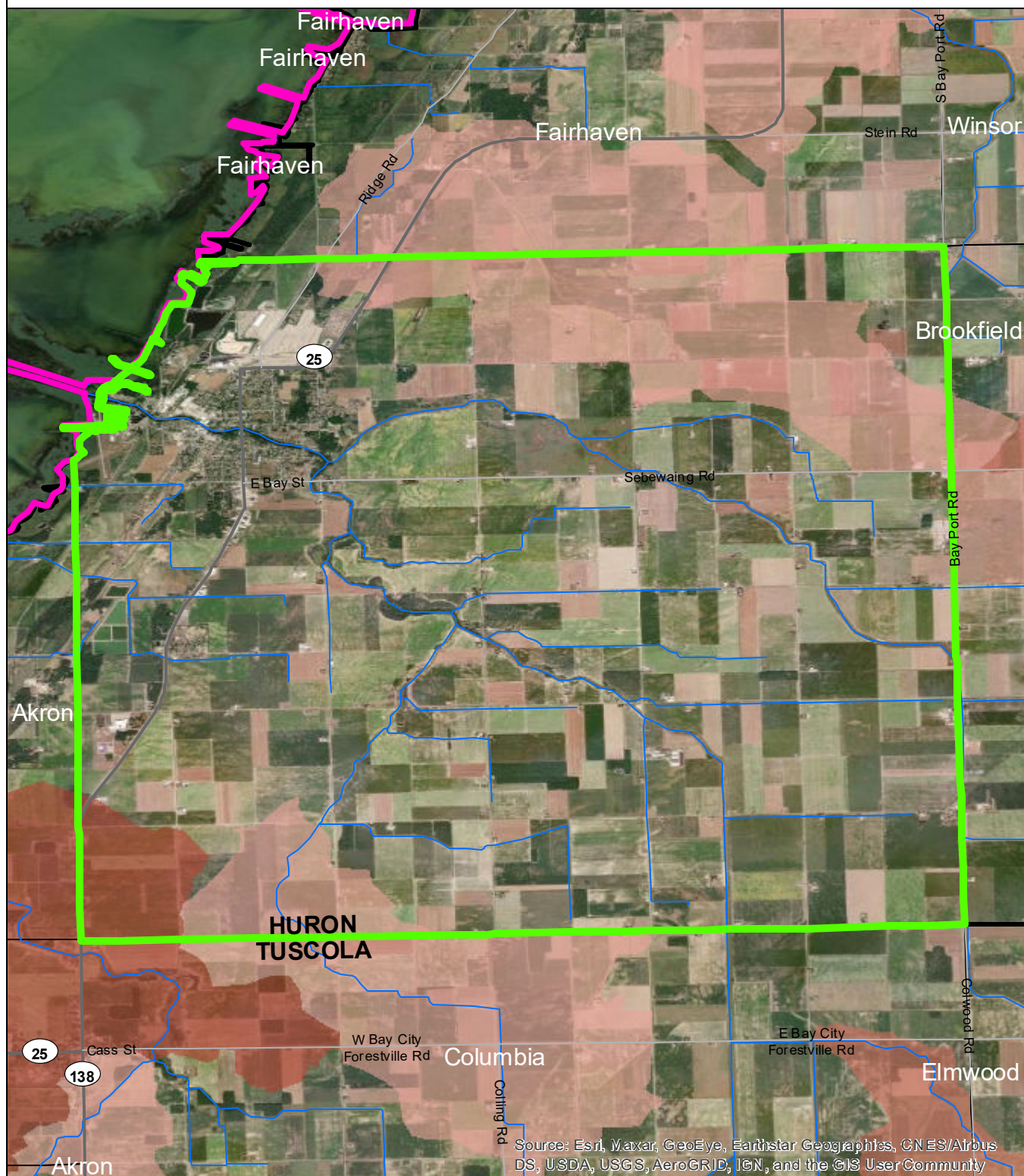
State of Michigan: Counties, Townships & Cities  
USGS: Sediment Loading Risk

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# Sebewaing Township



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

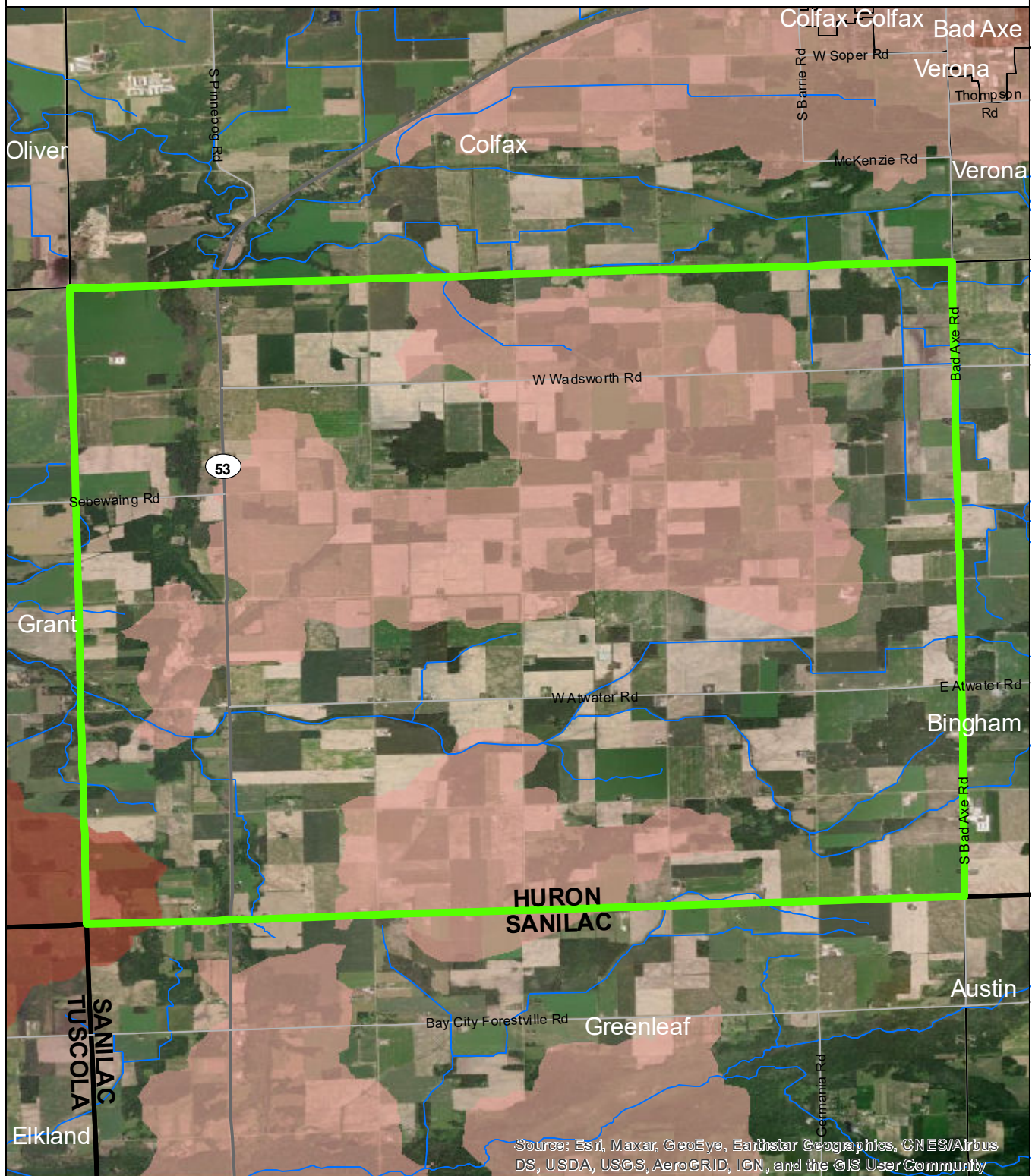
## Data Sources

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

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



# Sheridan Township



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

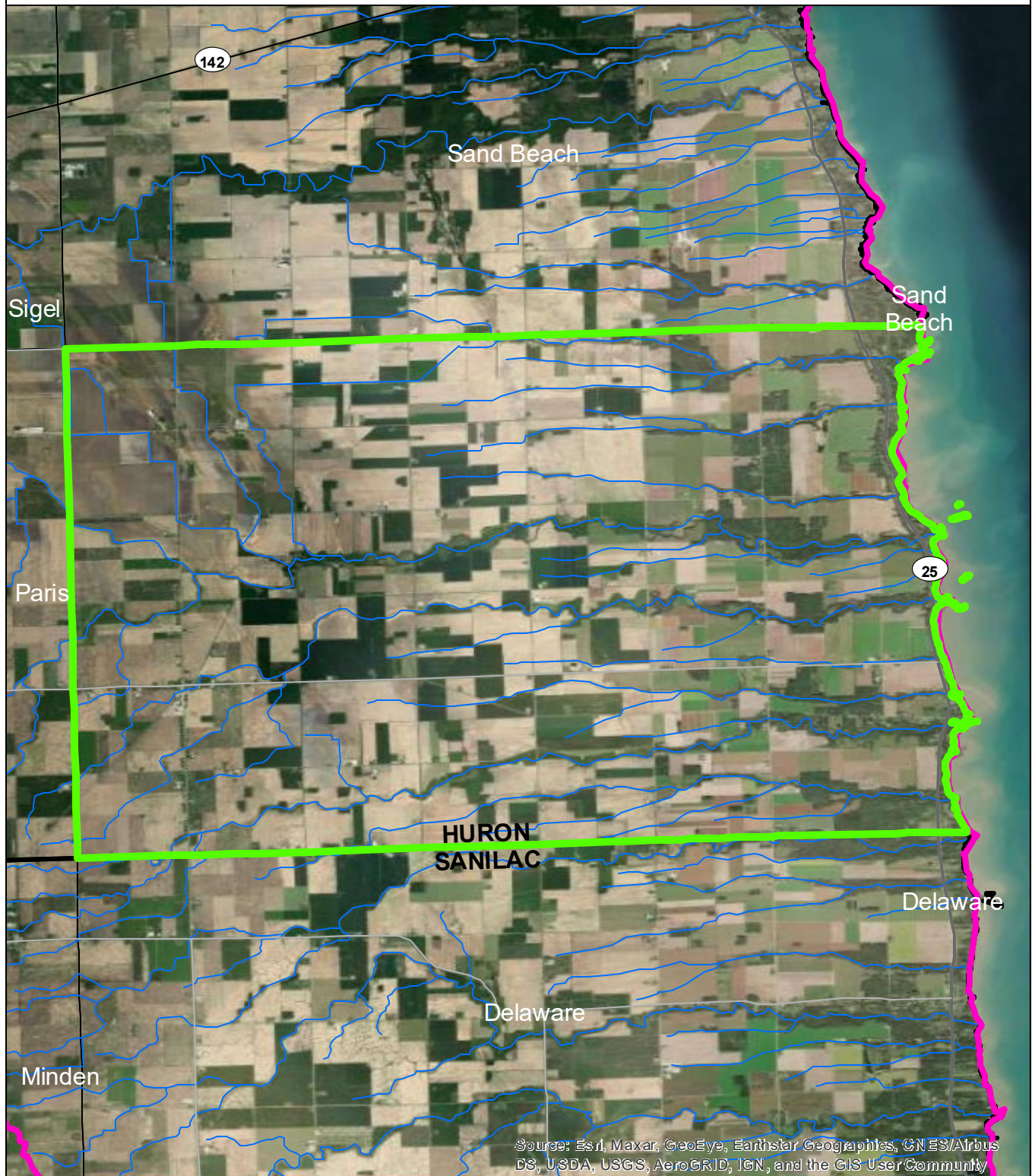
State of Michigan: Counties, Townships & Cities  
USGS: Sediment Loading Risk

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# Sherman Township



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

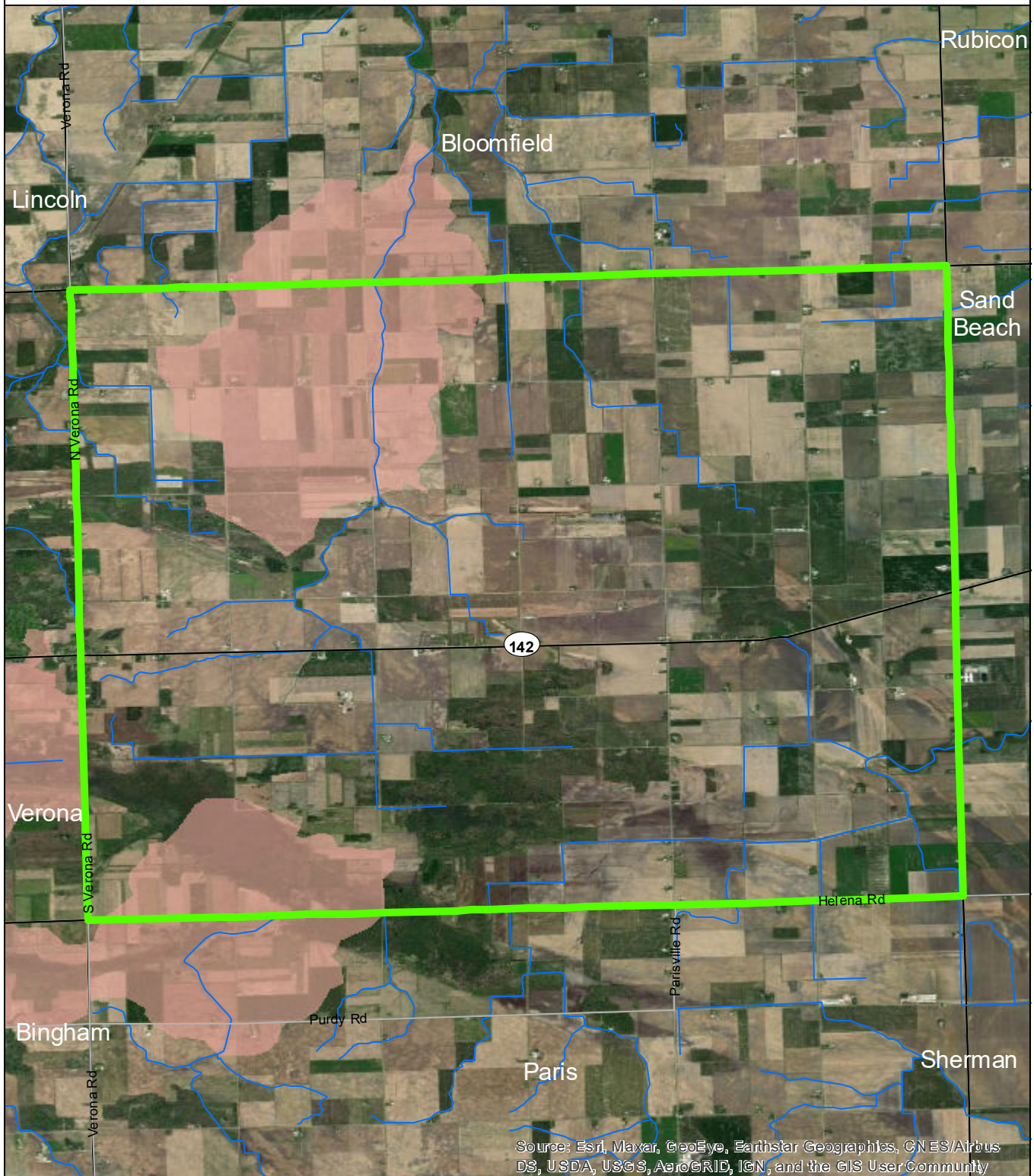
State of Michigan: Counties, Townships & Cities  
USGS: Sediment Loading Risk

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





# Sigel Township



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

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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

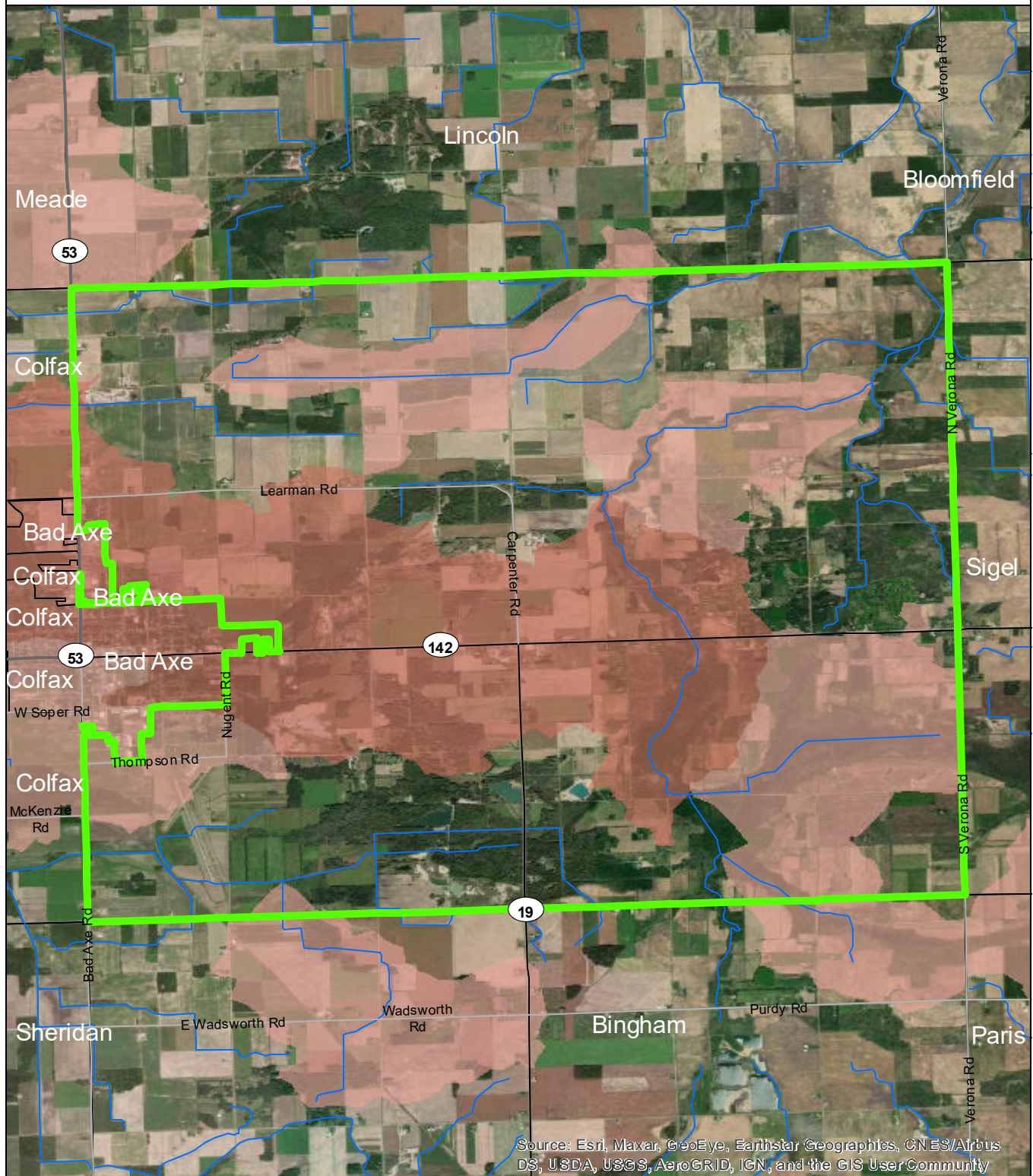
State of Michigan: Counties, Townships & Cities

USGS: Sediment Loading Risk

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



# Verona Township



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

## Sediment Loading Risk

- low
- moderate
- high
- very high

0 1 2 Miles

## Data Sources

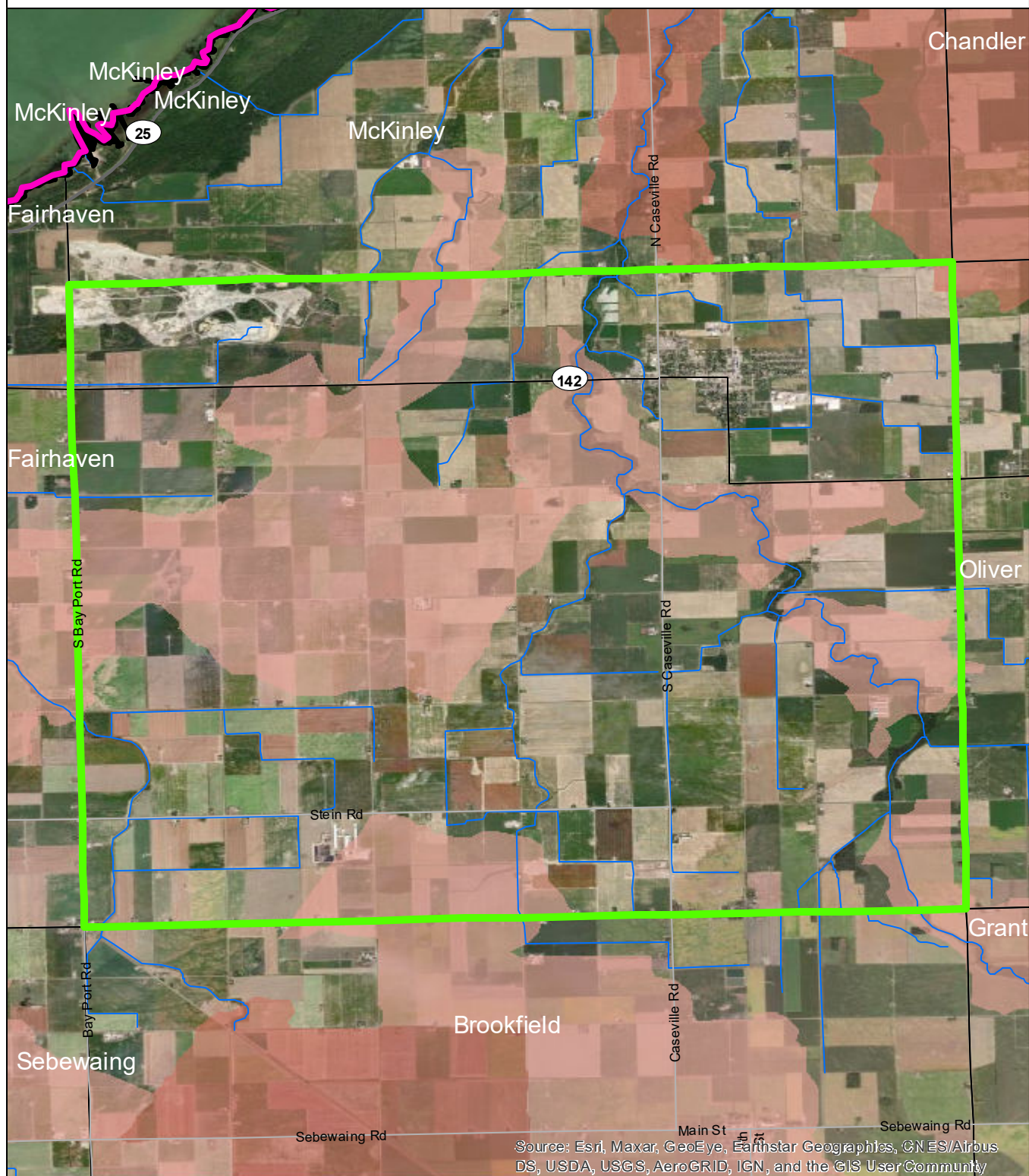
State of Michigan: Counties, Townships & Cities  
USGS: Sediment Loading Risk

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





# Winsor Township



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

- Winsor 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

