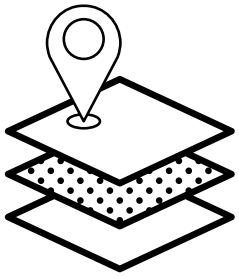
Washtenaw County Conservation District

COMMUNITY TREES MAP SET: SHARON TOWNSHIP

2022

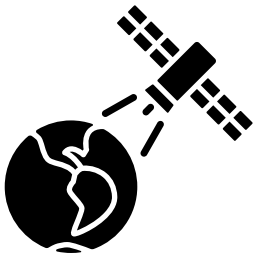
A GUIDE TO THE MAP SET

WHAT IS GIS?



GIS is the abbreviation for geographic information systems, computer software that allows the user to overlay multiple layers of information, such as streets, buildings, and vegetation, on the earth's surface. GIS can help to better understand the distribution of these elements and discover relationships and patterns.

TERMS



LiDAR is the abbreviation for light detection and ranging, a remote (i.e. satellites or planes) sensing technology that can calculate the height of an object, such as buildings or vegetation, on the earth's surface.

Aerial photographs and **satellite imagery** are both remotely sensed images distinguished by the altitude and characteristics of the sensors, namely cameras or electronic scanners. In general, data taken at low-altitude captures more detail, but covers a smaller area. Some sensors can capture energy from portions of the electromagnetic spectrum, such as infrared, that the human eye cannot see! These additional wavelengths, or bands, provide more data to help distinguish between features on the ground.

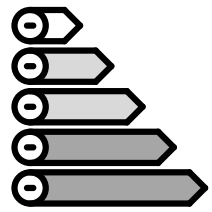
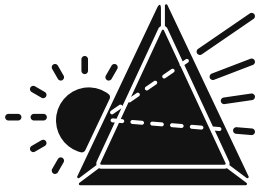


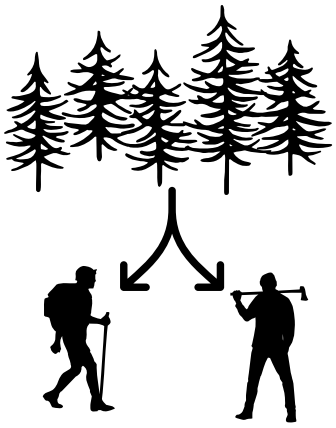
Image classification is the task of categorizing pixels based on their spectral characteristics in a raw image. **Supervised** classification means the analyst teaches the software to classify the pixels, while **unsupervised** means the classes are assigned based on the distribution of values. The final result might be a map of land cover classes (agriculture, urban, forest, etc.), impervious surfaces, or tree canopy cover.



NAIP is the abbreviation for USDA's National Agriculture Imagery Program which, every three years, collects four-band "leaf-on" data (i.e. during the growing season) at a 1-meter (about 3.2 feet) resolution. The four-bands are red, green, blue, and near infrared, which can help distinguish healthy and diseased vegetation.

Washtenaw County Conservation District

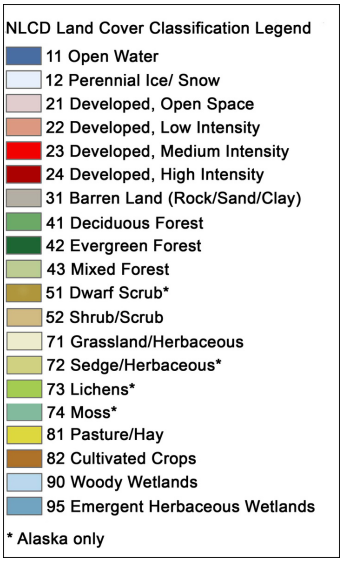
TERMS CONTINUED



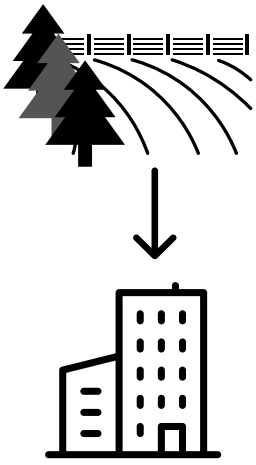
Land cover is the physical land type (forest, open water, wetlands, crops) and can be determined from remotely sensed images.

Land use is how people are using the land (recreation, industrial, residential, agriculture, commercial) and cannot necessarily be determined using satellite imagery or aerial photographs.

NLCD stands for National Land Cover Database, which provides nationwide United States data on land cover and land cover change at a 30m resolution. Since 2001, consistent methodologies and collection at 2-3 year intervals enables monitoring and trend assessments of land cover and associated changes over time. See the side bar for a brief overview of the land cover classes.



GRASS GIS, Geographic Resources Analysis Support System, is a free and open-source GIS software that began in 1982. It was developed as an international team effort that includes scientists and developers from various fields, including federal U.S. agencies, universities, and private companies. However, like most free software, it relies on users to develop new tools and applications and refine existing ones. **QGIS** is another example of a volunteer-driven, free and open-source GIS software that relies on users to improve and advance the product. **ArcGIS**, produced by Esri, is an example of a GIS software that is maintained and updated by a for-profit company. Selecting the appropriate GIS software might depend on the application, models to be integrated, and analyst/user comfort level,



FUTURES, FUTure Urban-Regional Environment Simulation, is an open-source land change model developed by the Landscape Dynamics Group at NC State University to examine regional-scale impacts of urbanization on the environment. It uses base data of land cover maps through time, as well as existing socio-economic, environmental (e.g. protected lands), or infrastructure (e.g. roads), and historical and projected population data to predict where future development is likely to occur.

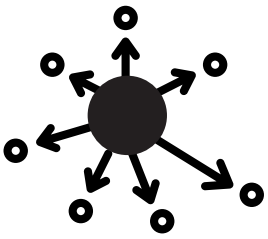
Washtenaw County Conservation District

TERMS CONTINUED

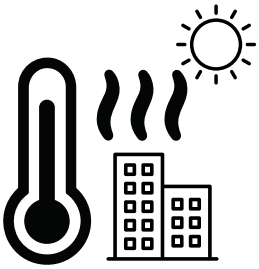
Stormwater runoff is snow melt or rainfall that, instead of soaking into the soil, flows over the ground and into stormdrains or waterbodies. Runoff doesn't receive any treatment, so anything it picks up (trash, chemicals, bacteria, sediment, etc.) can be flushed into our streams, rivers, and lakes and cause impairments for wildlife and human use. The large volume of runoff can also cause flooding, streambank erosion, and wash away habitat for wildlife.

Impervious surfaces prohibit the infiltration of water and are generally man-made structures, such as roads, sidewalks, buildings, parking lots, etc. Higher percentages of impervious surfaces in an area correspond to lower infiltration rates (ability of water to absorb into the soil) and increases in stormwater runoff.

Habitat connectivity is concerned with wildlife's ability to migrate between suitable environments necessary for survival, reproduction, and life cycle. As landscapes are increasingly developed, habitats, such as forests, may be fragmented into smaller areas which may not be suitable for a particular species or may not provide all elements necessary for a creature's life cycle.



Urban heat islands (UHI) are metropolitan areas that are a lot warmer than neighboring rural areas due to a higher percentage of materials that absorb and trap heat from the sun, such as buildings and roadways. UHIs often have higher energy costs, air pollution levels, and heat-related illness and mortality. Trees and other vegetation help to counteract this effect by shading surfaces, deflecting radiation, and releasing moisture.



Census tracts are small, semi-permanent subdivisions of a county used in statistical analyses to determine trends in an area over time and managed by the US Census Bureau.

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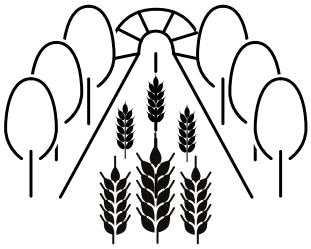
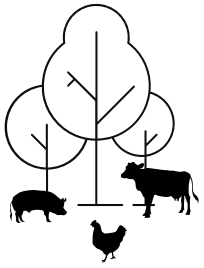
TERMS CONTINUED

Agroforestry is the intentional inclusion of trees and shrubs in crop and livestock farming systems for environmental, economic, and social benefits. Examples of agroforestry practices and some of its benefits include:

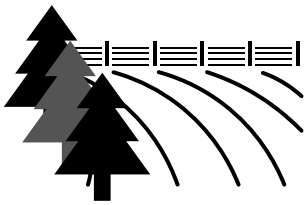


Alley cropping - Growing crops in alleys between regularly spaced rows of trees and shrubs intended to: diversify revenue streams, protect crops, and reduce soil erosion, nutrient leaching, and water runoff from fields.

Riparian buffers - Strips of permanent vegetation alongside a stream, wetland or lake planted or retained to protect crops by buffering floods, produce income in marginal farmland prone to flooding, diversify income, provide wildlife habitat and corridors, stabilize soils, and filter nutrients, pesticides, and sediment from farm runoff.

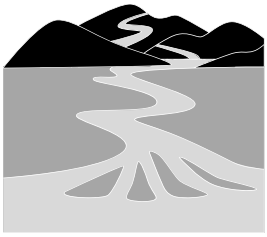


Silvopasture - Managing a wooded pasture through rotational grazing to support livestock and fodder trees or timber stand production to diversify income, improve livestock health, provide shade and wind protection, and support wildlife habitat.



Windbreaks - Strips of trees or shrubs strategically planted to protect crops, reduce soil loss, diversify income, provide wildlife corridors, and block views and odors. Also called shelterbelts, hedgerows, or living snow fences.

Watershed is all the land area that captures rainfall and snowmelt or other water runoff, like irrigation, and funnels it to a particular waterbody, such as a creek or river and eventually to an outflow point, such as a bay or ocean.



Headwaters are the start of the channel system and therefore close to a main source of water, such as a mountain stream or a groundwater aquifer seep. Downstream network health starts with nutrients, sediment, temperature, organic matter, and habitat quality in the headwaters.

Washtenaw County Conservation District

Tree Canopy

Sharon Township

This map depicts tree canopy, the leafy cover provided by branches, and illustrates density and distribution across the township. Tree location influences the many social, economic, and environmental benefits they provide. Tree canopy was identified using 2020 aerial photography and 2017 LiDAR data, which determines the height of ground features. Areas where LiDAR data was unavailable (red cross hatch) were excluded from calculations.

Tree Canopy

Data unavailable

Percent of Township Covered by Tree Canopy: 24% (5889 acres)

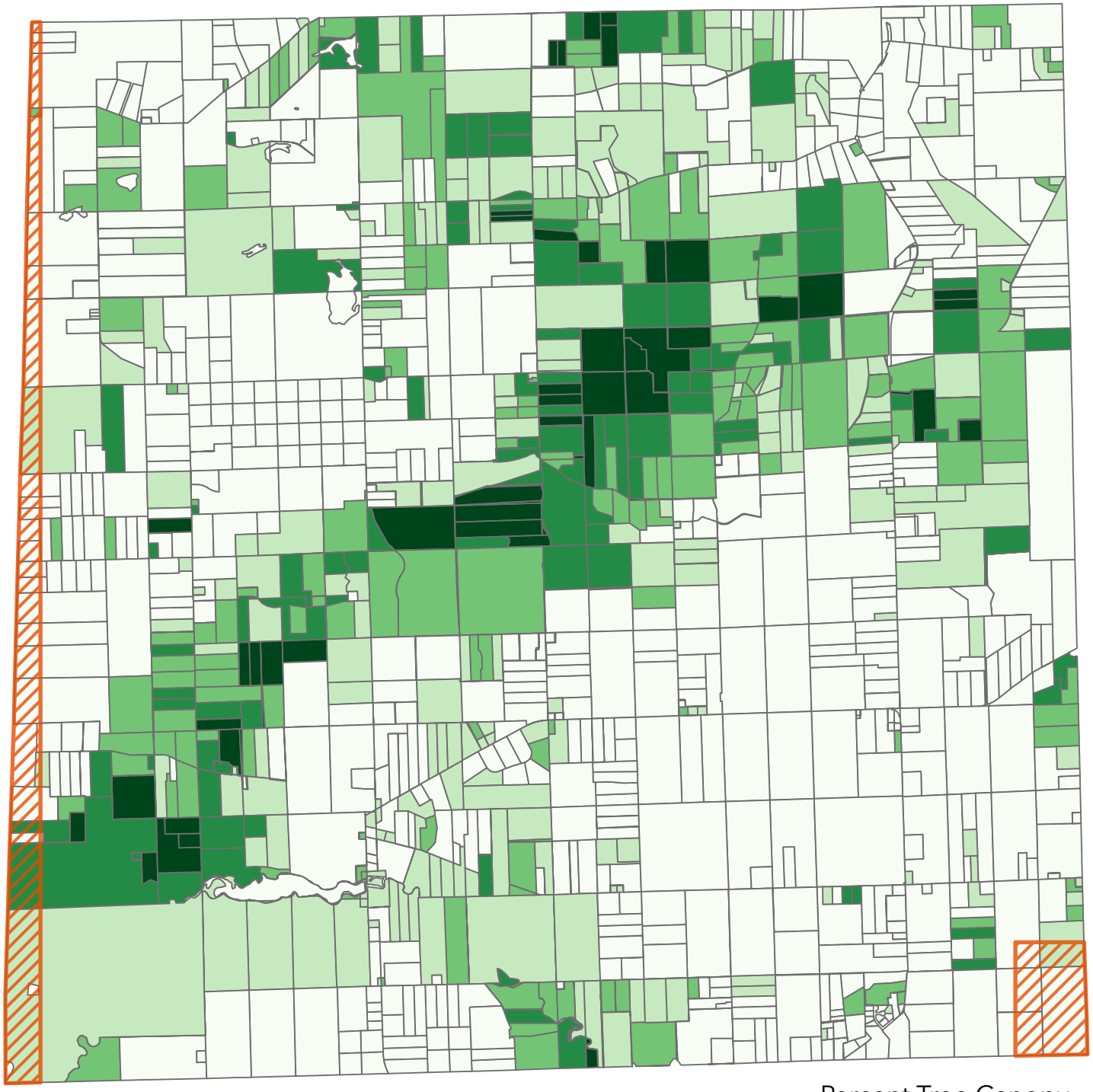
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020); Washtenaw County GIS Program - Township Boundary and LiDAR (2017)
Datum/Projection: NAD83 Michigan State Plane (South)
Layout by: Lyndsay Zemanek, March 15, 2022

Tree Canopy - All Parcels

Sharon Township



This map depicts percent tree canopy coverage for all parcels. Tree canopy was determined using an unsupervised clustering algorithm applied to 2020 NAIP Aerial Photography in combination with 2017 LiDAR data and then aggregated by land parcel. Parcels within areas of unavailable tree canopy data have skewed tree canopy percentages.

Mean Tree Canopy in all parcels: 34%

Percent Tree Canopy

- 0 - 20%
- 20.1 - 40%
- 40.1 - 60%
- 60.1 - 80%
- > 80%
- Canopy Data Unavailable

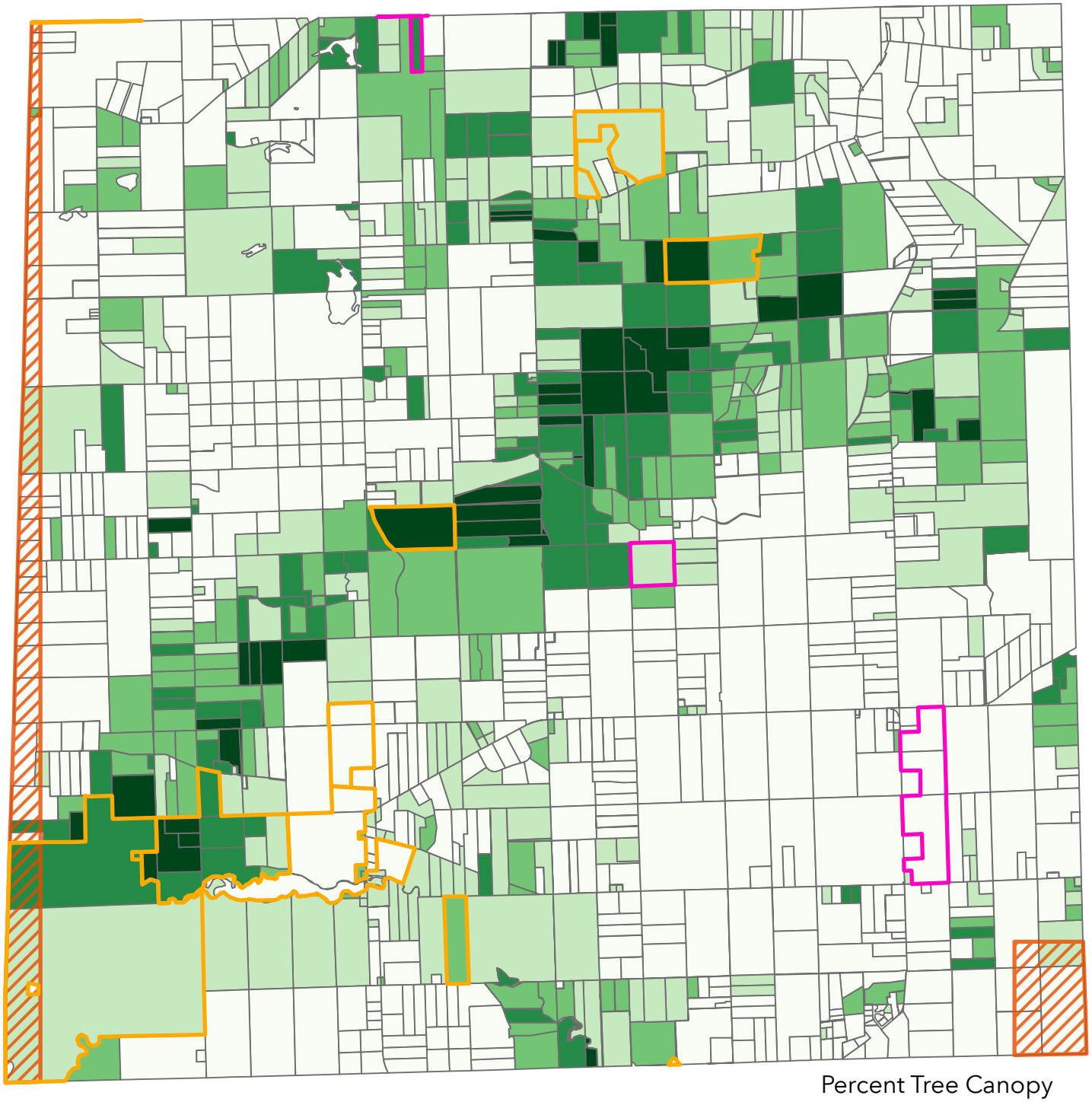
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020); Washtenaw County GIS Program - LiDAR (2017), Parcels
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Tree Canopy - All Parcels

Sharon Township



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Mean Tree Canopy in all parcels: 34%

Percent Tree Canopy

- 0 - 20%
- 20.1 - 40%
- 40.1 - 60%
- 60.1 - 80%
- > 80%
- Conservation Lands
- Recreation Lands
- Canopy Data Unavailable

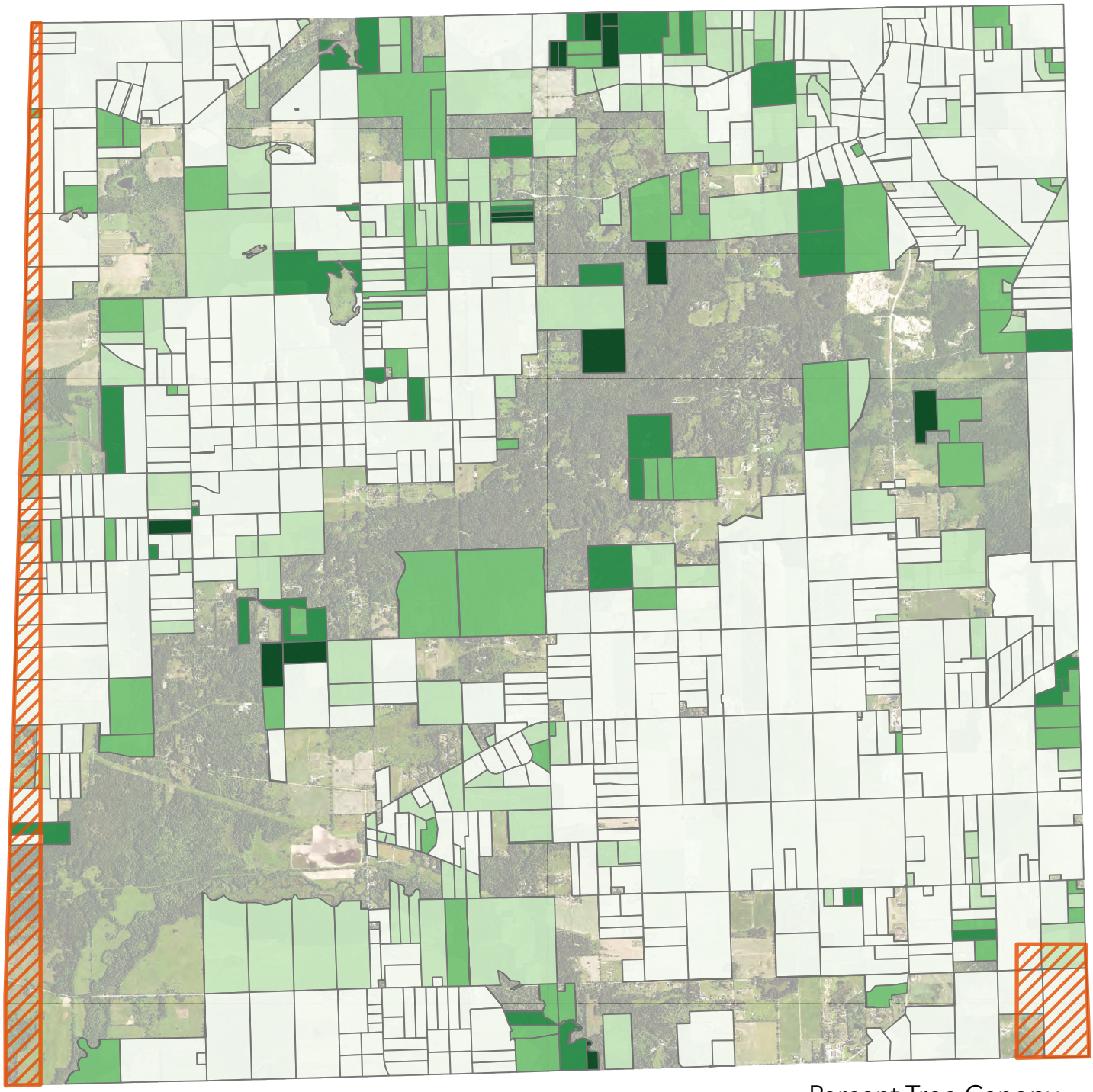
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020); Washtenaw County GIS Program - LiDAR (2017), Parcels
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Tree Canopy - Agriculture

Sharon Township



This map depicts percent tree canopy coverage in parcels with an Agricultural land use. Tree canopy was determined using an unsupervised clustering algorithm applied to 2020 NAIP Aerial Photography in combination with 2017 LiDAR data and then aggregated by land parcel. Parcels within areas of unavailable tree canopy data have skewed tree canopy percentages.

Mean Tree Canopy in Agricultural Parcels: 24%

Percent Tree Canopy

- 0 - 20%
- 20.1 - 40%
- 40.1 - 60%
- 60.1 - 80%
- > 80%
- Canopy Data Unavailable

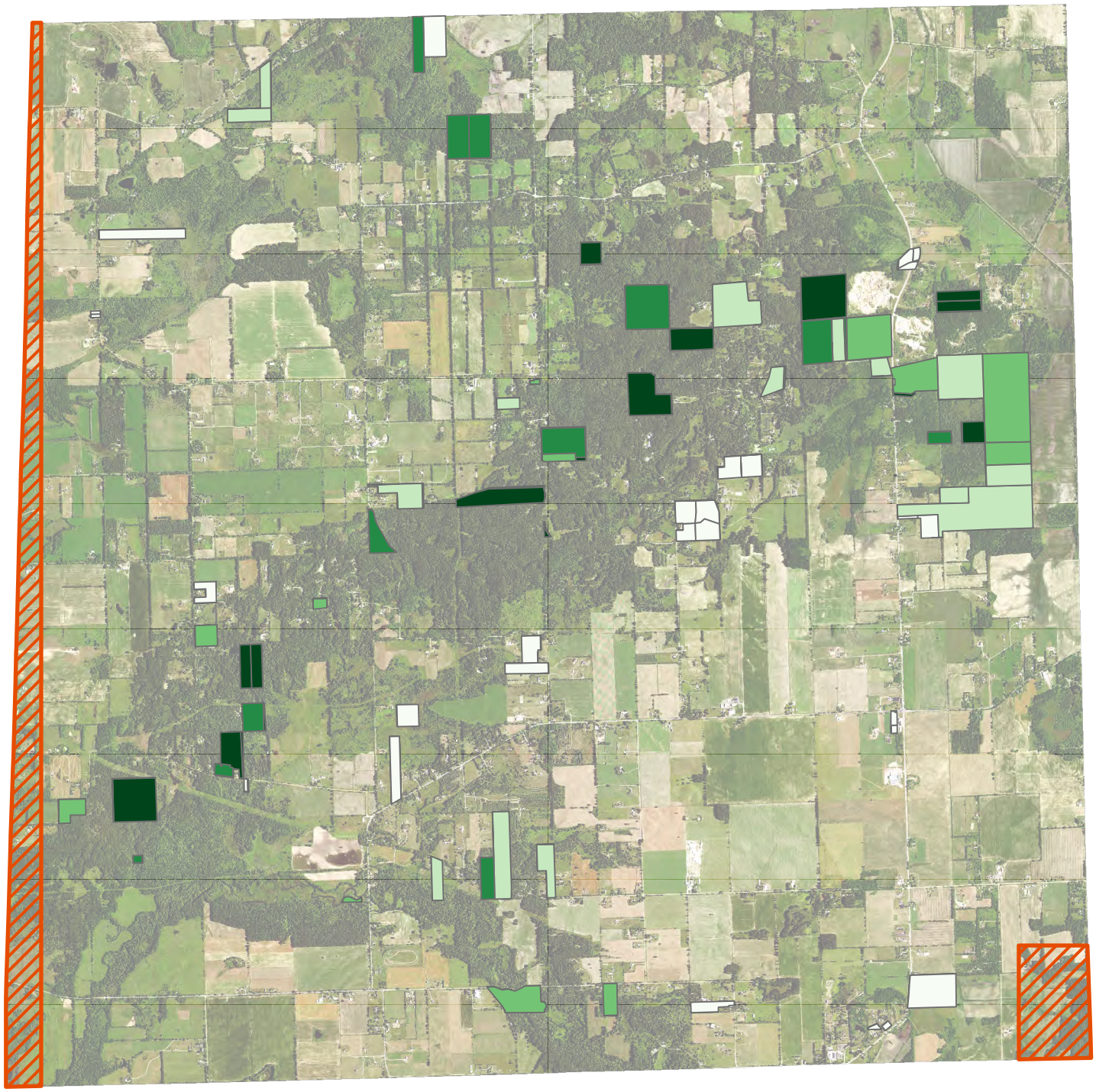
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020); Washtenaw County GIS Program - LiDAR (2017), Parcels; Carlisle | Wortman and Associates, Inc- 2020 Existing Land Use
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Tree Canopy - Vacant Parcels

Sharon Township



This map depicts percent tree canopy coverage in vacant parcels. Tree canopy was determined using an unsupervised clustering algorithm applied to 2020 NAIP Aerial Photography in combination with 2017 LiDAR data and then aggregated by land parcel.

Mean Tree Canopy in Vacant Parcels: 49%

Percent Tree Canopy

- 0 - 20%
- 20.1 - 40%
- 40.1 - 60%
- 60.1 - 80%
- > 80%
- Canopy Data Unavailable

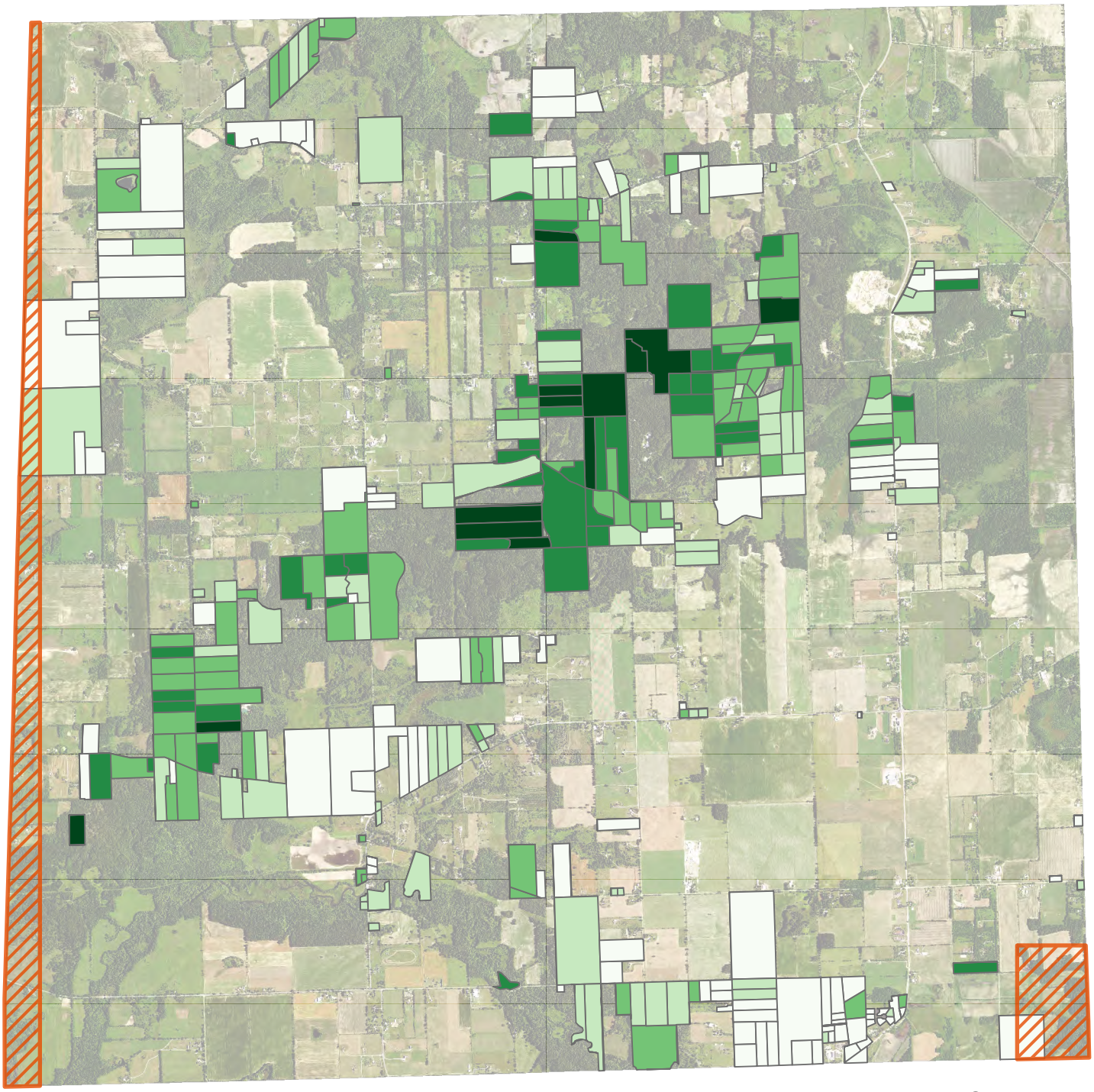
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020); Washtenaw County GIS Program - LiDAR (2017), Parcels; Carlisle | Wortman and Associates, Inc- 2020 Existing Land Use
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Tree Canopy - Residential Parcels

Sharon Township



This map depicts percent tree canopy coverage in parcels with a residential land use. Tree canopy was determined using an unsupervised clustering algorithm applied to 2020 NAIP Aerial Photography in combination with 2017 LiDAR data and then aggregated by land parcel. Parcels within areas of unavailable tree canopy data have skewed tree canopy percentages.

Mean Tree Canopy in Residential Parcels: 41%

Percent Tree Canopy

- 0 - 20%
- 20.1 - 40%
- 40.1 - 60%
- 60.1 - 80%
- > 80%
- Canopy Data Unavailable

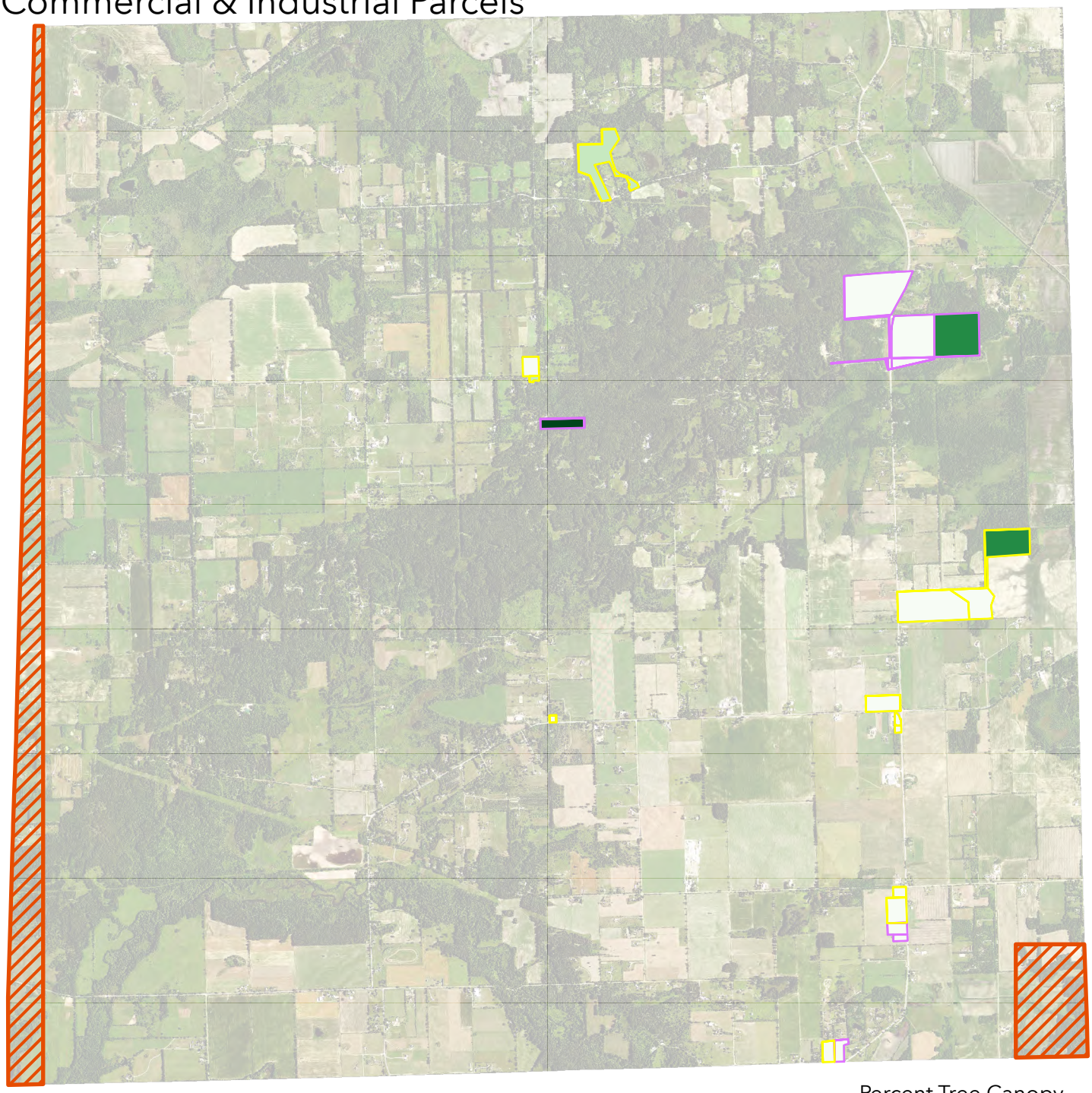
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020); Washtenaw County GIS Program - LiDAR (2017), Parcels; Carlisle | Wortman and Associates, Inc- 2020 Existing Land Use
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Tree Canopy
Commercial & Industrial Parcels

Sharon Township



This map depicts percent tree canopy coverage in parcels with either Commercial or Industrial land use, where "Hospitality", "Institutional", "Office", or "Retail " land uses are considered commercial parcels and "Extractive", "Industrial", or "Utilities" land uses are considered industrial parcels. Tree canopy was determined using an unsupervised clustering algorithm applied to 2020 NAIP Aerial Photography in combination with 2017 LiDAR data and then aggregated by land parcel.

Mean Tree Canopy in Industrial Parcels: 38%
Mean Tree Canopy in Commercial Parcels: 22%

N

0 0.5 1 2 Miles

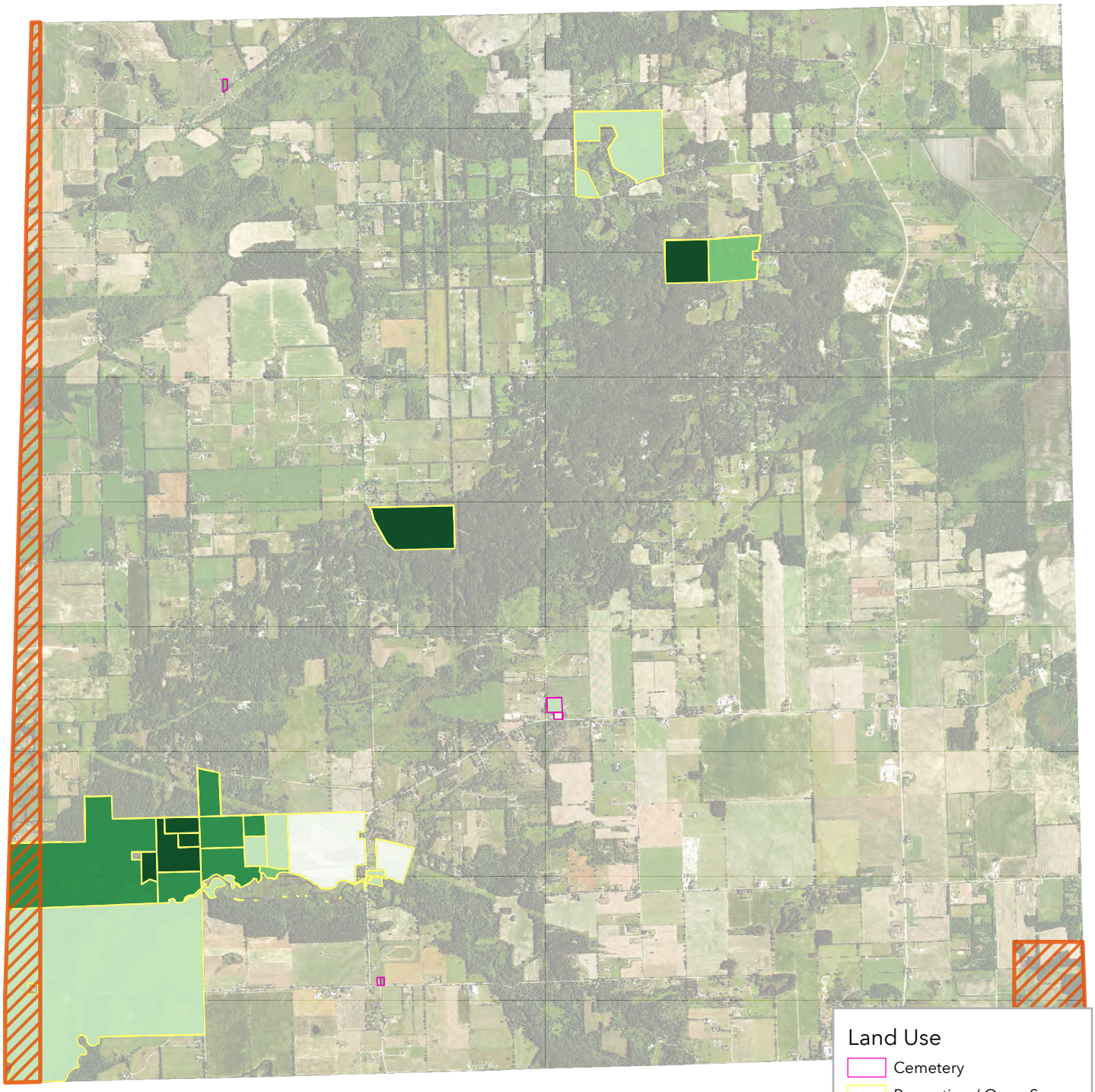
Percent Tree Canopy

- 0 - 20%
- 20.1 - 40%
- 40.1 - 60%
- 60.1 - 80%
- > 80%
- Commercial Parcel
- Industrial Parcel
- Canopy Data Unavailable

Data Sources: NAIP (2020); Washtenaw County GIS Program - LiDAR (2017), Parcels; Carlisle | Wortman and Associates, Inc- 2020 Existing Land Use
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

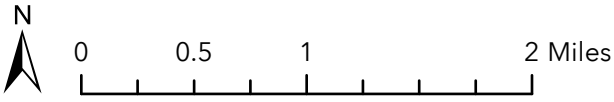
Tree Canopy - Open Space Parcels

Sharon Township



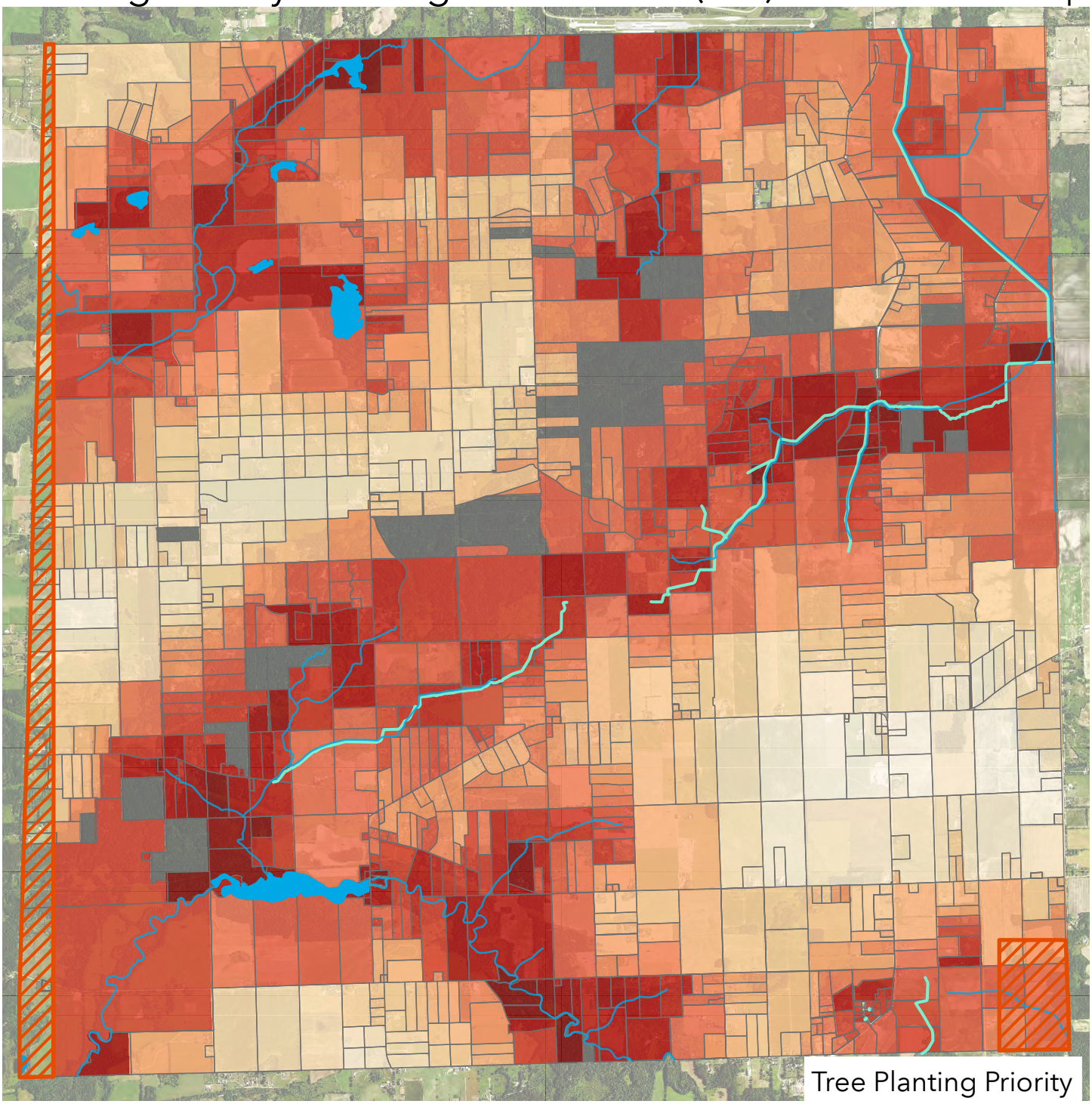
This map depicts percent tree canopy coverage in parcels with an Open Space land use, where "Cemetery" or "Recreation / Open Space" land uses are considered open space. Tree canopy was determined using an unsupervised clustering algorithm applied to 2020 NAIP Aerial Photography in combination with 2017 LiDAR data and then aggregated by land parcel. Parcels within areas of unavailable tree canopy data have skewed tree canopy percentages.

Mean Tree Canopy in Cemetery Parcels: 29%
Mean Tree Canopy in Recreation / Open Space Parcels: 62%



Data Sources: NAIP (2020); Washtenaw County GIS Program - LiDAR (2017), Parcels; Carlisle | Wortman and Associates, Inc- 2020 Existing Land Use
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.1) Sharon Township



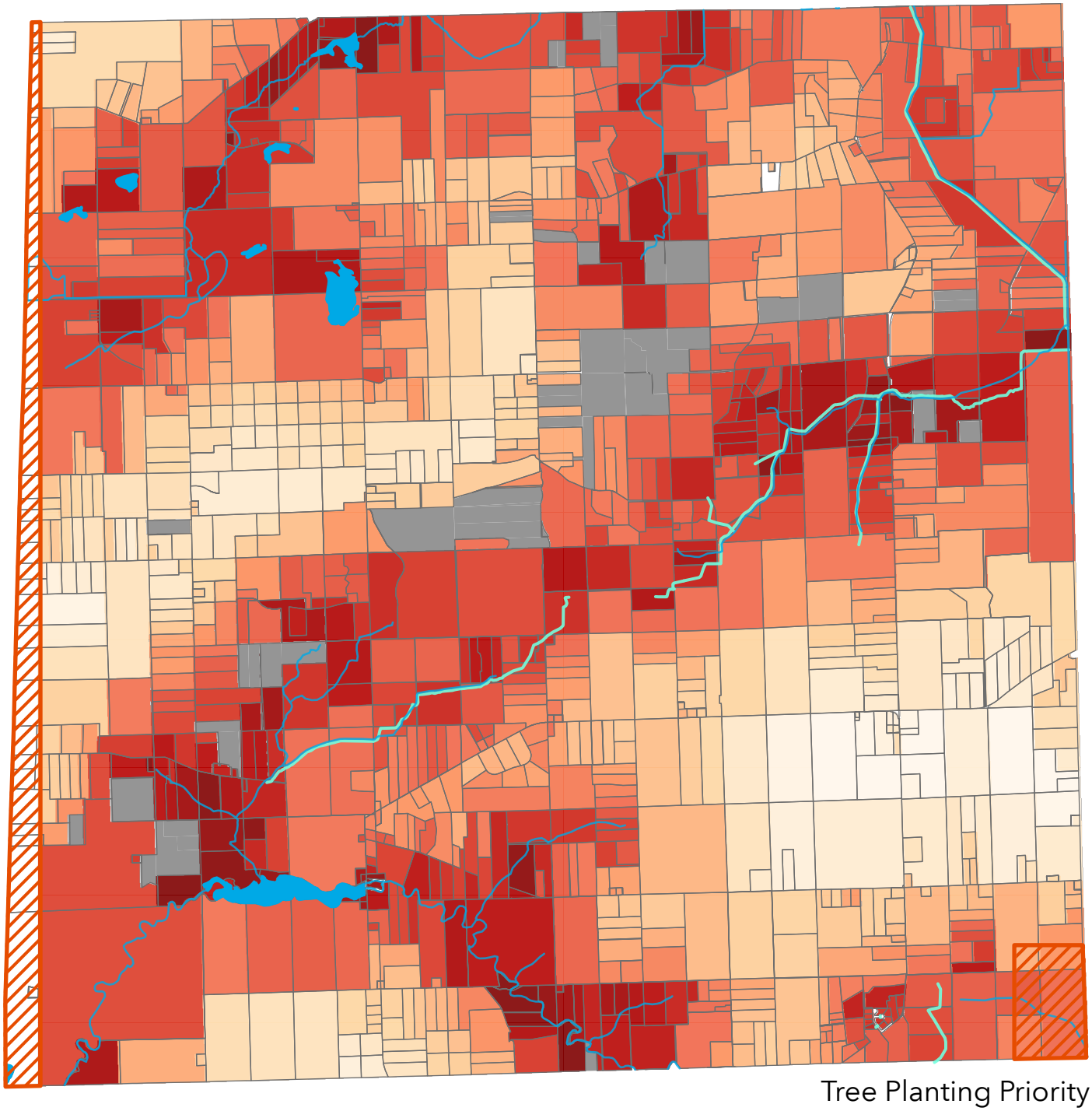
This map depicts tree planting priority in a scenario focused on ecological variables. Priority rankings for each parcel are determined from two considerations:1) potential for rain and irrigation runoff to impact water quality and 2) connectivity of surrounding woodlands. Parcels with more than 80% tree canopy cover have been excluded.

N

0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.1) Sharon Township



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Tree Planting Priority

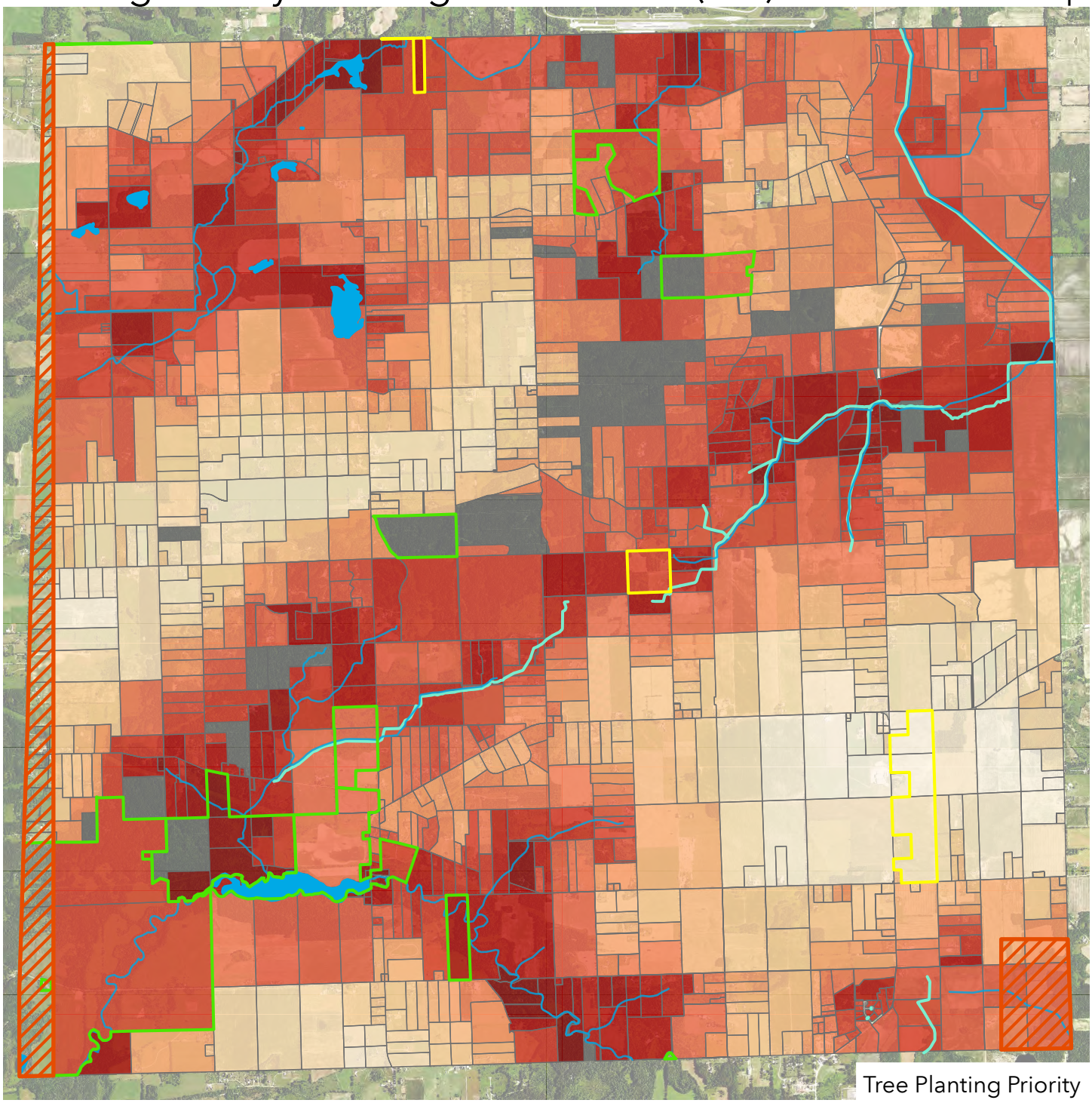
- High
- Low
- County Drains
- Natural Hydrology
- Tree Canopy > 80%
- Canopy Data Unavailable

N

0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.2) Sharon Township



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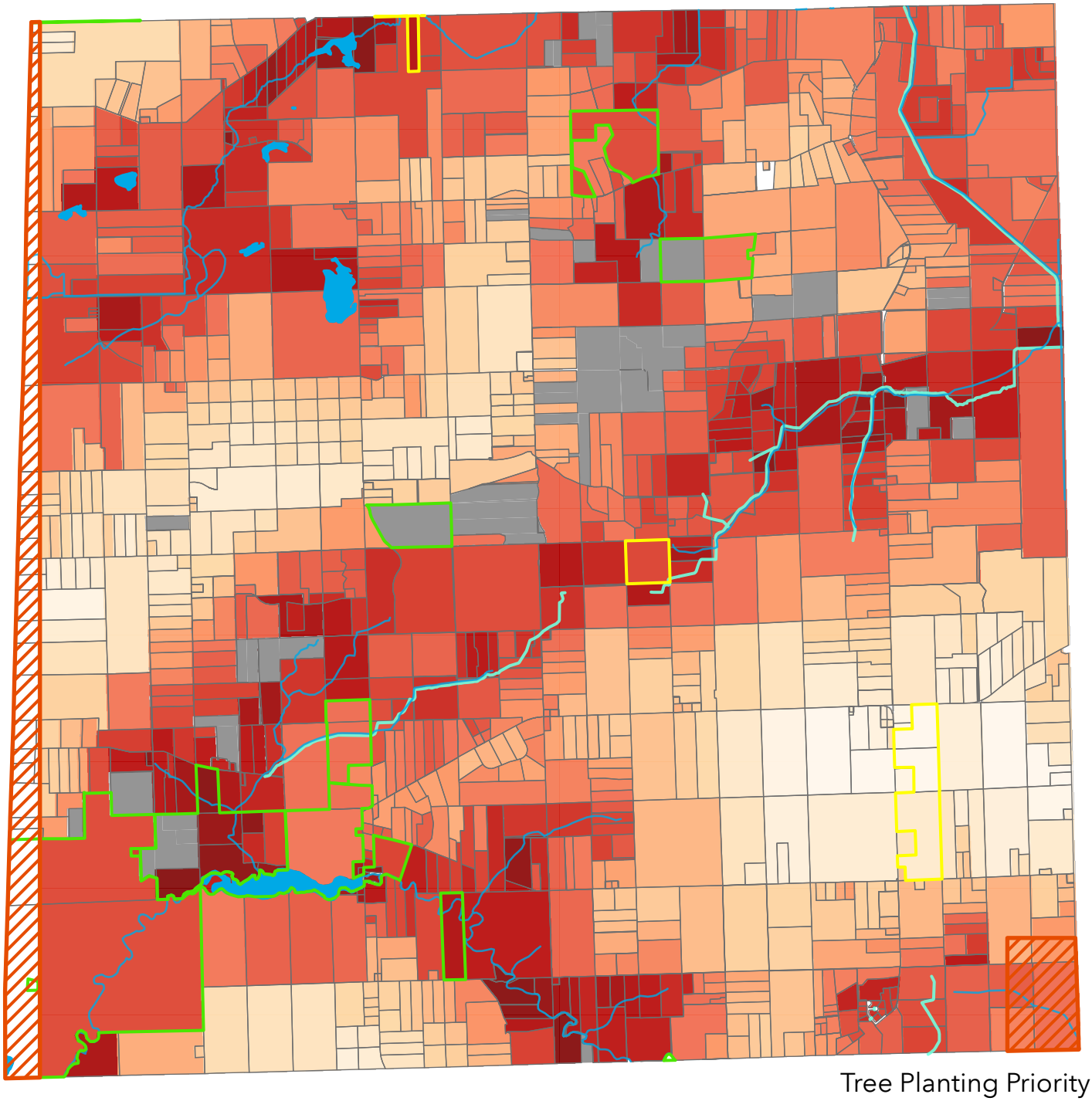
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels, Conservation/Recreation Lands; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.2) Sharon Township



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Tree Planting Priority

High

Low

County Drains

Natural Hydrology

Conservation Lands

Recreation Lands

Tree Canopy > 80%

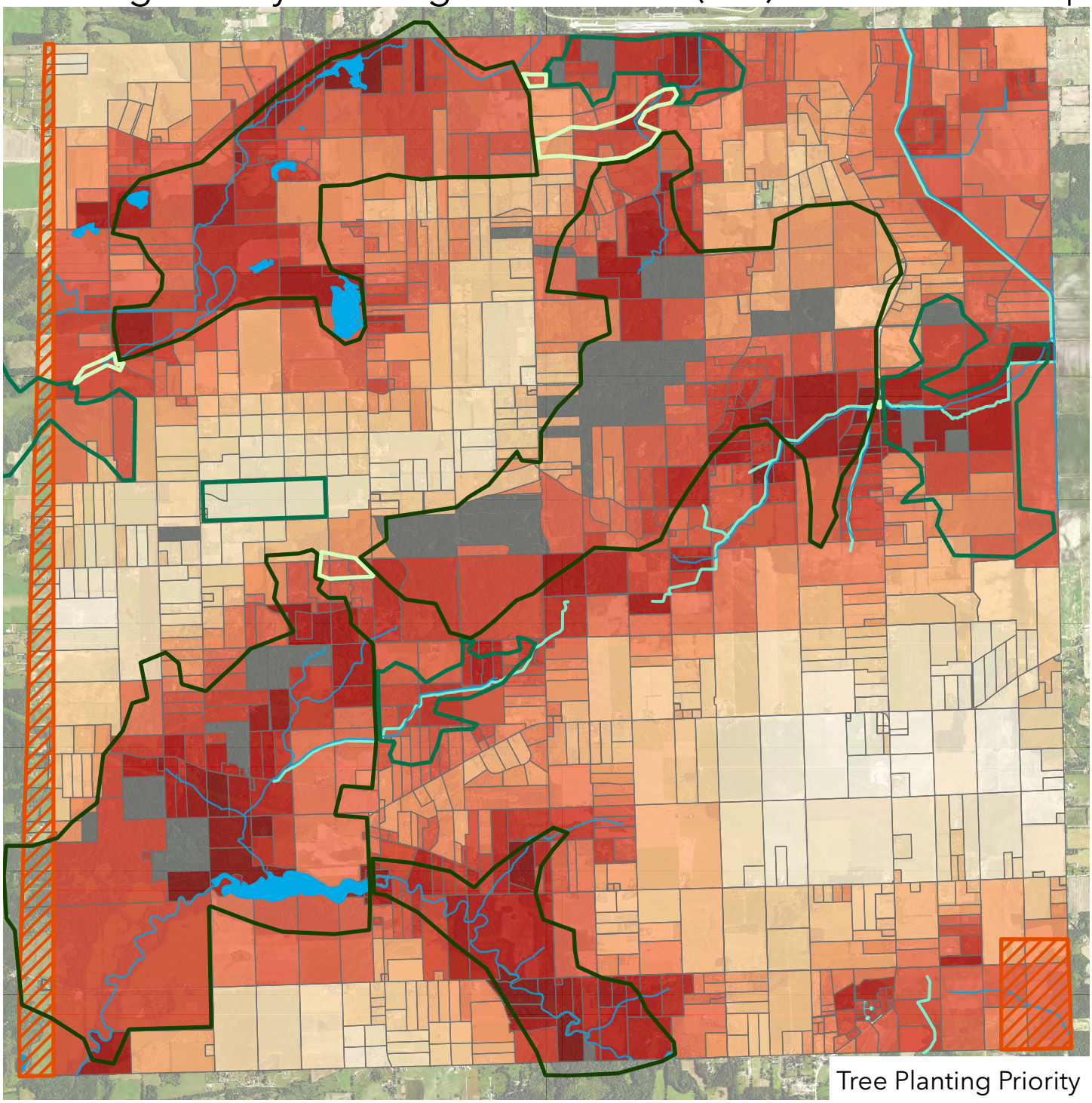
Canopy Data Unavailable

N

0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels, Recreation/Conservation Lands; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.3) Sharon Township



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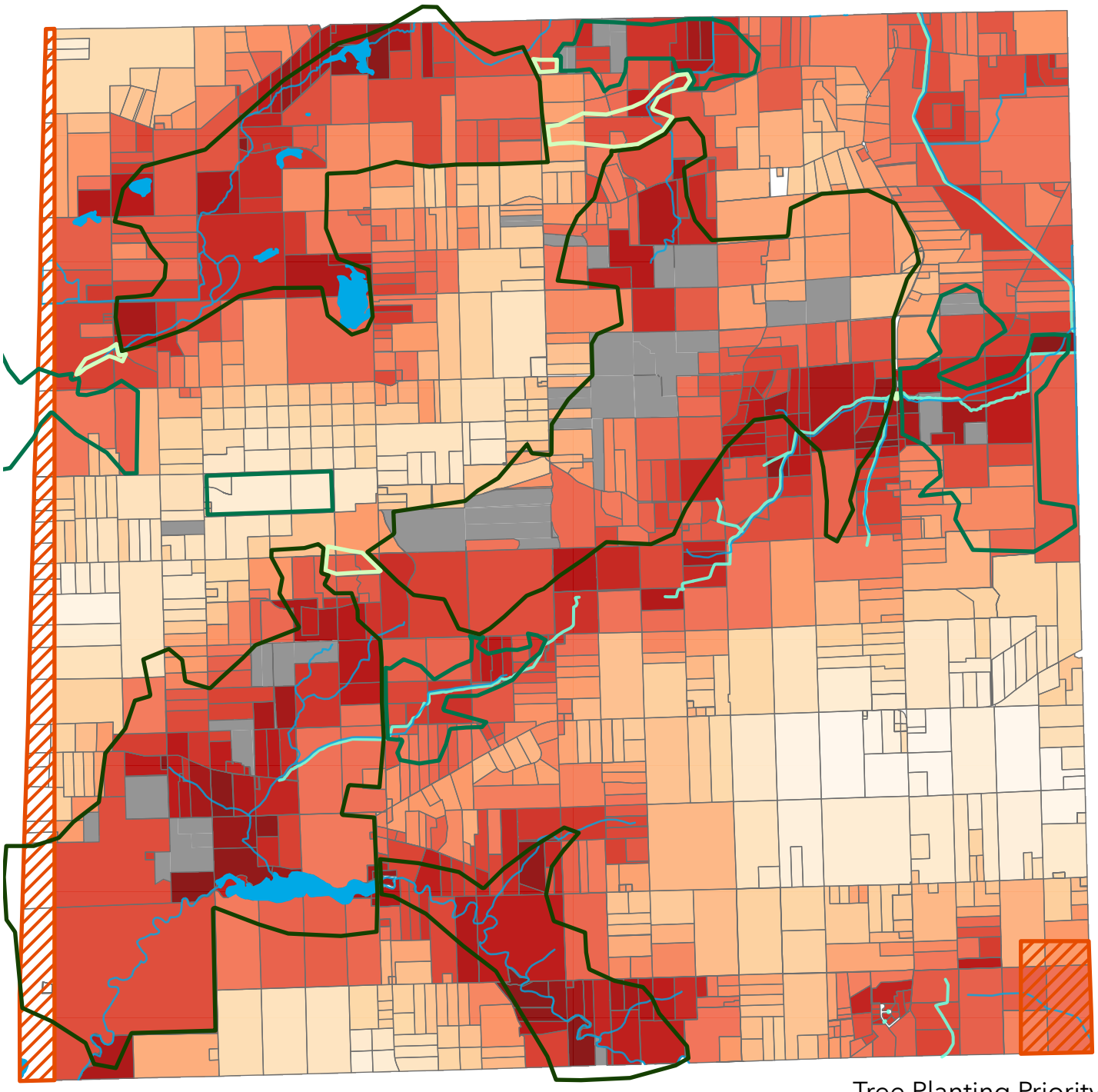
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography | Huron River Watershed Council - Green Infrastructure
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.3) Sharon Township



This map depicts tree planting priority in a scenario focused on ecological variables. Priority rankings for each parcel are determined from two considerations:
1) potential for rain and irrigation runoff to impact water quality and 2) connectivity of surrounding woodlands.
Parcels with more than 80% tree canopy cover have been excluded.

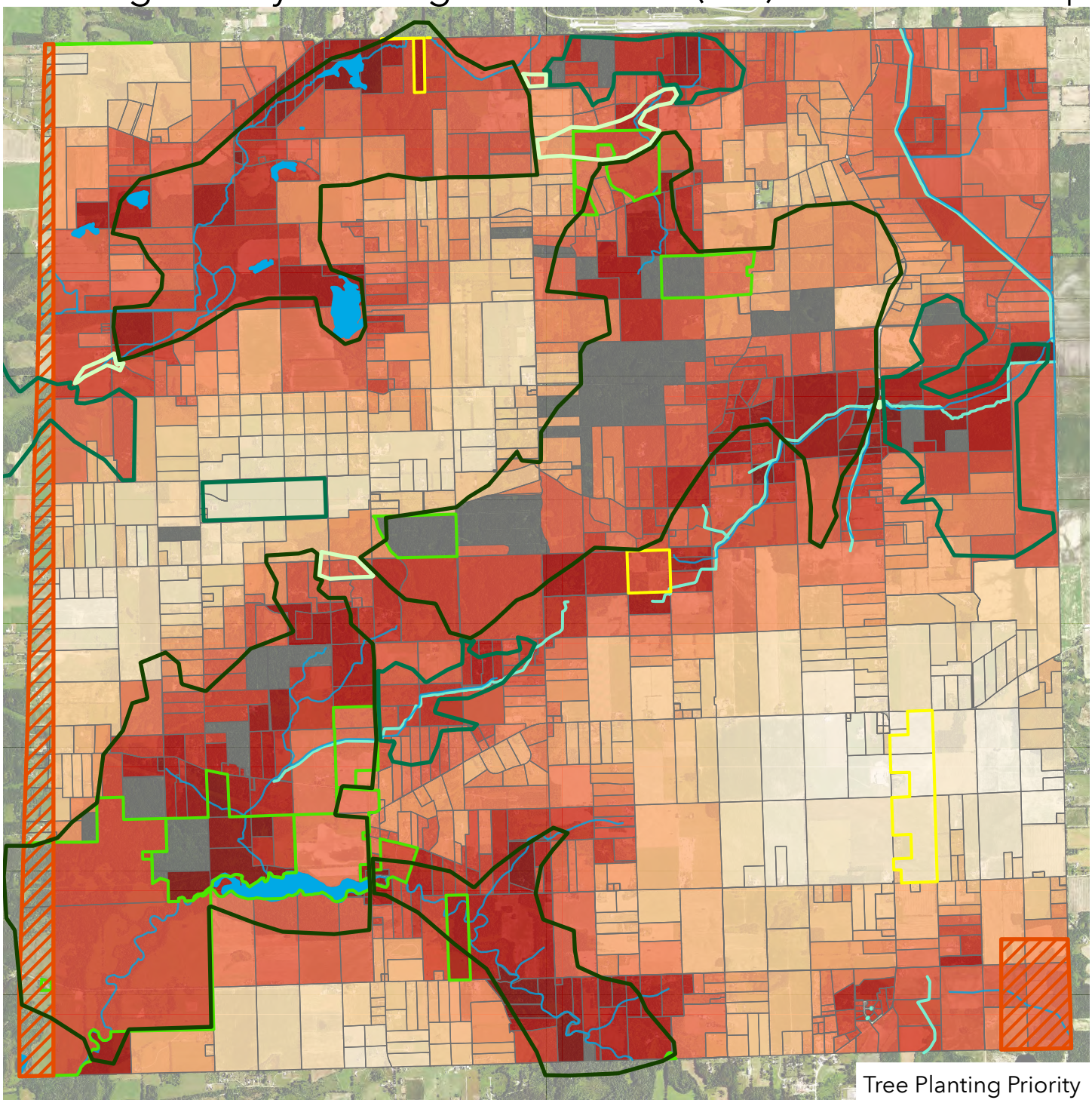
Tree Planting Priority
High
Low
County Drains
Natural Hydrology
Tree Canopy > 80%
Canopy Data Unavailable

HRWC Green Infrastructure
Hub
Site
Link

N
0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography | Huron River Watershed Council - Green Infrastructure
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.4) Sharon Township



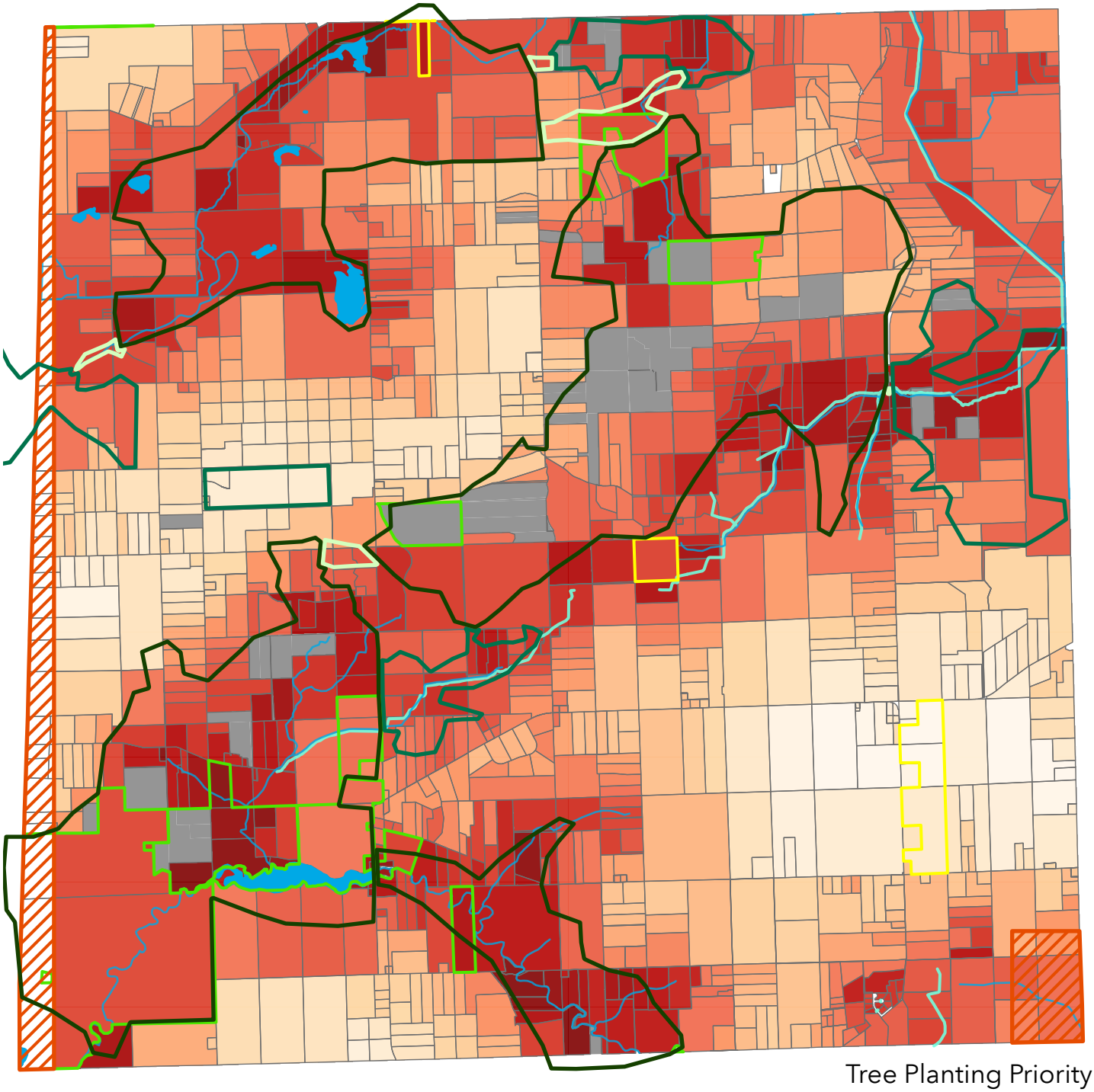
This map depicts tree planting priority in a scenario focused on ecological variables. Priority rankings for each parcel are determined from two considerations:
1) potential for rain and irrigation runoff to impact water quality and 2) connectivity of surrounding woodlands.
Parcels with more than 80% tree canopy cover have been excluded.

N

0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels, Conservation/ Recreation Lands; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography | Huron River Watershed Council - Green Infrastructure
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Planting Priority - Ecological Scenario (1.4) Sharon Township



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HRWC Green Infrastructure
- Hub
- Site
- Link

Tree Planting Priority
- High
- Low

- County Drains
- Natural Hydrology
- Conservation Lands
- Recreation Lands
- Tree Canopy > 80%
- Canopy Data Unavailable

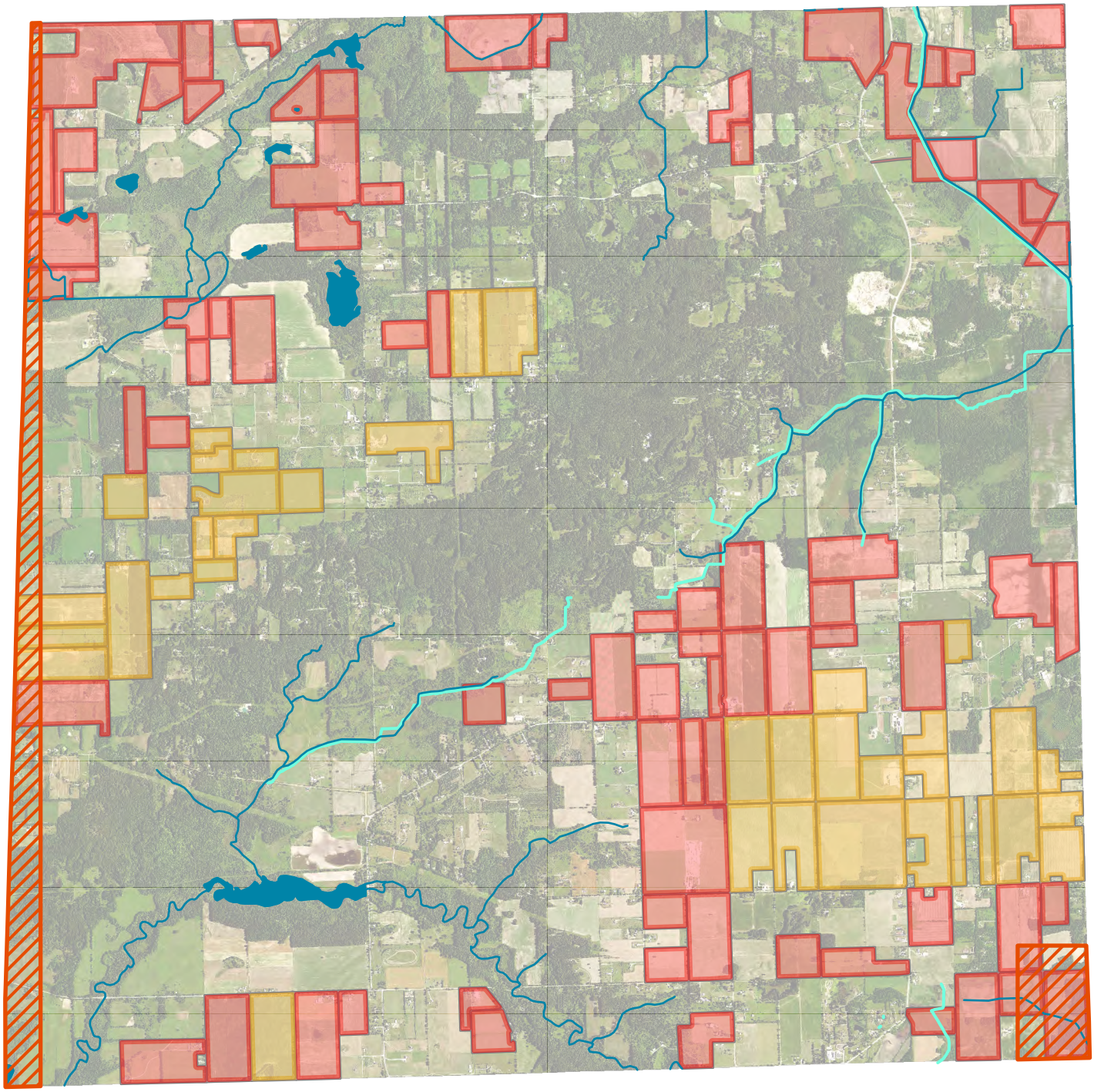
N

0 0.5 1 2 Miles

Data Sources: NAIP (2020) | Washtenaw County GIS Program - LiDAR (2017), Parcels, Recreation/ Conservation Lands; Washtenaw County Water Resources Commissioner's Office - County Drains | Michigan Open GIS - Hydrography | Huron River Watershed Council - Green Infrastructure
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek, May 10 2022

Priority Planting - Agroforestry Scenario (1)

Sharon Township



This map depicts two-tiers of parcels where agroforestry practices (the intentional mixing of trees with crops or livestock) on agricultural parcels larger than 20 acres with less than 10% tree canopy may improve water quality. **High priority** parcels are within a quarter mile of natural hydrology, county drains, or catch basins. **Moderate priority** parcels are further than a quarter mile from natural hydrology, county drains, or catch basins.

Tier 1 - High Priority
Tier 2 - Moderate Priority
Natural Hydrology
County Drains
Data Unavailable

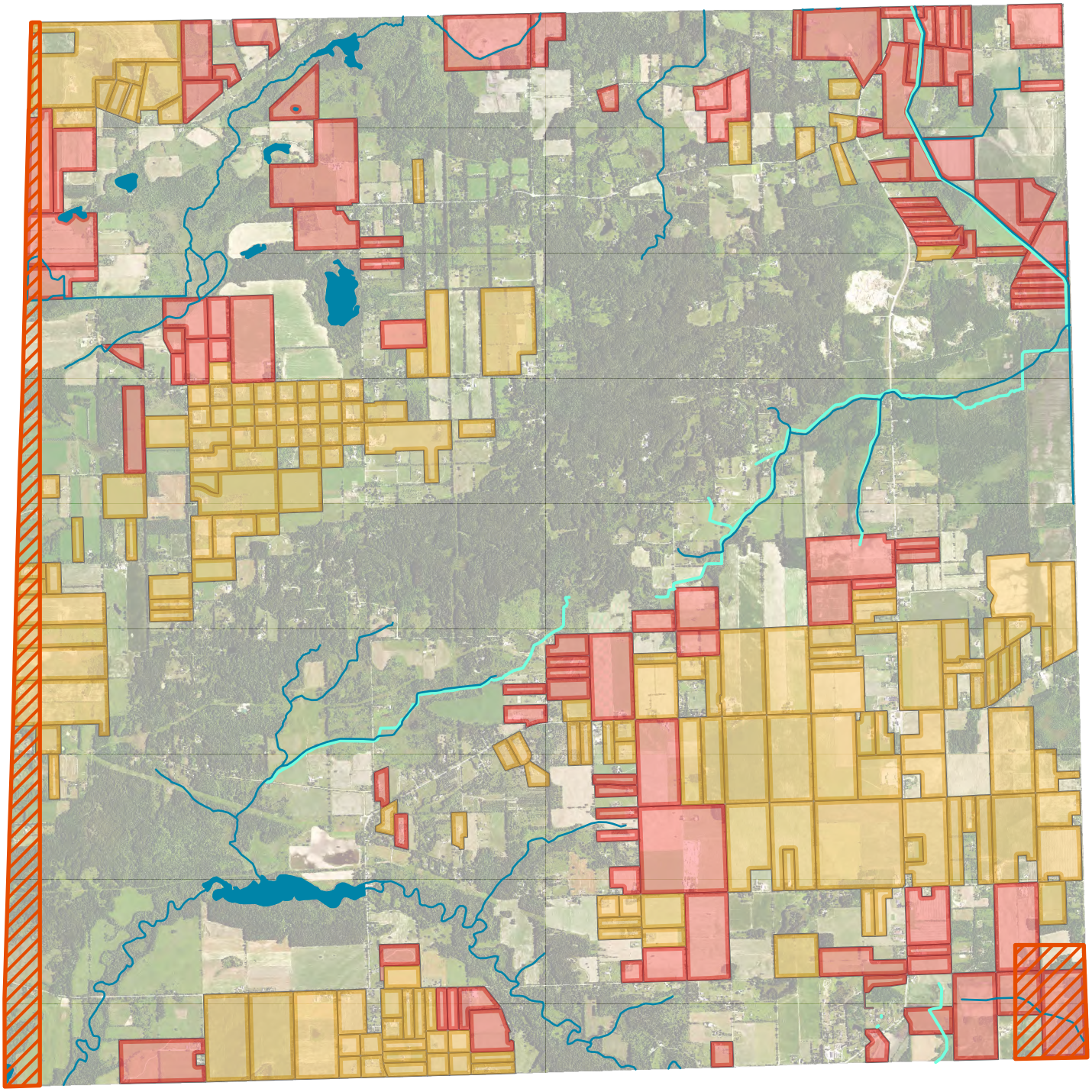
N

0 0.5 1 2 Miles

Data Sources: Washtenaw County GIS Program - Parcels, LiDAR (2017); Washtenaw County Water Resources Commissioner's Office - County Drains; Carlisle | Wortman and Associates, Inc. - Land Use (2020); State of Michigan Open GIS - Hydrography
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek | May 31 2022

Priority Planting - Agroforestry Scenario (2)

Sharon Township



This map depicts two-tiers of parcels where agroforestry practices (the intentional mixing of trees with crops or livestock) on agricultural parcels larger than 10 acres with less than 10% tree canopy may improve water quality. **High priority** parcels are within a quarter mile of natural hydrology, county drains, or catch basins. **Moderate priority** parcels are further than a quarter mile from natural hydrology, county drains, or catch basins.

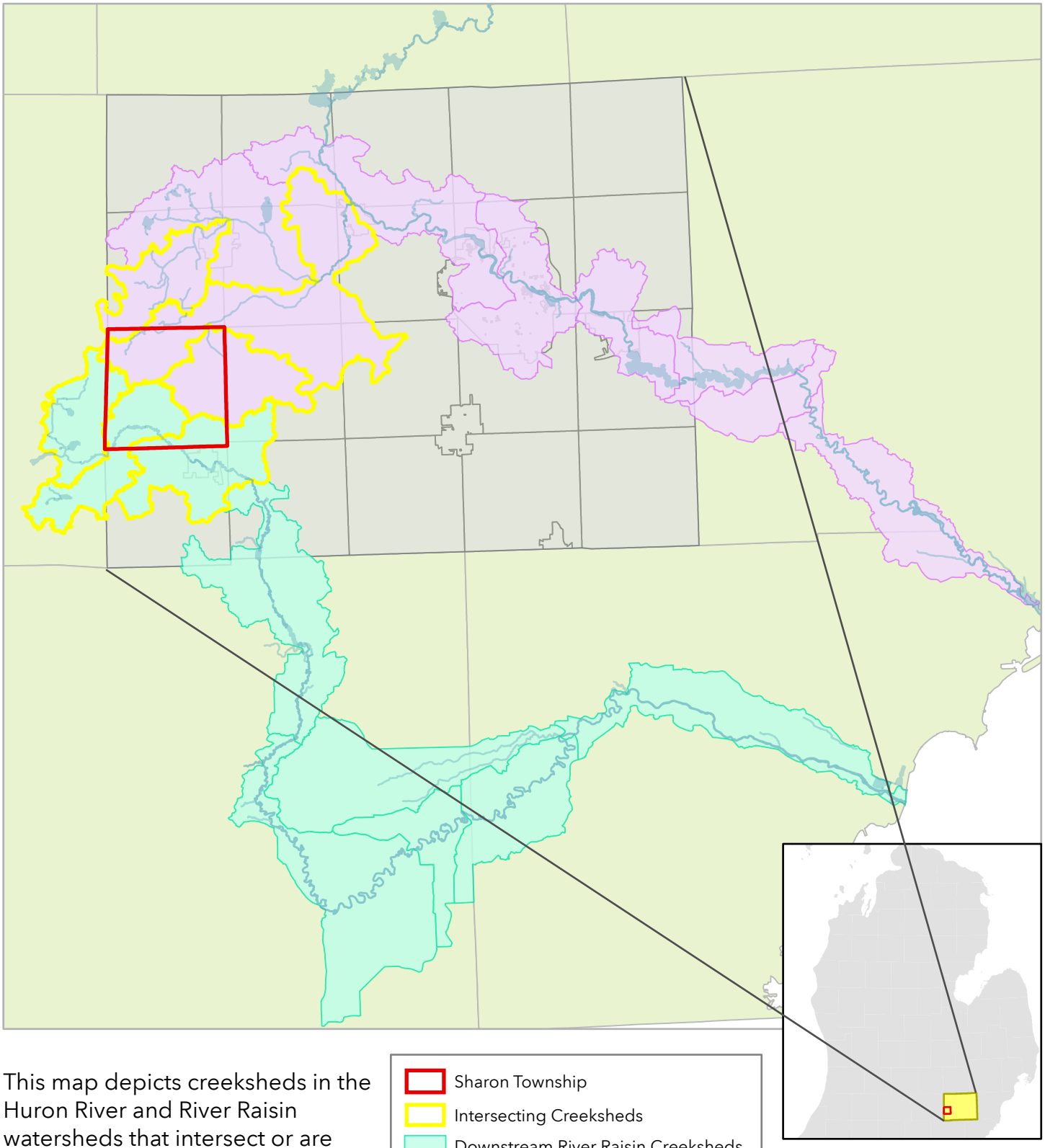
Tier 1 - High Priority
Tier 2 - Moderate Priority
Natural Hydrology
County Drains
Data Unavailable

N

0 0.5 1 2 Miles

Data Sources: Washtenaw County GIS Program - Parcels, LiDAR (2017); Washtenaw County Water Resources Commissioner's Office - County Drains; Carlisle | Wortman and Associates, Inc. - Land Use (2020); State of Michigan Open GIS - Hydrography
Datum/Projection: NAD 1983 State Plane Michigan South
Analysis/Cartography: Lyndsay Zemanek | May 31 2022

Watersheds of Sharon Township



This map depicts creeksheds in the Huron River and River Raisin watersheds that intersect or are downstream from Sharon Township.

- Sharon Township
- Intersecting Creeksheds
- Downstream River Raisin Creeksheds
- Downstream Huron River Creeksheds
- Rivers and Tributaries

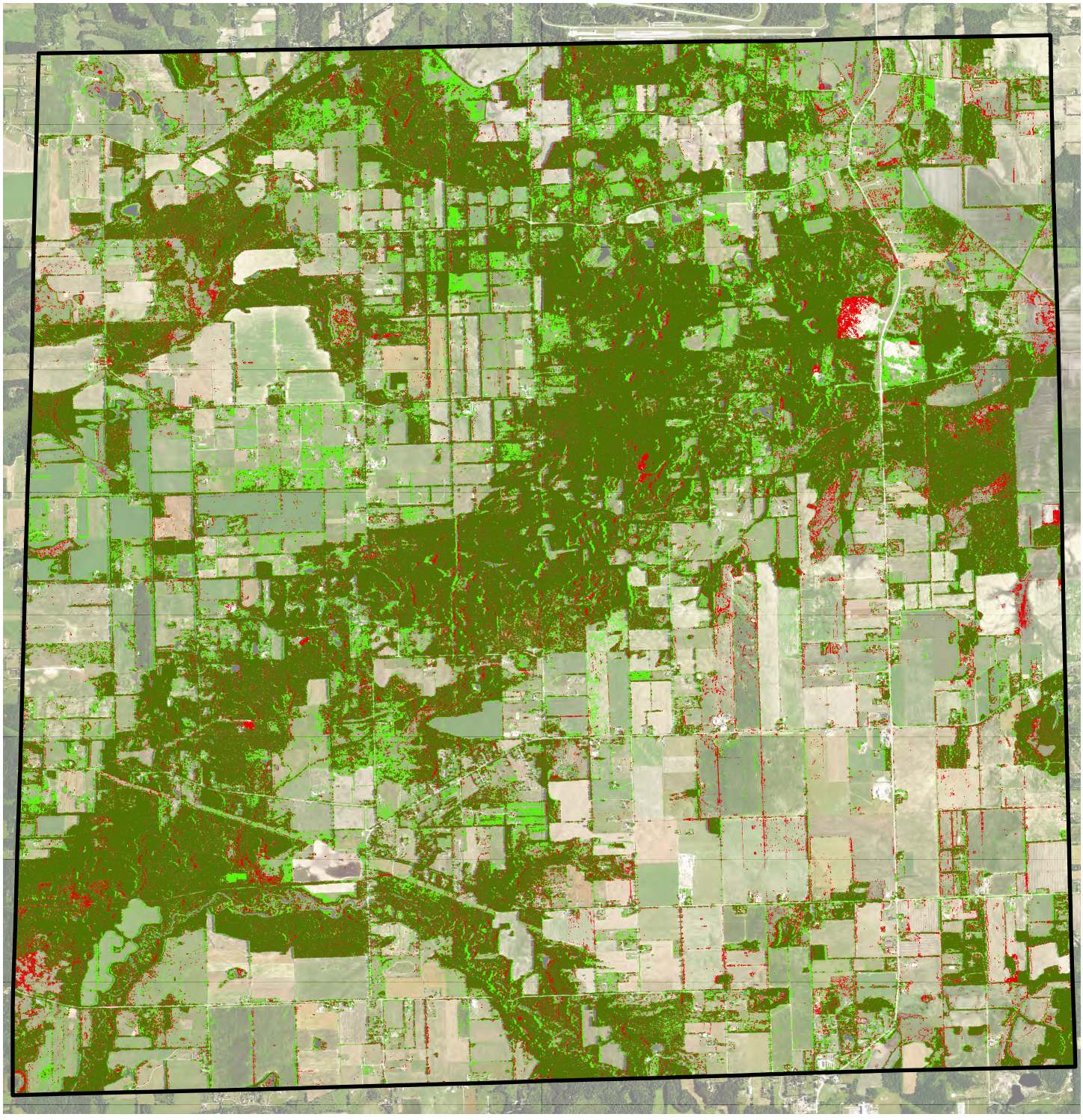
N

0 2.5 5 10 Miles

Data Sources: Forests to Faucets 2.0 - Watersheds | Michigan Open GIS Data - Hydrology, Counties | Washtenaw County GIS Program - Municipal boundaries
Datum/Projection: NAD 1983 State Plane Michigan South
Author: Lyndsay Zemanek, May 18 2022

Tree Canopy Change 2010 - 2020

Sharon Township



This map depicts tree canopy change between 2010 and 2020. Note that some areas of tree canopy change can be attributed to classification errors due to differences between each year's imagery like camera or sun angle, rather than actual canopy loss or gain. Tree canopy is also likely overestimated for both years due to inclusion of woody shrubs.

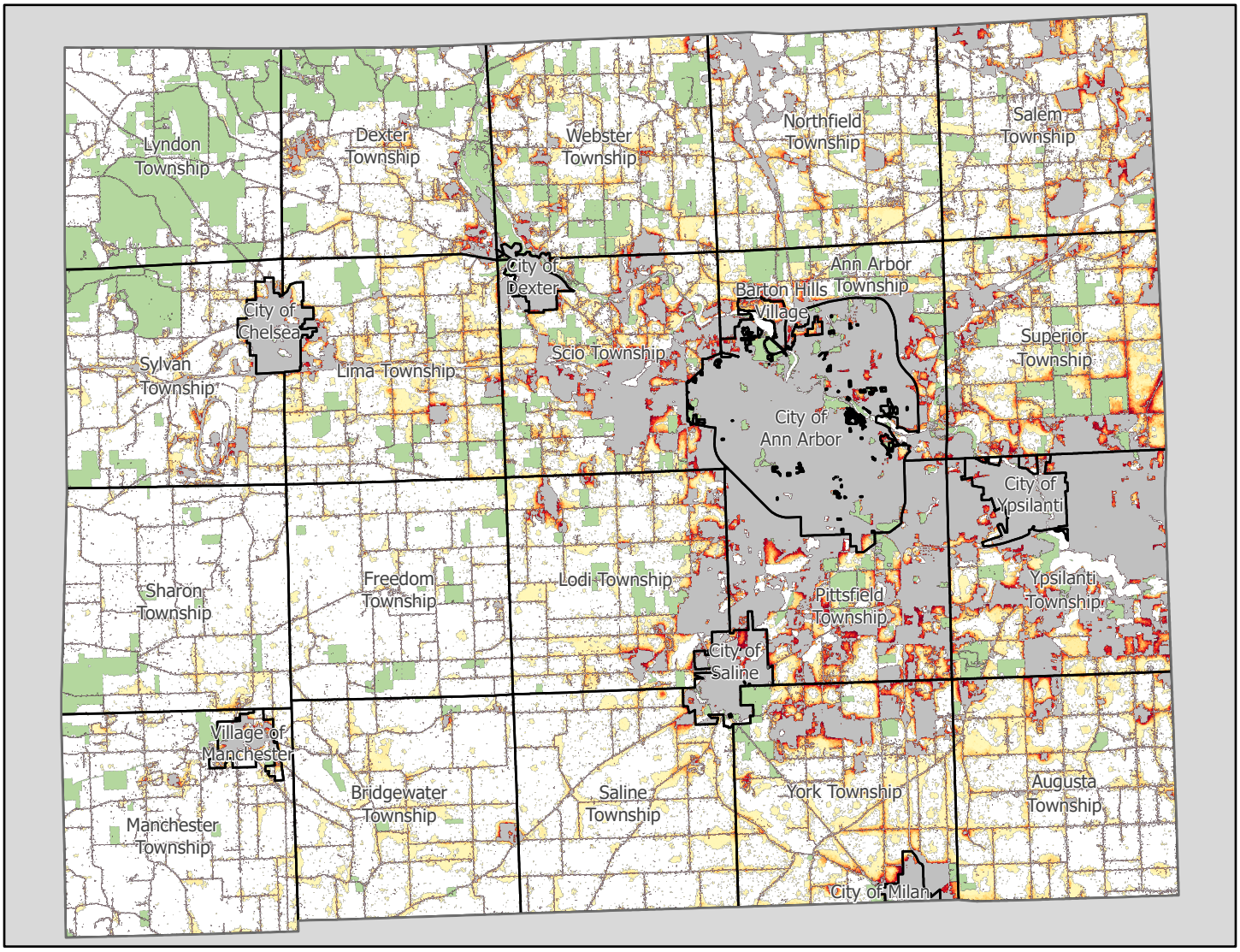
- No Change
- Canopy Loss
- Canopy Gain

N

0 0.5 1 2 Miles

Data Sources: NAIP (2020, 2010); Washtenaw County GIS Program - Township boundary
Datum/Projection: NAD83 Michigan State Plane (South)
Analysis/Cartography: Lyndsay Zemanek, June 10 2022

FUTURES Urban Projections for 2045
Washtenaw County



This map shows the potential growth of urban development in Washtenaw County by 2045. The projections were created in GRASS GIS using the FUTURES model, which takes into account factors such as relationships between population growth and past development, road density, distance to water, distance to highway interchanges, canopy cover, and proximity to existing development. NLCD classes 21-24 were considered urban. Due to randomness in the model, ten runs were executed in which the darkness of a pixel increases with the number of runs predicting it will be developed. The table below shows the predicted mean (and standard deviation) loss in acres for each landcover type. Forest includes deciduous, evergreen, and mixed forest. Agriculture includes pasture and crops.

Land Cover	Barren	Forest total	Scrub/shrub	Grassland	Ag total
Mean (acres)	94.78	6422.29	78.35	207.15	16059.25
SD(acres)	24.8	225.67	10.54	15.36	206.01

Protected Areas
2019 Urban Areas

Number of Model Runs

No Runs
1
2
3
4
5
6
7
8
9
10

N
0 2.5 5 10 Miles

Data sources: NLCD (2019 urbanization), Washtenaw County Open Data (township borders, protected areas), SEMCOG (population projections)
Datum/Projection: NAD83 Albers Conical Equal Area
Layout: Thomas Estabrook, 5/17/2022

Washtenaw County Conservation District

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THANK YOU...

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Washtenaw County GIS Program

Washtenaw County Water Resources Commissioner's Office

Ann Arbor Area Transit Authority

Carlisle Wortman

Huron River Watershed Council

Pilot Municipalities

Bridgewater Township | Sharon Township | City of Ypsilanti | Ypsilanti Township

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Lyndsay Zemanek, UM Student Contractor - GIS Analyst