Initial Analysis of Route 11 Bypasses and the Land-Use Impacts in Canton and Potsdam

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Special Thanks

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Local grassroots initiative focusing on highway transportation needs
For providing me an incredible amount of context to my study, including maps and analysis suggestions. Thank you for meeting with me throughout the semester and supporting my work. This study could not have been possible without you.

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Director, Potsdam Planning & Development
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Civil & Environmental Eng Instructor, Clarkson University
For broadening my knowledge of ArcGIS and assisting me with data collection. Most of all, for helping arrange this independent study.

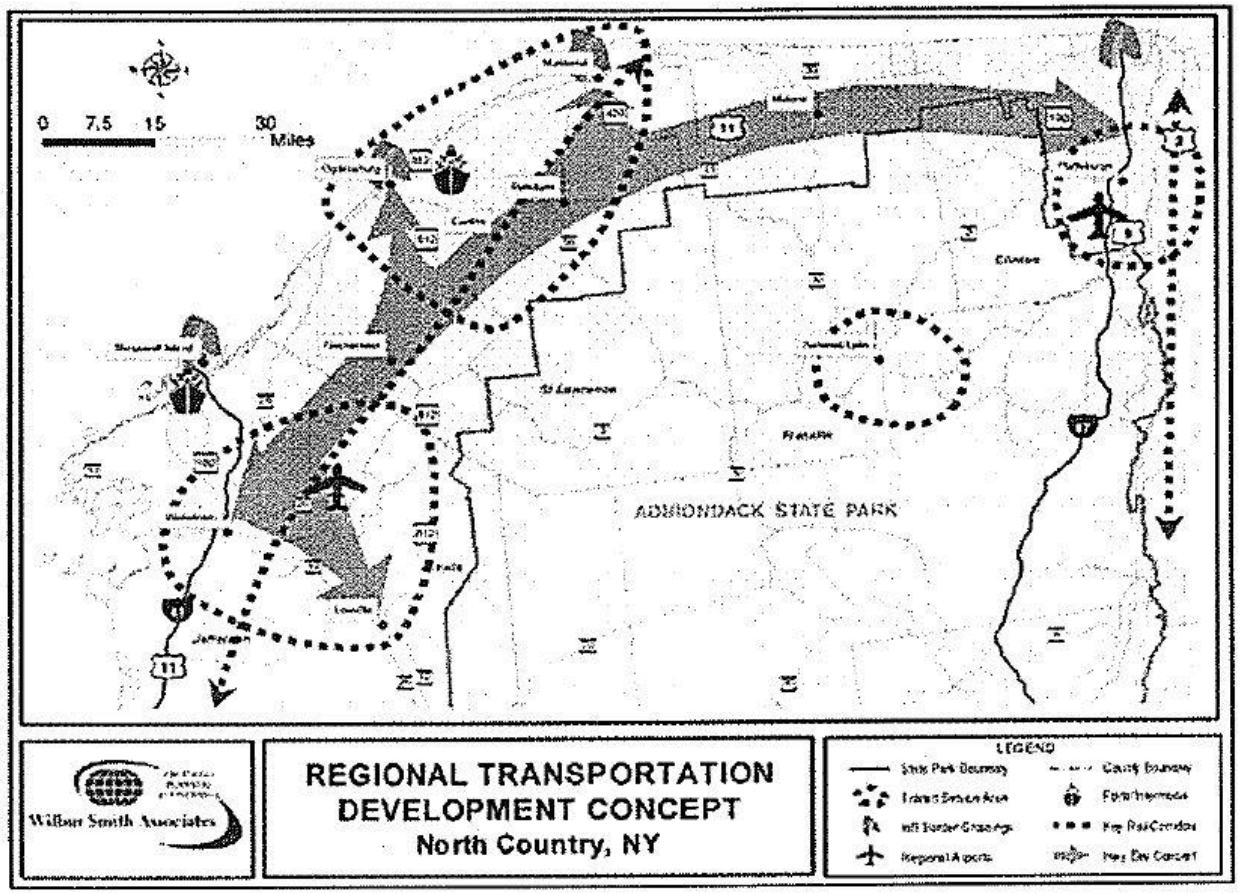
Preface

Erik Backus and Bill Olsen met with me in the final weeks of the 2015 fall semester to discuss the possibility of a GIS independent study, and Erik presented the idea of continuing Greg Lang's previous study on improving pedestrian infrastructure in the Village of Potsdam. Erik and I met with Fred Hanns the following January to discuss the project proposal, and during that meeting, Fred discussed the 2002 North Country Transportation Study and displayed maps of the bypass concepts around Canton and Potsdam. Following this meeting, I met with the local grassroots response to the Transportation Study, YesEleven, to discuss their perceptions of the study and to glean ideas for analysis. After this initial meeting on January 28th, I met with the group two more times to share results and gather more ideas for future analysis. This study encapsulates the analysis I conducted on the bypass concepts around Canton and Potsdam, in addition to the bypass that YesEleven proposed and dubbed the "Rooway". This report is structured as step-by-step narrative of how I proceeded with my analysis.

Background

The proposal of an express highway system linking Watertown to Plattsburg has existed for many decades, but the 2002 North Country Transportation Study instilled a lot of research and detail into this concept. Basic tenets of the report will be discussed in the following slides. The image below depicts the overall regional development strategy for the North Country, the large arrows indicating an express highway system.

Exhibit 1
RECOMMENDED OVERALL REGIONAL DEVELOPMENT PLAN



The 2002 North Country Transportation Study develops six different goals for the North Country region, as shown in the following slides. Outcomes related to the justification for bypass corridors will be highlighted.

Goal No. 1: Improve Access to and from the Region

The purpose here is to provide efficient transportation linkages to border crossings, Interstates, intermodal centers, and other primary activity centers within the North Country.

Desired Outcomes:

- Decrease travel times to major markets, suppliers, population centers, and destinations
- Increase reliability of road transportation
- Improve highway access to/from Canada (to and over existing bridges)
- Improve highway access to/from outside business markets (Midwest, Northeast, etc.)
- Improve highway access to/from state capital
- Regional airport
- Low-cost fast air service to/from area gateways (e.g., Syracuse, Albany, Ottawa, Montreal)
- Retain & improve rail freight to/from suppliers (South, Midwest) and markets (all directions)
- Restore passenger rail service (between Syracuse and Plattsburgh)
- Improve bus links with hubs in Syracuse and Albany
- Evaluate and improve intermodal transfer centers & ports

Goal No. 2: Facilitate Access within the Region

The intent of this goal is to reduce the conflicts among motorists, pedestrians, truckers, and bicyclists that would otherwise result from growth in traffic volumes.

Desired Outcomes:

- Improve travel time through/around village centers
- Improve highway access and decrease travel times within region to/from I-81 area
- Improve highway access and decrease travel times within region to/from I-87 area
- Improve highway access and decrease travel times within region to employment centers (Massena industries, Potsdam/Canton universities, etc.)
- Improve access to inter-modal connections (truck/rail, truck/sea)
- Improve access from regional airports to colleges in Canton and Potsdam
- Improve safety on local highways (passing, intersections, curves, shoulders)
- Improve reliability for truck shipments on local highways (passing, intersections)
- Enhance road capacity for Fort Drum vehicles

Goal No. 3: Promote Safety and Accident Reduction

The objective is to improve motorist, pedestrian, bicycle, and truck safety and to reduce roadway related hazards that contribute to accident frequency and/or severity. Accidents create an unacceptable risk to using the North Country's transportation facilities. It is important to always strive to reduce the frequency and severity of accidents by applying appropriate planning and design standards responsive to the roadways context.

Goal 4: Expand Transportation Service Levels

Goal No 5: Promote Economic Development

The purpose is to provide transportation infrastructure that supports initiatives for regional economic development by providing appropriate levels of accessibility and mobility.

Desired Outcomes:

- Create quality jobs to stem population loss and to attract & retain workforce
- Attract new industries to the region, to expand job and income opportunities
- Lower transportation costs for existing farms and industries by reducing truck travel times and attracting other industry for haul-backs
- Strengthen trade links with Canada
- Maximize value-added from extractive industries and ports through more finished products
- Promote tourism by improving access to population centers
- Increase attractiveness and competitiveness of area colleges through better outside access
- Enhance the area's image; overcome the notion that it is inaccessible
- Improve road signage
- Invest in telecom infrastructure
- Rework regulations that limit Port shipment activity

Goal No. 6: Retain Environmental Integrity

The objective is to satisfy local, regional and statewide transportation needs while observing local growth, development and environmental goals.

Desired Outcomes:

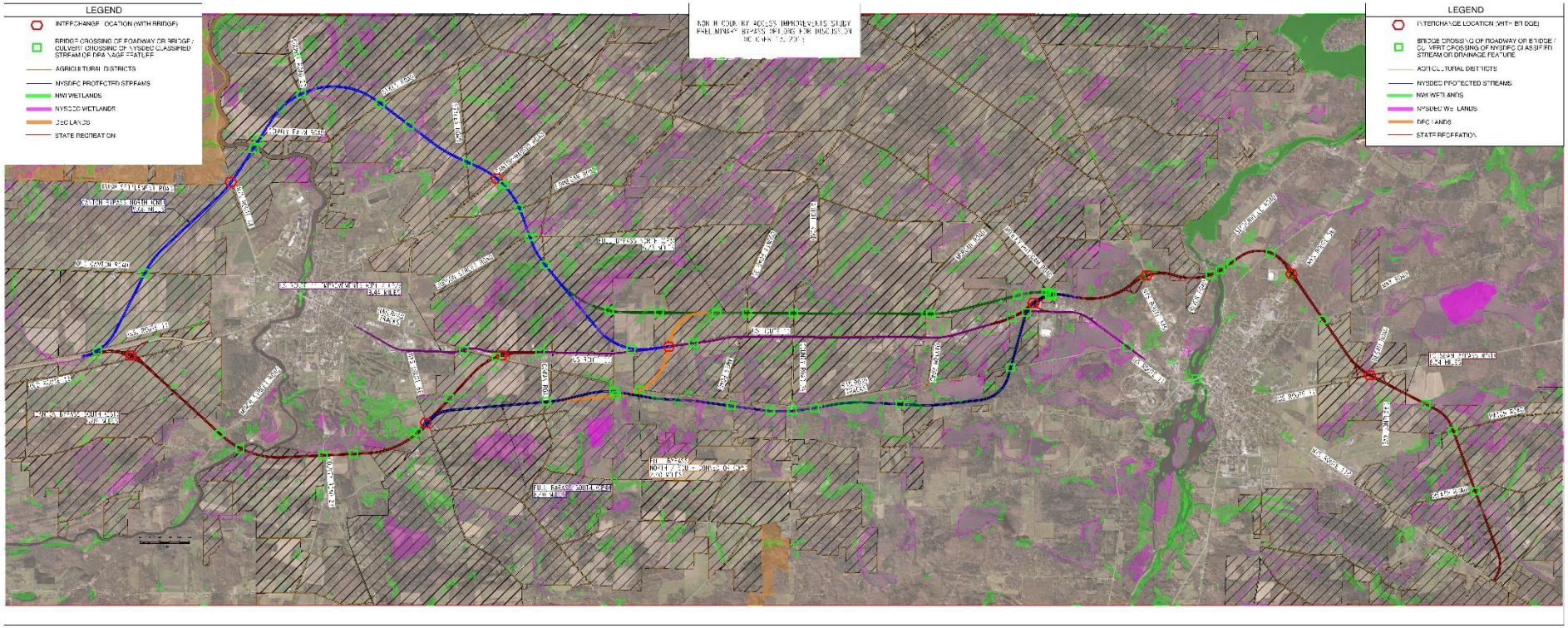
- Preserve high quality of life (from natural environment)
- Avoid environmental degradation
- Support the vitality of the region's farms
- Minimize impacts on environment and wetlands
- Prevent development sprawl
- Preserve and strengthen existing population centers and town centers

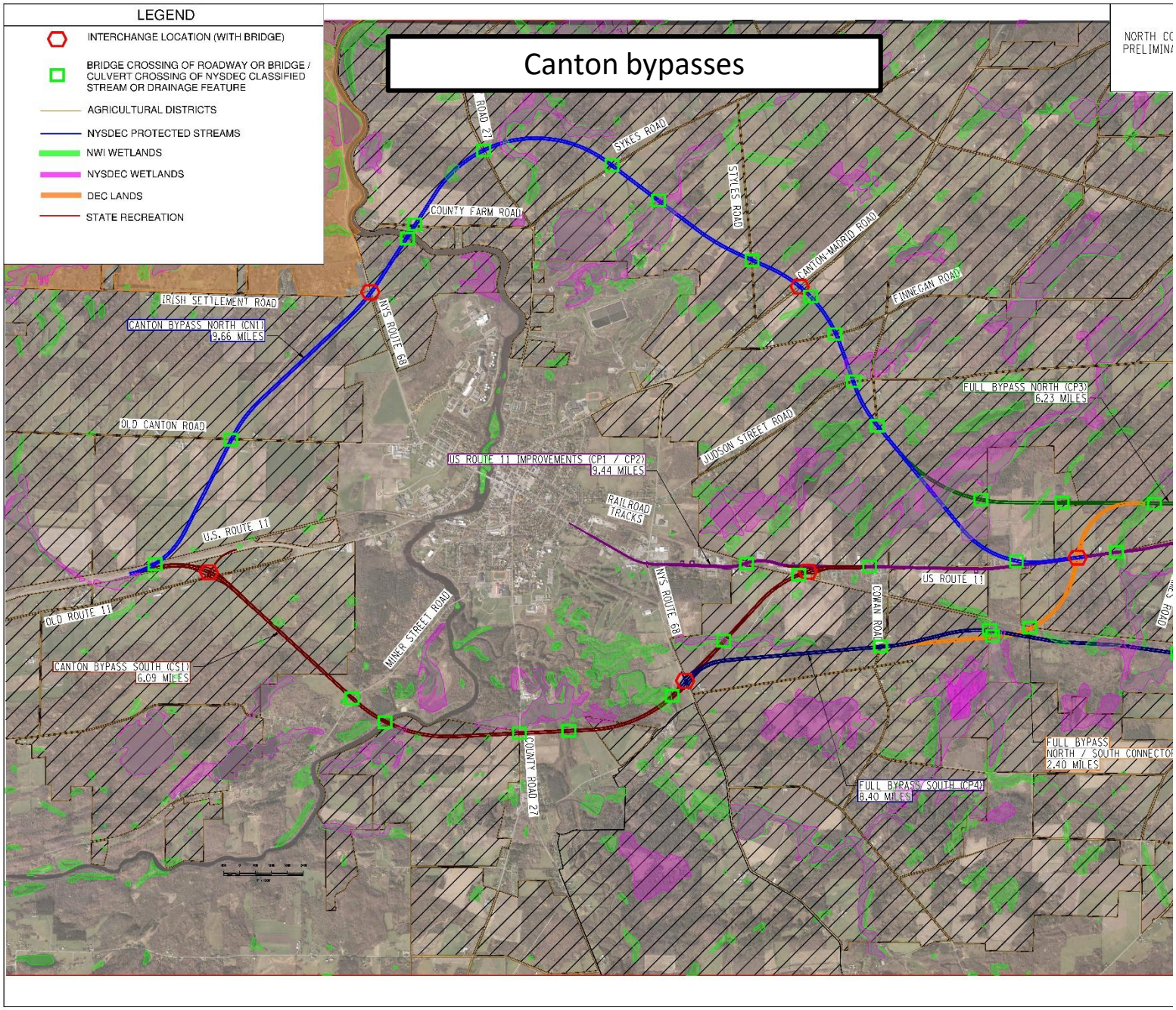
The six goals established by the 2002 North Country Transportation Study seek to improve regional access, facilitate regional access, promote safety and accident reduction, expand transportation service levels, promote economic development, and retain environmental integrity.

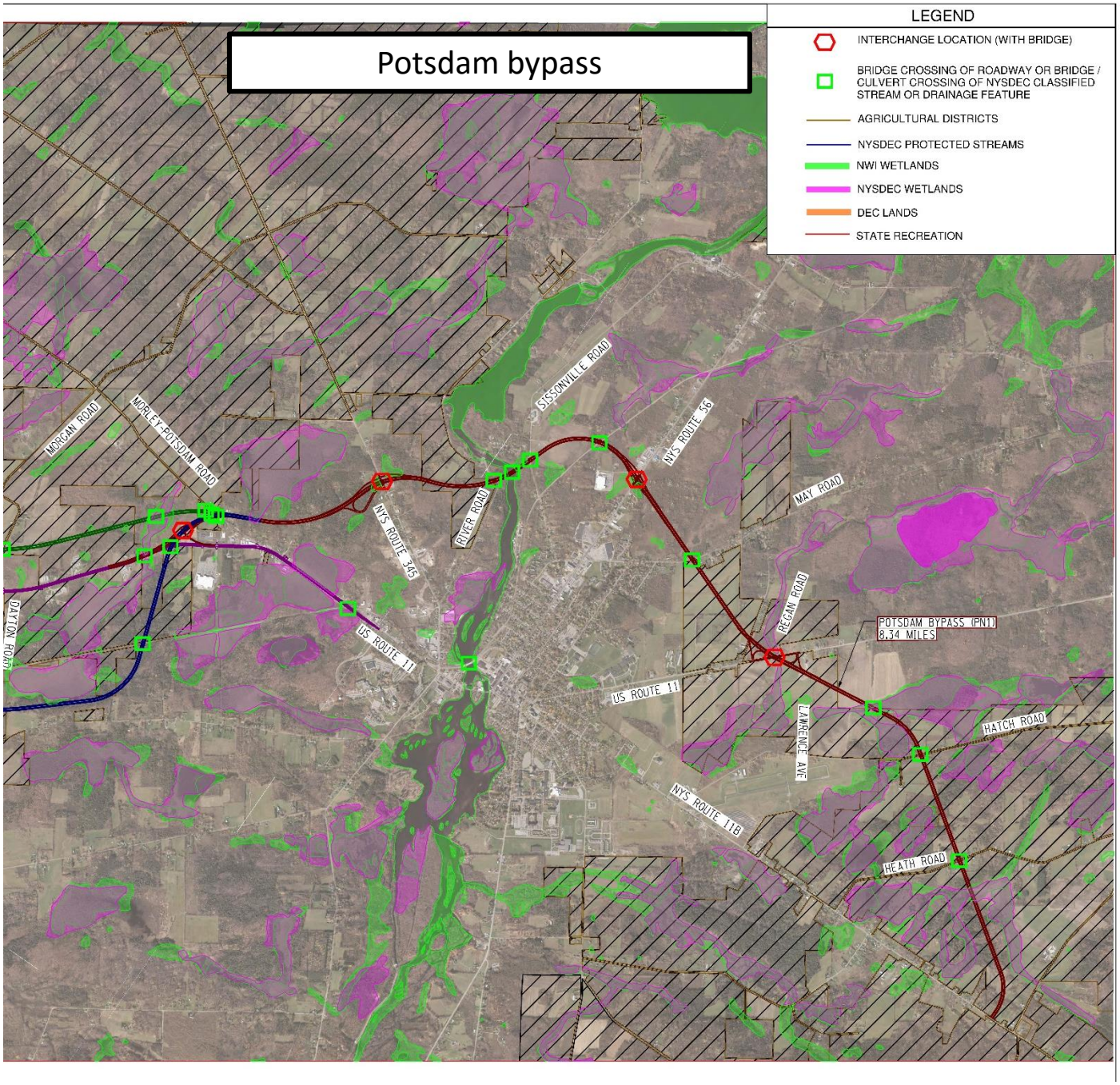
In order to implement the proposed highway corridor from Watertown to Plattsburg, the study proposes that the project should be conducted in phases, constructing segments in order to slowly build up the backbone to the highway corridor. A passage from the 2002 study below reveals how community bypasses are perceived as an essential phase to the long term implementation of the corridor.

By-Passes of Communities Along the Corridor - It is likely that the Tier I will identify the by-passes around the communities of Malone, Canton, Potsdam and Gouverneur as critical "early starts".

Since bypasses are seen as an “early start” to a greater regional vehicular corridor, bypass concepts have been drafted for the targeted communities. The bypass options around Canton and Potsdam are shown in the following slides. These maps are included in the 2002 North Country Transportation Study.



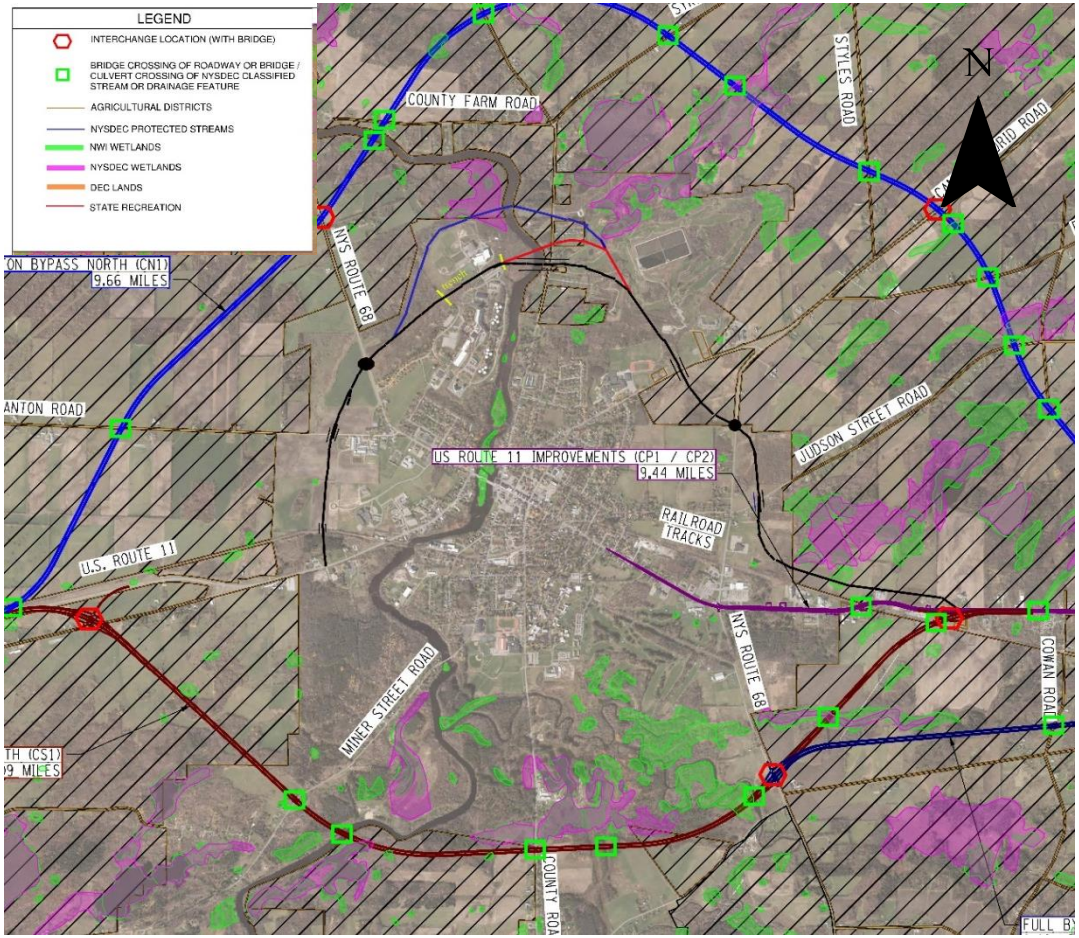

LEGEND
INTERCHANGE LOCATION (WITH BRIDGE)
BRIDGE CROSSING OF ROADWAY OR BRIDGE / CULVERT CROSSING OF NYSDEC CLASSIFIED STREAM OR DRAINAGE FEATURE
AGRICULTURAL DISTRICTS
NYSDEC PROTECTED STREAMS
NWI WETLANDS
NYSDEC WETLANDS
DEC LANDS
STATE RECREATION
Canton bypasses
ROAD 27
SYKES ROAD
STYLES ROAD
COUNTY FARM ROAD
CANTON-MADRID ROAD
FINNEGAN ROAD
IRISH SETTLEMENT ROAD
CANTON BYPASS NORTH (CN1)
9.66 MILES
NYS ROUTE 68
FULL BYPASS NORTH (CP3)
6.23 MILES
OLD CANTON ROAD
US ROUTE 11 IMPROVEMENTS (CP1 / CP2)
9.44 MILES
JUDSON STREET ROAD
RAILROAD TRACKS
U.S. ROUTE 11
US ROUTE 11
OLD ROUTE 11
MINER STREET ROAD
NYS ROUTE 68
COWAN ROAD
CANTON BYPASS SOUTH (CS1)
6.09 MILES
COUNTY ROAD 27
FULL BYPASS
NORTH / SOUTH CONNECTOR
2.40 MILES
FULL BYPASS SOUTH (CP4)
8.40 MILES


Potsdam bypass
LEGEND
INTERCHANGE LOCATION (WITH BRIDGE)
BRIDGE CROSSING OF ROADWAY OR BRIDGE / CULVERT CROSSING OF NYSDEC CLASSIFIED STREAM OR DRAINAGE FEATURE
AGRICULTURAL DISTRICTS
NYSDEC PROTECTED STREAMS
NWI WETLANDS
NYSDEC WETLANDS
DEC LANDS
STATE RECREATION
MORGAN ROAD
MORLEY-POTSDAM ROAD
SISSONVILLE ROAD
NYS ROUTE 56
MAY ROAD
RIVER ROAD
NYS ROUTE 345
DAYTON ROAD
US ROUTE 11
REGAN ROAD
POTSDAM BYPASS (PN1)
8.34 MILES
US ROUTE 11
LAWRENCE AVE
HATCH ROAD
NYS ROUTE 11B
HEATH ROAD

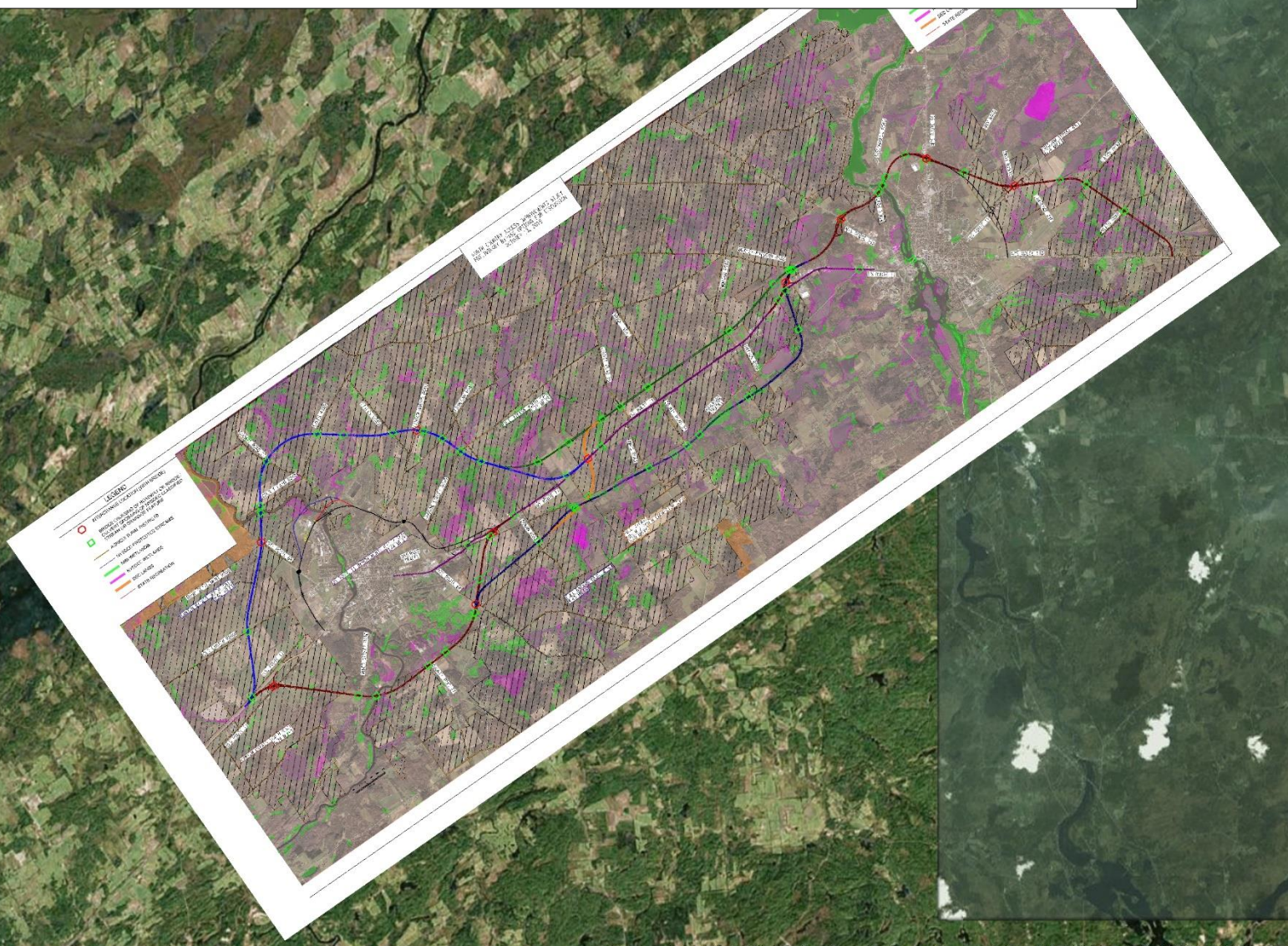
Overview

What this study seeks to evaluate is how well the proposed bypasses align with the six goals established in the 2002 North Country Transportation Study, particularly focusing on Goal #6, retaining environmental integrity. The bypasses will be inherently land consuming due to their proposed length and width, and the construction of these bypasses will consequently bisect properties and displace home owners. The 2002 North Country Transportation Study should be amended to include a seventh goal of retaining community integrity, as these bypasses will directly impact the lives of hundreds, if not thousands, of local residents. This study focuses on both the environmental and social impacts of these bypasses, including the bypass proposed by YesEleven.

YesEleven proposed their own bypass, the Rooway, featured in the map below. According to the group, this bypass is intended to be more of a 45mph community-oriented parkway, as it connects SUNY Canton and other sources of high traffic. The Rooway has three renditions, but only the shortest route, in black, was selected for comprehensive GIS analysis. The Rooway was originally drawn by hand on a paper copy of this map, causing obvious hurdles for GIS analysis. The Rooway was drawn in Photoshop on the original map .TIFF, then uploaded into ArcMap.

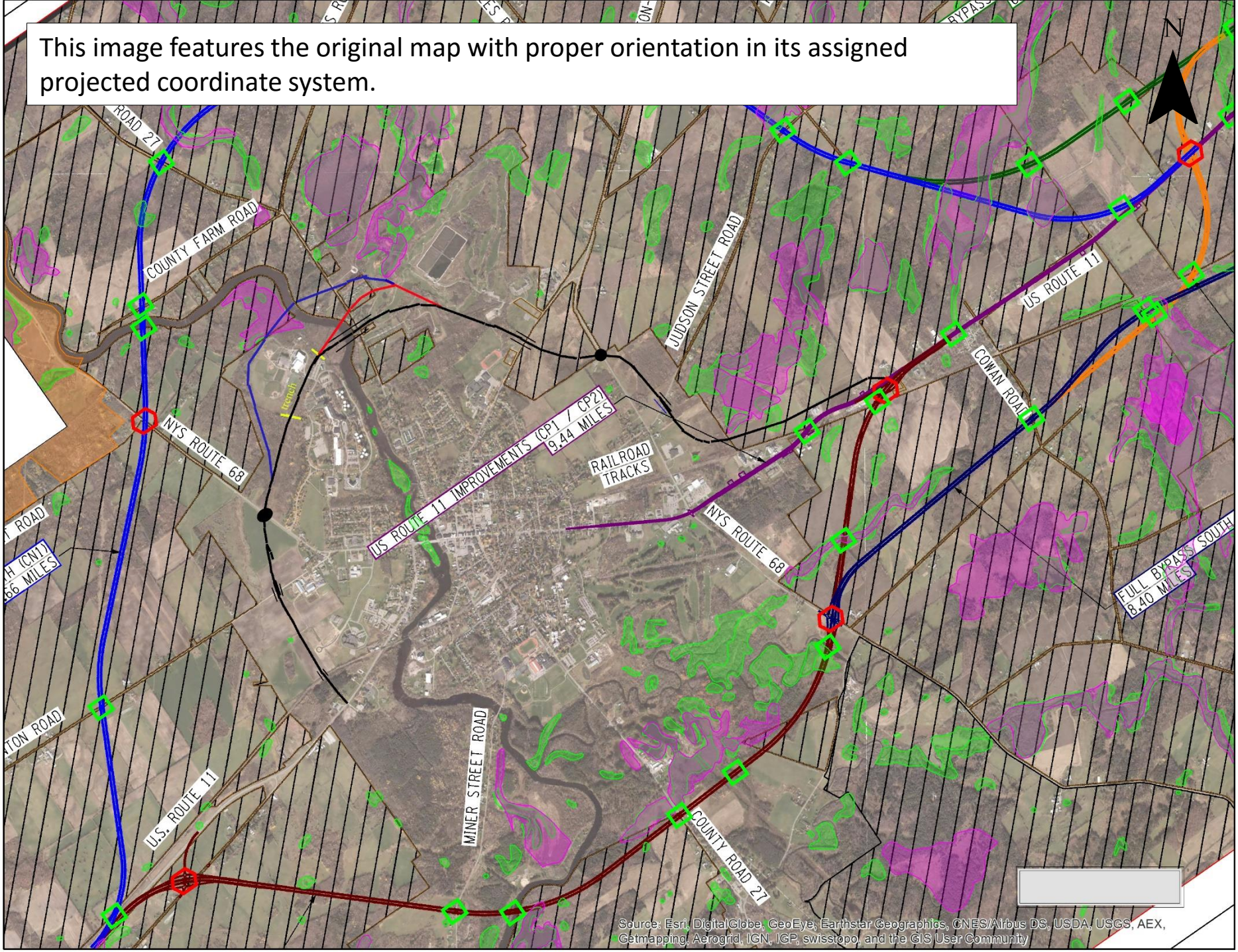


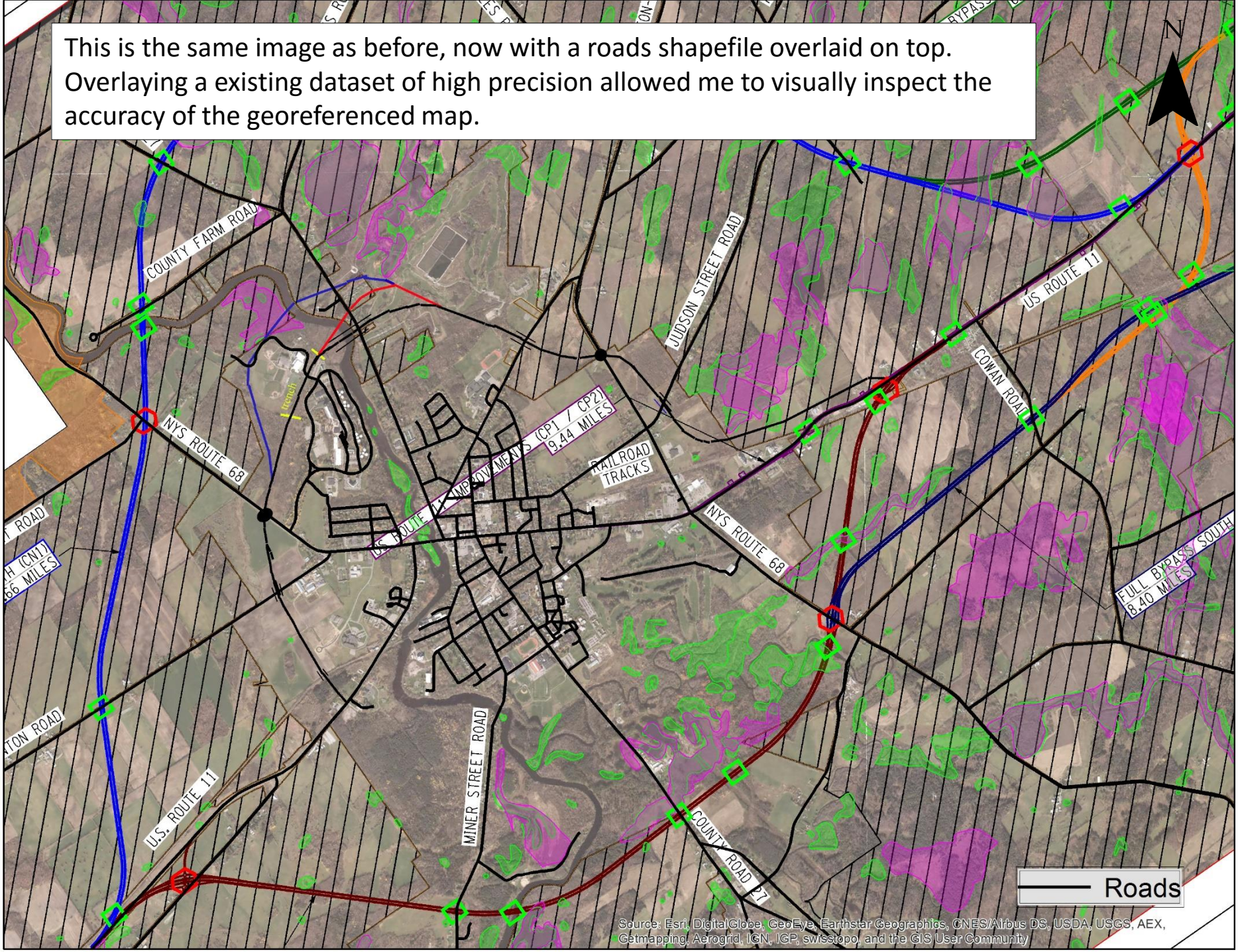
The .TIFF image, uploaded into ArcMap, was bereft of a coordinate system, and also lacked proper orientation. Using the ESRI Georeferencing tool, I was able to orient the original map to an existing projected coordinate system, thus allowing me to measure and manipulate this map accurately.



N

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

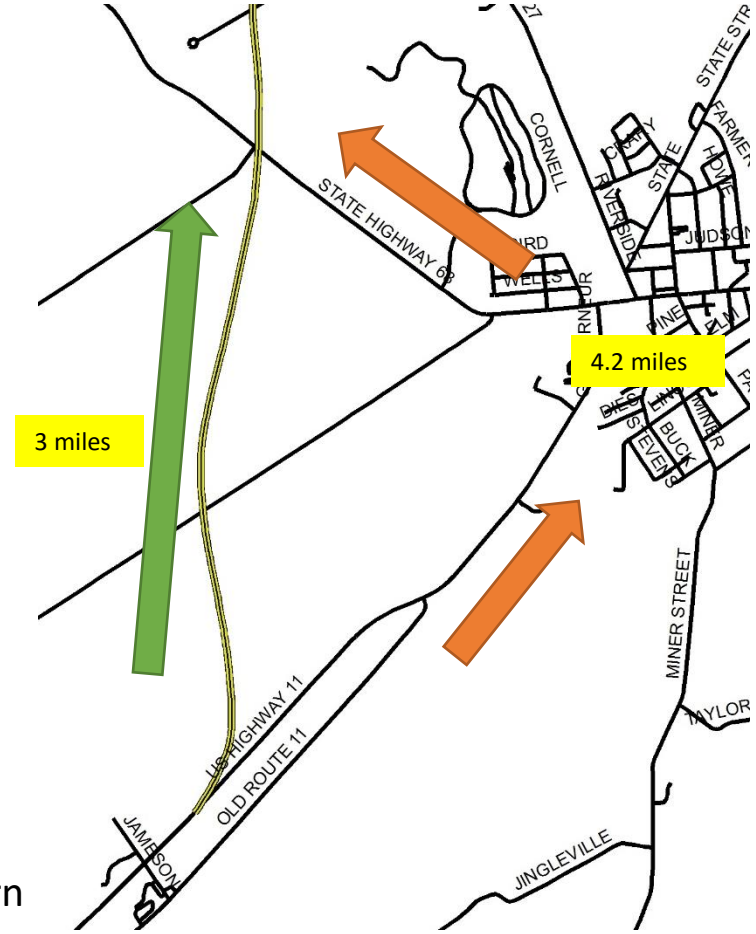

This image features the original map with proper orientation in its assigned projected coordinate system.
N
ROAD 27
COUNTY FARM ROAD
NYS ROUTE 68
JUDSON STREET ROAD
US ROUTE 11
COWAN ROAD
US ROUTE 11 IMPROVEMENTS (CP1 / CP2)
9.44 MILES
RAILROAD TRACKS
NYS ROUTE 68
FULL BYPASS SOUTH
8.40 MILES
MINER STREET ROAD
U.S. ROUTE 11
COUNTY ROAD 27
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


This is the same image as before, now with a roads shapefile overlaid on top. Overlaying a existing dataset of high precision allowed me to visually inspect the accuracy of the georeferenced map.
N
COUNTY FARM ROAD
JUDSON STREET ROAD
US ROUTE 11
COWAN ROAD
NYS ROUTE 68
RAILROAD TRACKS
IMPROVEMENTS (CP1 / CP2) 9.44 MILES
FULL BYPASS SOUTH 8.40 MILES
MINER STREET ROAD
U.S. ROUTE 11
COUNTY ROAD 27
Roads
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

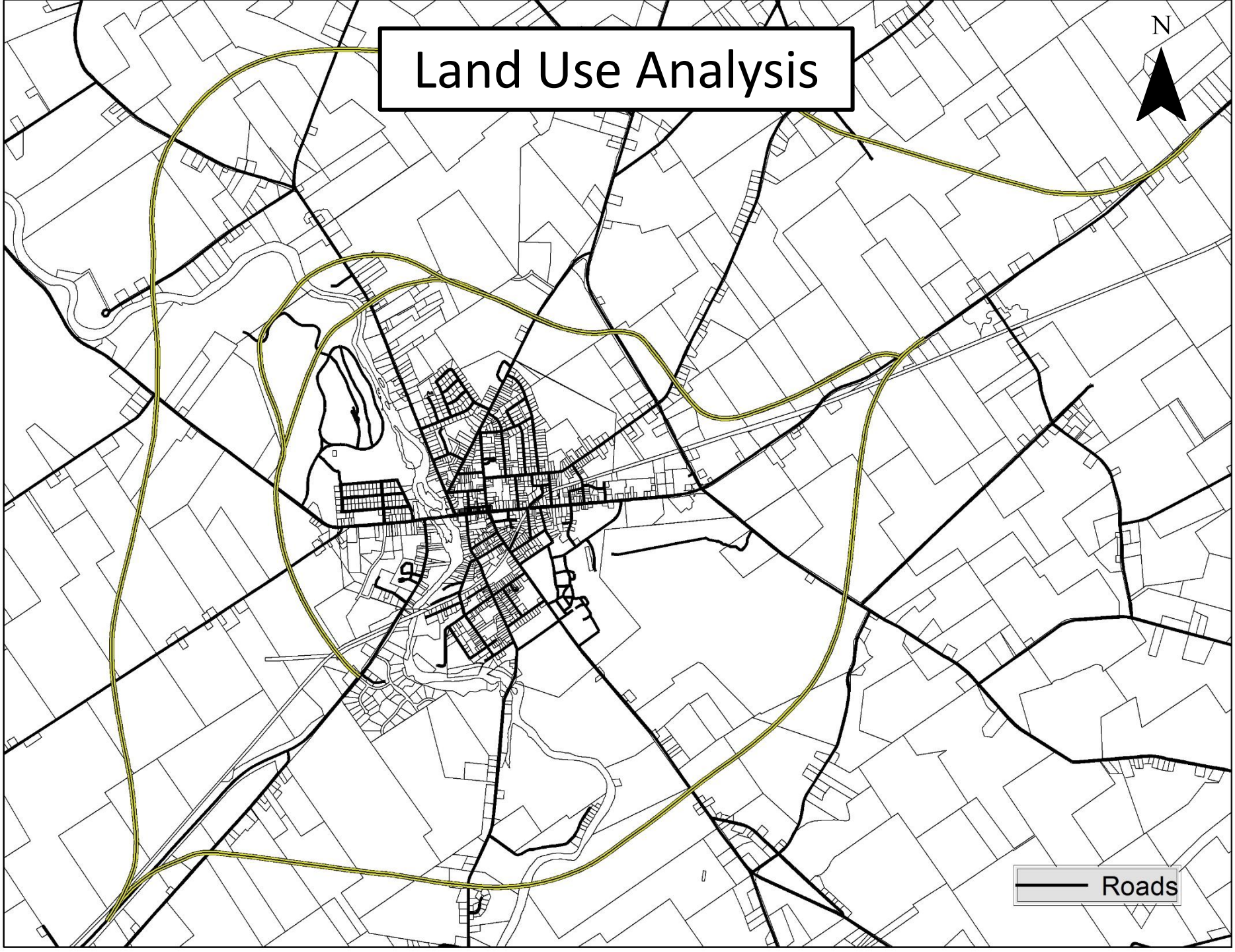
With confirmation that the georeferenced map was accurate, I used the map as a template to draw new line features into the existing roads data set. I essentially traced the bypasses using the advanced editor toolbar, and created individual shapefiles for each bypass in Potsdam and Canton.

Bypass figures

Northern Canton bypass length:	9.6 miles
Length of road bypassed, end to end:	7.1 miles
Southern Canton bypass length:	5.9 miles
Length of road bypassed, end to end:	5.2 miles
Short Rooway length:	5.1 miles
Length of road bypassed, end to end:	3.4 miles
Potsdam bypass length:	8 miles
Length of road bypassed, end to end:	6.8 miles



These figures do not represent the efficiency of each bypass, and cannot be interpreted as such. These figures only reflect through-distances, and do not evaluate connectivity and efficiency of segments of the bypasses. For example, if a semi-truck was traveling on north on Route 11 with Ogdensburg as its destination, the Northern Canton bypass would cut its travel distance to 3 miles instead of navigating 4.2 miles through Canton, with the additional benefits of skipping a left hand turn at a busy intersection.


Land Use Analysis
N
Roads

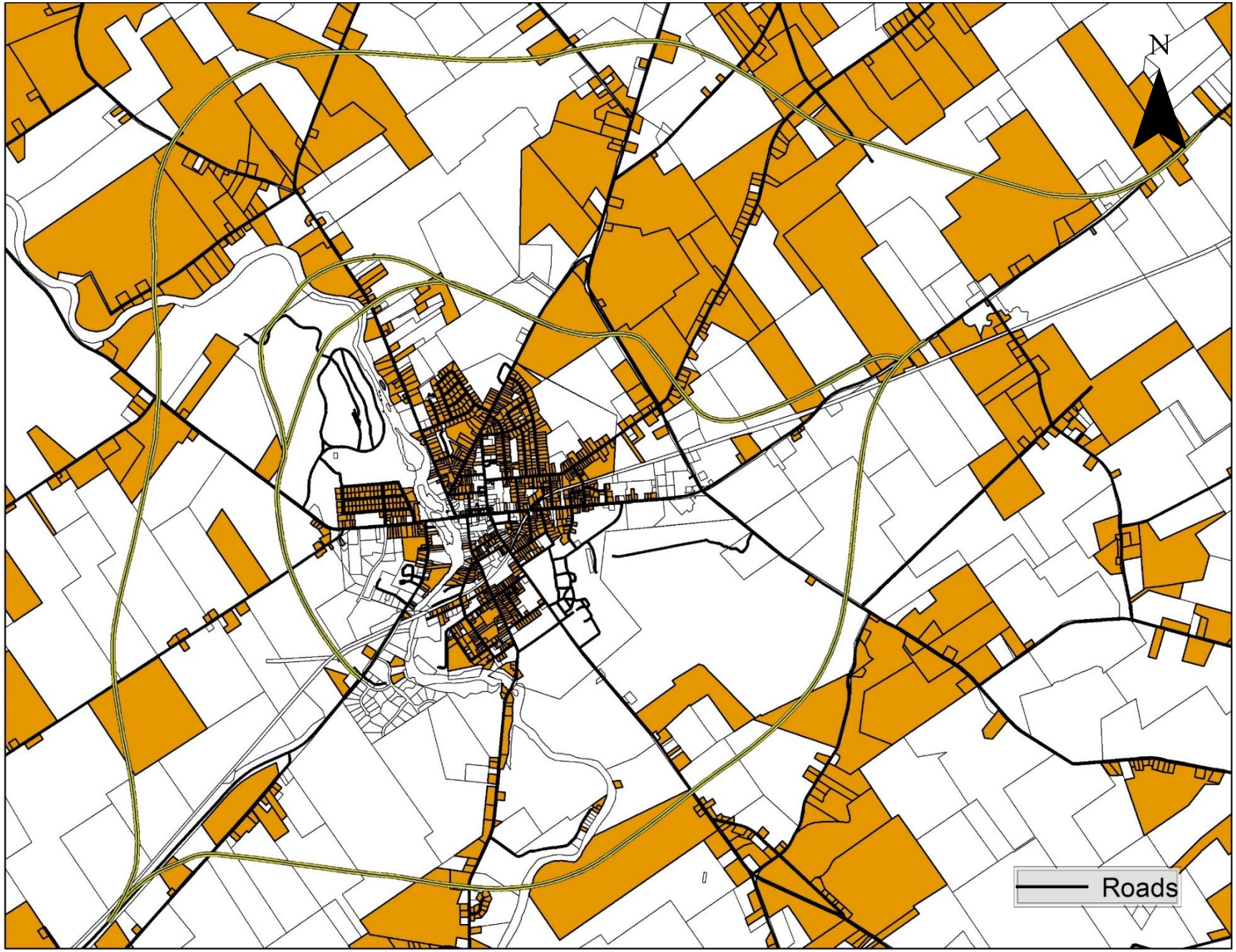
The following slides will elucidate current land use patterns in the Canton community, and how the bypasses interact with these different land uses. The land use analysis conducted in this study was based upon a 2015 Real Property data set obtained from the St. Lawrence County Planning Office. The map below depicts parcel boundaries and the three Canton bypass options.

This is the New York State property classification code system used to classify individual properties. The 2015 Real Property shapefile for St. Lawrence County includes a specific code for each property, which I sorted into the general categories listed below. The following maps illustrate how I sorted and displayed the real property data.

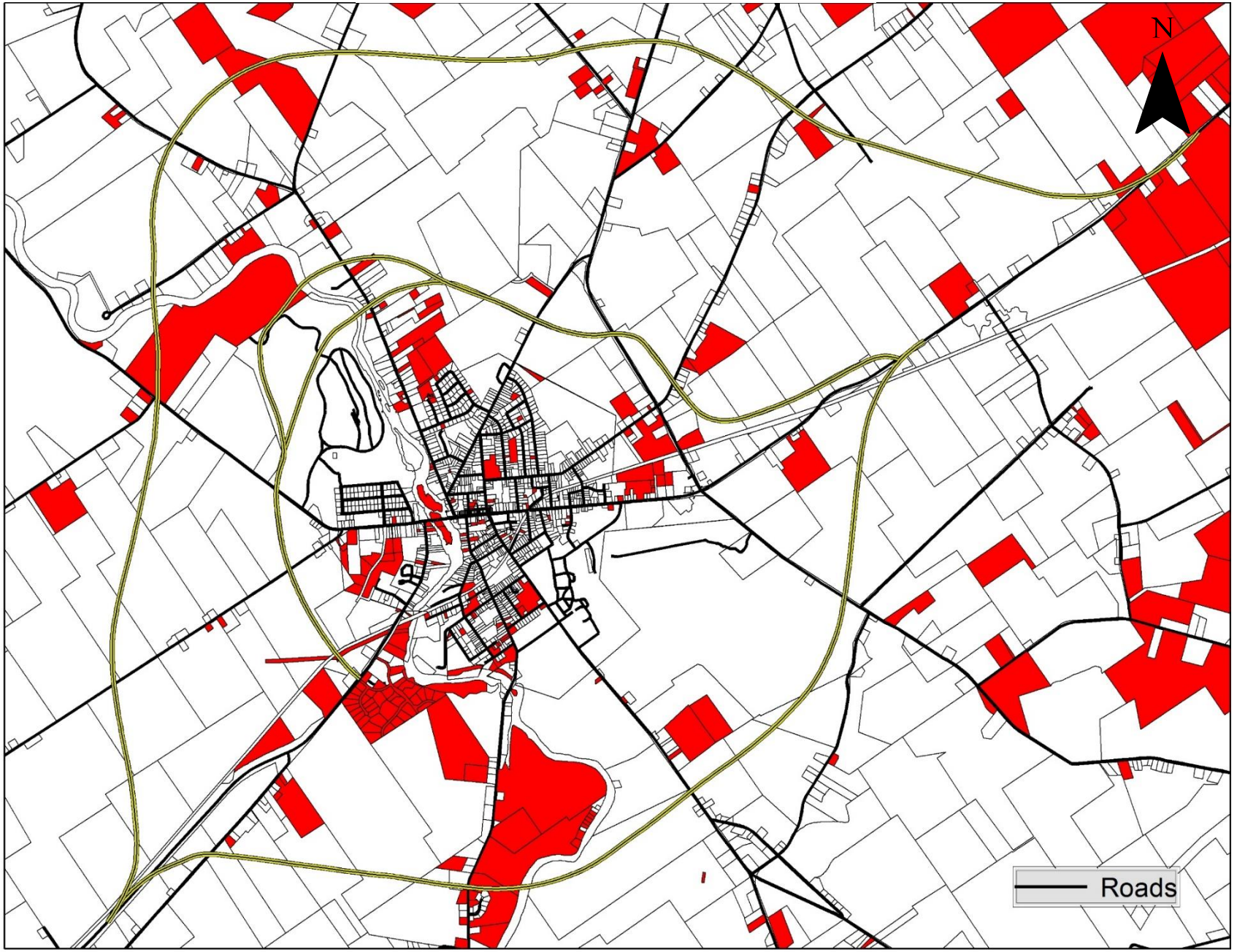
- 100 - Agricultural - Property used for the production of crops or livestock.
- 200 - Residential - Property used for human habitation. Living accommodations such as hotels, motels, and apartments are in the Commercial category
- 300 - Vacant Land - Property that is not in use, is in temporary use, or lacks permanent improvement.
- 400 - Commercial - Property used for the sale of goods and/or services.
- 500 - Recreation & Entertainment - Property used by groups for recreation, amusement, or entertainment.
- 600 - Community Services - Property used for the well being of the community.
- 700 - Industrial - Property used for the production and fabrication of durable and nondurable man-made goods.
- 800 - Public Services - Property used to provide services to the general public.
- 900 - Wild, Forested, Conservation Lands & Public Parks - Reforested lands, preserves, and private hunting and fishing clubs

Parcels classified as 100 - Agricultural

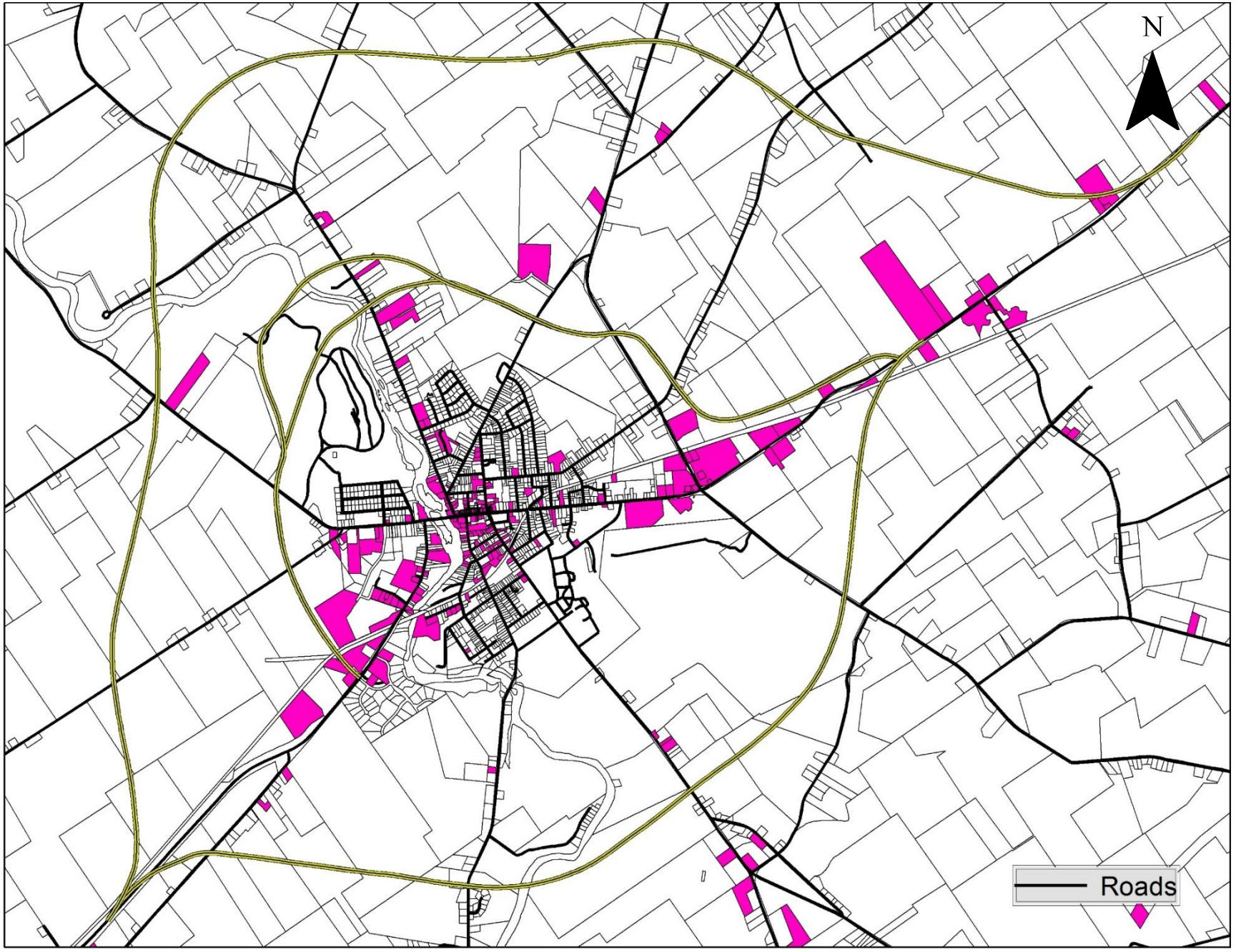
Parcels classified as 200 - Residential



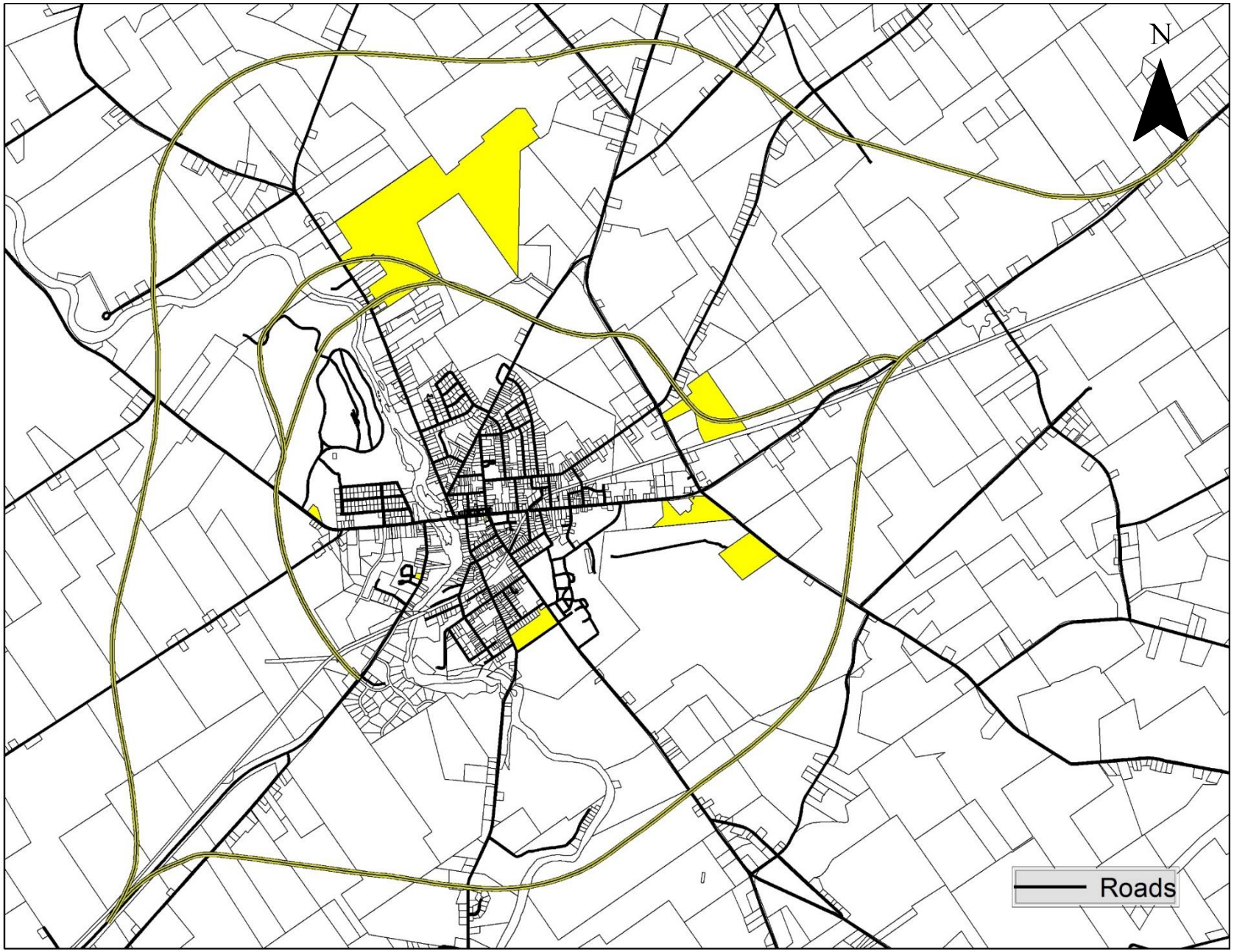
Parcels classified as 300 – Vacant Land



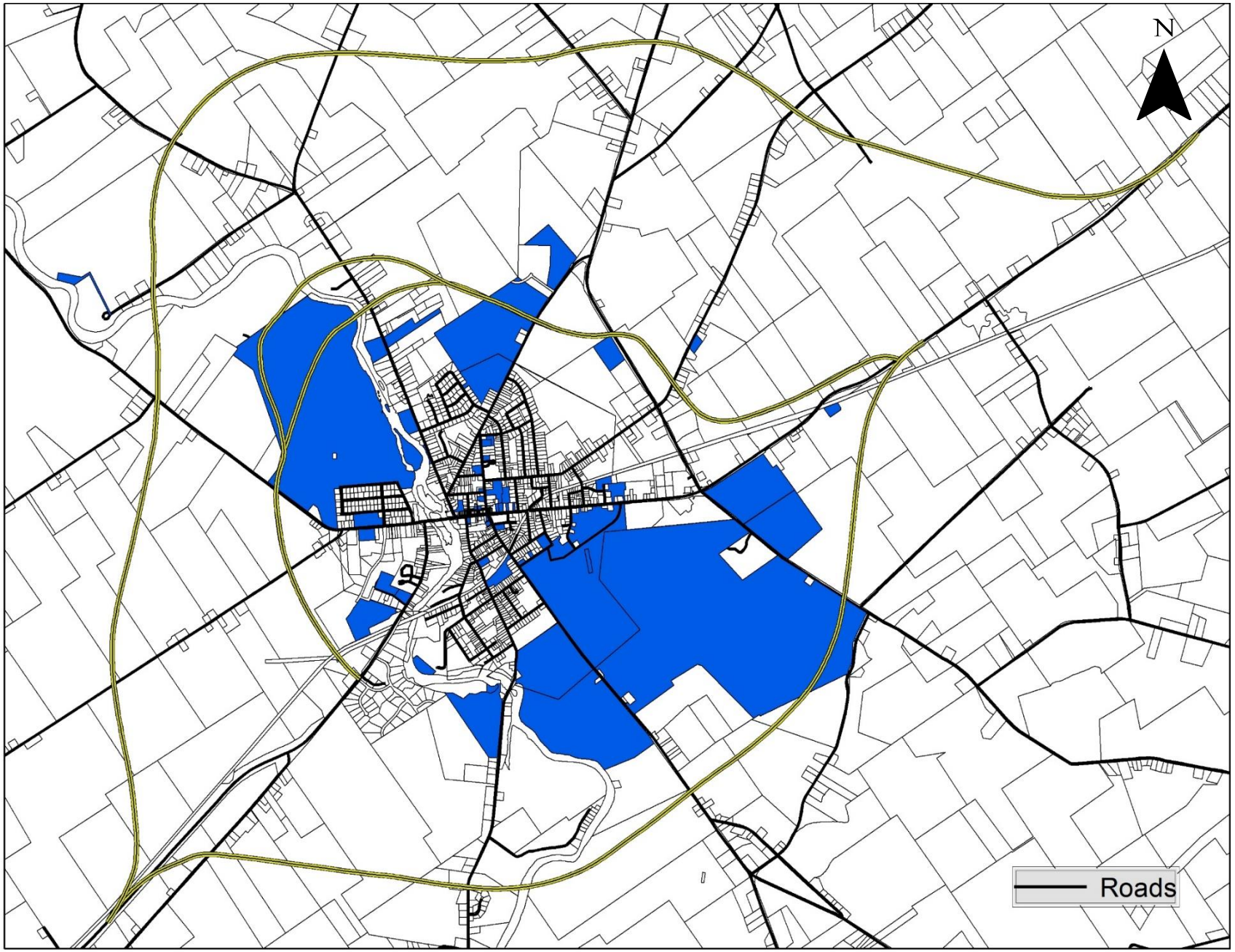
Parcels classified as 400 - Commercial



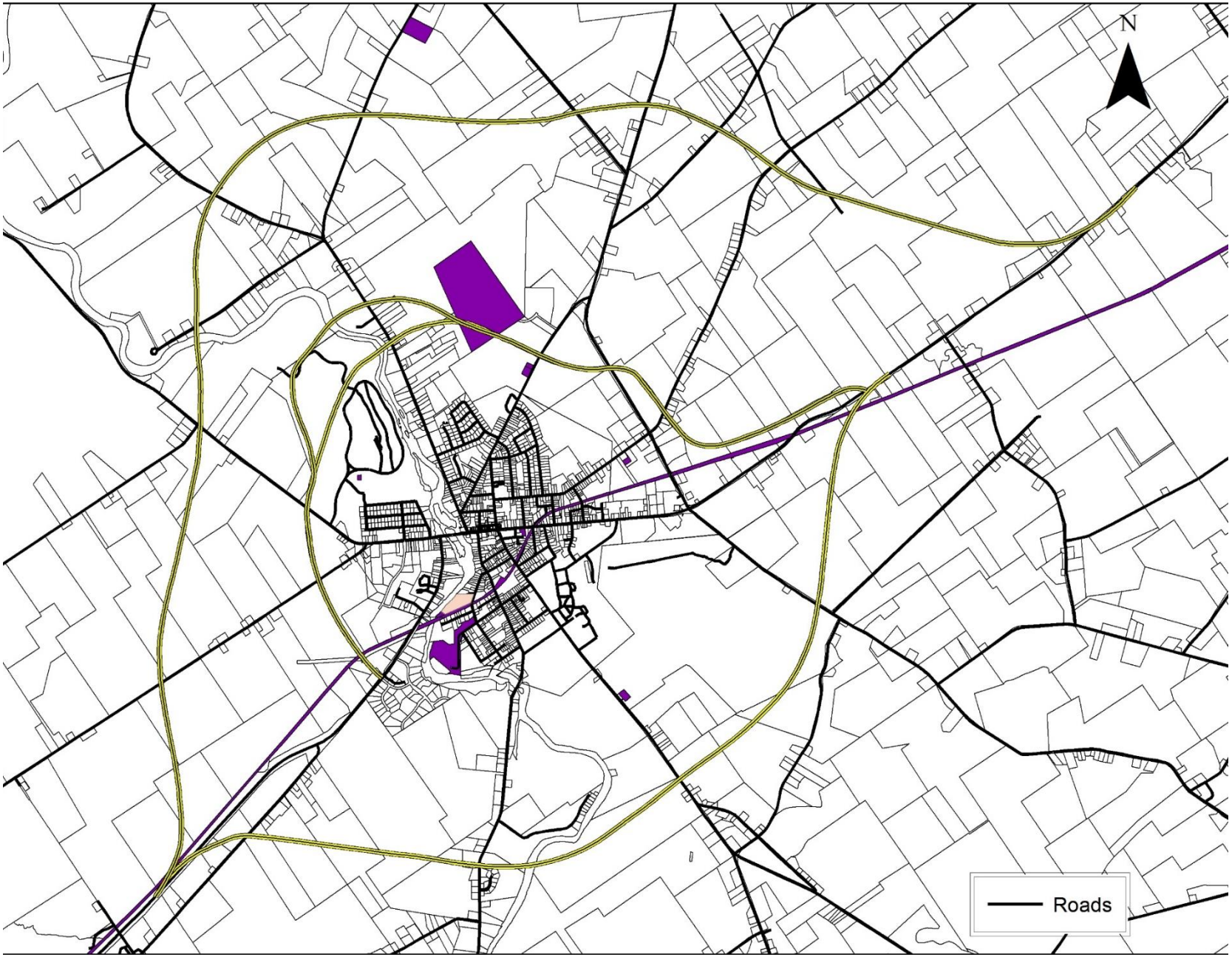
Parcels classified as 500 – Recreation and Entertainment



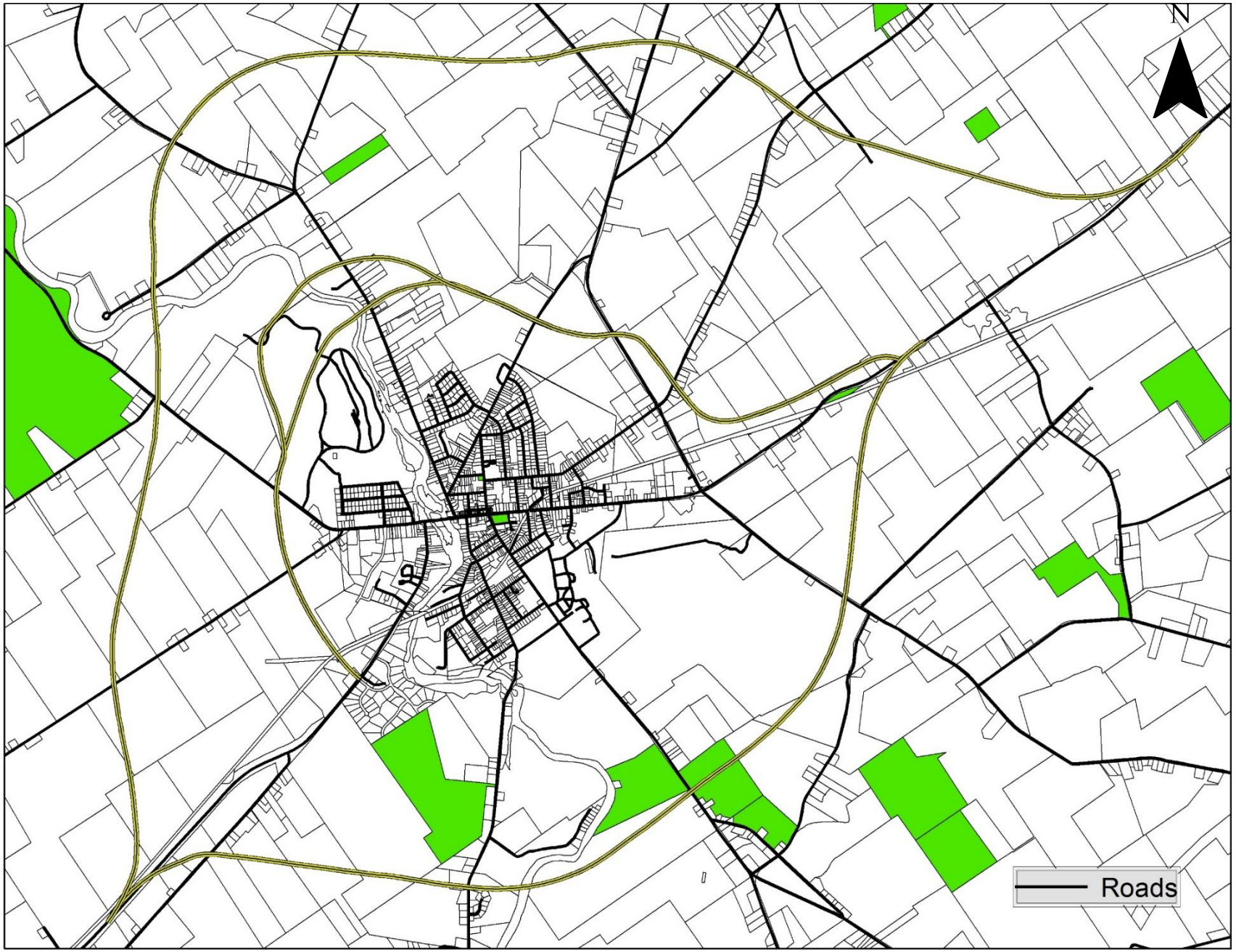
Parcels classified as 600 – Community Services



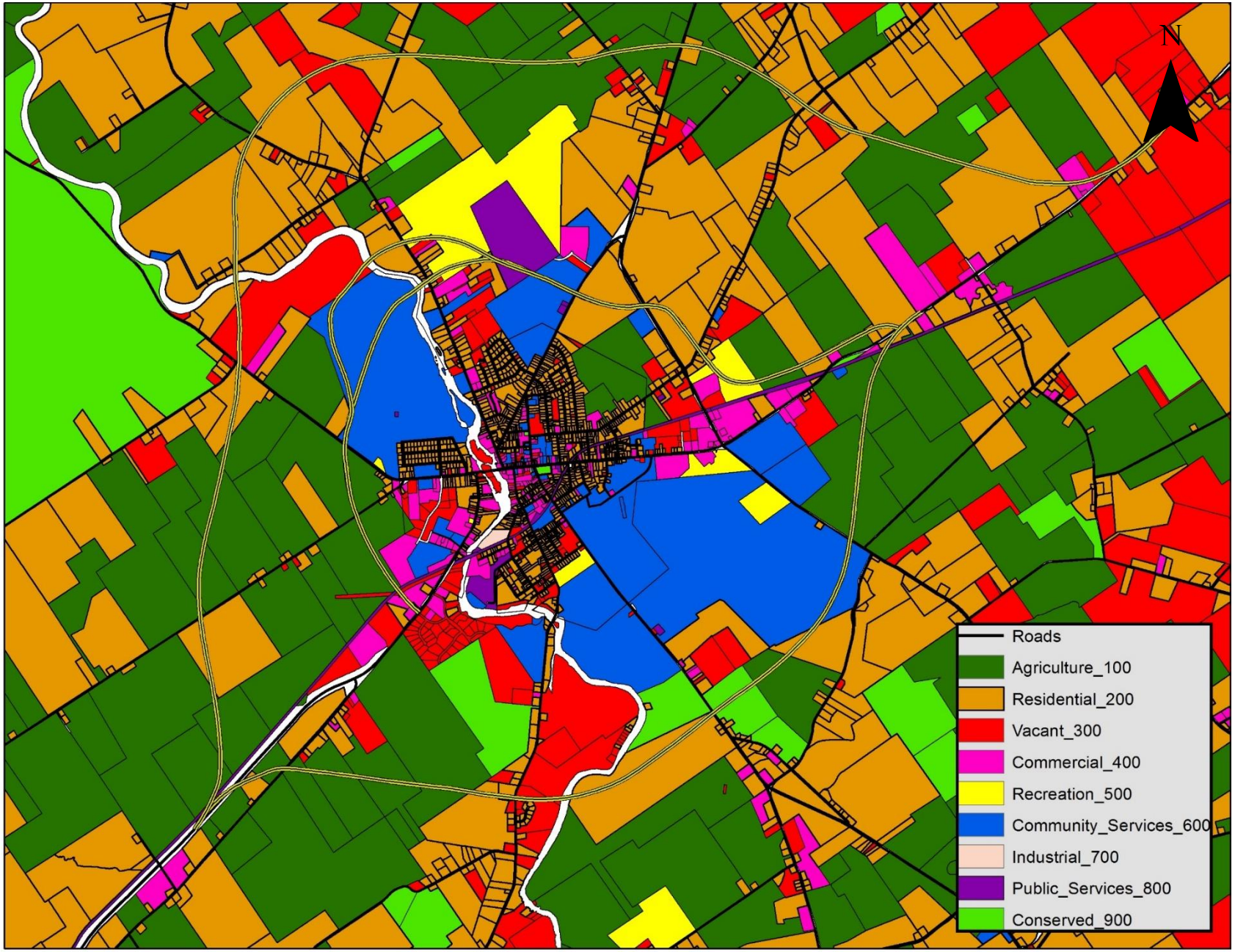
Parcels classified as 700 – Industrial (pink) and 800- Public Services (purple)



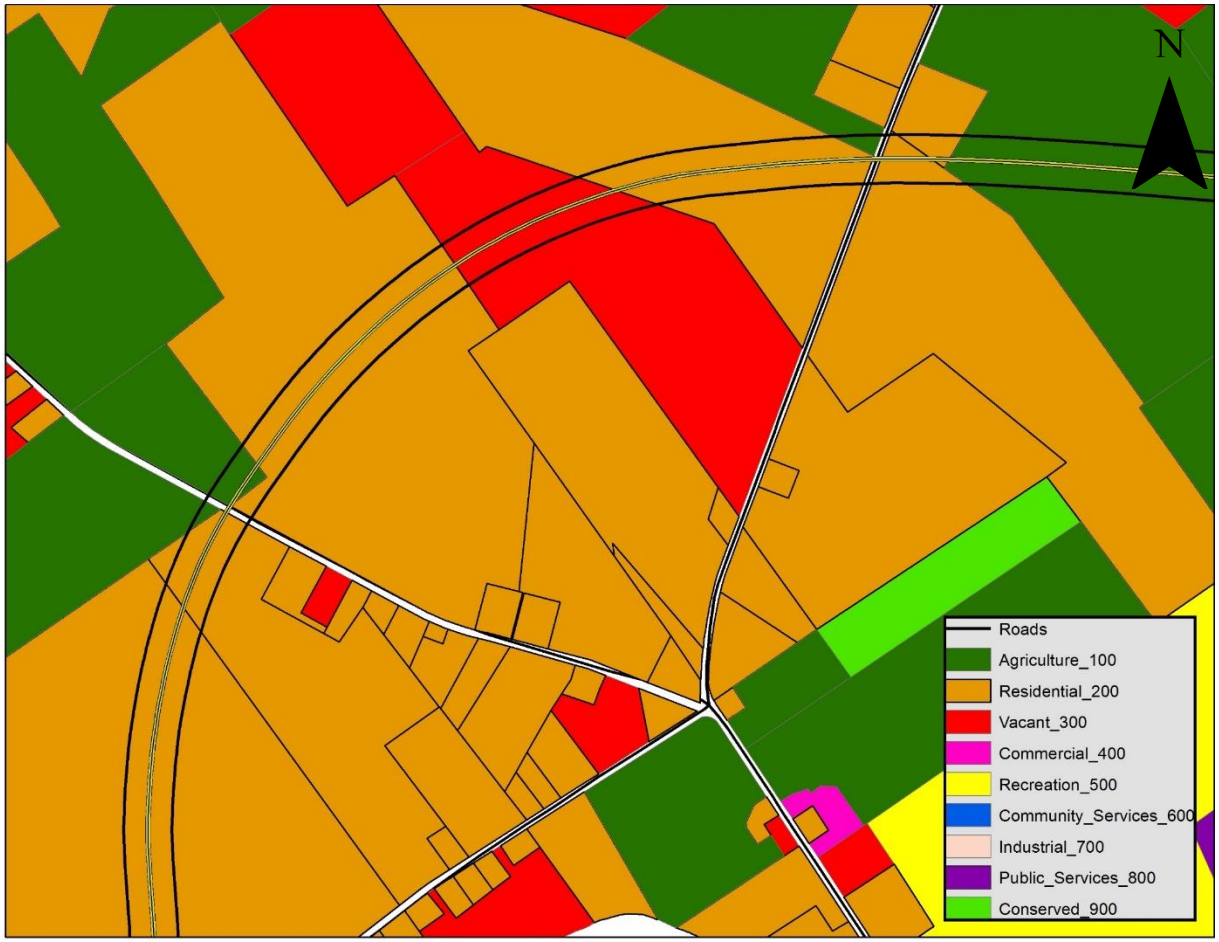
Parcels classified as 900 – Wild, forested, conservation lands and public parks



Total property classifications for the Canton area



To determine the land-use footprint of each bypass, it was necessary to determine the anticipated ROW (right-of-way) of the bypass options. The bypass designs featured in the 2002 North Country Transportation Study were given a 325 foot wide ROW (as shown below), and the Rooway bypass was given a 80 foot wide ROW. The Transportation Study anticipates that the bypasses will be four lane expressways, and as such, the ROW width was determined by the dimensions of the recent I-781 project in Watertown. The Rooway was conceived to be a two lane parkway with slower speeds, and as such, the ROW width was determined by measuring the ROW of local state and county highways.

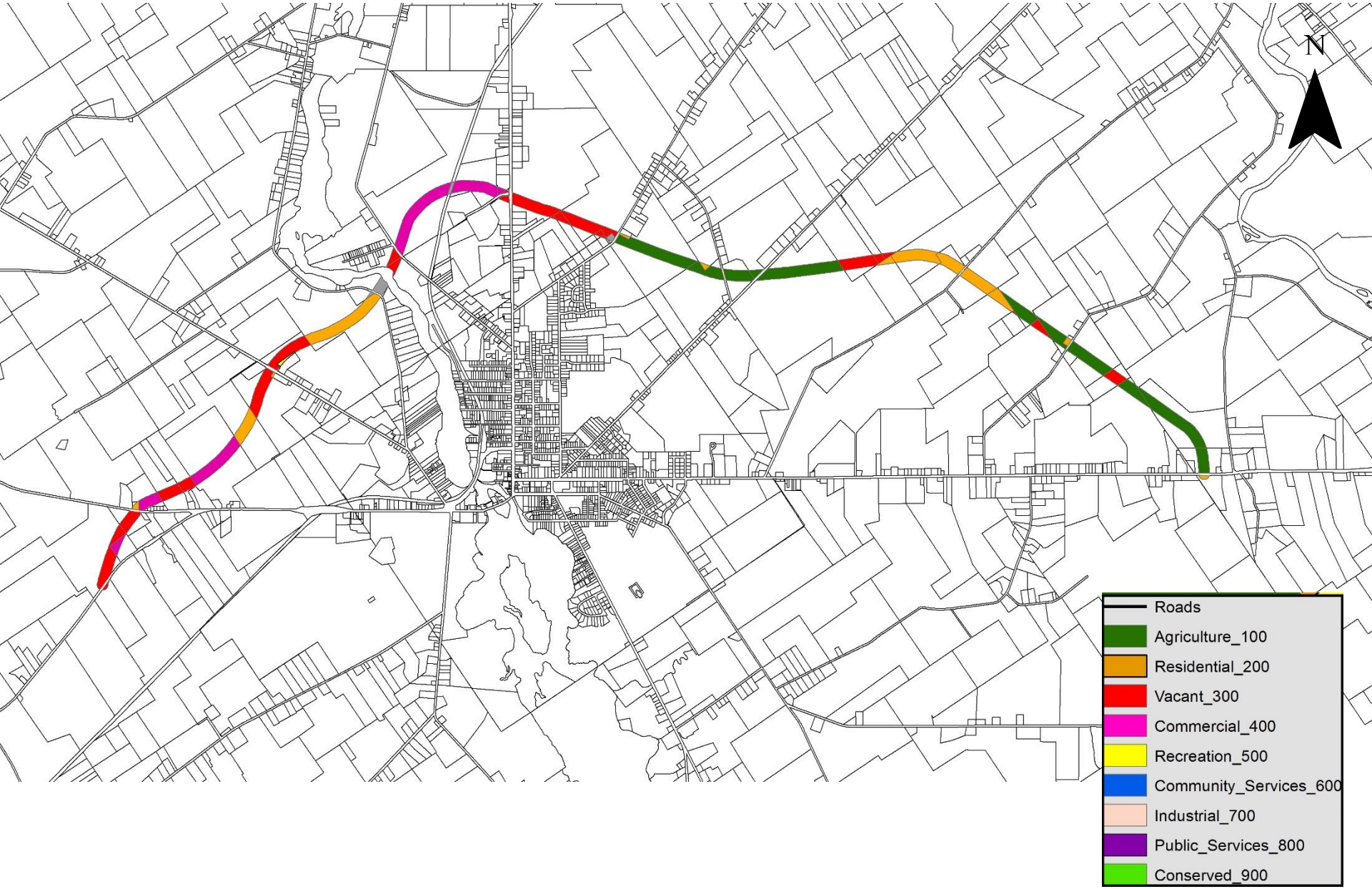


In order to calculate each bypass's specific land use footprints, the ROW of each bypass was used to clip the real property data, thus resulting in a data set that strictly reveals the land use qualities of each bypass ROW. A portion of the 2002 North Country Transportation Study northern bypass around Canton is featured below.

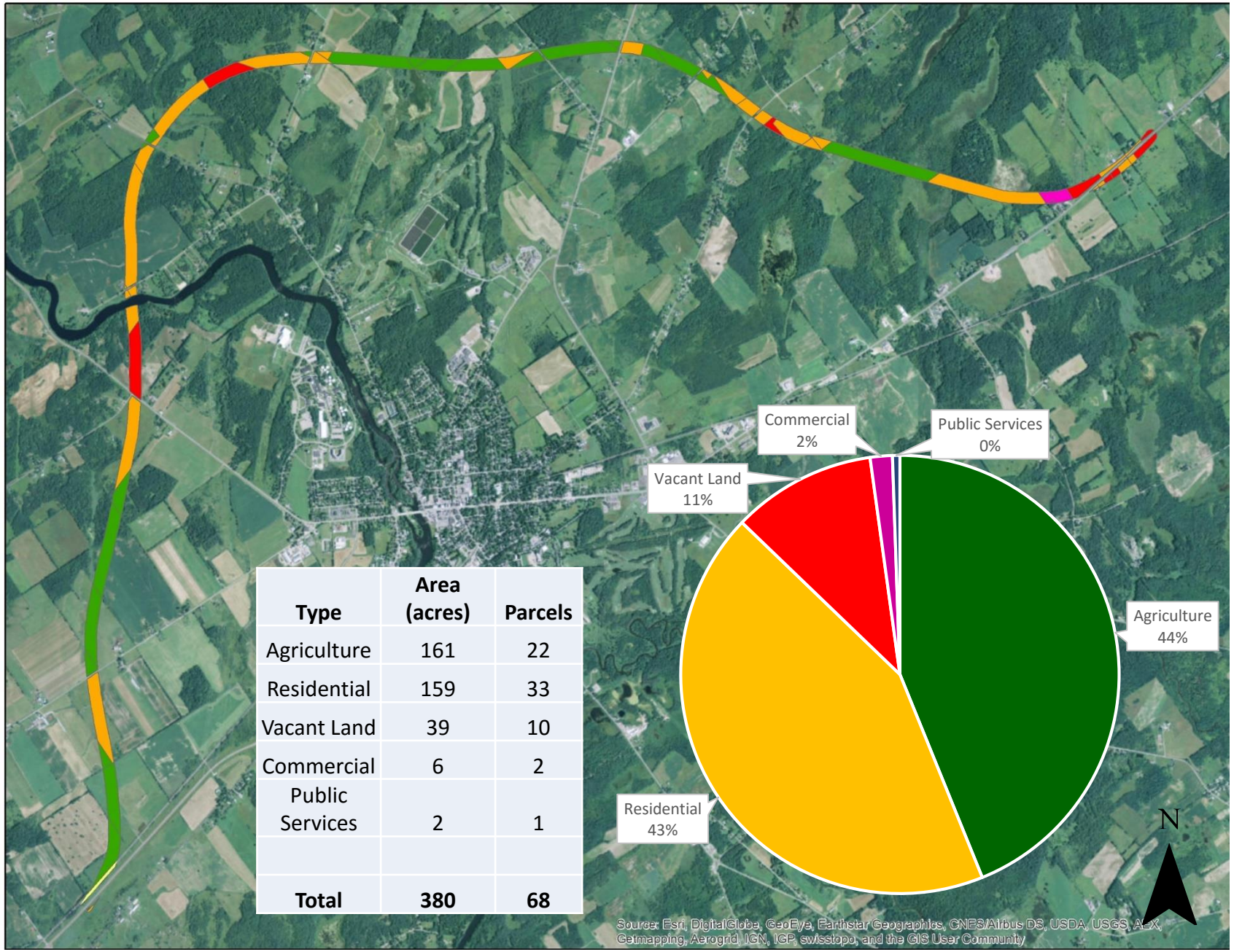
This map features the land use footprints of all of the bypass design options in Canton.

A closer look at the footprint of the Rooway

This map features the land use footprint of the Potsdam bypass.

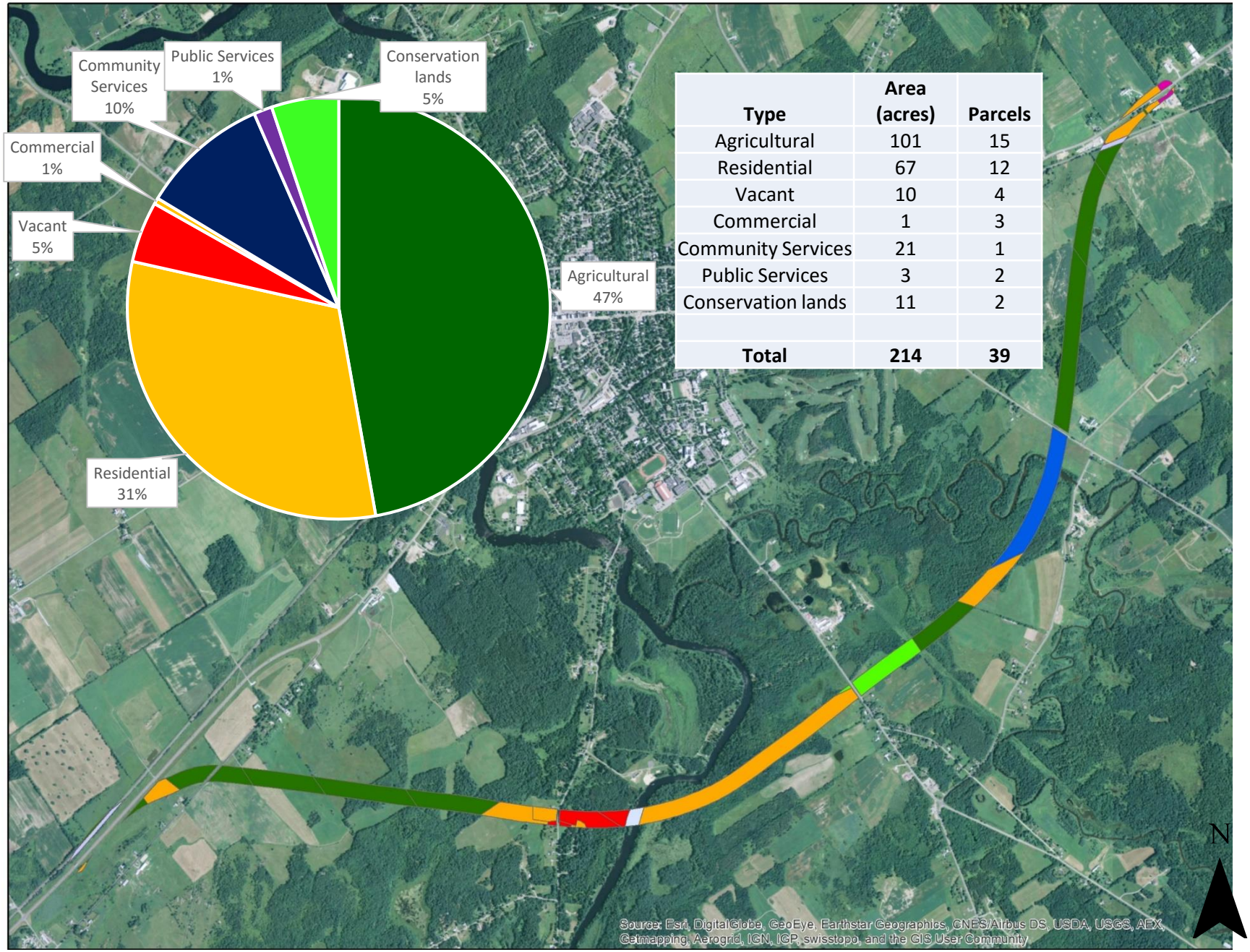


Land use analysis of the northern bypass option in Canton.



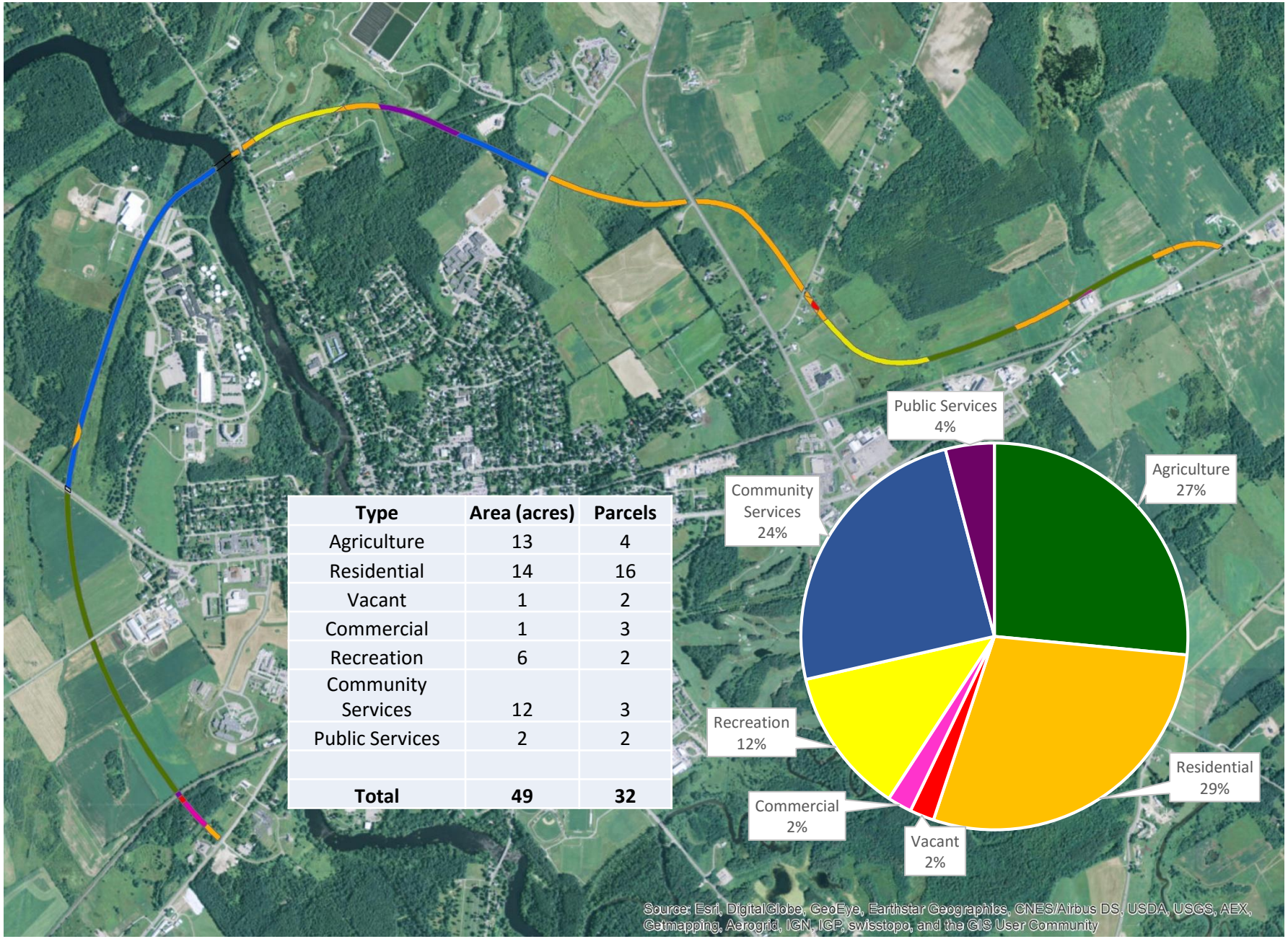
Type	Area (acres)	Parcels
Agriculture	161	22
Residential	159	33
Vacant Land	39	10
Commercial	6	2
Public Services	2	1
Total	**380**	**68**

Land use analysis of the southern bypass option in Canton.



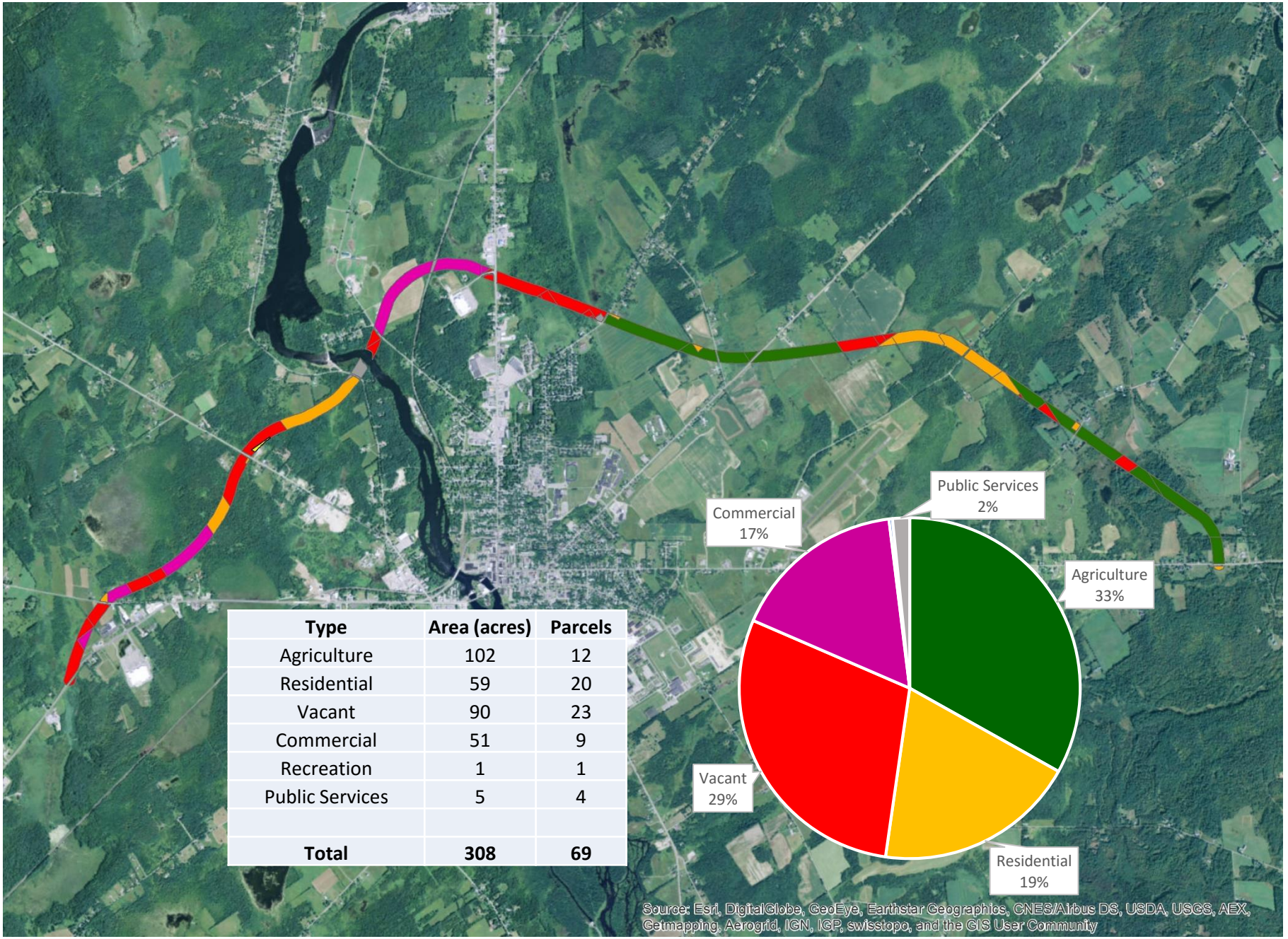
Type	Area (acres)	Parcels
Agricultural	101	15
Residential	67	12
Vacant	10	4
Commercial	1	3
Community Services	21	1
Public Services	3	2
Conservation lands	11	2
Total	**214**	**39**

Land use analysis of the short Rooway bypass around Canton.



Type	Area (acres)	Parcels
Agriculture	13	4
Residential	14	16
Vacant	1	2
Commercial	1	3
Recreation	6	2
Community Services	12	3
Public Services	2	2
Total	**49**	**32**

Land use analysis of the Potsdam bypass.

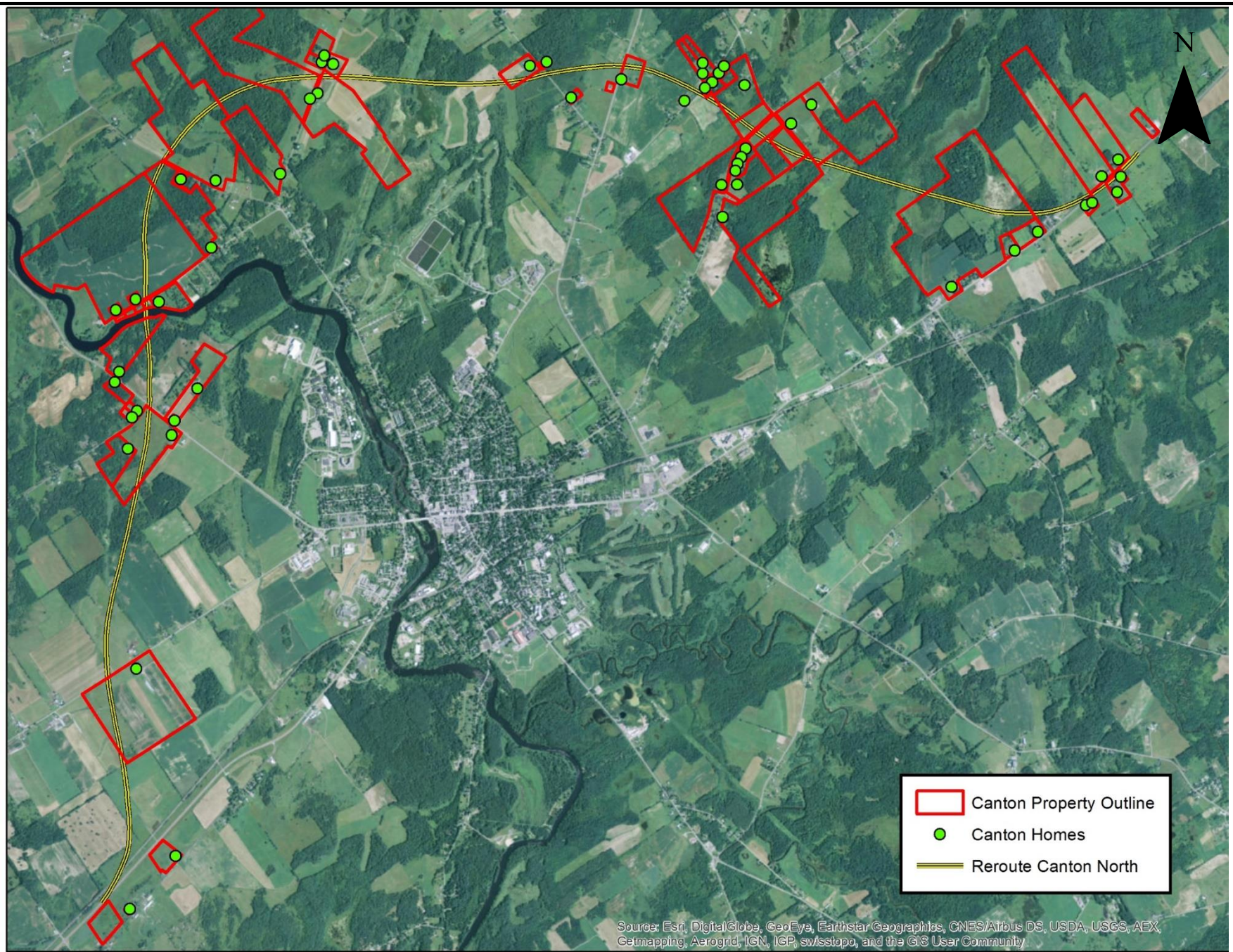


Type	Area (acres)	Parcels
Agriculture	102	12
Residential	59	20
Vacant	90	23
Commercial	51	9
Recreation	1	1
Public Services	5	4
Total	**308**	**69**

The Community Impact

The next sequence of slides will examine the impact of each bypass on local homeowners, specifically targeting homes that fall within 150 meters from each bypass's ROW. To do this, the "Selection by Location" tool was used to find residential properties that fell within 150 meters of each ROW. Using digital satellite imagery, a point was manually placed on top of each house in the selected residential properties. "Selection by Location" was then used to find all the homes that fell within 150 meters of each ROW, since some of the selected residential properties were very large and featured homes that were far away from the bypass ROW. Once all the homes within 150 meters of each ROW were identified, "Selection by Location" was used to identify the properties that the homes belonged to, and the property owner information was copied from the attributes table. This property owner information could be valuable to organizations that wish to contact land owners that would be directly impacted by the possible construction of these bypasses.

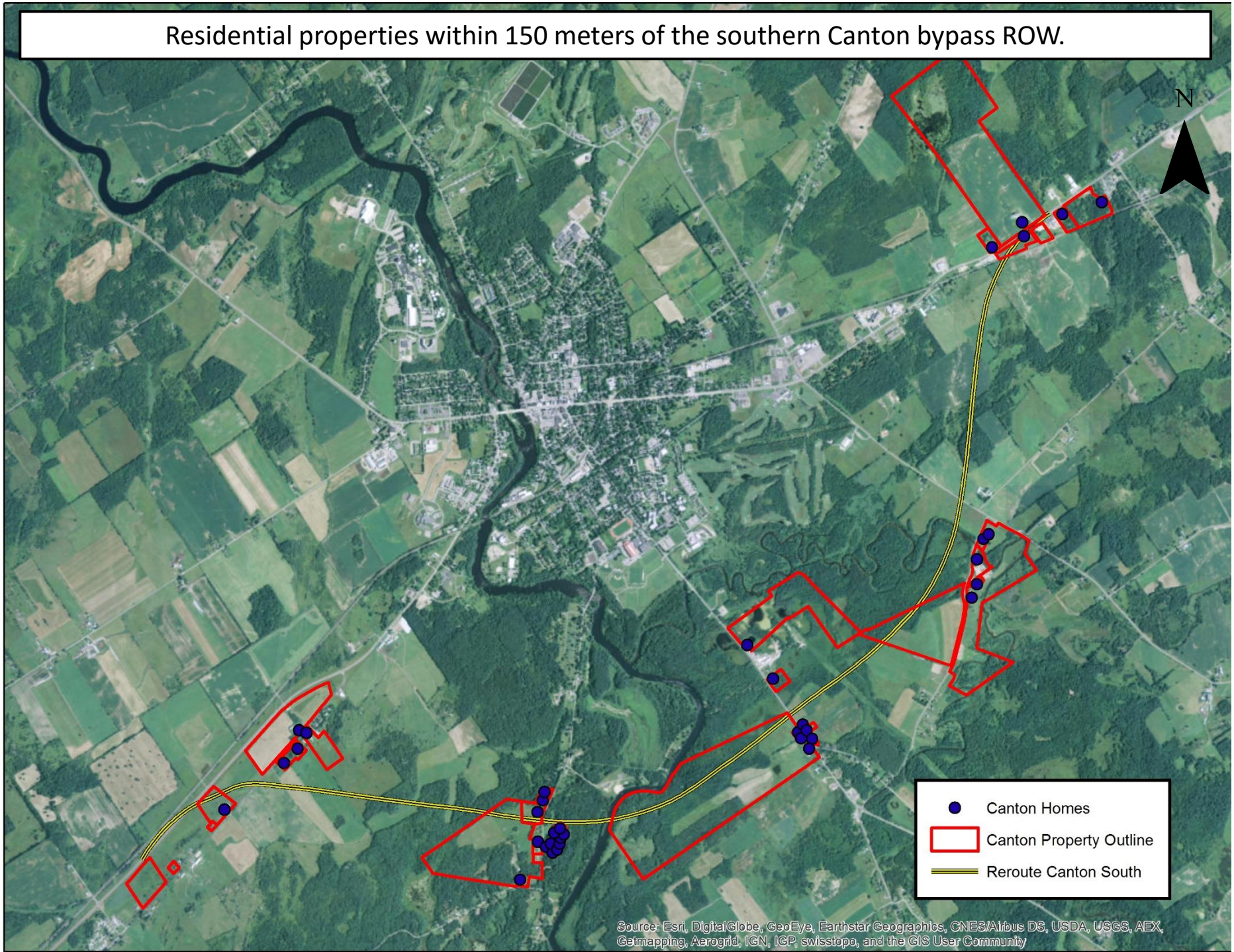
Residential properties within 150 meters of the northern Canton bypass ROW.

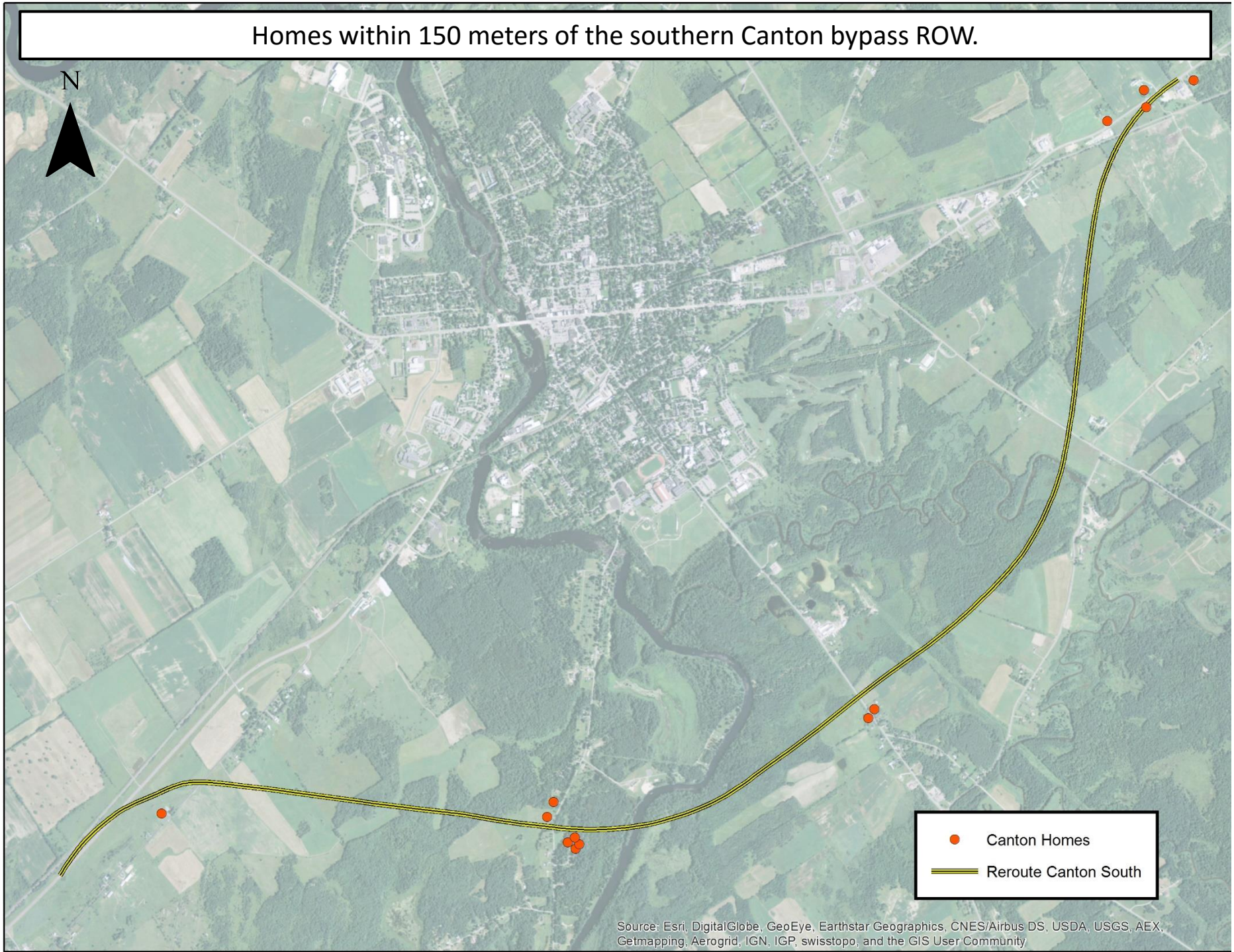


Homes within 150 meters of the northern Canton bypass ROW.

Homeowners within 150 meters of the northern Canton bypass ROW.

OWNER_NAME	ATTENTION_	ADDITIONAL	PO_BOX	CURRENT_O	STREET_ADD
Ormsby, Anthony-LC W.					4081 State Highway 56
Durocher, Arthur					26 West Main St
Cunningham, Michael J.			366		
Kirka, James					6514 US Highway 11
Durham, James			548		
Bisonette, Gail-LU					6480 US Highway 11
Weissbard, David					169 Sykes Rd
Rhoda, Philip W. Jr					170 Sykes Rd
Pike, Ronald U.					111 Stiles Rd
Sweeney, Daniel J.					502 State Highway 310
Freego, John F.					100 Stiles Rd
Crandall, Ralph					124A Sykes Rd
Clifford, Jody J.					190 Finnegan Rd
Ames, Shirley					182 Finnegan Rd
Butler, Gail J.					155 Finnegan Rd
Backus, Paul J.					167 County Route 32
Burns, Ronald			191		
Shoulette, Donald J.					404 Miner Street Rd
Hills, Ronald R.					1119 Irish Settlement Rd
Grayson, Richard L.					1090 Irish Settlement Rd

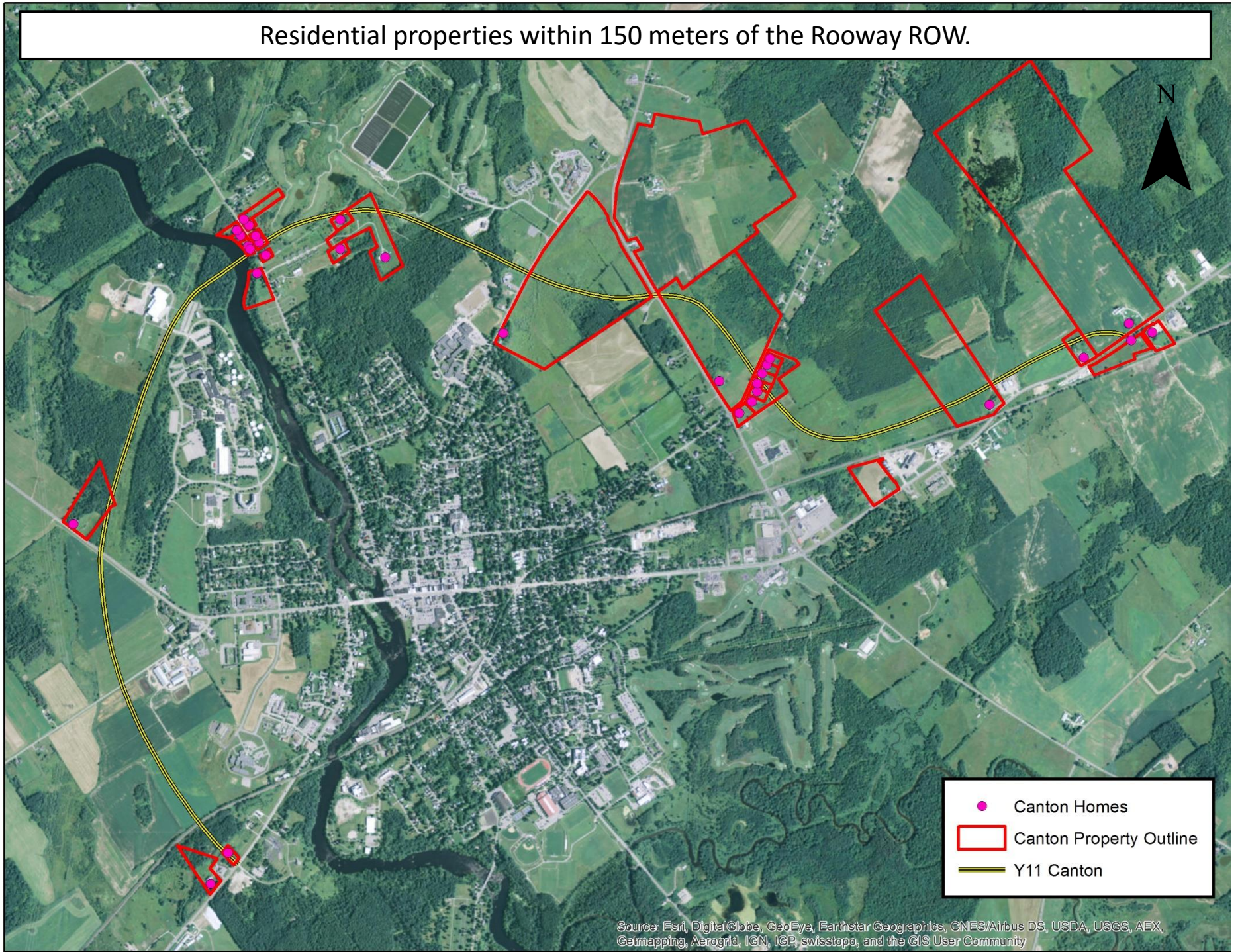

Residential properties within 150 meters of the southern Canton bypass ROW.
N
Canton Homes
Canton Property Outline
Reroute Canton South
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

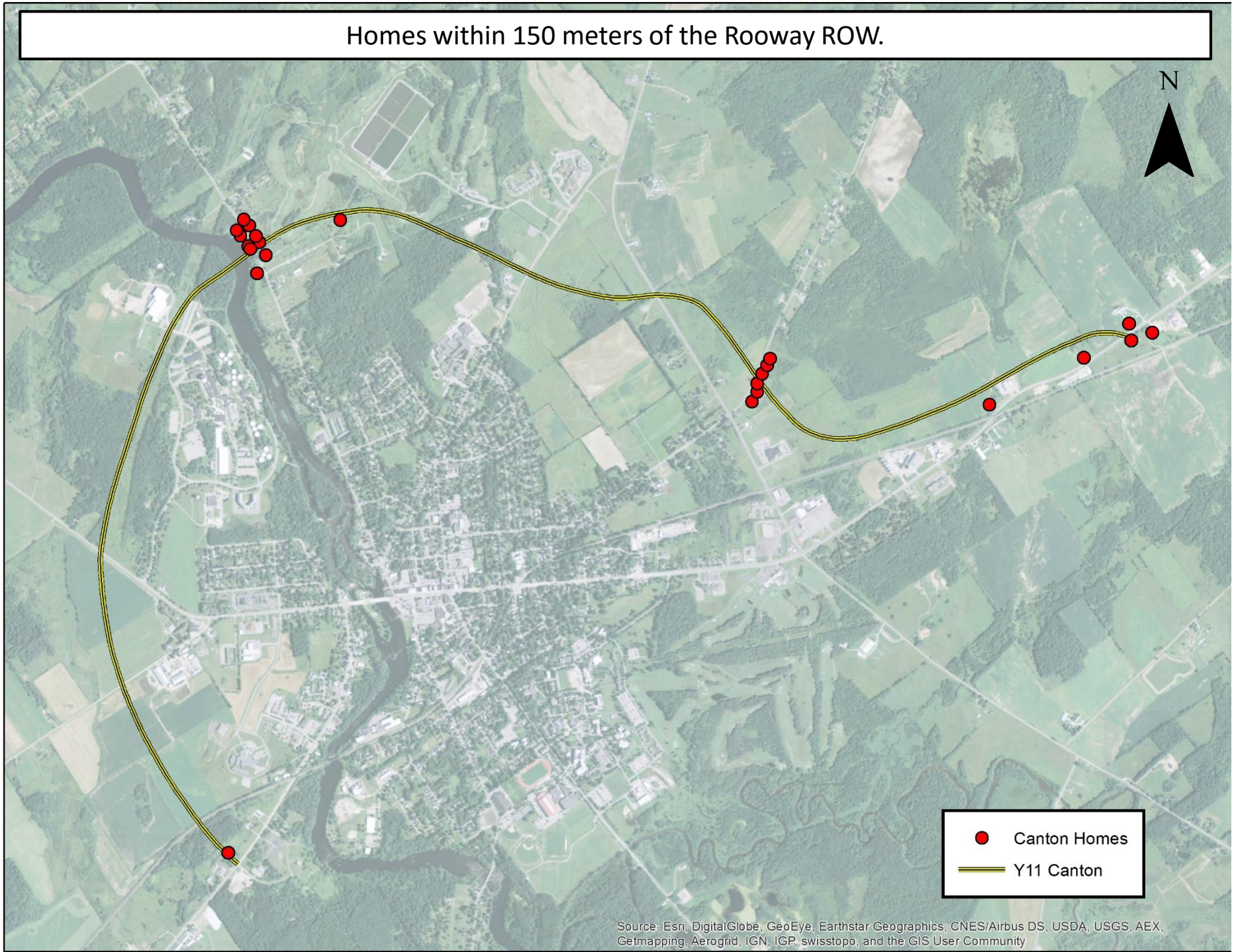

Homes within 150 meters of the southern Canton bypass ROW.
N
Canton Homes
Reroute Canton South
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Homeowners within 150 meters of the southern Canton bypass ROW.

OWNER_NAME	ATTENTION_	ADDITIONAL	PO_BOX	CURRENT_O	STREET_ADD
Aldous, Vernon C.					6171 US Highway 11
Durham (LU), James V			548		
McCollum, Debra J.					6133 US Highway 11
MacKellar, Ian					6166 US Highway 11
Collins, John M.					5912 County Route 27
Young, Cynthia L.					5911 County Route 27
Reed, Jason					393 Old Route 11
NYSARC Inc,	Attn: Patricia Campanella				6 Commerce Ln
Frank, Randy S.					372 Miner Street Rd
Alguire, Brent					23 Woodmere Dr
Furgal, Michael J (LU)					21 Woodmere Dr
Garman, Margaret R.					24 Woodmere Dr
Geleta, David					20 Woodmere Dr

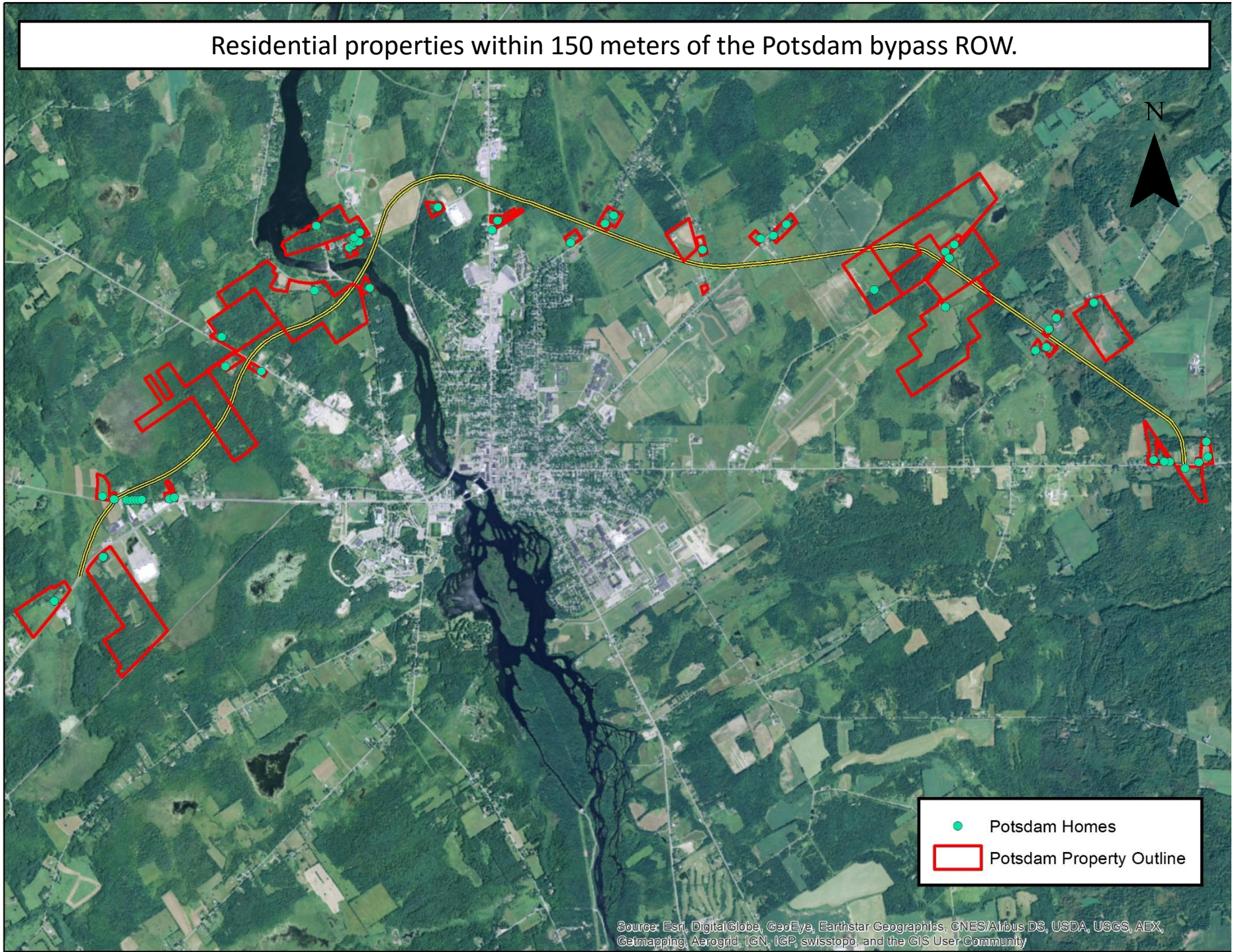
Residential properties within 150 meters of the Rooway ROW.

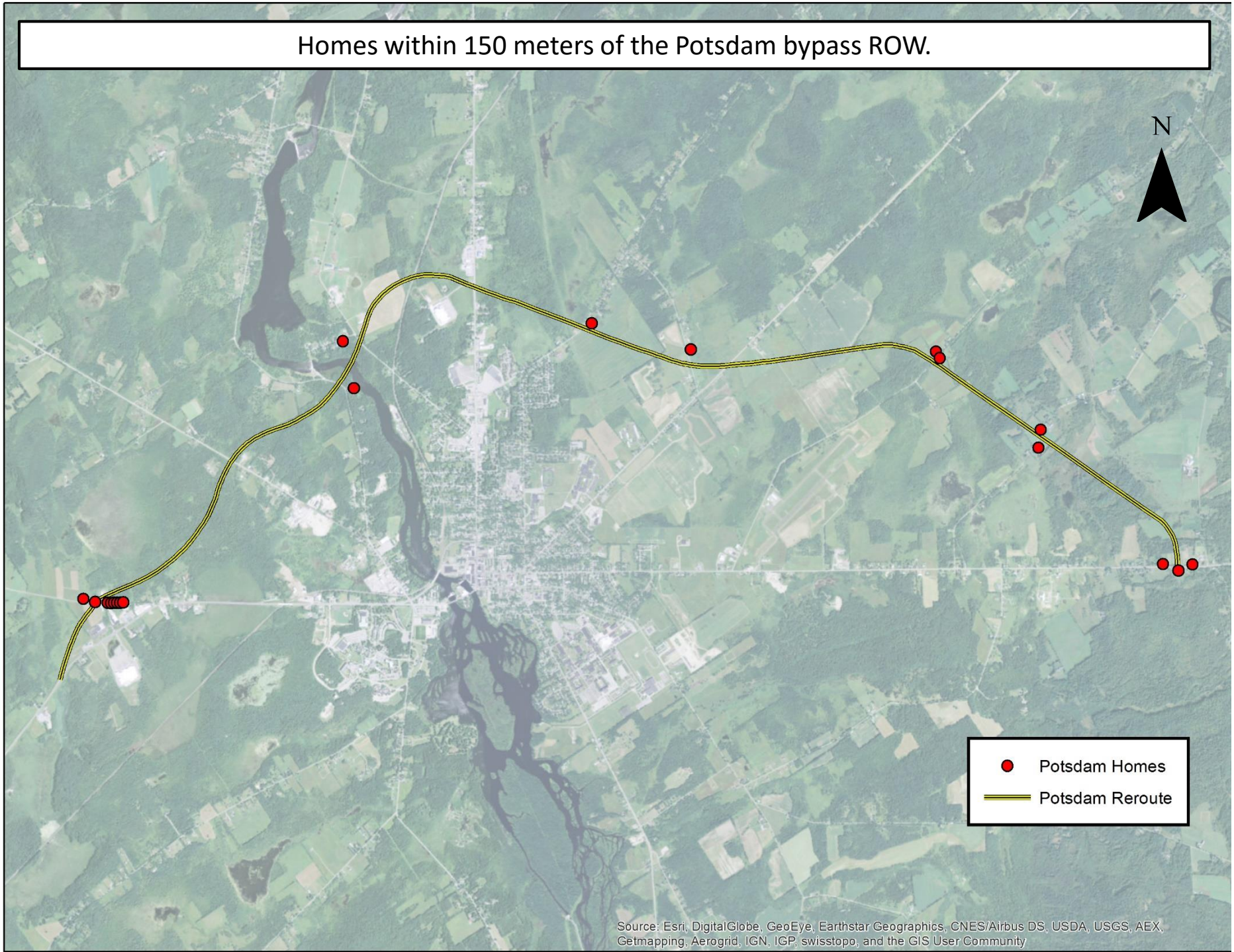



Homes within 150 meters of the Rooway ROW.
N
Canton Homes
Y11 Canton
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Homeowners within 150 meters of the Rooway ROW.

OWNER_NAME	ATTENTION_	ADDITIONAL	PO_BOX	CURRENT_O	STREET_ADD
Peters, Barbara J.				Lot 2	6232 County Route 27 Lot 2
Jenison, Thomas L.					46 Goodrich St
Aldous, Vernon C.					6171 US Highway 11
Seeley, Eugene					6270 County Route 27
Hashey, Laura Ann					6264 County Route 27
Rexford, Mary B.					6265 County Route 27
Miller, Anita			733		
Waters, Andrea					6263 County Route 27
Fletcher, Steven W.					6254 County Route 27
Spicer, Lawrence					483 Eddy Pyrites Rd
Spicer, Lawrence E.					483 Eddy-Pyrites Rd
Conant, Terry L.			48		
McCollum, Kevin					6133 US Highway 11
Frazer Properties, LLC ,					28 Woods Dr
McCollum, Debra J.					6133 US Highway 11
MacKellar, Ian					6166 US Highway 11
Hance, M. Wayne					162 Judson Street Rd
United Cerebral Palsy ,	Attn: Assoc of the North Count				4 Commerce Ln
Gibson, Kenneth N.					250 Pike Rd
Pike, Ronald A.					176 Judson Street Rd
Pike, Ronald					176 Judson Street Rd
McCluskey, Brian J.					170 Judson Street Rd
Lawrence, Ted					24 Spears St


Residential properties within 150 meters of the Potsdam bypass ROW.
N
Potsdam Homes
Potsdam Property Outline
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Homes within 150 meters of the Potsdam bypass ROW.
N
Potsdam Homes
Potsdam Reroute
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

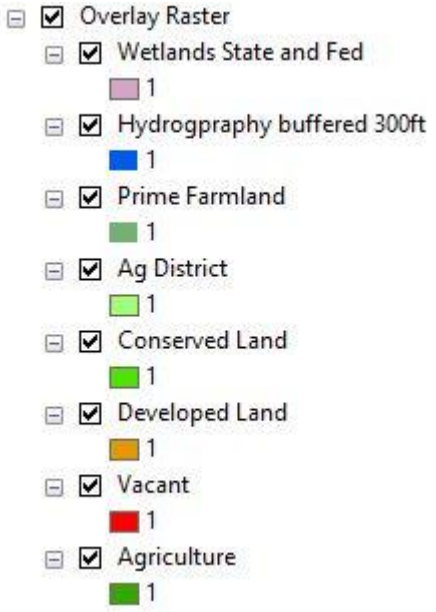
Homeowners within 150 meters of the Potsdam bypass ROW.

OWNER_NAME	ATTENTION_	ADDITIONAL	PO_BO	CURRENT_O	STREET_ADD
Lynch, Patrick J.					476 Porter Lynch Rd
Clemons, Cortney					720 State Highway 11B
Burnah, Lawrence			762		
MacDonald Revocable Trust, Joan C.					1491 Bonnie View Rd
Cole, Rebecca L.					15 Sisson Rd
Haught, Wayne					48 Regan Rd
Minter, Salena A.					363 Hatch Rd
Hauerstock, David A.					172 River Rd
Basford, Troy					201 Heath Rd
Basford, Chad E.					190 Heath Rd
Porter, Clark R.					559D County Route 24
Freeman, Marilyn M.			775		
Matott, Lowell					1885 Morley Potsdam Rd
Horton, Eileen					1917 Morley Potsdam Rd
Pierre, George F.					11714 Silmarillion Trl
Lyon, Edward F.					1911 Morley Potsdam Rd
Yette, Michael J.					1907 Morley Potsdam Rd
Fetcie, Steven			668		
Blanchard, Kip					6846 US Highway 11

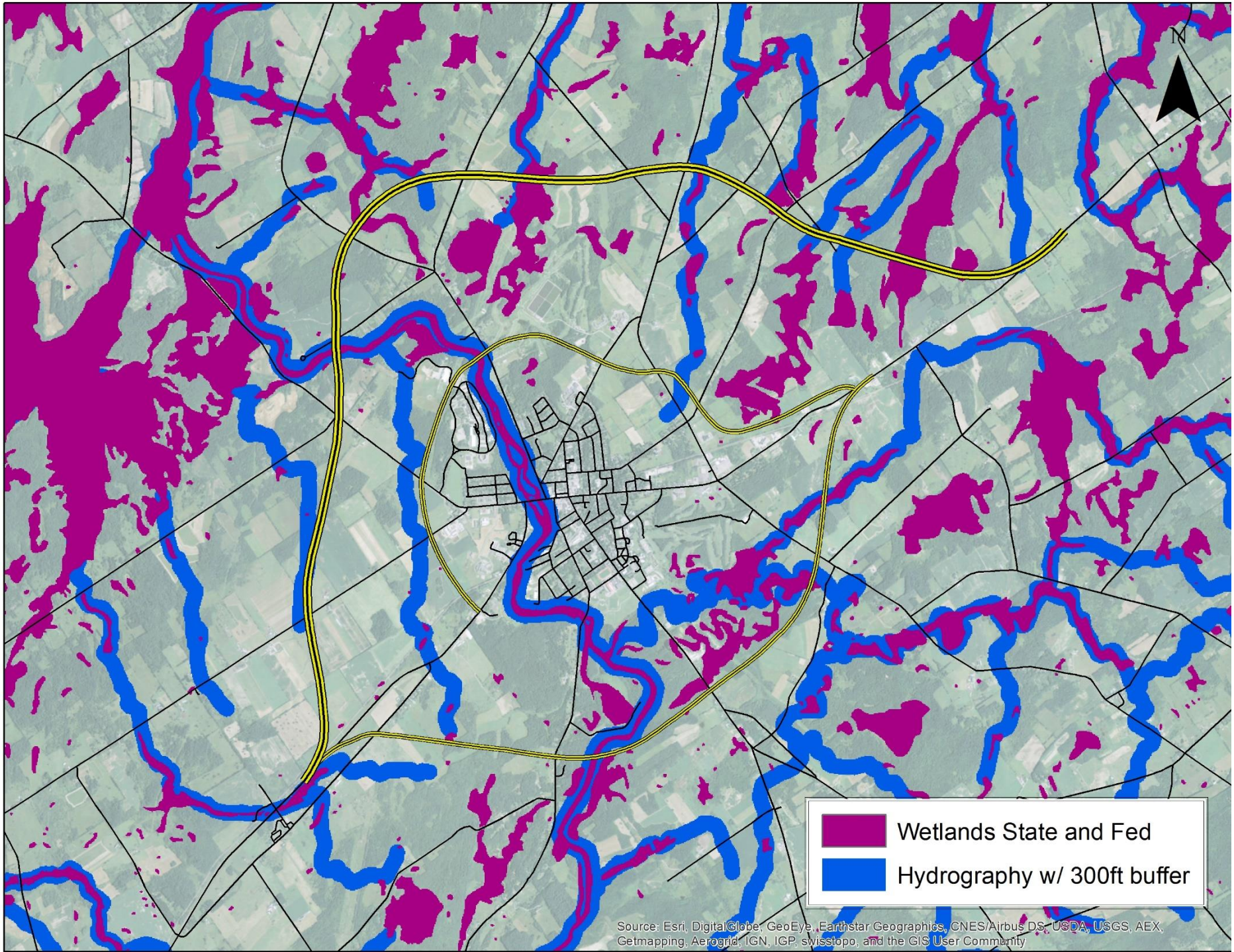
Raster Analysis of Land Use Impacts

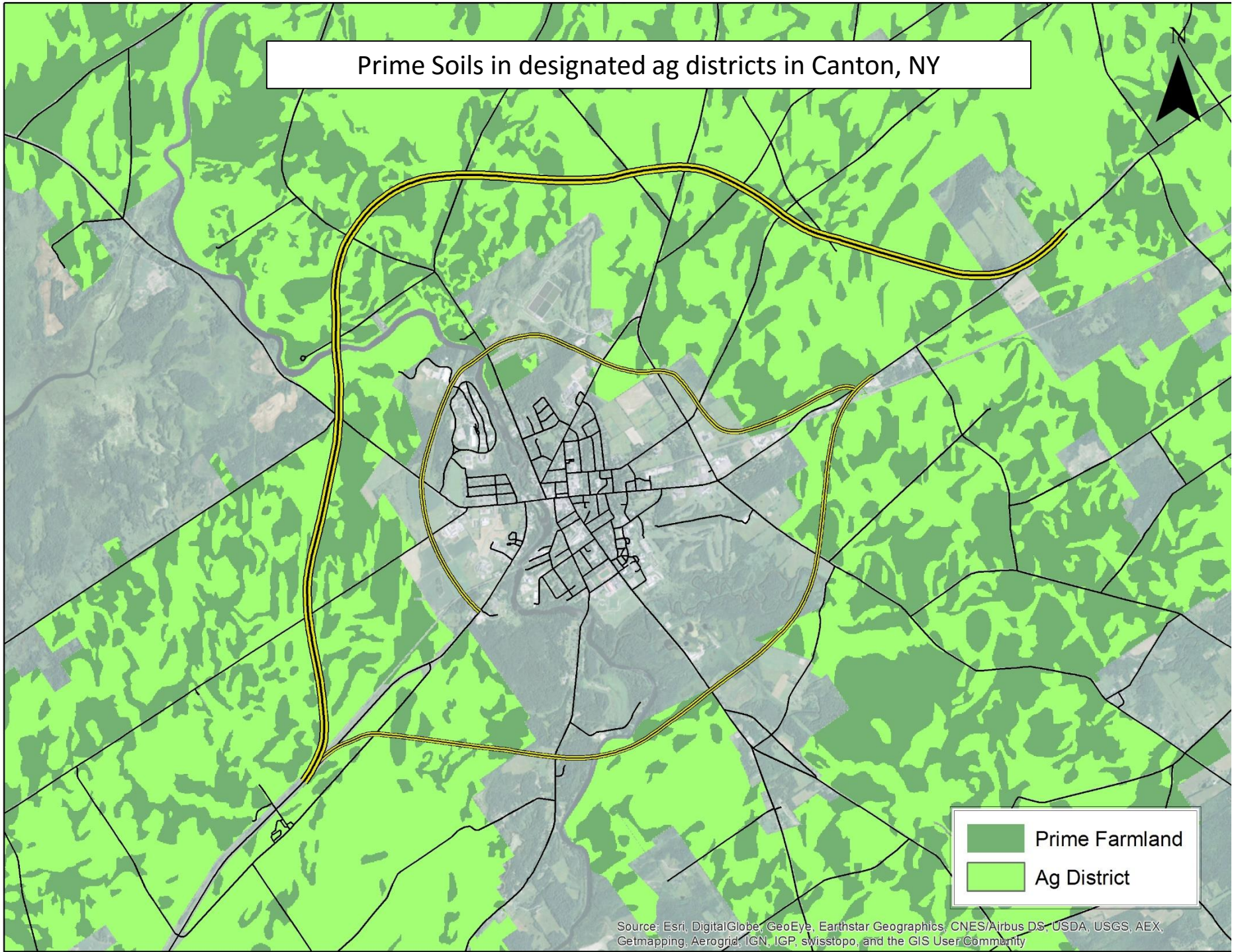
The previous slides detailing vector analysis are incredibly useful for precise measurements of area, but vector cannot measure the density of overlaid data sets, necessitating the use of raster analysis. All vector data sets were converted to raster data sets using conversion tools in ArcGIS. To simplify the raster analysis, vector data sets that shared common themes were combined into general categories. The following slides discuss the data sets used in the raster analysis of each bypass, using the Canton community as an example.

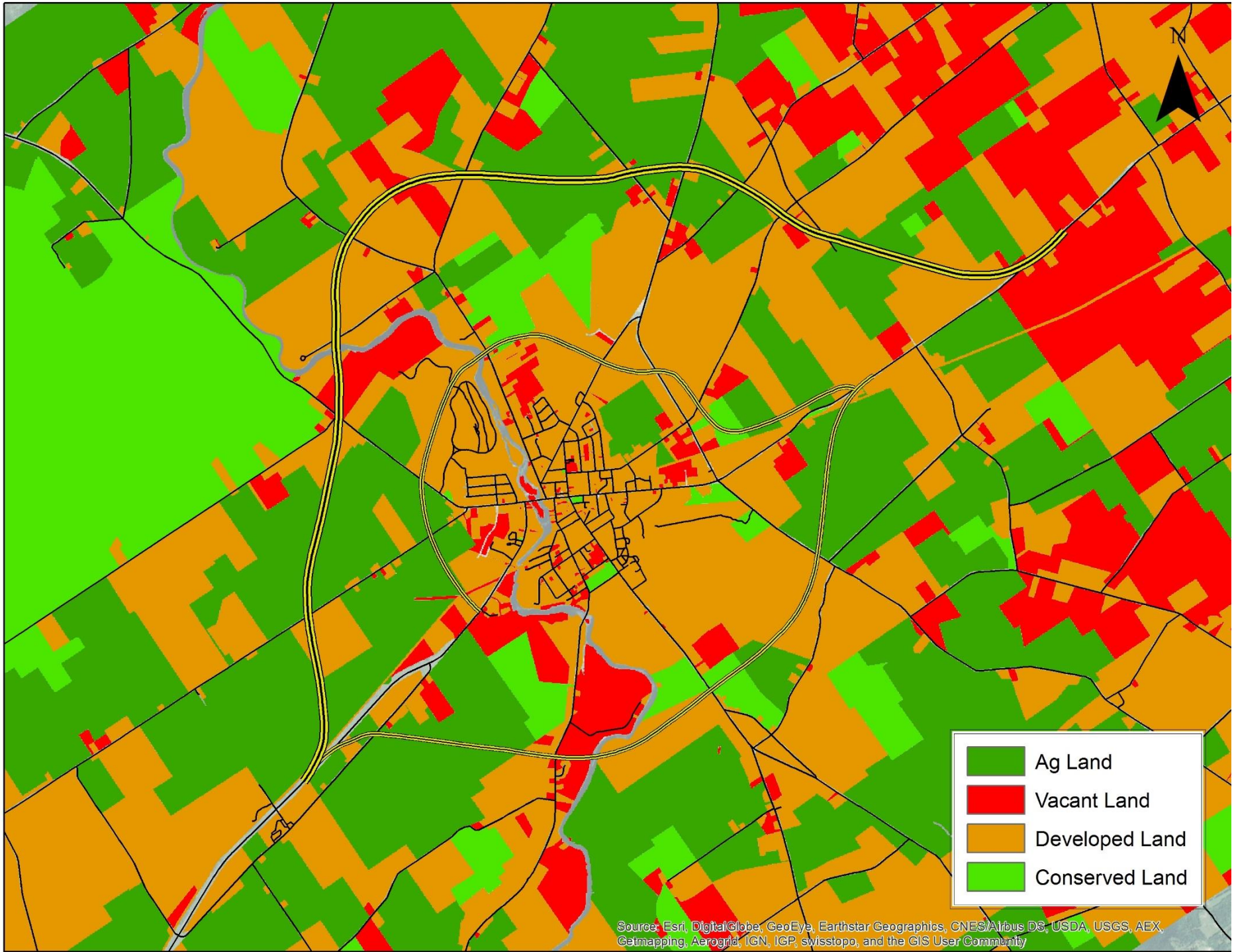
All of the data sets shown on the left are included in the raster analysis of the bypasses. The hydrography shapefile was buffered to 300 feet to include the riparian area and animal travel corridors inherent of hydrological features.



The data sets shown on the left are the final consolidated data sets used for raster analysis. State and federal wetlands were consolidated; 900 Conserved, 500 Recreation, and DEC Lands were consolidated to “Conserved Land”; 800 Public Services, 700 Industrial, 600 Community Services, 400 Commercial, and 200 Residential were consolidated to “Developed Land”. The following maps depict each data set.


N
Wetlands State and Fed
Hydrography w/ 300ft buffer
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Prime Soils in designated ag districts in Canton, NY
N
Prime Farmland
Ag District
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


N
Ag Land
Vacant Land
Developed Land
Conserved Land
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Weighted Overlays

Using the data sets shown in the previous slides and a spatial analyst tool called “Weighted Overlay,” groups of data sets can be combined into one map. Where data sets overlap more frequently, a higher value is give; where data sets overlap infrequently or not at all, lower values are given. Data sets are given specific weights by the user, which are used to calculate the final value for each cell in the map.

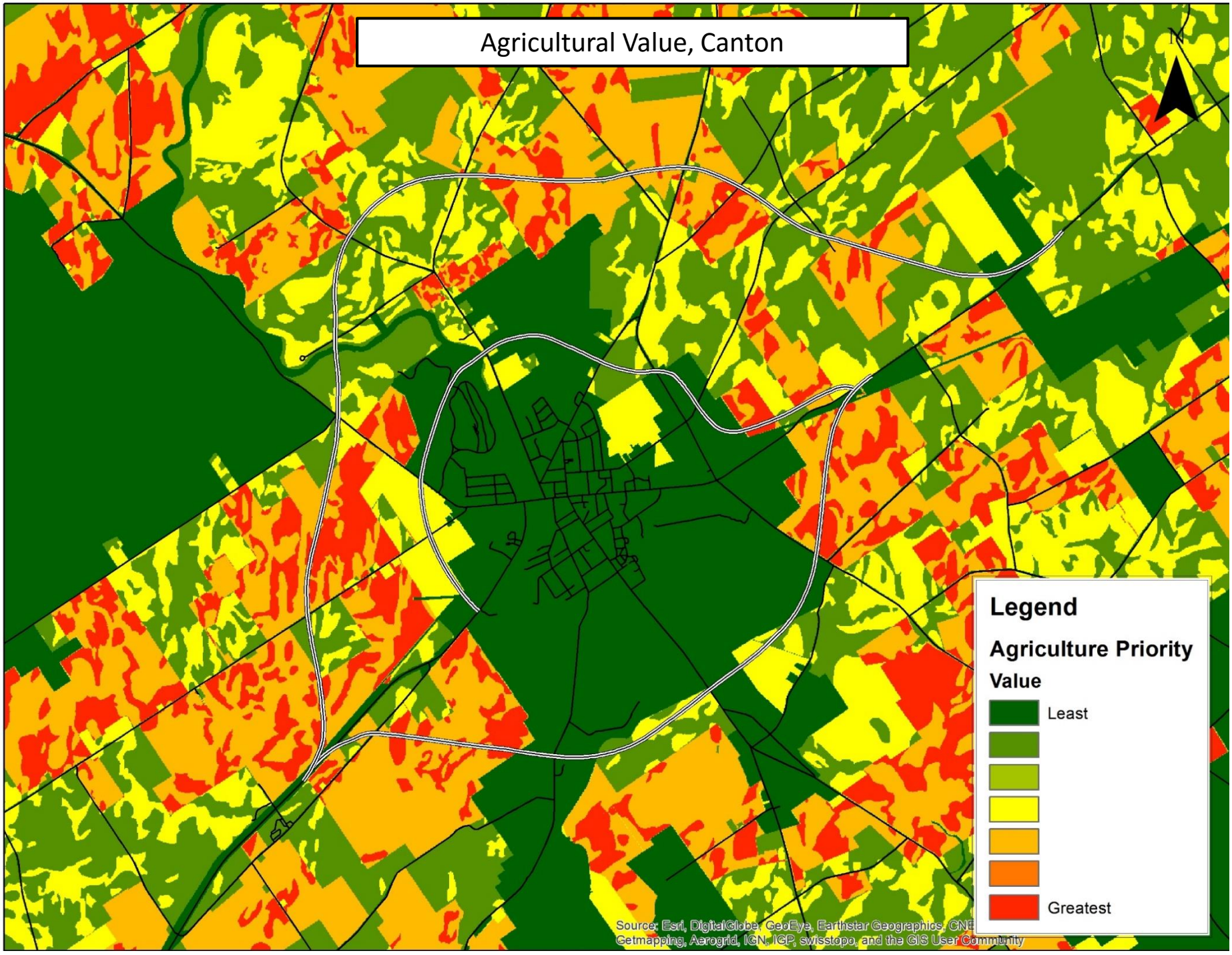
Using the “Weighted Overlay” tool, new maps were created based three different value-systems regarding the landscape and the bypasses: Agricultural Value, Ecosystem Value and Cost (in regards to perceived development costs and barriers). The resulting maps are shown below, along with the tables used to weight and rank each data set in the map.

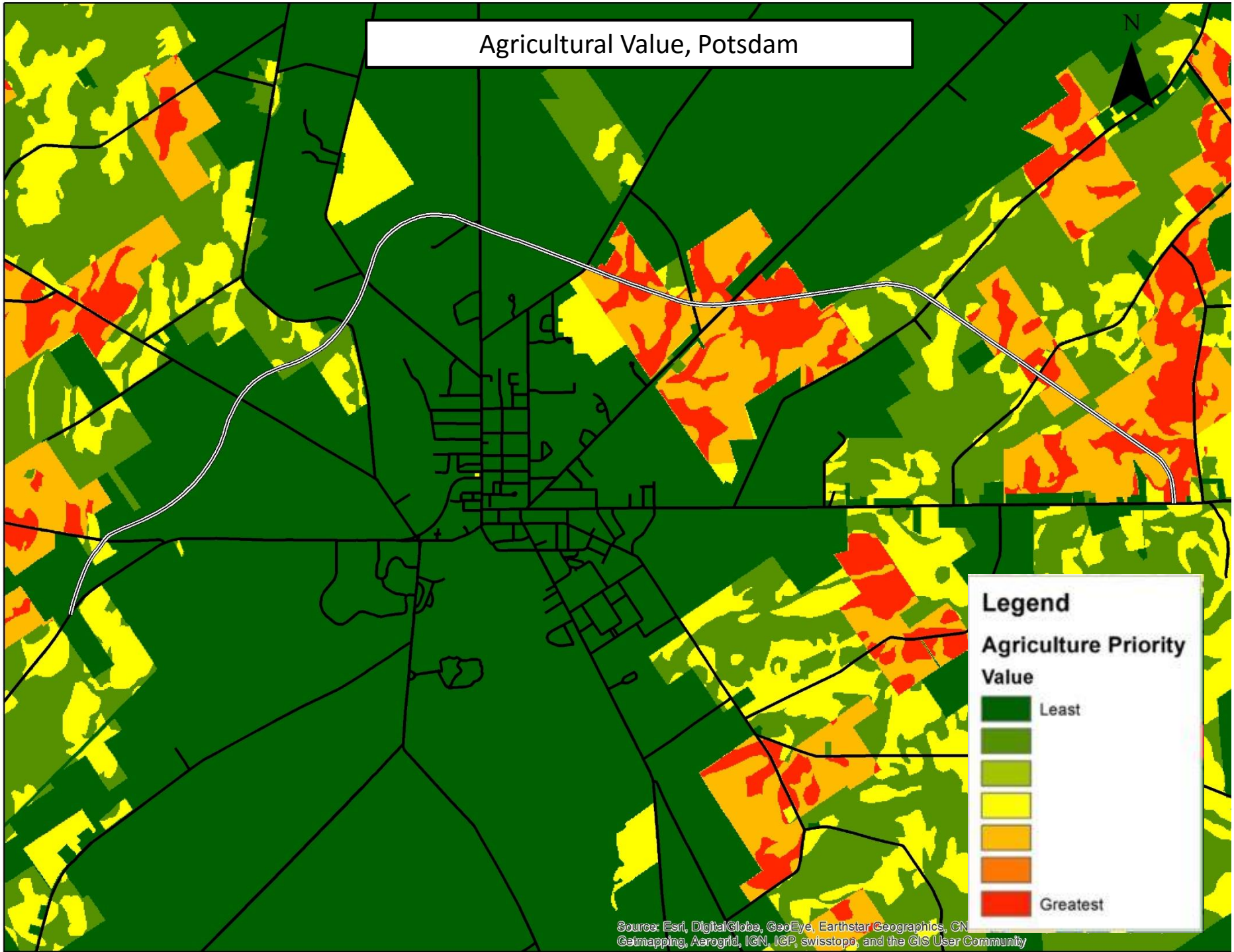
Agricultural Value

Weighted overlay table

Raster	% Influence	Field	Scale Value
Prime Farmland	30	Value	
		1	7
		NODATA	1
Ag District	20	Value	
		1	5
		NODATA	1
Agriculture	40	Value	
		1	9
		NODATA	1
Vacant	10	Value	
		1	4
		NODATA	1

Vacant land is included in the analysis, albeit, given a lower weight due to its potential to become farmland if needed.


Agricultural Value, Canton
Legend
Agriculture Priority
Value
Least
Greatest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNE
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

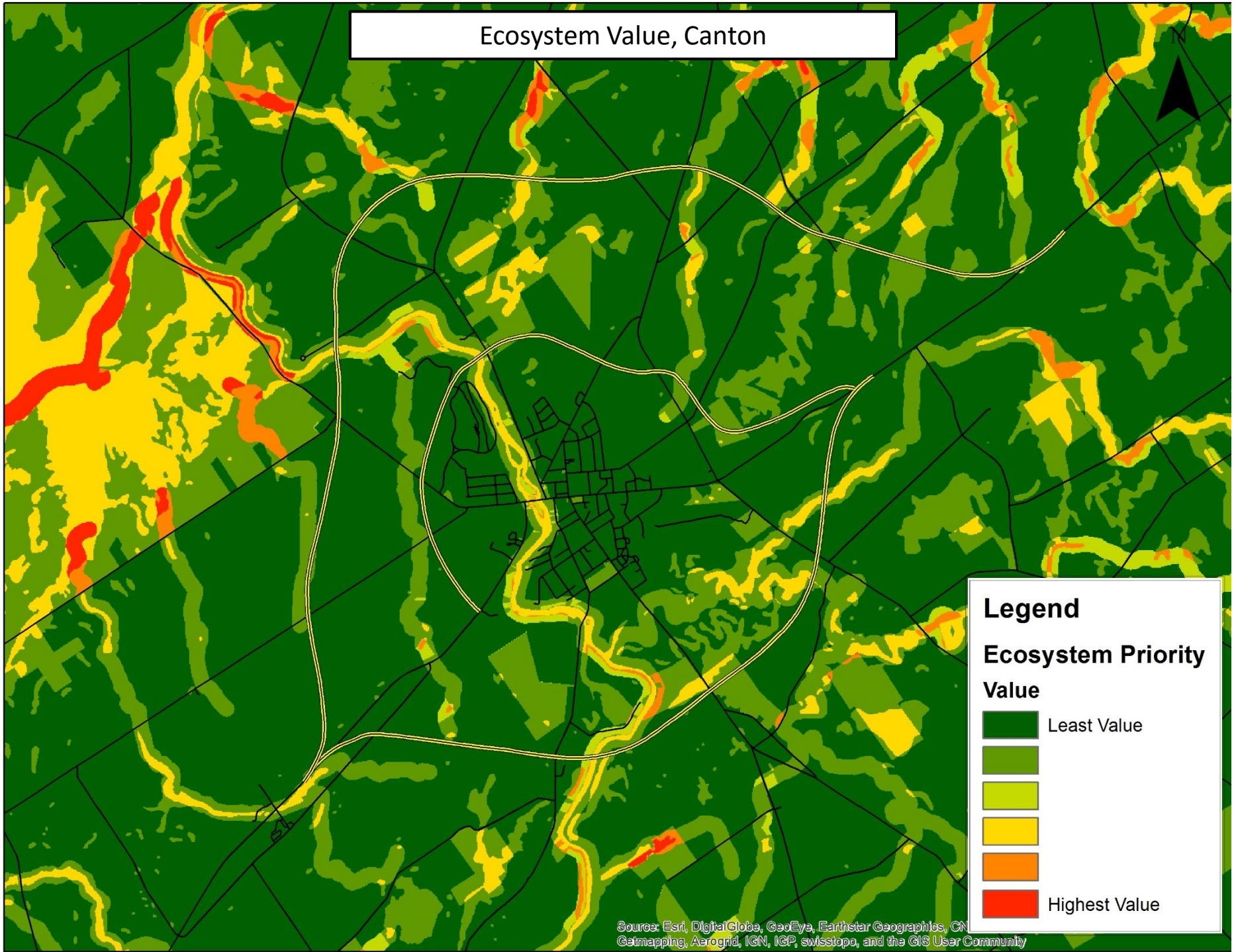

Agricultural Value, Potsdam
N
Legend
Agriculture Priority
Value
Least
Greatest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CN
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

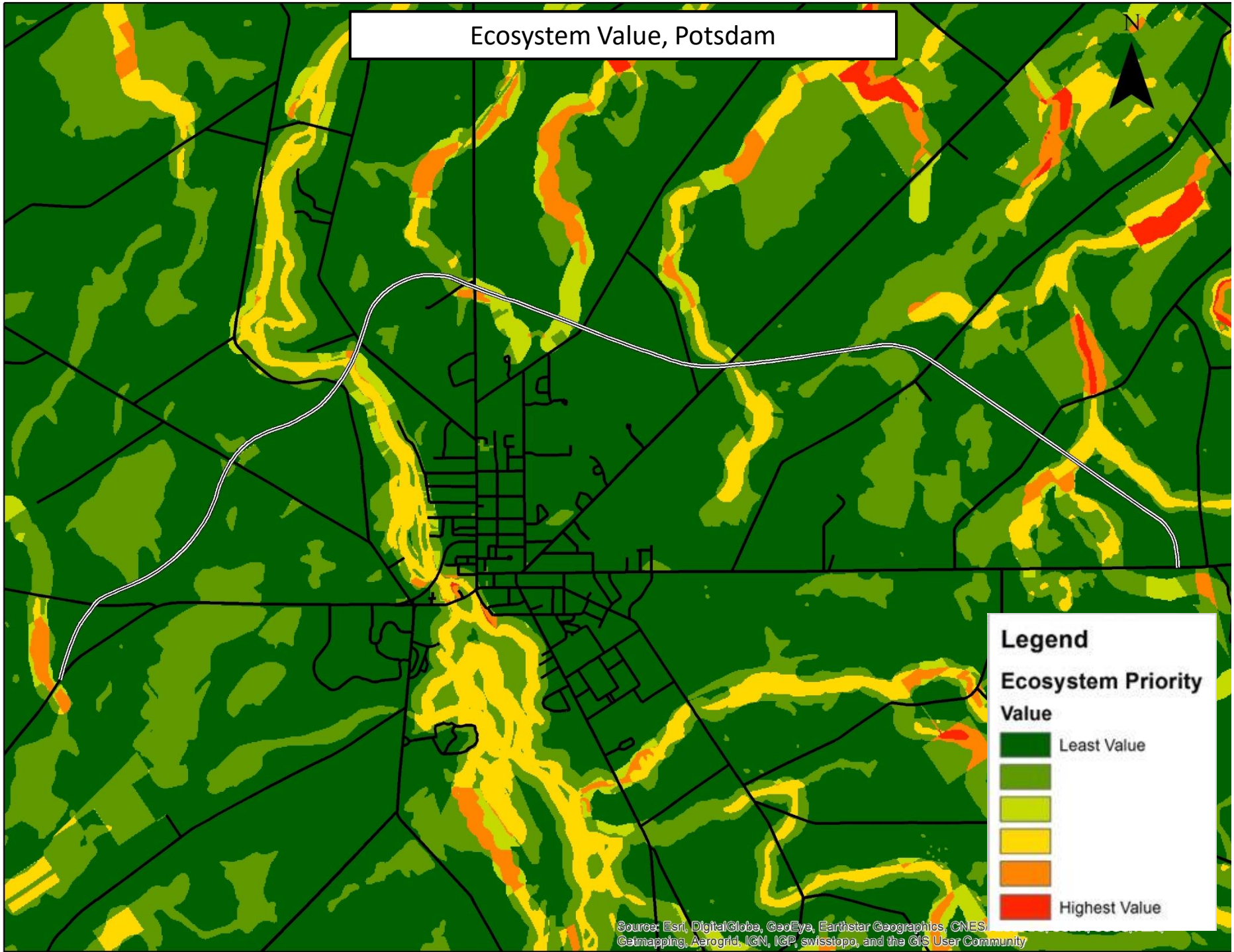
Ecosystem Value

Weighted overlay table

Raster	% Influence	Field	Scale Value
Wetlands State an	30	Value	
		1	8
		NODATA	1
Hydrogpraphy buff	30	Value	
		1	9
		NODATA	1
Conserved Land	30	Value	
		1	9
		NODATA	1
Vacant	10	Value	
		1	4
		NODATA	1

Vacant land is included in the analysis, albeit, given a lower weight due to its potential value as habitat.

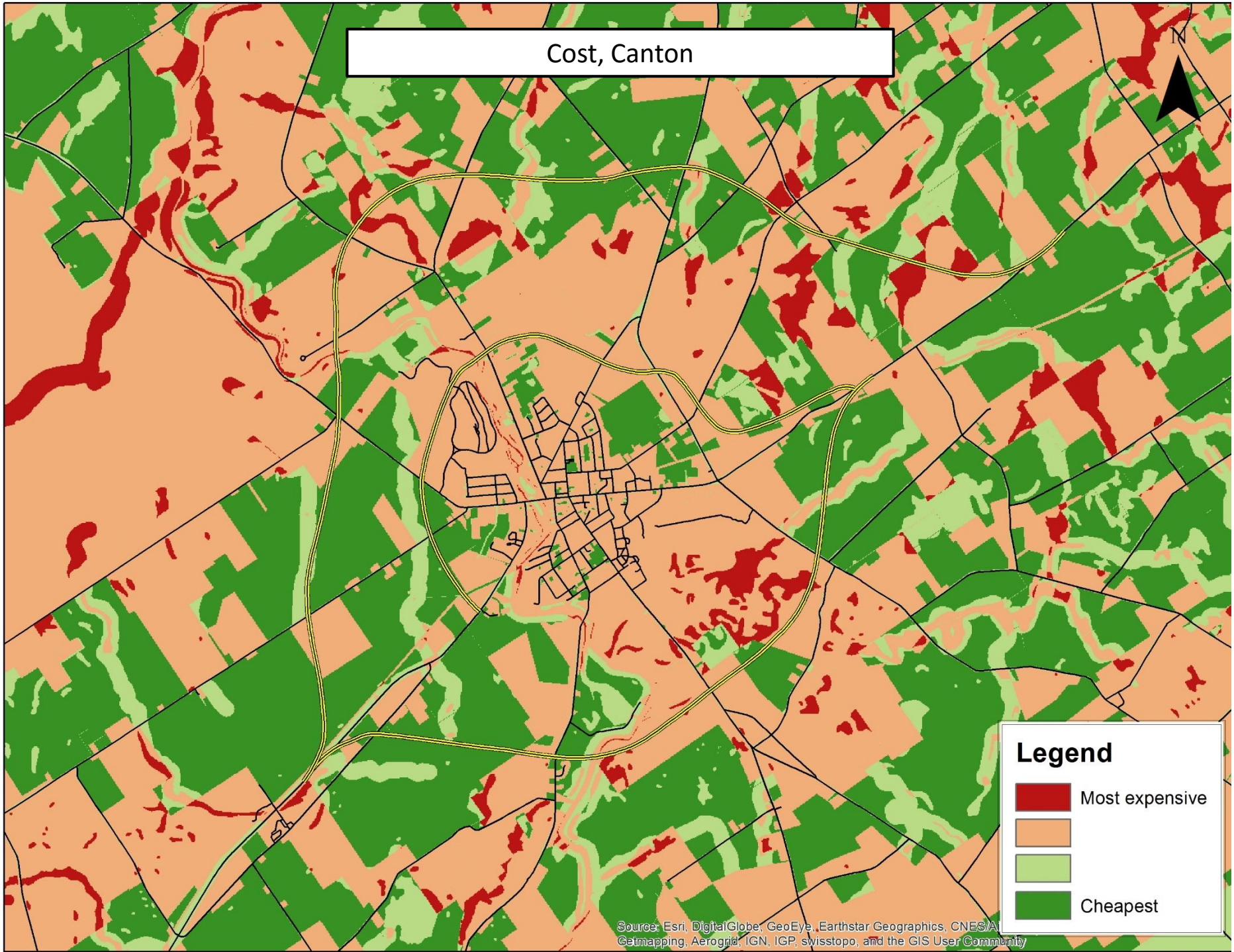

Ecosystem Value, Canton
Legend
Ecosystem Priority
Value
Least Value
Highest Value
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CN
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

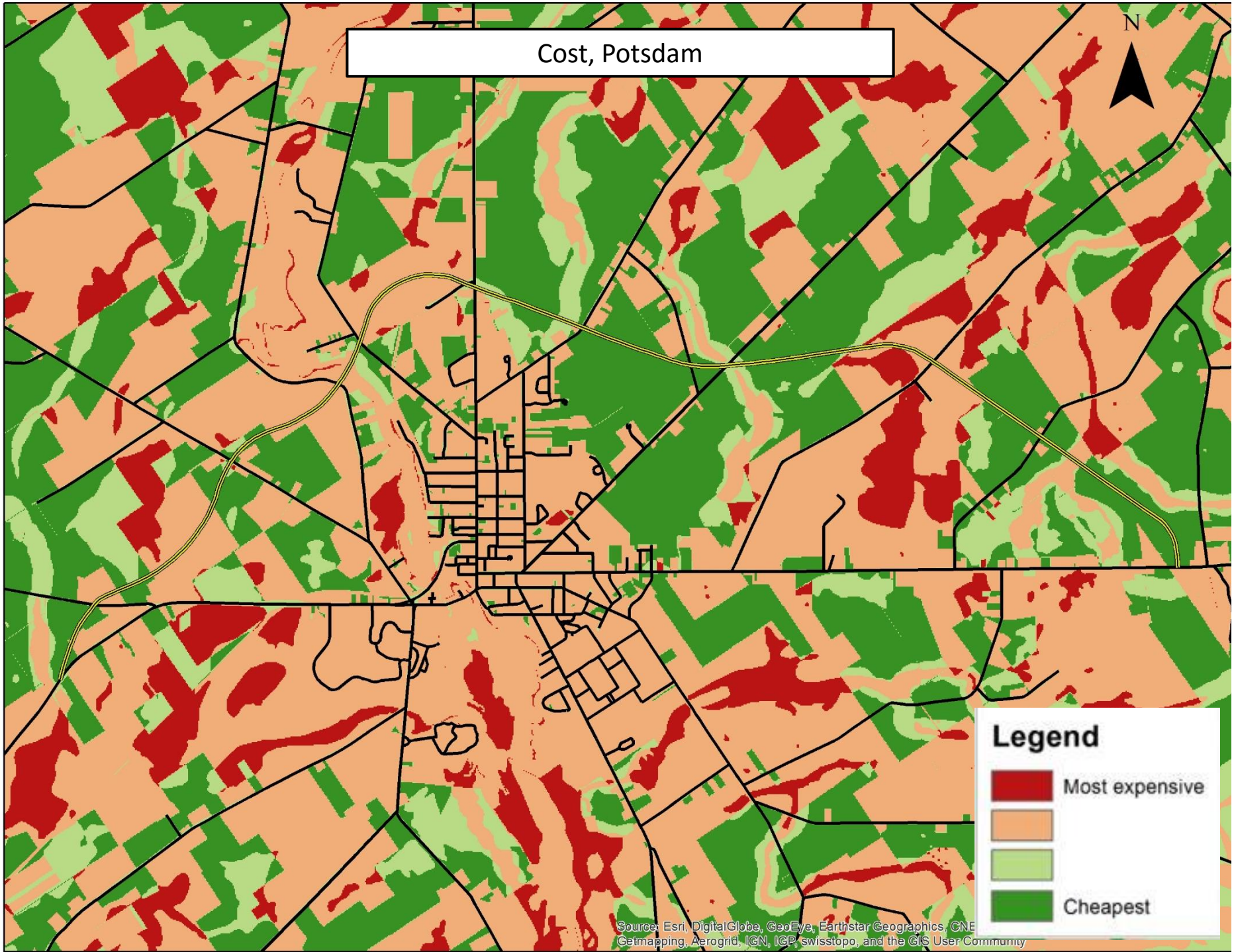

Ecosystem Value, Potsdam
N
Legend
Ecosystem Priority
Value
Least Value
Highest Value
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Cost

Weighted overlay table

Raster	% Influence	Field	Scale Value
Wetlands State an	16	Value	
		1	1
		NODATA	7
Hydrogpraphy buff	16	Value	
		1	1
		NODATA	8
Conserved Land	16	Value	
		1	1
		NODATA	6
Developed Land	16	Value	
		1	1
		NODATA	6
Vacant	18	Value	
		1	1
		NODATA	9
Agriculture	18	Value	
		1	1
		NODATA	9

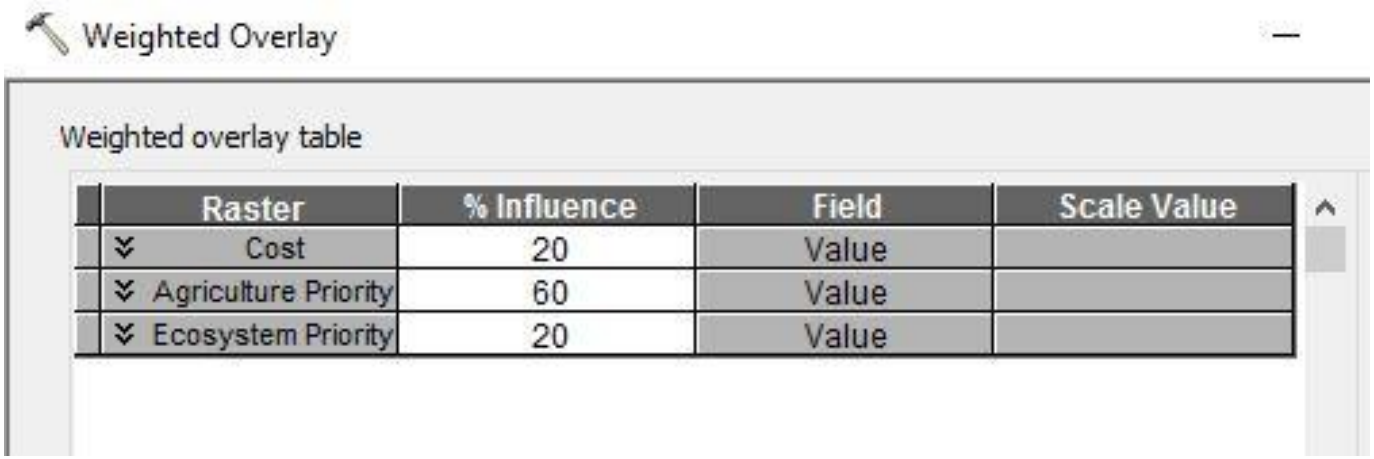

Cost, Canton
N
Legend
Most expensive
Cheapest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/A
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

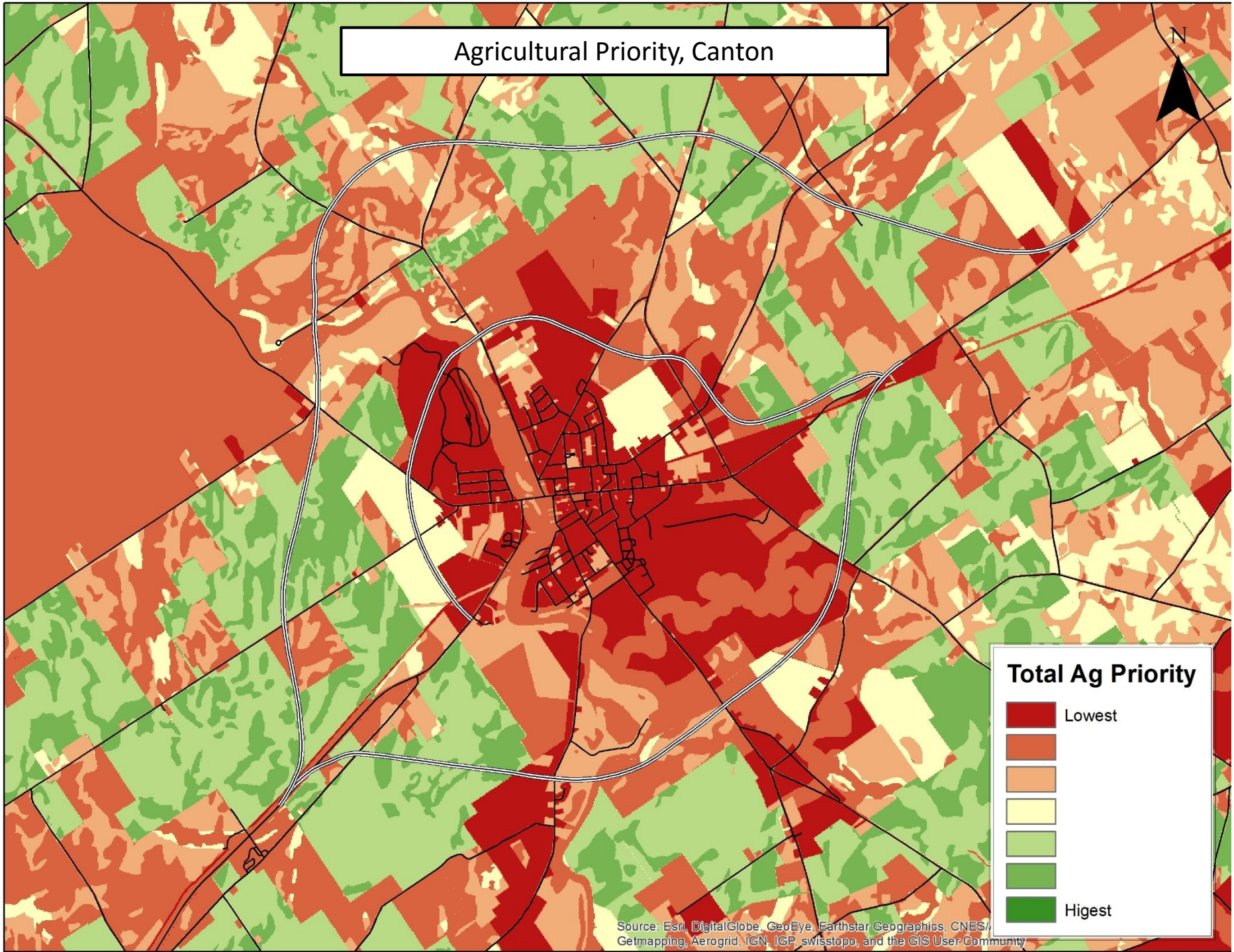

Cost, Potsdam
N
Legend
Most expensive
Cheapest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNE
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

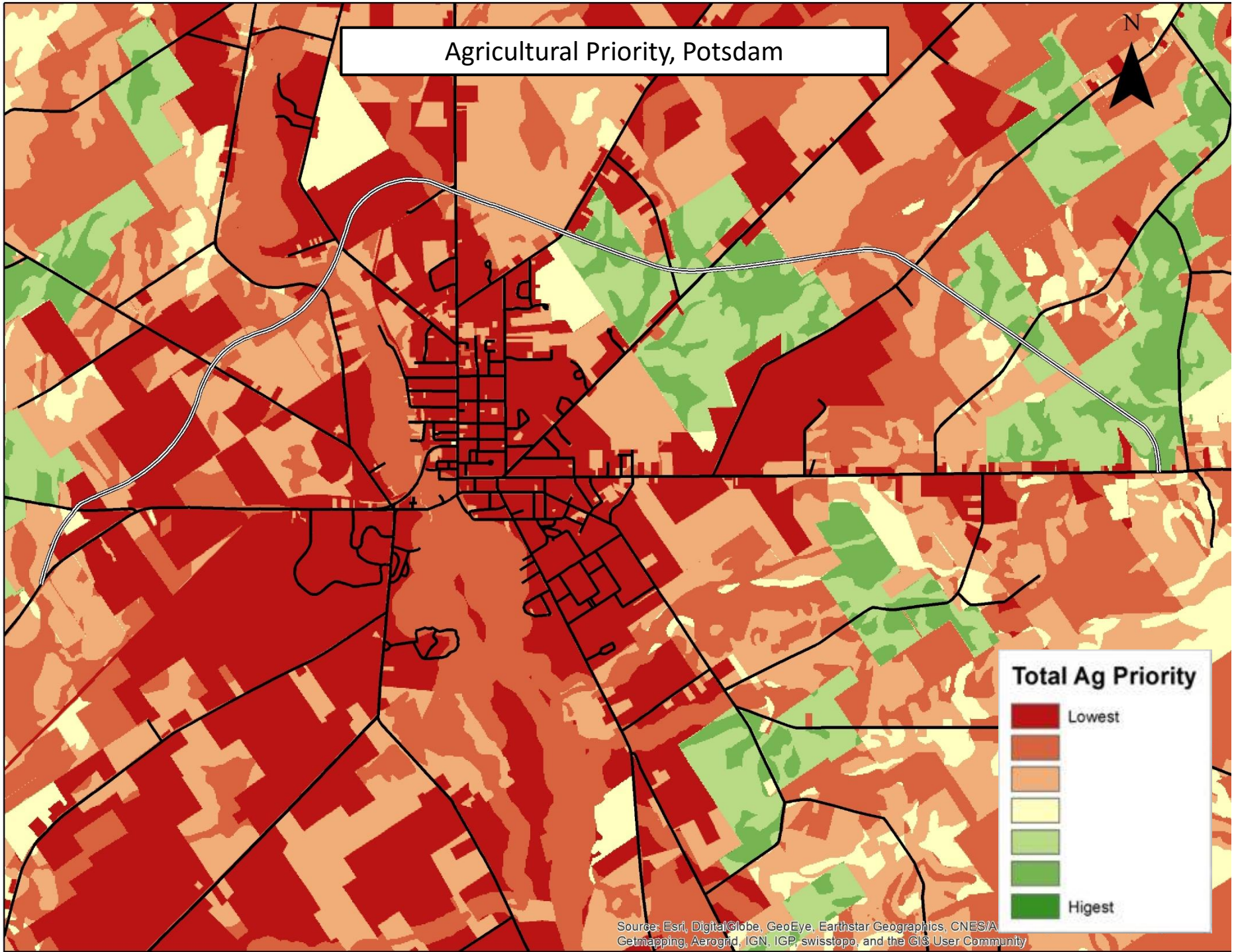
With the creation of these three raster data sets of different value systems, more analysis can be conducted by combining all three perspectives in one map, and adjusting the weight values to see how the results vary when one perspective is given more weight than others.

The table below has been arranged to give agriculture greater weight, and the results are shown on the following slide. Later slides depict the results of other algorithms.

Agricultural Priority



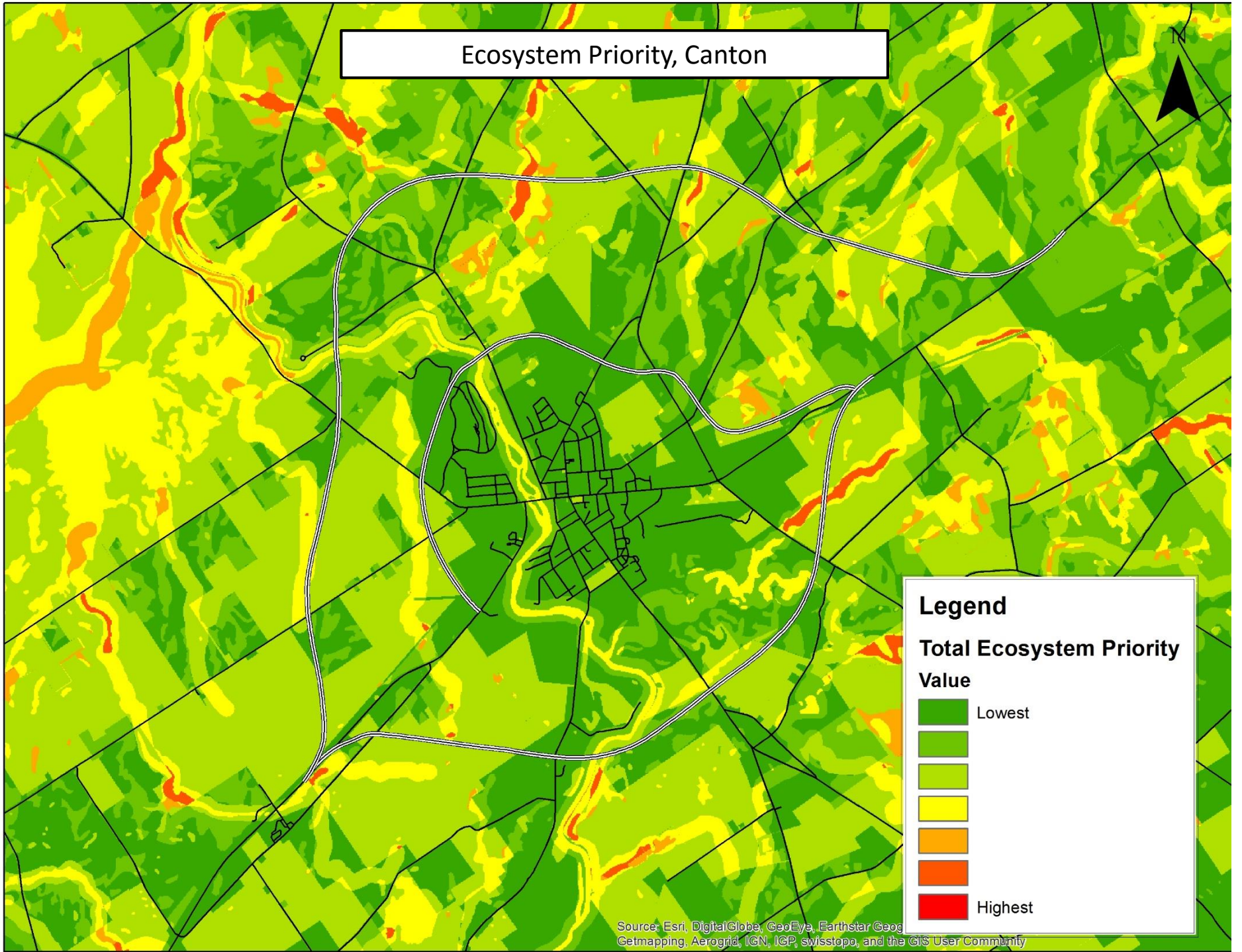

Agricultural Priority, Canton
N
Total Ag Priority
Lowest
Higest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

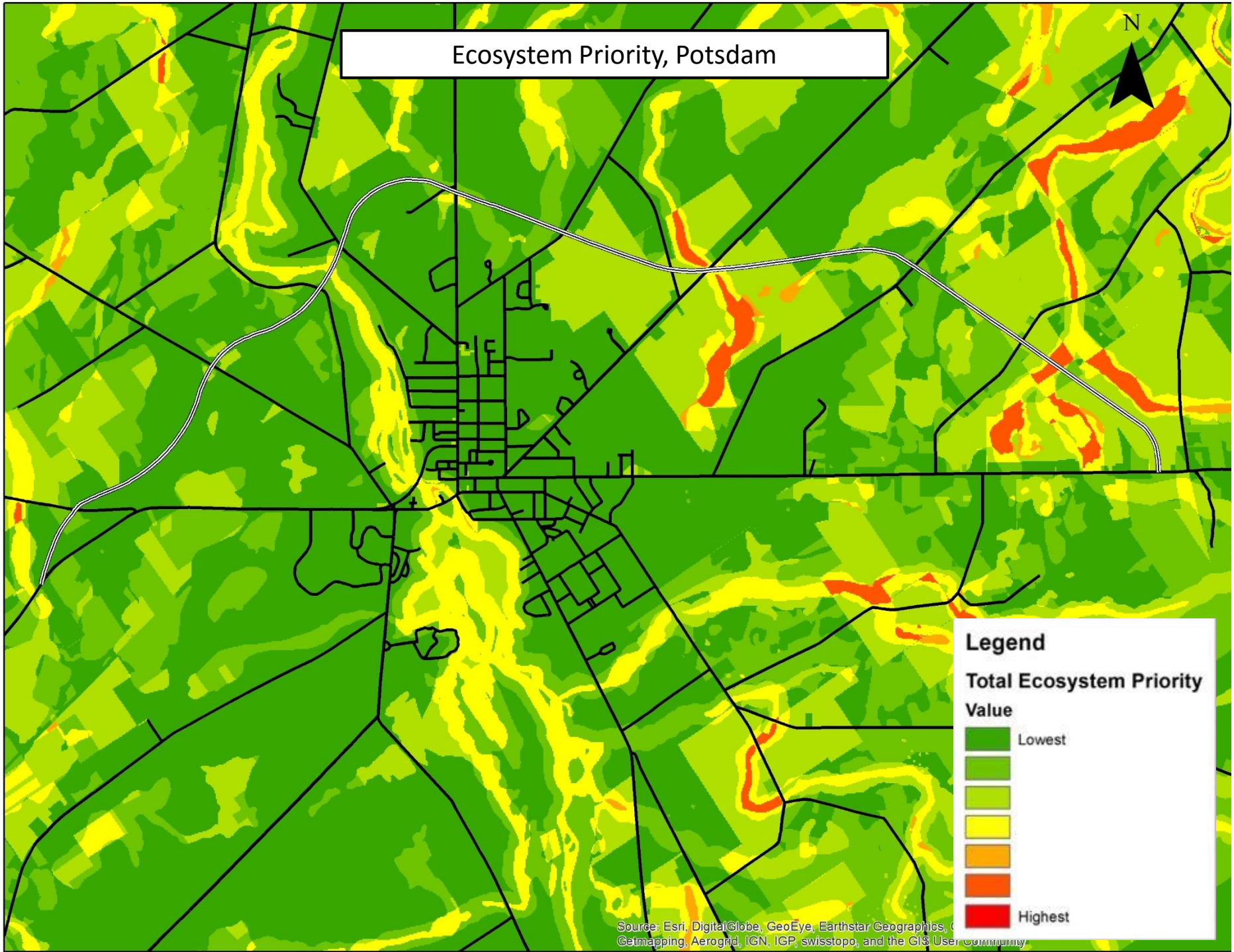

Agricultural Priority, Potsdam
N
Total Ag Priority
Lowest
Higest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/A
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Ecosystem Priority

Weighted overlay table

Raster	% Influence	Field	Scale Value
Cost	20	Value	
Agriculture Priority	20	Value	
Ecosystem Priority	60	Value	

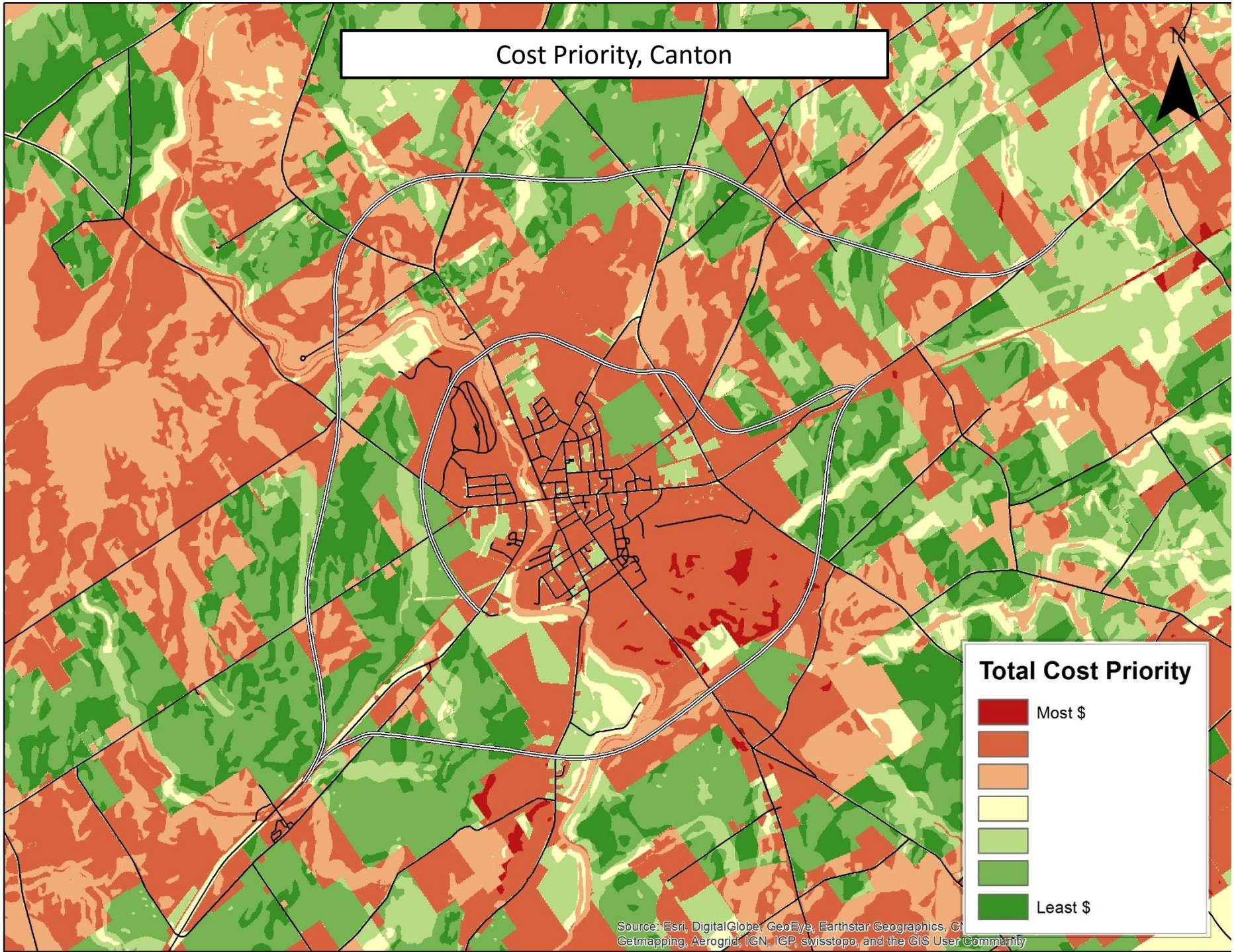

Ecosystem Priority, Canton
N
Legend
Total Ecosystem Priority
Value
Lowest
Highest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geog
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

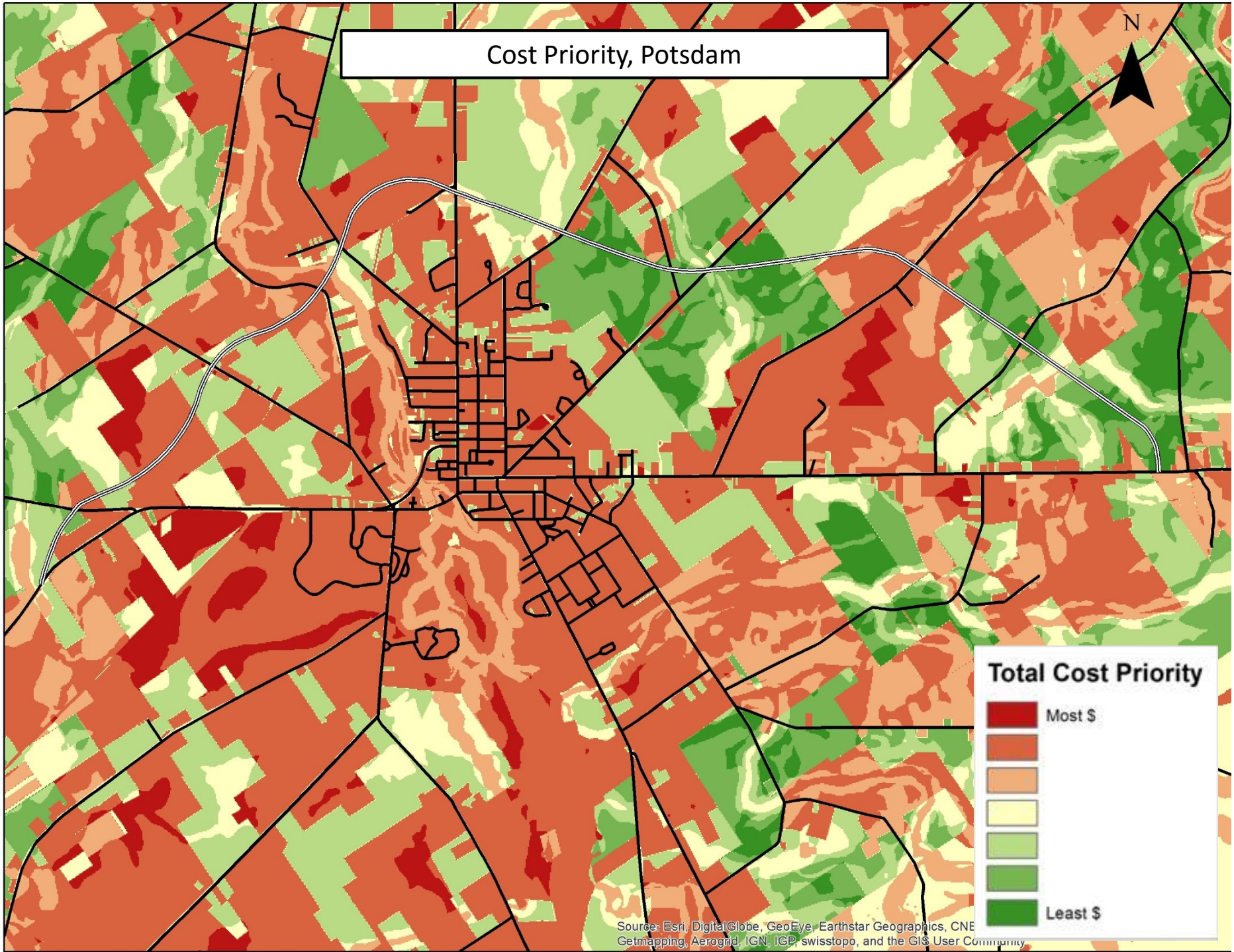

Ecosystem Priority, Potsdam
N
Legend
Total Ecosystem Priority
Value
Lowest
Highest
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Cost Priority

Weighted overlay table

Raster	% Influence	Field	Scale Value
Cost	50	Value	
Agriculture Priority	30	Value	
Ecosystem Priority	20	Value	

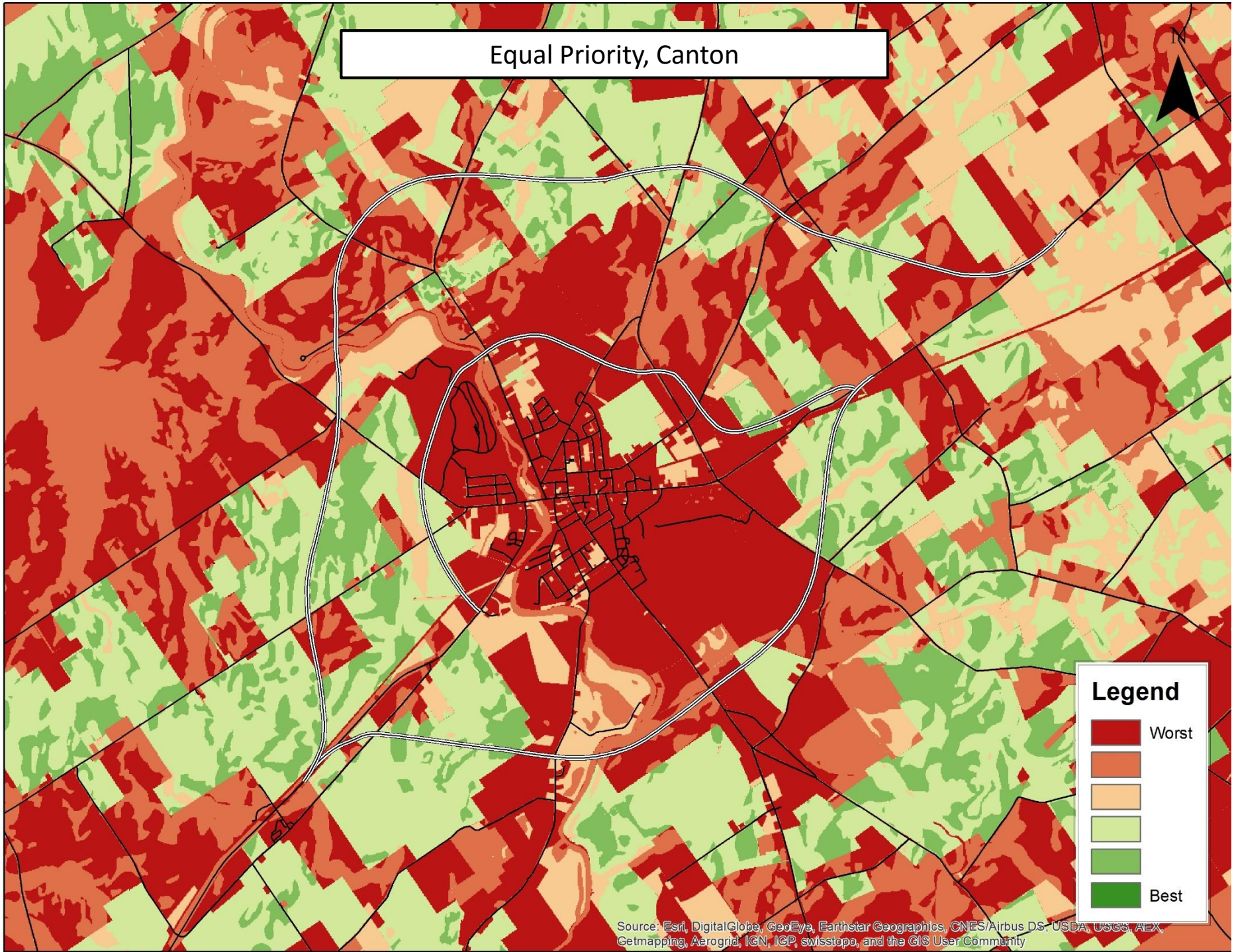

Cost Priority, Canton
N
Total Cost Priority
Most $
Least $
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, C
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

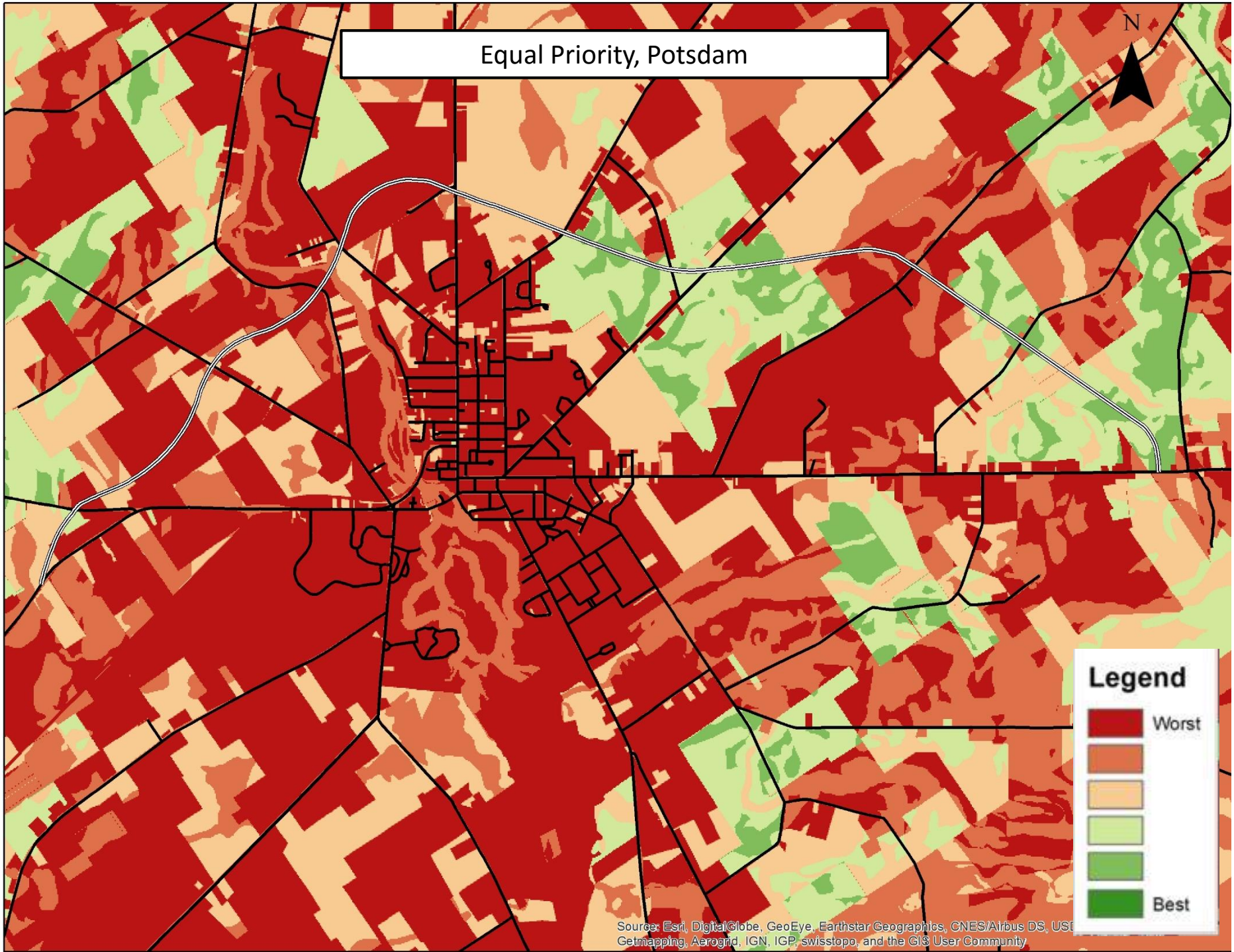

Cost Priority, Potsdam
N
Total Cost Priority
Most $
Least $
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNE
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Equal Priority

Weighted overlay table

Raster	% Influence	Field	Scale Value
Cost	33	Value	
Agriculture Priority	33	Value	
Ecosystem Priority	34	Value	


Equal Priority, Canton
N
Legend
Worst
Best
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Equal Priority, Potsdam
N
Legend
Worst
Best
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USD
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Conclusion

This analysis included in this study is strictly focused on the footprint of the bypass options in Canton and Potsdam, and how these bypasses would affect different landowners, especially home owners. The raster analysis conducted in the latter half of this study reveals how different value-systems affect perceptions of impact, revealing strengths and weaknesses of each bypass concept, in addition to presenting new design opportunities. This study does not make any conclusions about the efficacy of each bypass, and does not condone one particular strategy. The value of this study lies in the data, which simultaneously provides more clarity but also reveals the need for more analysis to complete the picture.

It is apparent that all the bypass concepts examined in this report have footprints that will immediately impact the community it is attempting to serve. This study hopefully elucidates particular strengths and weaknesses of each bypass, while also emphasizing that much more research needs to be conducted, as discussed in the next slide, if construction is indeed intended. Development at this scale has tantamount consequences, and it is imperative that as many facets are studied as possible in order to provide these two communities with the best possible product.

Recommendations for Future Studies

This study provides the groundwork for future studies that must be completed to create a more holistic portrait of the potential effects of these bypasses on their associated communities. It is strongly suggested that analysis be conducted for the following:

-Traffic efficiencies of each bypass compared to the original routes, with the knowledge that the bypasses will be 55 mph

-Determining the cost-benefit ratio of each bypass and searching for other alternatives to service Canton and Potsdam

-The impacts that the bypasses will have on pedestrian safety

-Determining if, with our current national infrastructure demands, if the Watertown – Plattsburg express highway is even feasible, and what other options exist that are cheaper and easier.

-How these bypasses will effect the local community and economy.

- What zoning is necessary to prevent development along route 11, and possible development along the bypasses.

Bibliography

The 2002 North Country Transportation Study can be found on the North Country Access Improvements Study website at https://www.dot.ny.gov/ncaccessstudy. Many reports and maps are included on this site.

Literature for Future Studies on Impacts of Bypasses

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Haskins III, C.B. (2002). *The Influence of Highways on Rural Economic Development: Evidence from North Carolina.* Retrieved from the Kentucky Transportation Center website: http://transportation.ky.gov/Congestion-Toolbox/Documents/NC%20Economic%20Development%20Roads.pdf

Srinivasan, S., & Kockelman, K. (2002). The Impacts of Bypasses on Small- and Medium-Sized Communities: An Econometric Analysis. *Journal of Transportation Statistics, 5, 57-69.*

Thompson, E.A., Miller, J., & Roenker, J. (2001). *The Impact of a New Bypass Route on the Local Economy and Quality of Life.* Retrieved from the Kentucky Transportation Center website: http://transportation.ky.gov/Congestion-Toolbox/Documents/KTC%20Economic%20Impact%20of%20Bypass.pdf