CLIMATE CHANGE IMPACTS ON WATER INFRASTRUCTURE: VULNERABILITY TO SEA-LEVEL RISE & COASTAL STORM SURGES

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East Carolina University

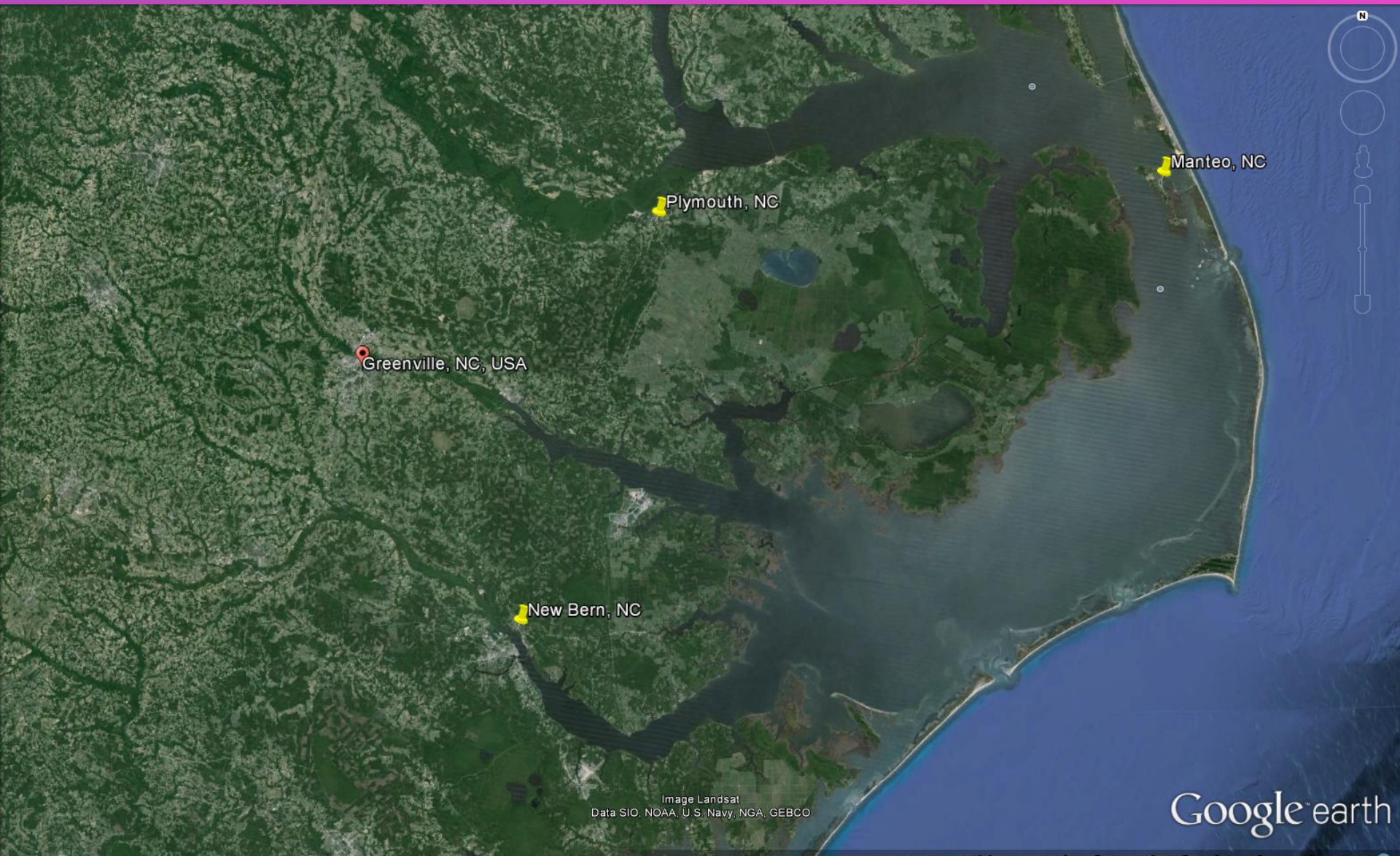
OBJECTIVES

- To identify the potential vulnerability of municipal water resource infrastructure to
  - Storm surge
  - Sea Level Rise
  - Flooding
- To assist communities in addressing their capacities to plan and adapt

STUDY AREAS

- Manteo: On Roanoke Island between the Albemarle and Pamlico Sounds
- Plymouth: On the Roanoke River near Albemarle Sound
- New Bern: On the Neuse River near Pamlico Sound

STUDY AREAS

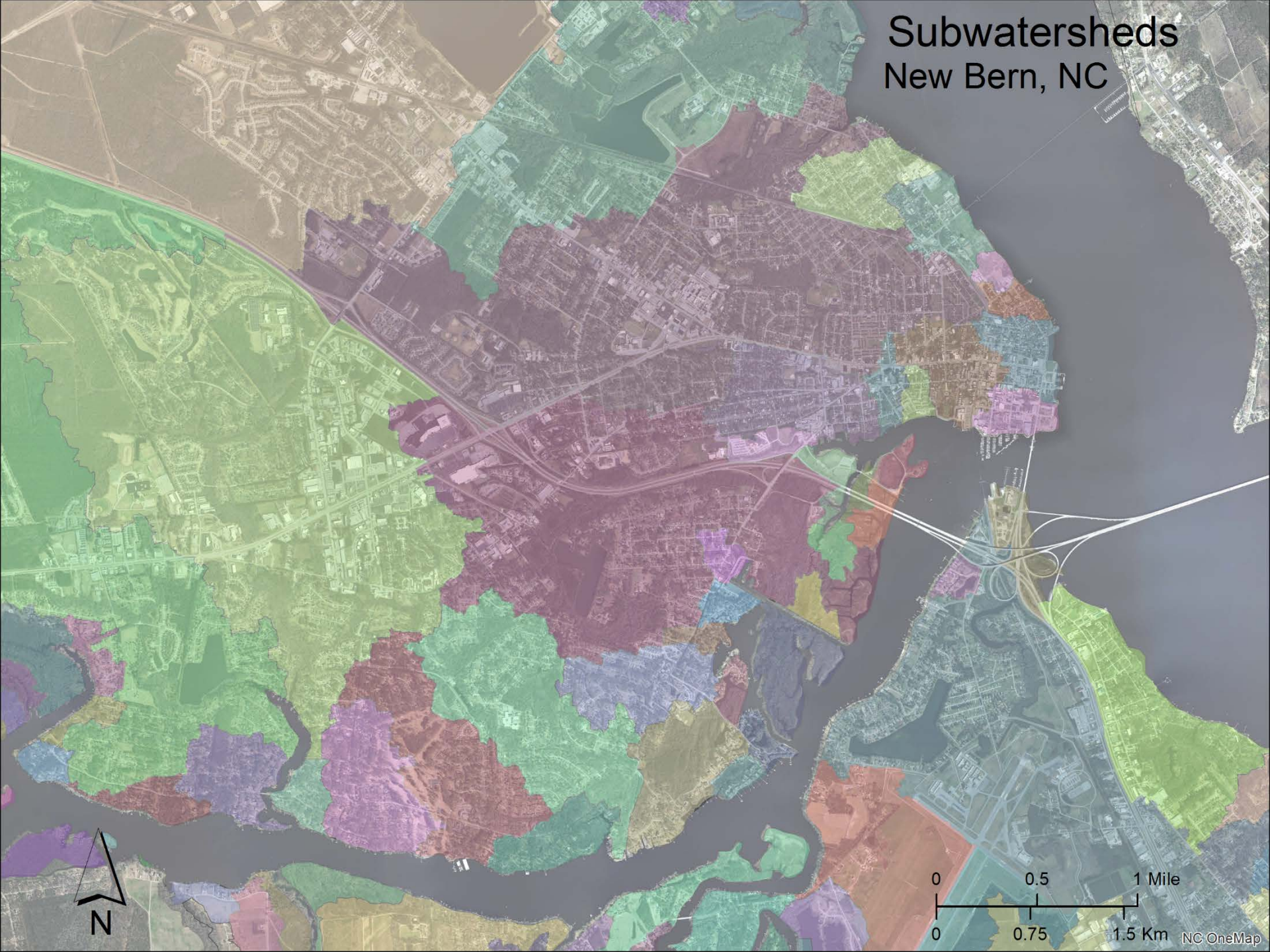

Manteo, NC
Plymouth, NC
Greenville, NC, USA
New Bern, NC
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth

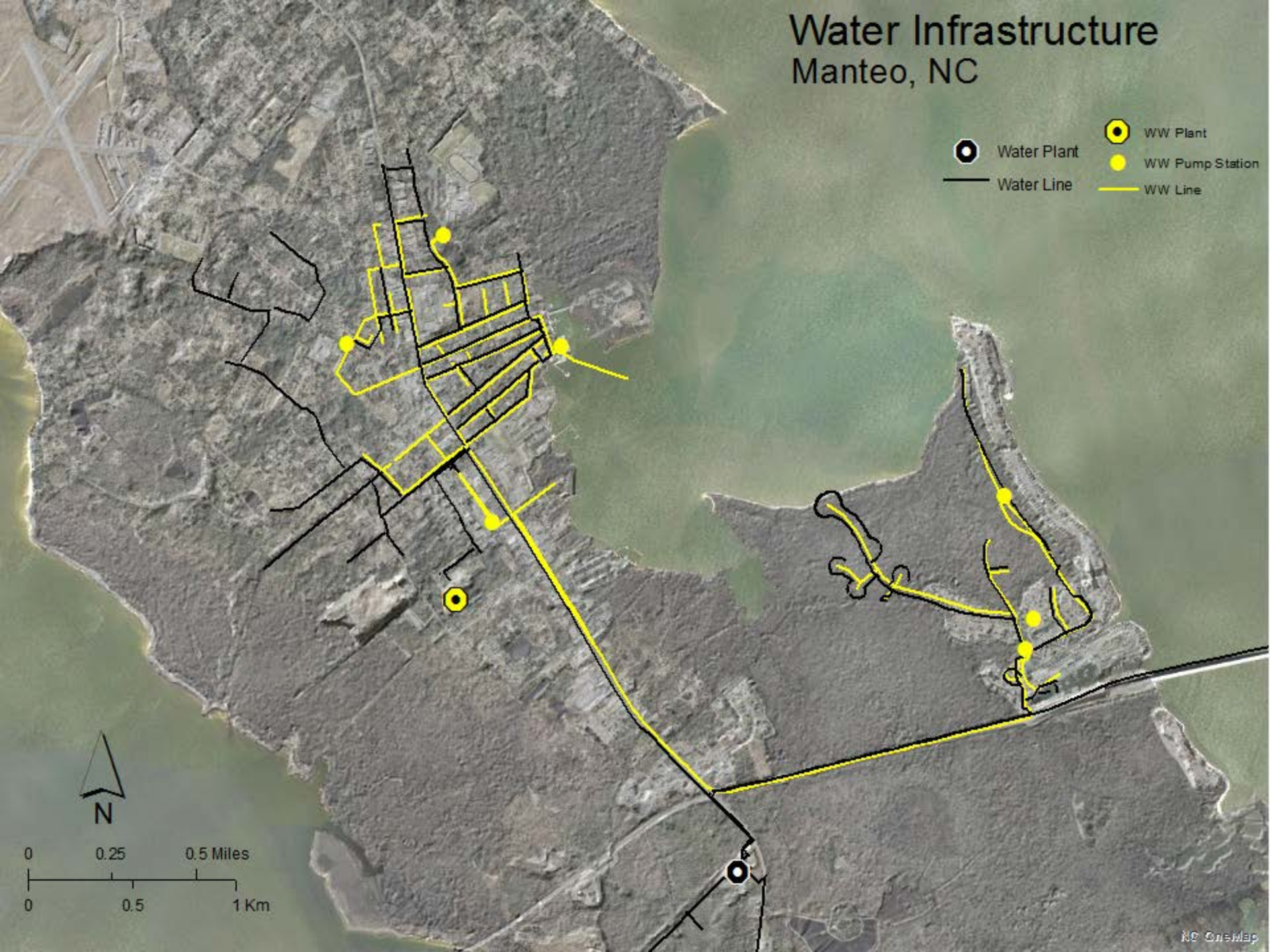
METHODS

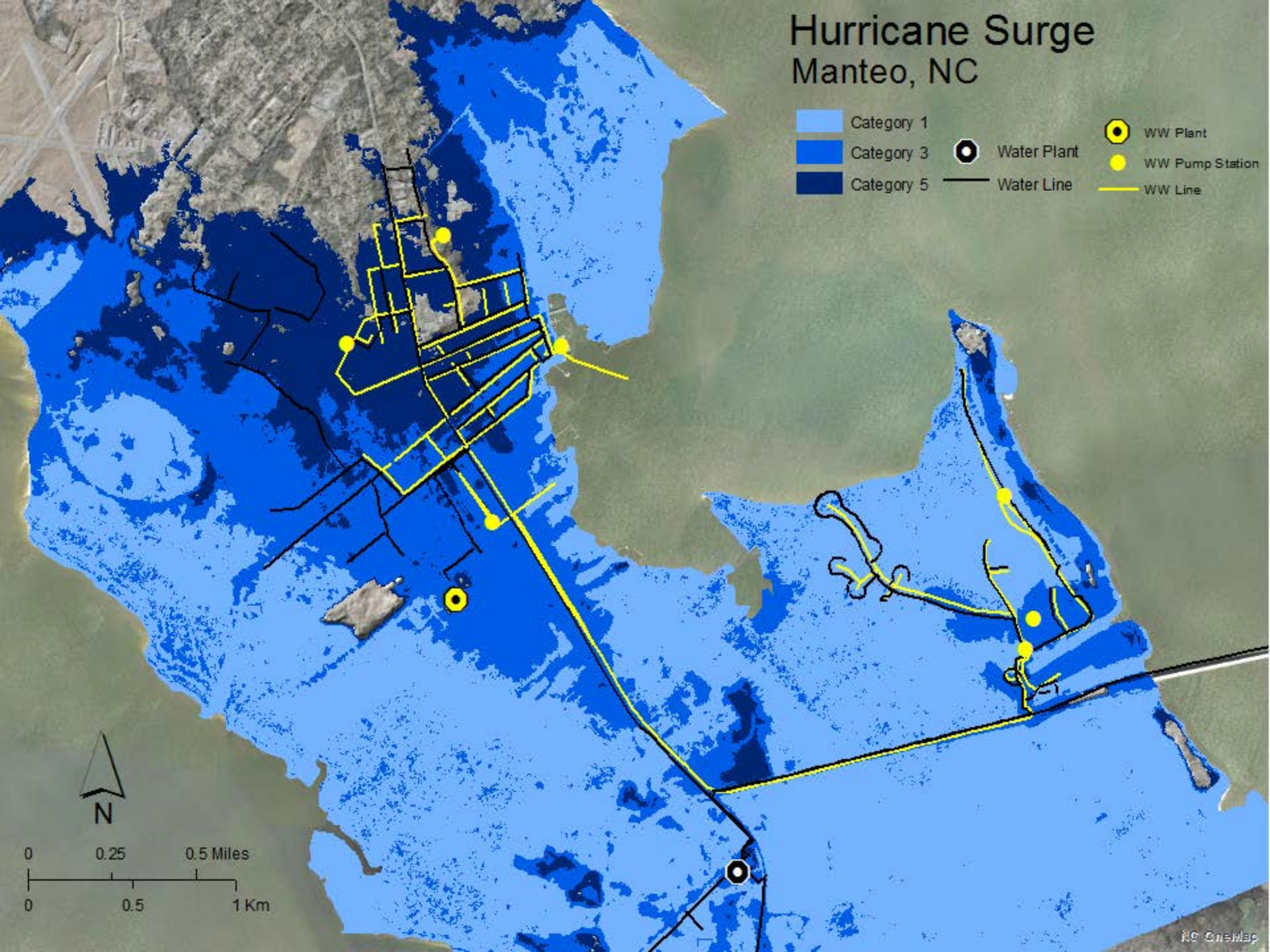
- Collect information on water infrastructure
  - Treatment
  - Pump stations
  - Distribution systems
- Build infrastructure database
- Map spatial extent of storm surge, sea level rise, and floodplains

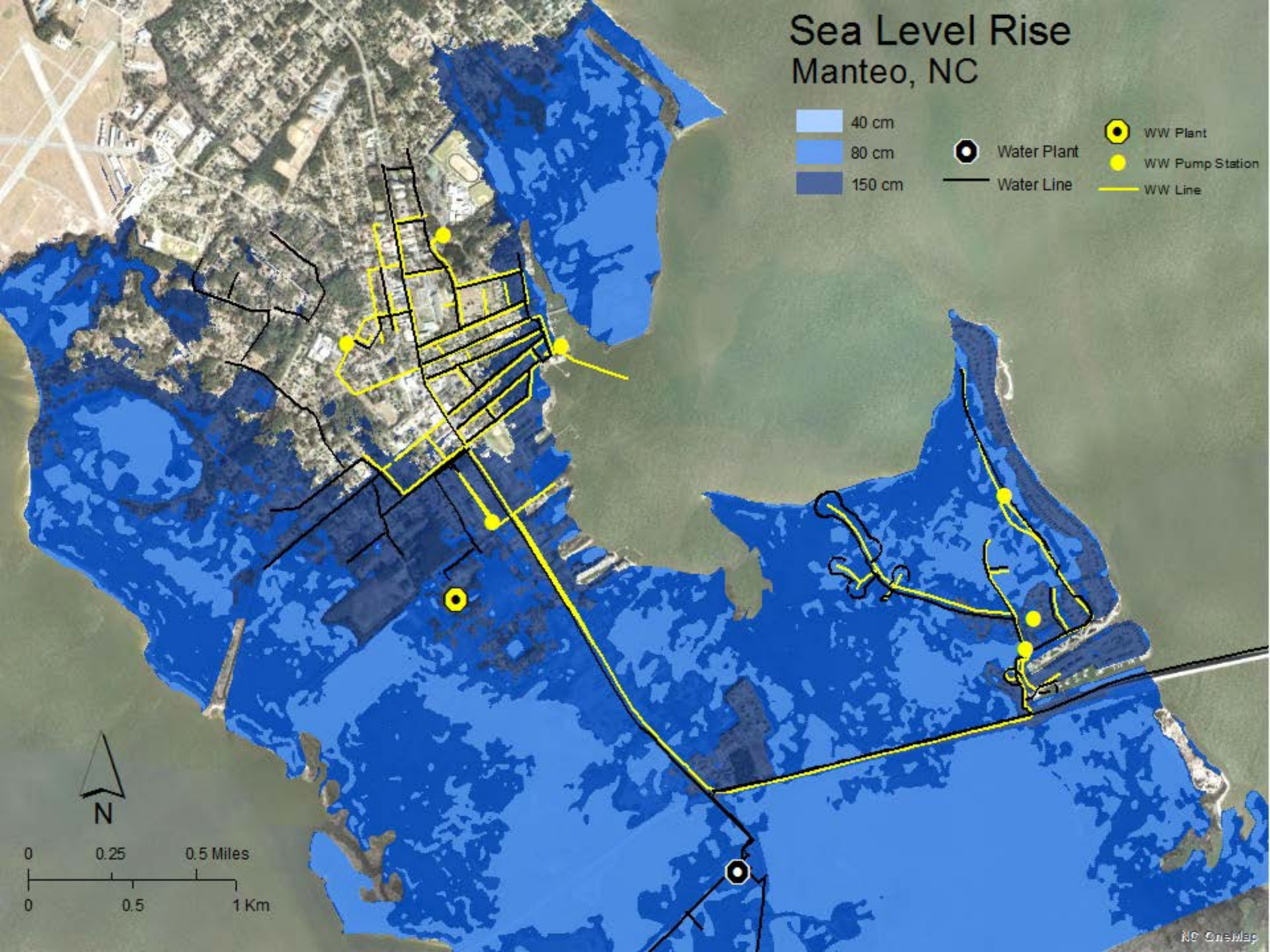
GEOSPATIAL ANALYSIS

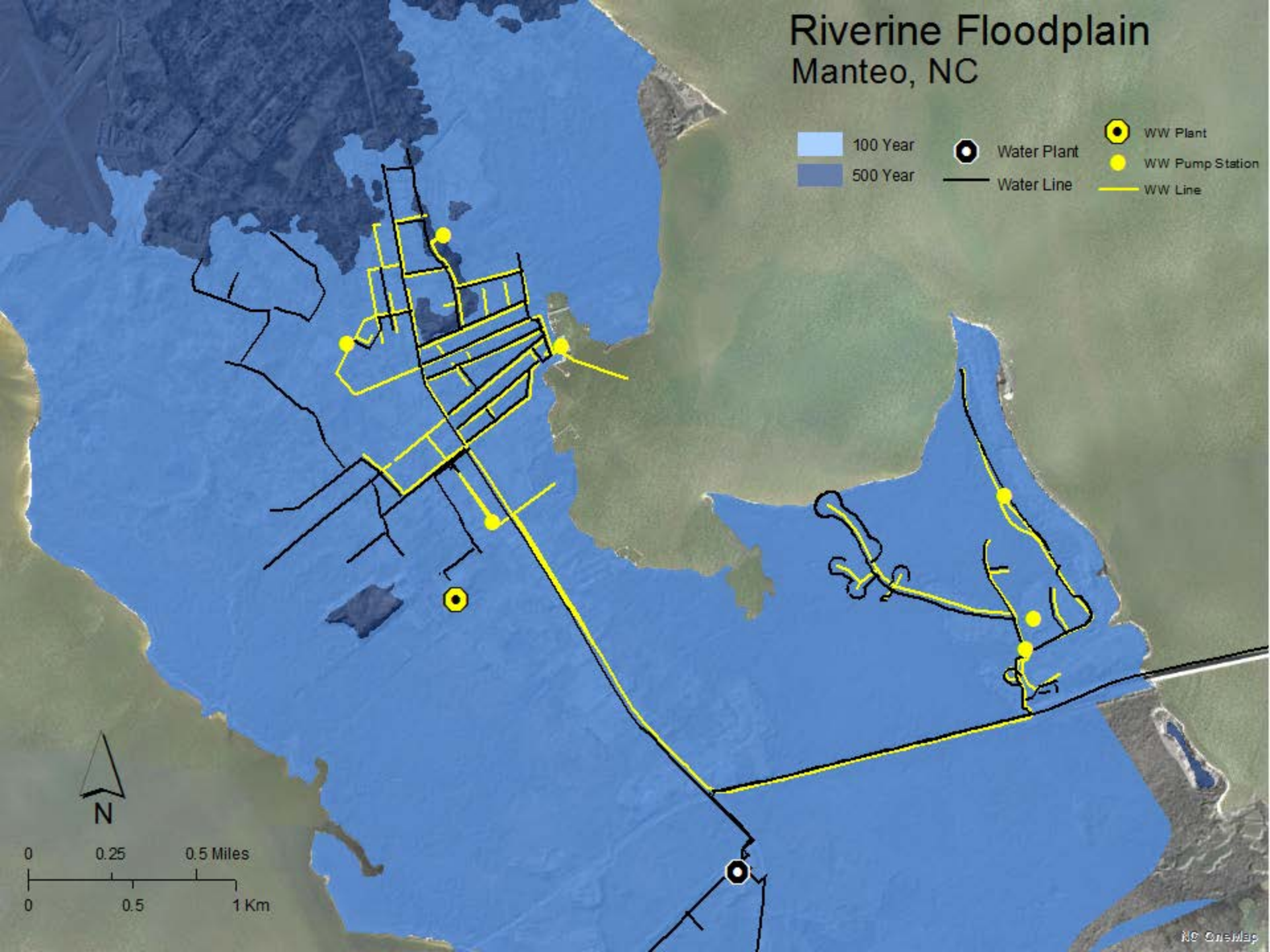
- Storm Surge: downscaling of SLOSH model
- Sea Level Rise: “Bathtub” model with hydroconnectivity
- Floodplains: NC Flood Maps

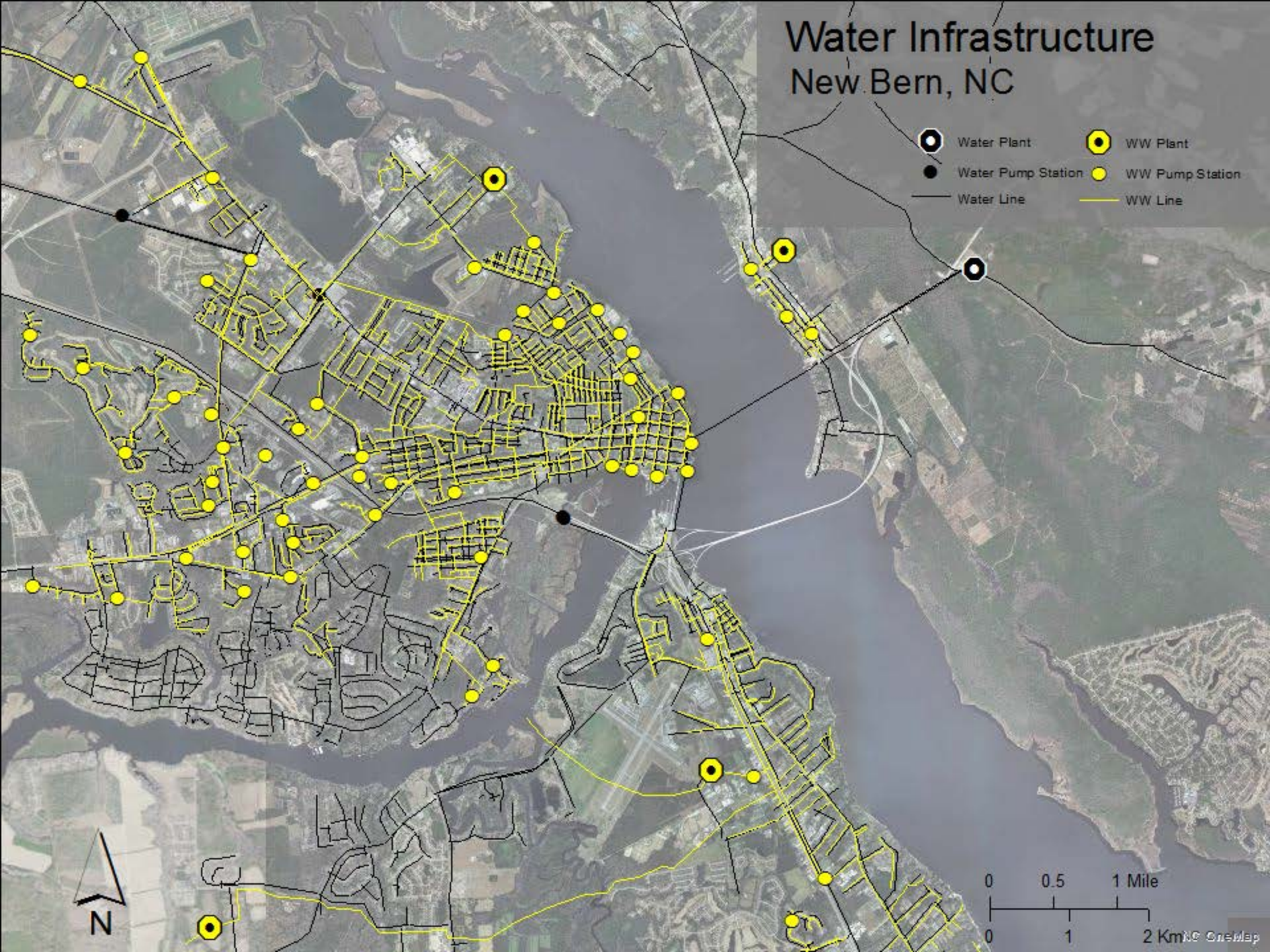

Subwatersheds
New Bern, NC
N
0
0.5
1 Mile
0
0.75
1.5 Km
NC OneMap

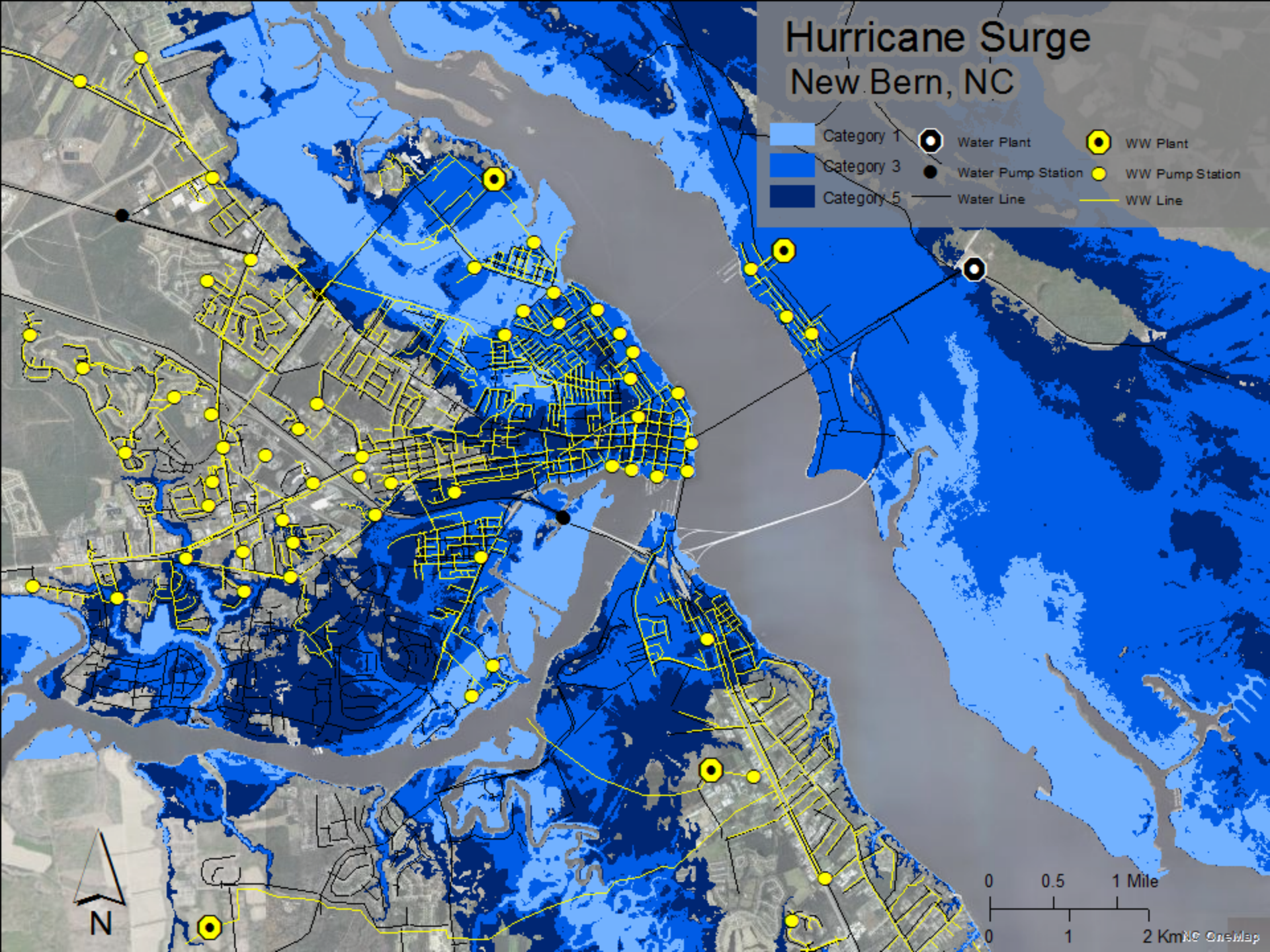

Water Infrastructure
Manteo, NC
Water Plant
Water Line
WW Plant
WW Pump Station
WW Line
N
0
0.25
0.5 Miles
0
0.5
1 Km
NC OneMap


Hurricane Surge
Manteo, NC
Category 1
Category 3
Category 5
Water Plant
Water Line
WW Plant
WW Pump Station
WW Line
N
0
0.25
0.5 Miles
0
0.5
1 Km
NC OneMap


Sea Level Rise
Manteo, NC
40 cm
80 cm
150 cm
Water Plant
Water Line
WW Plant
WW Pump Station
WW Line
N
0
0.25
0.5 Miles
0
0.5
1 Km
NC OneMap


Riverine Floodplain
Manteo, NC
100 Year
500 Year
Water Plant
Water Line
WW Plant
WW Pump Station
WW Line
N
0
0.25
0.5 Miles
0
0.5
1 Km
NC OneMap


Water Infrastructure
New Bern, NC
Water Plant
WW Plant
Water Pump Station
WW Pump Station
Water Line
WW Line
N
0
0.5
1 Mile
0
1
2 Km
NC OneMap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New Bern, NC
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Water Pump Station
Water Line
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WW Pump Station
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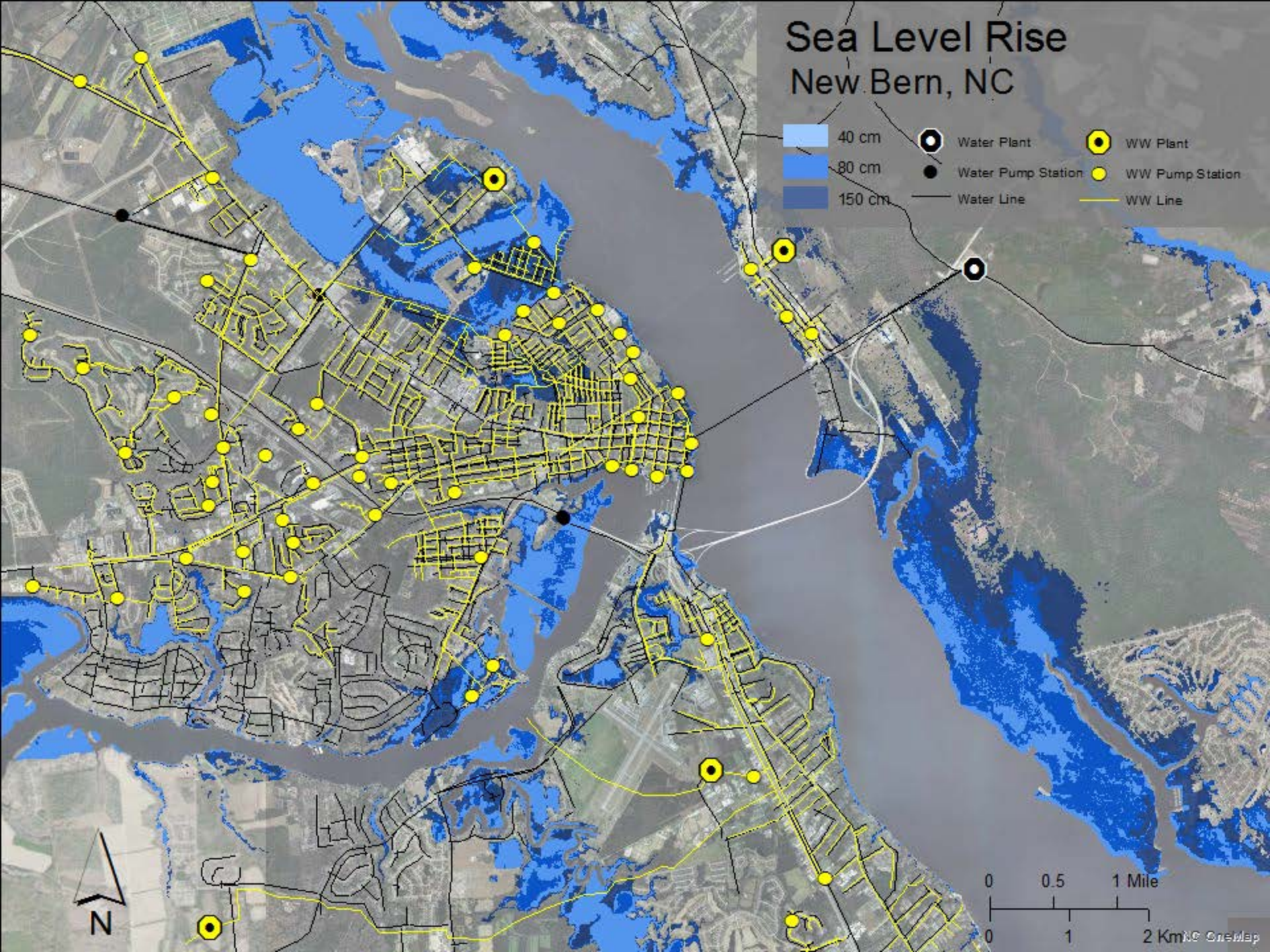
N
0
0.5
1 Mile
0
1
2 Km
NC OneMap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Water Line
WW Plant
WW Pump Station
WW Line
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1 Mile
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2 Km
NC OneMap


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Water Plant
Water Pump Station
Water Line
WW Plant
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WW Line
N
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0.5
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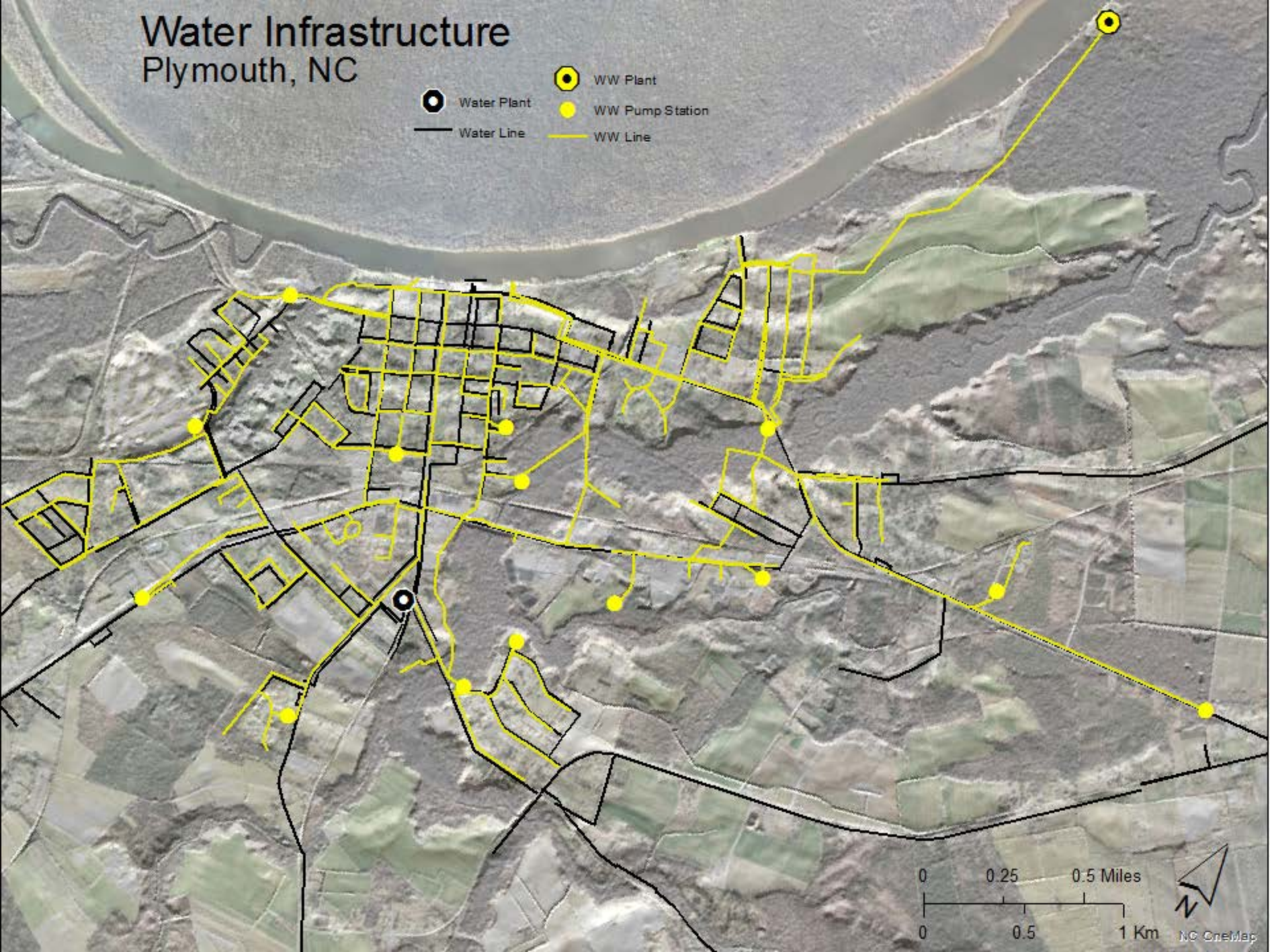
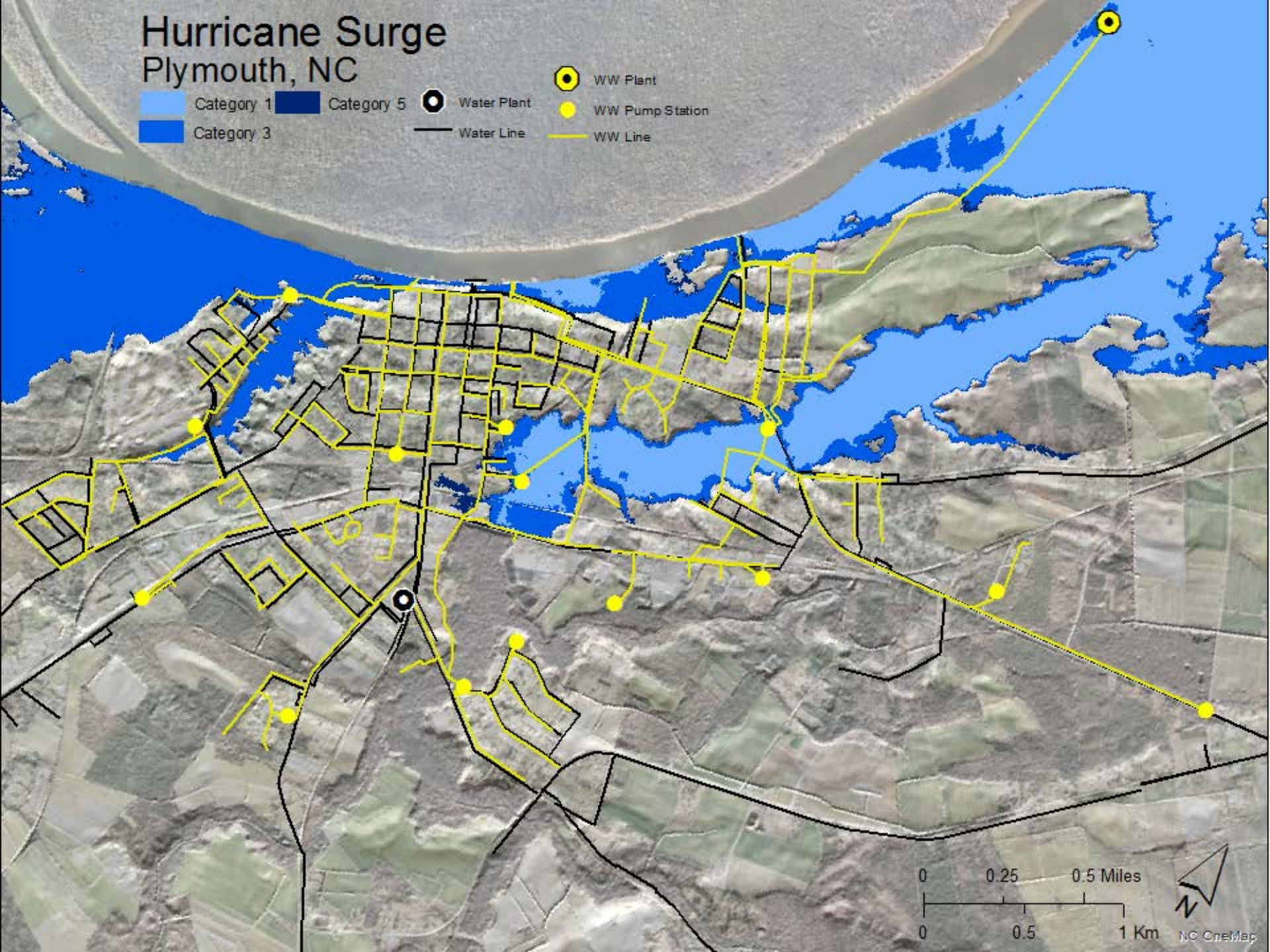
0
1
2 Km
NC OneMap


Water Infrastructure
Plymouth, NC
Water Plant
Water Line
WW Plant
WW Pump Station
WW Line
0
0.25
0.5 Miles
0
0.5
1 Km
NC OneMap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Plymouth, NC
Category 1
Category 5
Category 3
Water Plant
Water Line
WW Plant
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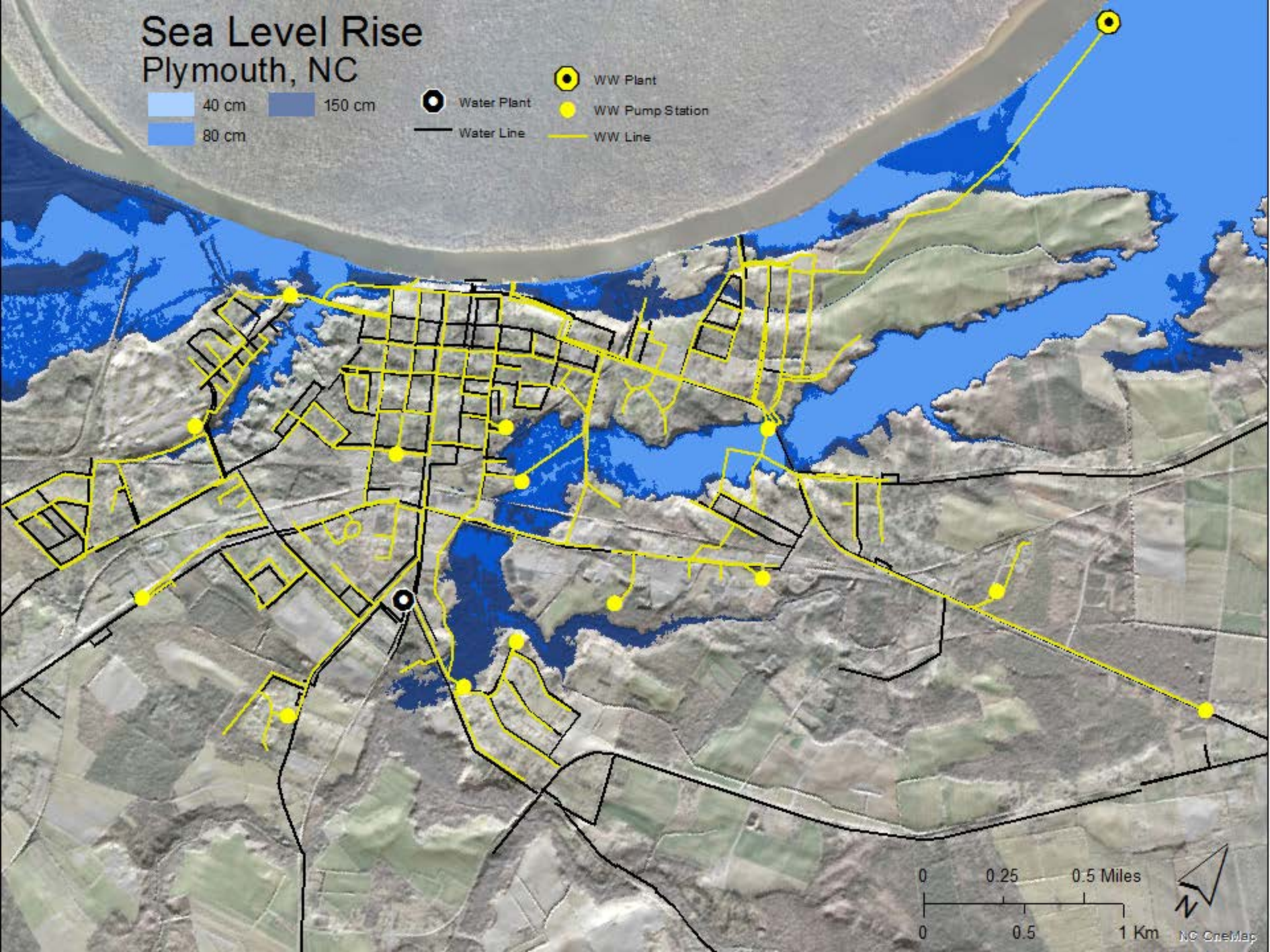
WW Line
0
0.25
0.5 Miles
0
0.5
1 Km
NC OneMap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0
0.25
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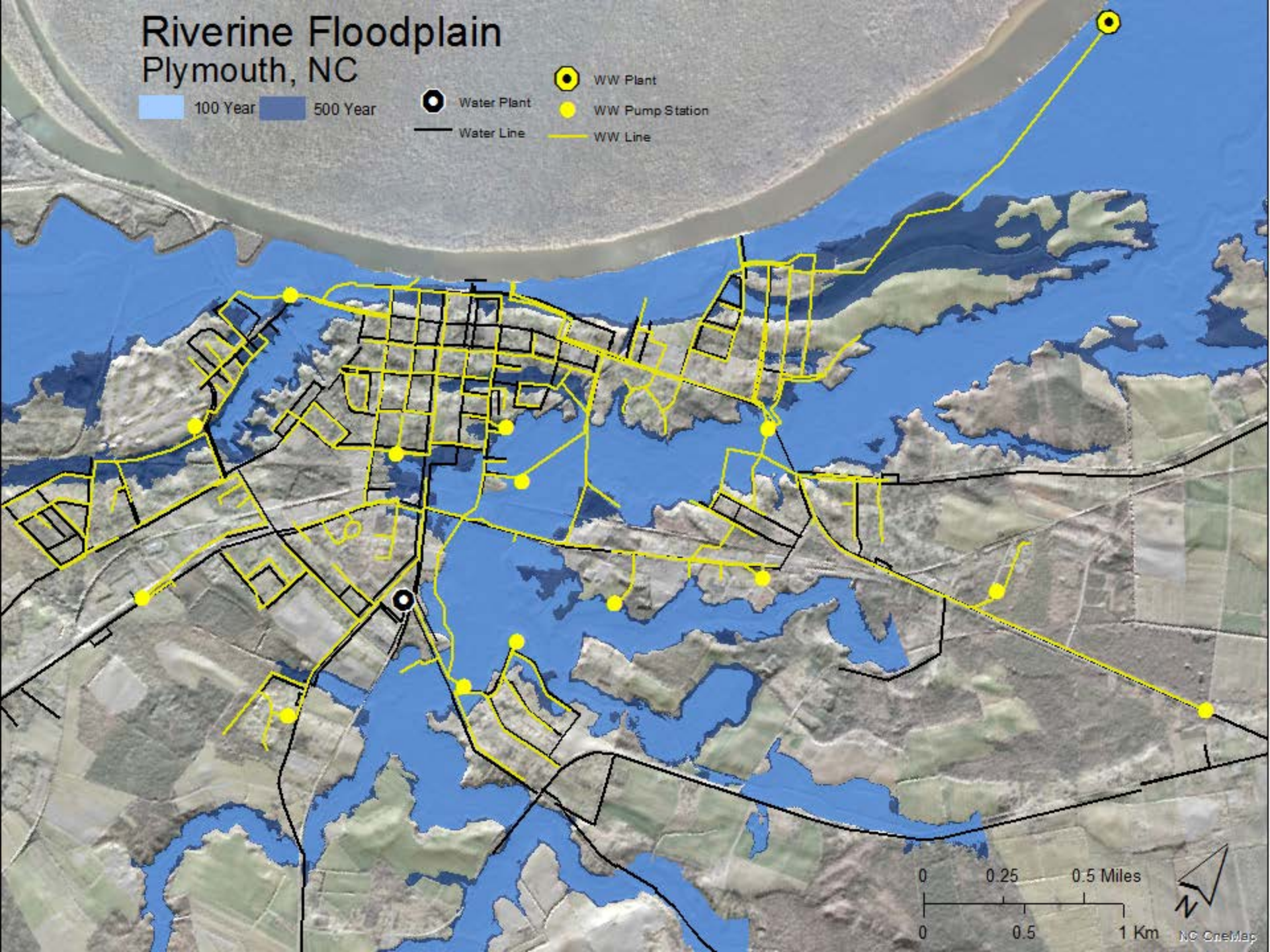
1 Km
NC OneMap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0
0.25
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0
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1 Km
NC OneMap

FINDINGS

- Variable vulnerabilities within and between
  - Communities
  - Threats
  - Components of water infrastructure

NEXT STEPS

- Analysis at subwatershed level within each community
- Determine thresholds of infrastructure vulnerability
- Work with communities to identify mitigation and adaptation options

THANK YOU

Questions? Comments?