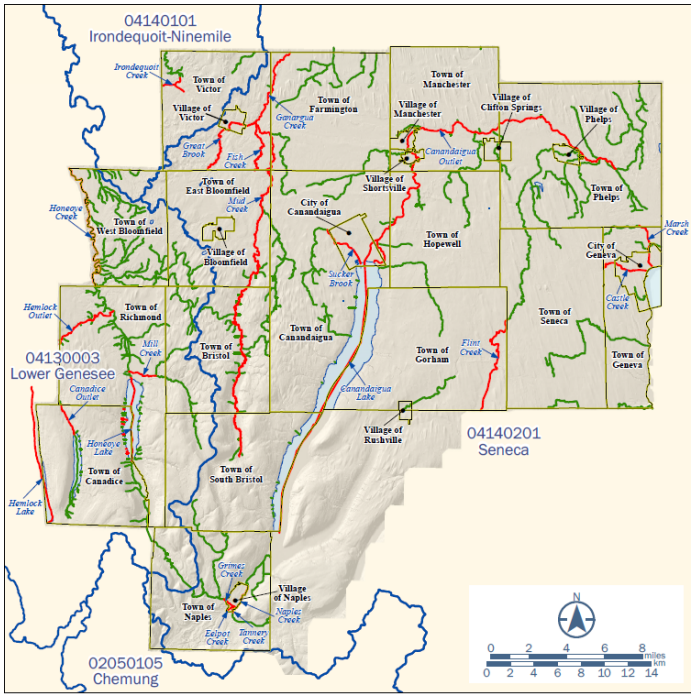
RiskMAP
Increasing Resilience Together

Flood Risk Project

Ontario County, New York Project – **Hydrology Results Discussion**

October, 2019



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Presentation Agenda

- Recap
- Project Scope
- Hydrologic Analysis Task Scope
- Hydrologic Analysis & Results
- Schedule

How did we get here?
Recap

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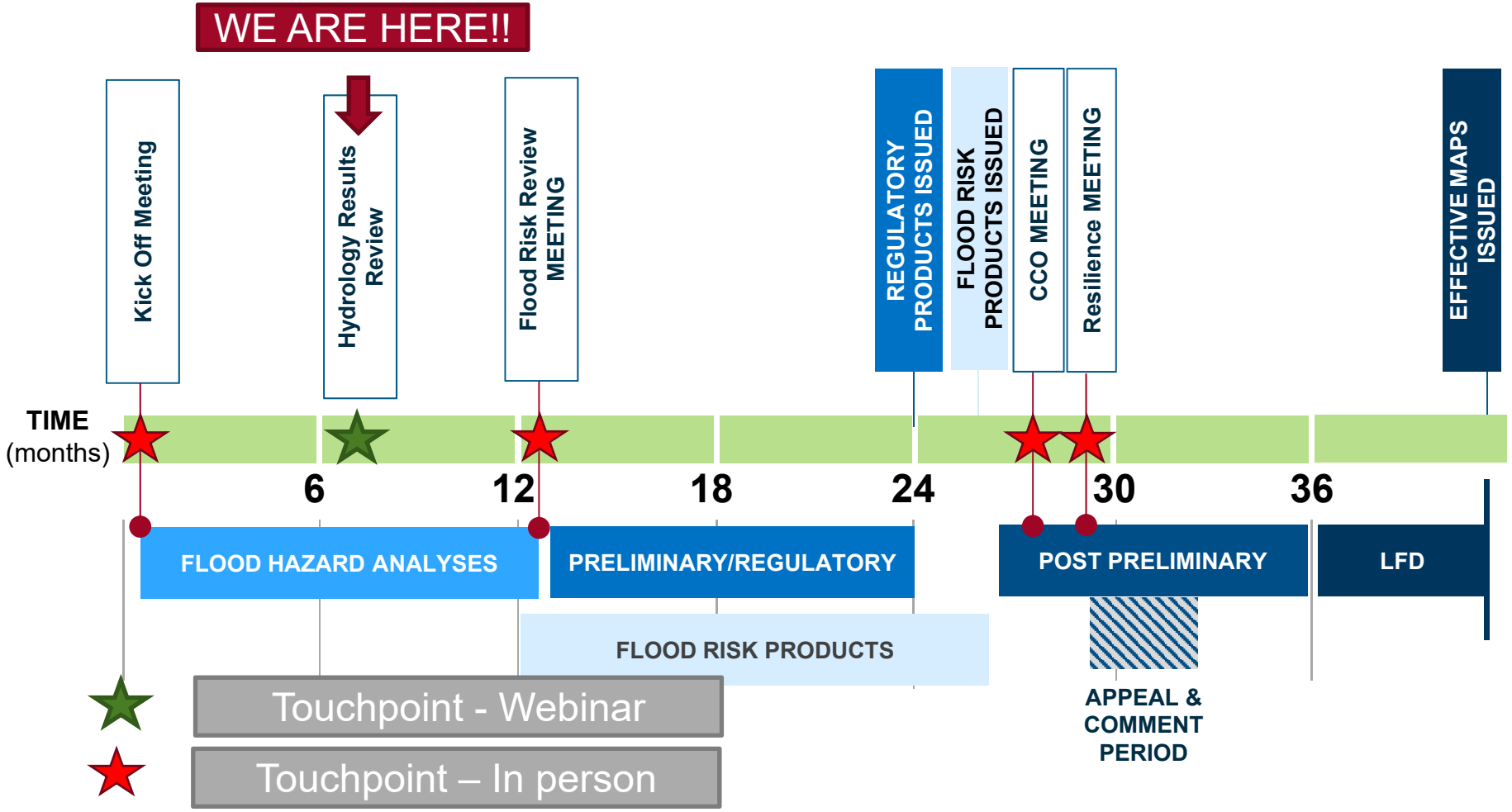
Overall Flood Risk Project Timeline



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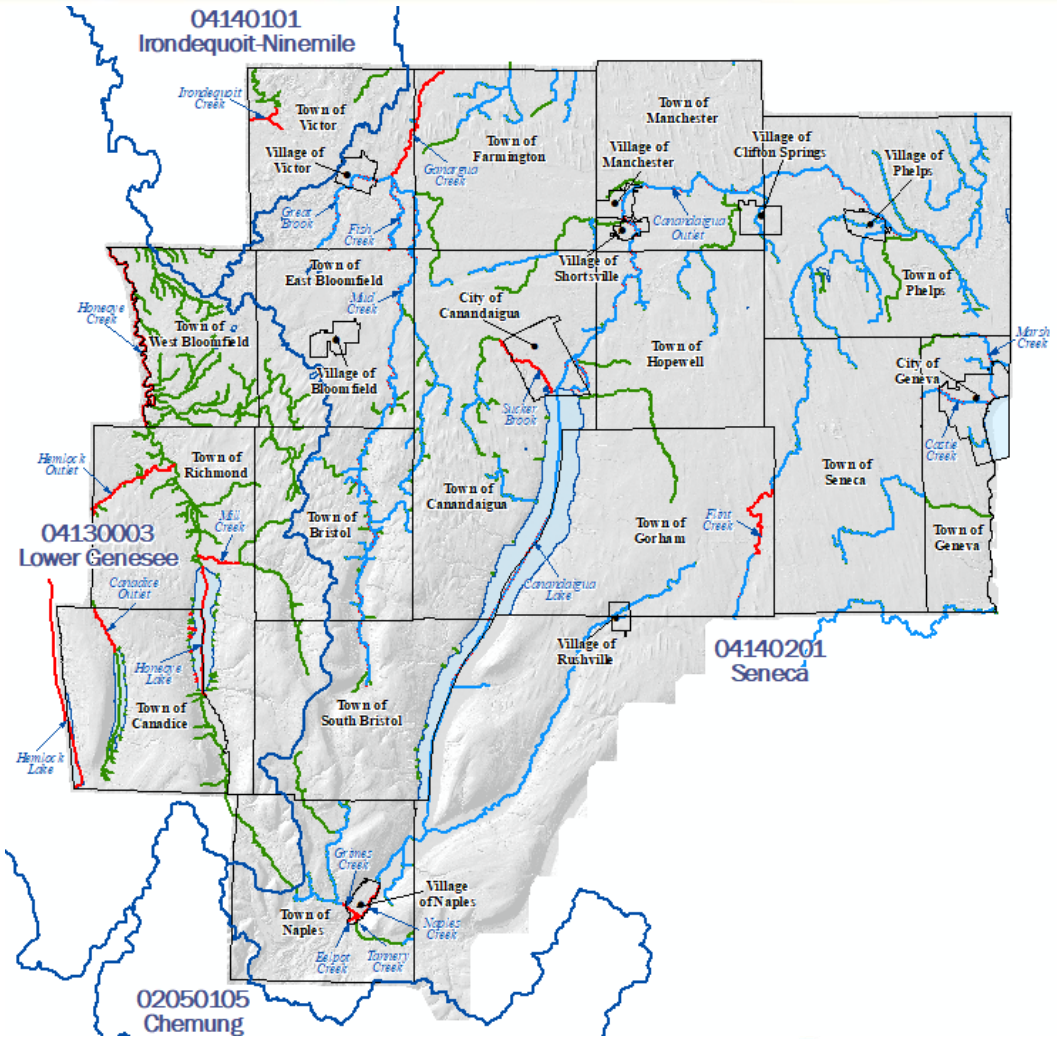
Discovery/Post-Discovery Progress
Recap

- Meetings held in May 2014
  - In Hopewell on May 14, 2014
- Discovery project completed in 2015
- FEMA reviewed community input to determine priorities
- Town of Victor identified flooding during May 2014

Kick- Off Meeting
Recap

- Meetings held in March 4/5 2019
- FEMA provided details about the scope/ details of the studies



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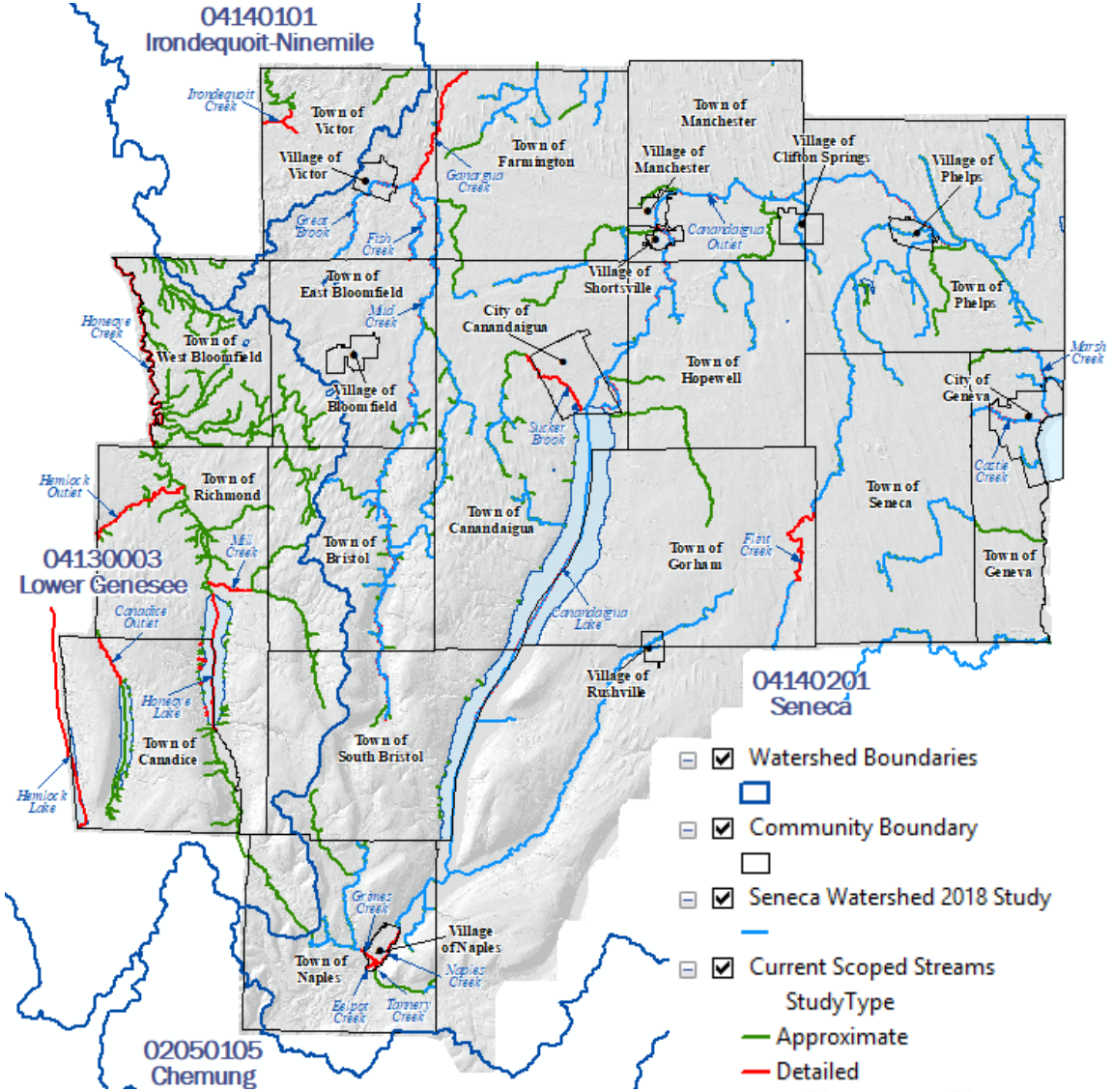
Ontario County, Countywide Flood Risk Study *Scope*

- **First time digital countywide maps**
- **Additional flooding sources analyzed**
  - 41.5 miles - Detailed (AE) streams
  - 187 miles – Approximate (A) streams
  - 12 miles - Lake Gage Analysis
- **Includes Seneca Watershed study**
- **29 affected communities**
- **134 map panels**
- **Multiple touchpoints**



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What is being studied now?
Discuss scope of new study (Recap)

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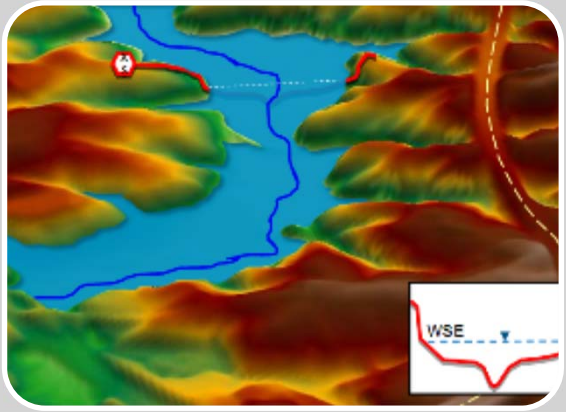
Flood Hazard Analysis



Hydrology

Volume of water?
Peak Flows?

When will storm water or runoff make it to the stream?

Hydraulics

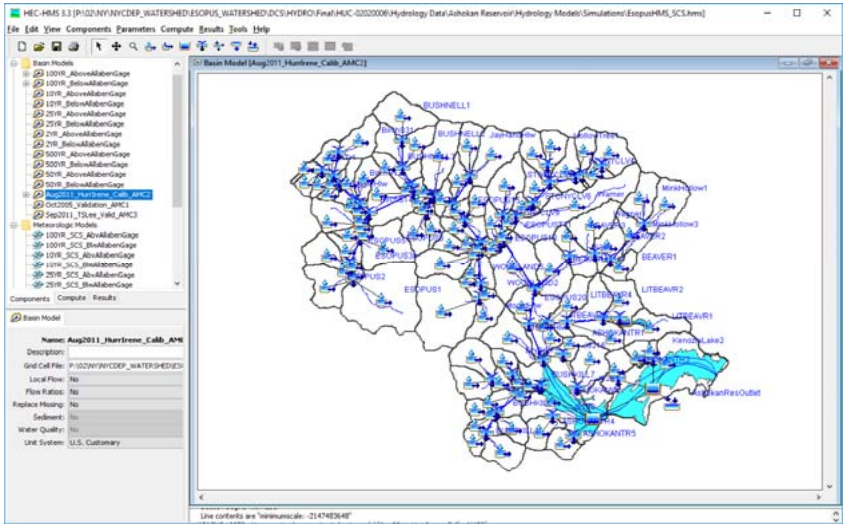
Will the stream in question be able to convey all storm water or runoff that arrives?

Floodplain Mapping

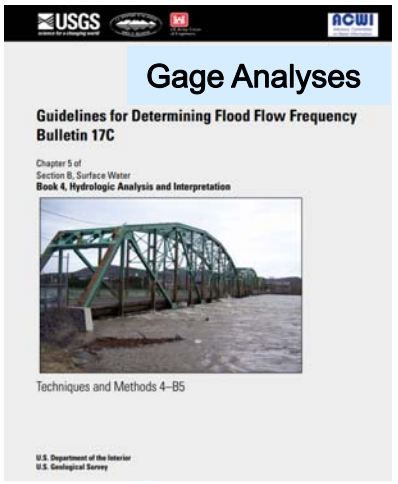
What areas of a community will be inundated based on engineering analysis?

Hydrologic Analysis

- Typical Methods FEMA utilizes
  - Statistical Gage Analyses
  - Regression Analyses
  - Rainfall Runoff Modeling
- Gage/Regression are based on availability stream gage data
- Rainfall-Runoff physical modeling chosen due to limited gage data
  - Using USACE's HEC-HMS Program
- Discharges developed for
  - 10%, 4%, 2%, 1%, 1%+, 1%-, 0.2%
  - Inputs for hydraulic analyses



Regression Report



Gage Analyses

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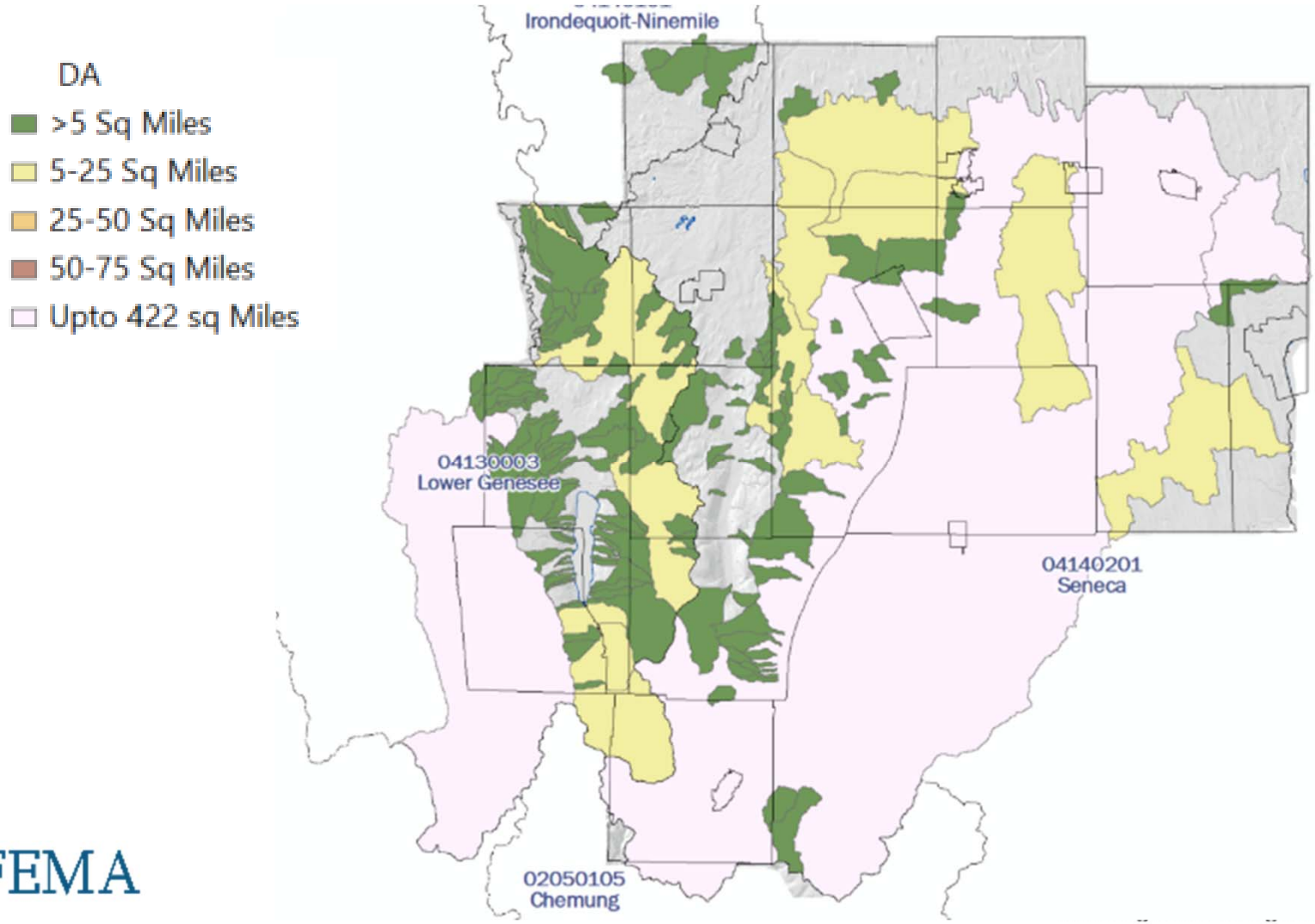
Drainage Area Map



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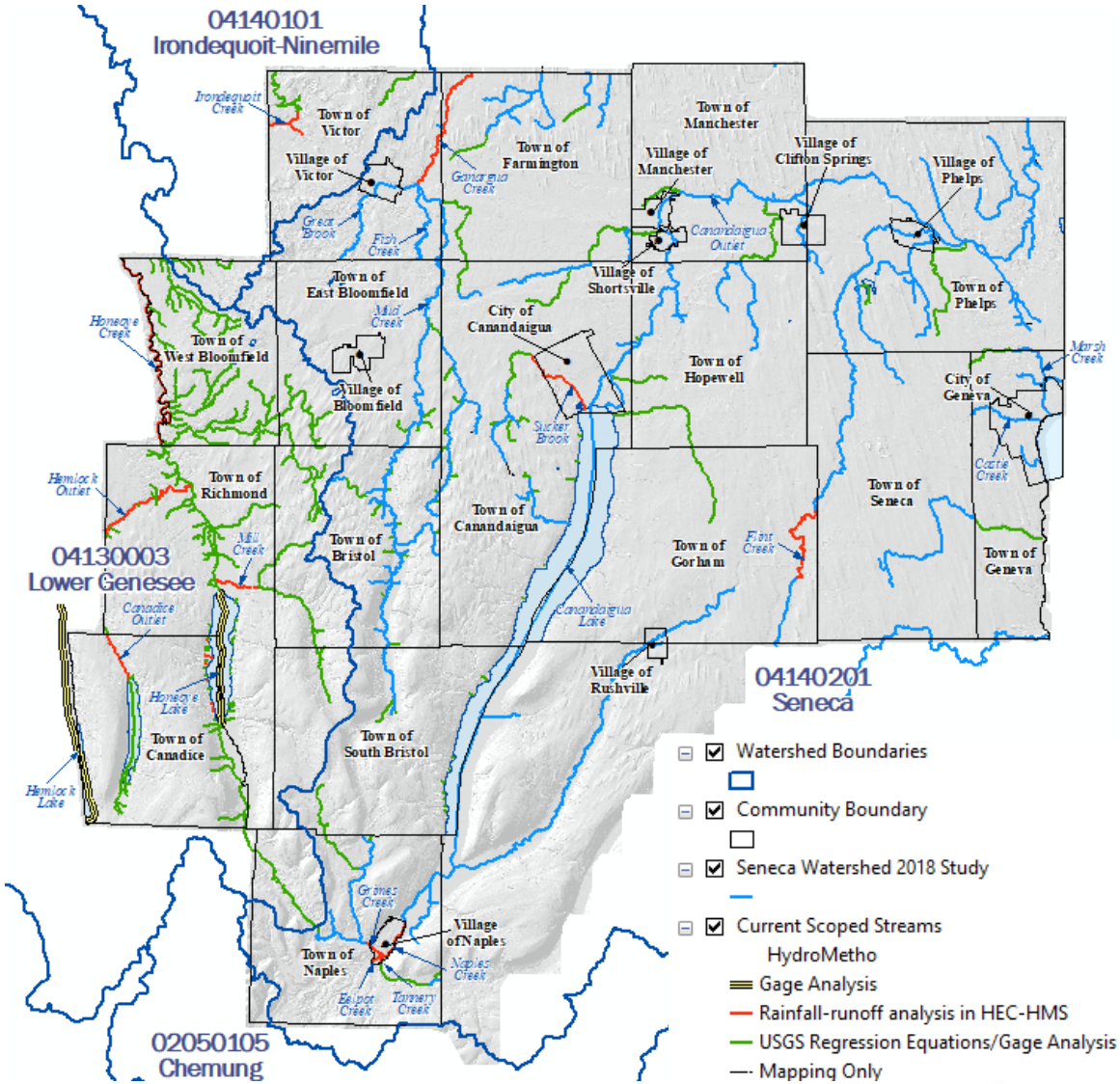
Detailed Streams – Zone AE
Hydrologic Analysis

- **29 Flooding Sources**
- **Hydrologic Analyses**
  - Stage-Discharge relationship
    - Hemlock Lake
    - Honeoye Lake
  - Rainfall-Runoff modeling
    - 41 miles
    - USACE's HEC-HMS Program
  - Discharges developed for
    - 10%, 4%, 2%, 1%, 1%+, 1%-, 0.2%



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Detailed Streams – Zone AE
Hydrologic Analysis – Rainfall Depths

	100-Year Storm Frequency Partial Duration Depth (In.)						
Duration	Flint Creek Watershed	Ganargua Creek Watershed	Hemlock Creek Watershed	Irondequoit Creek Watershed	Marsh Creek Watershed	Naples Creek Watershed	Sucker Brook Watershed
5-Min	0.80	0.78	0.77	0.77	0.81	0.78	0.78
15-Min	1.33	1.30	1.28	1.28	1.36	1.30	1.30
1-Hr	2.29	2.25	2.24	2.27	2.29	2.25	2.22
2-Hr	2.75	2.70	2.70	2.69	2.77	2.75	2.67
3-Hr	3.04	2.98	2.97	2.94	3.06	3.06	2.95
6-Hr	3.60	3.50	3.48	3.43	3.61	3.63	3.45
12-Hr	4.27	4.10	4.07	4.00	4.22	4.25	4.04
24-Hr	5.06	4.79	4.74	4.64	4.87	5.02	4.71

Minimum

Maximum

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Detailed Streams – Zone AE
Hydrologic Analysis – Land use (14 categories)

NLCD Land Use Class

- Barren Land
- Cultivated Crops
- Deciduous Forest
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Emergent Herbaceuous Wetlands
- Evergreen Forest
- Hay/Pasture
- Herbaceuous
- Mixed Forest
- Open Water
- Shrub/Scrub
- Woody Wetlands

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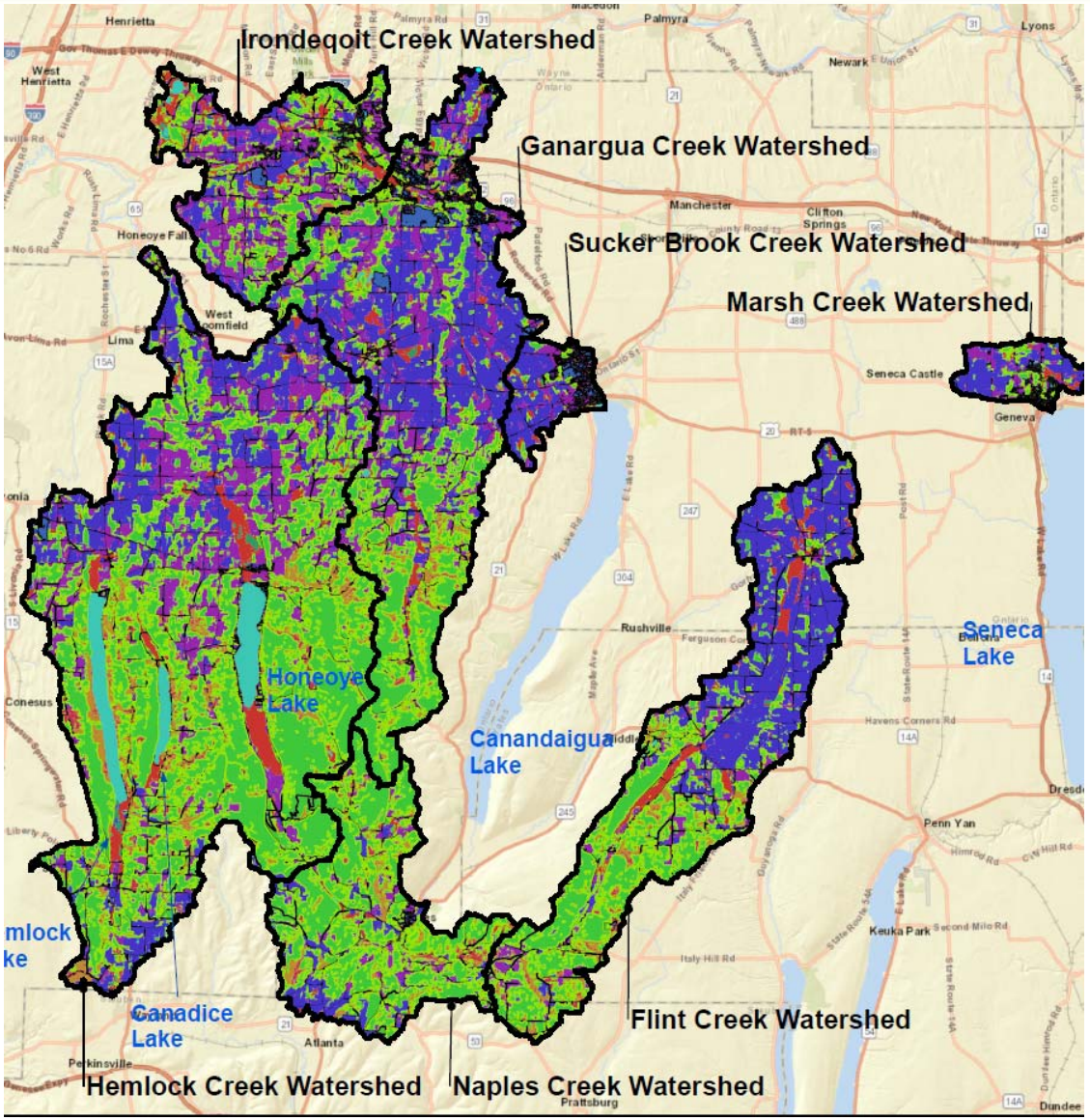
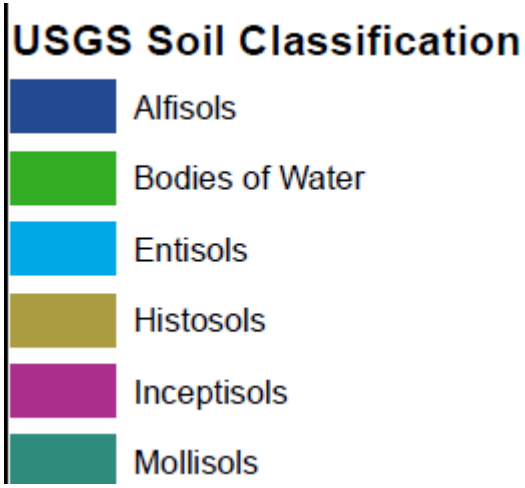


Detailed Streams – Zone AE
Hydrologic Analysis – Soil Types(6 categories)



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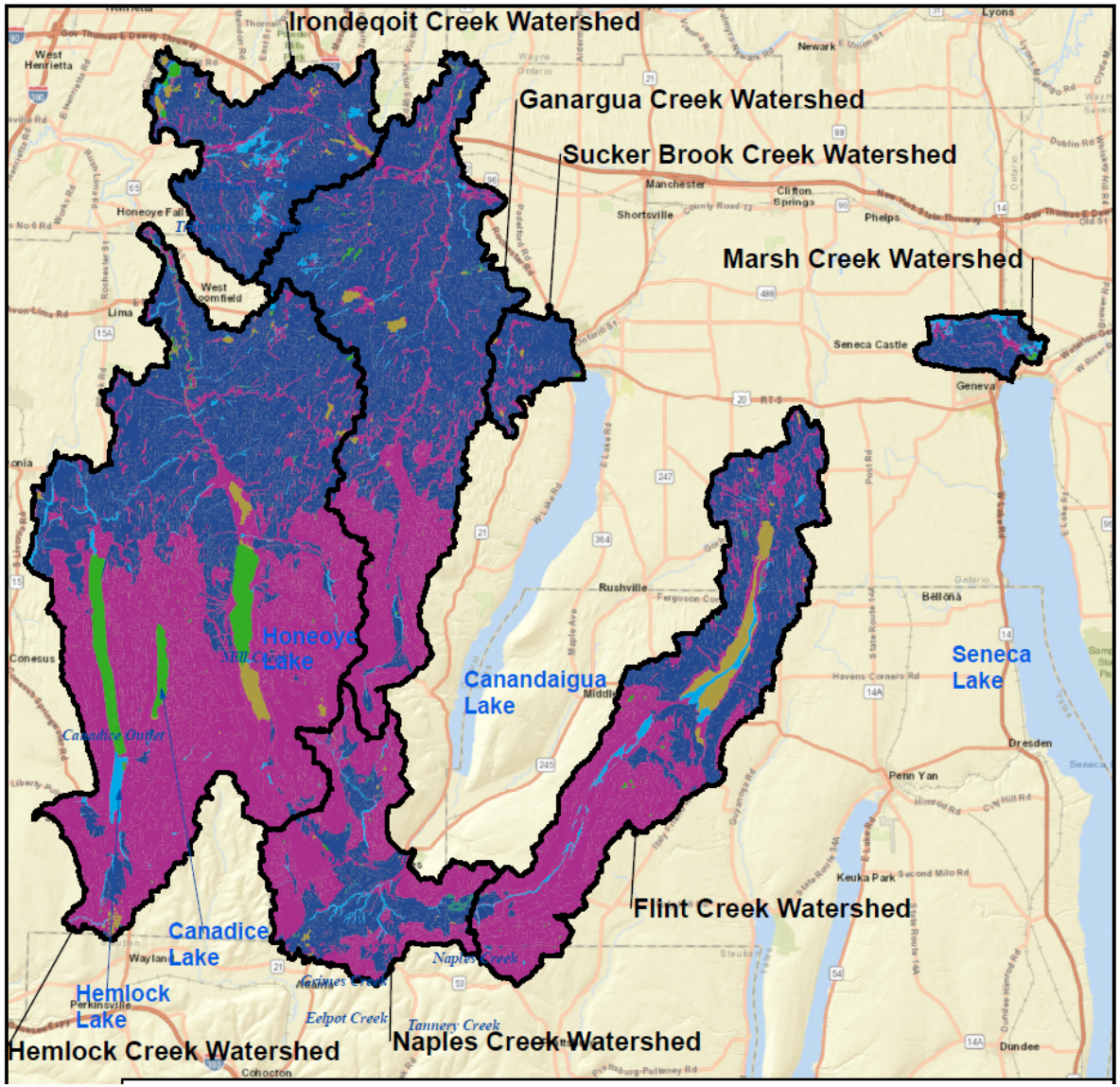


Detailed Studies – Recommended Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (mi^2)	PEAK DISCHARGES (cfs)				
		10-YR	25-YR	50-YR	100-YR	500-YR
Canadice Outlet						
At mouth	14.86	572	770	941	1,138	1,736
Eelpot Creek						
At mouth	18.47	792	1,503	2,155	2,941	5,740
Flint Creek						
At mouth	70.00	1,320	2,301	3,112	4,071	7,290
Ganargua Creek						
At mouth	98.39	2,449	4,084	5,624	7,375	13,023
Grimes Creek						
At mouth	16.9	681	1,235	1,737	2,332	4,447

Detailed Studies – Recommended Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (mi^2)	PEAK DISCHARGES (cfs)				
		10-YR	25-YR	50-YR	100-YR	500-YR
Hemlock Outlet						
At mouth	77.58	1,755	2,257	2,690	3,182	4,756
Honeoye Creek						
At mouth	187.36	3,060	4,391	5,577	6,951	11,346
Irondequoit Creek						
At mouth	38.92	851	1,148	1,988	2,627	4,714
Marsh Creek						
At mouth	3.16	124	134	205	317	542
Mill Creek						
At mouth	12.69	1,336	2,206.4	2,918.8	3,770.4	6,379

Detailed Studies – Recommended Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (mi^2)	PEAK DISCHARGES (cfs)				
		10-YR	25-YR	50-YR	100-YR	500-YR
Naples Creek						
At mouth	43.1	1584	2,963.7	4,220	5,728.8	11,052
Sucker Brook						
At mouth	9.22	374	605.1	807.3	1,035.6	1,762.1
Tannery Creek						
At mouth	5.9	403	677	914.8	1,193.7	2,150.3
Tributary T-10						
At mouth	0.09	43	61.5	75.7	91.6	137.7
Tributary T-15						
At mouth	0.12	49	72.1	90.4	111	171.4

Detailed Studies – Recommended Discharges

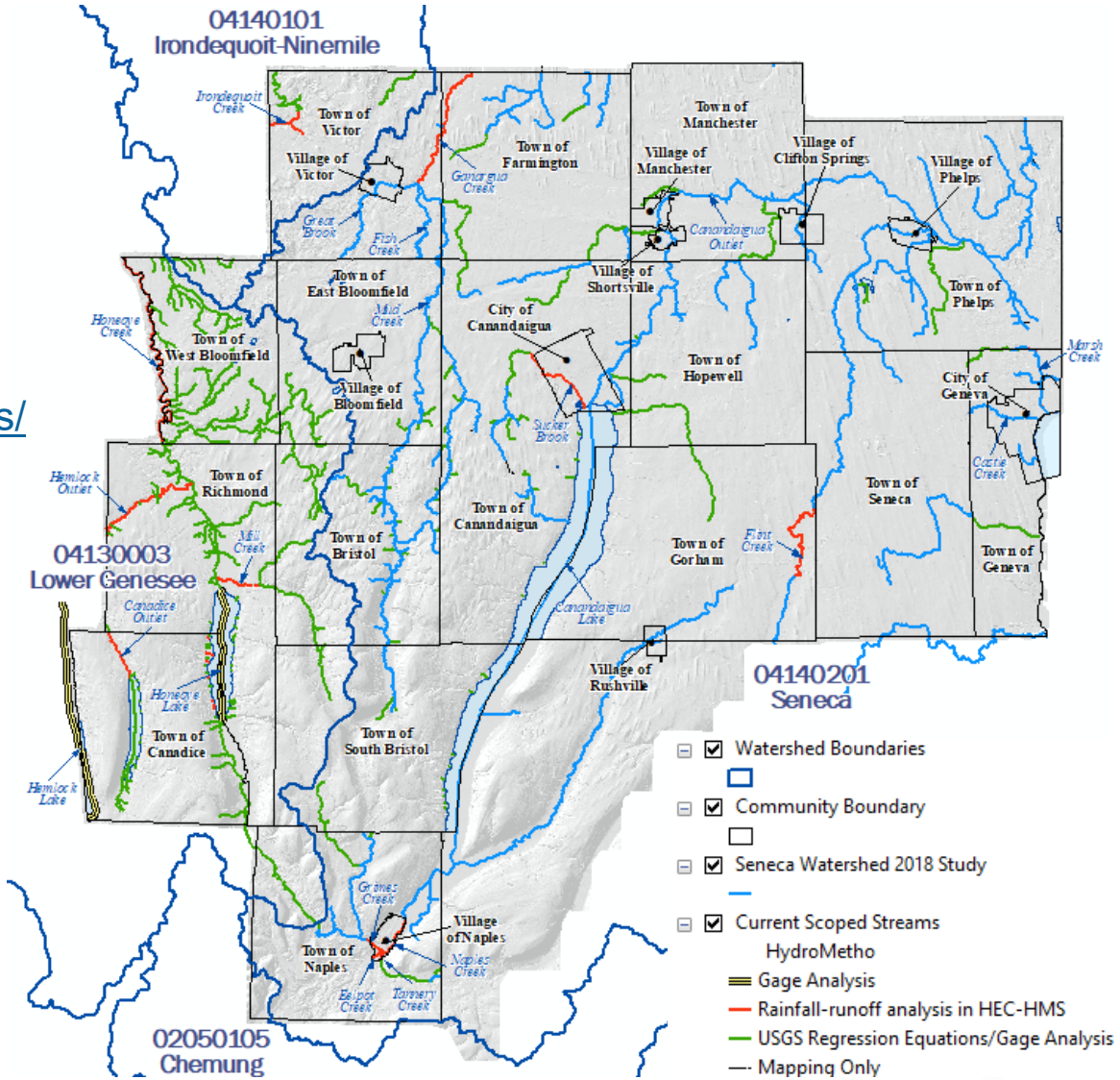
FLOODING SOURCE AND LOCATION	DRAINAGE AREA (mi^2)	PEAK DISCHARGES (cfs)				
		10-YR	25-YR	50-YR	100-YR	500-YR
Tributary T-16						
At mouth	0.23	82	124	157.7	195.8	308.9
Tributary T-17						
At mouth	0.106	109	157.9	196.4	239.8	365.8
Tributary T-18						
At mouth	0.1	54	77.6	96.4	117.5	178.9
Tributary T-2						
At mouth	0.12	38	57.5	73.2	91	143.9
Tributary T-5						
At mouth	1.57	217	356.7	477.5	617.4	1,050.7

Detailed Studies – Recommended Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (mi^2)	PEAK DISCHARGES (cfs)				
		10-YR	25-YR	50-YR	100-YR	500-YR
Tributary T-5A						
At mouth	1.15	262	356.7	477.5	617.4	1,050.7
Tributary T-5B						
At mouth	0.38	78	122.3	158.7	199.9	324.7
Tributary T-7						
At mouth	0.35	92	136.3	171.7	211	328.5
Tributary to Irondequoit Creek						
At mouth	60.96	1,254	2,144	2,888	3,764	6,738

Approximate Streams – Zone A
Hydrologic Analysis

- **290 Flooding Sources**
- **Hydrologic Analyses**
  - State of New York Region 5 Regression Equations
  - Streamstats – GIS web based application @ https://streamstats.usgs.gov/ss/
  - Discharges developed for
    - 10%, 4%, 2%, 1%, 1%+, 1%-, 0.2%



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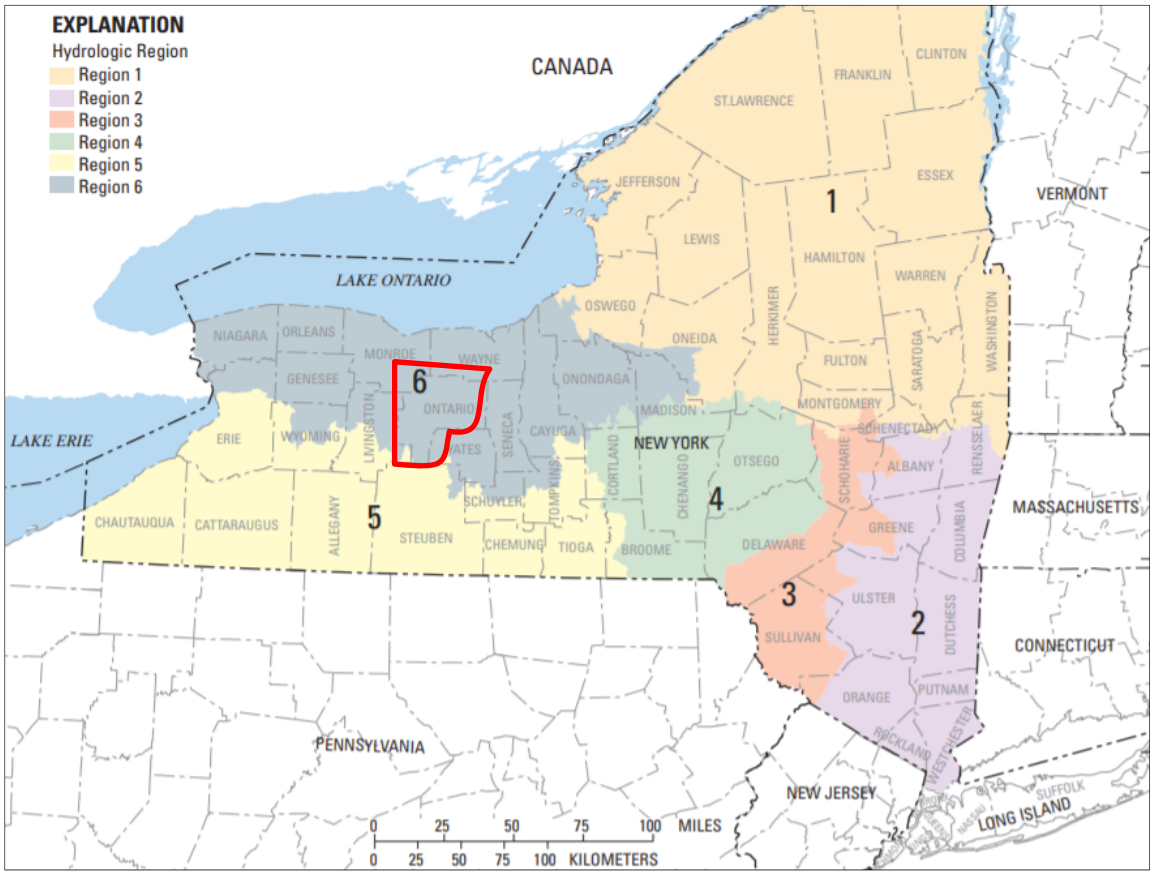
Regression Analysis

- USGS New York regression equation: SIR 2006-5112
- Study area falls within USGS NY regression Region 6
- Also used for Validation of HMS discharges for AE streams

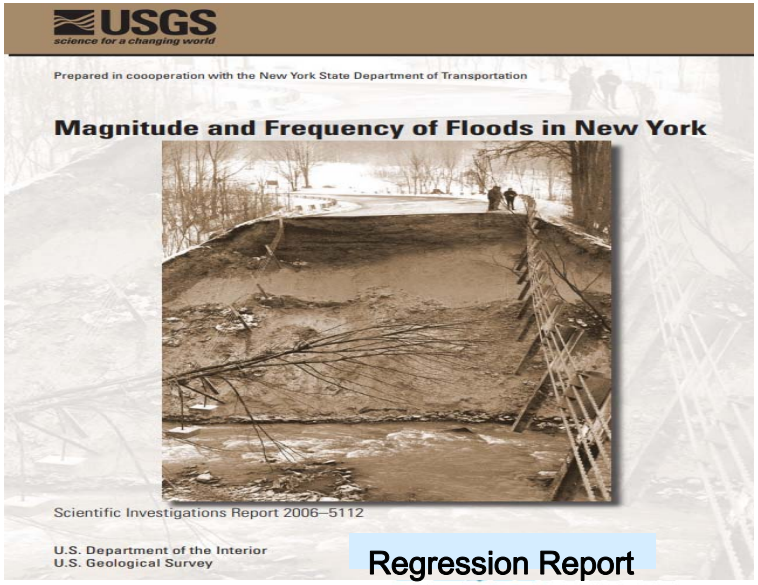


Approximate Streams – Zone A
Hydrologic Analysis

USGS NYS Hydrologic Region 6

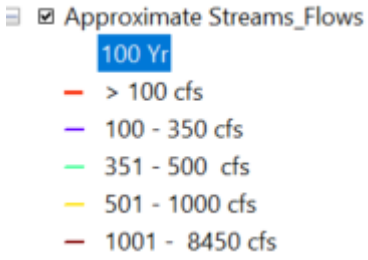
Q_{10}	$23.4\,(A)^{0.810}\,(ST+0.5)^{-0.218}\,(RUNF)^{0.600}\,(EL12+1)^{0.133}\,(SR)^{0.268}$
Q_{25}	$32.1\,(A)^{0.815}\,(ST+0.5)^{-0.200}\,(RUNF)^{0.555}\,(EL12+1)^{0.148}\,(SR)^{0.290}$
Q_{50}	$39.0\,(A)^{0.819}\,(ST+0.5)^{-0.188}\,(RUNF)^{0.528}\,(EL12+1)^{0.157}\,(SR)^{0.305}$
Q_{100}	$46.0\,(A)^{0.823}\,(ST+0.5)^{-0.177}\,(RUNF)^{0.505}\,(EL12+1)^{0.166}\,(SR)^{0.318}$
Q_{200}	$53.2\,(A)^{0.828}\,(ST+0.5)^{-0.167}\,(RUNF)^{0.487}\,(EL12+1)^{0.173}\,(SR)^{0.330}$
Q_{500}	$62.7\,(A)^{0.834}\,(ST+0.5)^{-0.155}\,(RUNF)^{0.466}\,(EL12+1)^{0.183}\,(SR)^{0.345}$

- ✓ *A – Drainage Area in square miles*
- ✓ *ST – Basin Storage in % of DA*
- ✓ *RUNF – Mean annual runoff in inches*
- ✓ *EL12 - % of DA at or greater than 1,200 ft*
- ✓ *SR – Slope Ratio*

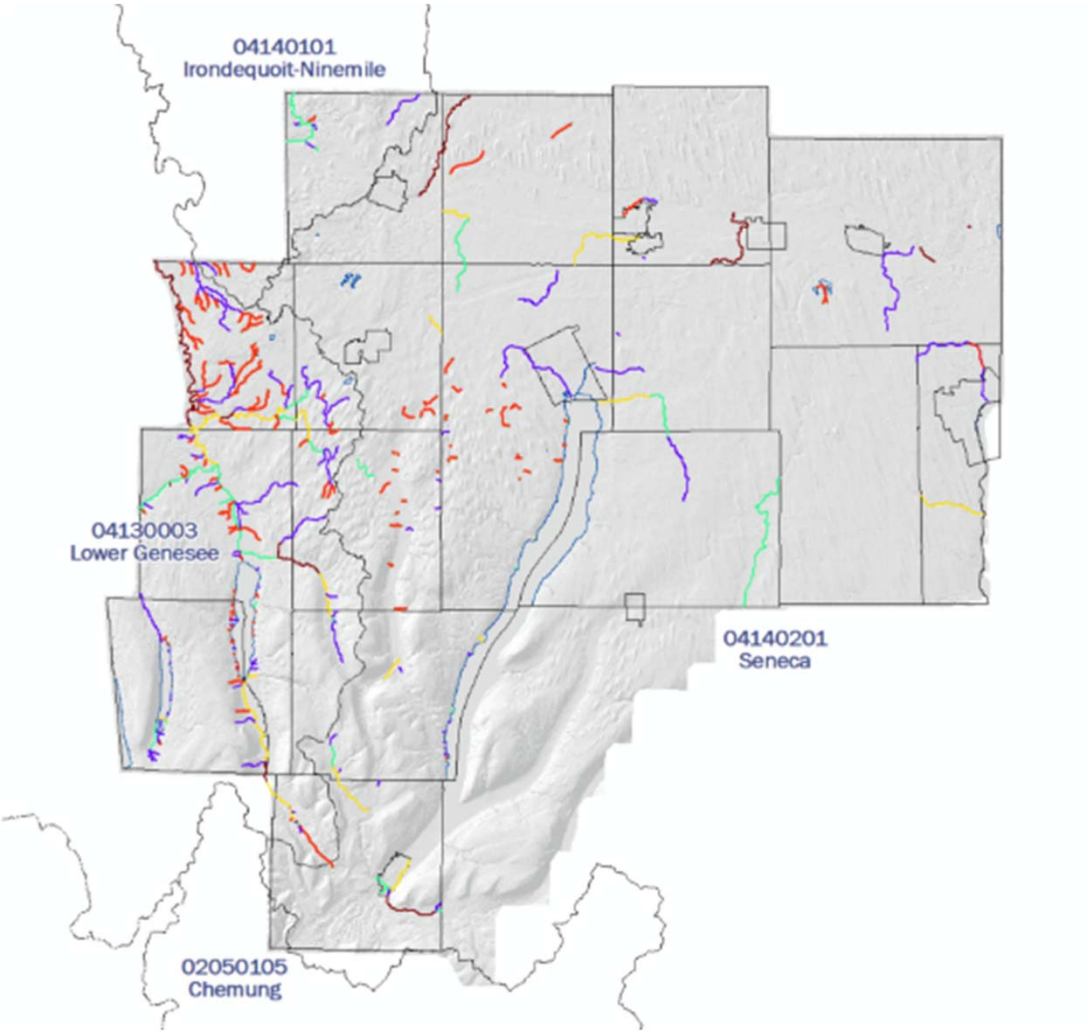


Regression Report

Approximate Streams – Zone A – Results Summary



- 290 Flooding Sources



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Where are we now and what is next?
Discuss next steps

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Major Study Milestones

- **Data Development (12 months)**
  - Field Reconnaissance and Survey
  - Hydraulic Modeling
  - Floodplain Mapping (workmaps)
- **Flood Risk Review Meeting**
  - Work map products (14 months)
- **Regulatory Product Update (FIRM & FIS)**
  - Preliminary issuance (24 months)
- **Resilience Meeting**
  - Flood risk products (28 months)

Dam Breach Analysis

- Up to 5 Medium/High Hazard Dams analyzed
- Engineering analyses developed for FIRM will be leveraged
- Flood Inundation Maps will be developed

What are Next Steps?

Timeline

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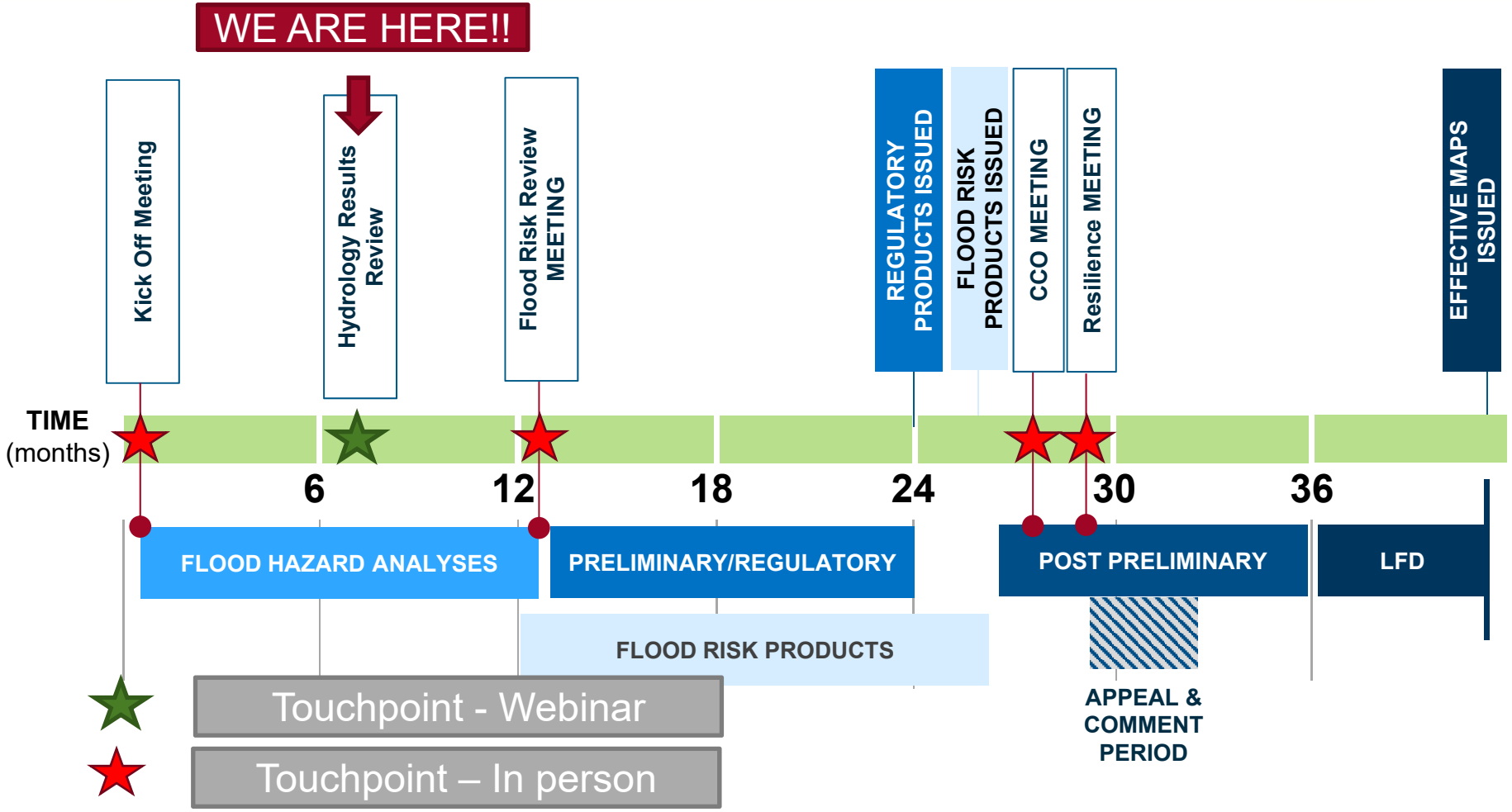
Overall Flood Risk Project Timeline



Contacts

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Questions? Comments?

Thank you!

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