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Overview of HEC-RAS 2D Modeling and How It Can Be Used to Evaluate and Reduce Flood Hazards

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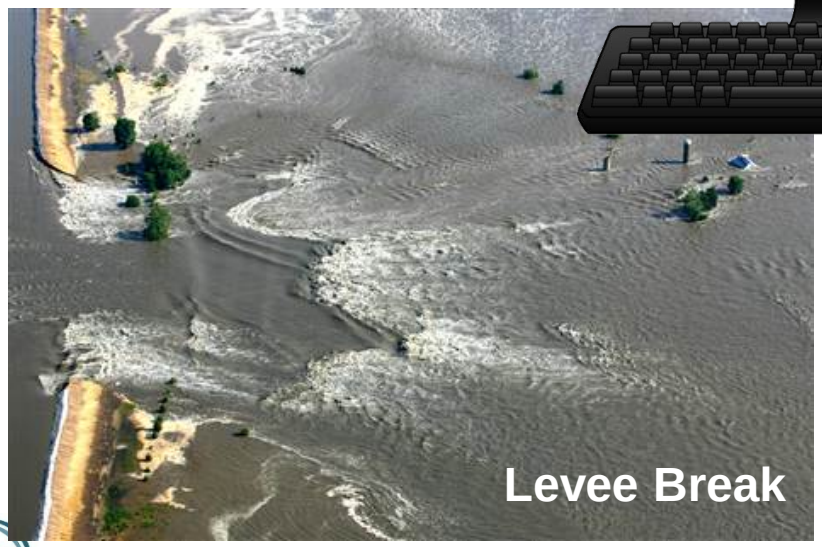
Connecticut Association of Floodplain Managers Annual Conference
October 25, 2017

Hydrologic Engineering Center - River Analysis System



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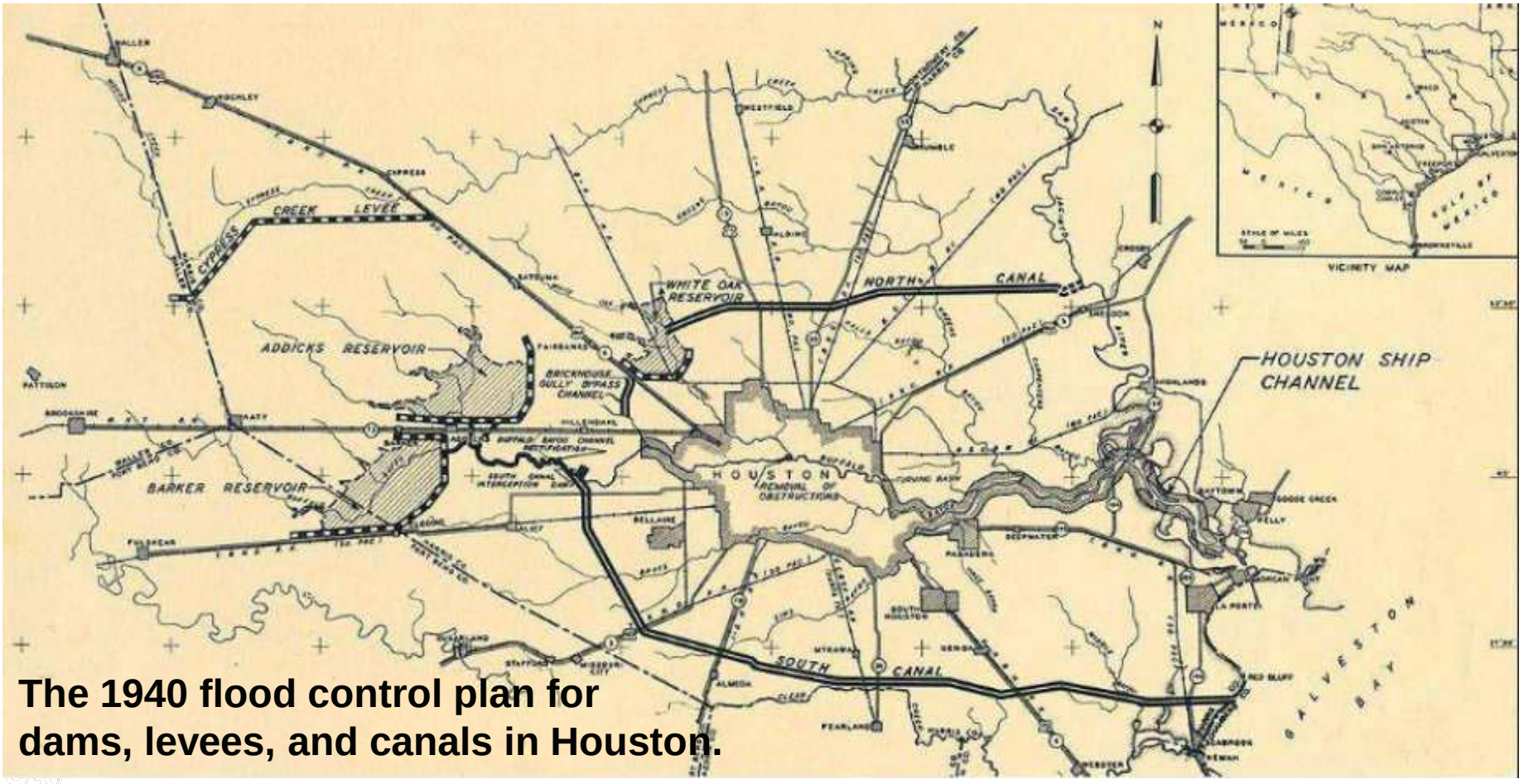
How did HEC-RAS come to be?

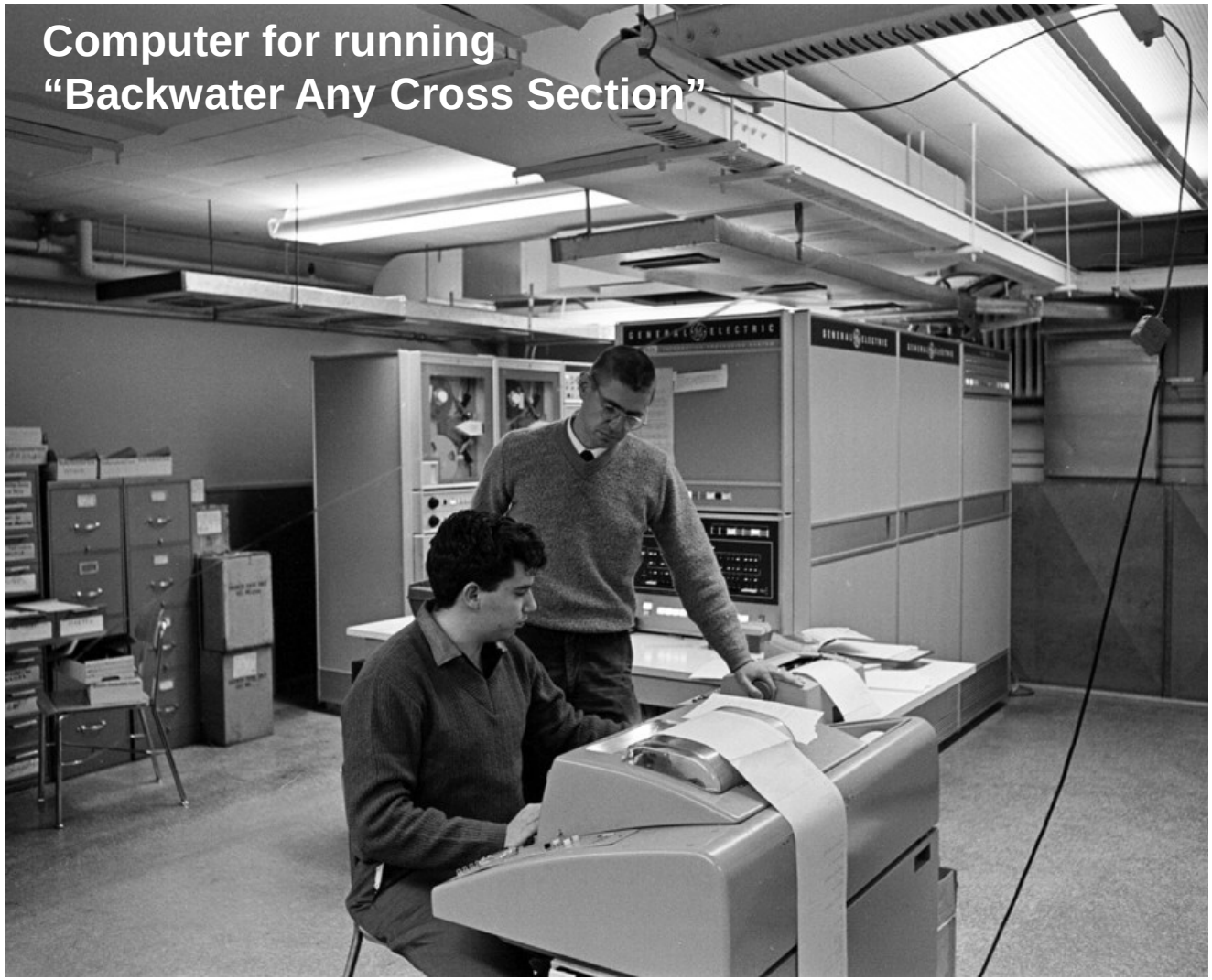
1824: U.S. Army Corps of Engineers (USACE) starts their first Civil Works project - to promote safety on the Ohio and Mississippi River.

1936: Flood Control Act gives USACE authority to provide flood protection across entire country.



The 1940 flood control plan for dams, levees, and canals in Houston.

1966: USACE releases the computer program “Backwater Any Cross Section”

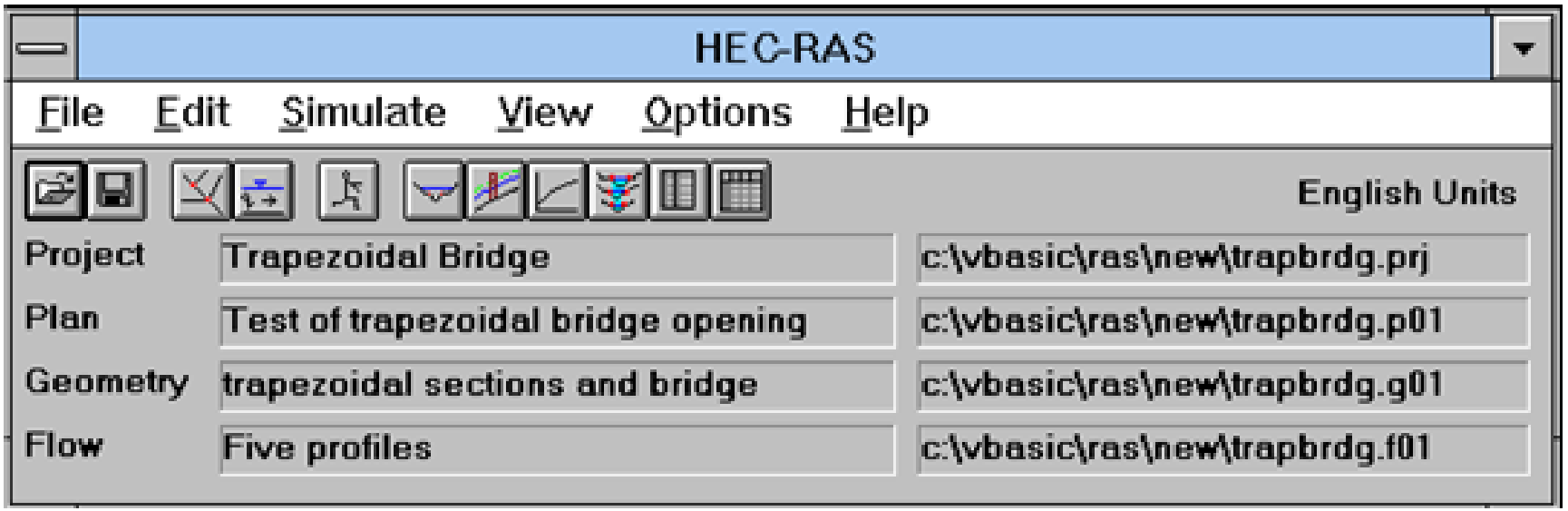


1968: HEC releases the software HEC-2 to estimate water levels on a river

1984: HEC-2 can be run on a personal computer

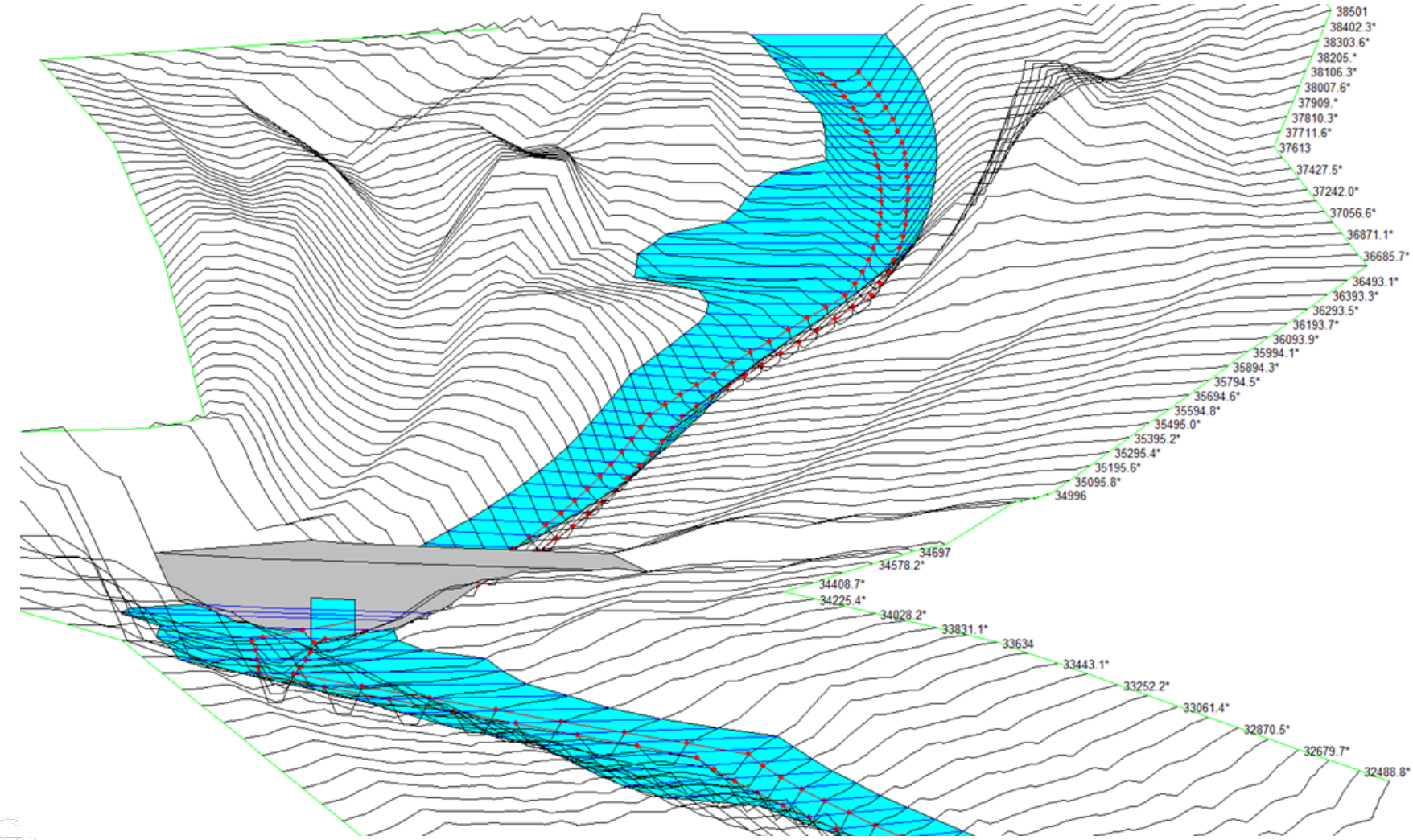
IBM personal computer in 1981

1995: HEC releases HEC-RAS Version 1.0



HEC-RAS version 1.0

1995-2015: HEC-RAS is limited to 1-dimensional modeling



HEC-RAS Cross Sections

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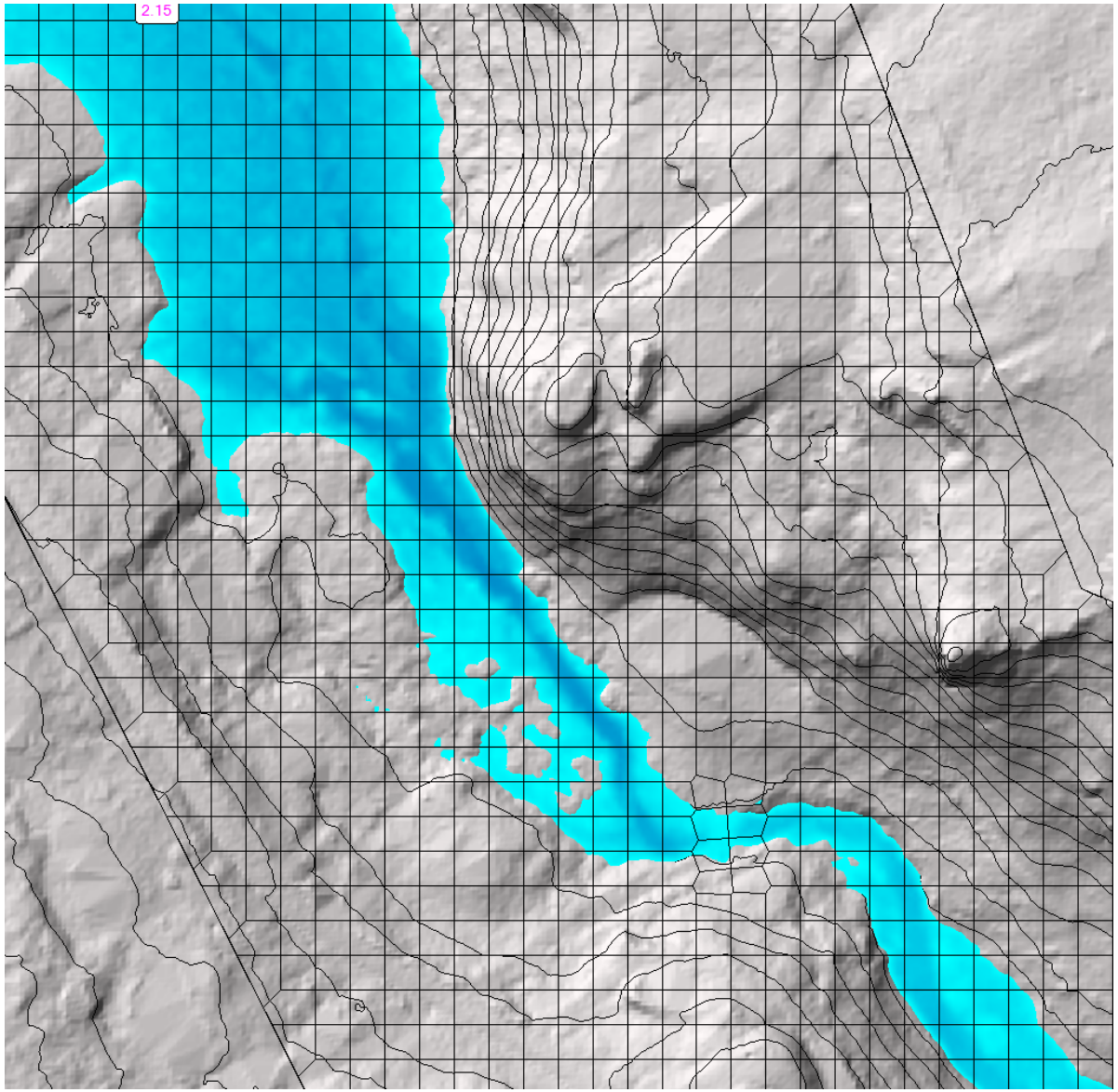
2016: HEC-RAS 5.0 is released with 2-dimensional modeling



HEC-RAS 2-D Flow Area

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How do you set up and run a HEC-RAS 2D model?

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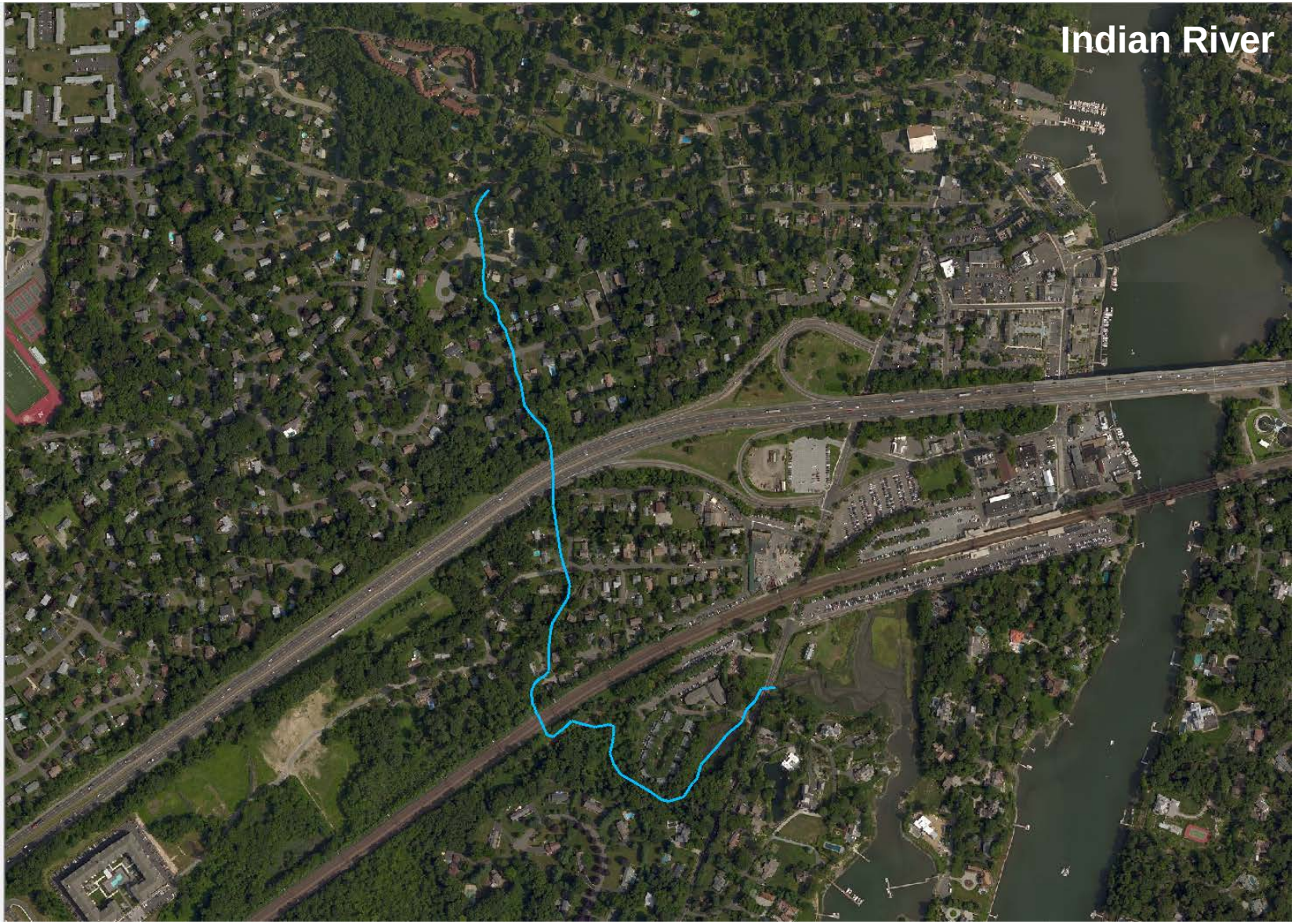
Model Setup



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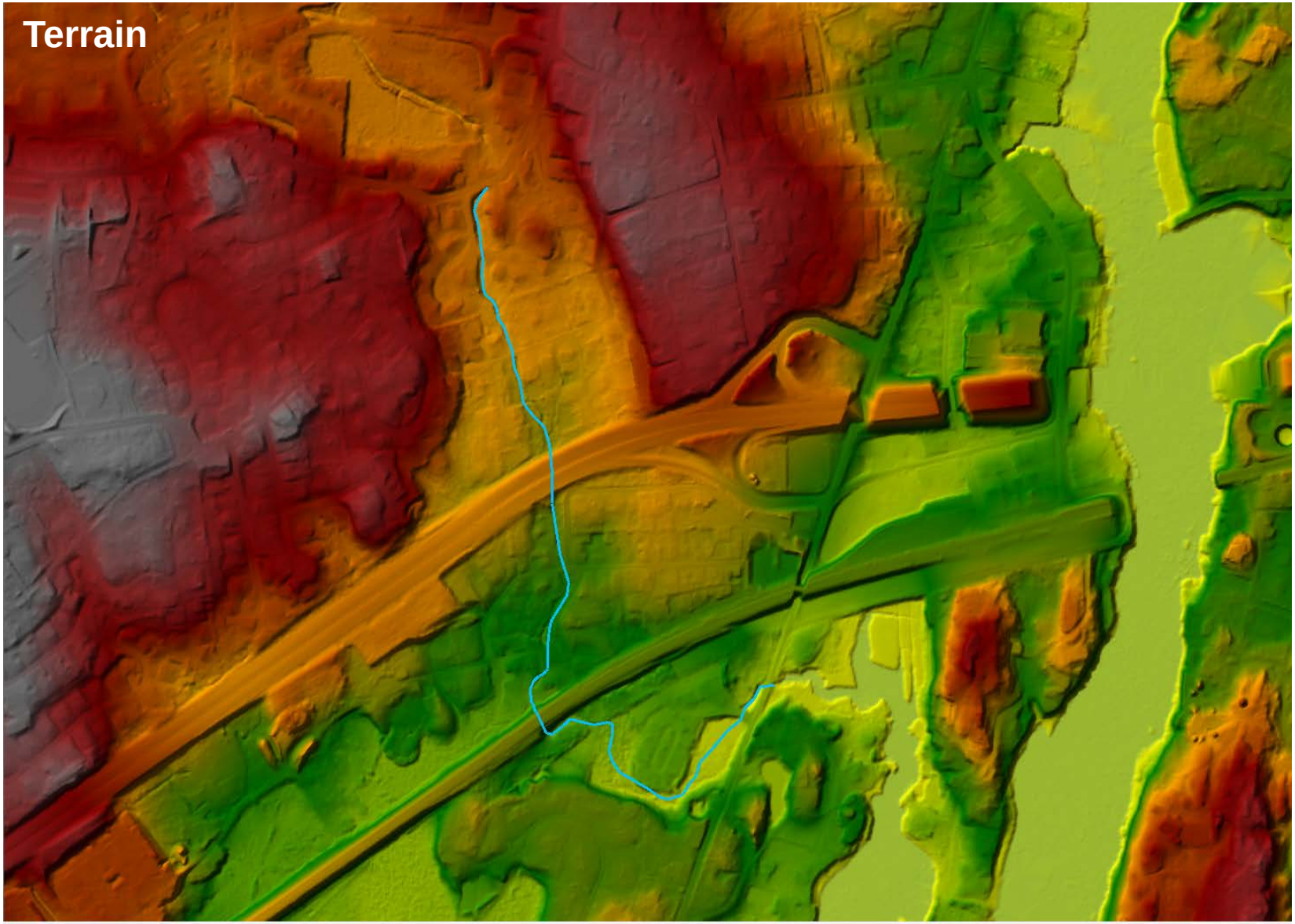

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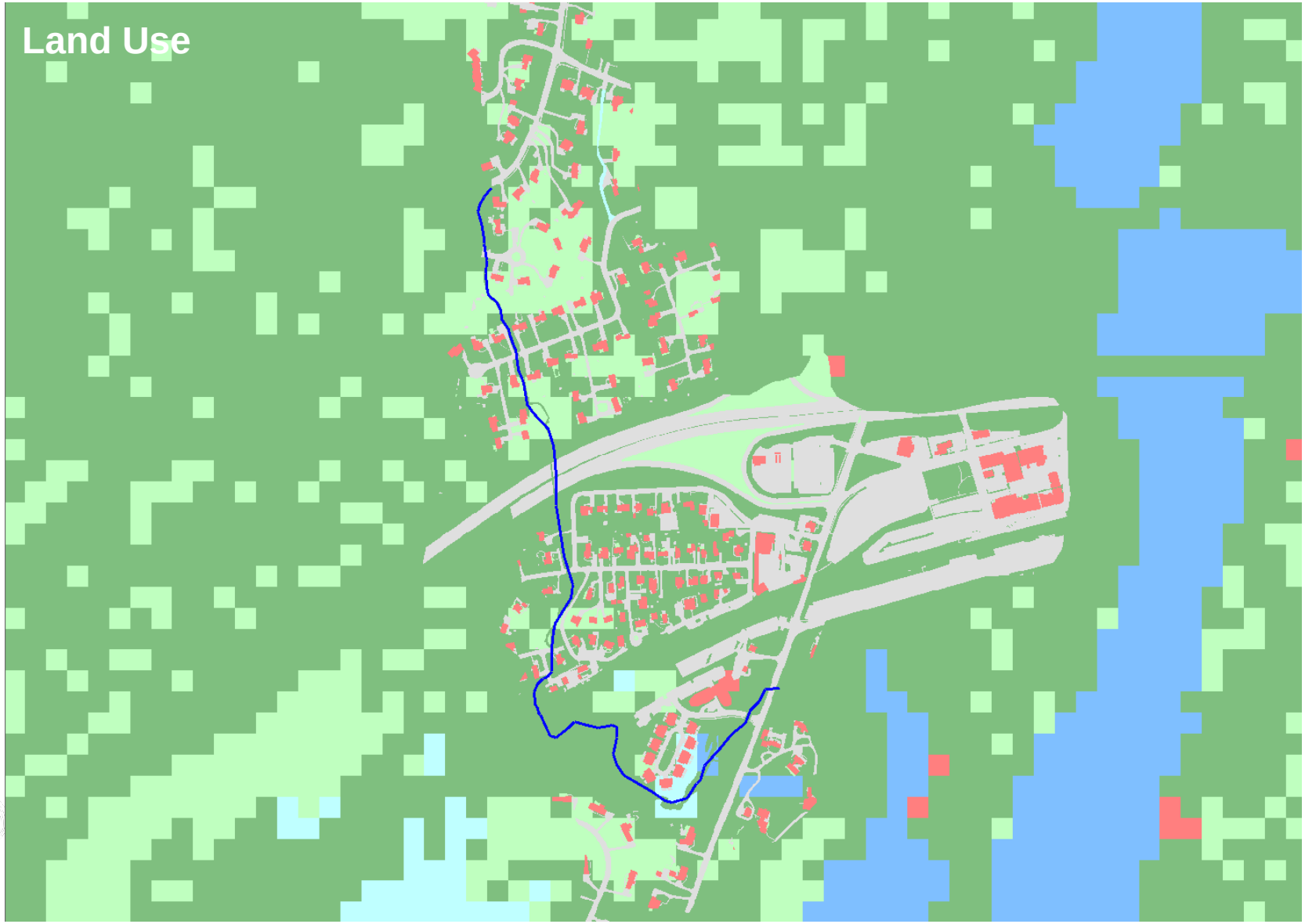

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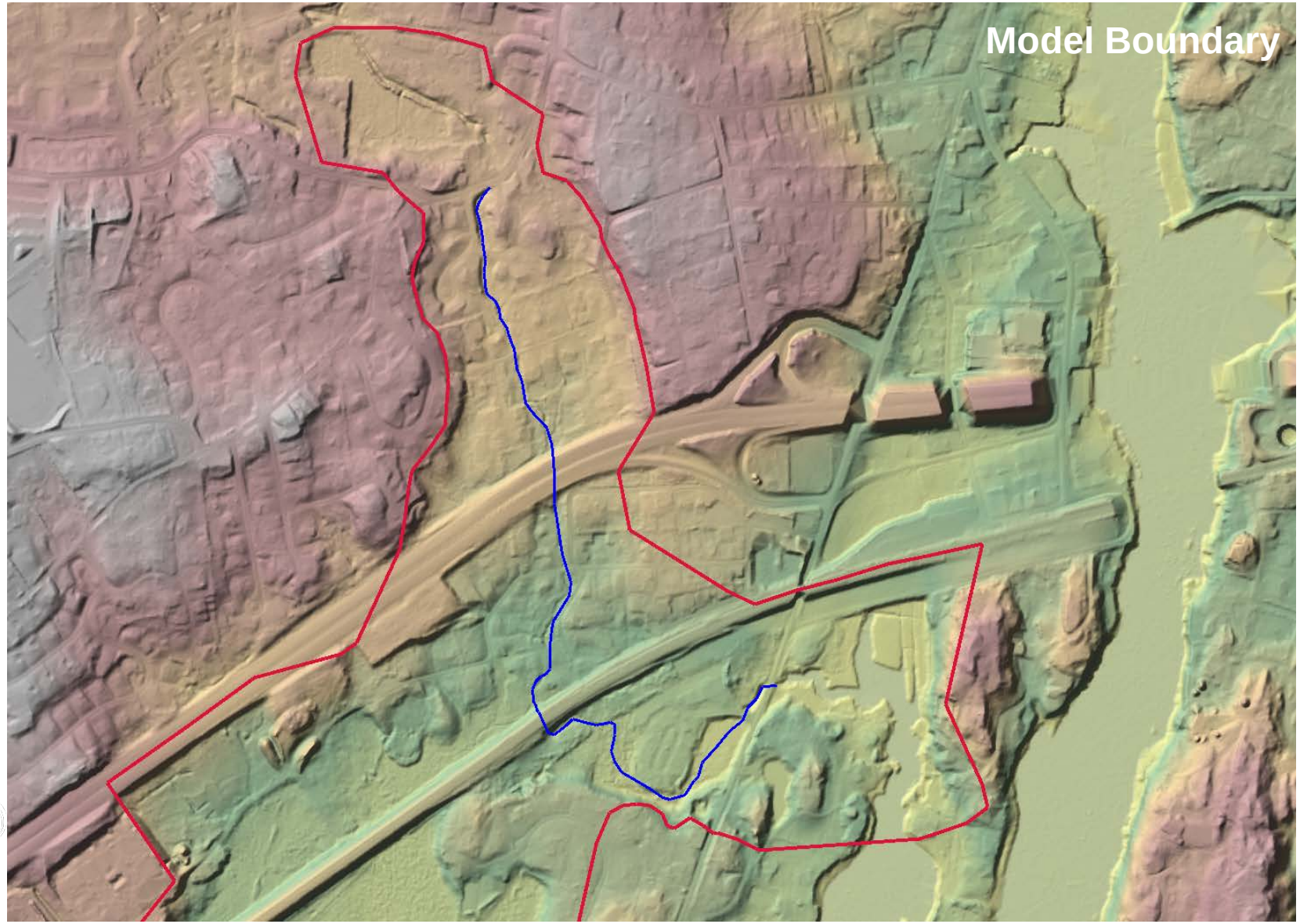

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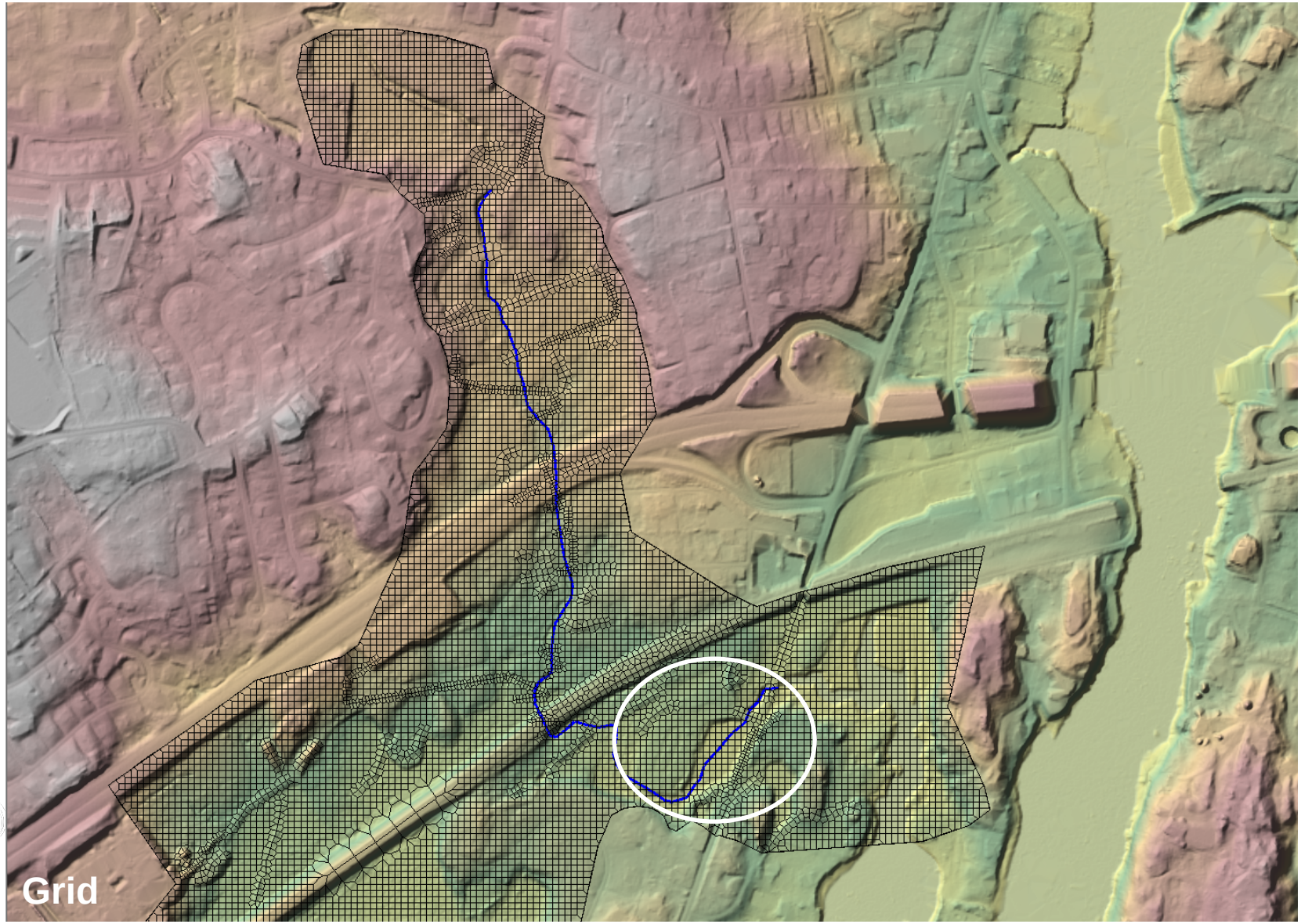

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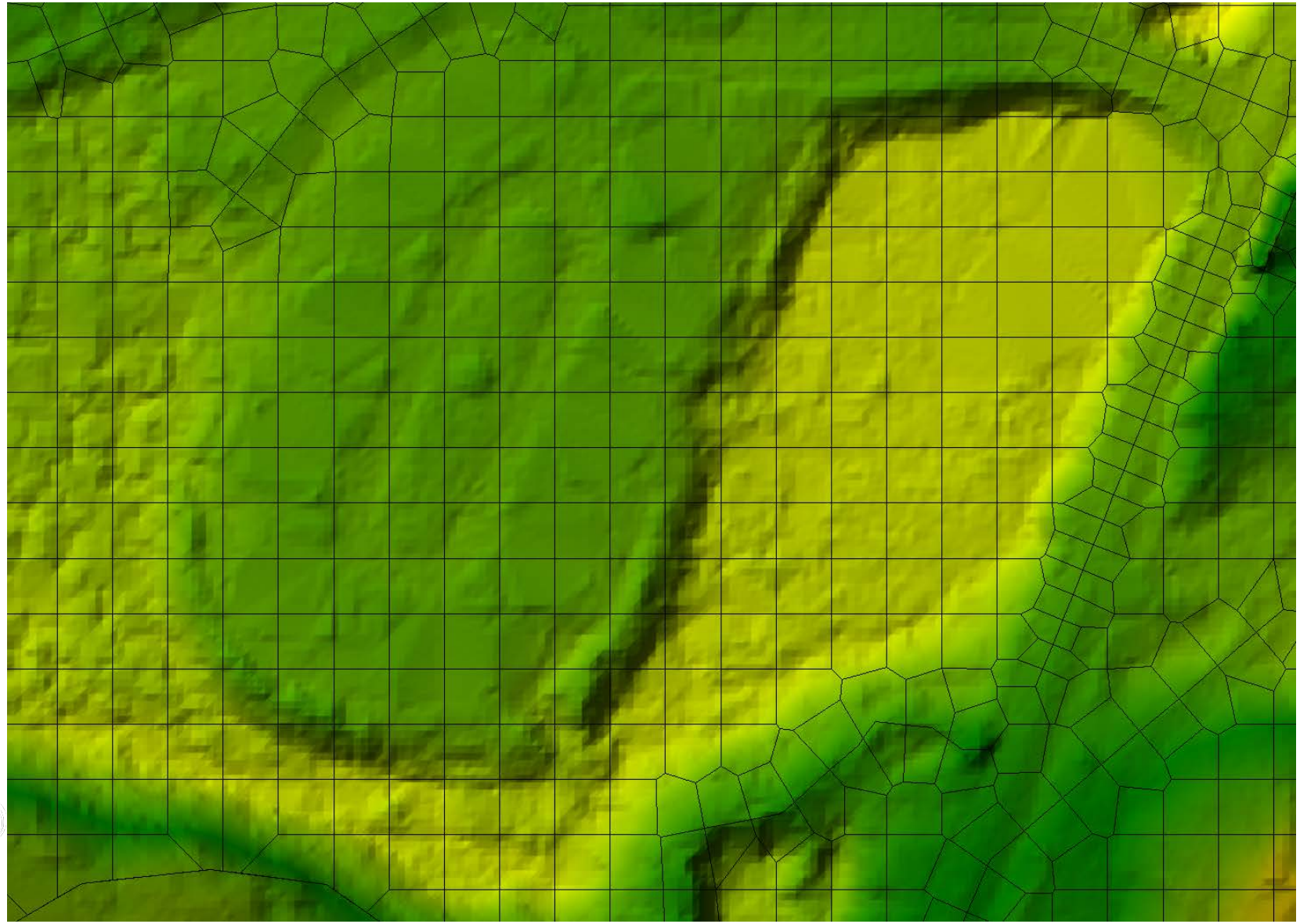

Model Setup

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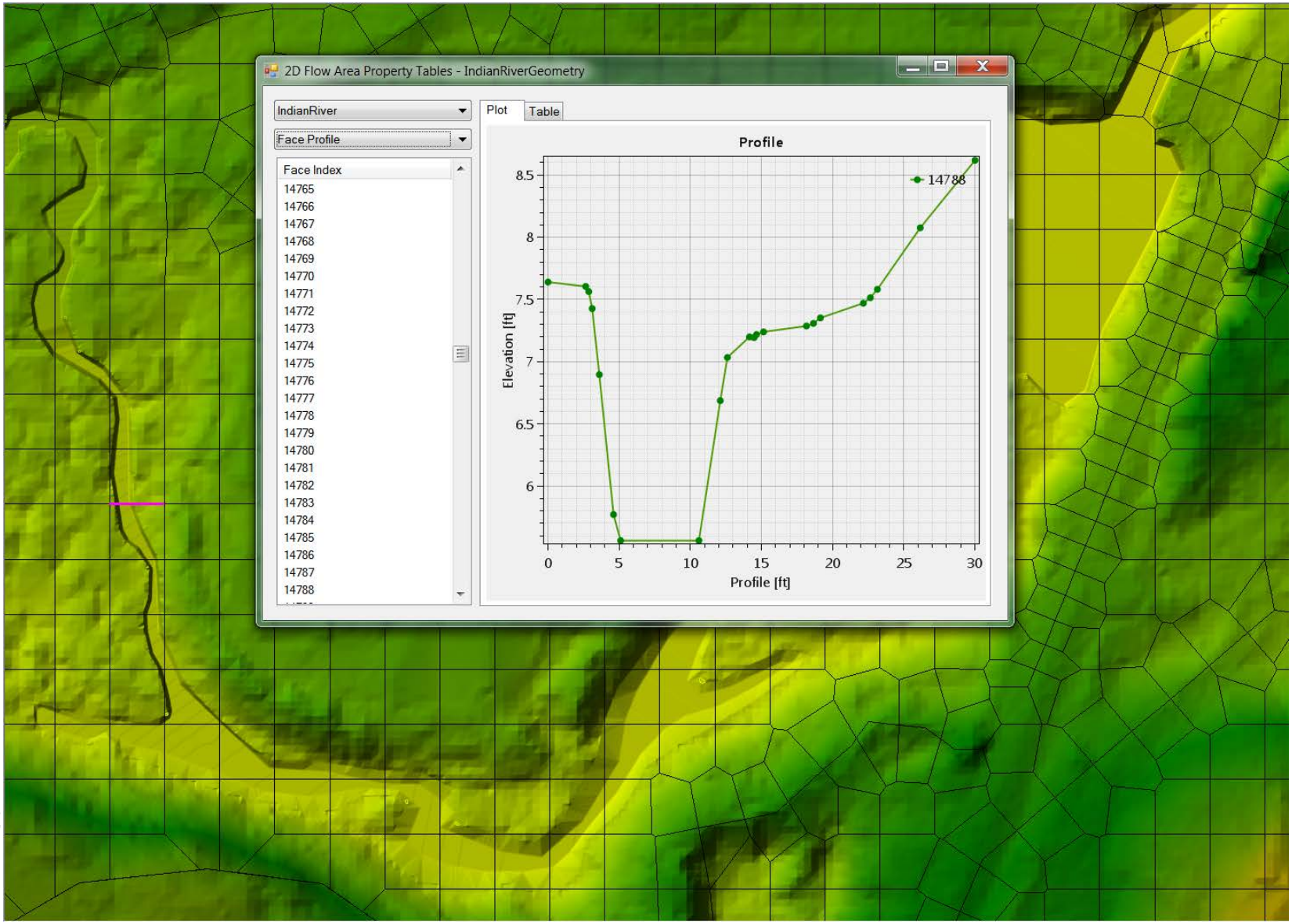

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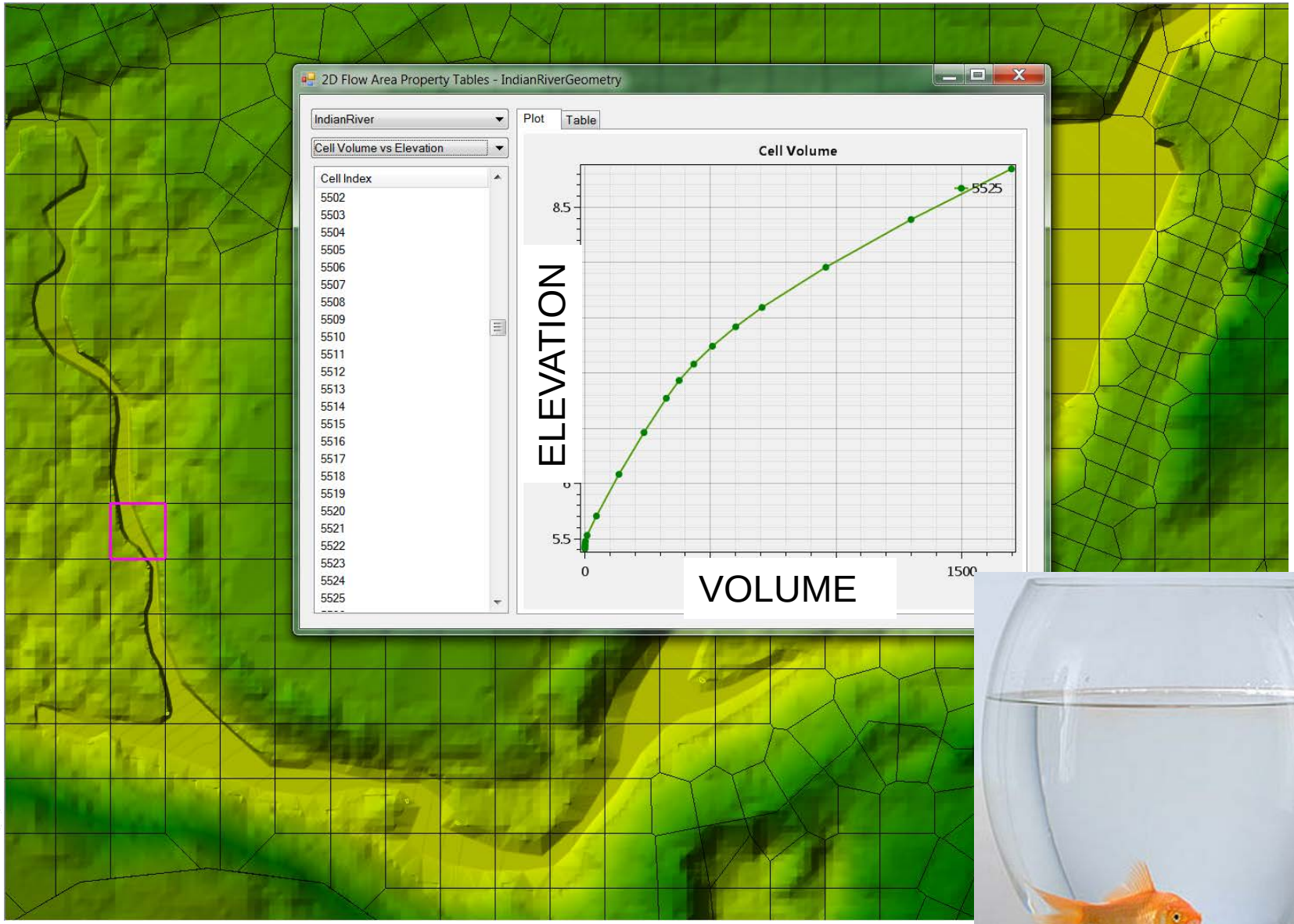

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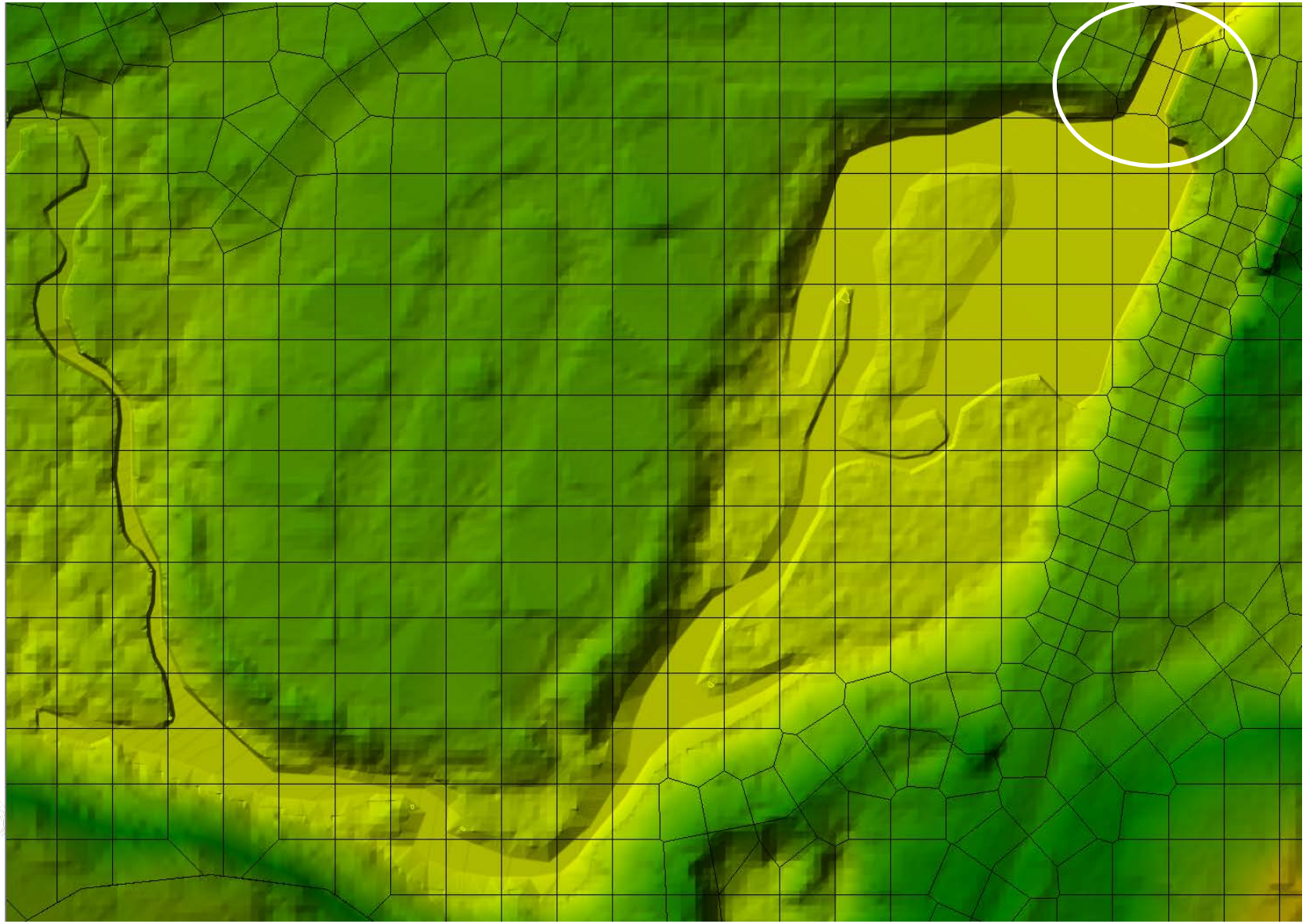

Model Setup

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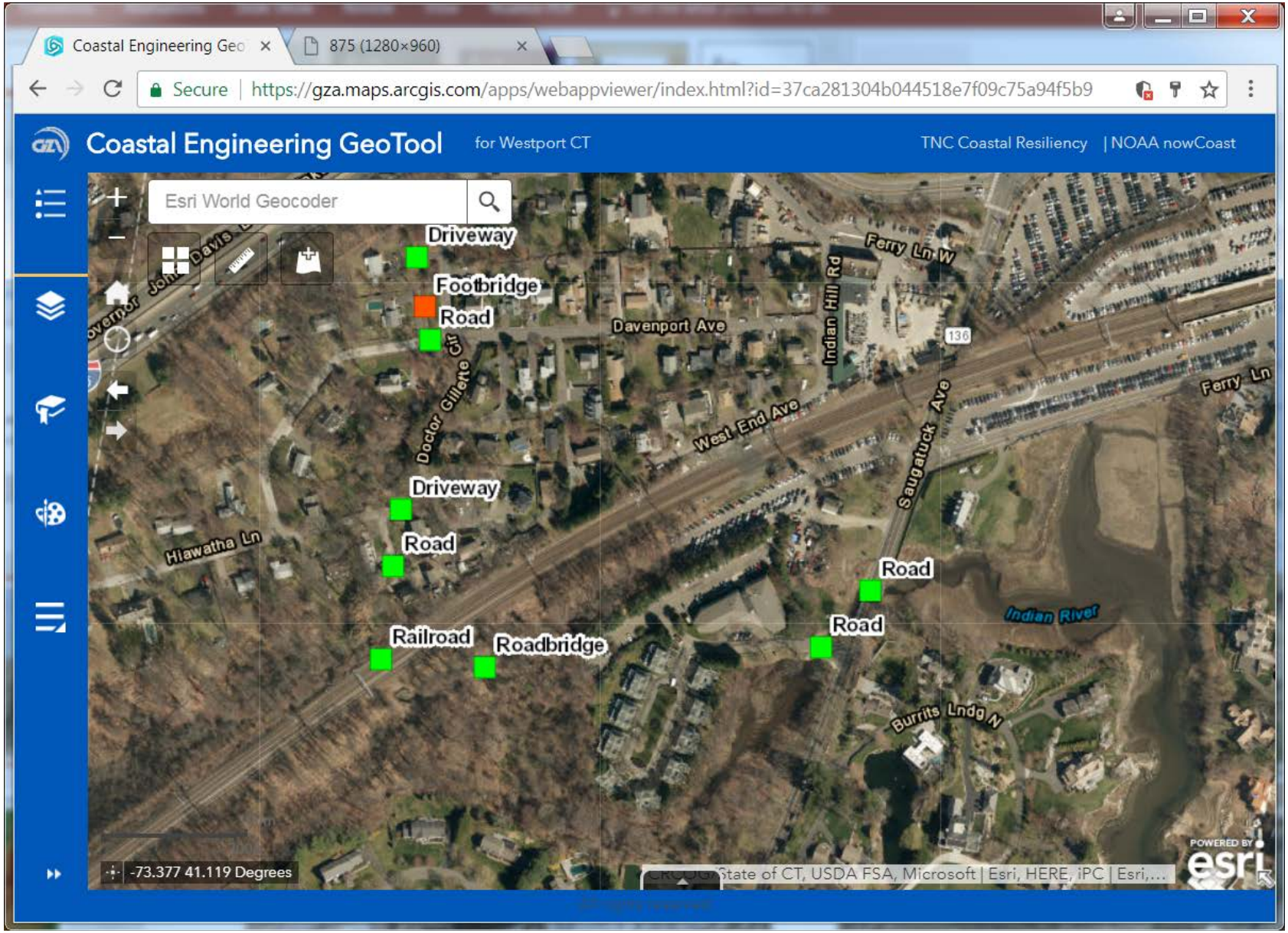
Field Work



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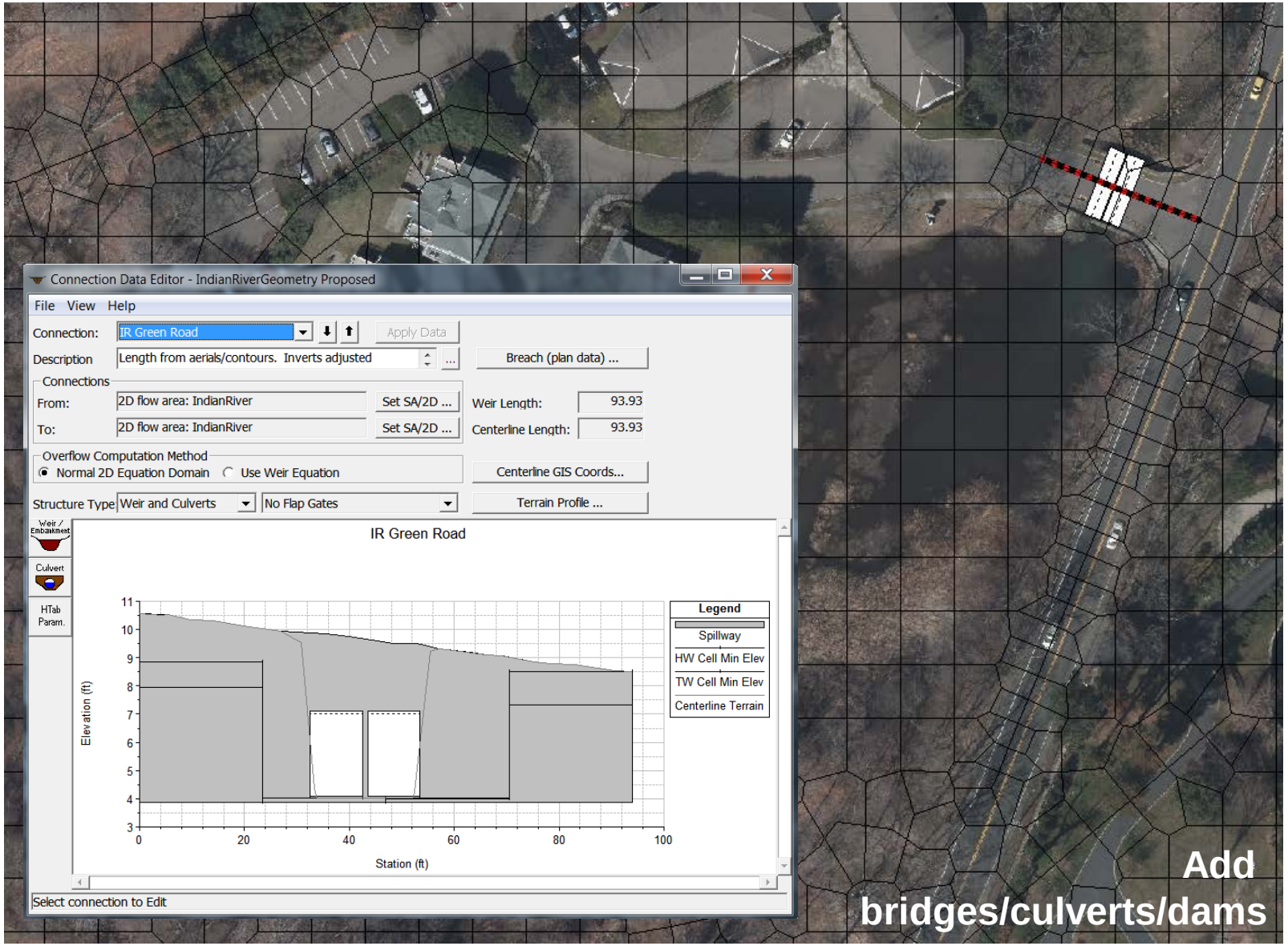
Field Work

Model Setup



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Model Setup

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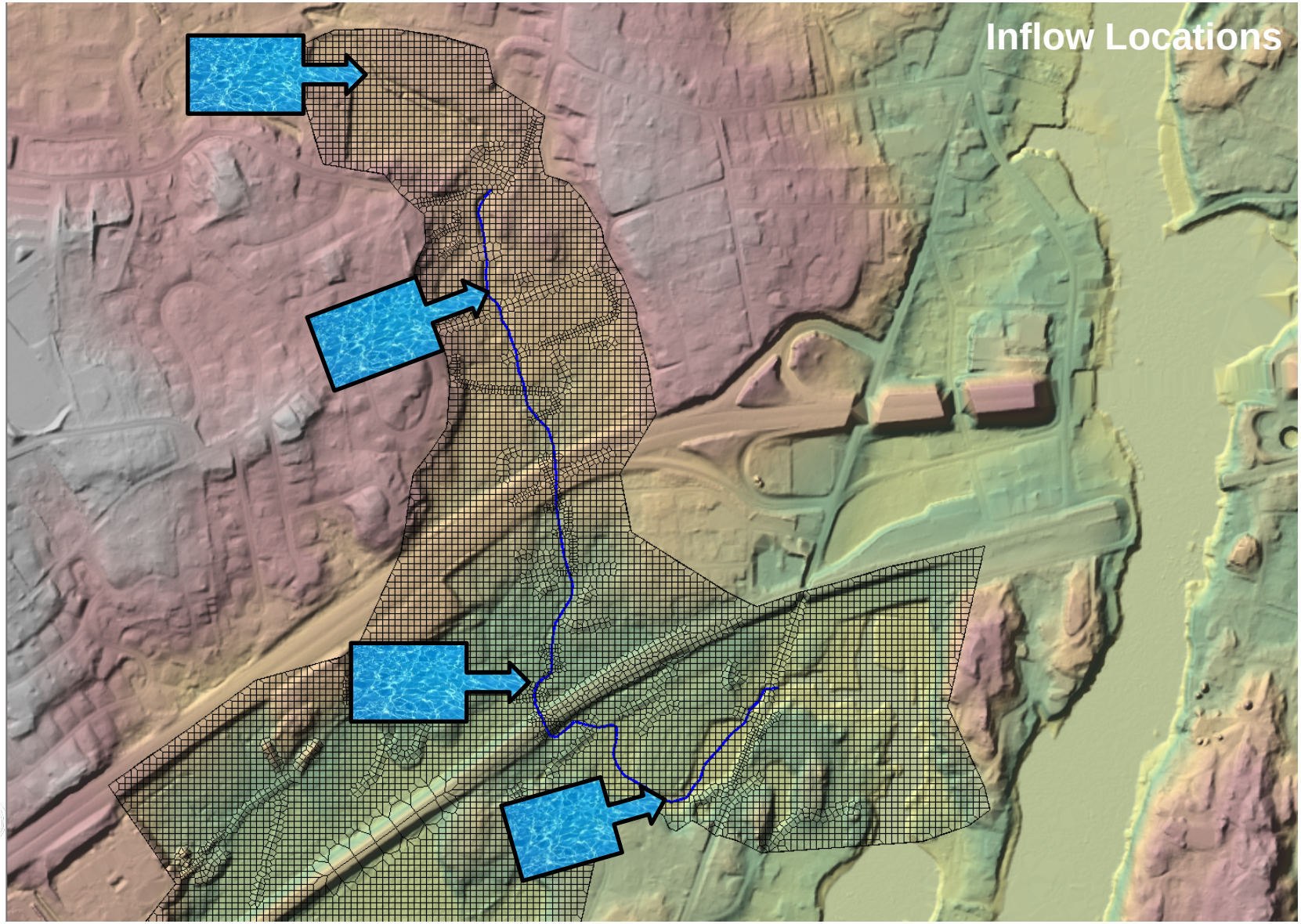
Model Setup



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Model Setup

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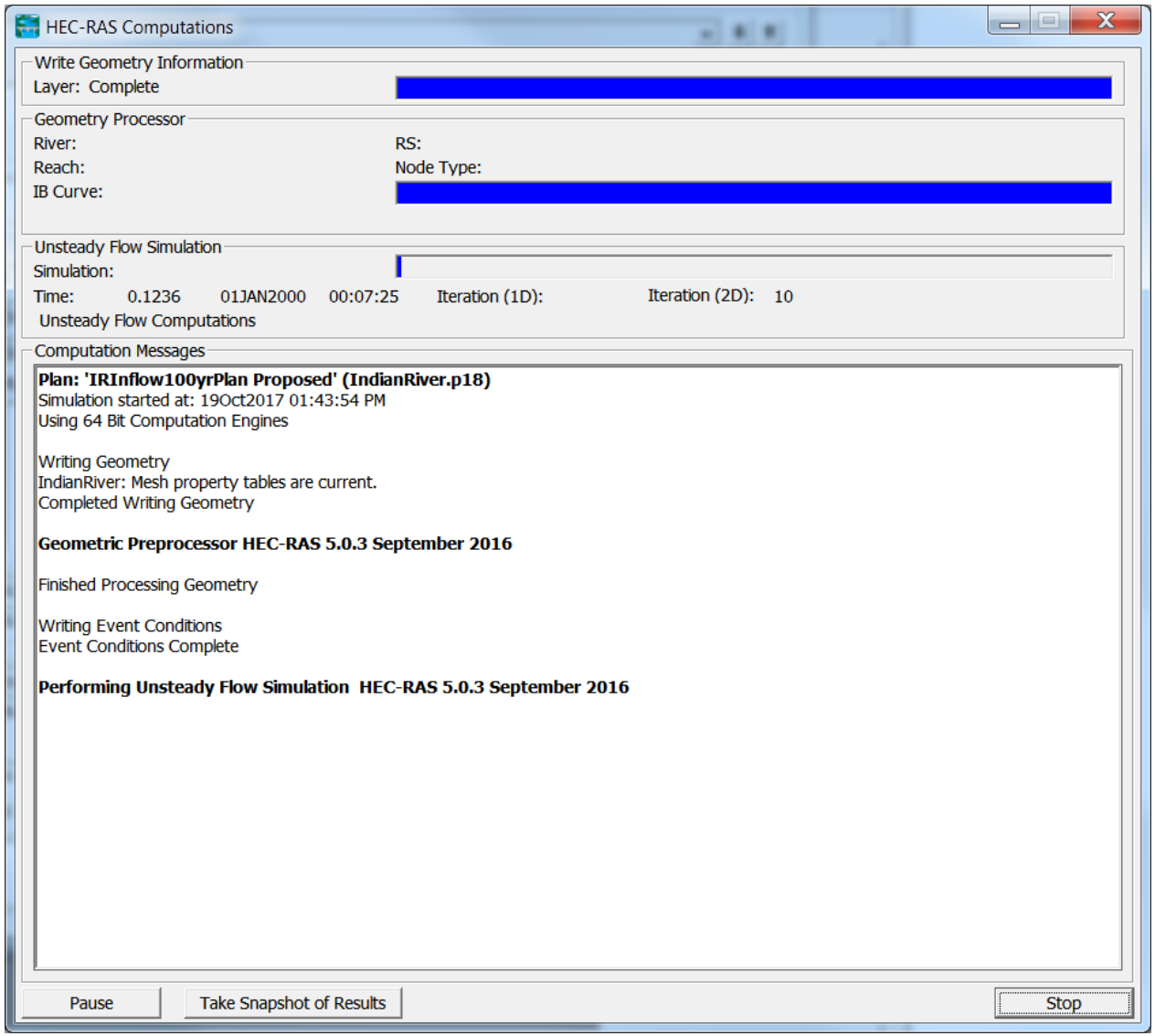
Run the Model

Simulation Duration:
1.5 days

Time Step:
5 seconds



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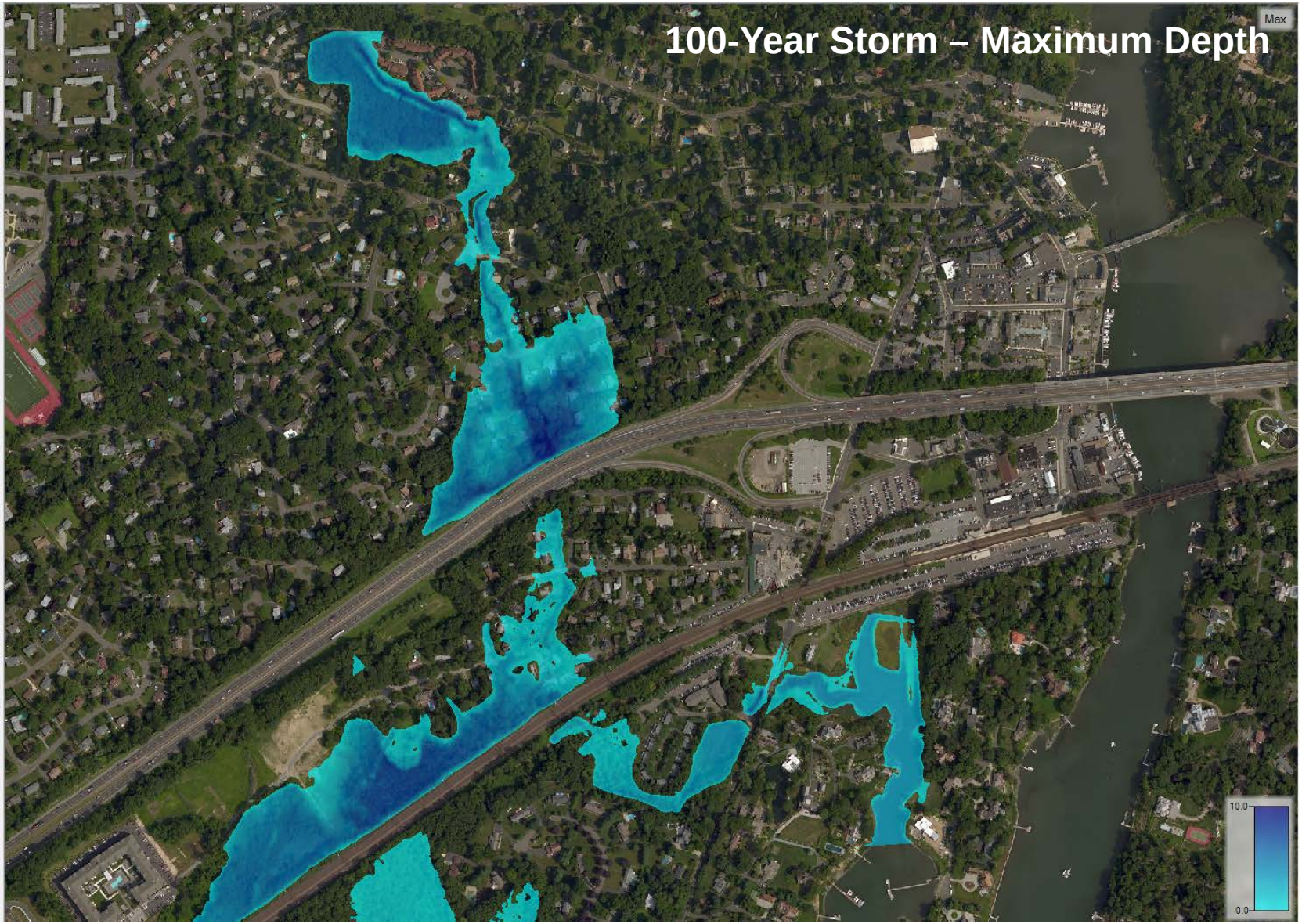
View Results



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View Results

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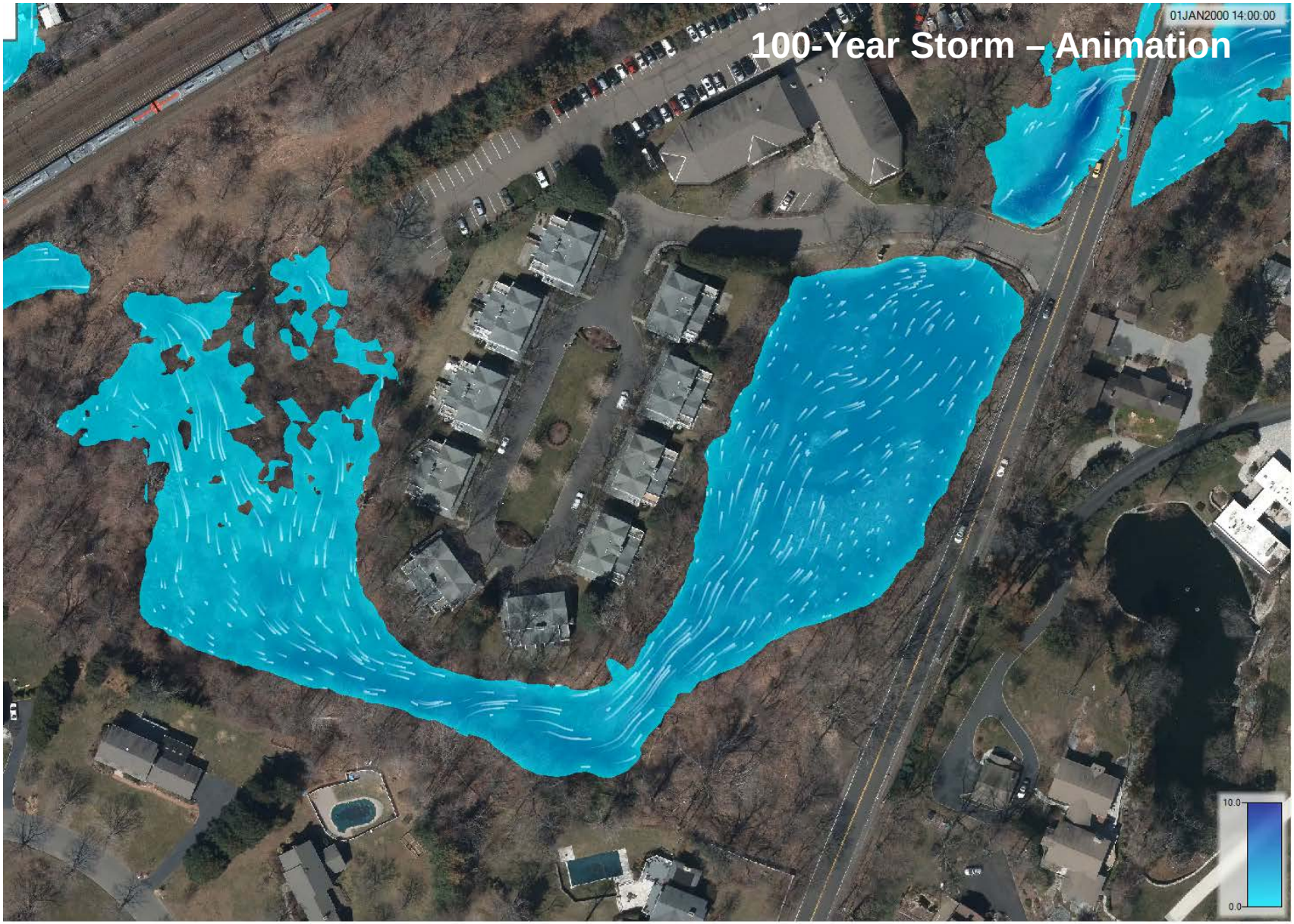

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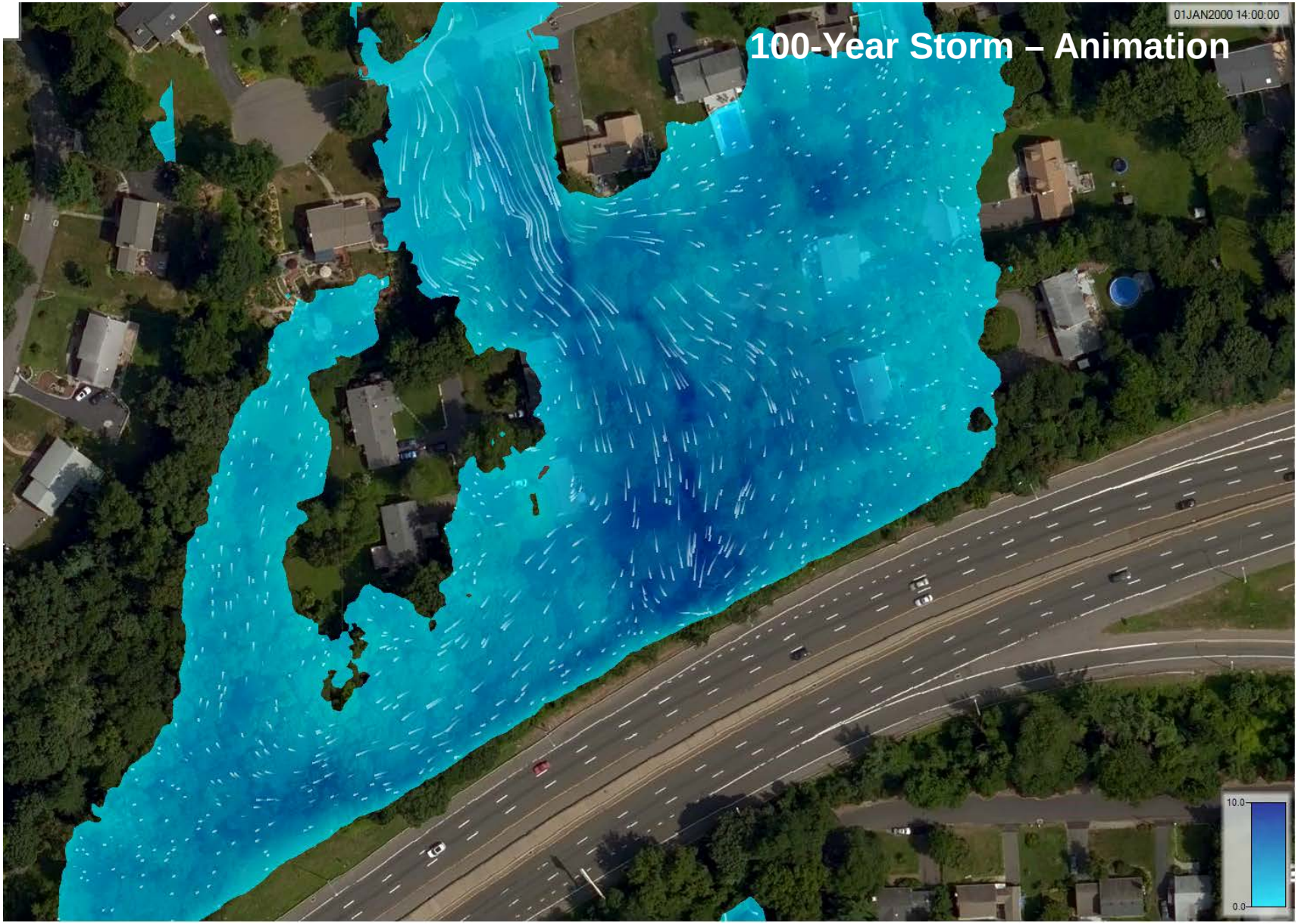

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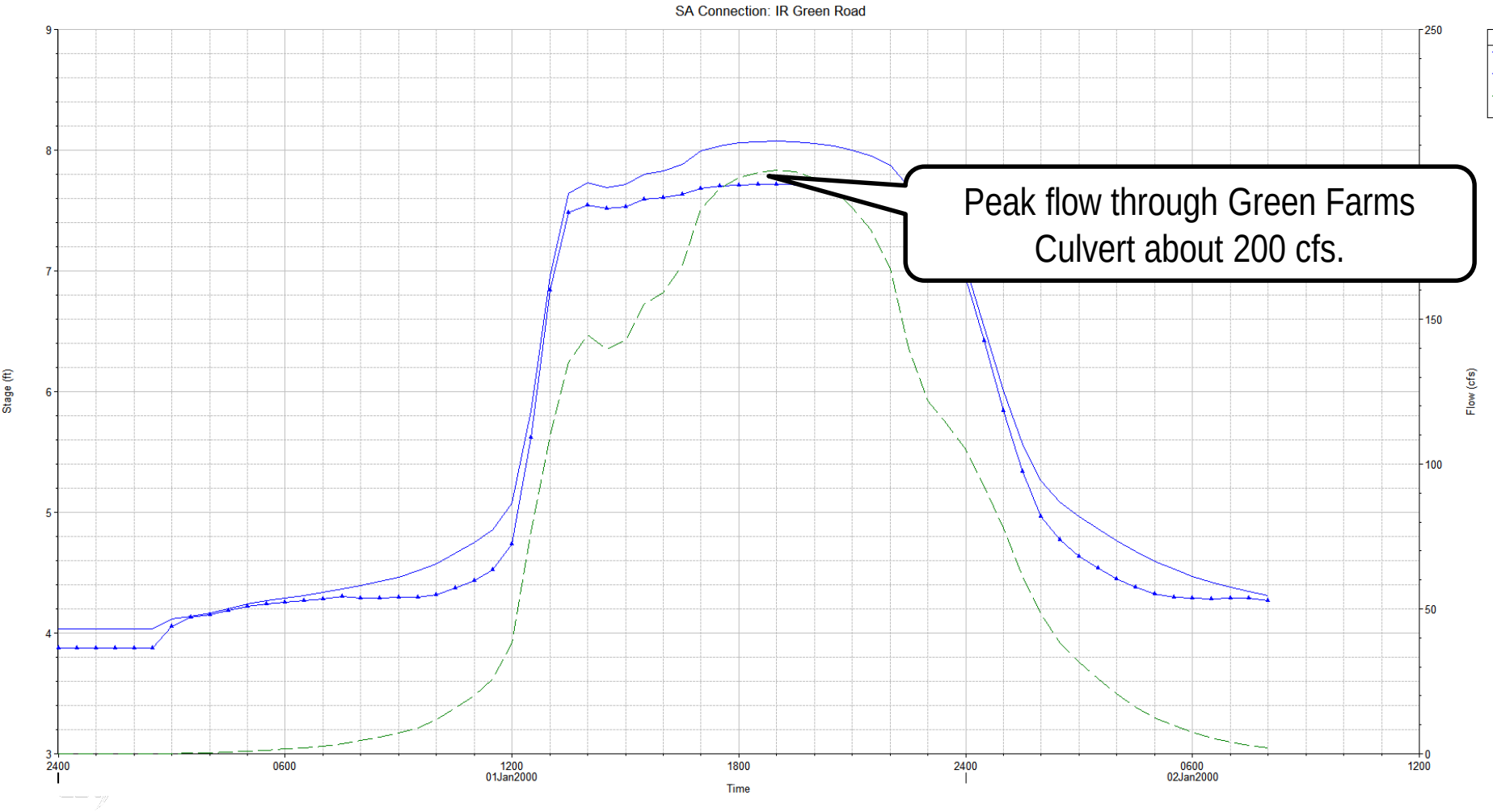
View Results



Peak flow through Green Farms Culvert about 200 cfs.

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Calibrate the Model

Just compare results

OR

Simulate historic storm

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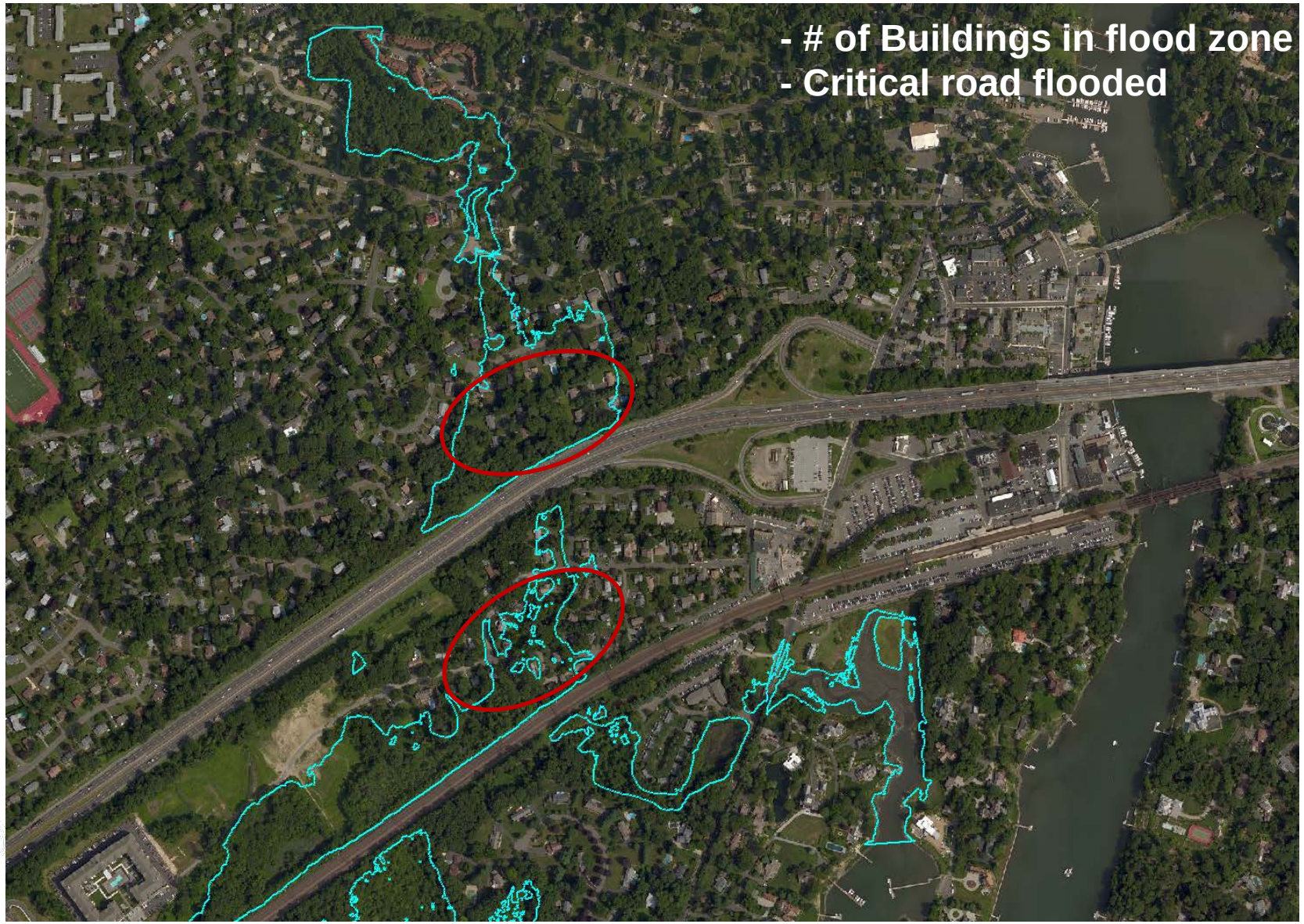
Identify Locations with Significant Flooding



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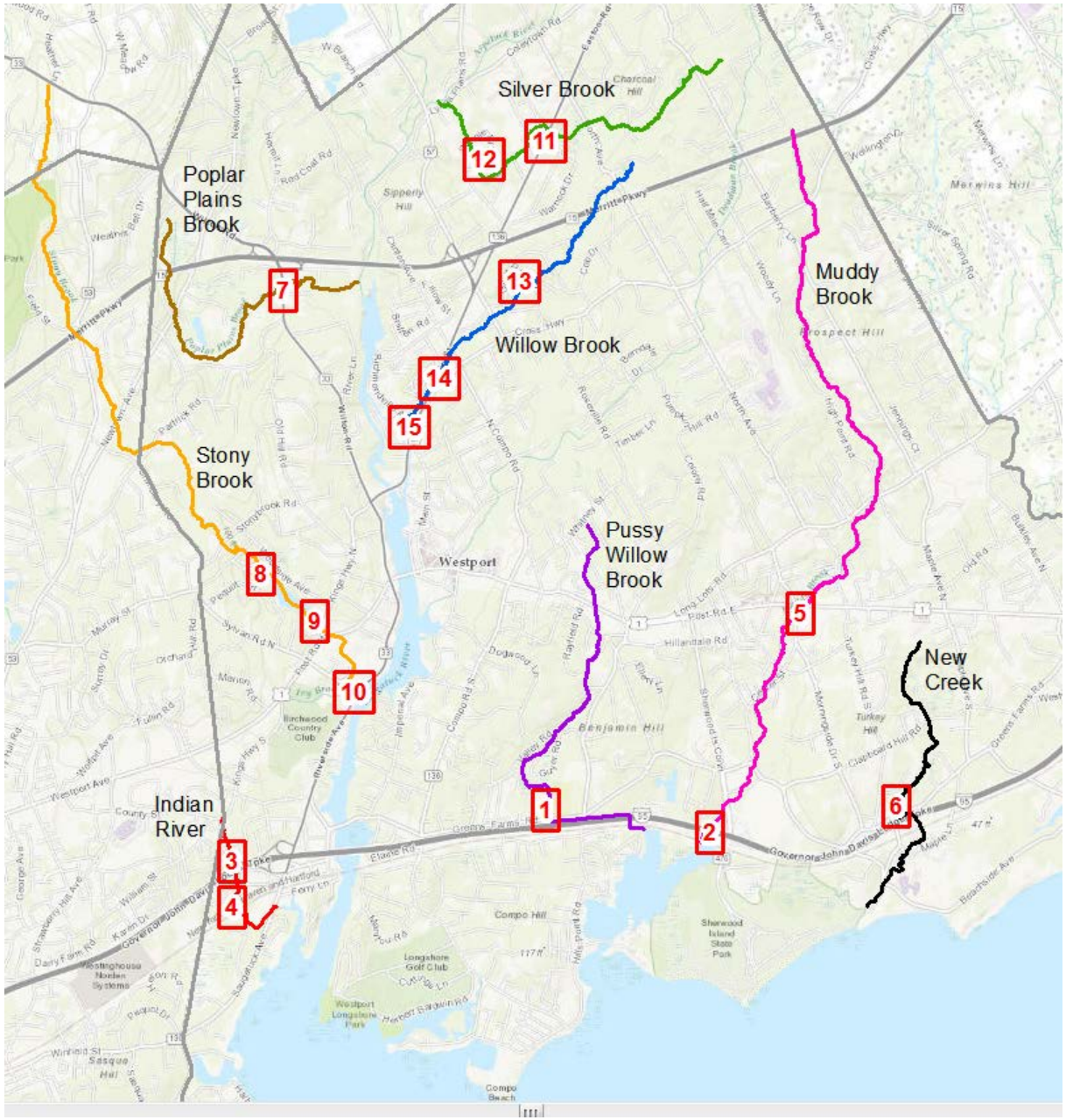
Identify Locations with Significant Flooding



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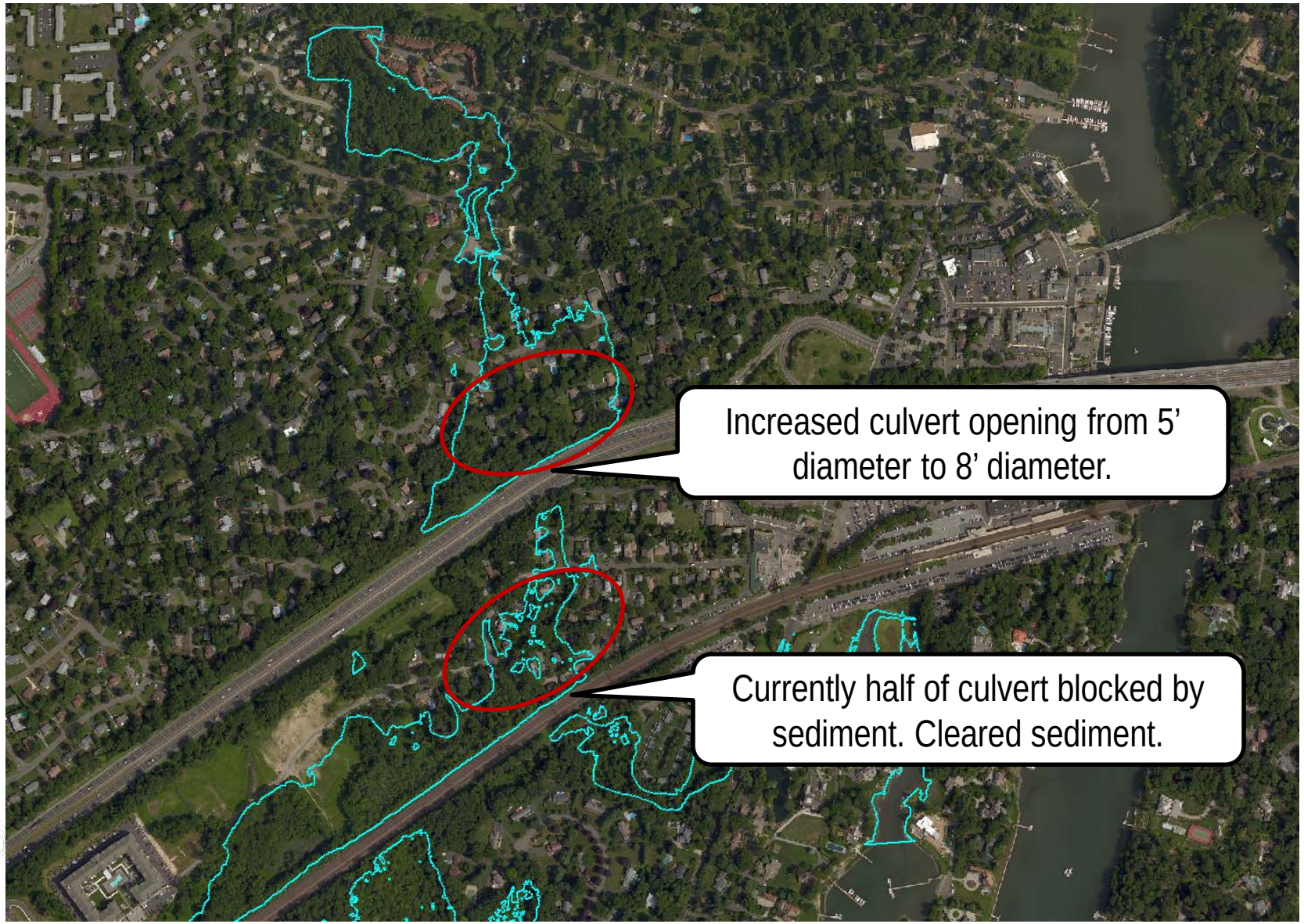
Perform Simulations with Proposed Changes



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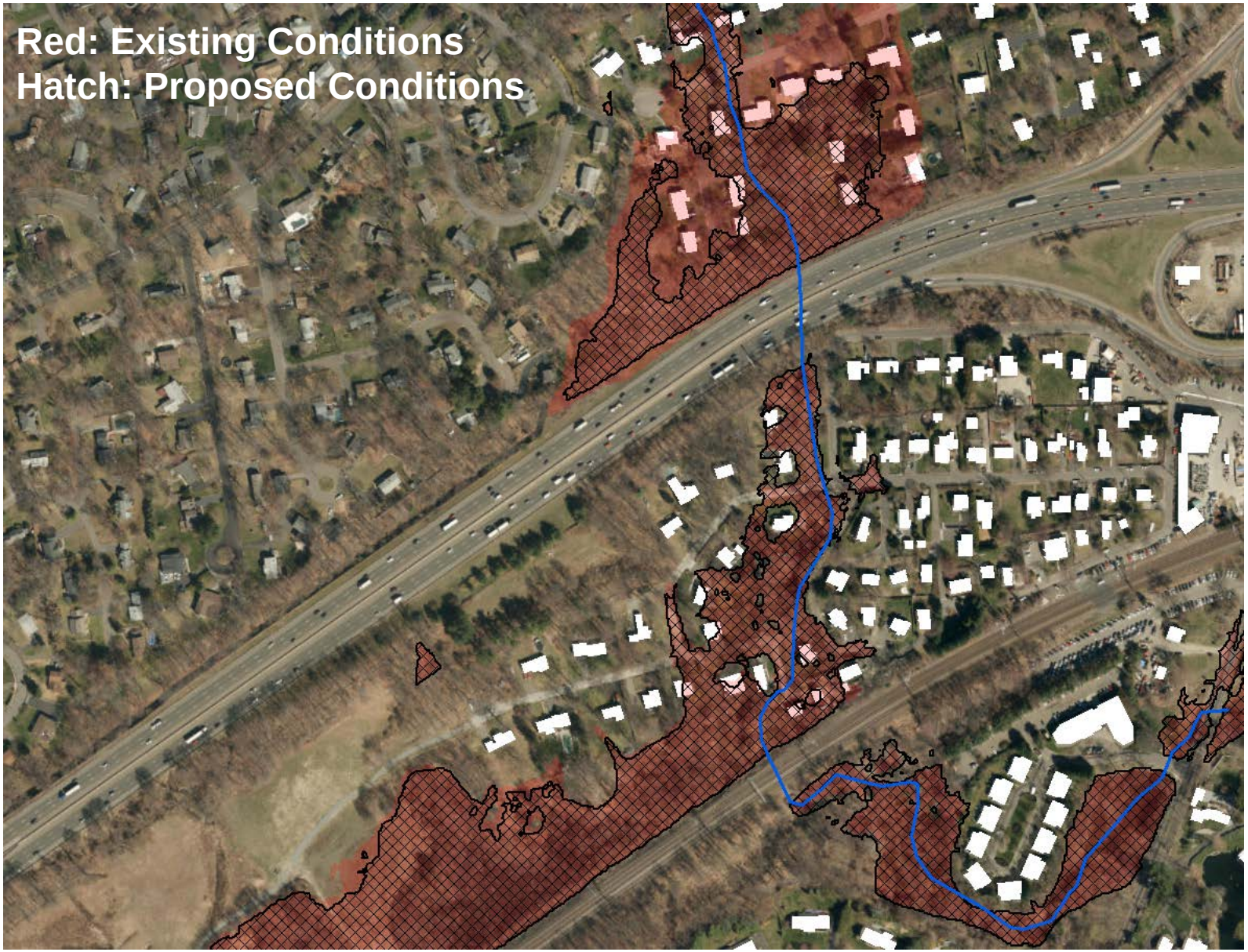

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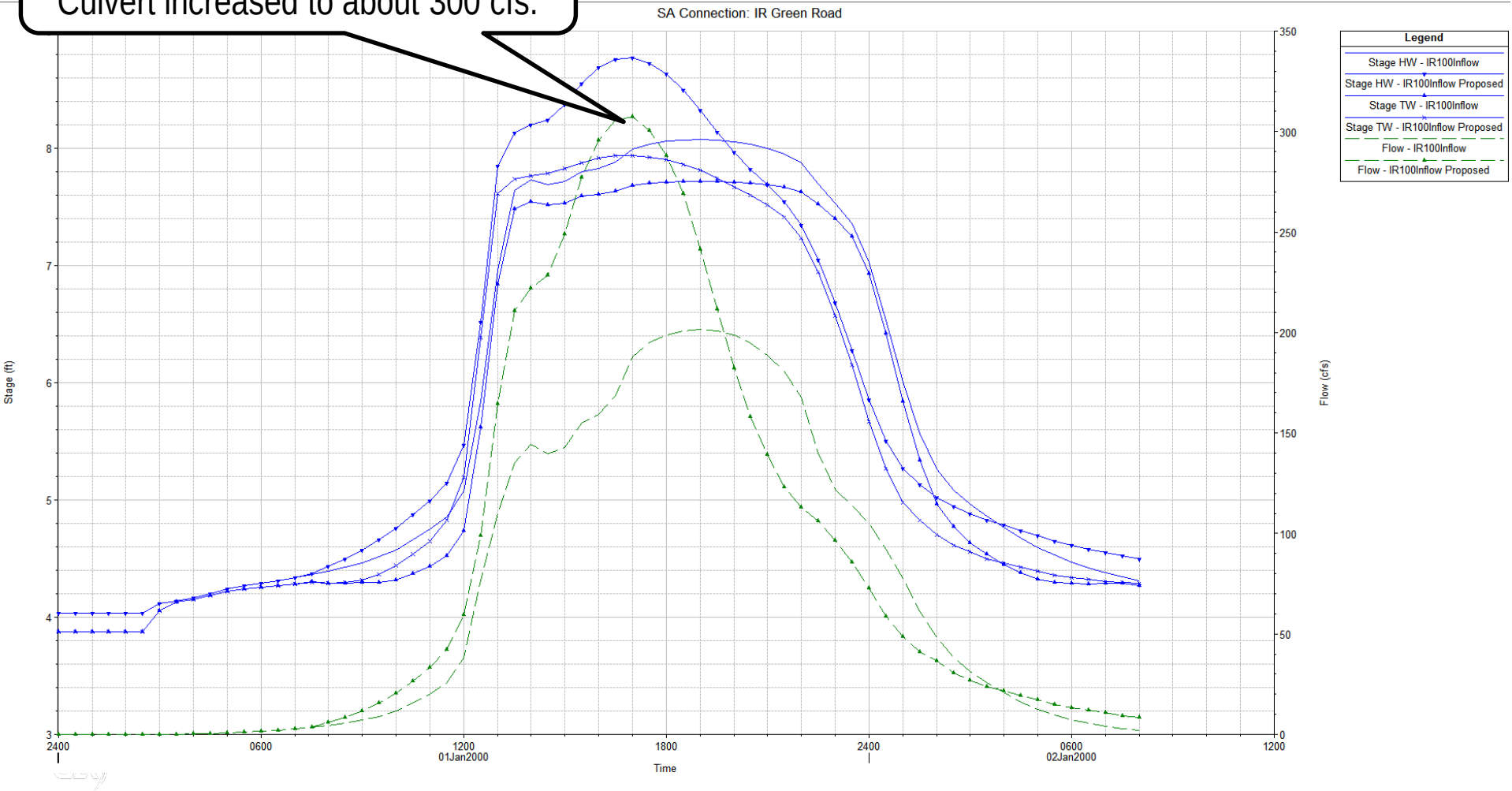
Perform Simulations with Proposed Changes

Peak flow through Green Farms Culvert increased to about 300 cfs.



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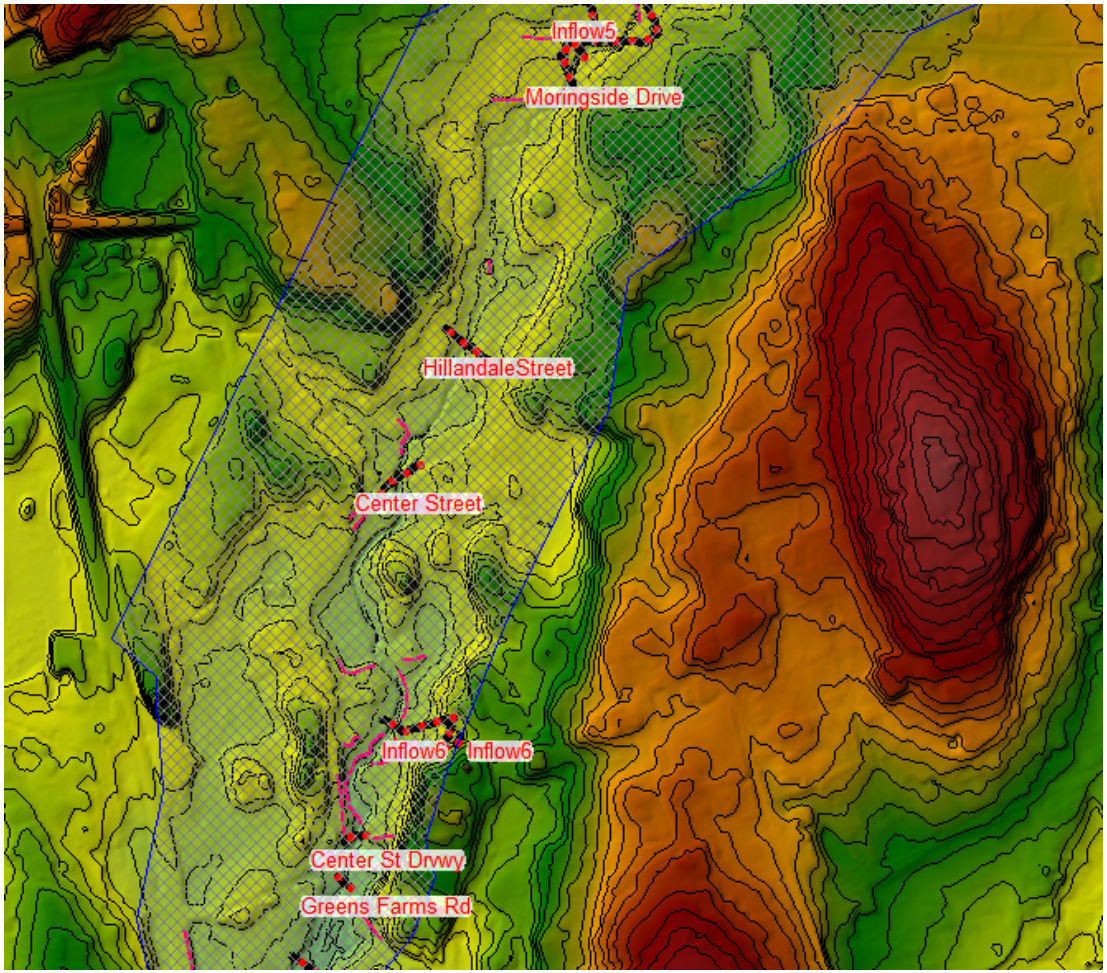
Once you have a model, the possibilities are endless.

Thank you!



Feel free to contact me at Christine.Suhonen@gza.com

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Sources

- https://www.civilgeo.com/the-road-to-hec-ras/