



Loudoun County

VIRGINIA

WHERE TRADITION MEETS INNOVATION

Welcome Selma Estates Community Meeting

2/10/2020

Agenda

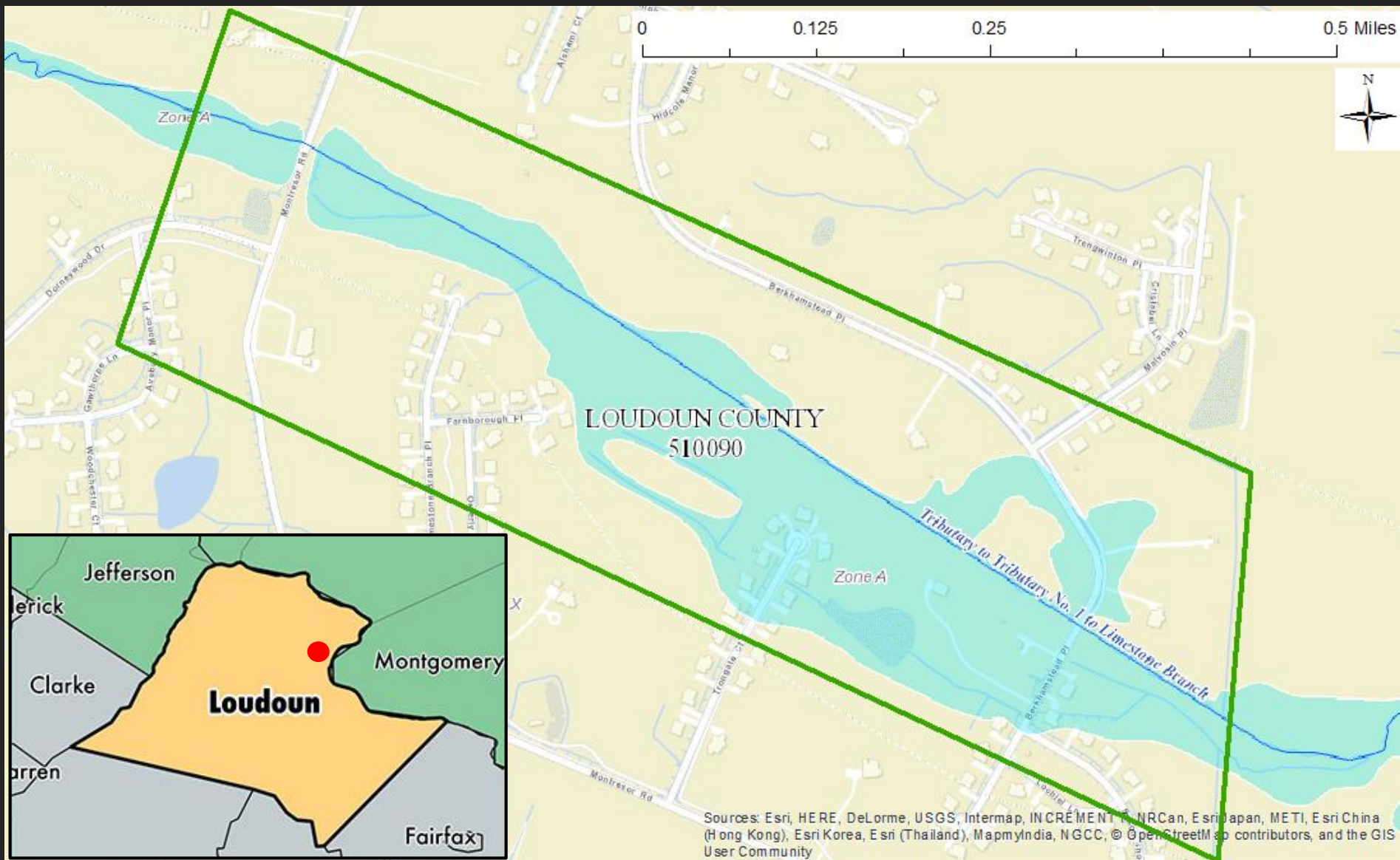
- Overall project and findings of Wood Watershed Analysis
- Revisions to the FEMA floodplain maps
- Potential for additional structures to be removed from the floodplain boundary
- Revisions to Elevation Certificates based on new information

Wood Presentation

Scope

- Drainage Area Analysis
- Floodplain Modeling (develop 100-yr floodplain)
 - Updated aerial and ground survey
- Natural Resources Inventory
- Evaluation of Mitigation Alternatives
 - Berm (proposed by others)
 - Upsize stormwater system
 - Large Stormwater Pond with upsized stormwater system
 - Home Buyout

Study Area

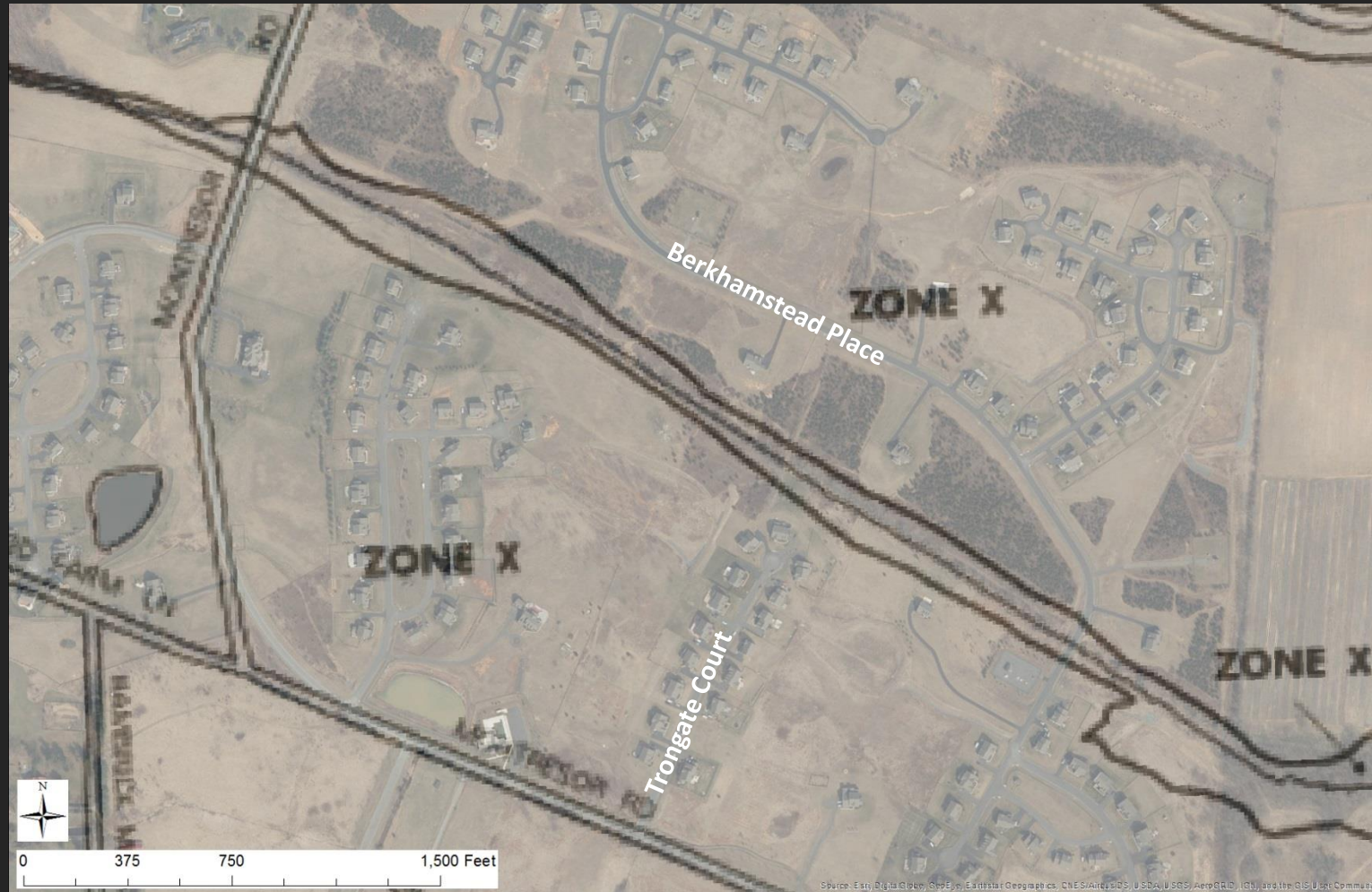


Previous Mapped Floodplains Timeline



Previous Mapped Floodplains Timeline

- 2001
Minor
Floodplain



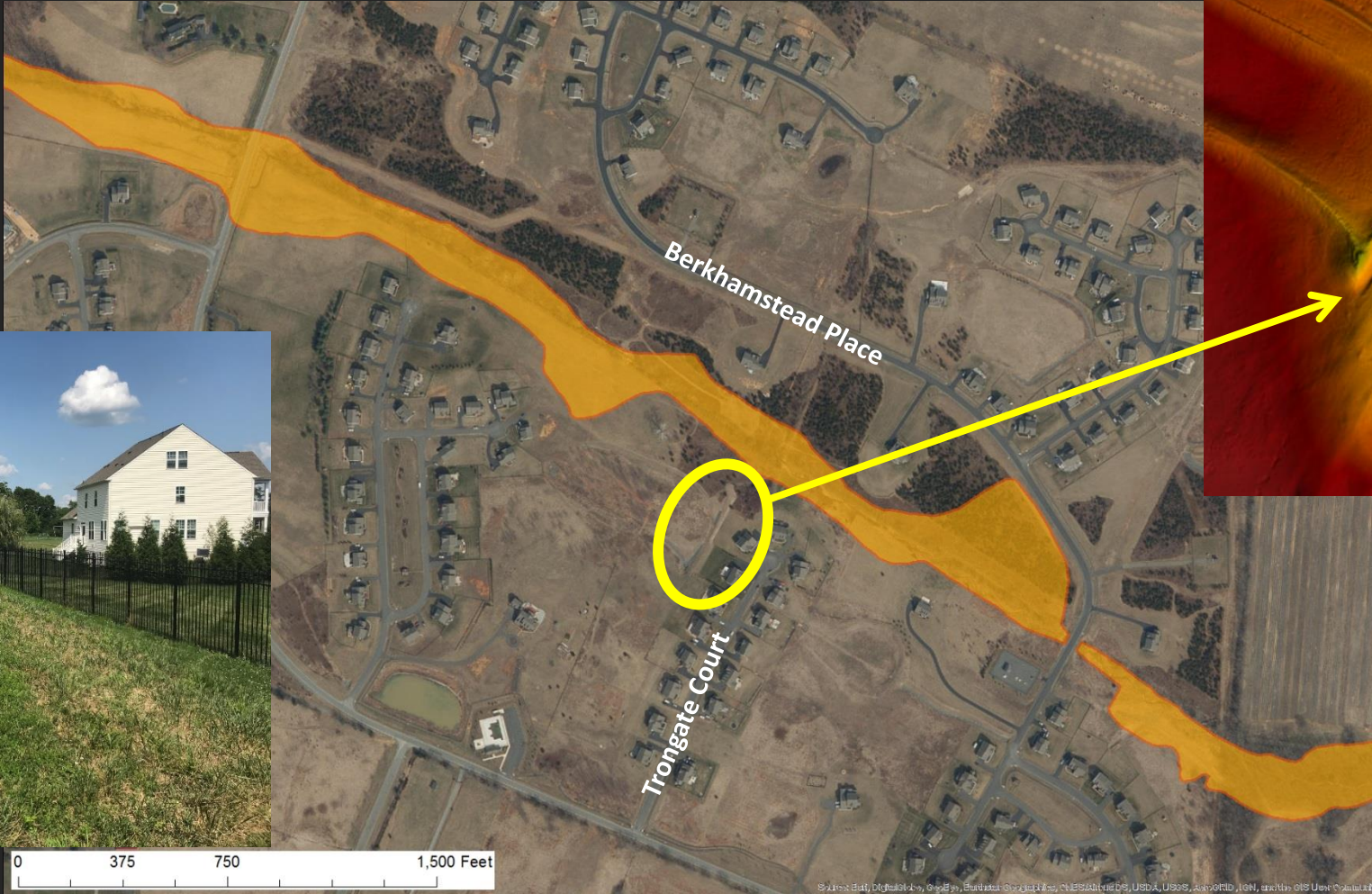
Previous Mapped Floodplains Timeline

- Floodplain developed 2002



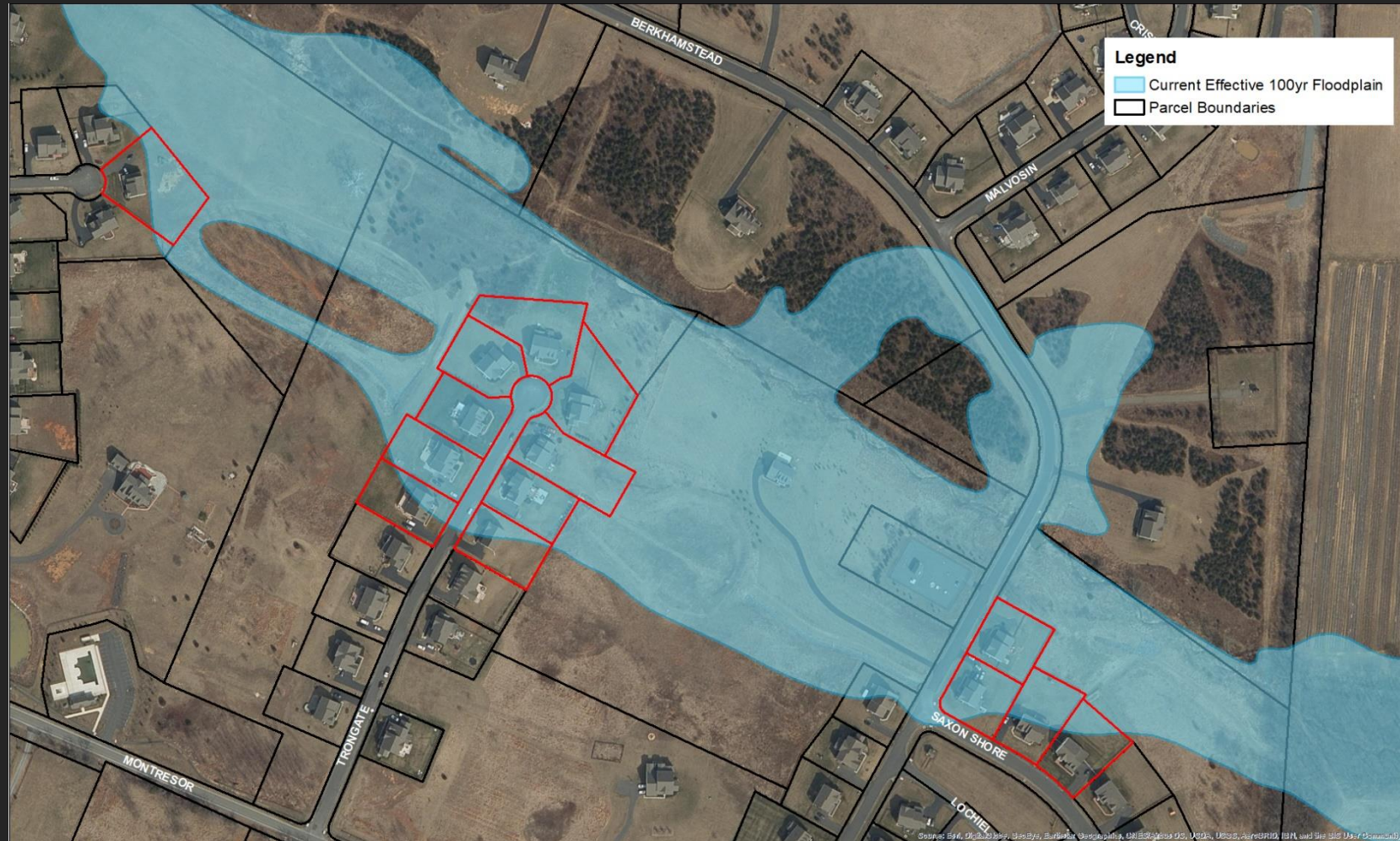
Previous Mapped Floodplains Timeline

- Houses built 2013
- Flooding 2013 & 15

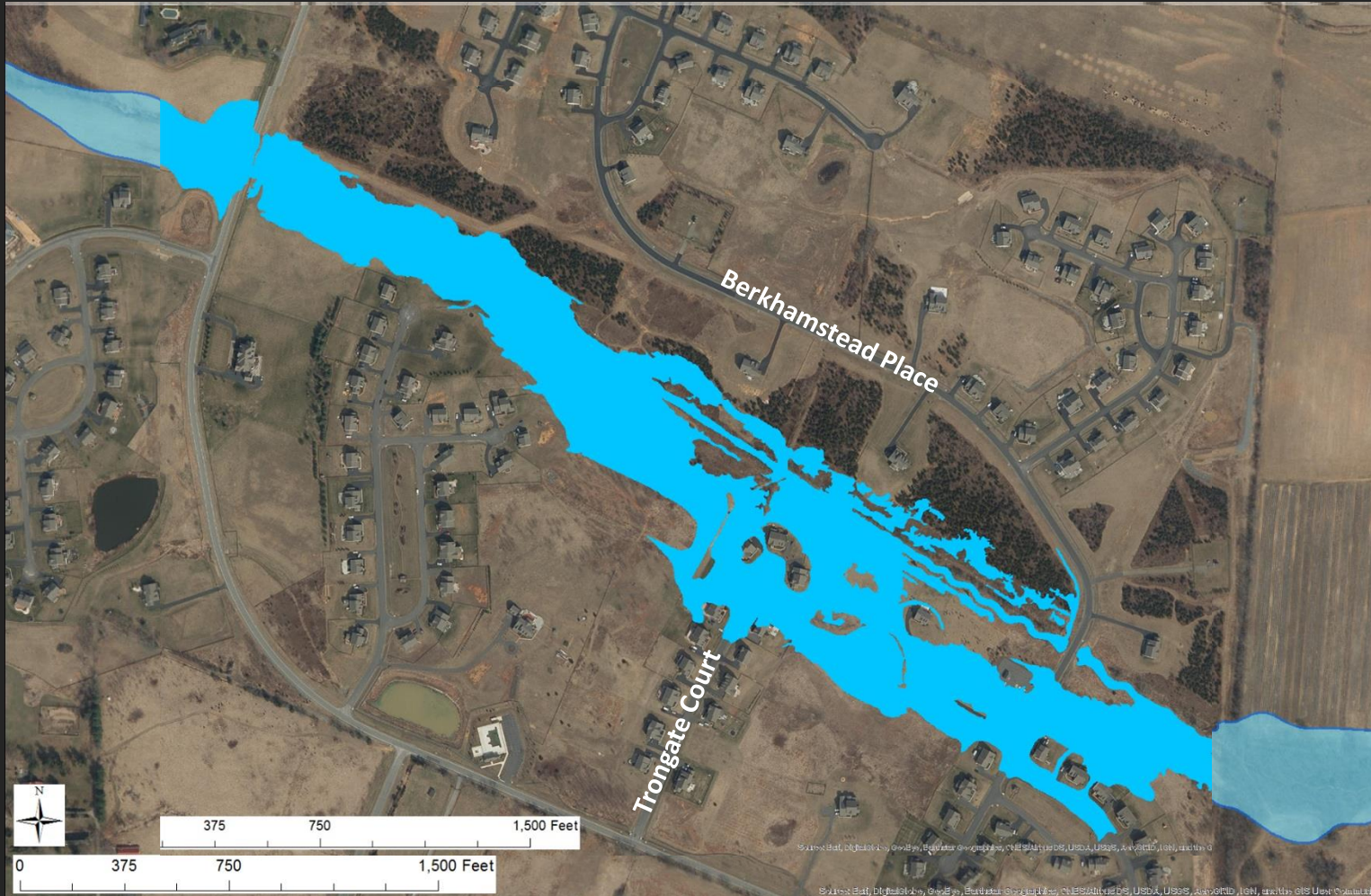


Previous Mapped Floodplains Timeline

- Letter of Map Revision (LOMR) effective June 2019
- Floodplain became regulatory
- Letter of Map Amendment (LOMA) Sept 2019
- 14 houses in floodplain



Previous Mapped Floodplains Timeline

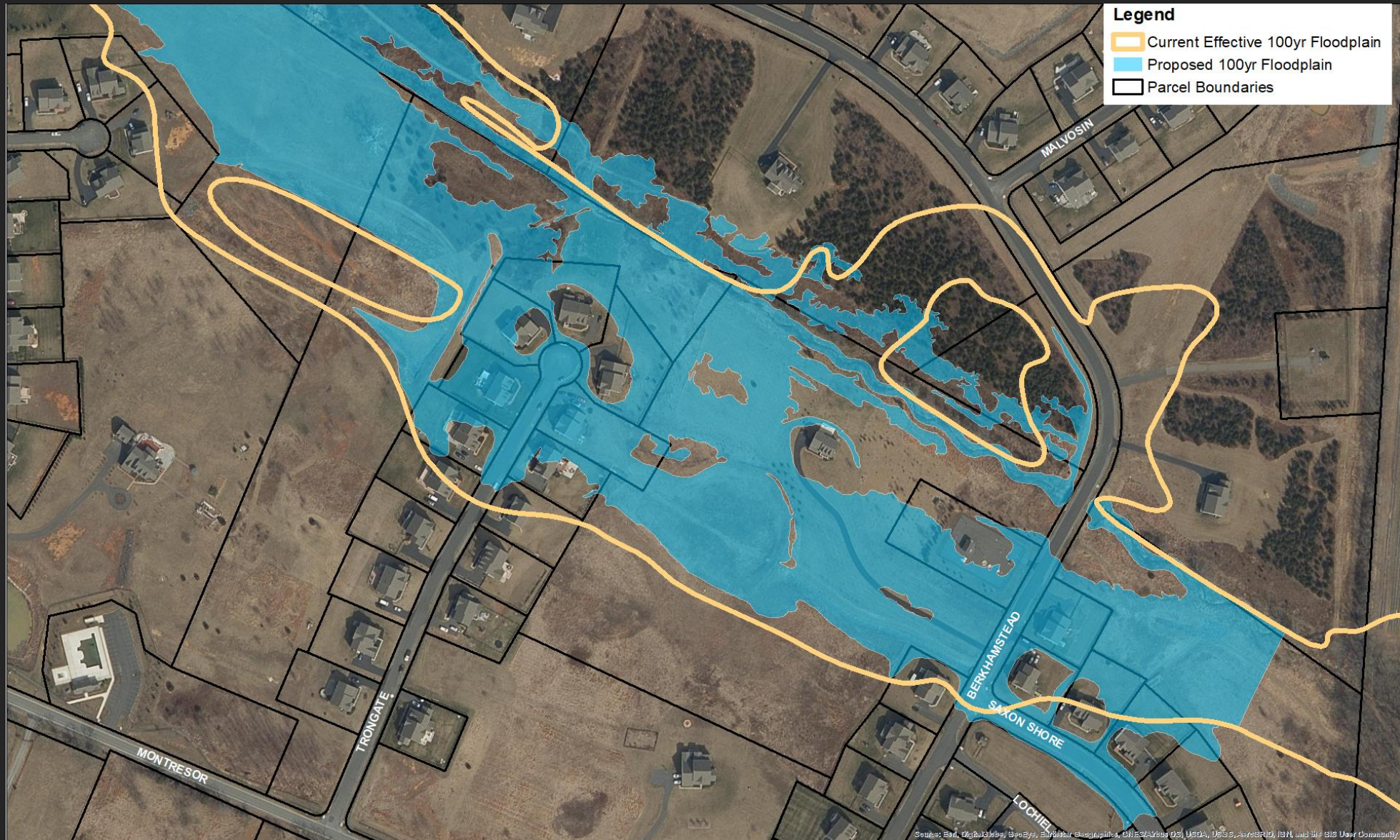


Letter of Map Revision (LOMR)

LOMR

- A new floodplain is developed and a package is submitted to FEMA
 - Includes modeling, documentation, survey, etc.
- FEMA reviews the LOMR package
 - Back and forth between FEMA and engineers
- Once FEMA is satisfied with the LOMR package the case is issued (determination letter sent)
- FEMA officially revises the Flood Insurance Rate Map (FIRM) to reflect the new floodplain

**LOMR process involves additional steps not outlined above*



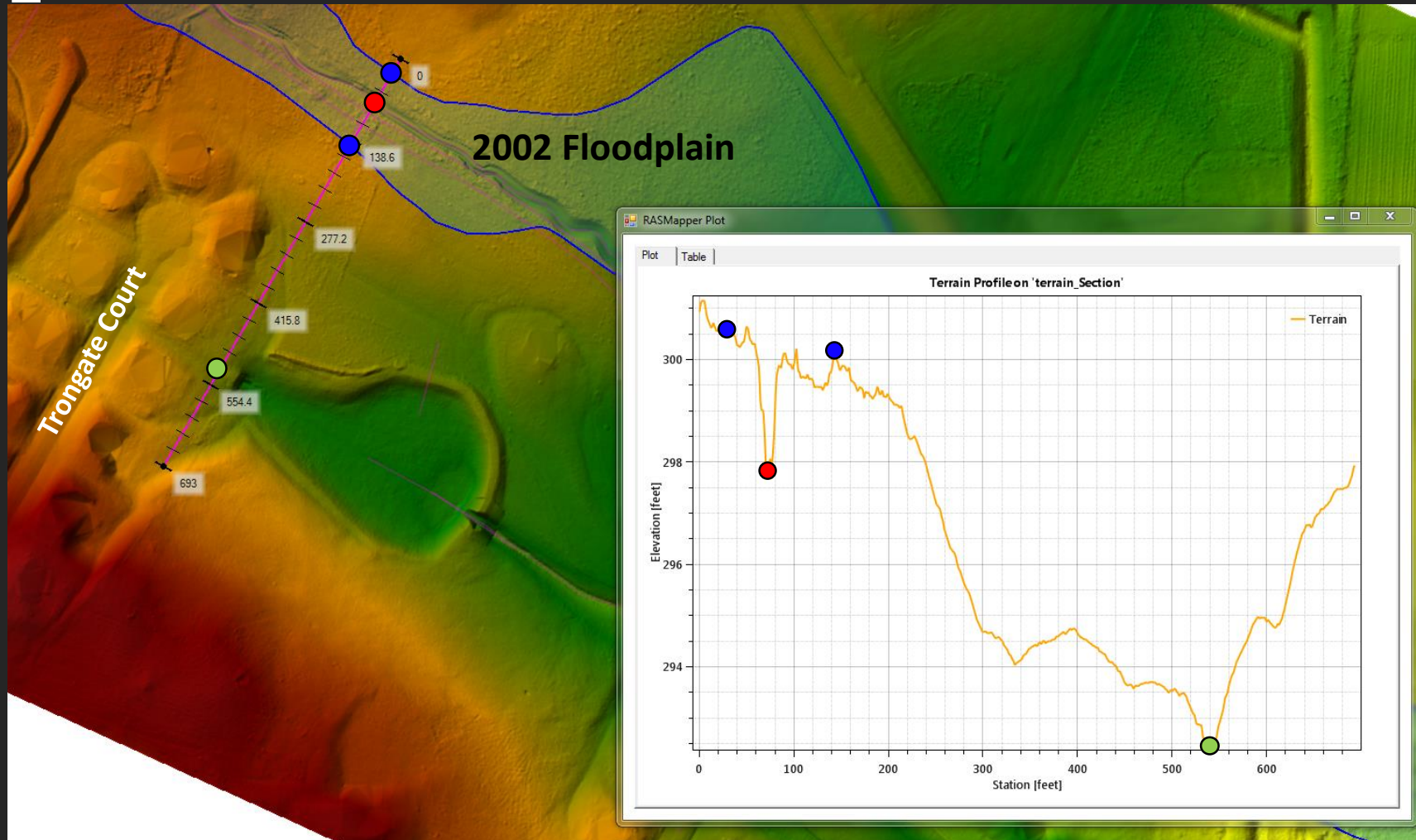
Site Background

Site History

- Southern boundary of floodplain is at a lower elevation than the channel

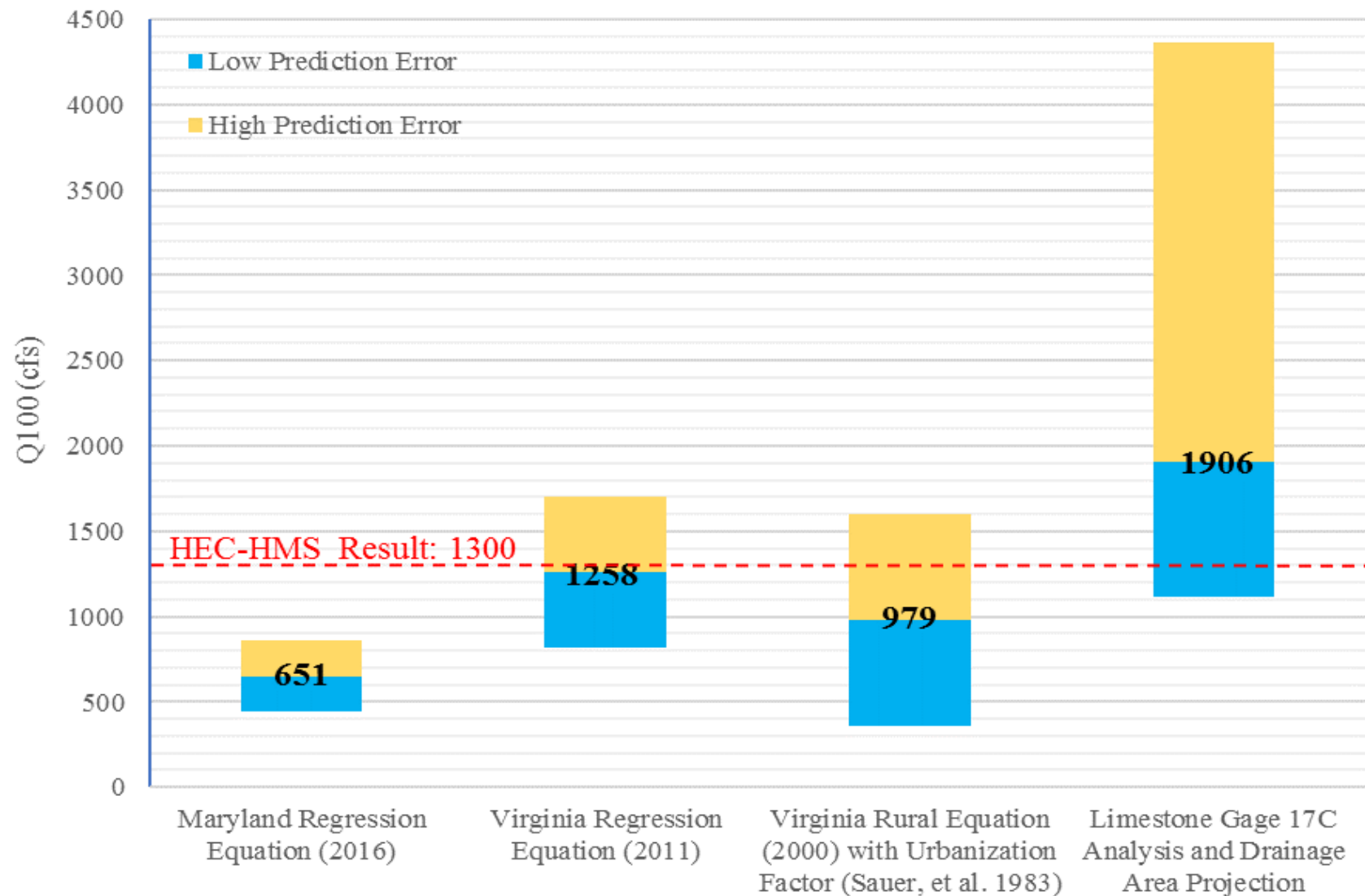


Floodplain Cross Section



Hydrology

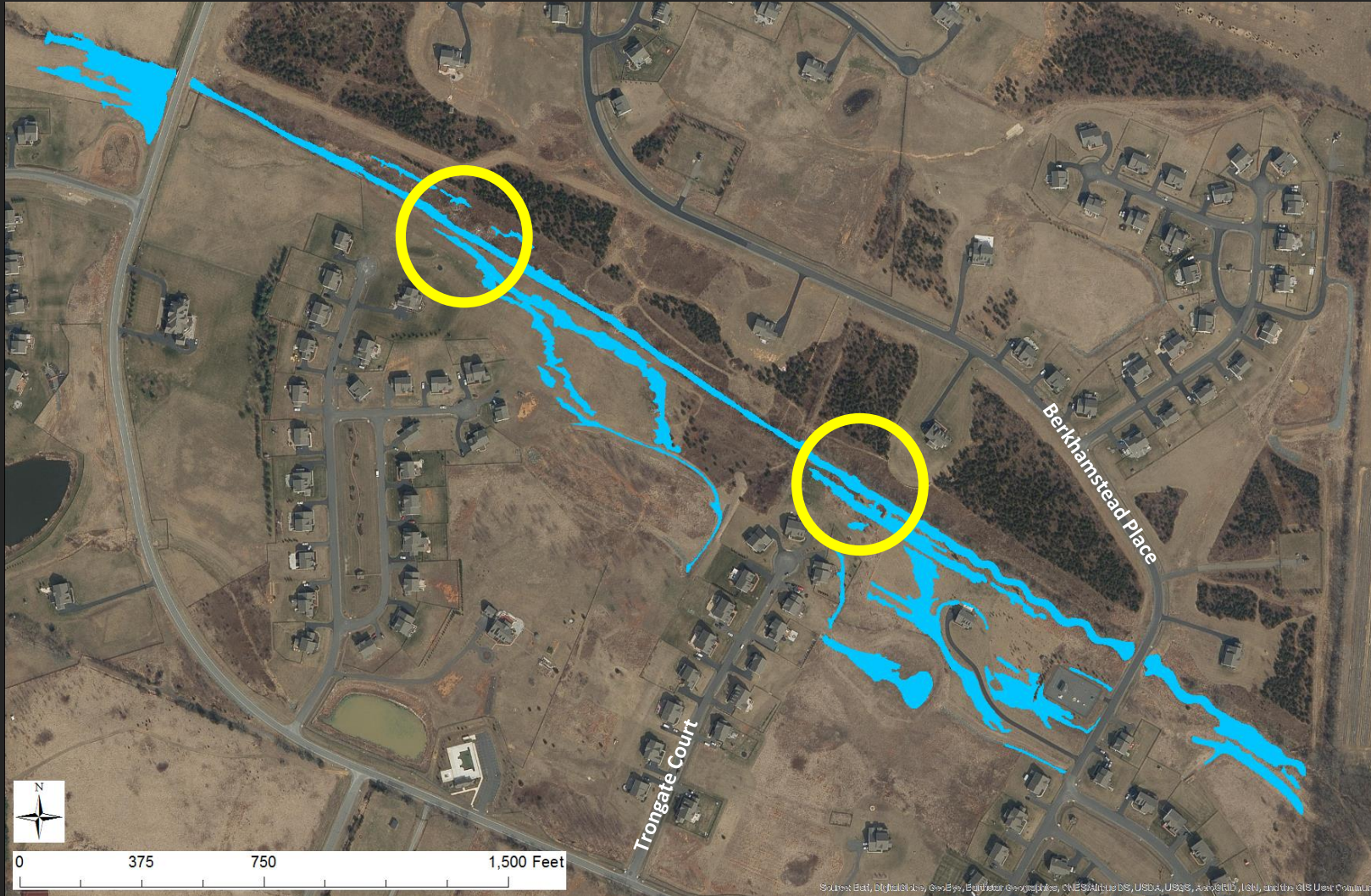
Hydrology



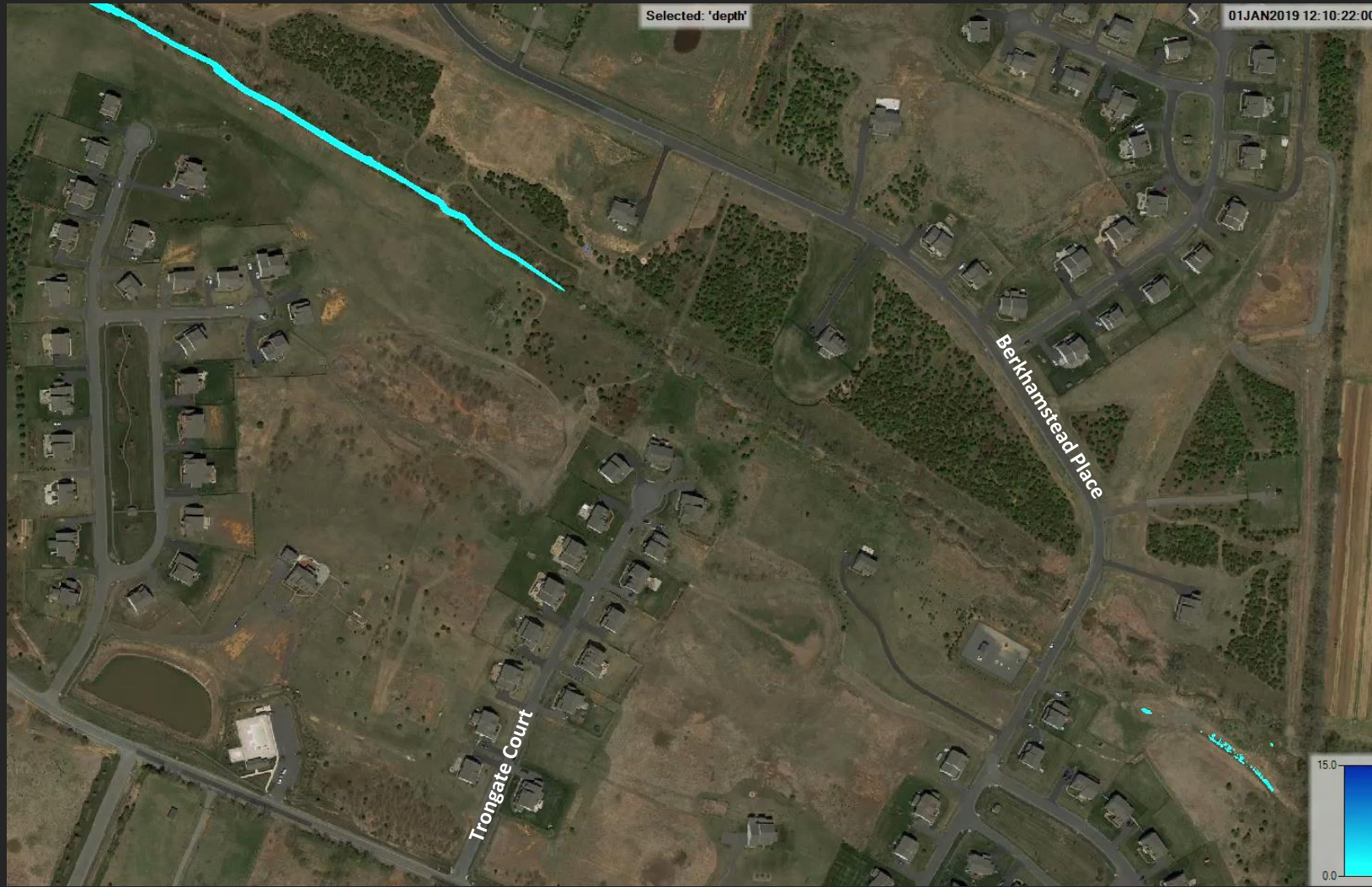
Hydraulics

Hydraulic Results: 2yr

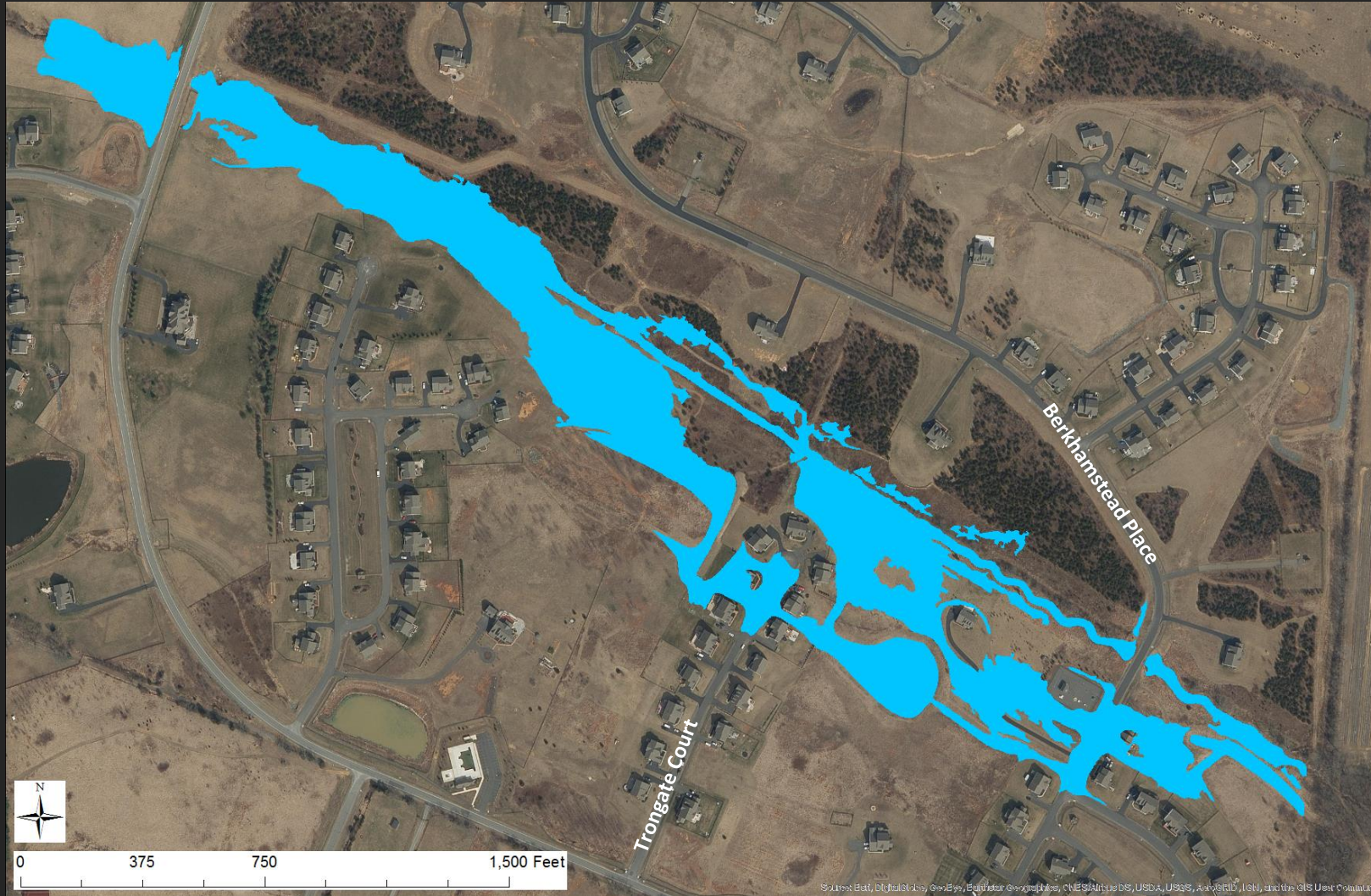
- Estimated channel capacity: 121 Cubic Feet per Second
- 2yr Discharge: 136 Cubic Feet per Second



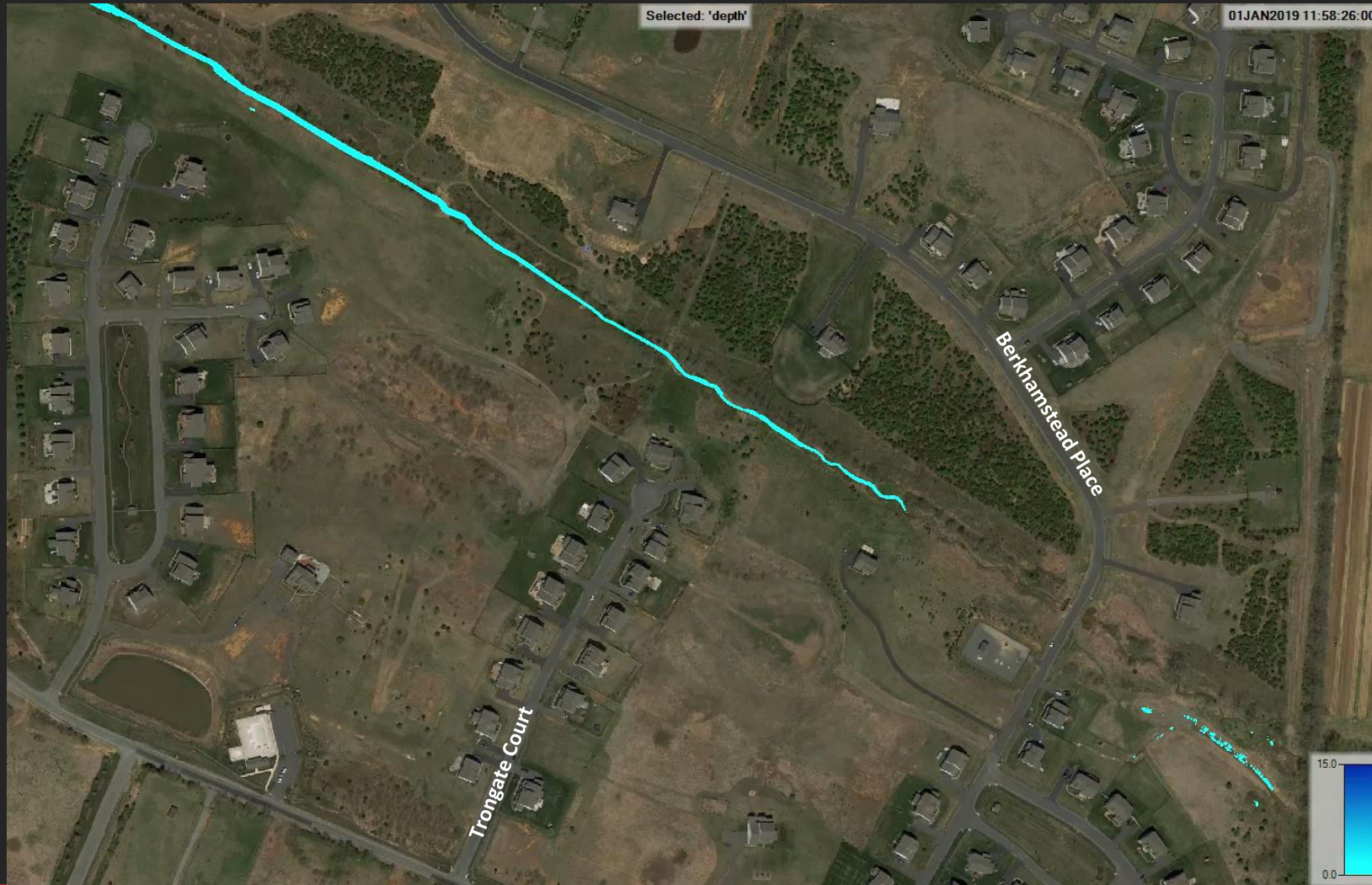
Hydraulic Results: 2yr Time Lapse Video



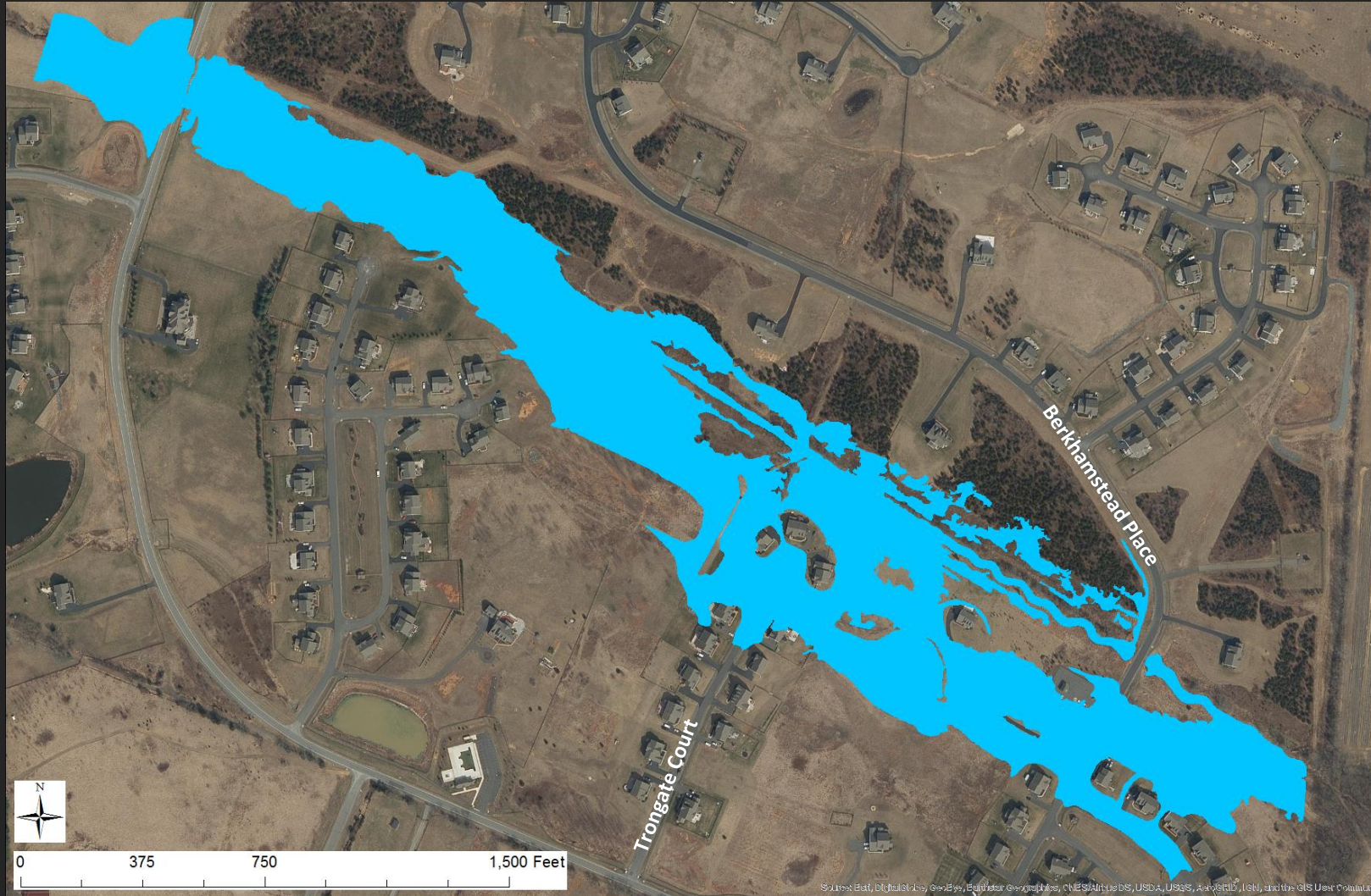
Hydraulic Results: 10yr



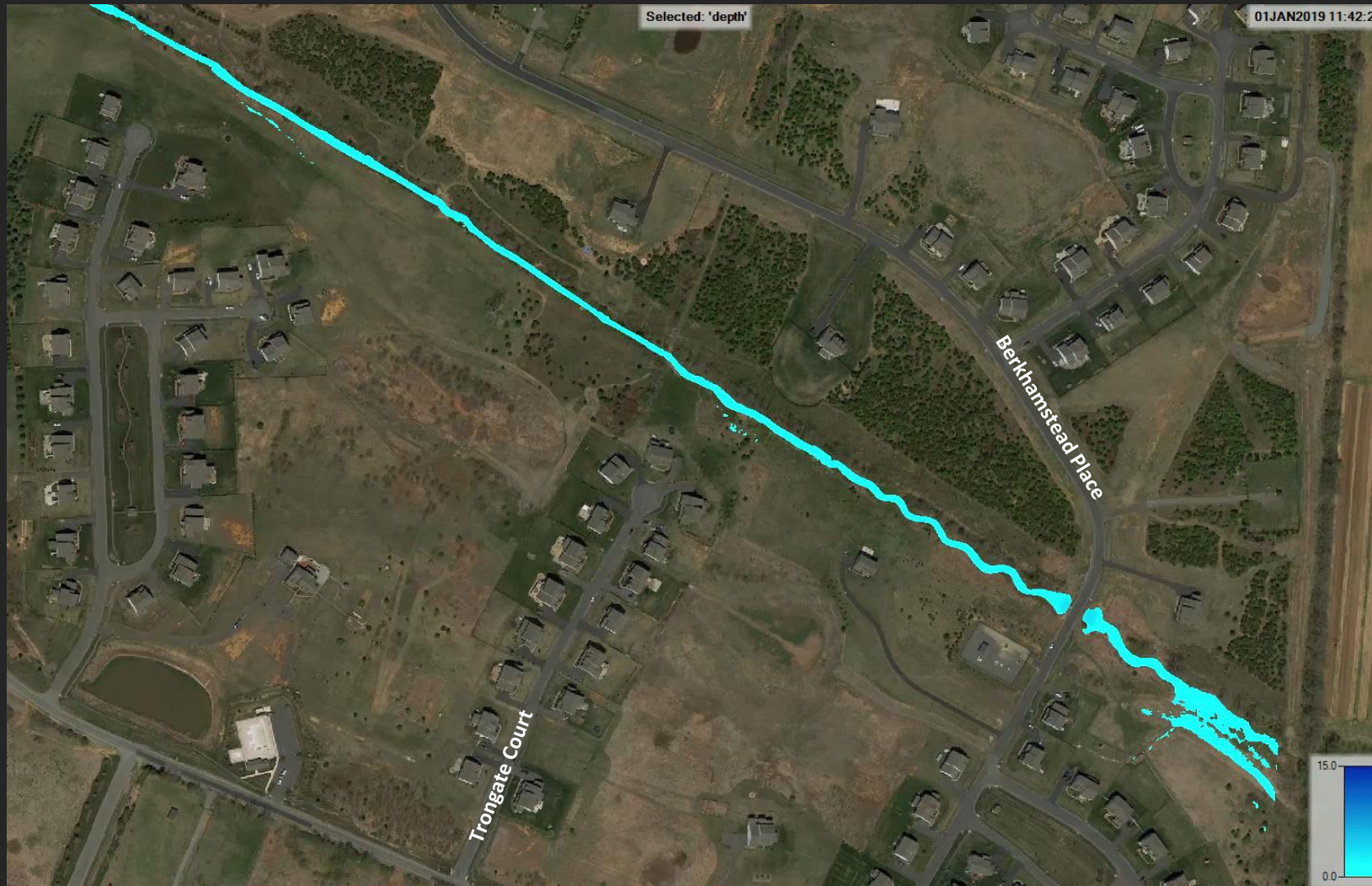
Hydraulic Results: 10yr Time Lapse Video



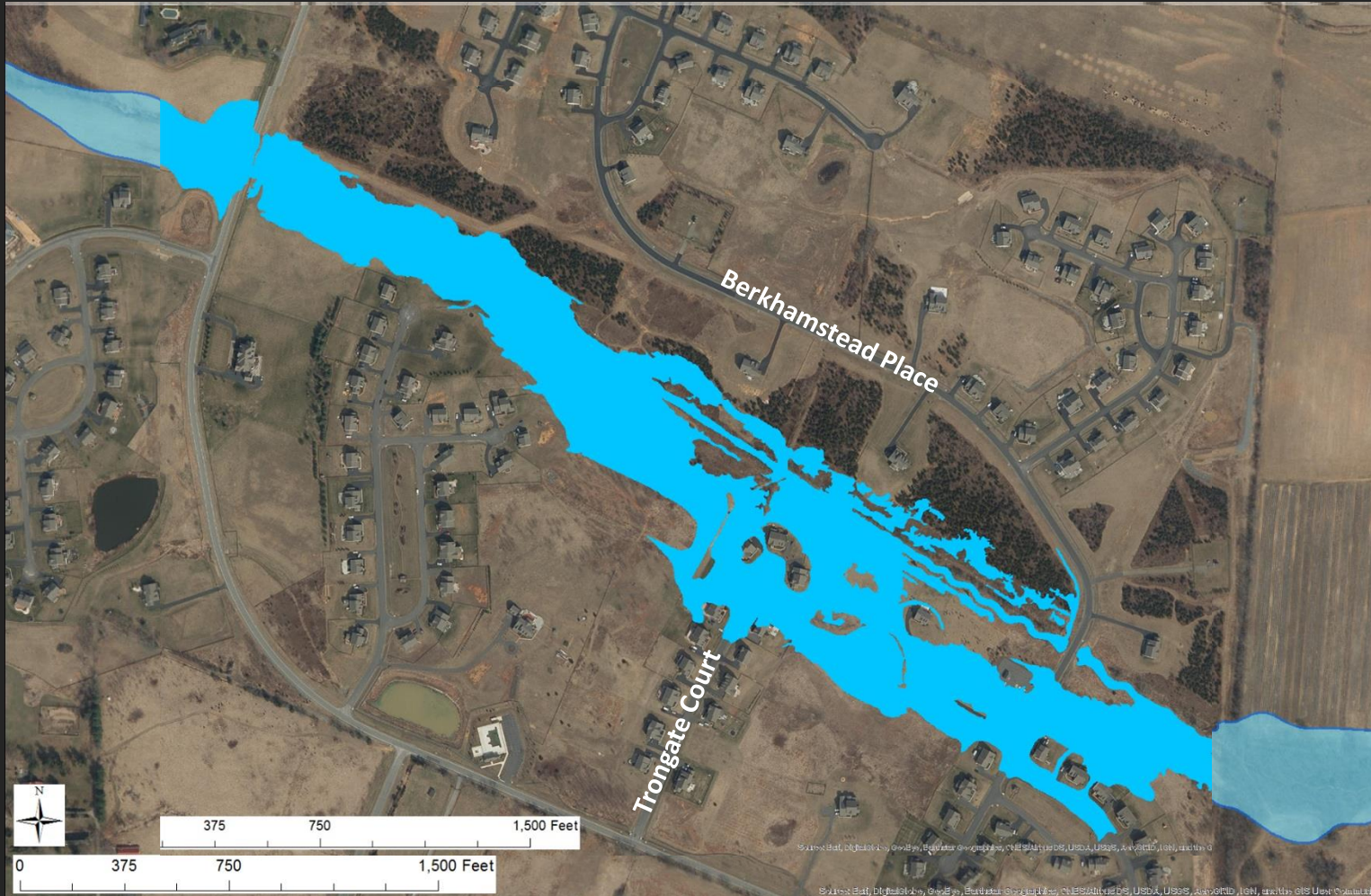
Hydraulic Results: 100yr



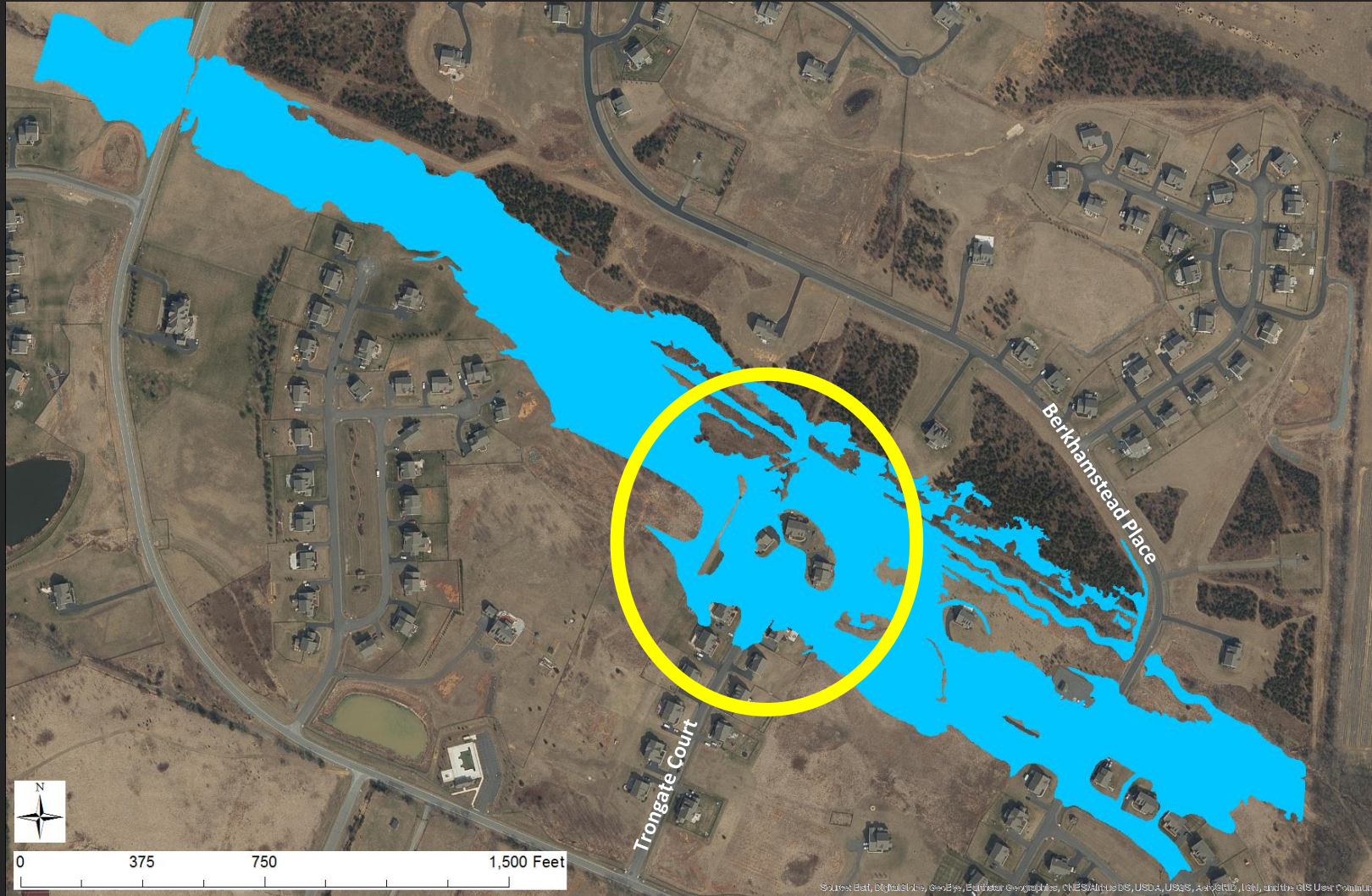
Hydraulic Results: 100yr Time Lapse Video



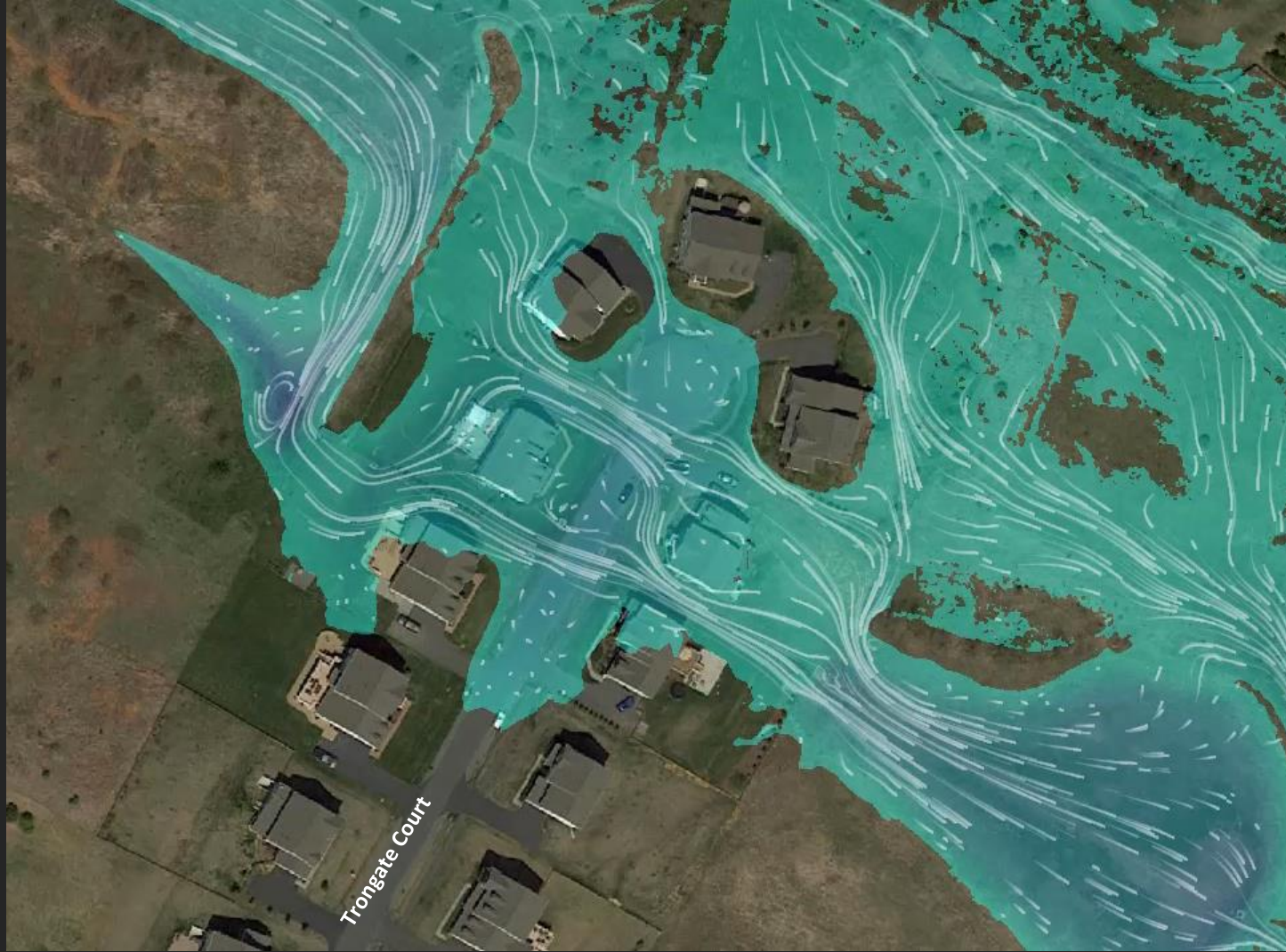
Previous Mapped Floodplains Timeline



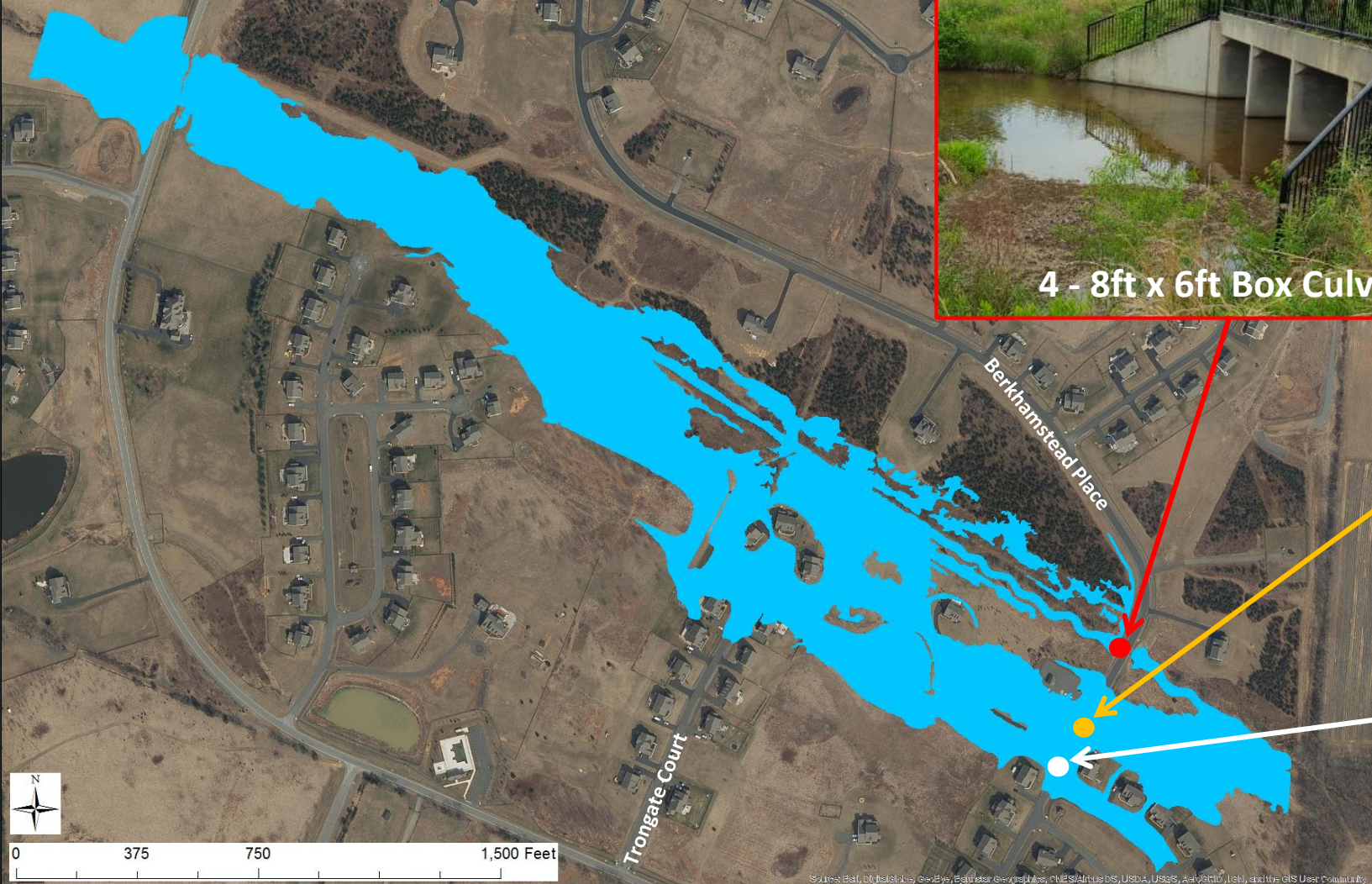
Trongate Court



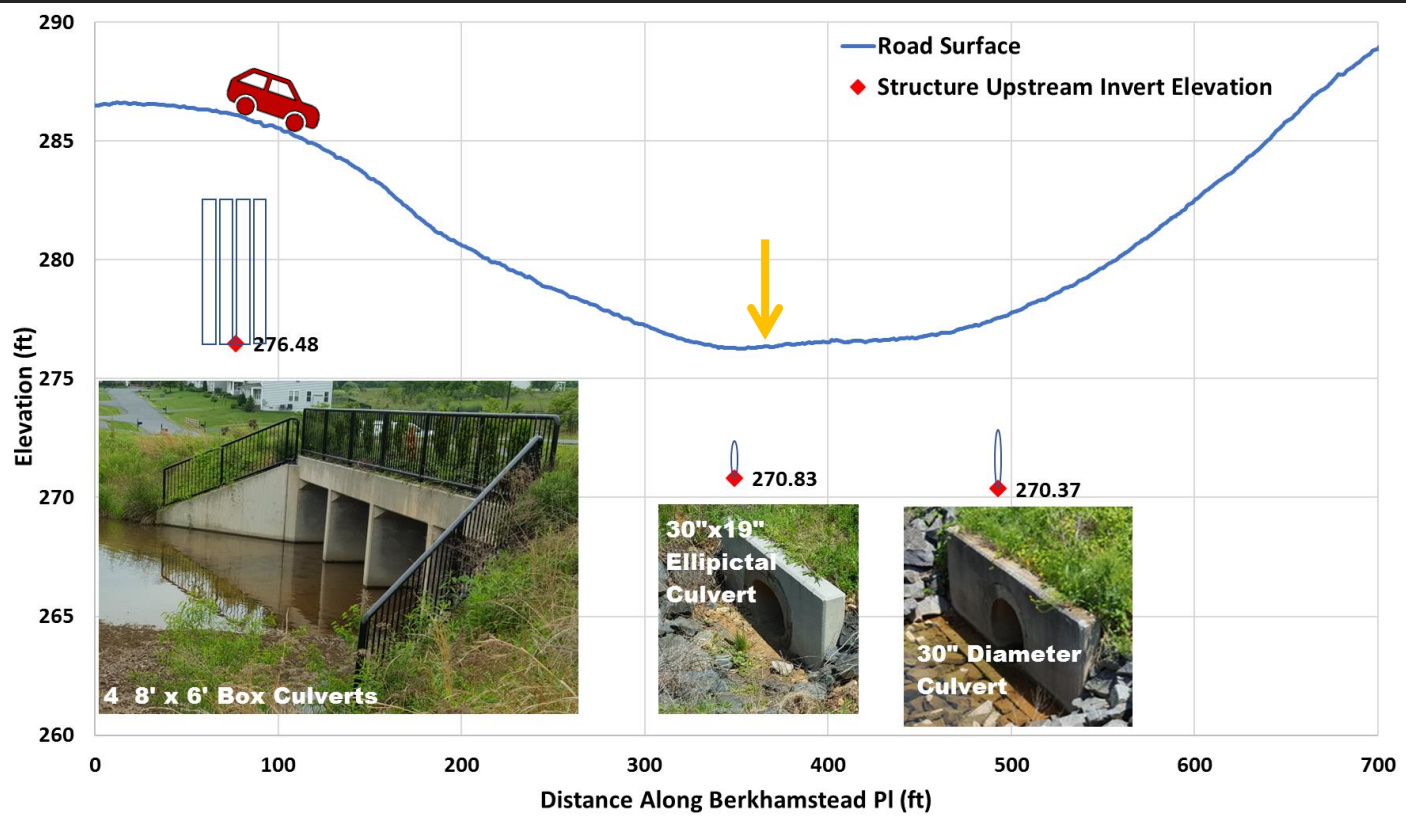
Trongate Court



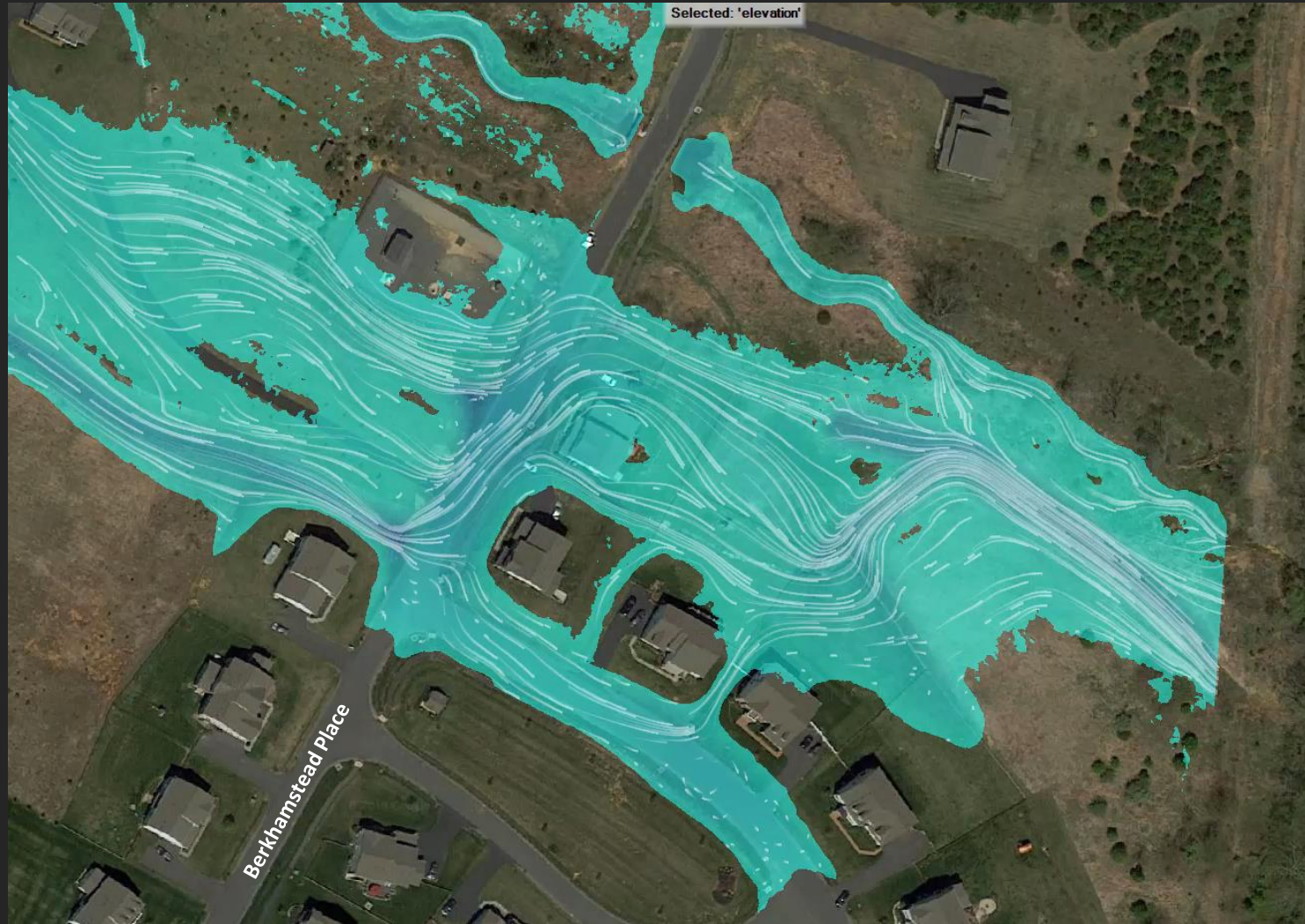
Berkhamstead Place



Berkhamstead Place



Berkhamstead Place



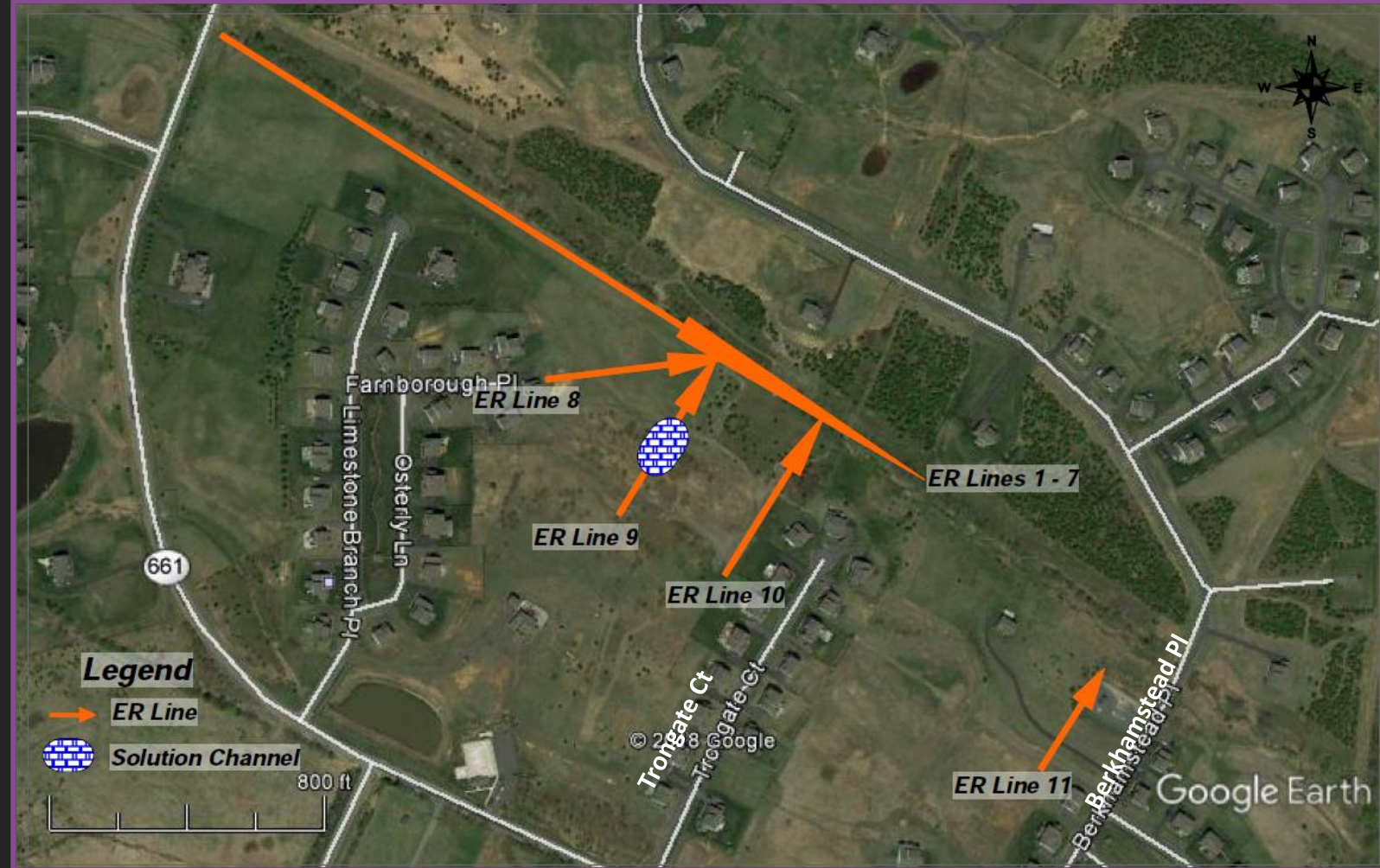
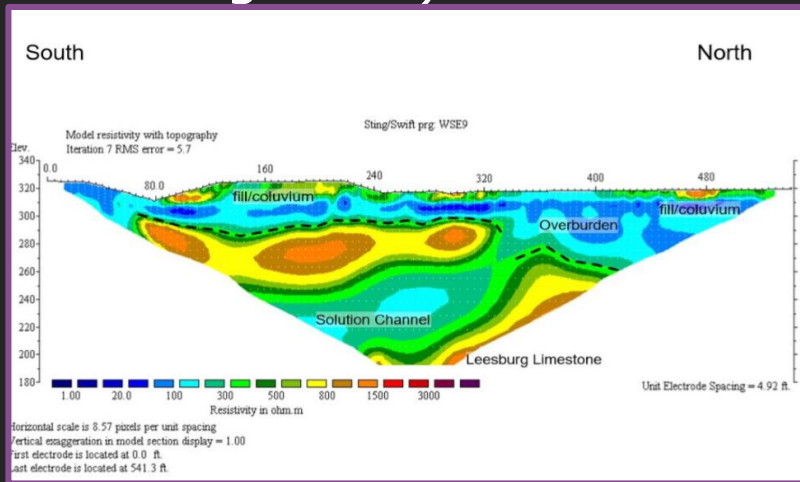
Natural Resources Inventory

Natural Resources Inventory

- Geophysical Survey
- Vegetation Survey
- Steep Slopes
- Soils Survey

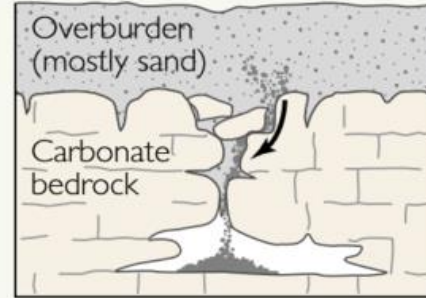
Geophysical Survey

- Electric Resistivity(ER) survey locates underground voids and caverns
- Solution Channel detected at spoils pile
- Saturated fracture detected west of Trongate Ct (on existing berm)

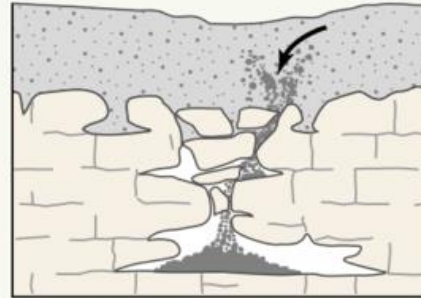


Limestone Overlay District

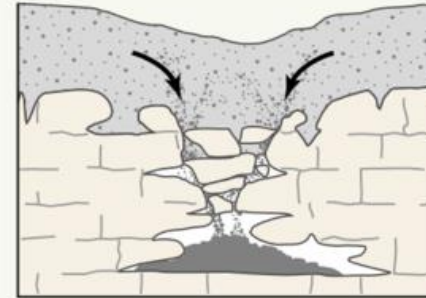
Granular sediments spill into secondary openings in the underlying carbonate rocks.



A column of overlying sediments settles into the vacated spaces (a process termed "piping").



Dissolution and infilling continue, forming a noticable depression in the land surface.

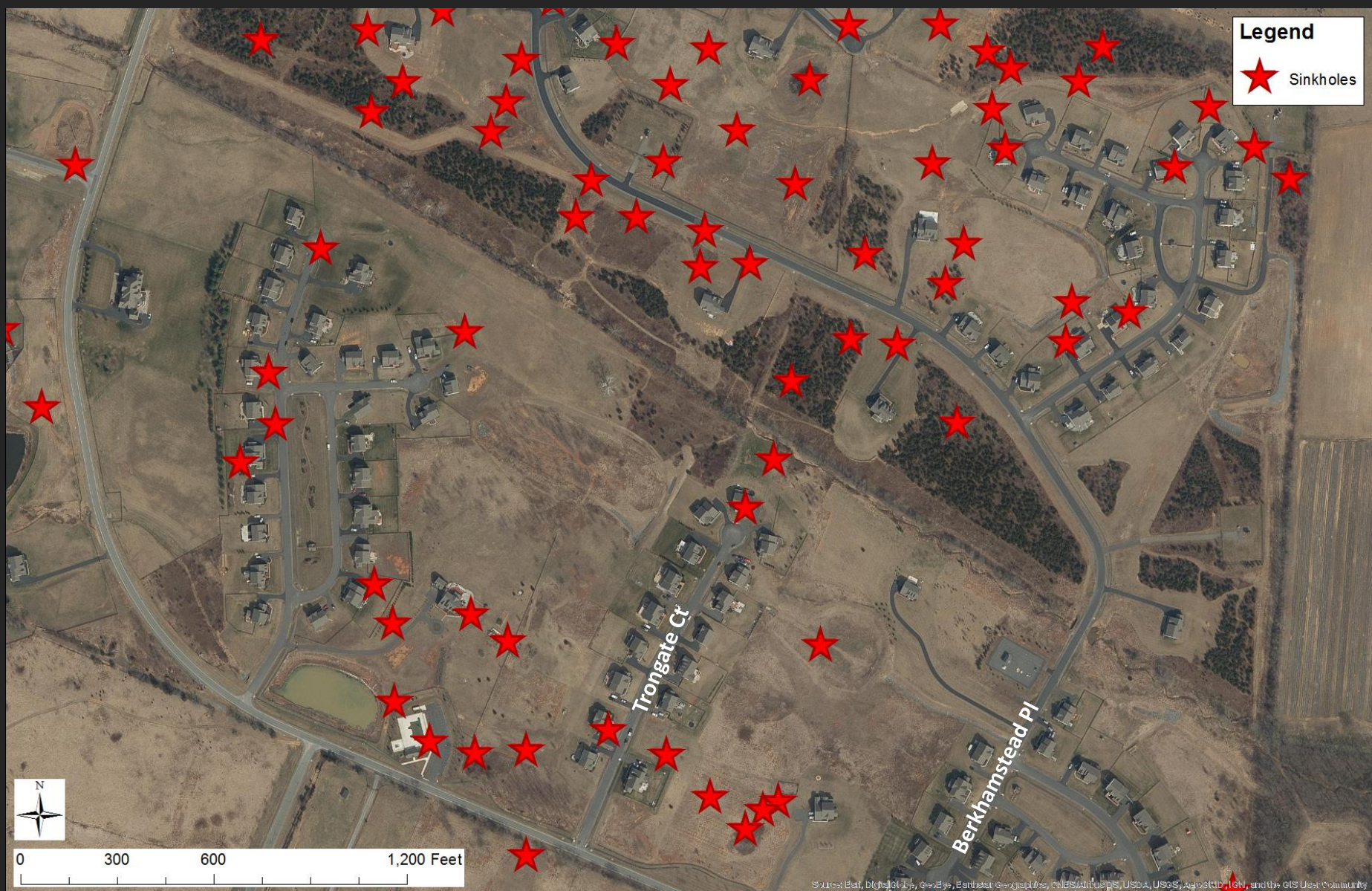


The slow downward erosion eventually forms small surface depressions 1 inch to several feet in depth and diameter.



https://www.usgs.gov/special-topic/water-science-school/science/sinkholes?qt-science_center_objects=0#qt-science_center_objects

- Changing drainage patterns in karst can create sinkholes.
- Loudoun County Zoning Ordinance: Section 4-1900 Limestone Overlay District
 - Avoid damage to karst/sensitive environmental features
 - Do not change natural drainage pattern

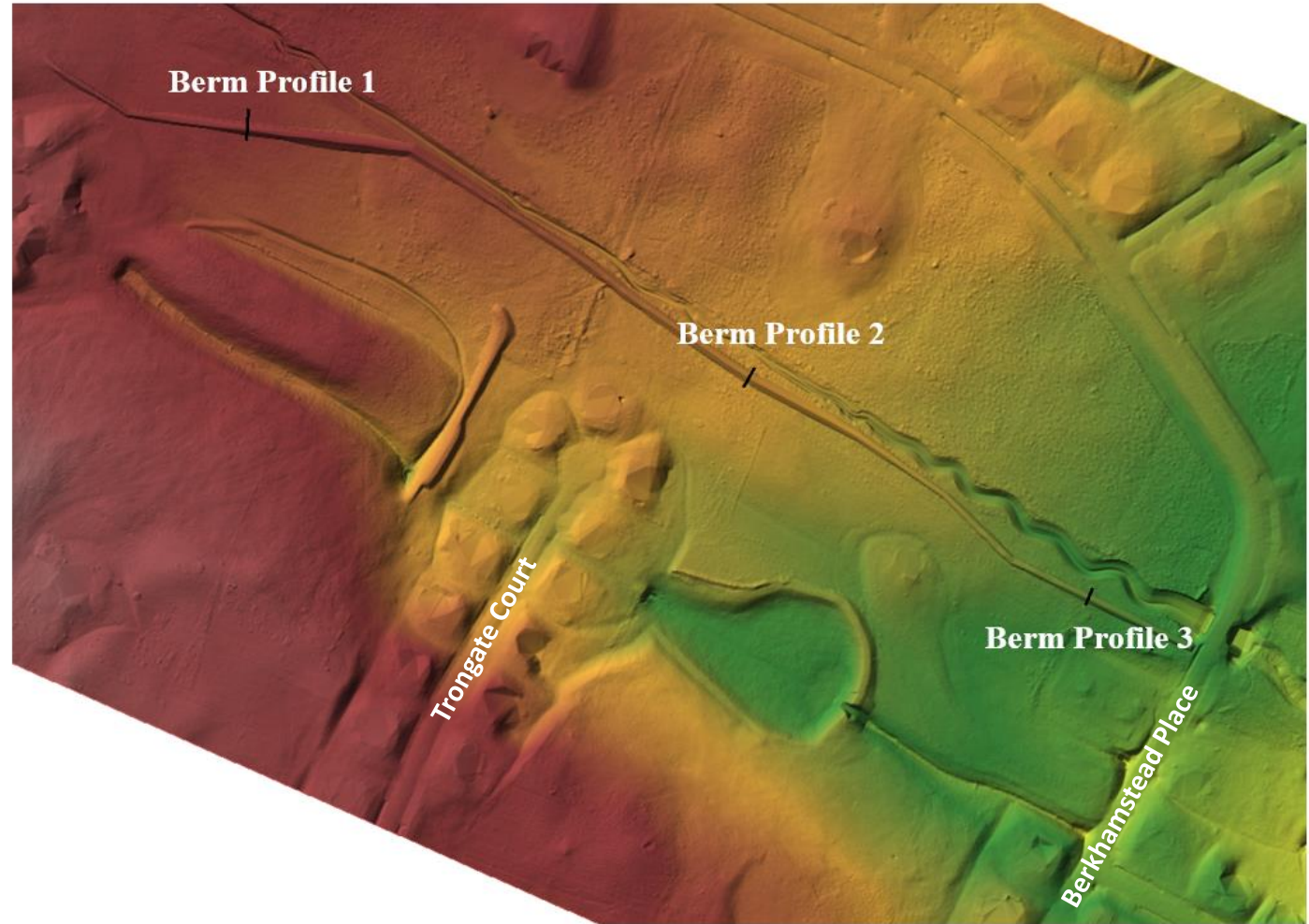
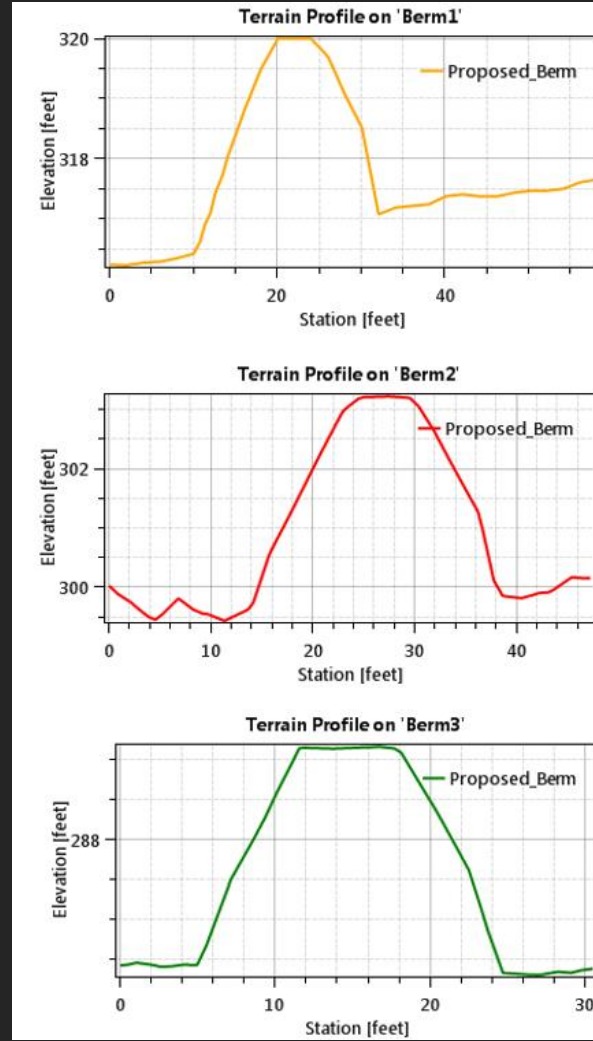


Vegetation Survey/Steep Slopes/Soils

- Identified jurisdictional streams and wetlands
- Located 3 different vegetation communities and 3 specimen trees
- Steep slopes ($>15\%$) were typically man-made
- Erosive soils were identified on site

Evaluation of Proposed Alternatives by Others

Proposed Berm: Design



Proposed Berm: Items to Consider

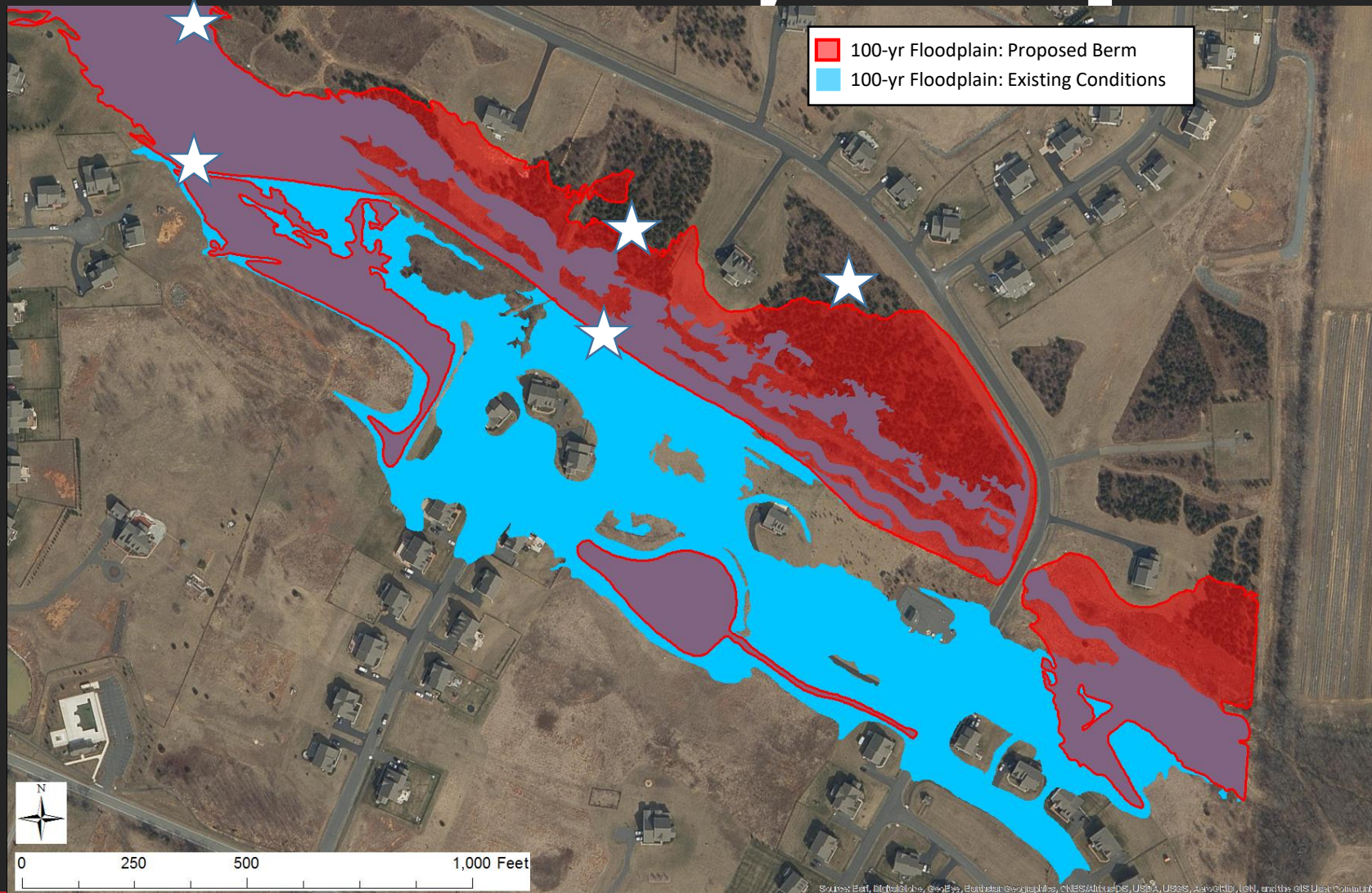
- Overtops earthen berm and could potentially breach (model does not consider)
 - seepage, burrowing animals, settlement, debris, trees, climate change
- Not FEMA accredited
- Flooding relocated to adjacent properties north of the tributary
- Located in highly erosive soil
- Located on privately owned property
- Intersects the conservation easement
 - Any modification of the restrictive covenants must have the written approval and consent of the Owner, the USACE, and DEQ
- Contrary to Limestone Overlay District requirements
- Adverse impact to existing stream restoration project
- Removal of specimen trees

Proposed Berm: Items to Consider

- FEMA Accredited Levee Requirements (44 CFR § 65.10)
 - 3 ft of freeboard – 4 ft within 100 ft of a structure
 - embankment protection
 - embankment and foundation stability analysis
 - settlement analysis
 - interior drainage analysis
 - operation plan and maintenance plan

Proposed Berm: Modeled 100-yr Floodplain

★ MAPPED SINKHOLES



Potential Solutions

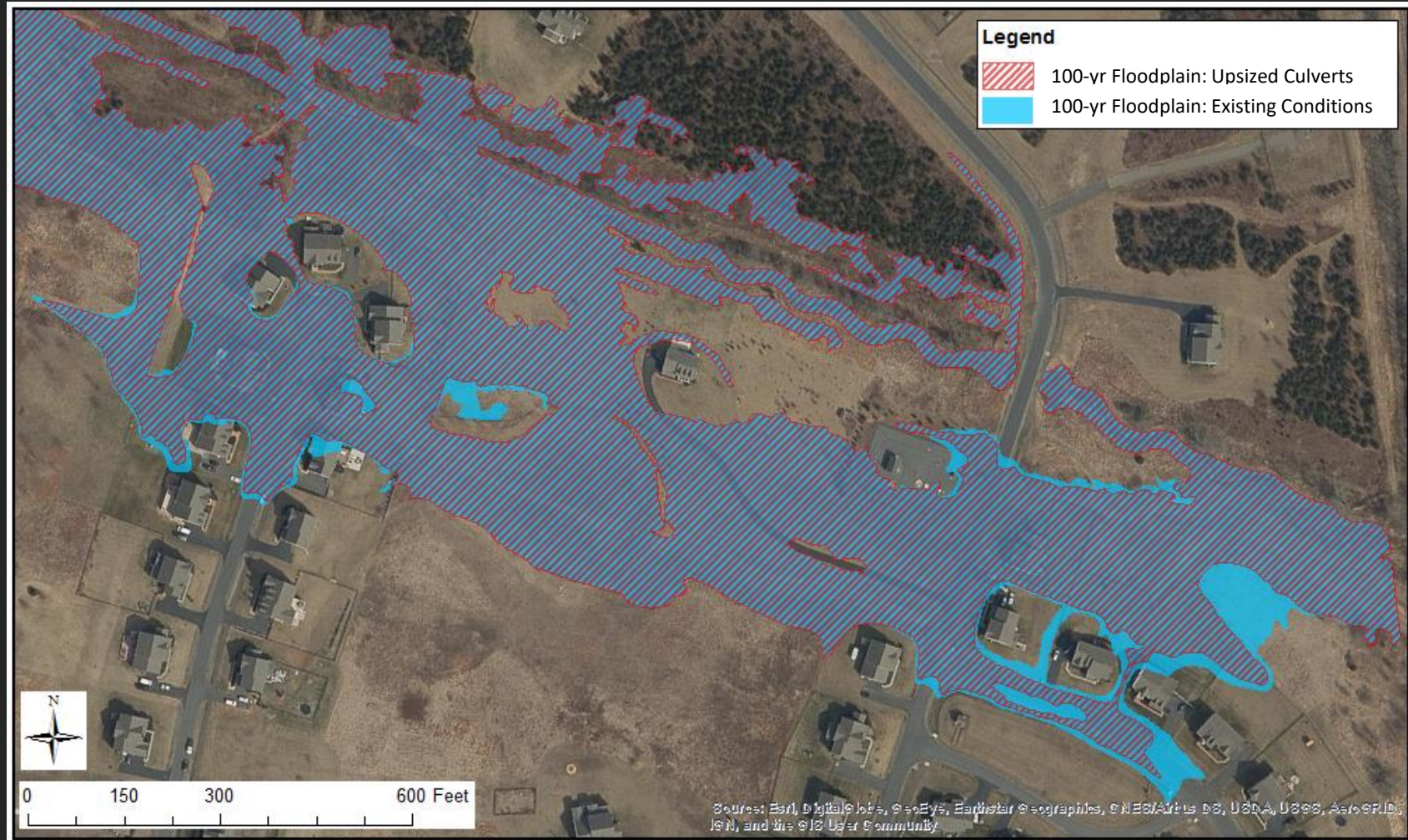
Upsized Culverts

- 1,000 ft+ of storm sewer upsizing
- 30" RCP to 68" elliptical replaced with 58" x 91" HEP



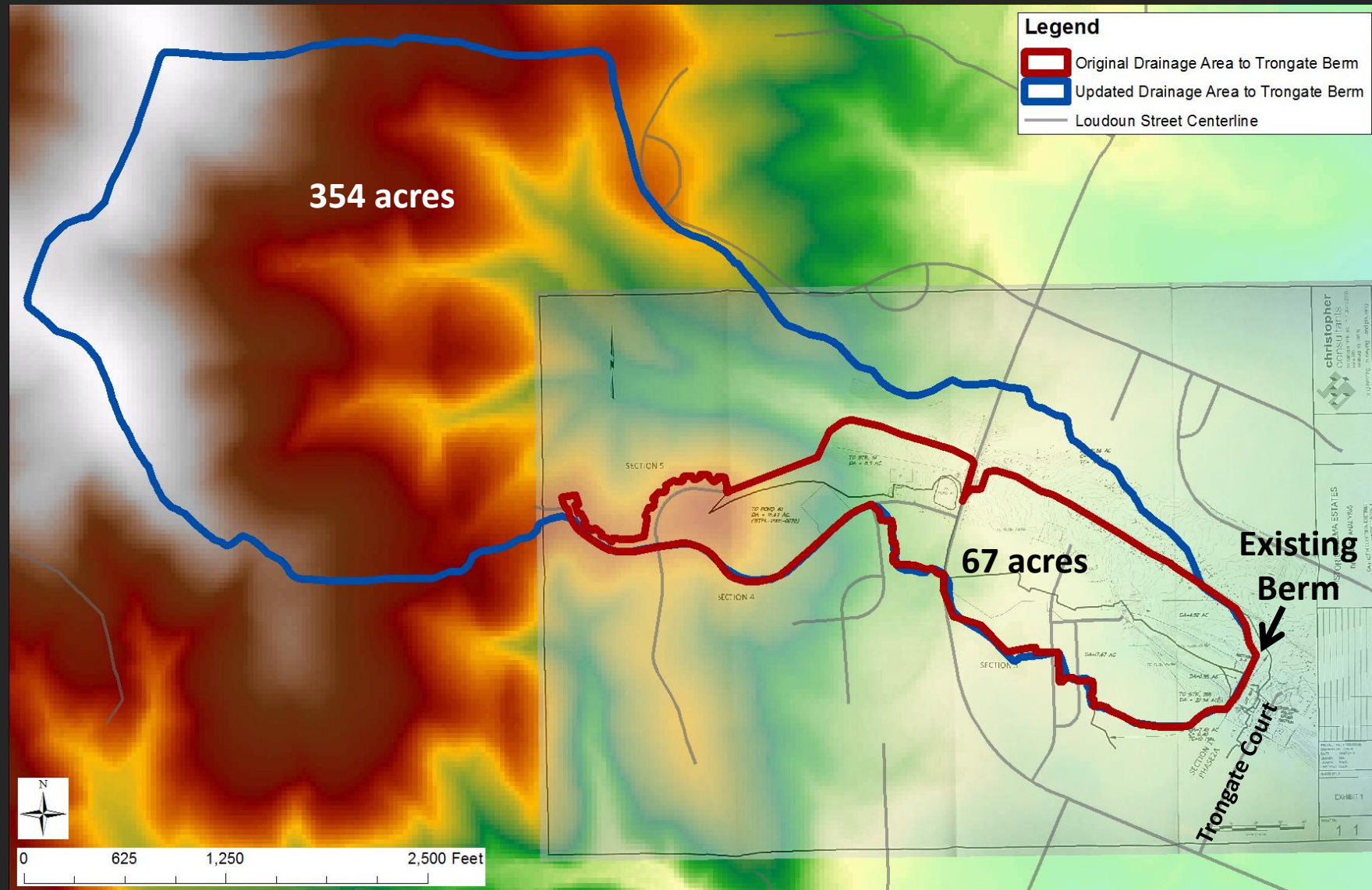
Upsized Culverts: Items to Consider

- Upsizing culverts had minimal impact (drainage area)
- Design requirements – minimum cover, easements, velocities
- Cost



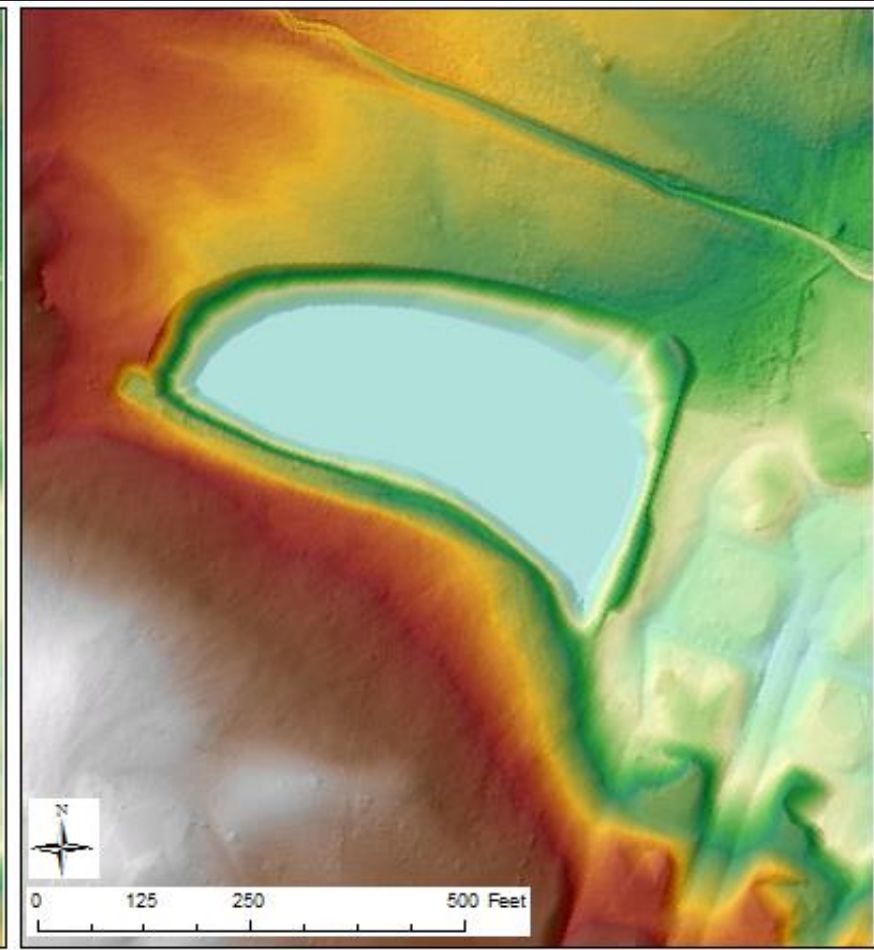
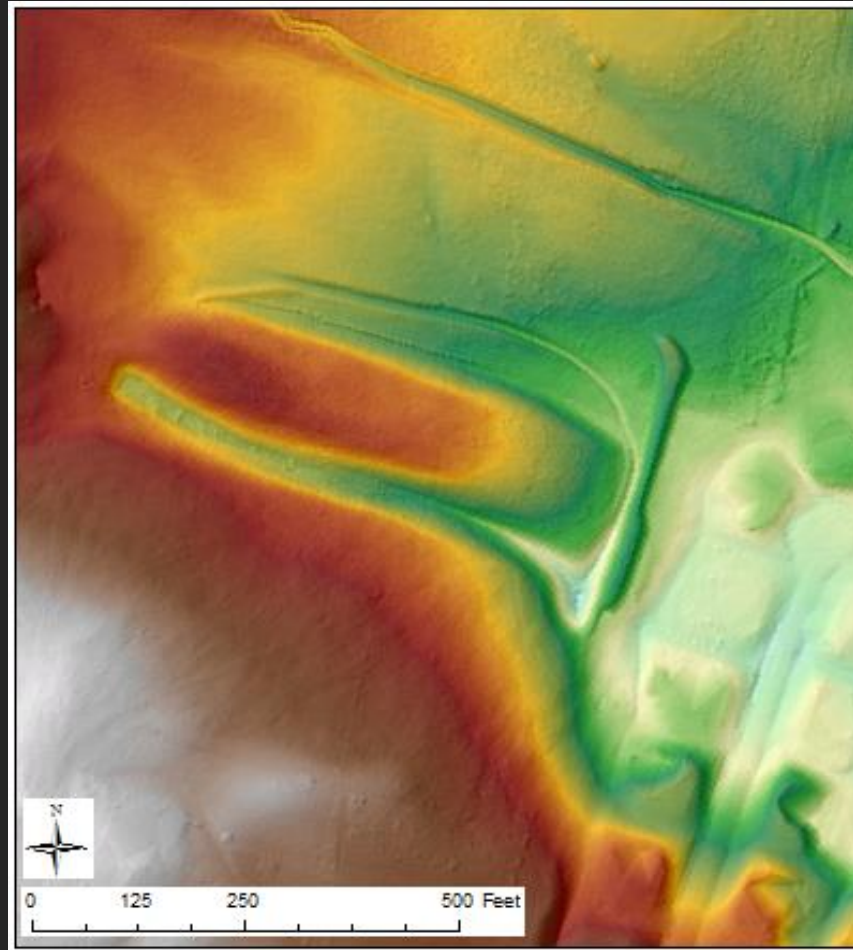
Site Drainage

- Storm water infrastructure designed for under-sized drainage area



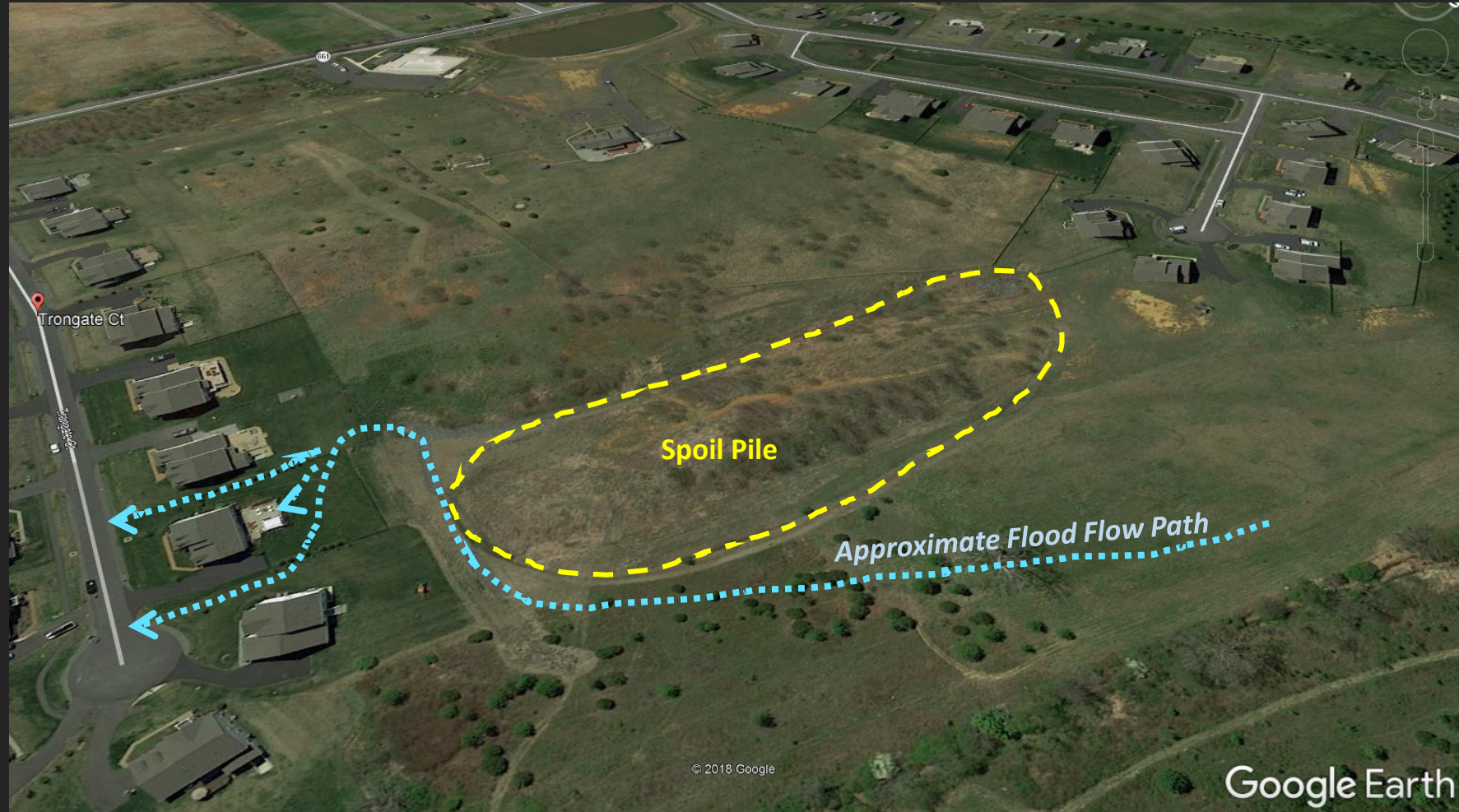
Pond and Upsized Culverts

- 3.7 acre pond
- 1,000 ft storm sewer



Pond and Upsized Culverts: Items to Consider

- Reduces flooding of structures
- Solution channel and saturated fracture
- Homes in an unintentional spillway
- Cost



Buyout: Items to Consider

- Additional costs: demolition, conversion to green open space, lost tax revenue, potential relocation
- FEMA's property acquisition program are strictly voluntary
- Homeowners in the vicinity of the floodplain boundary may want to be included in the buyout
- May attract attention from other homeowners with nuisance flooding
- Buyout only considered for the 100-year event
- Protection of Loudoun Water wastewater lift station
- FEMA grant opportunities for buyout

Summary

Summary

- A buyout is the only evaluated option that removes flood risk and safety concerns associated with the 1%-annual-chance event (100-yr) as described in the report, with certainty.

Letter of Map Revision (LOMR)

LOMR

- Updates the FEMA maps
- Provides Base Flood Elevations
- Improved accuracy of assessing a structure's risk to flooding
- Package sent to FEMA February 6th
- Property Owner Notification letters mailed

Letter Of Map Amendment (LOMA)

Process

- LOMR must be Effective prior to application submission
- County staff submits new LOMA package
- County staff updates Elevation Certificates
- It is anticipated that additional structures may be removed from the floodplain
 - This determination will be at FEMA's discretion

Next Steps

Next Steps

- Private conversations with property owners with structures in the 100 year floodplain to gauge their interest in participating in a buy-out program.
- Finalize staff assessment of grant opportunities and developing the framework for a buy out program to be presented to the Board in this spring.

Questions?

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