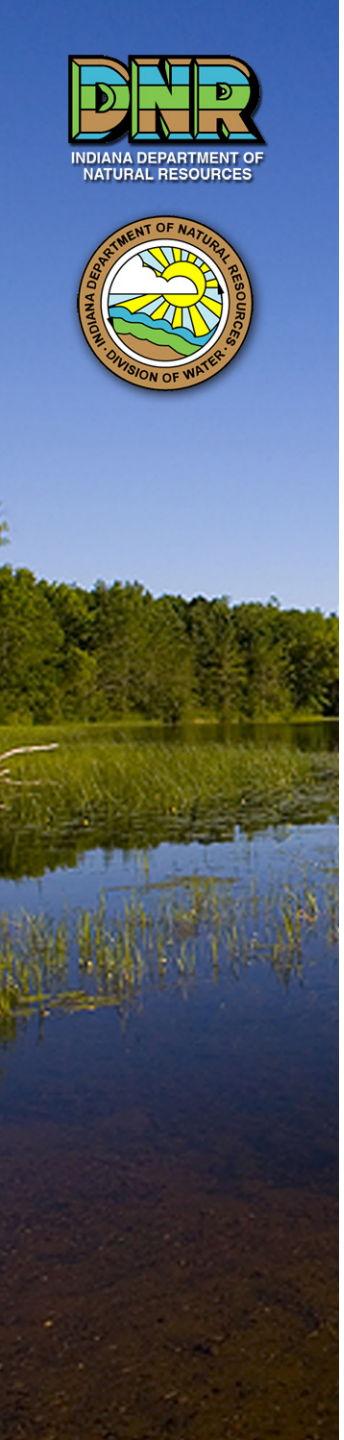
Effective use of LiDAR

INAFSM
September 7, 2016

Eric Moster
Engineering Section Manager



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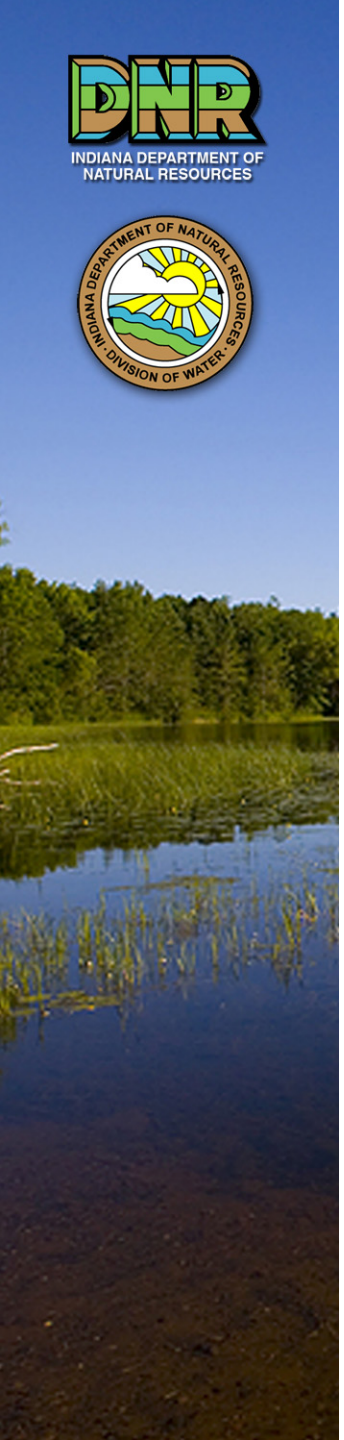
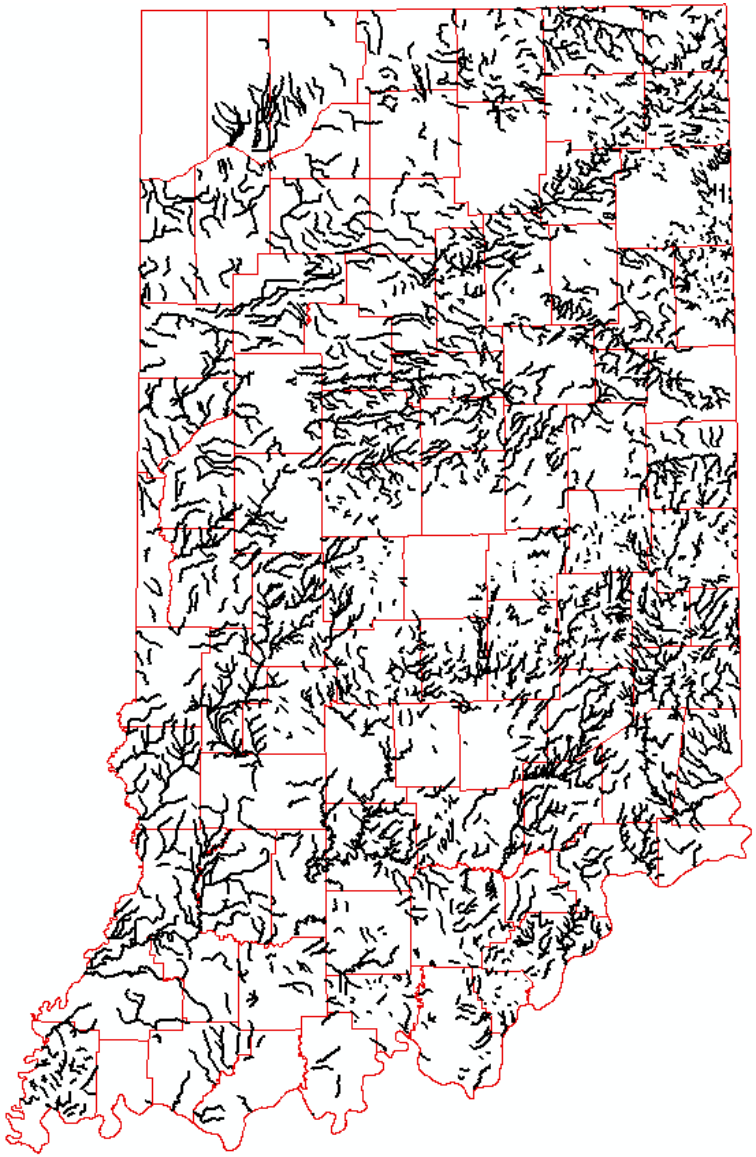


Zone A project

- FEMA guidance – all new zones must be model based
- Approximate model (no bridges)
- Hydrology : Purdue regression equations from Streamstats
- Bridges not modeled, but adjusted for using ineffective flow and manning's n-values, where necessary
- Full "RiskMAP" modeling, including 5 profiles (10%, 4%, 2%, 1% and 0.2% annual chance), Flood elevation points, Flood Boundary Standards points, depth grids, SFHA boundaries and floodways

What's done

- 10,000+ stream miles of floodplain completed
- 5,000+ stream miles of floodway done
- Working with Polis to add it all to INFIP as "Best available" layer



Floodmaps.in.gov

Model library

Discharge calculator

IDNR HEC-RAS tool

Indiana Floodplain Mapping Quick Links

- **The Indiana Floodplain Information Portal**
  Launch INFIP, an interactive floodplain mapping tool, which includes address searching and eFARA, the Division of Water's on-line floodplain analysis submittal tools. INFIP also now includes the "Best Available Data" layer, showing up to date floodplain mapping information.
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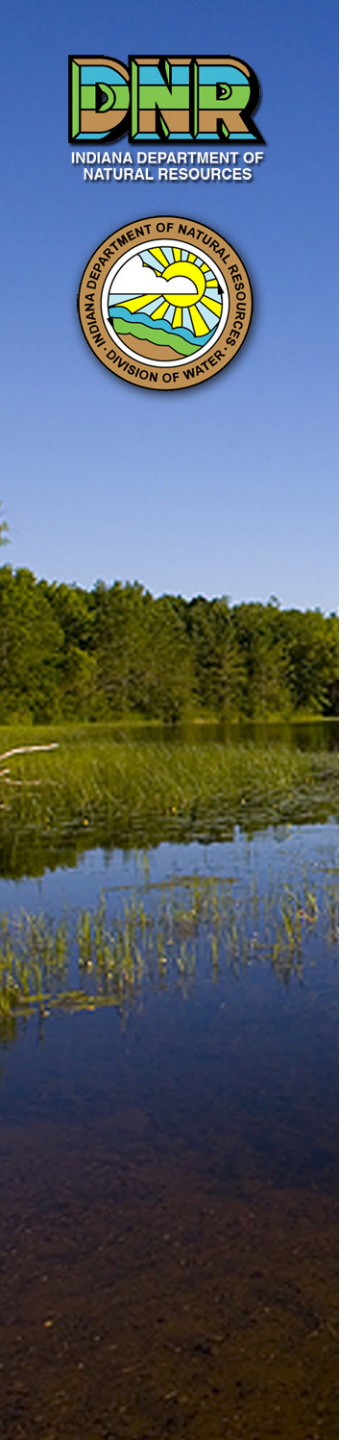


IDNR HEC-RAS Geometric Data Tool Quick Guide

This tool will create a ".sdf" file that can be imported into a HEC-RAS geometry file, based on input cross sections and stream centerline. The ".sdf" file will be fully attributed with station / elevation points for each cross section, bank stations, channel and overbank lengths, and Manning's N roughness coefficients.

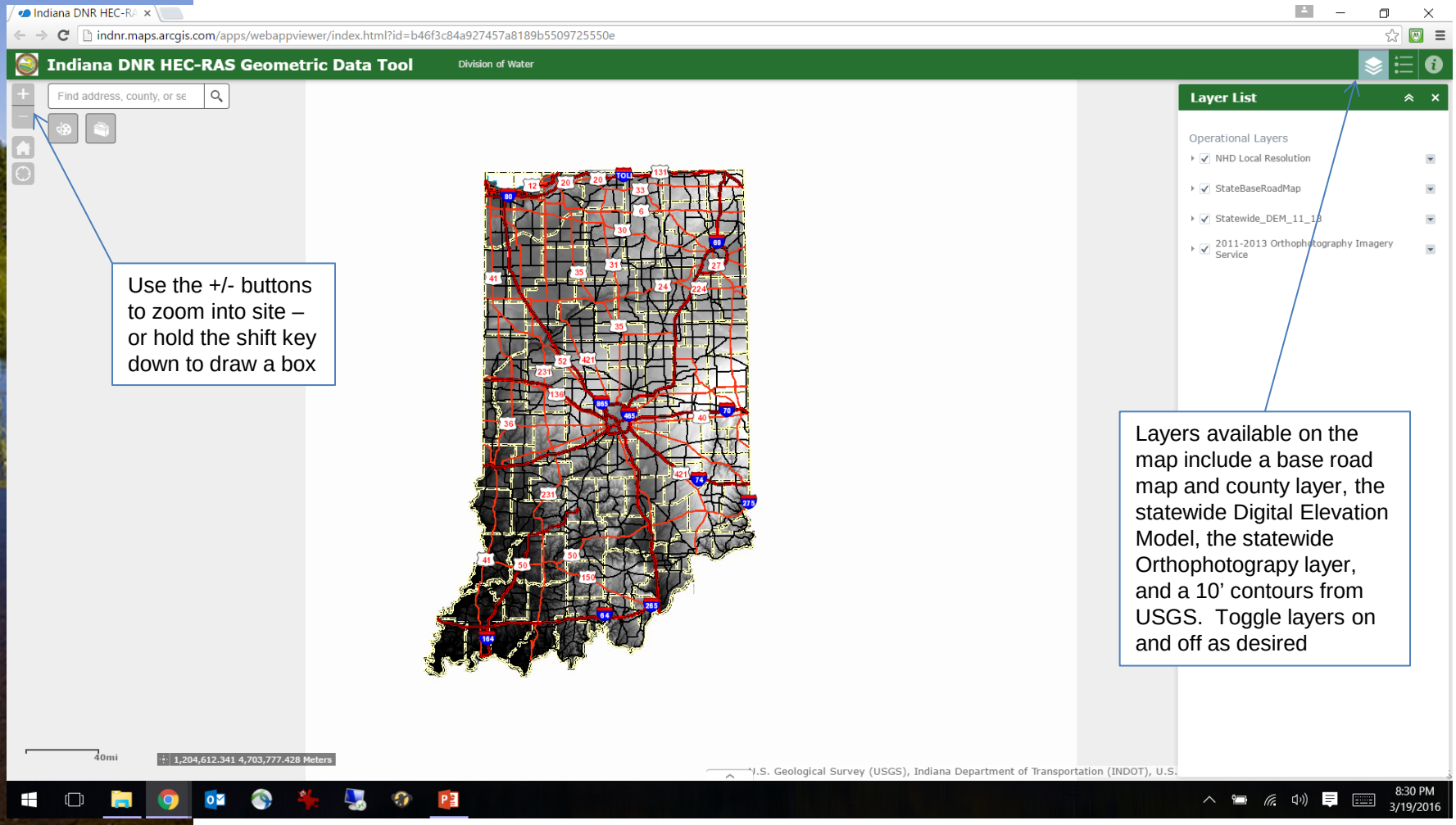
See the "Hydraulic Data Reference" for details on how the data is derived.

http://www.in.gov/dnr/water/files/wa-IDNR_HEC-RAS_Geometric_Data_Tool_Reference.pdf

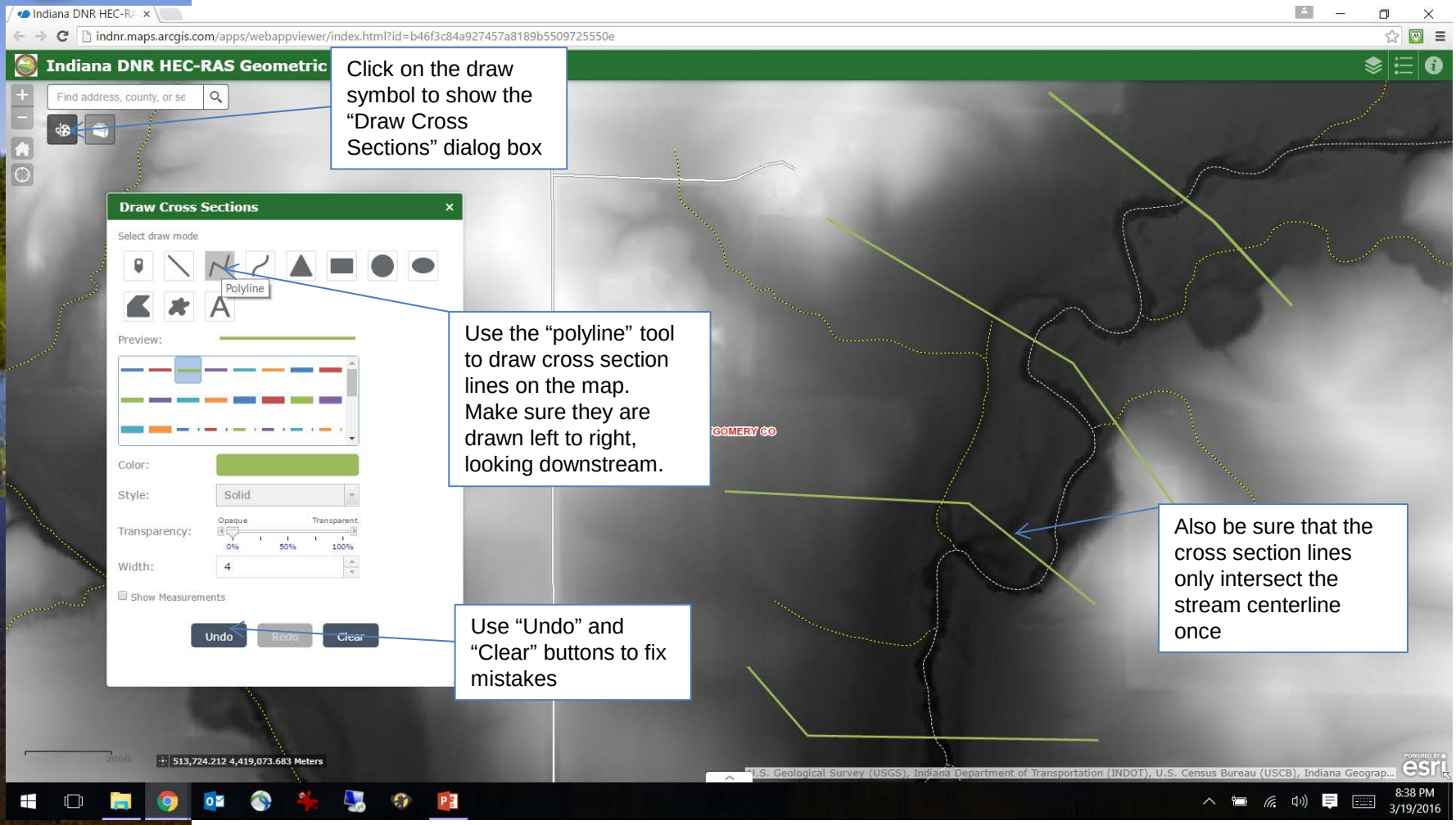
Application:

http://indnr.maps.arcgis.com/apps/webappviewer/index.html?id=b46f3c84a927457a8189b5509725550e

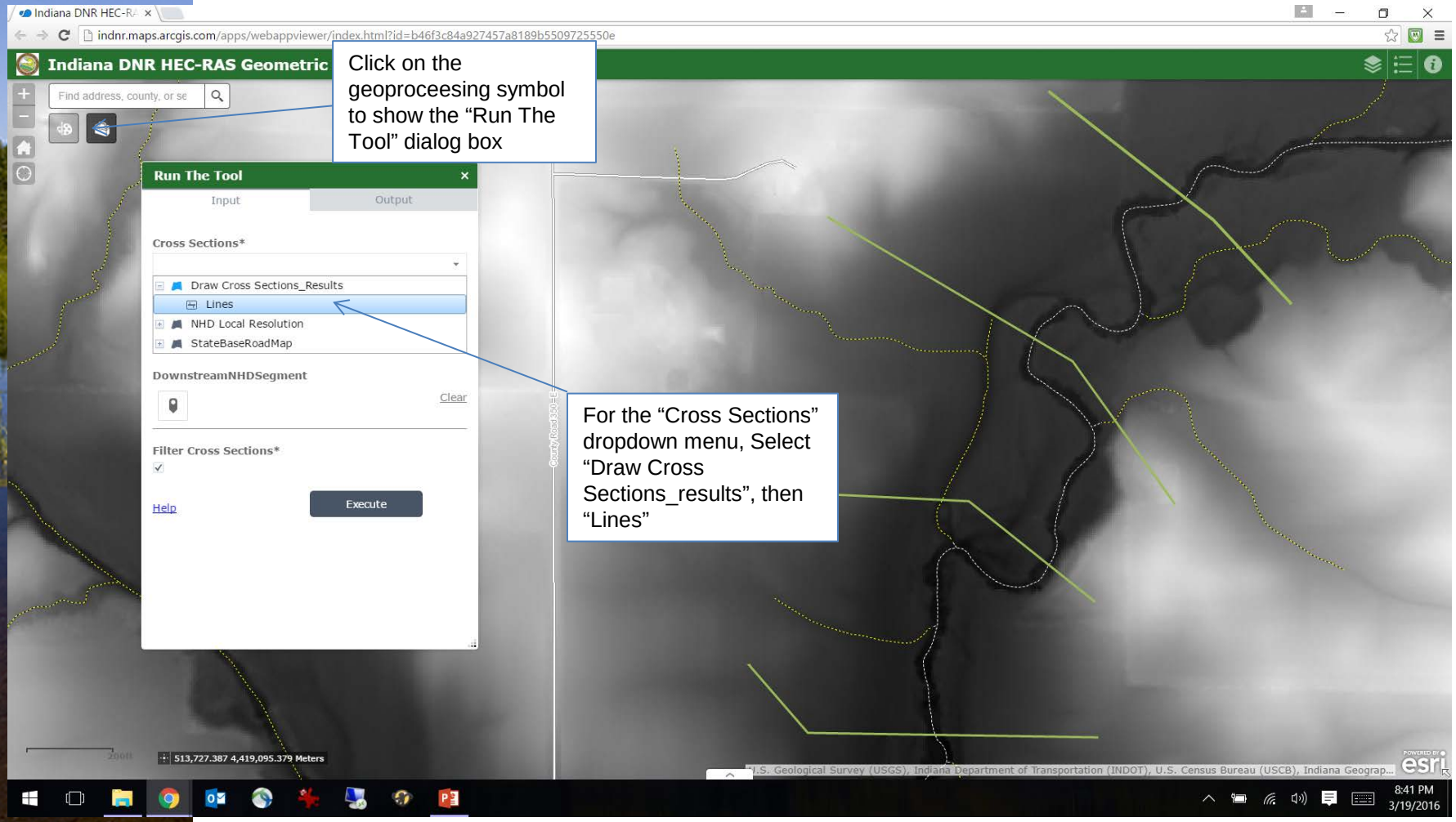
Zoom into site



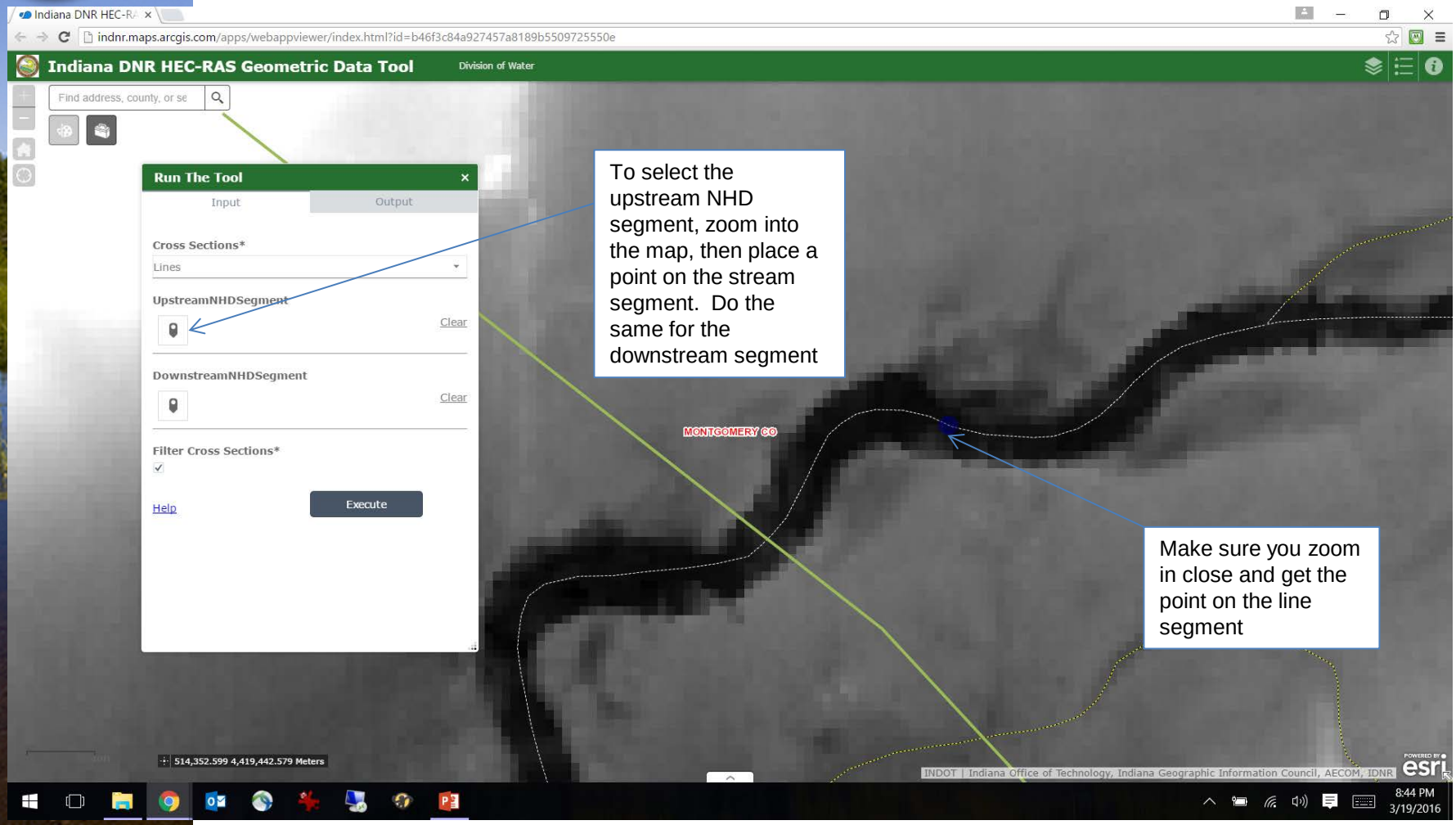
Draw Cross Sections



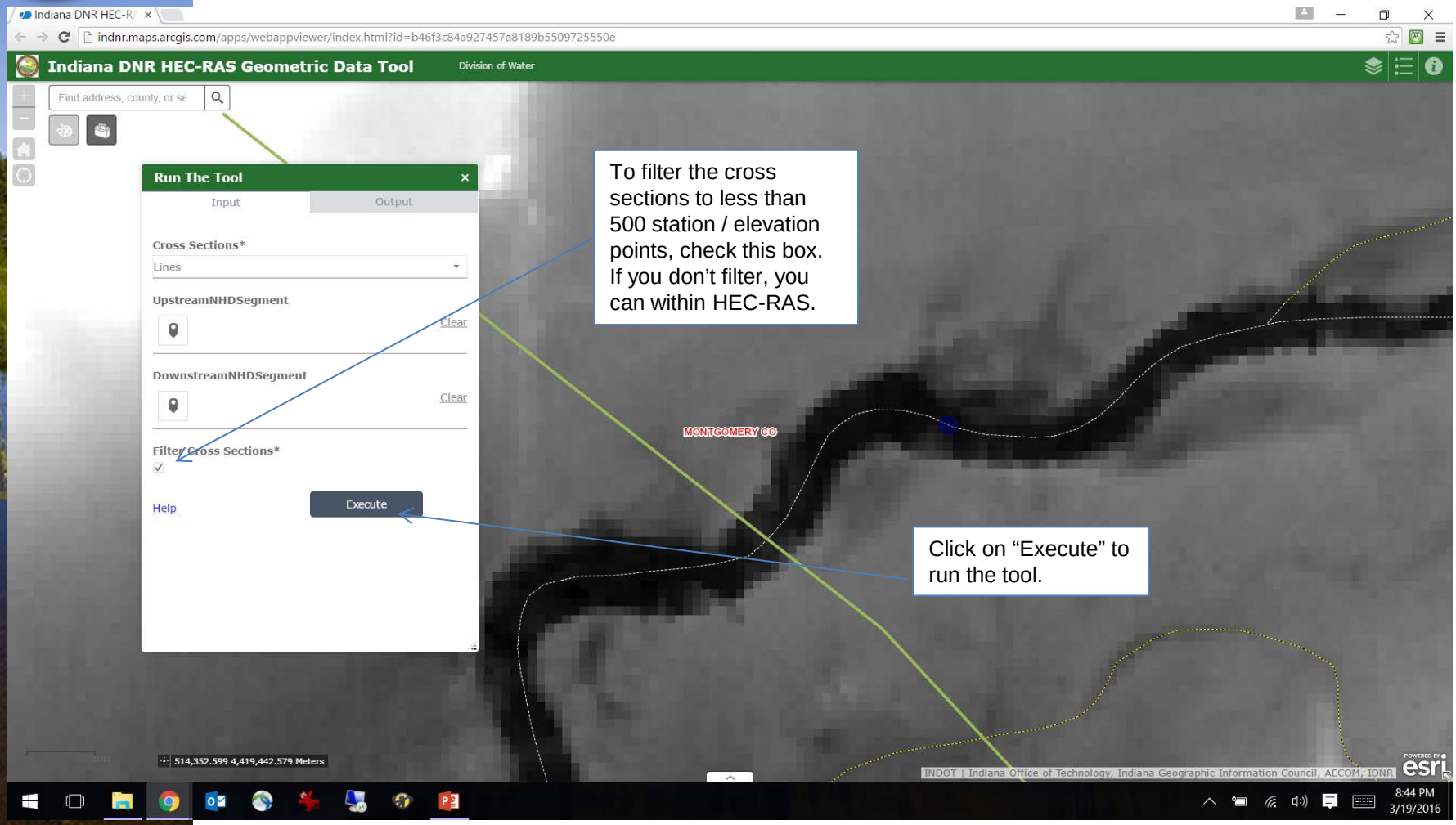
Run the tool


Indiana DNR HEC-RAS Geometric
indnr.maps.arcgis.com/apps/webappviewer/index.html?id=b46f3c84a927457a8189b5509725550e
Find address, county, or se
Click on the geoproceesing symbol to show the “Run The Tool” dialog box
Run The Tool
Input
Output
Cross Sections*
Draw Cross Sections_Results
Lines
NHD Local Resolution
StateBaseRoadMap
DownstreamNHDSegment
Clear
Filter Cross Sections*
Help
Execute
For the “Cross Sections” dropdown menu, Select “Draw Cross Sections_results”, then “Lines”
513,727.387 4,419,095.379 Meters
U.S. Geological Survey (USGS), Indiana Department of Transportation (INDOT), U.S. Census Bureau (USCB), Indiana Geograp...
8:41 PM
3/19/2016

Select upstream / downstream NHD segments



Run the tool


Indiana DNR HEC-RAS Geometric Data Tool
Division of Water
indnr.maps.arcgis.com/apps/webappviewer/index.html?id=b46f3c84a927457a8189b5509725550e
Find address, county, or se
Run The Tool
Input
Output
Cross Sections*
Lines
UpstreamNHDSegment
Clear
DownstreamNHDSegment
Clear
Filter Cross Sections*
Help
Execute
To filter the cross sections to less than 500 station / elevation points, check this box. If you don't filter, you can within HEC-RAS.
Click on "Execute" to run the tool.
MONTGOMERY CO
514,352.599 4,419,442.579 Meters
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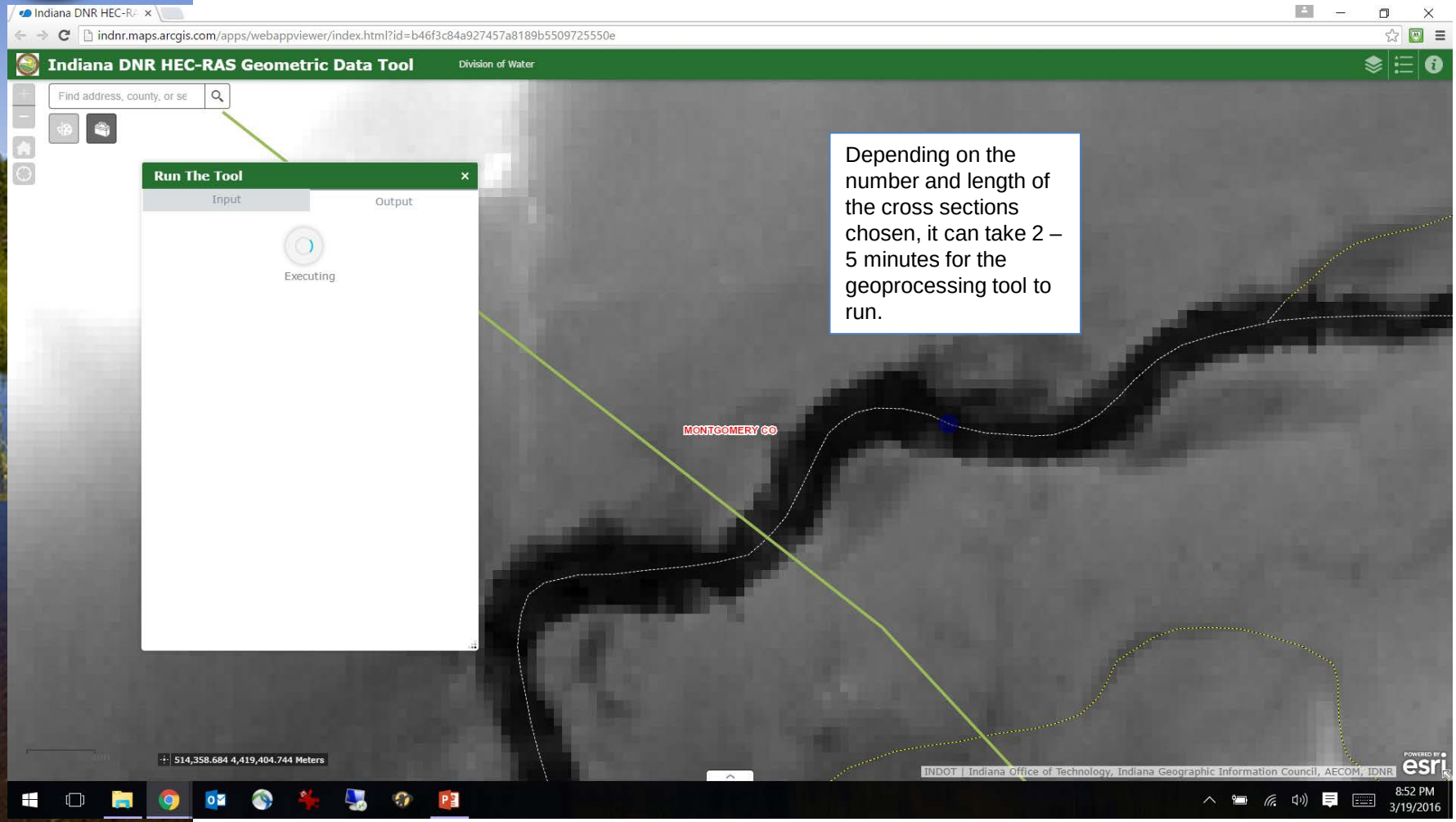
Be Patient!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indnr.maps.arcgis.com/apps/webappviewer/index.html?id=b46f3c84a927457a8189b5509725550e
Find address, county, or se
Run The Tool
Input
Output
Executing
Depending on the number and length of the cross sections chosen, it can take 2 – 5 minutes for the geoprocessing tool to run.
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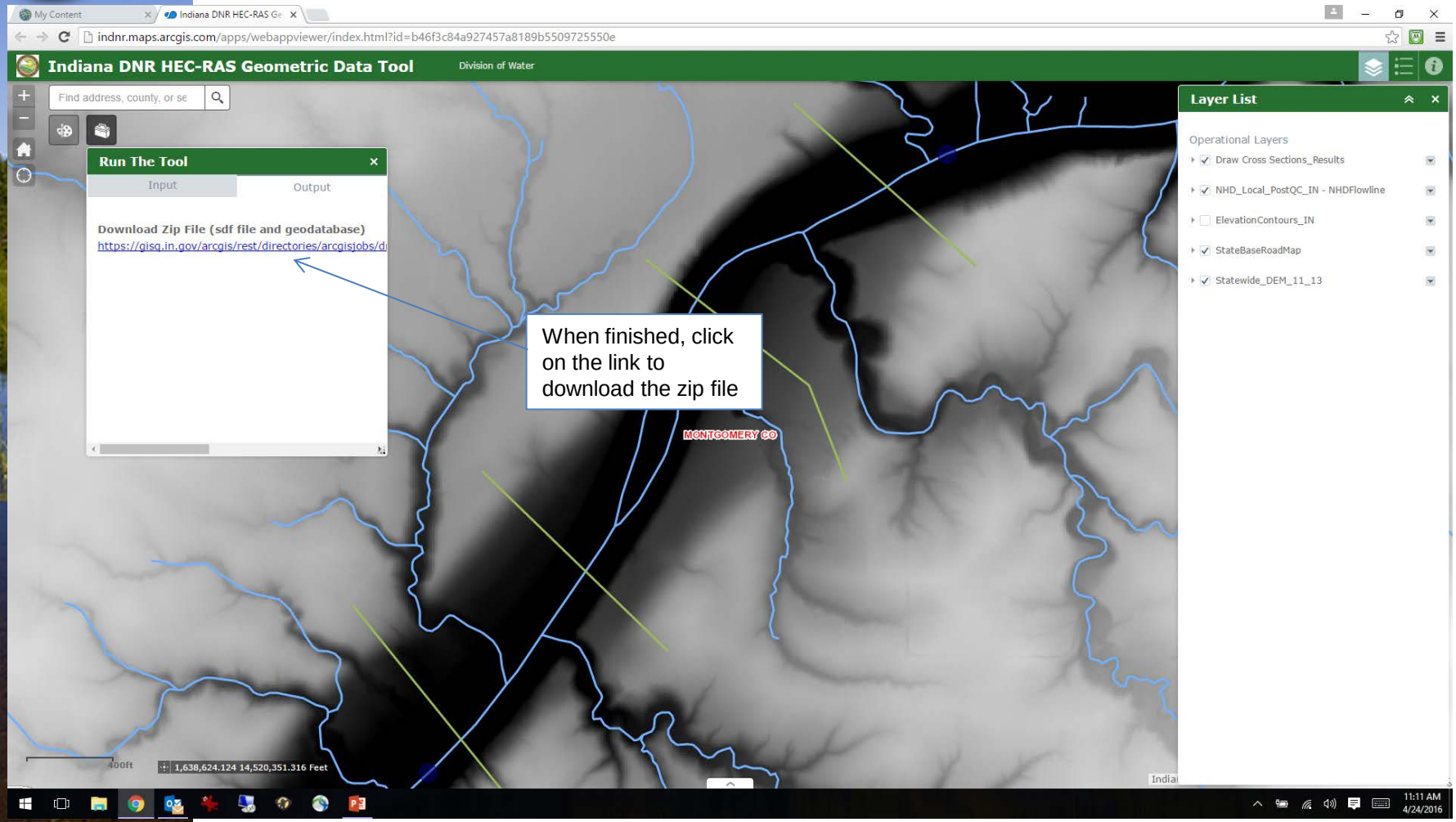
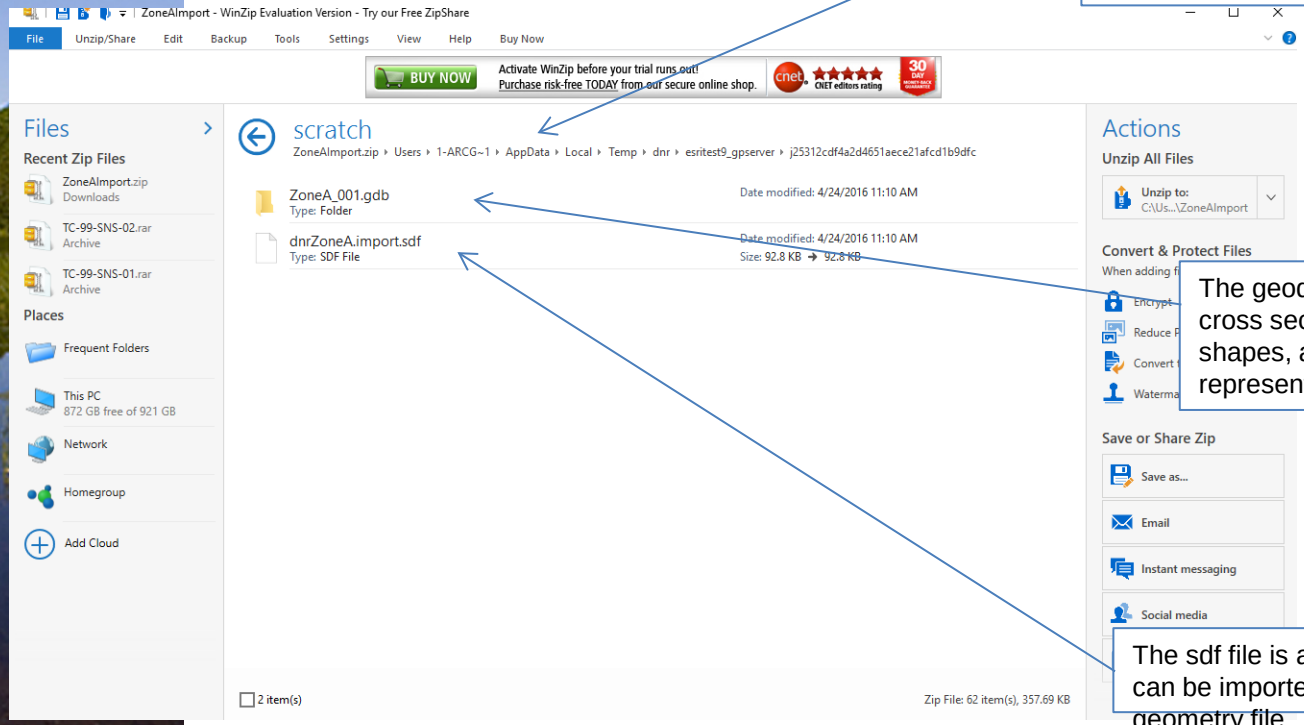
Successfully Run



Downloaded Zip File

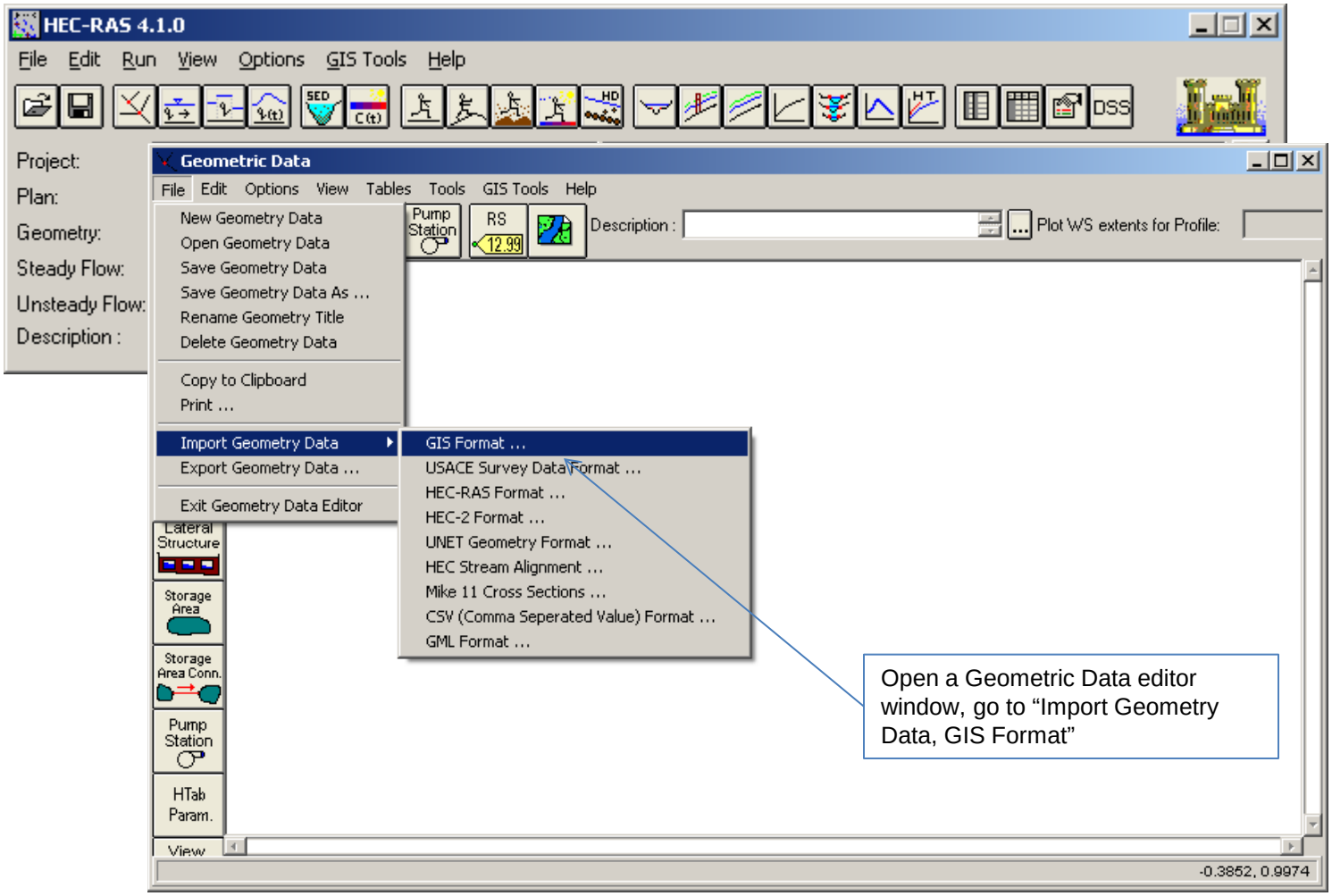
The gdb directory and sdf file will be buried under a series of directories – these are from the ArcGIS server environment



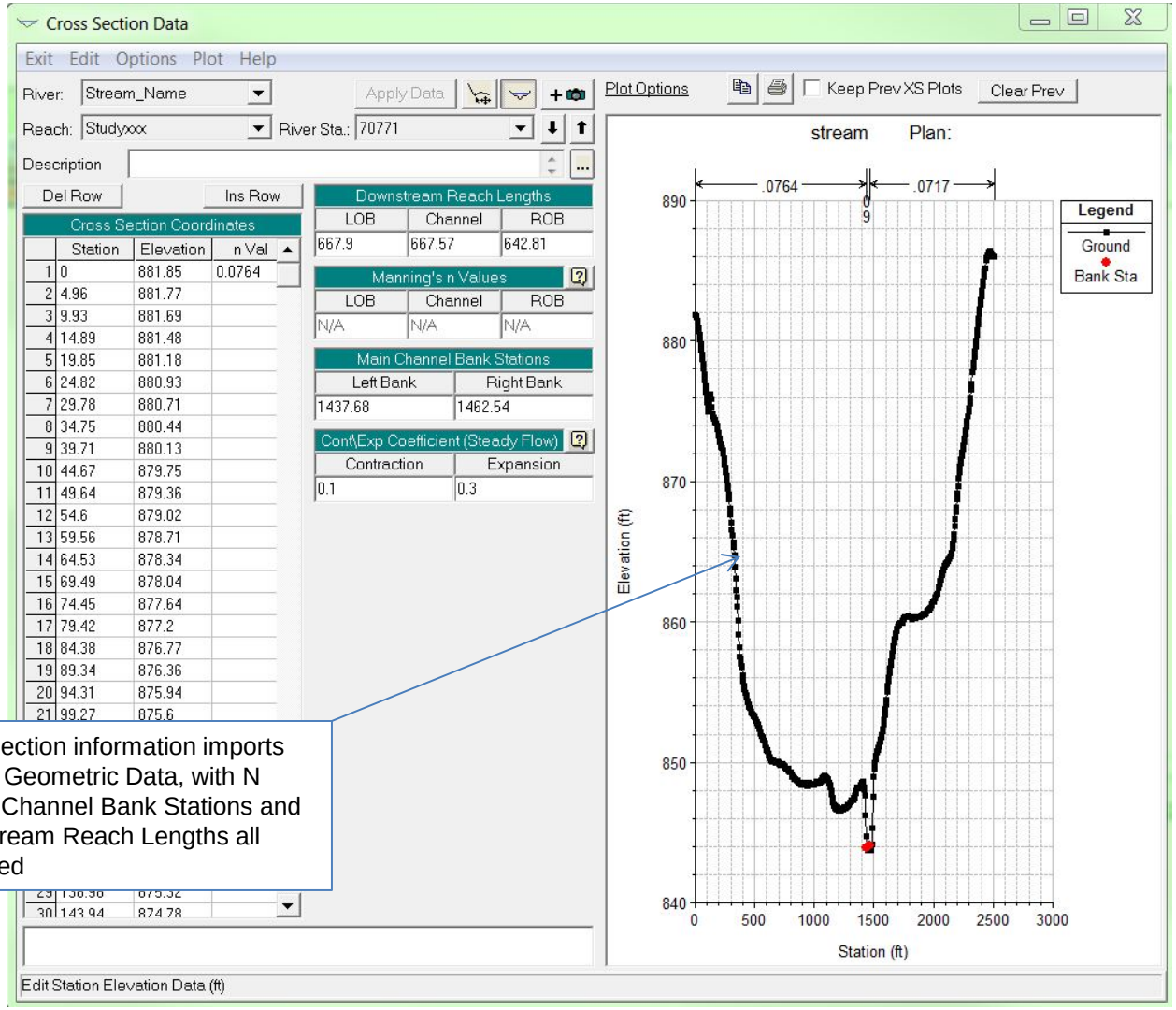
The geodatabase will contain the cross section and stream centerline shapes, along with a polygon shape representing the n value regions.

The sdf file is and ASCII file that can be imported into a HEC-RAS geometry file

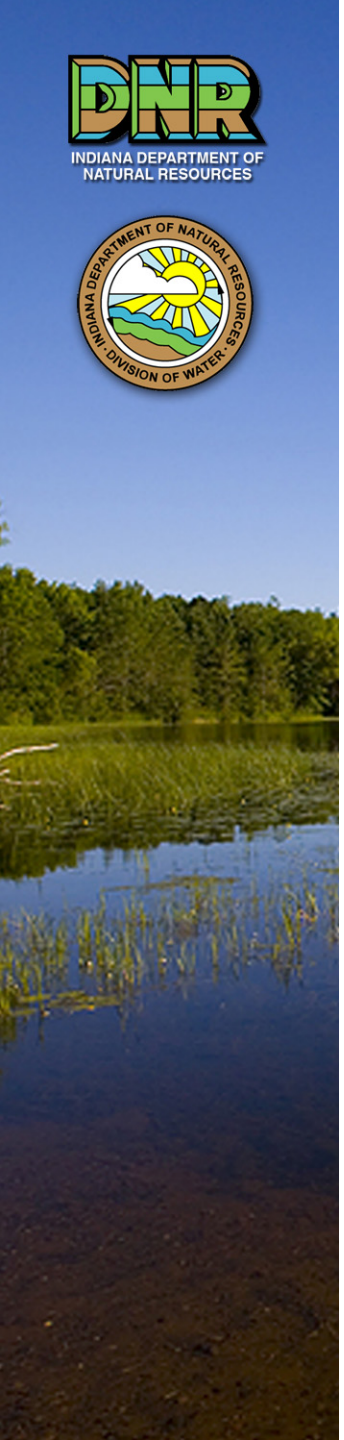
Importing into HEC-RAS



Cross section data

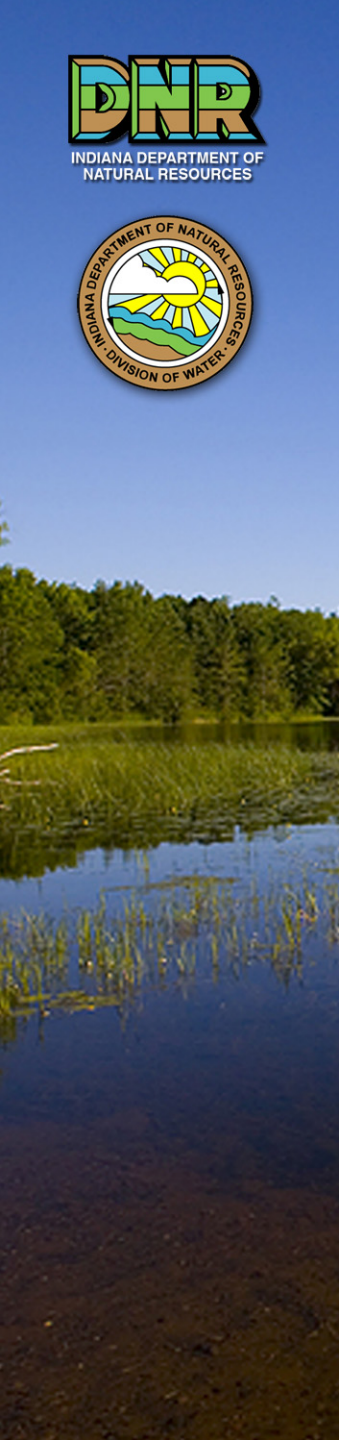


Cross section information imports into the Geometric Data, with N values, Channel Bank Stations and Downstream Reach Lengths all populated



Disclaimer

This application, including its underlying data and web services are distributed "AS-IS" without warranties of any kind, expressed or implied, including but not limited to warranties of suitability of a particular purpose or use. These data graphical representations and are for public use informational purposes only. They are not to be construed as a legal document or survey instrument. The Indiana Department of Natural Resources assumes no liability. A detailed on-the-ground survey and historical analysis of individual features may differ from this data. Credit should be given to the Indiana Department of Natural Resources. The IDNR provides no assurance that use of this tool will result in a model that can be approved by the Department for any purpose. Modeling and other floodplain analyses should be directed by a licensed engineer experienced in hydrology and hydraulics.



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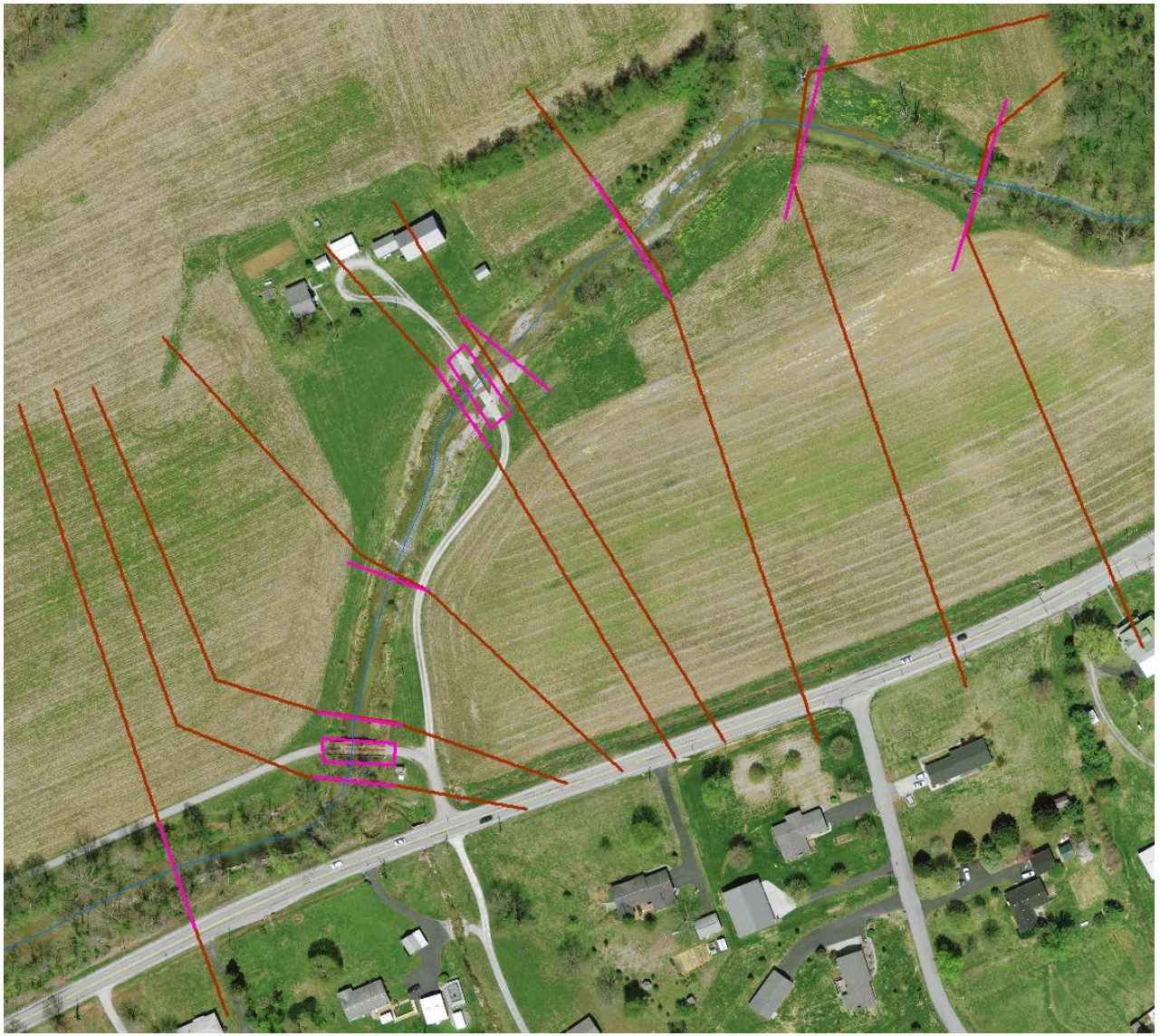
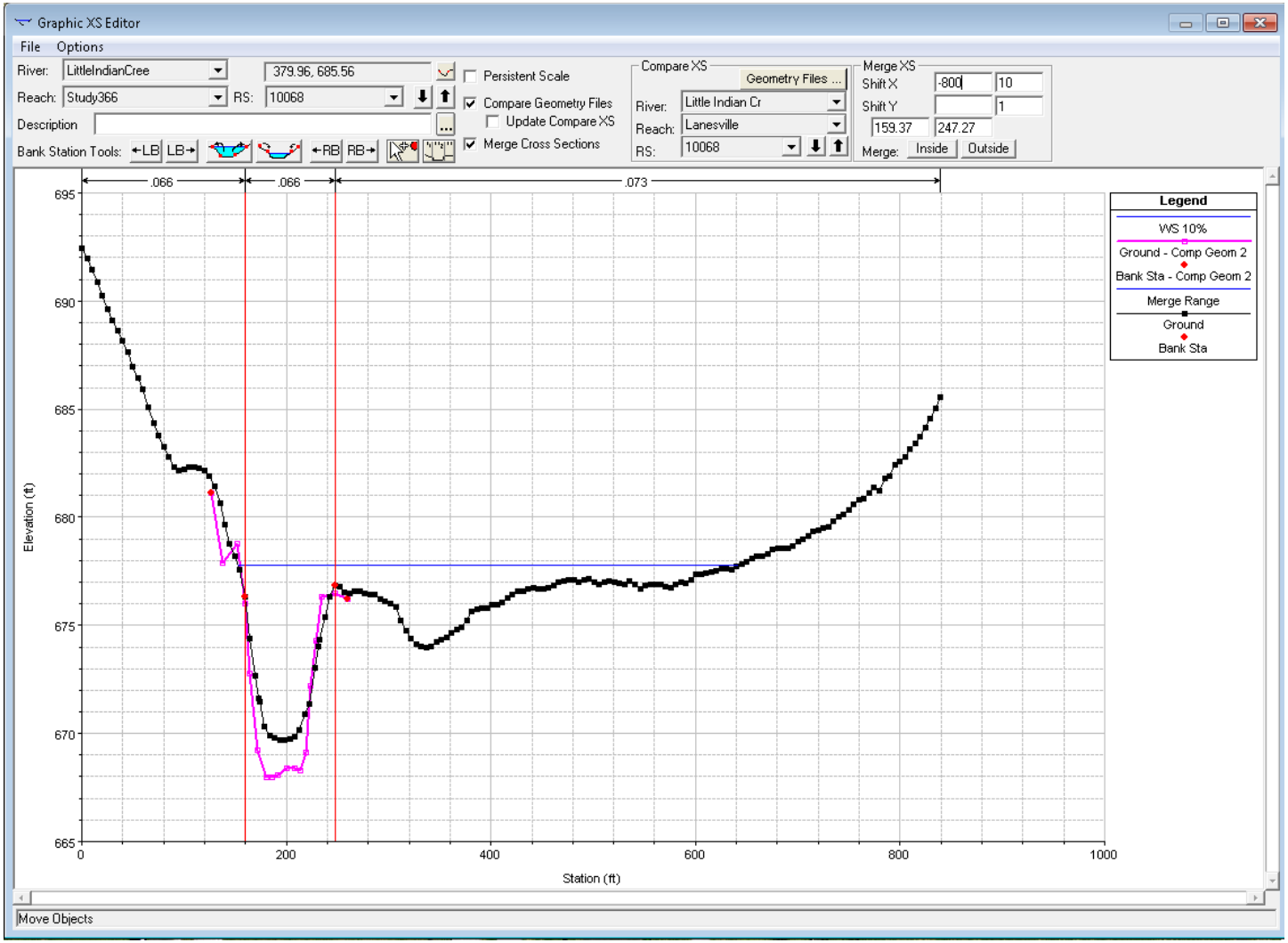
INDIANA DEPARTMENT OF NATURAL RESOURCES

Add Channel data



Compare and merge XSs



Getting IDNR discharge

Discharge calculator →

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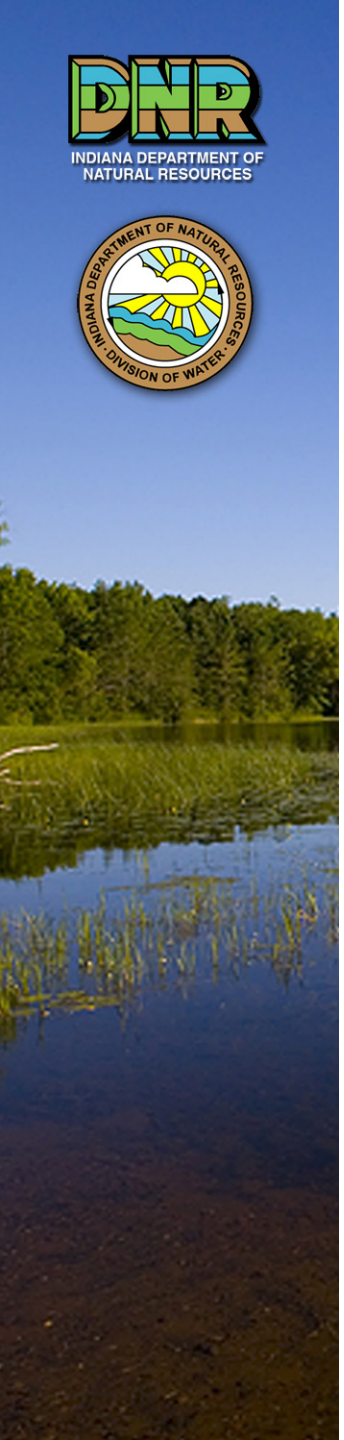
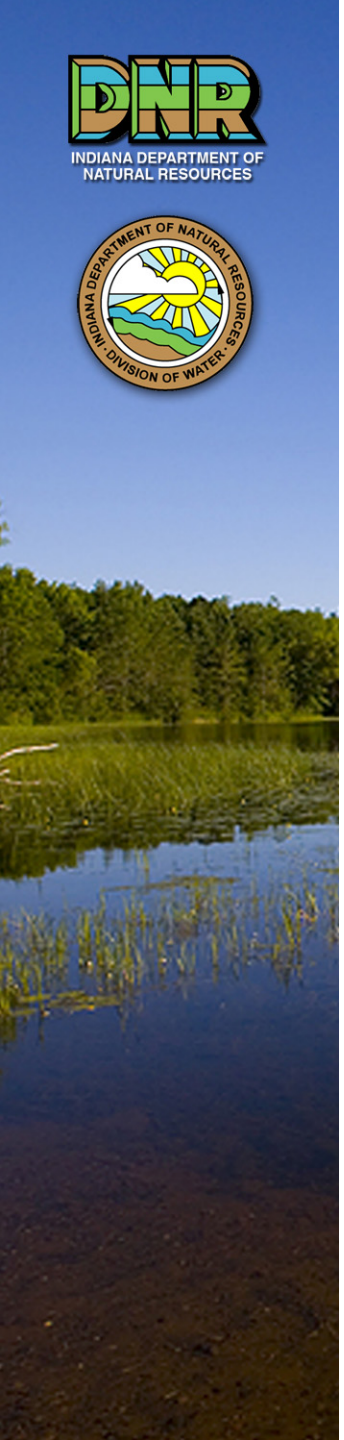


How does IPDDS work?

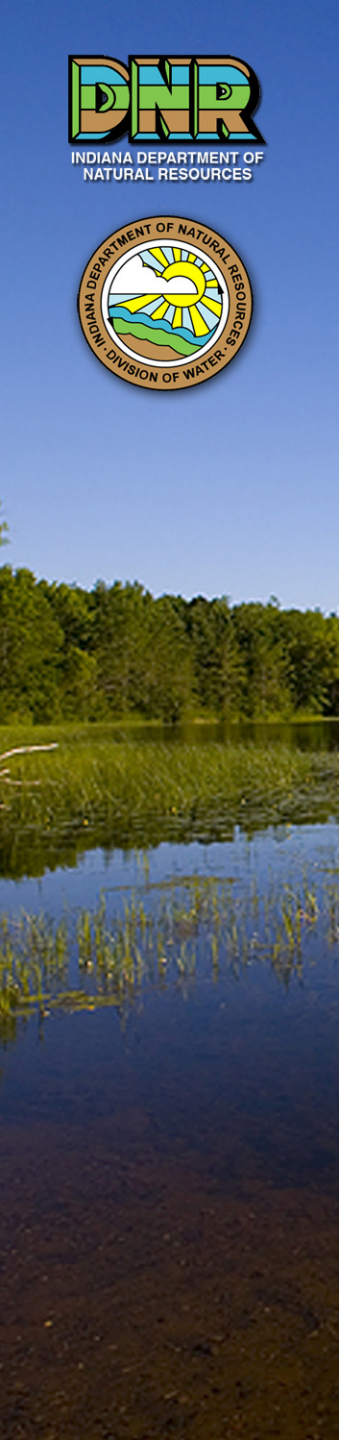
- Click the “Request a discharge determination” button to run the program (can take a few minutes).
  - The program sends a request to the Streamstats server
  - Then queries the IDNR Unity databases for hydrologic information
  - Once complete a zip file can be downloaded



Detailed model complete

- You started with the approximate model
- You have added channel data from a survey at a few locations
- You have added bridge data for all bridges in the reach
- You requested discharges from IDNR and entered them in your model

Your detailed model is complete with minimal survey data required.



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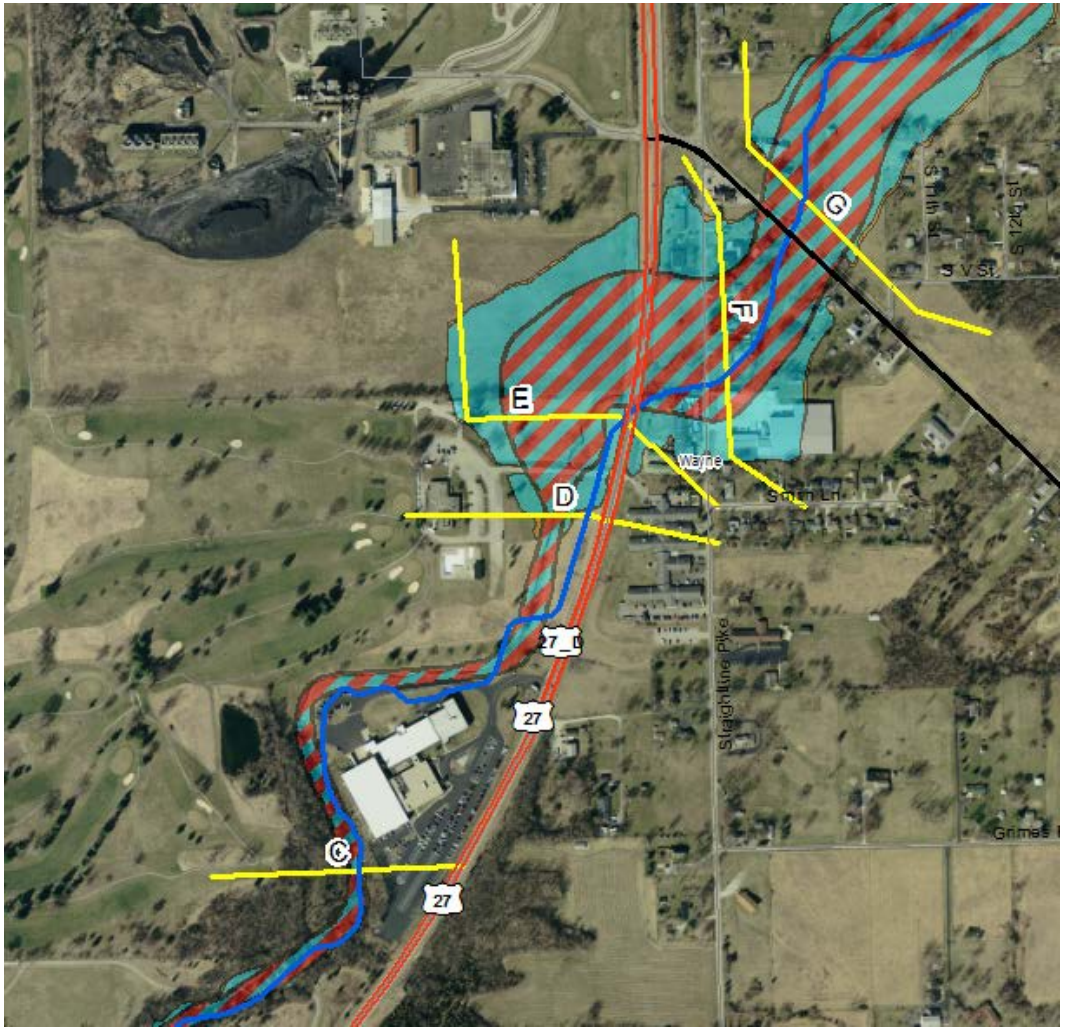
Update existing model



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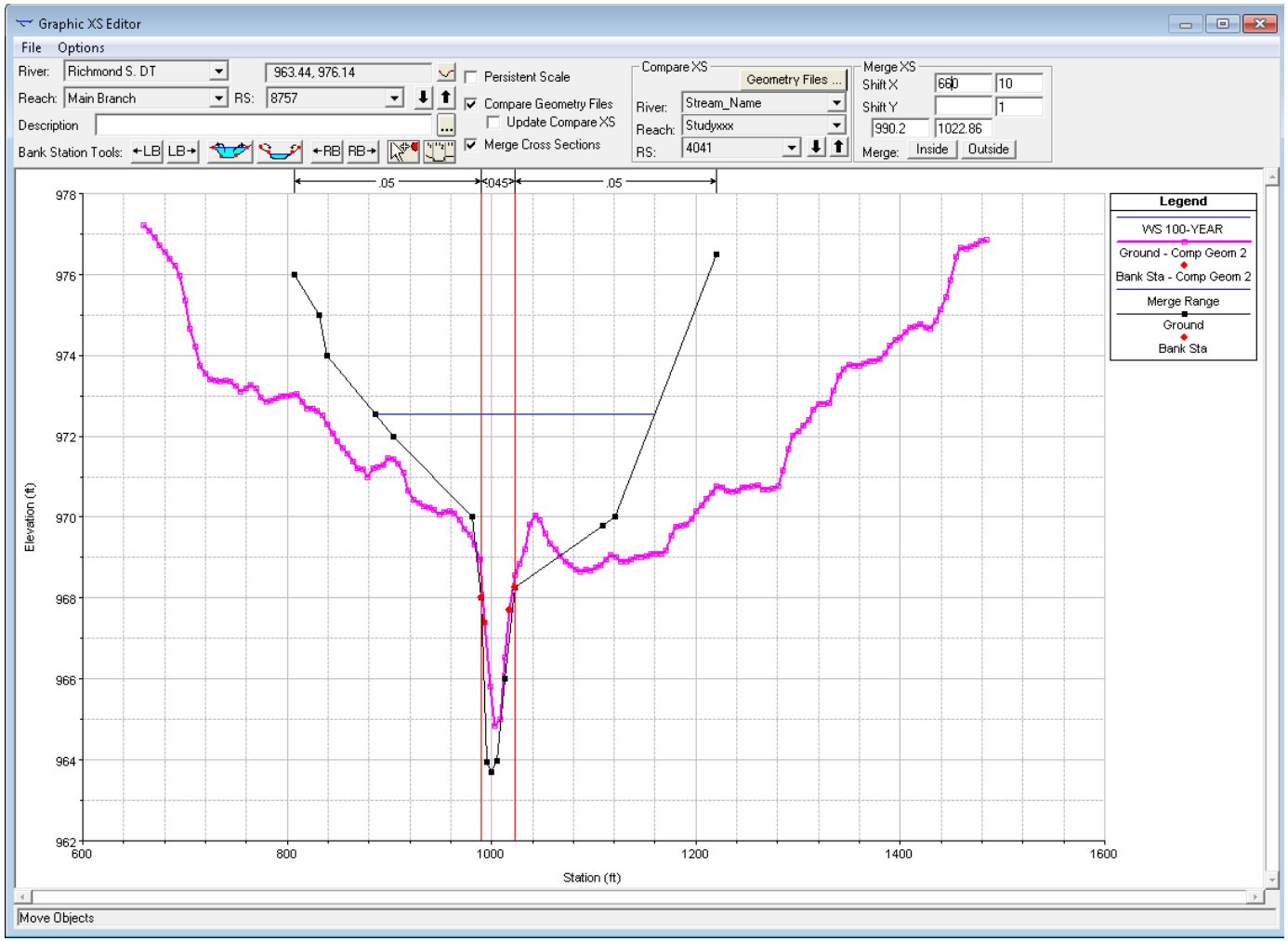
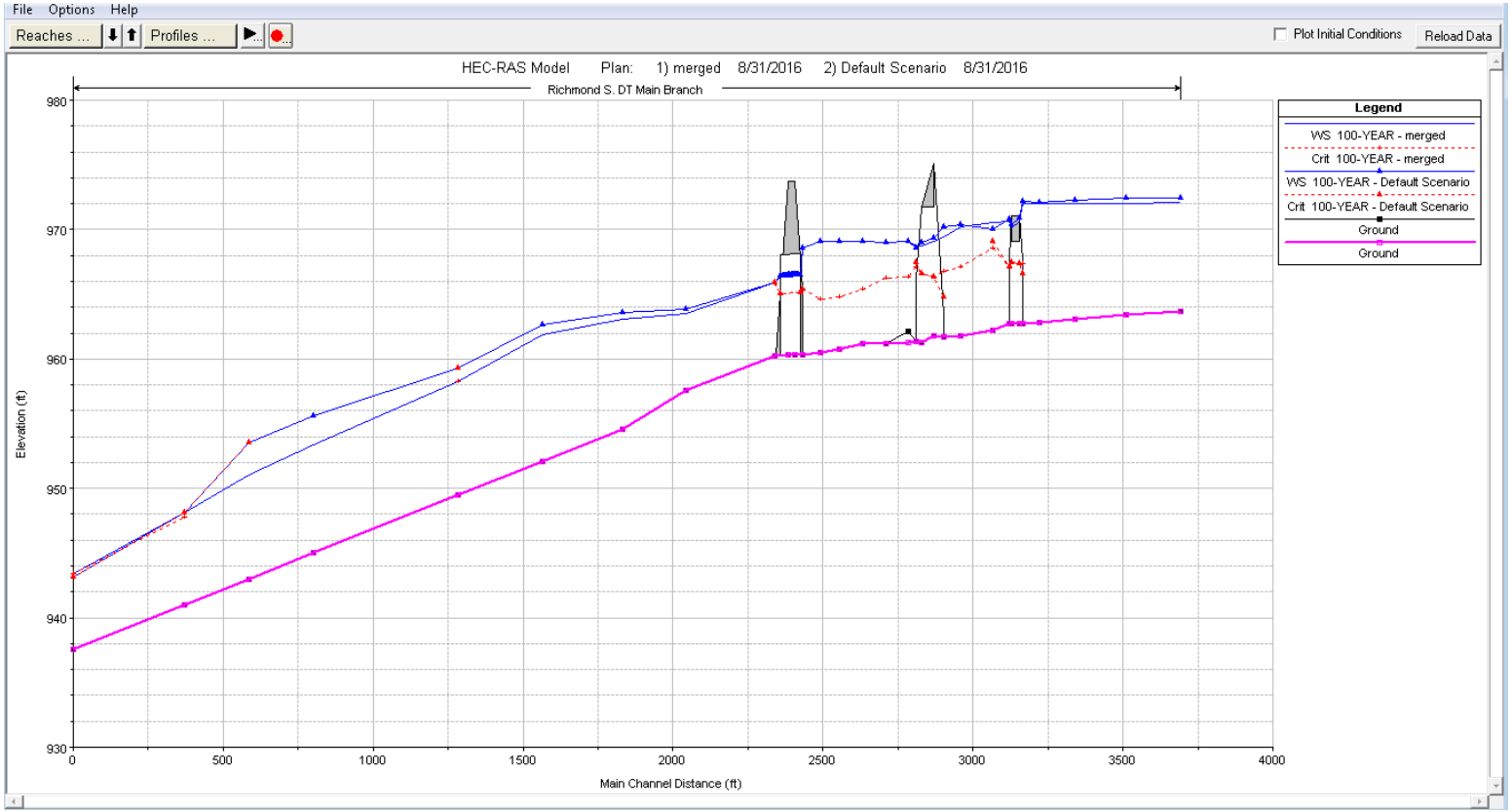
Compare and merge XSs



Compare flood profile

Look at the change in water surface after introducing LiDAR to the cross sections



When not to use LiDAR?

- When you have survey data for the entire site or better topographic data – expensive
- Using LiDAR is an inexpensive way to improve and extend all hydraulic models
- More to come with HEC-RAS 5.0

Questions????

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