Groundpoint
ENGINEERING

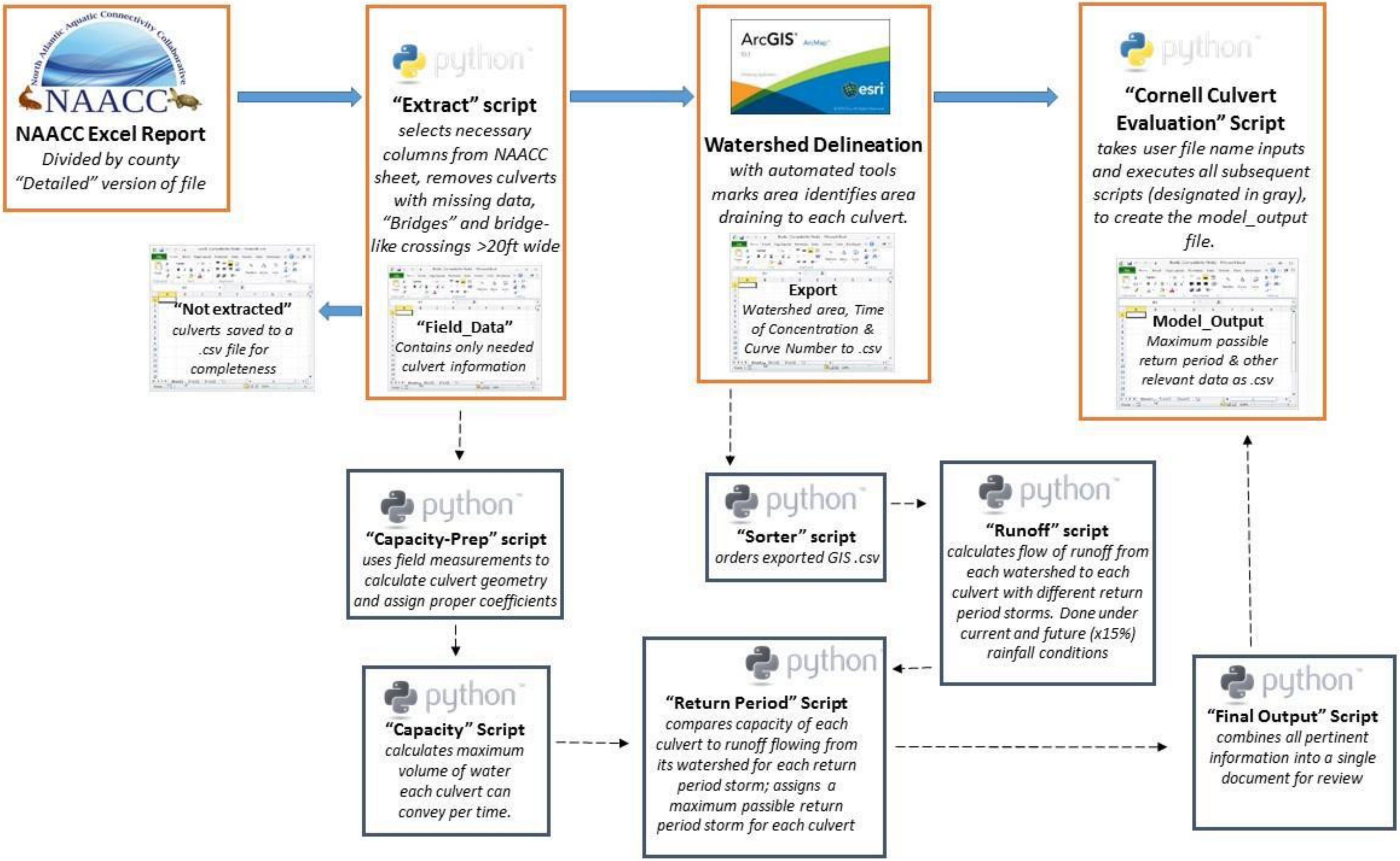
What the heck?

- Who is WRI and what are they doing?
- Standards Based Data Structures
- Adaptation for using LiDAR
    - Runoff Characteristics
    - Peak Flow Estimates
- Case Studies in Urban Pittsburgh and Ulster County NY

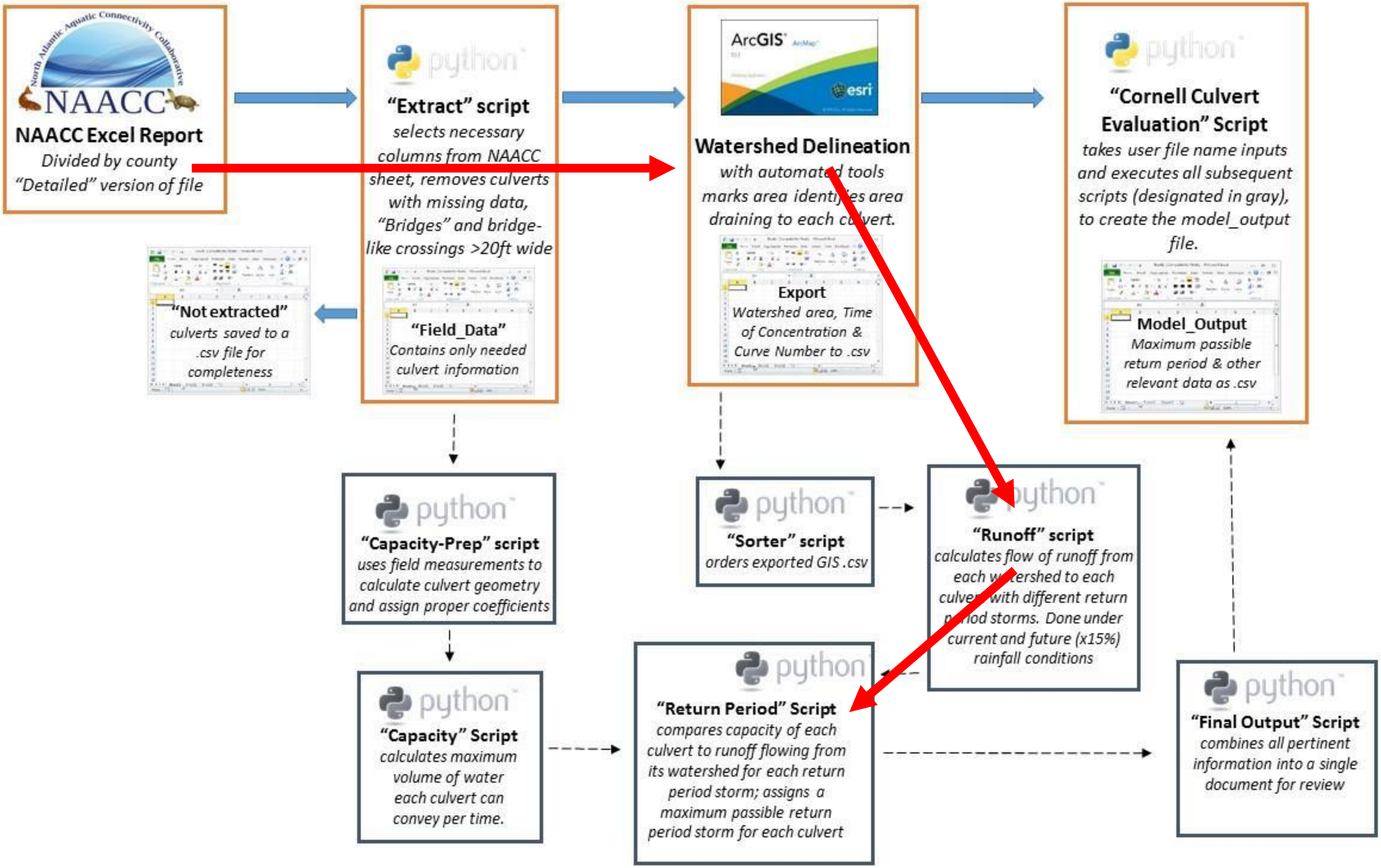
Ulster County

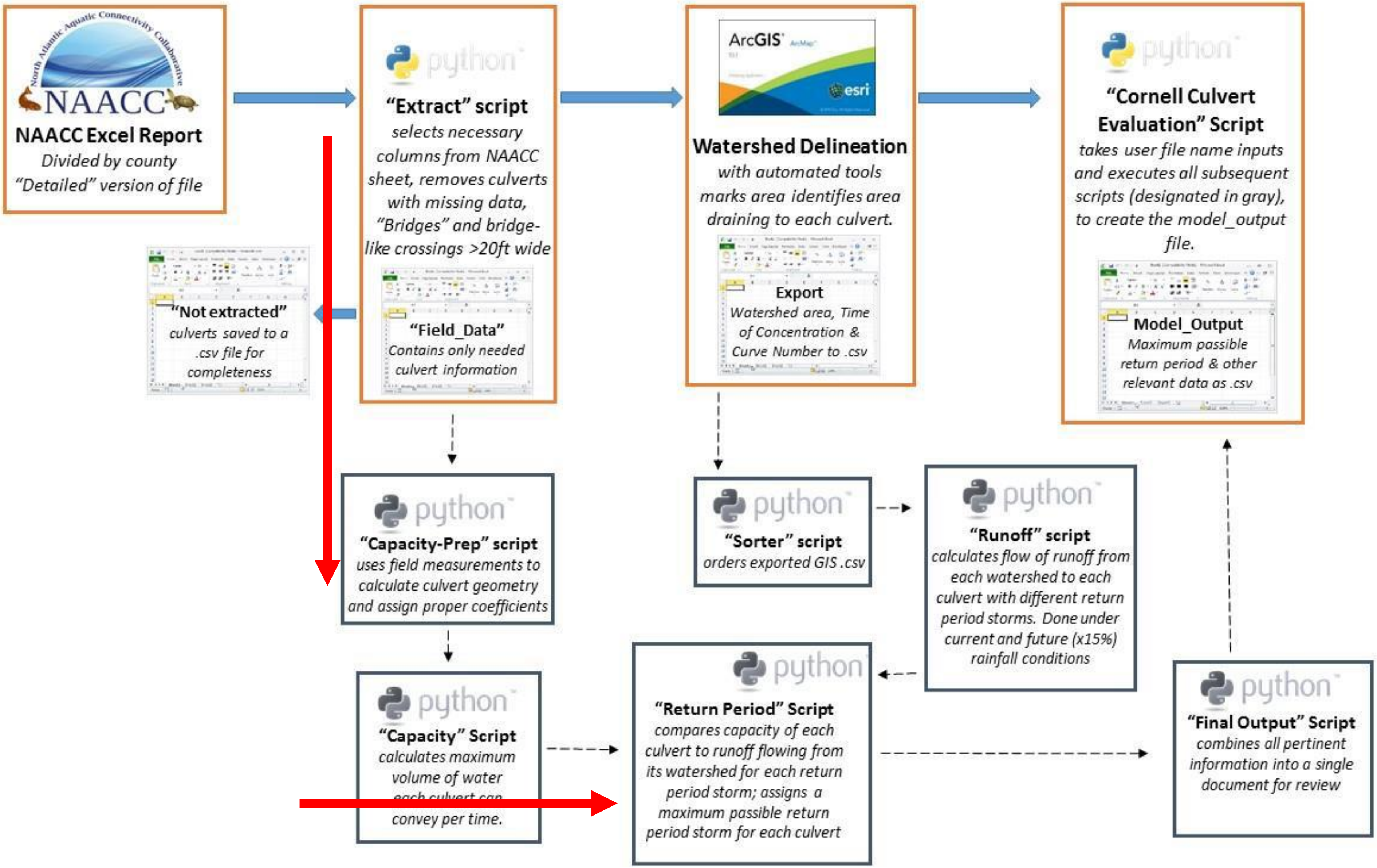
Cornell University

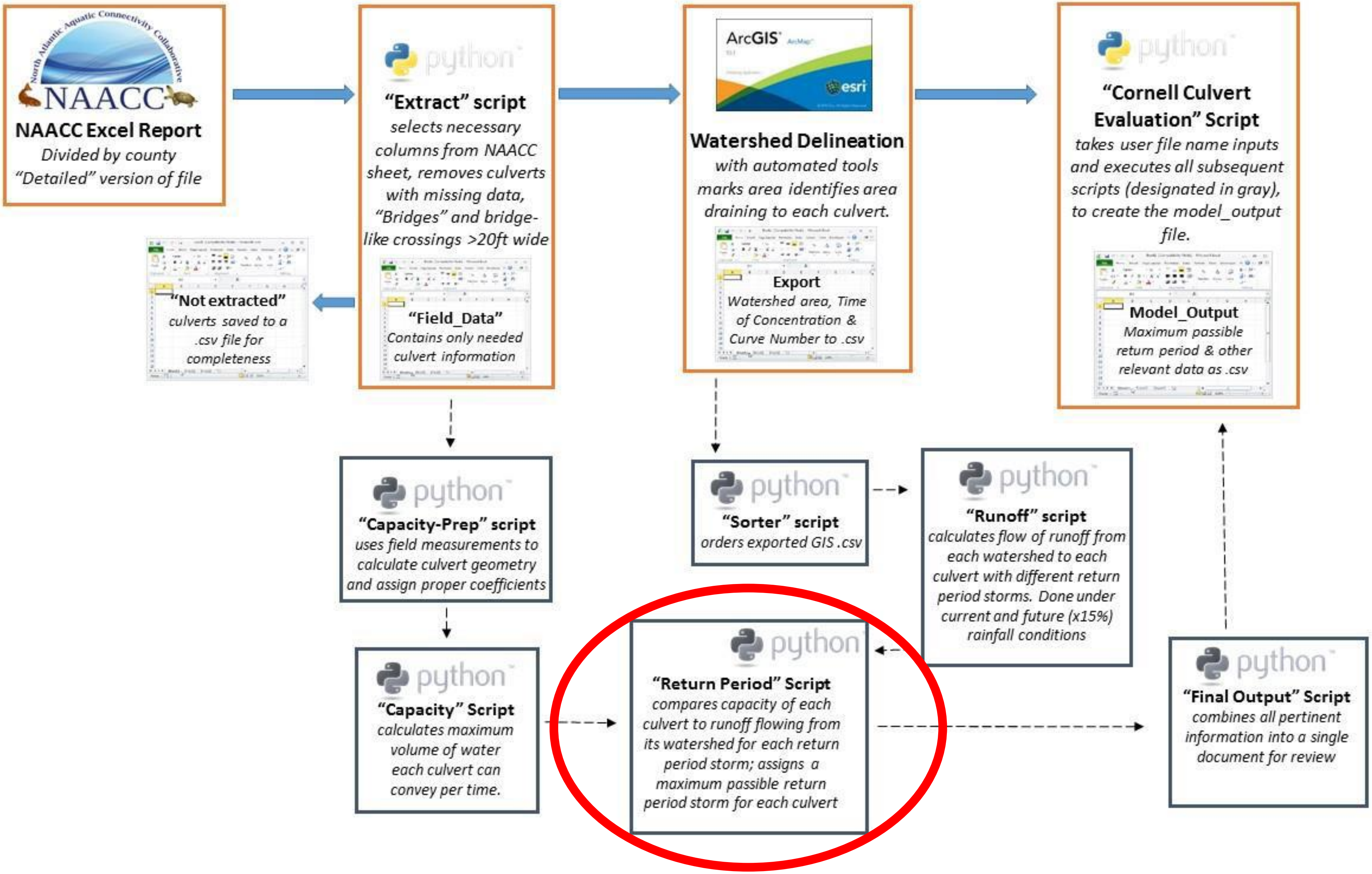
NYS Water Resources Institute



North Atlantic Aquatic Connectivity Collaborative
NAACC
NAACC Excel Report
Divided by county
"Detailed" version of file
python
"Extract" script
selects necessary columns from NAACC sheet, removes culverts with missing data, "Bridges" and bridge-like crossings >20ft wide
"Field_Data"
Contains only needed culvert information
"Not extracted"
culverts saved to a .csv file for completeness
ArcGIS
esri
Watershed Delineation
with automated tools marks area identifies area draining to each culvert.
Export
Watershed area, Time of Concentration & Curve Number to .csv
python
"Cornell Culvert Evaluation" Script
takes user file name inputs and executes all subsequent scripts (designated in gray), to create the model_output file.
Model_Output
Maximum passible return period & other relevant data as .csv
python
"Capacity-Prep" script
uses field measurements to calculate culvert geometry and assign proper coefficients
python
"Sorter" script
orders exported GIS .csv
python
"Runoff" script
calculates flow of runoff from each watershed to each culvert with different return period storms. Done under current and future (x15%) rainfall conditions
python
"Capacity" Script
calculates maximum volume of water each culvert can convey per time.
python
"Return Period" Script
compares capacity of each culvert to runoff flowing from its watershed for each return period storm; assigns a maximum passible return period storm for each culvert
python
"Final Output" Script
combines all pertinent information into a single document for review


North Atlantic Aquatic Connectivity Collaborative
NAACC
NAACC Excel Report
Divided by county
"Detailed" version of file
python
"Extract" script
selects necessary columns from NAACC sheet, removes culverts with missing data, "Bridges" and bridge-like crossings >20ft wide
"Field_Data"
Contains only needed culvert information
"Not extracted"
culverts saved to a .csv file for completeness
ArcGIS
esri
Watershed Delineation
with automated tools marks area identifies area draining to each culvert.
Export
Watershed area, Time of Concentration & Curve Number to .csv
python
"Cornell Culvert Evaluation" Script
takes user file name inputs and executes all subsequent scripts (designated in gray), to create the model_output file.
Model_Output
Maximum possible return period & other relevant data as .csv
python
"Capacity-Prep" script
uses field measurements to calculate culvert geometry and assign proper coefficients
python
"Sorter" script
orders exported GIS .csv
python
"Runoff" script
calculates flow of runoff from each watershed to each culvert with different return period storms. Done under current and future (x15%) rainfall conditions
python
"Capacity" Script
calculates maximum volume of water each culvert can convey per time.
python
"Return Period" Script
compares capacity of each culvert to runoff flowing from its watershed for each return period storm; assigns a maximum passible return period storm for each culvert
python
"Final Output" Script
combines all pertinent information into a single document for review


North Atlantic Aquatic Connectivity Collaborative
NAACC
NAACC Excel Report
Divided by county
"Detailed" version of file
python
"Extract" script
selects necessary columns from NAACC sheet, removes culverts with missing data, "Bridges" and bridge-like crossings >20ft wide
"Field_Data"
Contains only needed culvert information
"Not extracted"
culverts saved to a .csv file for completeness
ArcGIS
esri
Watershed Delineation
with automated tools marks area identifies area draining to each culvert.
Export
Watershed area, Time of Concentration & Curve Number to .csv
python
"Cornell Culvert Evaluation" Script
takes user file name inputs and executes all subsequent scripts (designated in gray), to create the model_output file.
Model_Output
Maximum passible return period & other relevant data as .csv
python
"Capacity-Prep" script
uses field measurements to calculate culvert geometry and assign proper coefficients
python
"Sorter" script
orders exported GIS .csv
python
"Runoff" script
calculates flow of runoff from each watershed to each culvert with different return period storms. Done under current and future (x15%) rainfall conditions
python
"Capacity" Script
calculates maximum volume of water each culvert can convey per time.
python
"Return Period" Script
compares capacity of each culvert to runoff flowing from its watershed for each return period storm; assigns a maximum passible return period storm for each culvert
python
"Final Output" Script
combines all pertinent information into a single document for review


North Atlantic Aquatic Connectivity Collaborative
NAACC
NAACC Excel Report
Divided by county
"Detailed" version of file
"Extract" script
selects necessary columns from NAACC sheet, removes culverts with missing data, "Bridges" and bridge-like crossings >20ft wide
"Field_Data"
Contains only needed culvert information
"Not extracted"
culverts saved to a .csv file for completeness
ArcGIS
esri
Watershed Delineation
with automated tools marks area identifies area draining to each culvert.
Export
Watershed area, Time of Concentration & Curve Number to .csv
"Cornell Culvert Evaluation" Script
takes user file name inputs and executes all subsequent scripts (designated in gray), to create the model_output file.
Model_Output
Maximum passible return period & other relevant data as .csv
"Capacity-Prep" script
uses field measurements to calculate culvert geometry and assign proper coefficients
"Sorter" script
orders exported GIS .csv
"Runoff" script
calculates flow of runoff from each watershed to each culvert with different return period storms. Done under current and future (x15%) rainfall conditions
"Capacity" Script
calculates maximum volume of water each culvert can convey per time.
"Return Period" Script
compares capacity of each culvert to runoff flowing from its watershed for each return period storm; assigns a maximum passible return period storm for each culvert
"Final Output" Script
combines all pertinent information into a single document for review

A Brief Aside on Scale

30m resolution = 900 m^2	USGS DEM, LANDSAT
10m resolution = 100 m^2	resampled from 30m
1m resolution = 1 m^2	LIDAR DEM
1ft resolution = 0.1 m^2	Standard Ortho Imagery

North Atlantic Aquatic Connectivity Collaborative

The North Atlantic Aquatic Connectivity Collaborative (NAACC) is a network of individu
conservation organizations, and state and federal natural resource and transportation
improving aquatic connectivity across a thirteen-state region, from Maine to West Vir

The NAACC has developed common protocols and **TRAINING** for assessing road-stre
bridges) and developed a regional **DATABASE** for this field data. The information coll
high priority bridges and culverts for upgrade and replacement.

******Webinar on revisions to the NAACC protocol and 2016 data form******

Assessment FAQ

The NAACC will support planning and decision making by providing information about
likely to bring the greatest improvements in aquatic connectivity. The NAACC has crea
prioritization map to help focus survey efforts in the project area, as well as a custom
with ArcGIS Desktop.

North Atlantic Aquatic Connectivity Collaborative

North Atlantic Aquatic Connectivity Collaborative
NAACC

- Home
- About NAACC
- Aquatic Connectivity
- Participating States
- Assessing Crossing Structures
- Resources
- Sign me up!
- Database

North Atlantic Aquatic Connectivity Collaborative

The North Atlantic Aquatic Connectivity Collaborative (NAACC) is a network of individu
conservation organizations, and state and federal natural resource and transportation
improving aquatic connectivity across a thirteen-state region, from Maine to West Virg

The NAACC has developed common protocols and **TRAINING** for assessing road-stre
bridges) and developed a regional **DATABASE** for this field data. The information coll
high priority bridges and culverts for upgrade and replacement.

Webinar on revisions to the NAACC protocol and 2016 data form

Assessment FAQ

The NAACC will support planning and decision making by providing information about
likely to bring the greatest improvements in aquatic connectivity. The NAACC has crea
prioritization map to help focus survey efforts in the project area, as well as a custom
with ArcGIS Desktop.

NOAA's National Weather Service

Hydrometeorological Design Studies Center

Precipitation Frequency Data Server (PFDS)

Home | Site Map | News | Organization

General Information
- Homepage
- Progress Reports
- FAQ
- Glossary

Precipitation Frequency
- Data Server
- GIS Grids
- Maps
- Time Series
- Temporals
- Documents

Probable Maximum Precipitation
- Documents

Miscellaneous
- Publications
- Storm Analysis
- Record Precipitation

Contact Us
- Inquiries

USA.gov

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: KS

Data description

Data type: Precipitation depth ▼ Units: English ▼ Time series type: Partial duration ▼

Select location

1) Manually:

a) By location (decimal degrees, use "-" for S and W): Latitude: [ ] Longitude: [ ] Submit

b) By station (list of KS stations): Select station ▼

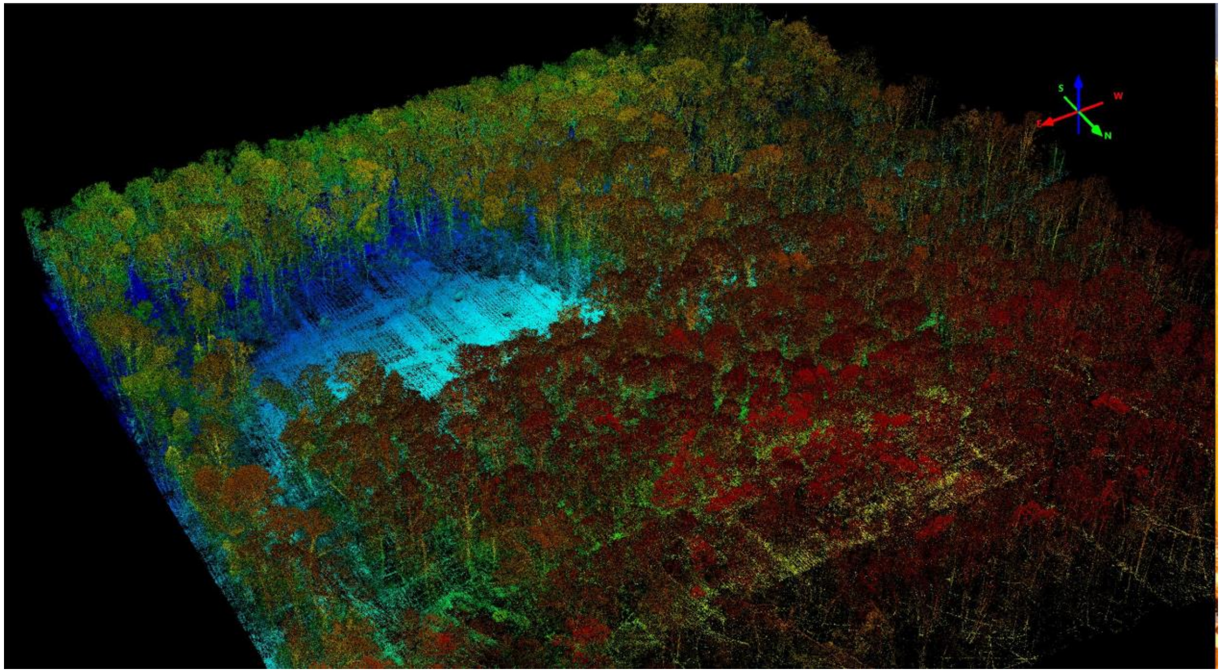
c) By address Search

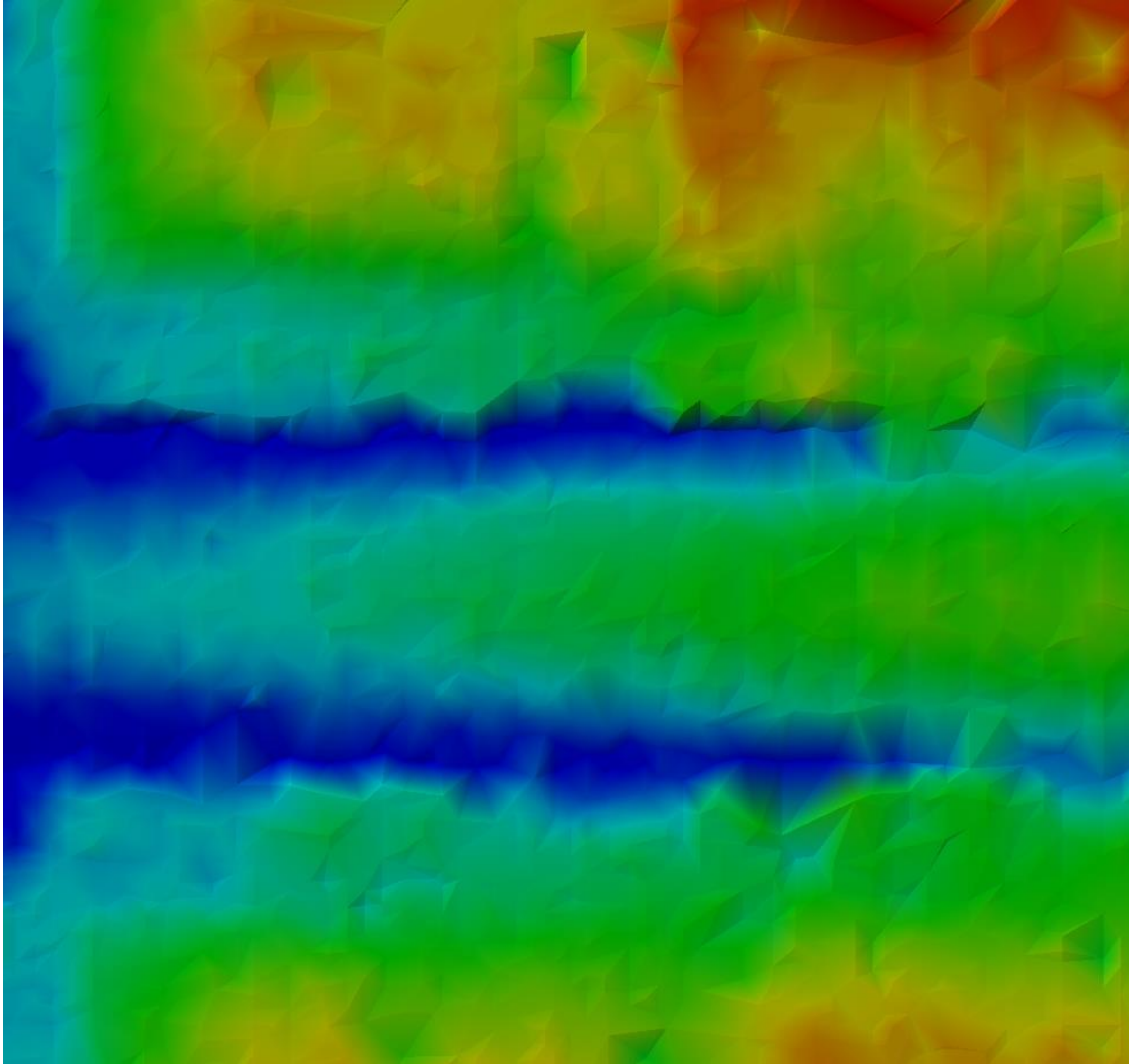
2) Use map (if ESRI interactive map is not loading, try adding the host: **https://js.arcgis.com/** to the firewall, or contact us at hdsc.questions@noaa.

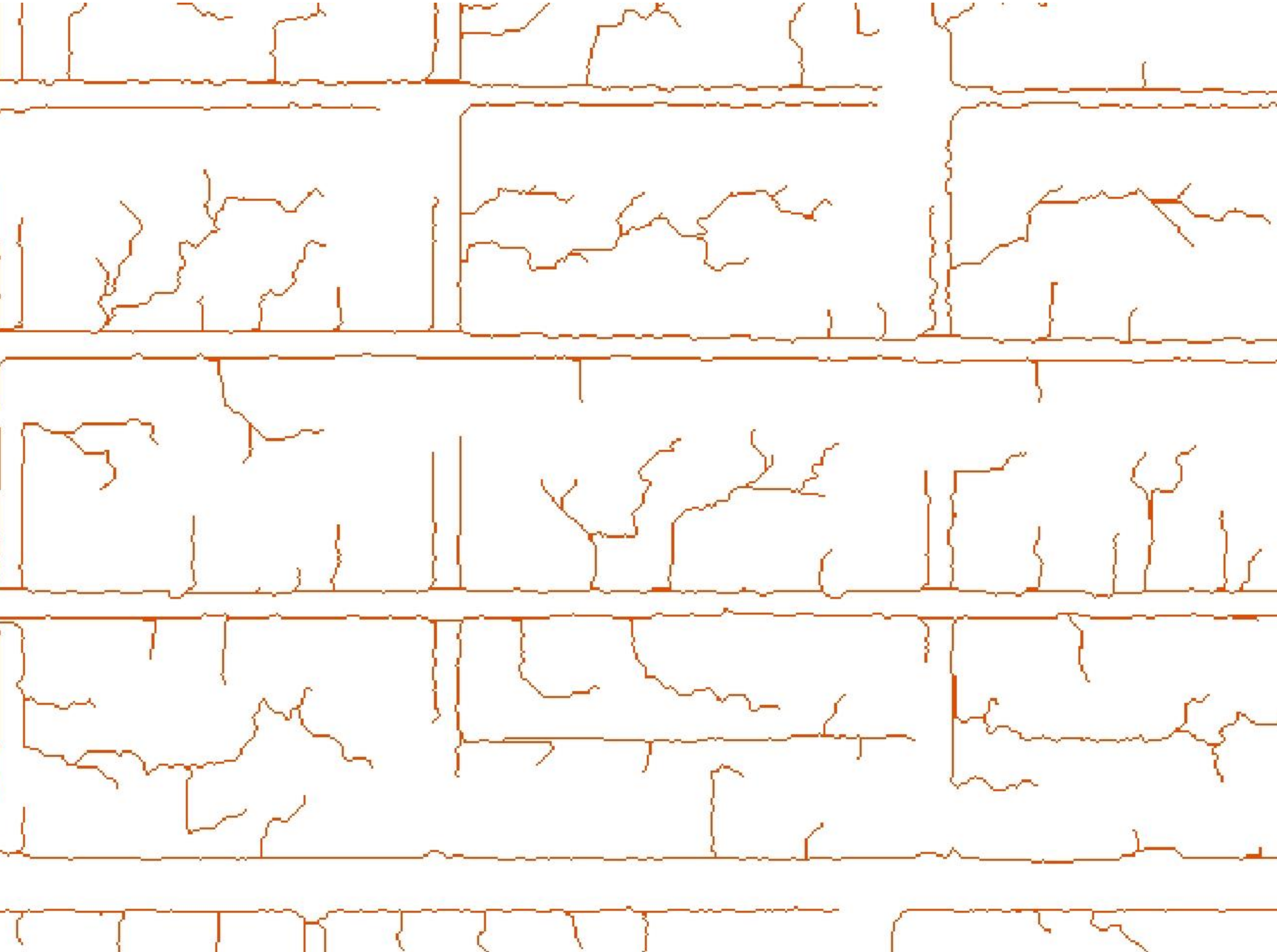
a)

b)

And now…back to our Story….







WRI Data Processes

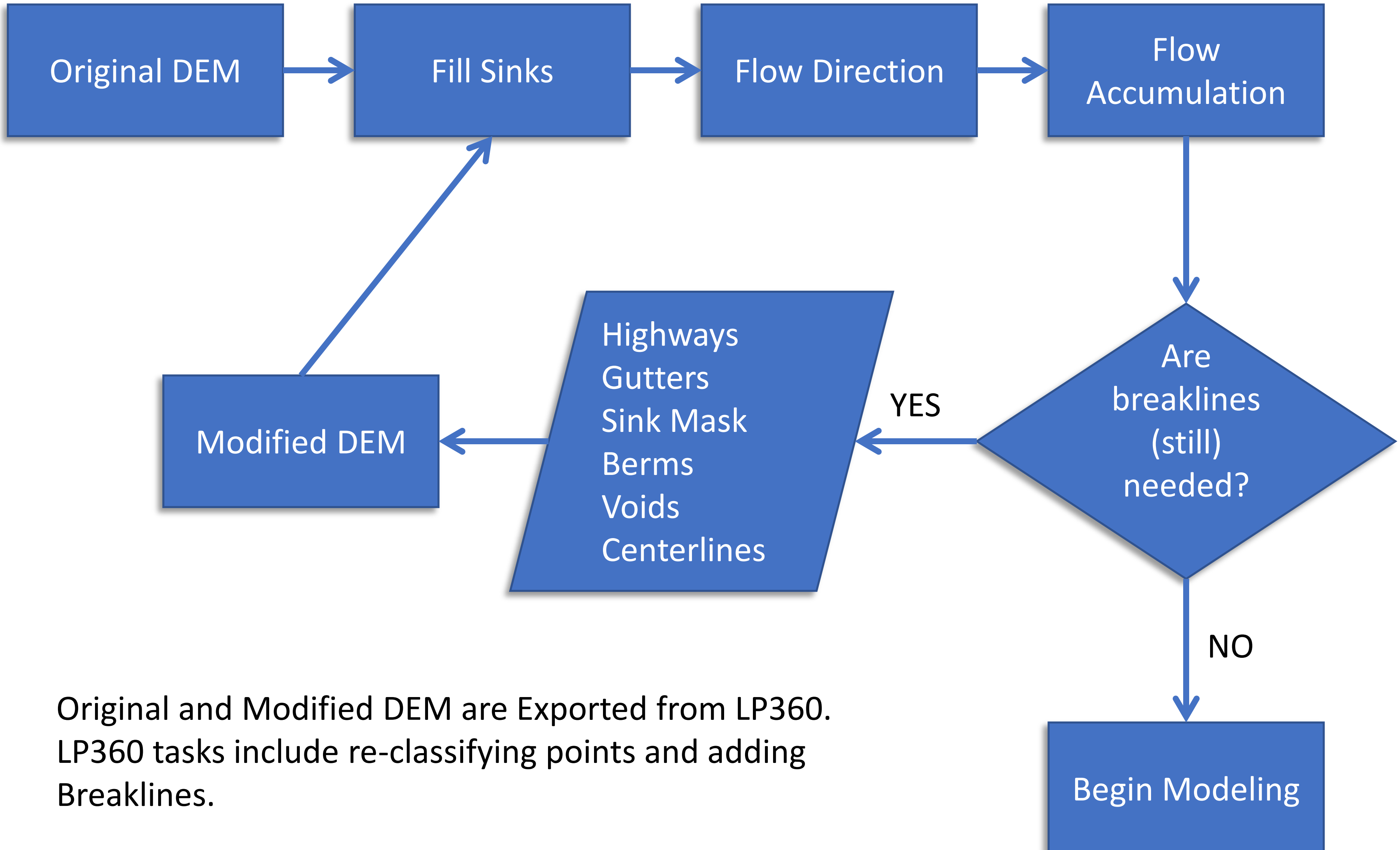
- NED (10m DEM)
- Burn NHD Streams
- Fill
    - (Depressionless DEM)

GroundPoint Data Processes

- LiDAR
    - Remove Artifacts
- Fill/ Mask
    - Remove Artifacts
    - ***Some Sinks are OK!***
- Flow Accumulation
- Breaklines
    - Stream centerlines
    - Berms/Gutters/Culverts

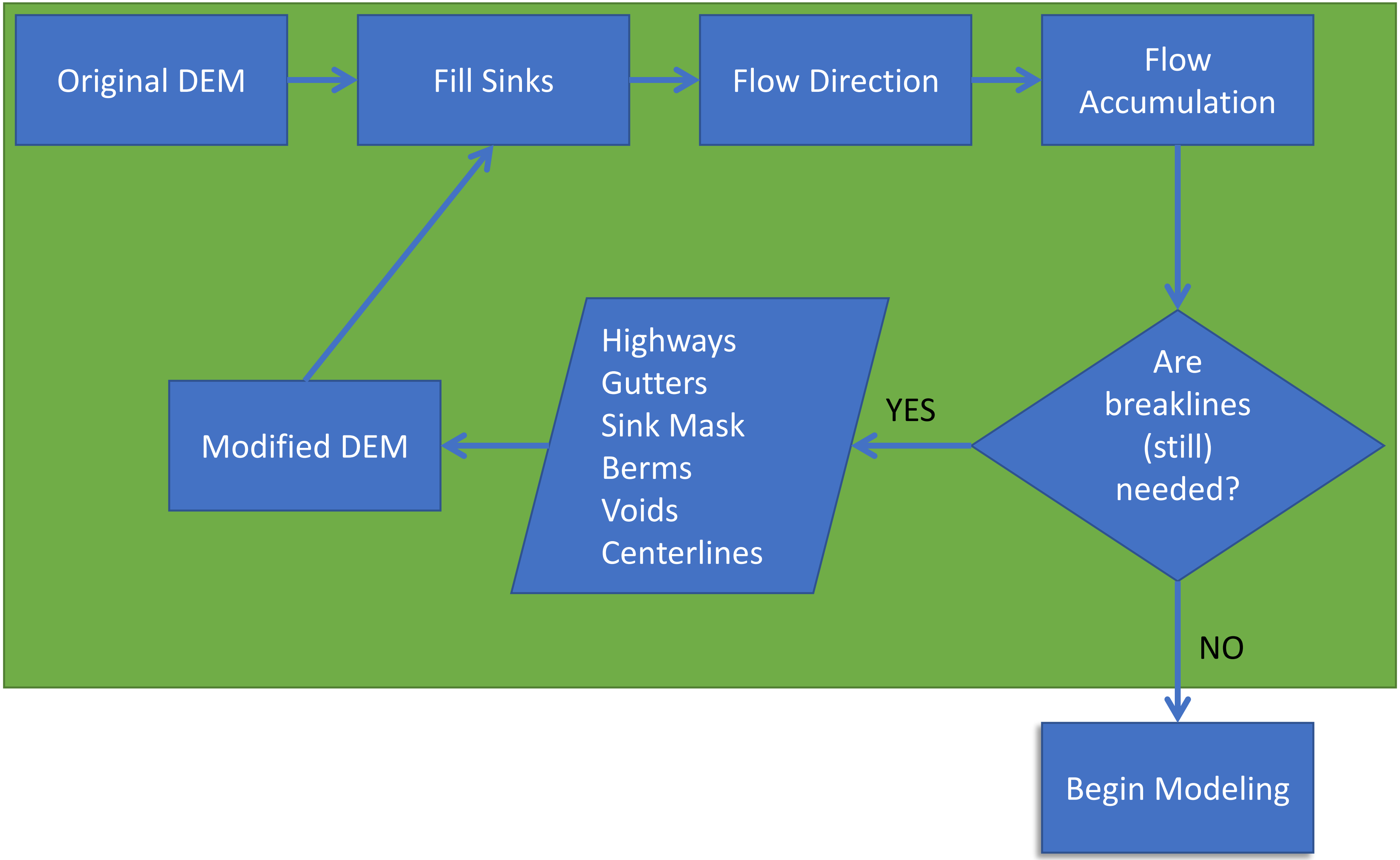
Result is a *drainage surface*

Workflow- Surface Prep

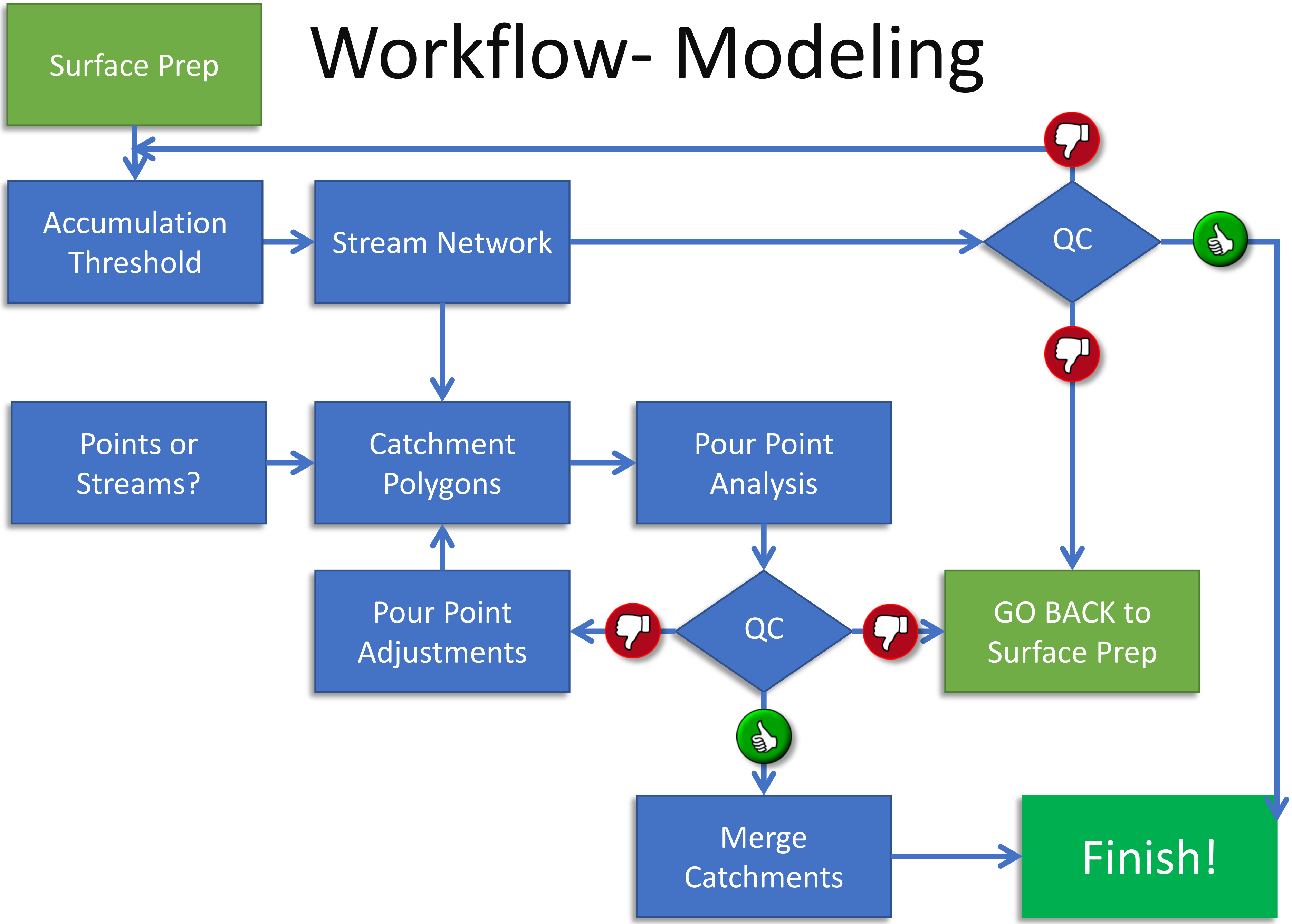


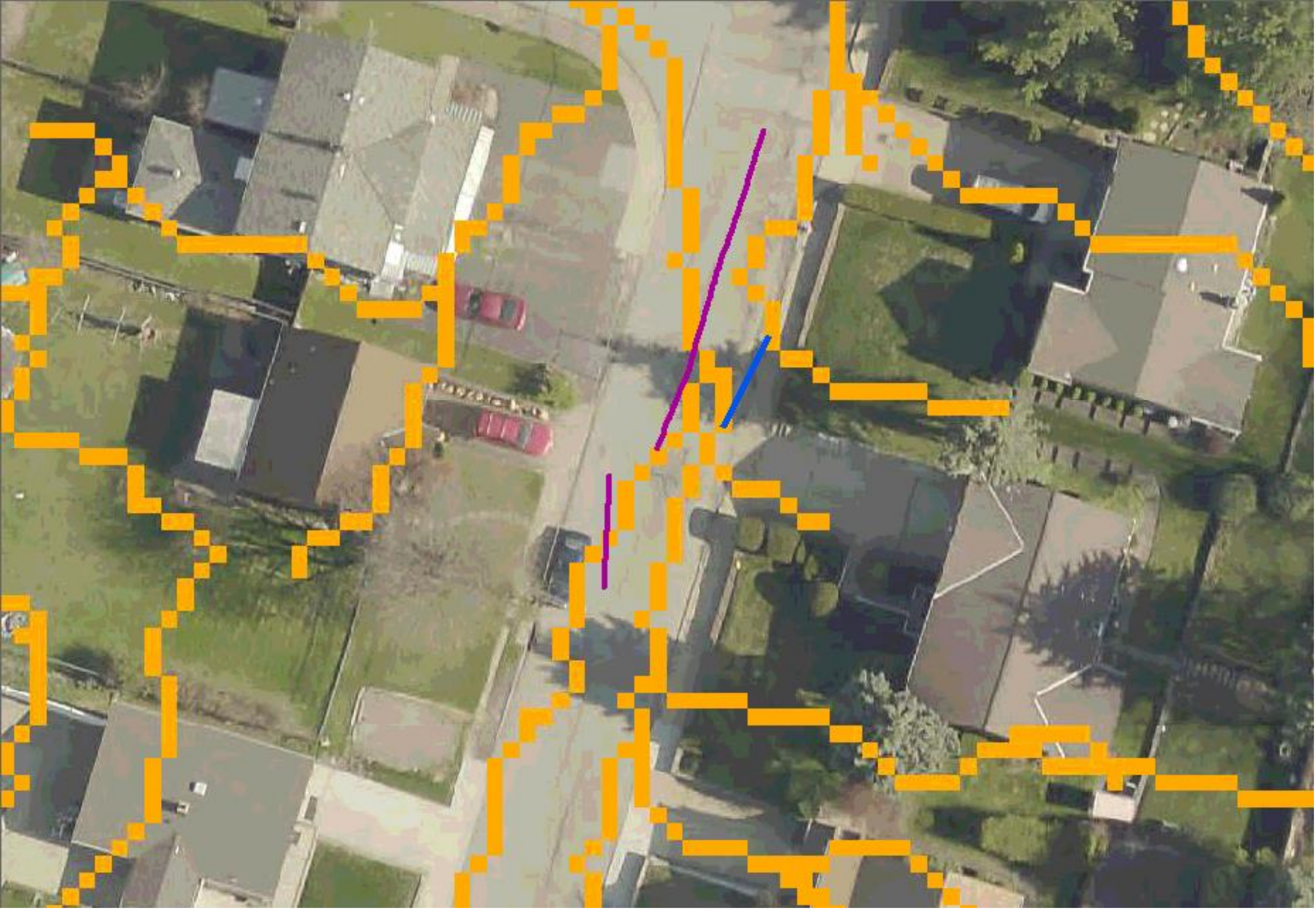
Original and Modified DEM are Exported from LP360. LP360 tasks include re-classifying points and adding Breaklines.

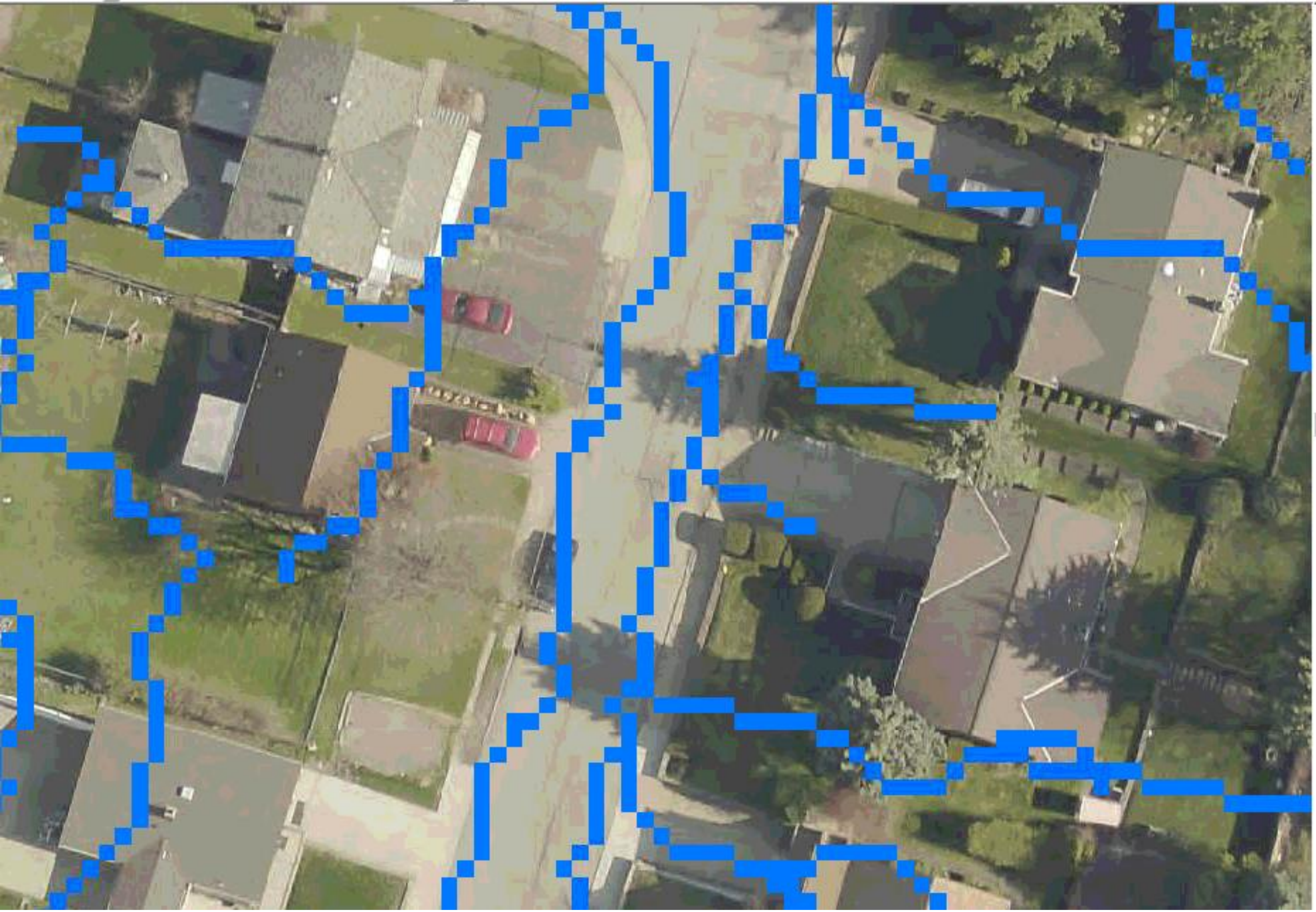
Workflow- Surface Prep

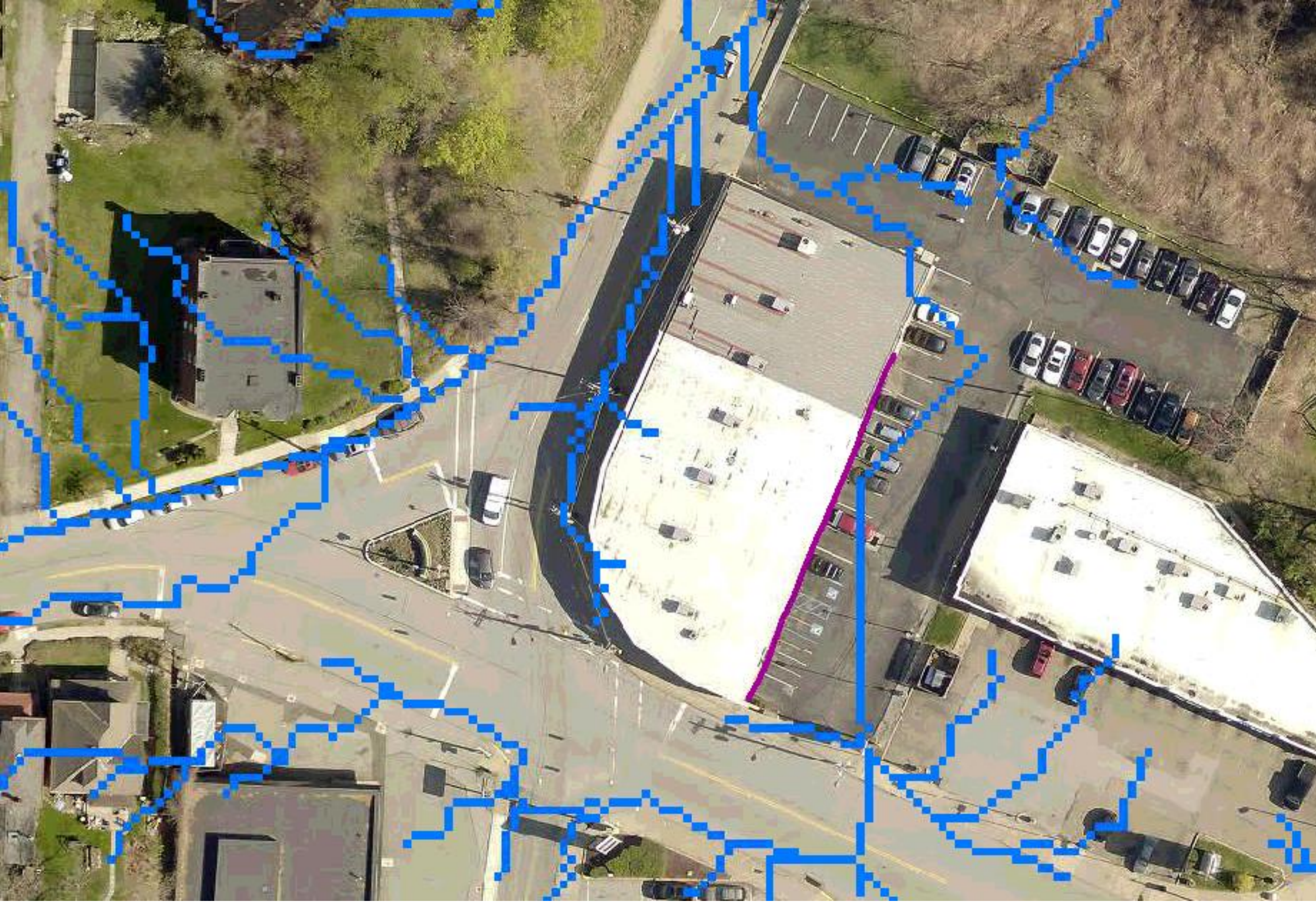


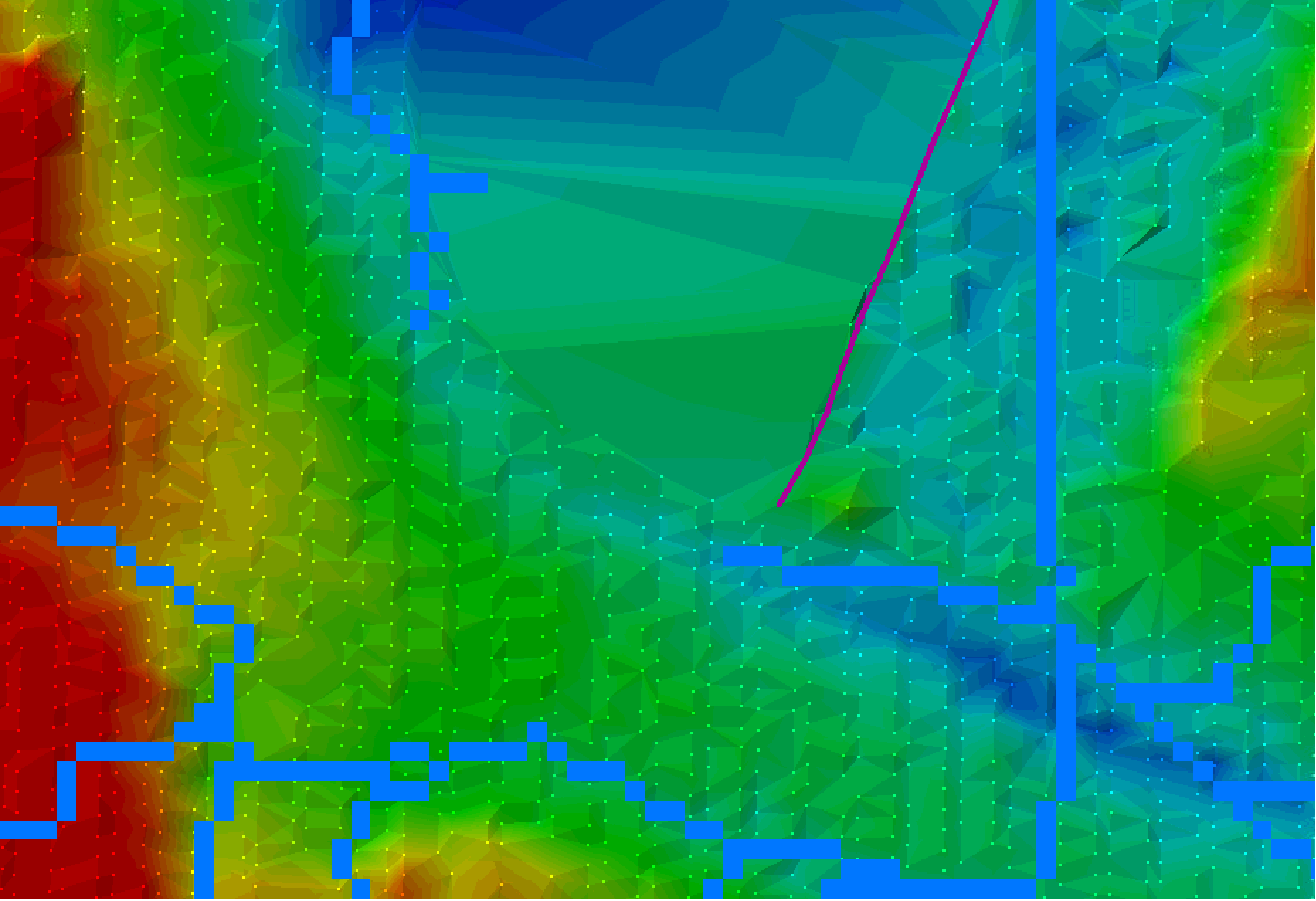
Workflow- Modeling



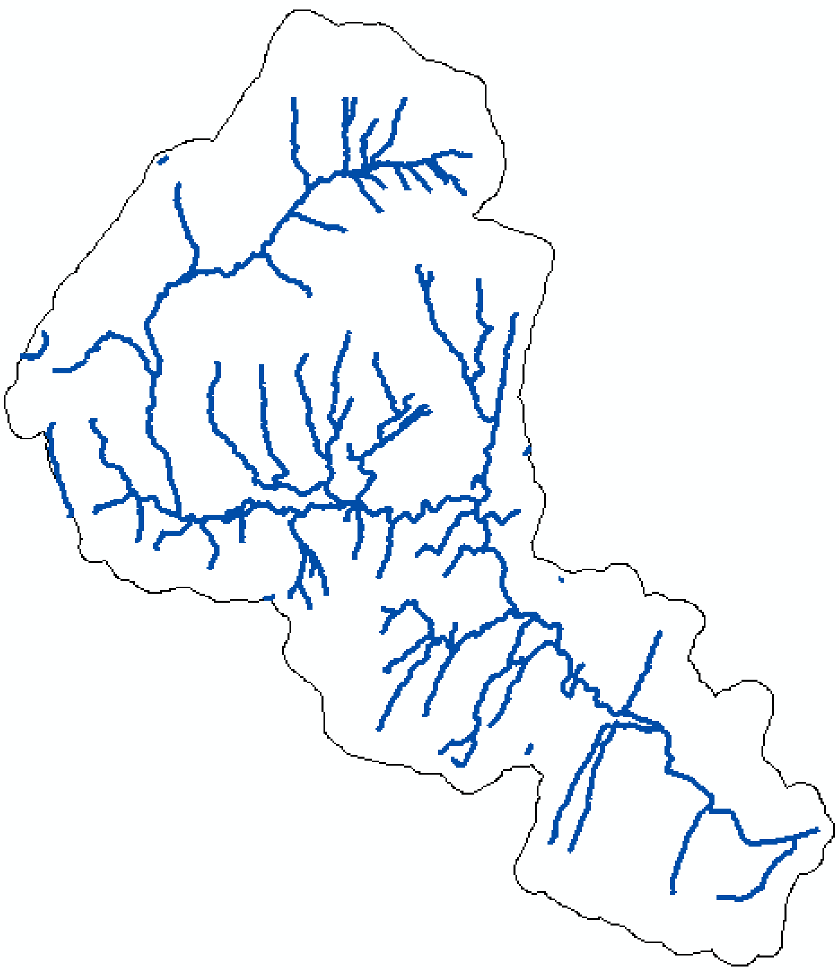


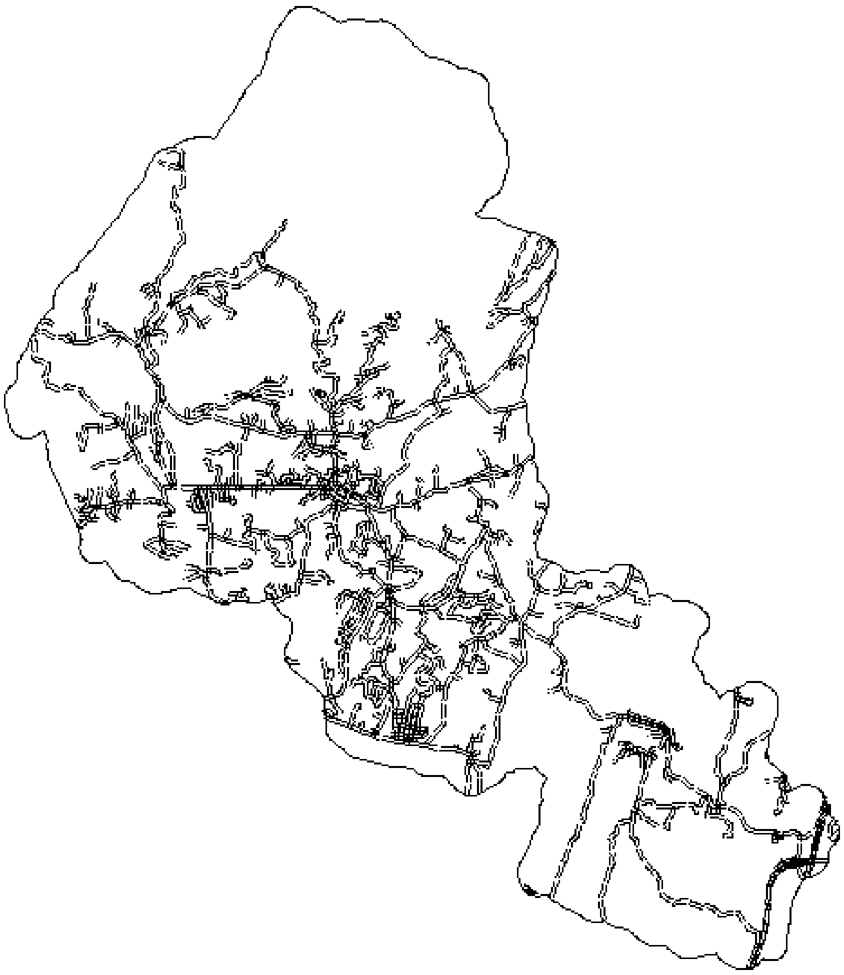


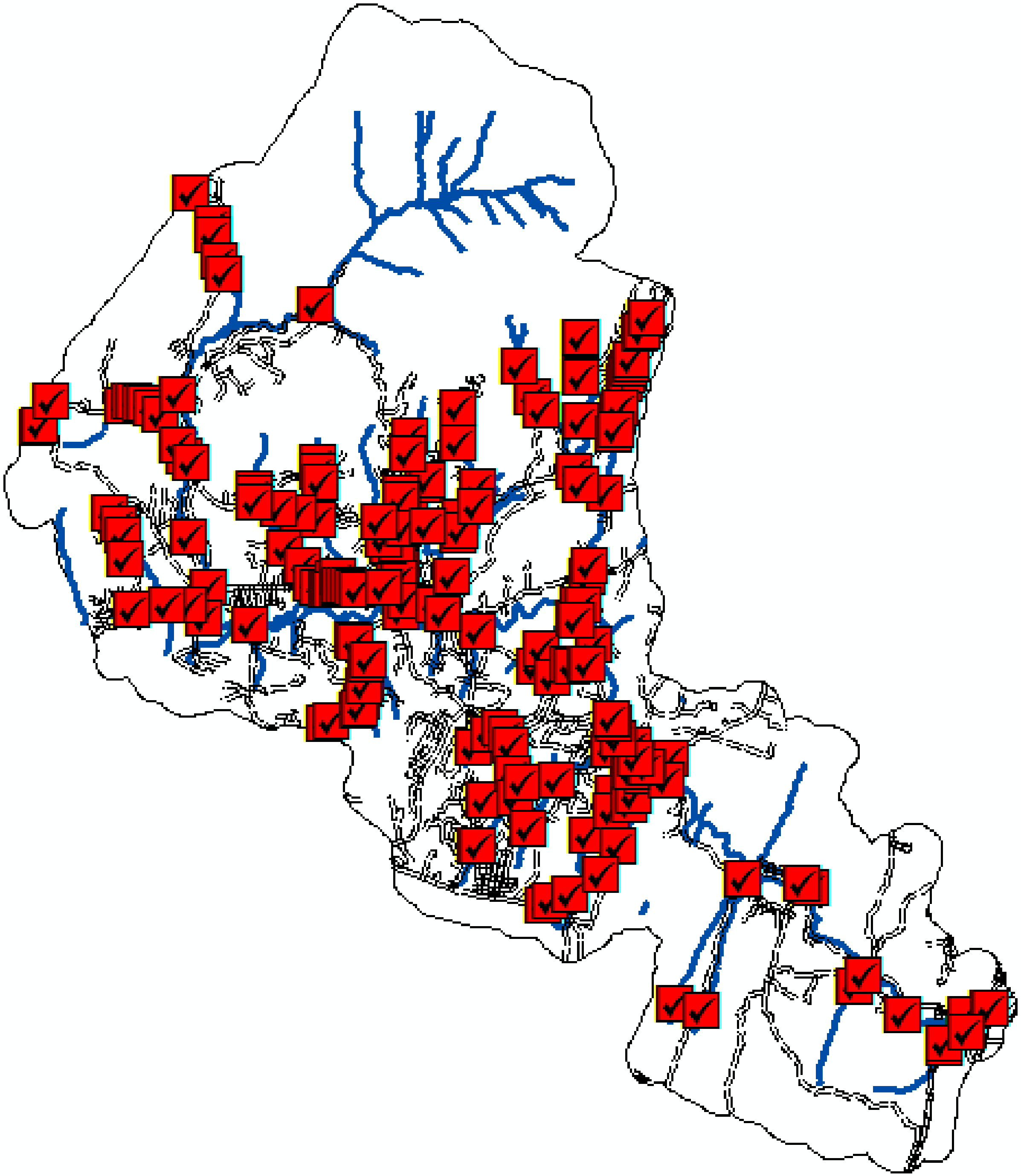


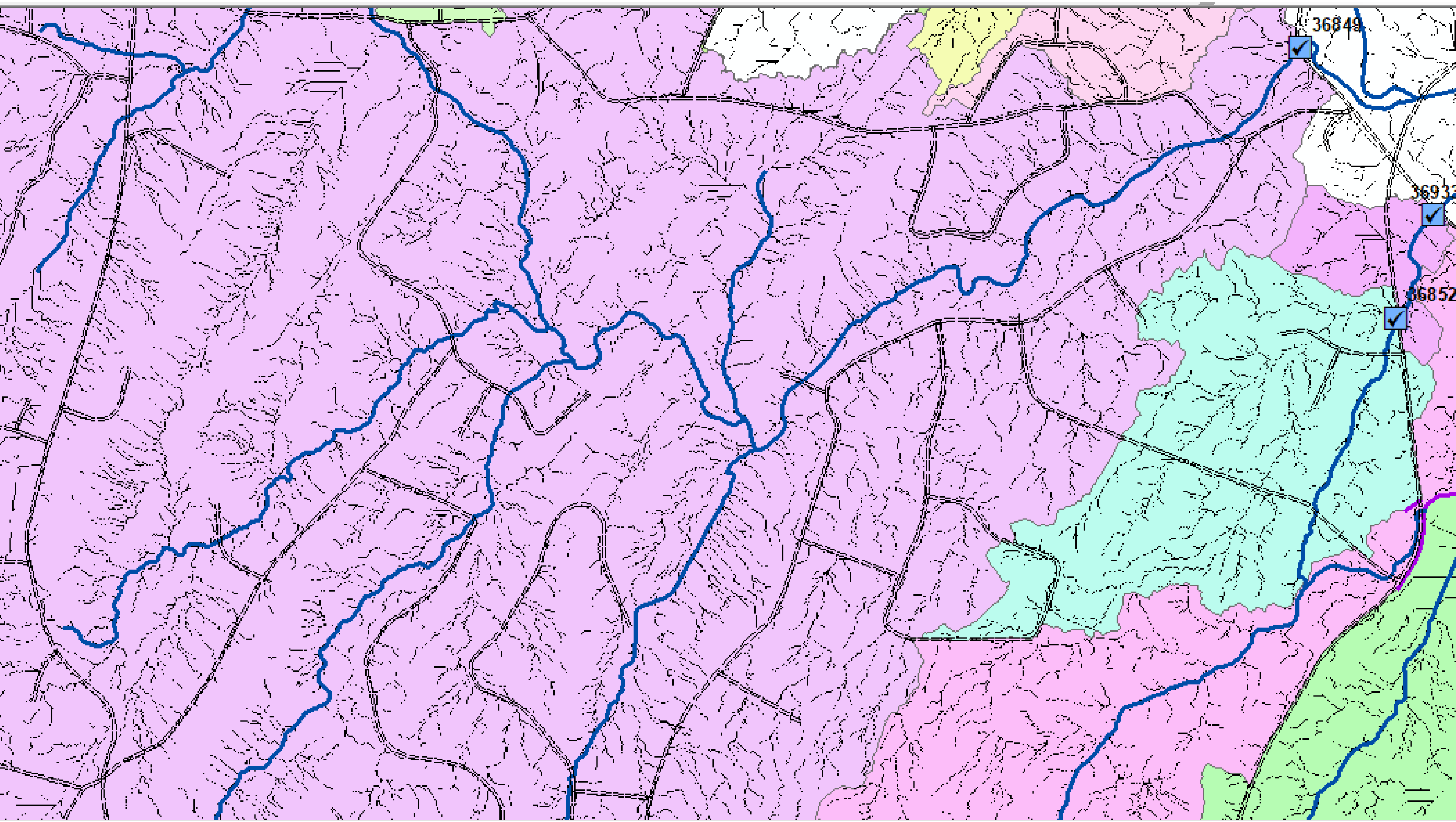


Saw Kill Creek Watershed

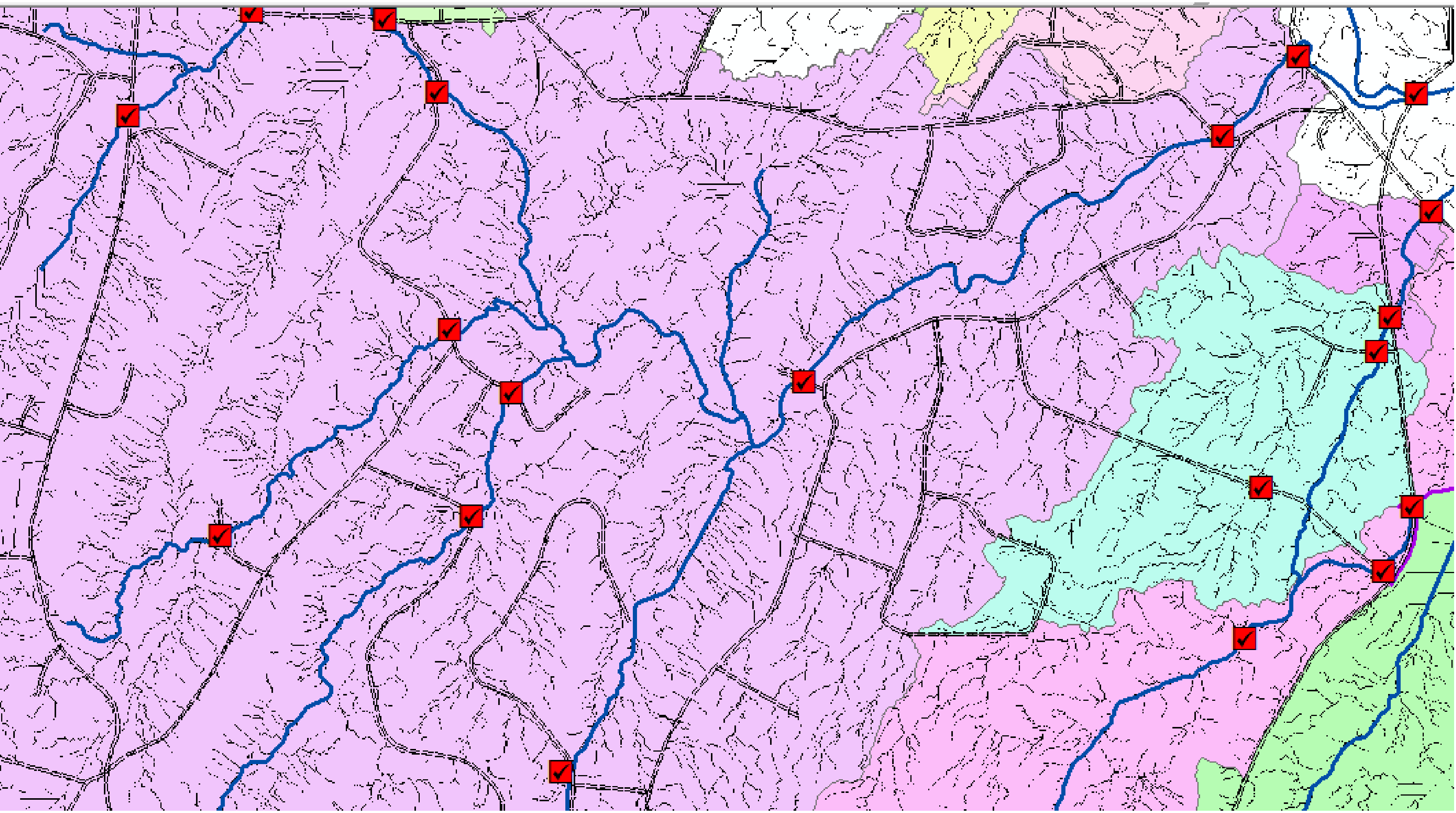


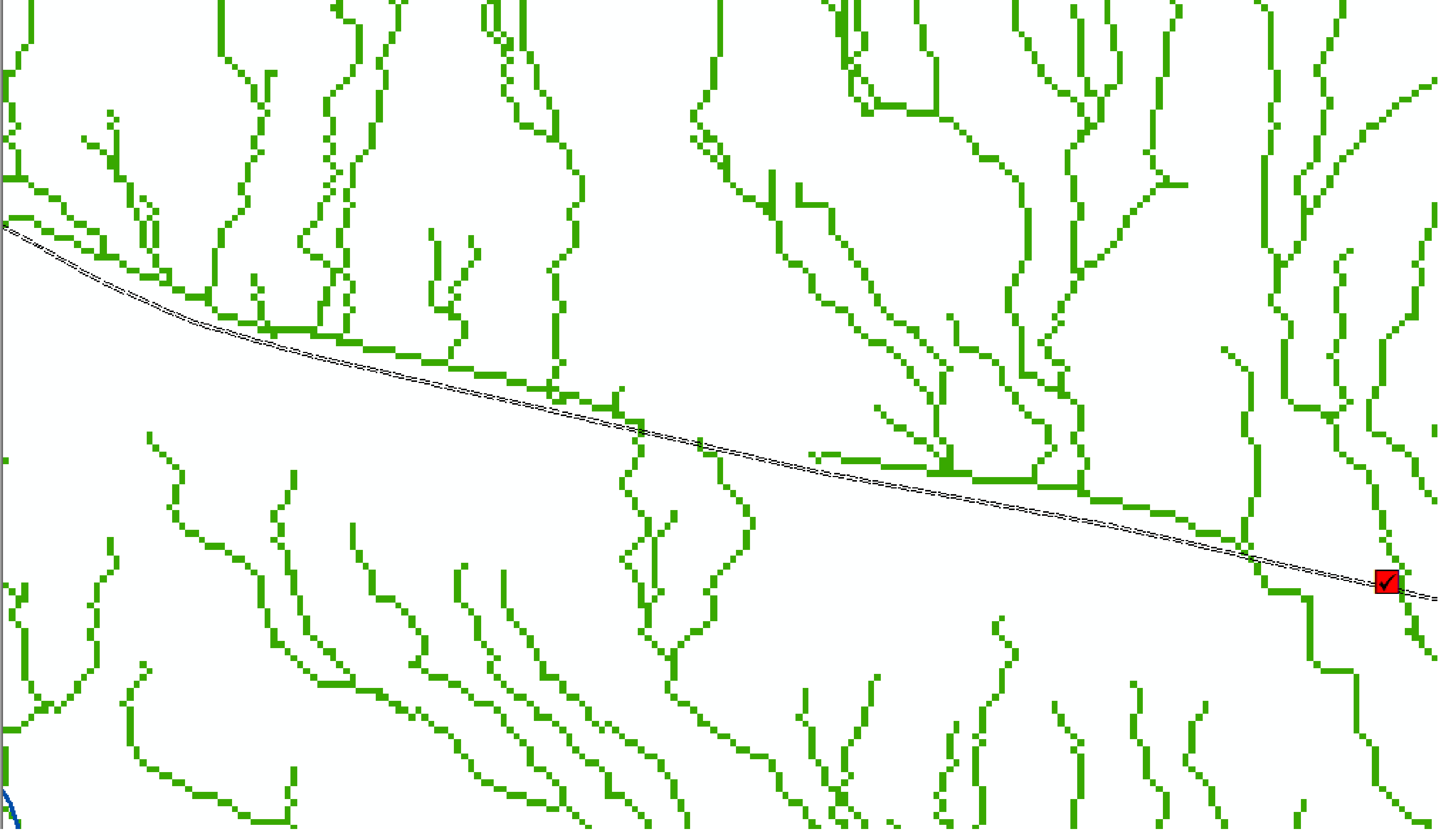


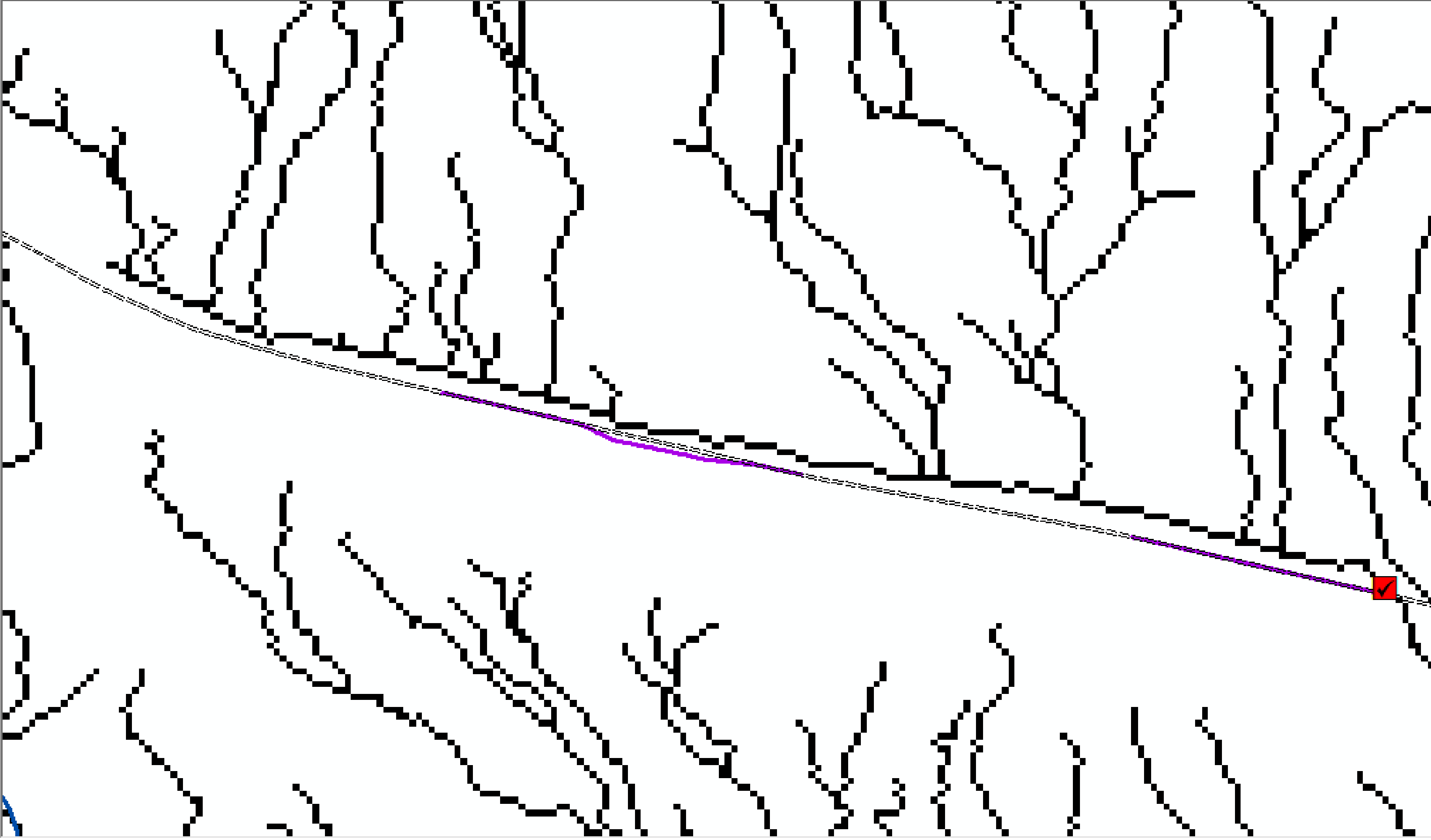


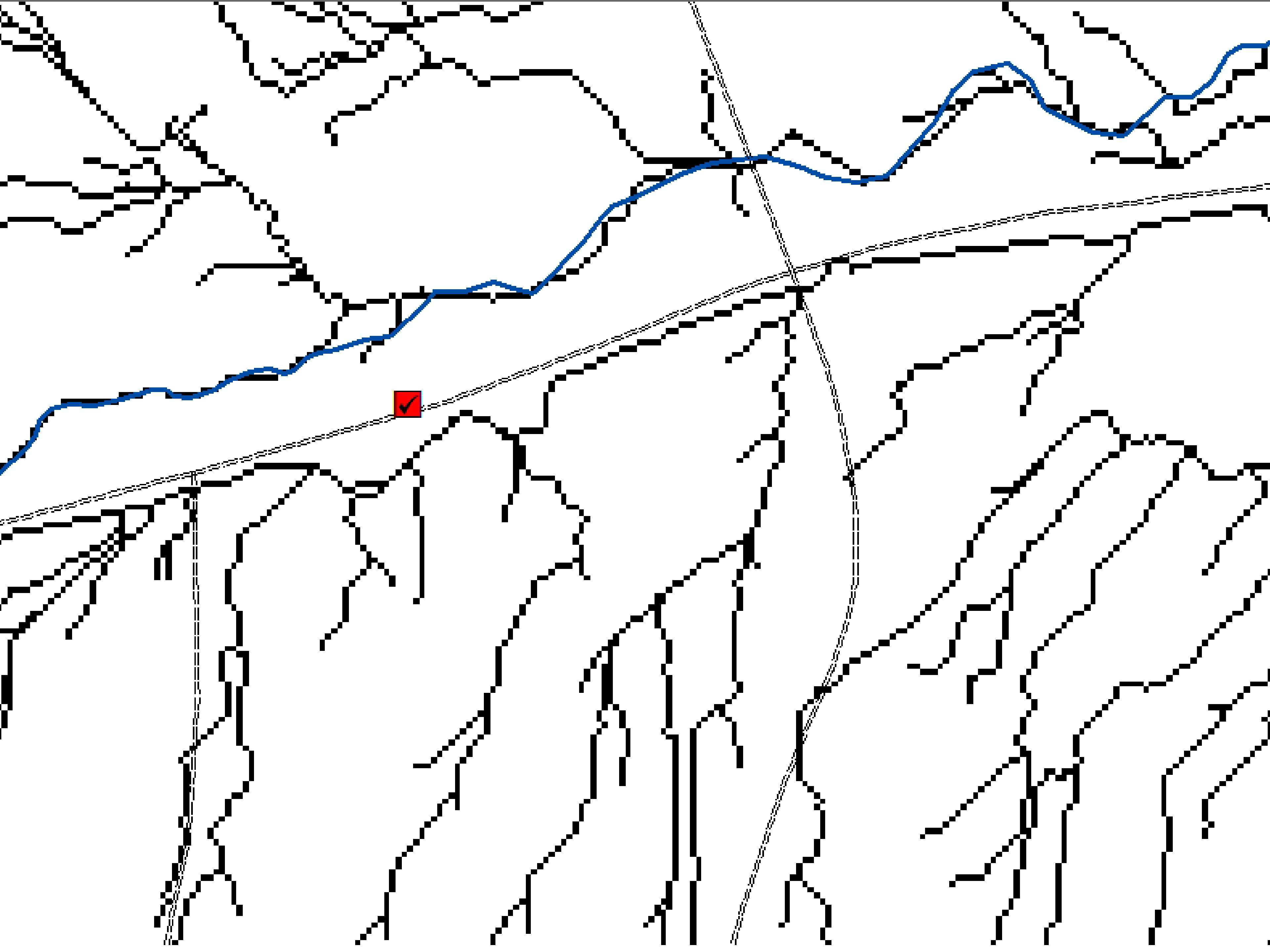


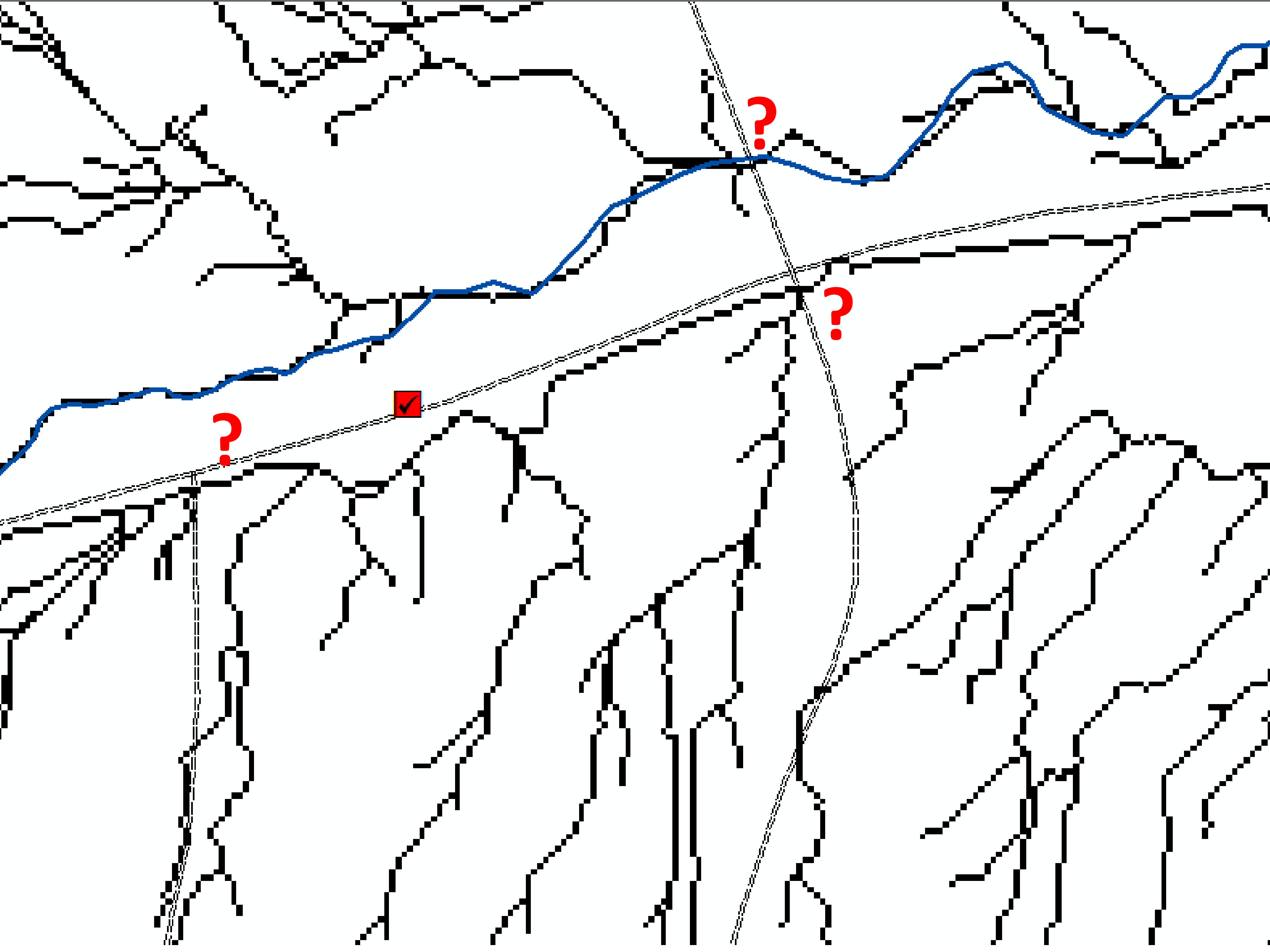
36849
3693
36852

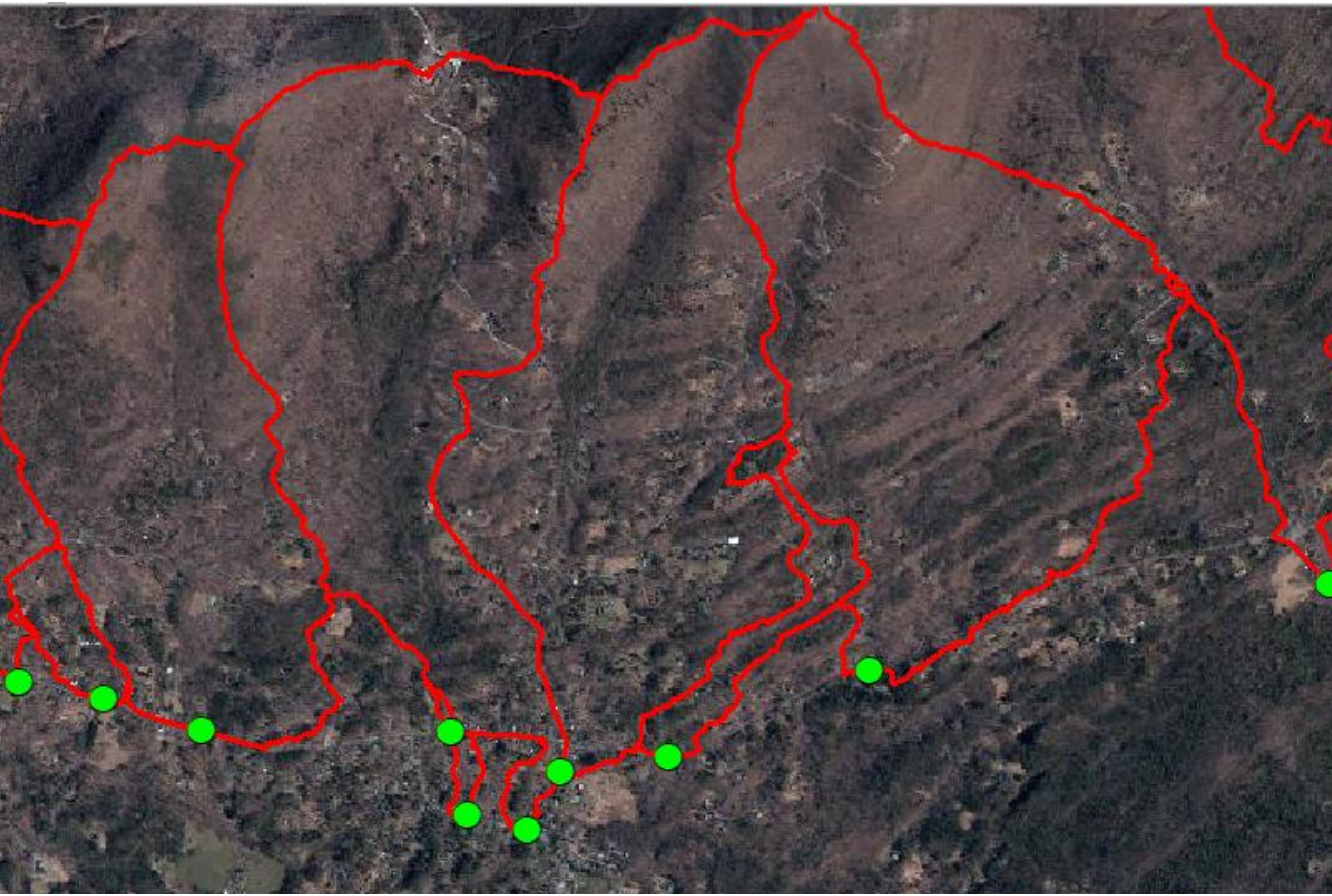


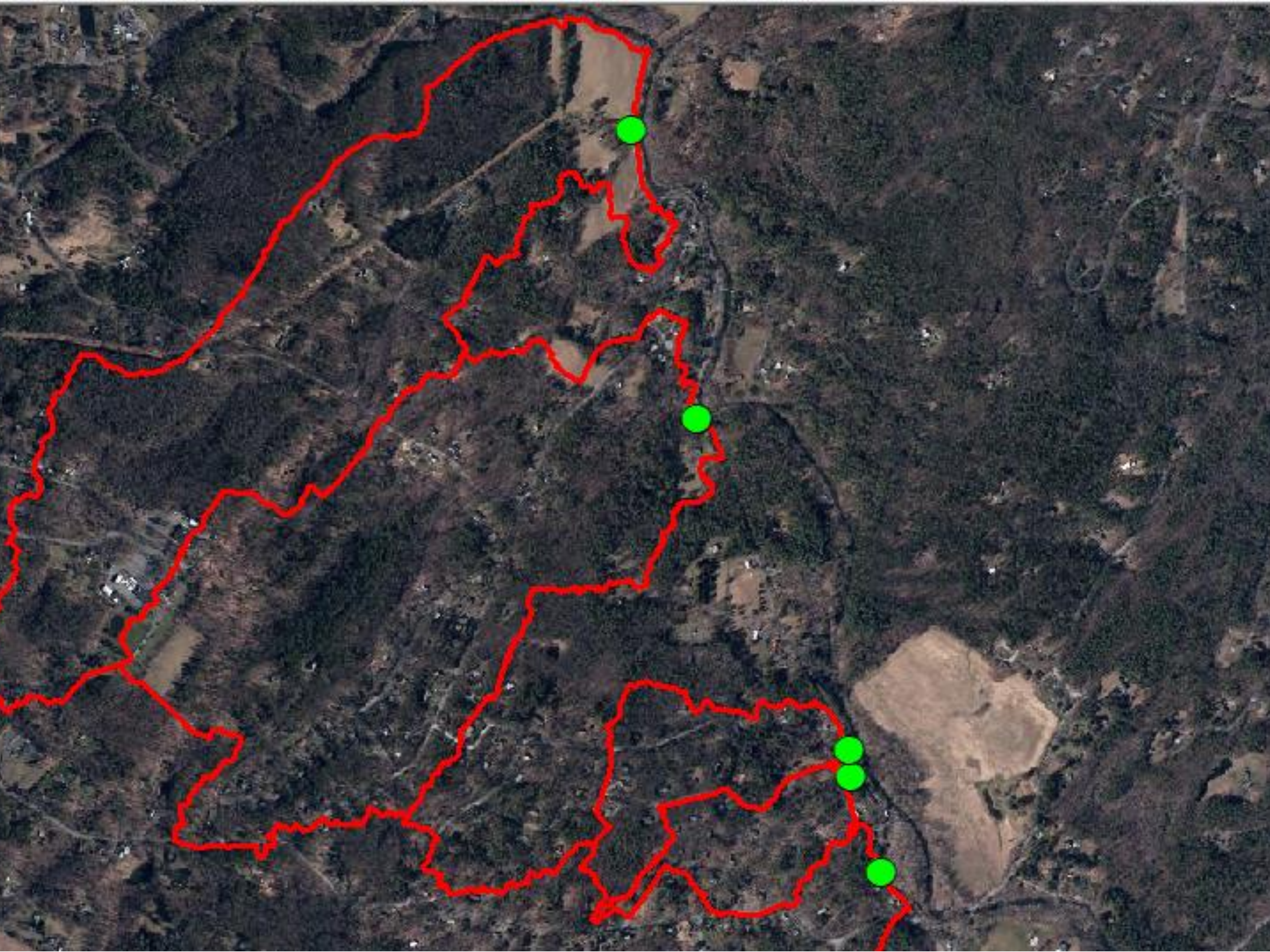


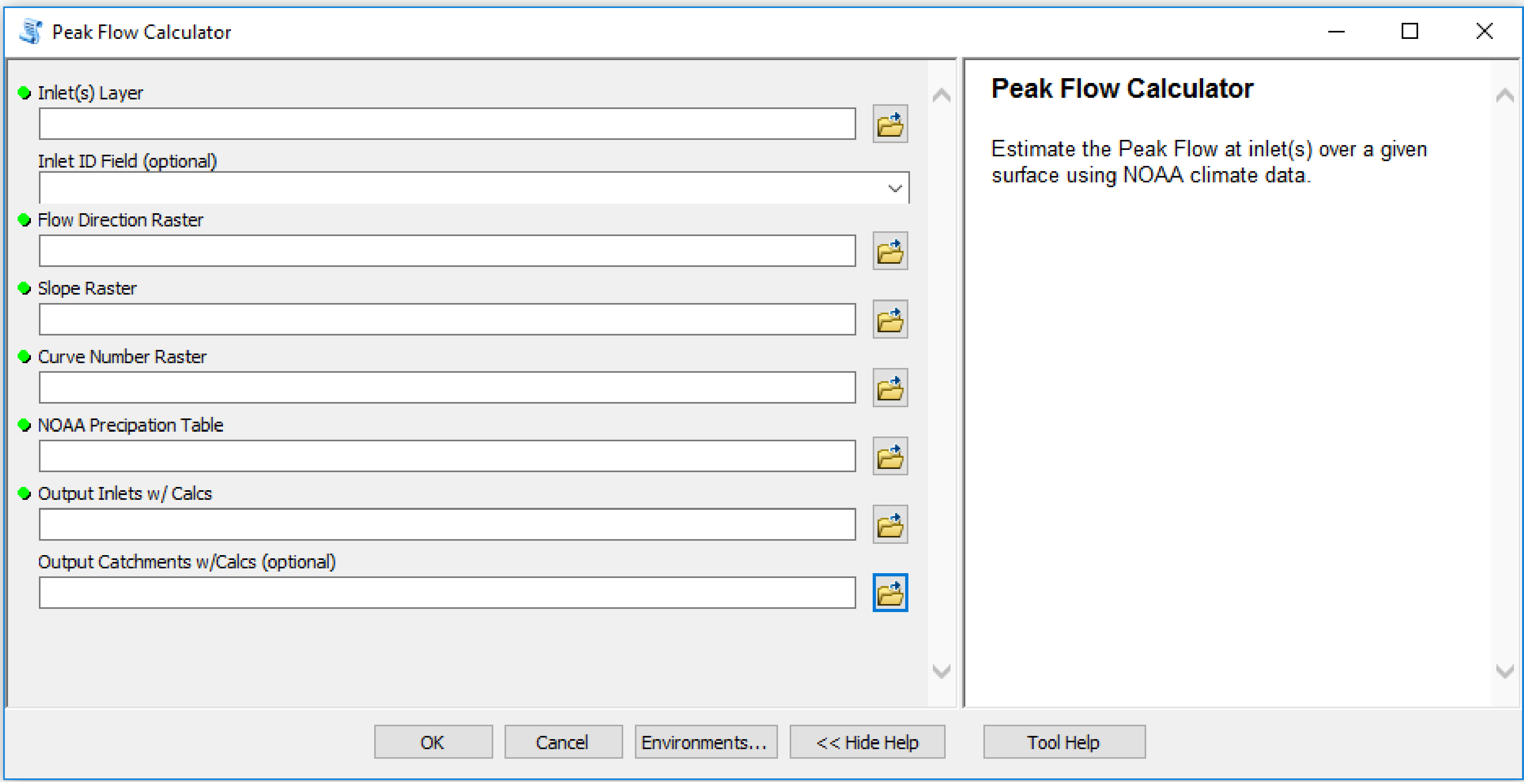






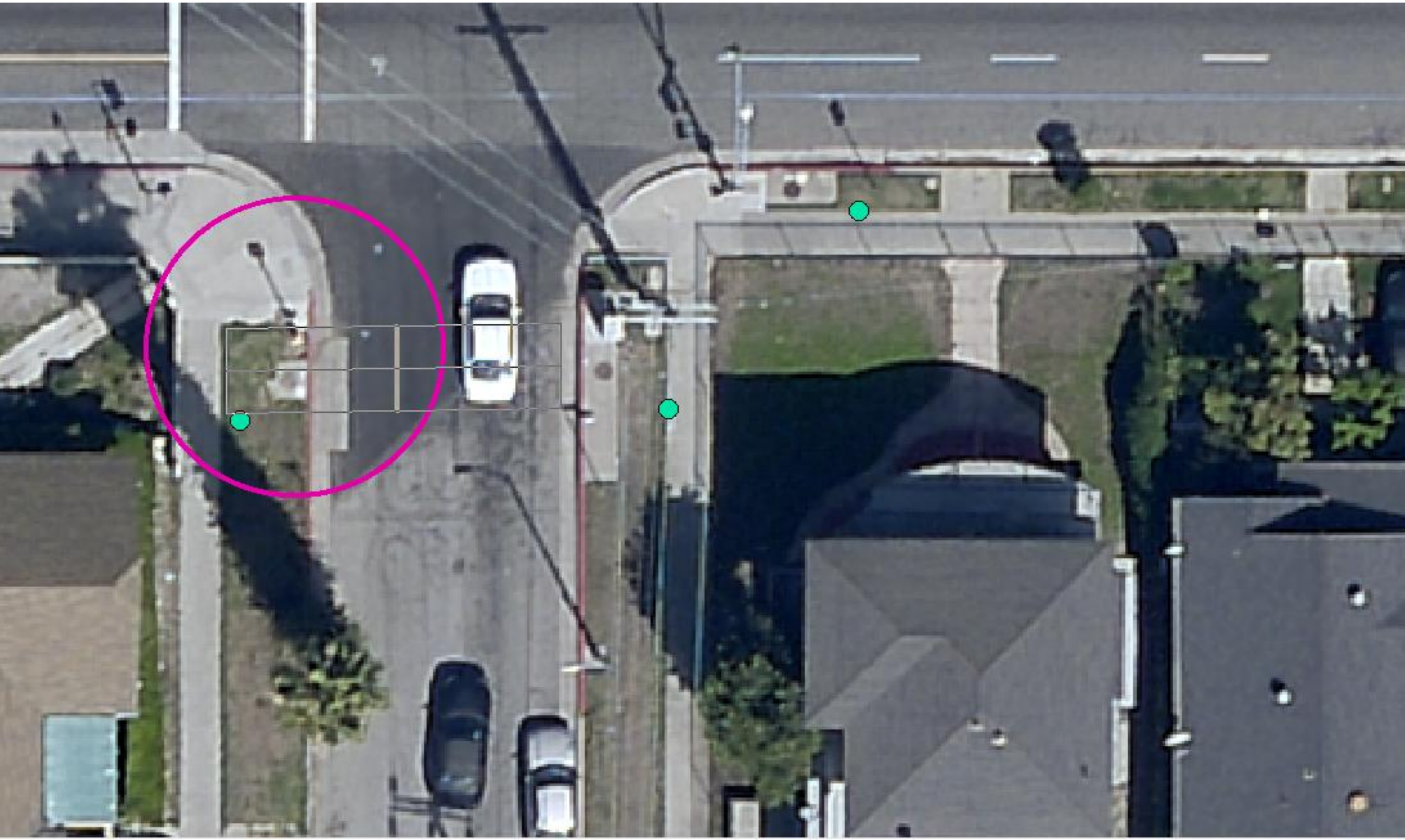





Peak Flow Calculator
Inlet(s) Layer
Inlet ID Field (optional)
Flow Direction Raster
Slope Raster
Curve Number Raster
NOAA Precipation Table
Output Inlets w/ Calcs
Output Catchments w/Calcs (optional)
Peak Flow Calculator
Estimate the Peak Flow at inlet(s) over a given surface using NOAA climate data.
OK
Cancel
Environments...
<< Hide Help
Tool Help

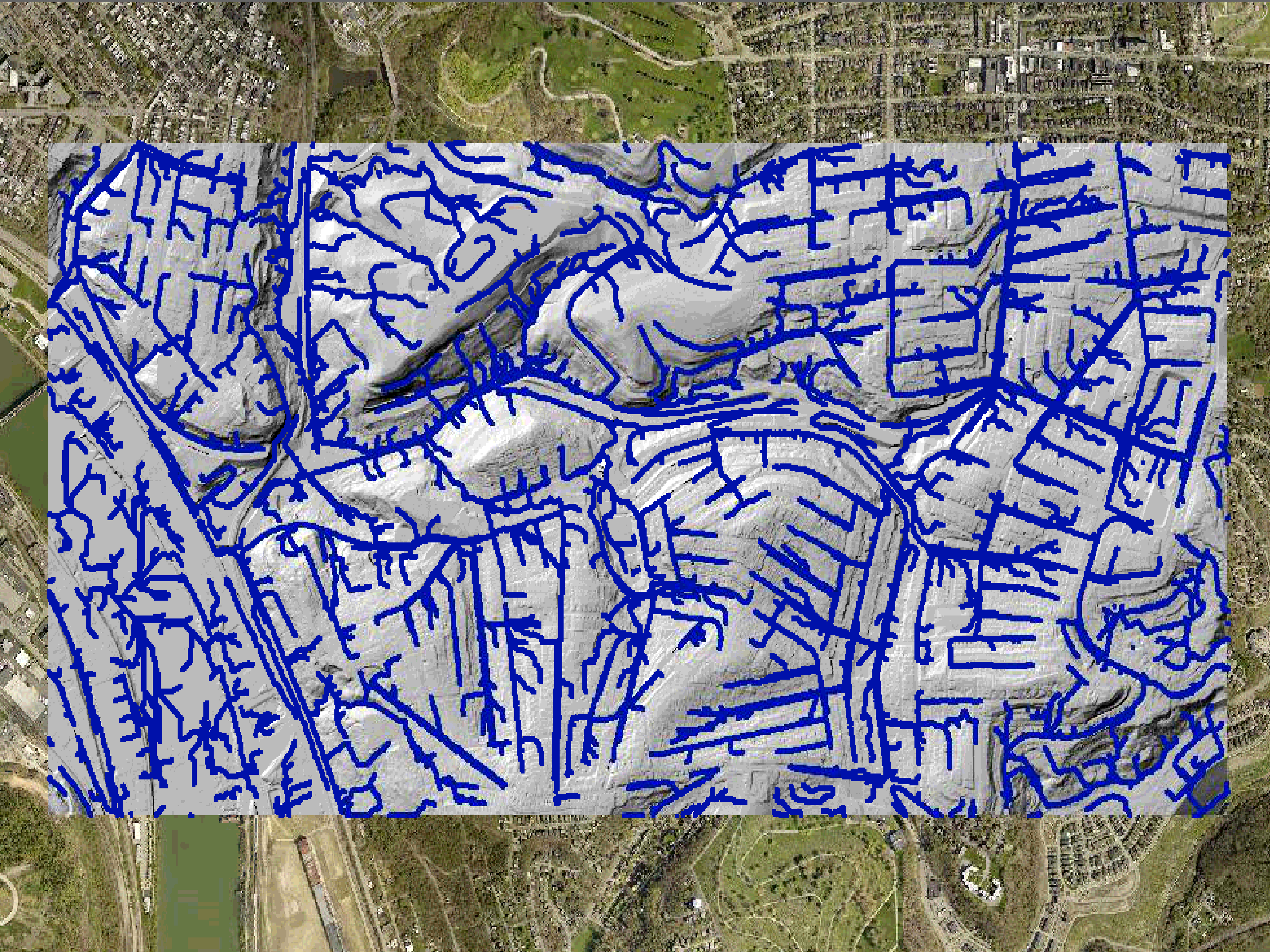
Facility ID	area_sqkm	avg_slope	max_fl	avg_cn	Y1	Y2	Y5	Y10	Y25	Y50	Y100
STM-2125	0.000002	0.053406	0.9144	71	0.000011	0.000018	0.000027	0.000034	0.000044	0.000052	0.00006
STM-3376	0.000003	5.872121	2.207557	81	0.000031	0.000037	0.000045	0.000052	0.000061	0.000068	0.000078
STM-2075	0.000003	7.637143	1.293157	77	0.000039	0.000046	0.000055	0.000062	0.000072	0.000079	0.000087
STM-2341	0.000004	4.560364	1.8288	90	0.00005	0.000061	0.000082	0.0001	0.000124	0.000145	0.000167
STM-435	0.000004	10.249034	3.6576	90	0.000054	0.000066	0.000088	0.000106	0.000133	0.000155	0.000178
STM-1531	0.000006	12.980993	7.758942	81	0.000074	0.000092	0.000118	0.000137	0.000165	0.000187	0.000215
STM-1911	0.000006	3.37349	4.036357	81	0.000074	0.000092	0.000118	0.000138	0.000165	0.000188	0.000216
STM-349	0.000007	10.940294	6.622671	81	0.000084	0.000105	0.000134	0.000156	0.000186	0.000211	0.000243
STM-3663	0.000008	8.95891	4.793871	77	0.000085	0.00011	0.000142	0.000167	0.0002	0.000227	0.000255
STM-1914	0.000008	1.588645	5.329514	81	0.000094	0.000121	0.000158	0.000187	0.000228	0.000261	0.000301
STM-3864	0.000008	4.925812	5.865157	77	0.000091	0.000121	0.000161	0.000192	0.000235	0.000269	0.000304
STM-2094	0.000008	7.402003	5.4864	77	0.000093	0.000122	0.00016	0.000189	0.000228	0.000261	0.000294
STM-553	0.000008	9.028109	6.622671	81	0.000105	0.000132	0.000168	0.000197	0.000236	0.000268	0.000308
STM-1466	0.000011	0.034084	10.9728	81	0.000097	0.000136	0.000193	0.000239	0.000304	0.000358	0.000419
STM-2095	0.00001	7.079666	7.693957	77	0.000109	0.000145	0.000194	0.000232	0.000284	0.000326	0.000369
STM-3661	0.000009	9.004822	6.622671	81	0.000116	0.000145	0.000185	0.000217	0.00026	0.000295	0.000339
STM-3615	0.00001	19.889884	5.329514	81	0.000124	0.000152	0.000188	0.000217	0.000257	0.000289	0.000332
STM-3810	0.000008	35.981529	10.345256	94	0.000125	0.000158	0.000204	0.000242	0.000295	0.00034	0.000386
STM-3866	0.000008	16.372104	5.329514	94	0.000132	0.000167	0.000216	0.000255	0.000312	0.000359	0.000408
STM-3672	0.000011	7.25289	4.415114	81	0.000136	0.000169	0.000212	0.000247	0.000294	0.000332	0.000382
STM-423	0.000011	9.573367	5.865157	81	0.000136	0.00017	0.000216	0.000251	0.0003	0.000341	0.000391
STM-1939	0.000009	2.860376	7.001428	90	0.000142	0.000176	0.000236	0.000286	0.000356	0.000416	0.000478
STM-997	0.000013	6.095804	7.380185	77	0.000144	0.000193	0.000259	0.00031	0.000379	0.000435	0.000493
STM-348	0.000014	4.135438	8.830228	77	0.000148	0.000202	0.000276	0.000333	0.000412	0.000477	0.000543
STM-3682	0.000014	39.545462	11.259656	77	0.00016	0.000207	0.00027	0.000318	0.000383	0.000436	0.00049
STM-3668	0.000013	17.157233	7.380185	81	0.000168	0.000209	0.000264	0.000307	0.000366	0.000415	0.000477

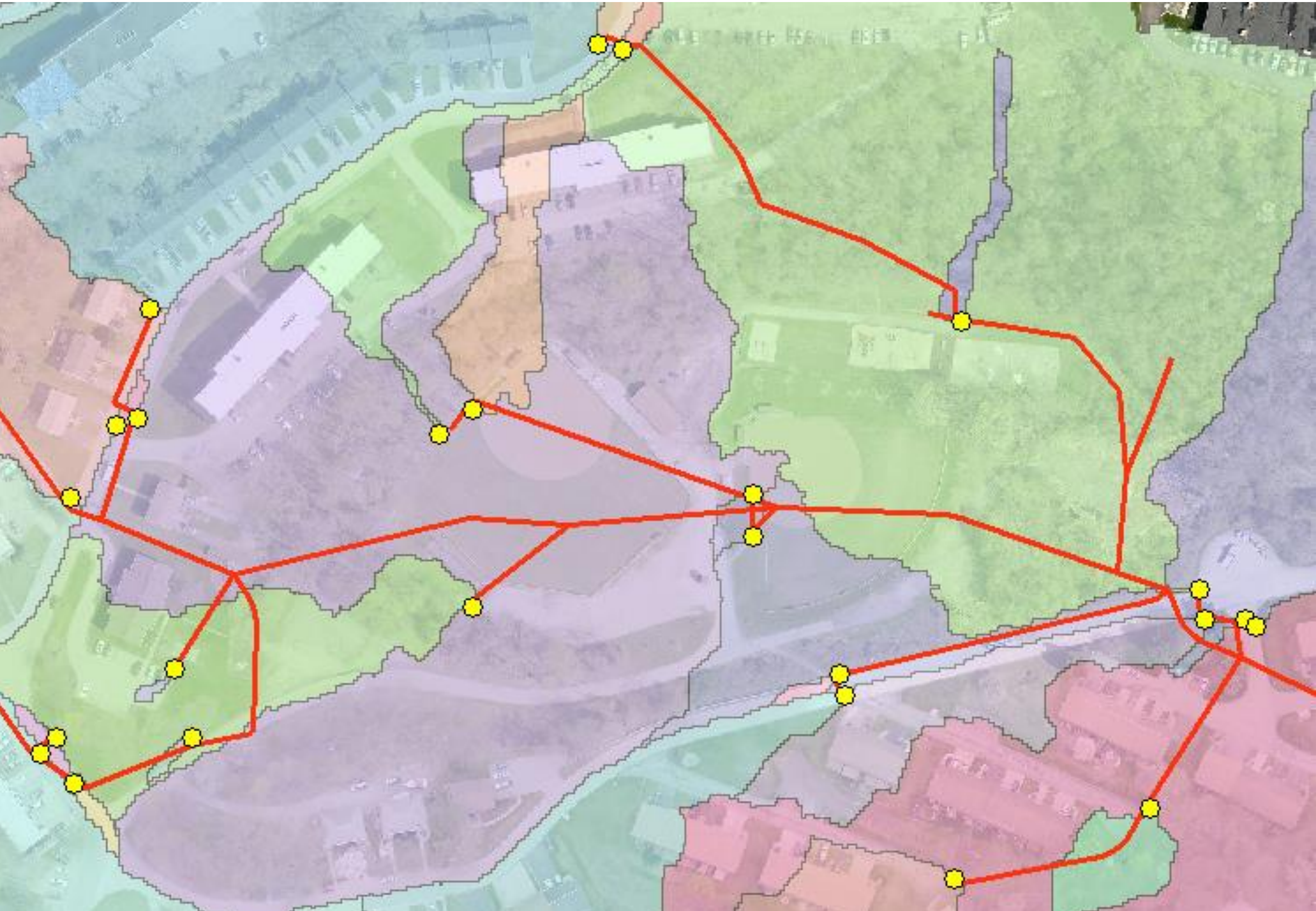
Catch Basin (Drain) Issues




LOS ANGELES REGION
LAR|iac
imagery acquisition consortium
PICTOMETRY
137.0
136.4
135.8
135.1
134.5


LOS ANGELES REGION
LAR|IAC
imagery acquisition consortium
PICTOMETRY
137.0
136.4
135.8
135.1
134.5





Conclusions

- Surface prep works for catch basins as well as culverts. Can be applied in urban settings

- Workflow is iterative
- Prepare the surface!
  - Prepare the surface
    - Prepare the surface
      - Prepare the surface
        - Prepare the surface