Introduction & Hypothesis

My project focused on determining the potential runoff created during storm events across Williamson County, TX. My primary objective was to create runoffs map for 10-year, 50-year, 100-year, and 500-year storm events. For this project, I utilized the Curve Number method of runoff calculation as exhibited by the authors of this article[1]. The common projection used was Albers WGS 1984.

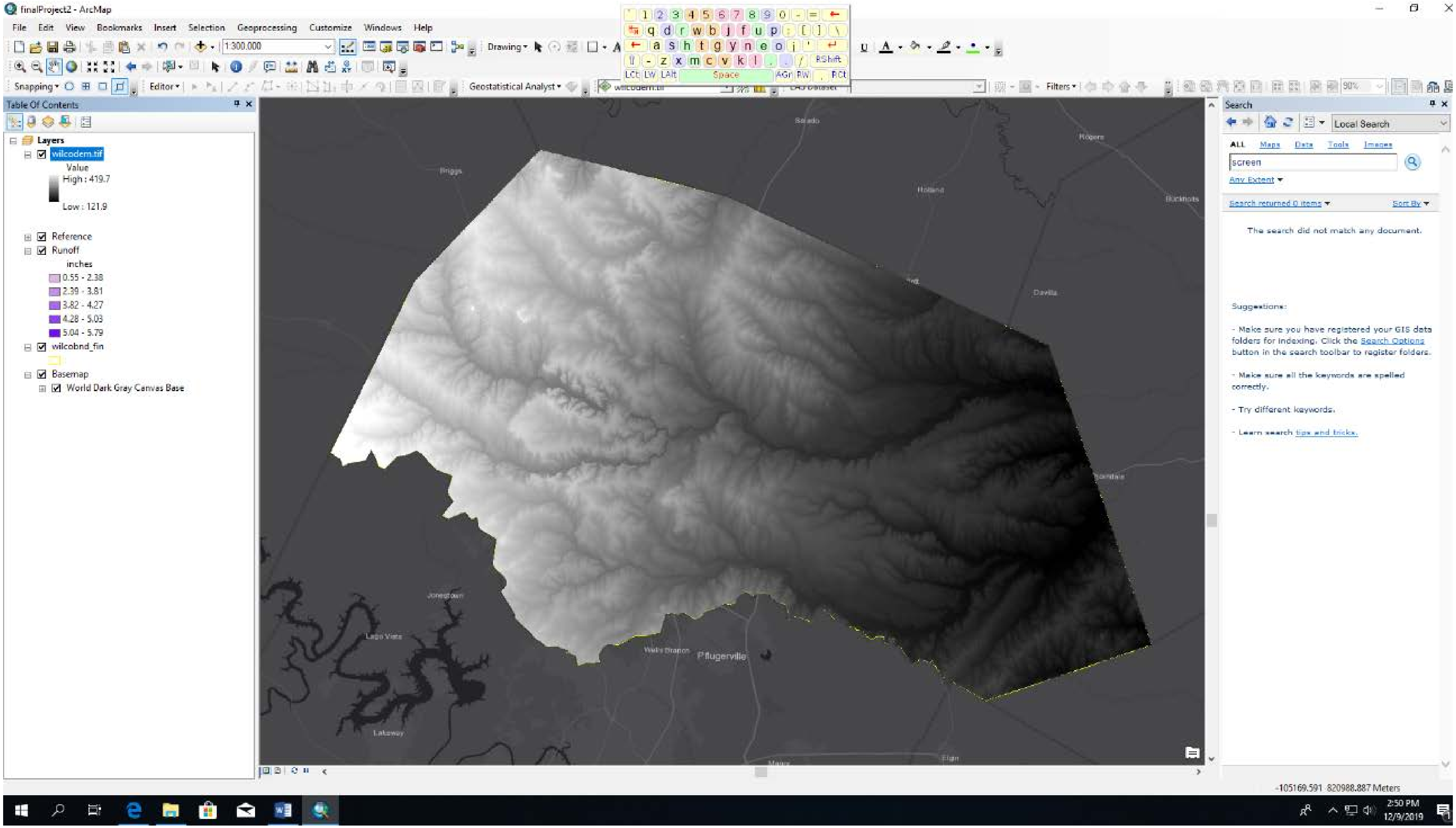
Data Collection

- To get started, I need the following datasets:
- a DEM of Williamson County,
- a layer displaying soil variations across the county
- a landcover raster covering the county
- a shapefile for the county itself

A 10x10m resolution DEM from the USGS 2013 National Elevation Dataset, covering the West Austin & East Llano quadrangles, and a 30x30m resolution landcover raster from the USGS 2016 National Landcover Database were both retrieved from the TNRIS DataHub[2].
The soil data was retrieved from the NRCS Web Soil Survey[3].
The county shapefile was retrieved from the Williamson County GIS data page[4].

Preprocessing

Each DEM had to be re-projected to the host projection, clipped to the county area they each covered, and the resulting clips mosaicked together using the Data Management – Mosaic tool.



The search did not match any document.

Suggestions:

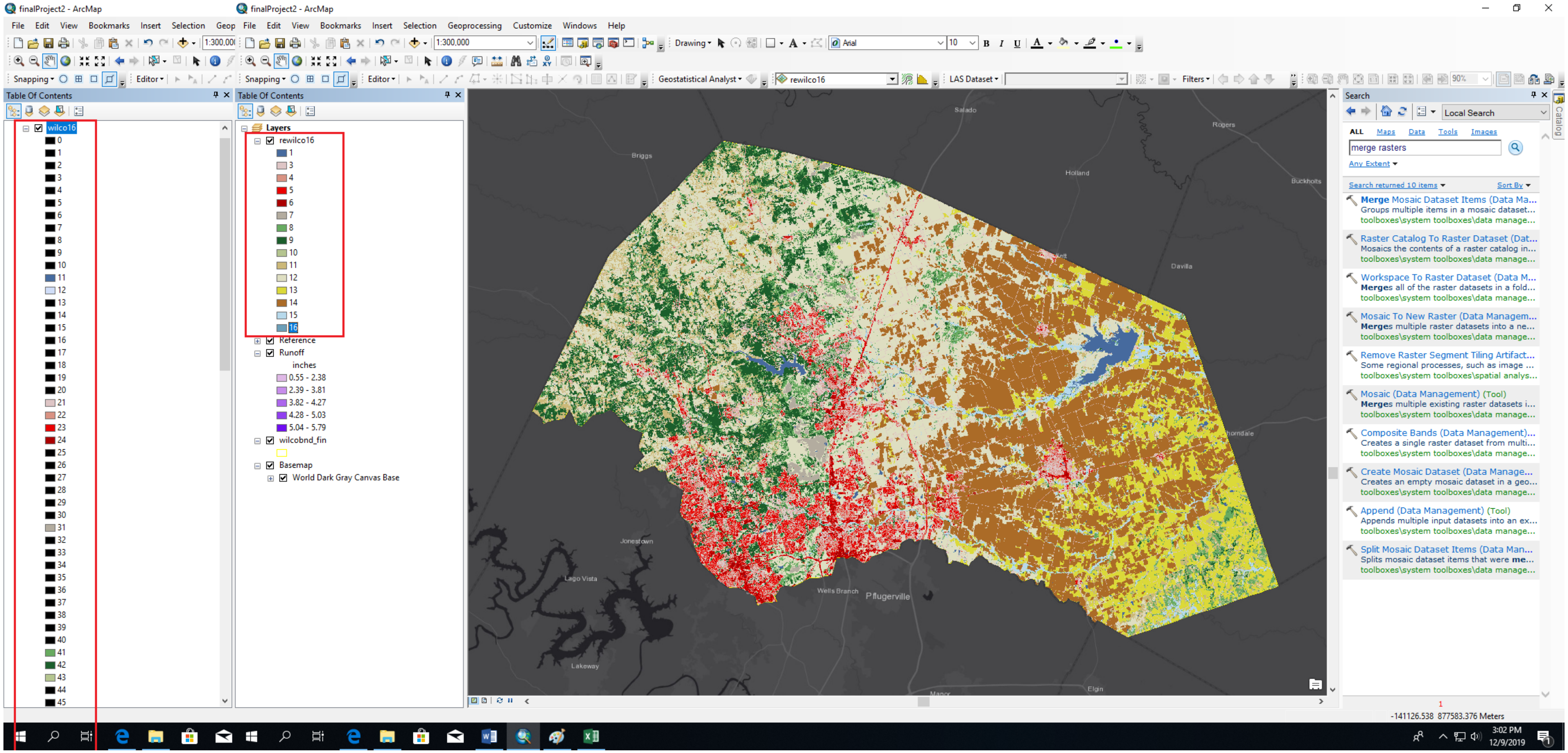
- Make sure you have registered your GIS data folders for indexing. Click the Search Options button in the search toolbar to register folders.

- Make sure all the keywords are spelled correctly.

- Try different keywords.

- Learn search tips and tricks.

The landcover raster was re-projected, clipped to the county area, and was reclassified to eliminate all no-data values from the symbology. The opposing classifications are boxed in red in the image below.



ALL Maps Data Tools Images

merge rasters

Any Extent

Search returned 10 items

Sort By

Merge Mosaic Dataset Items (Data Ma...
Groups multiple items in a mosaic dataset...
toolboxes\system toolboxes\data manage...

Raster Catalog To Raster Dataset (Dat...
Mosaics the contents of a raster catalog in...
toolboxes\system toolboxes\data manage...

Workspace To Raster Dataset (Data M...
Merges all of the raster datasets in a fold...
toolboxes\system toolboxes\data manage...

Mosaic To New Raster (Data Managem...
Merges multiple raster datasets into a ne...
toolboxes\system toolboxes\data manage...

Remove Raster Segment Tiling Artifact...
Some regional processes, such as image ...
toolboxes\system toolboxes\spatial analys...

Mosaic (Data Management) (Tool)
Merges multiple existing raster datasets i...
toolboxes\system toolboxes\data manage...

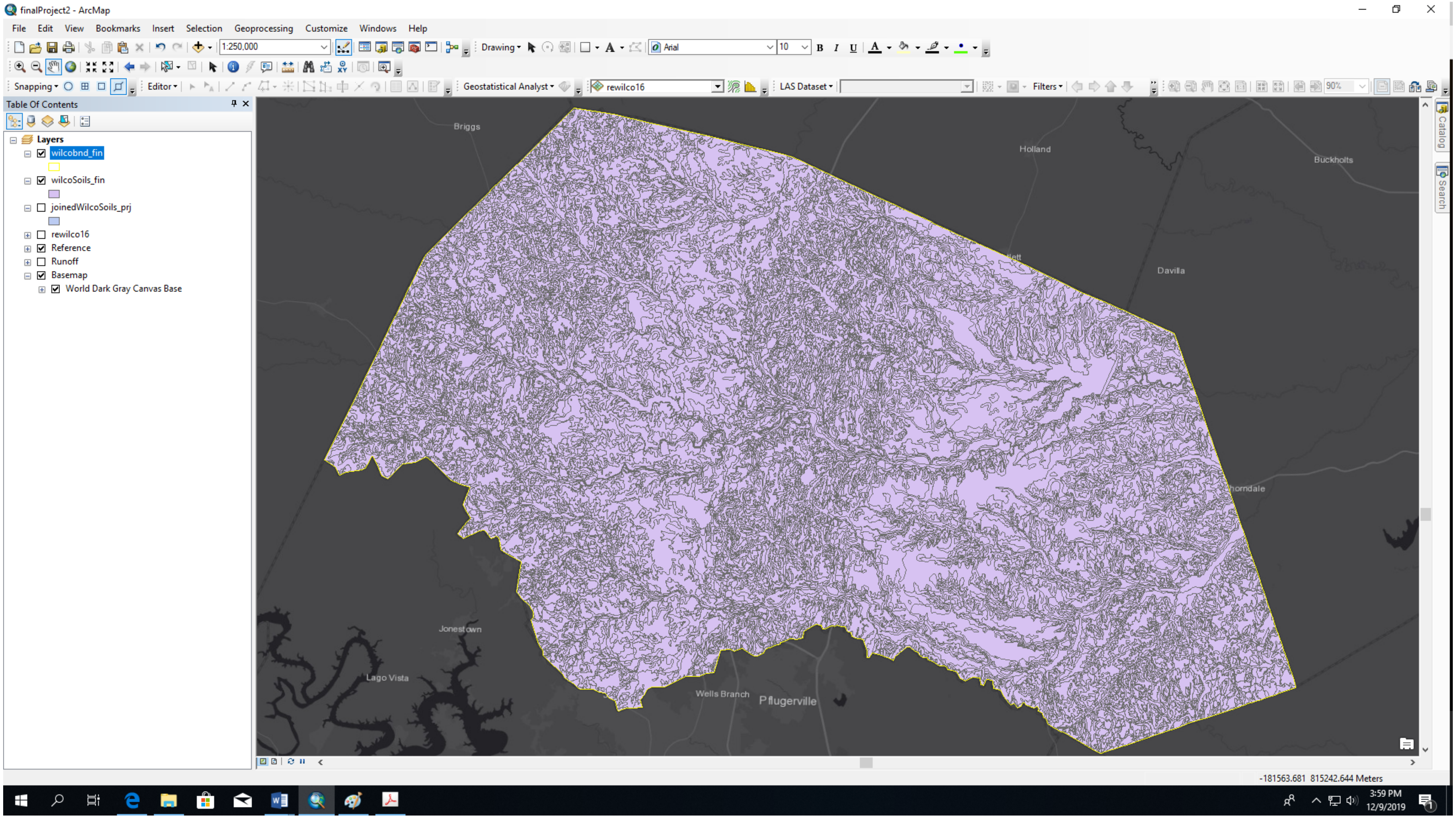
Composite Bands (Data Management)...
Creates a single raster dataset from multi...
toolboxes\system toolboxes\data manage...

Create Mosaic Dataset (Data Manage...
Creates an empty mosaic dataset in a geo...
toolboxes\system toolboxes\data manage...

Append (Data Management) (Tool)
Appends multiple input datasets into an ex...
toolboxes\system toolboxes\data manage...

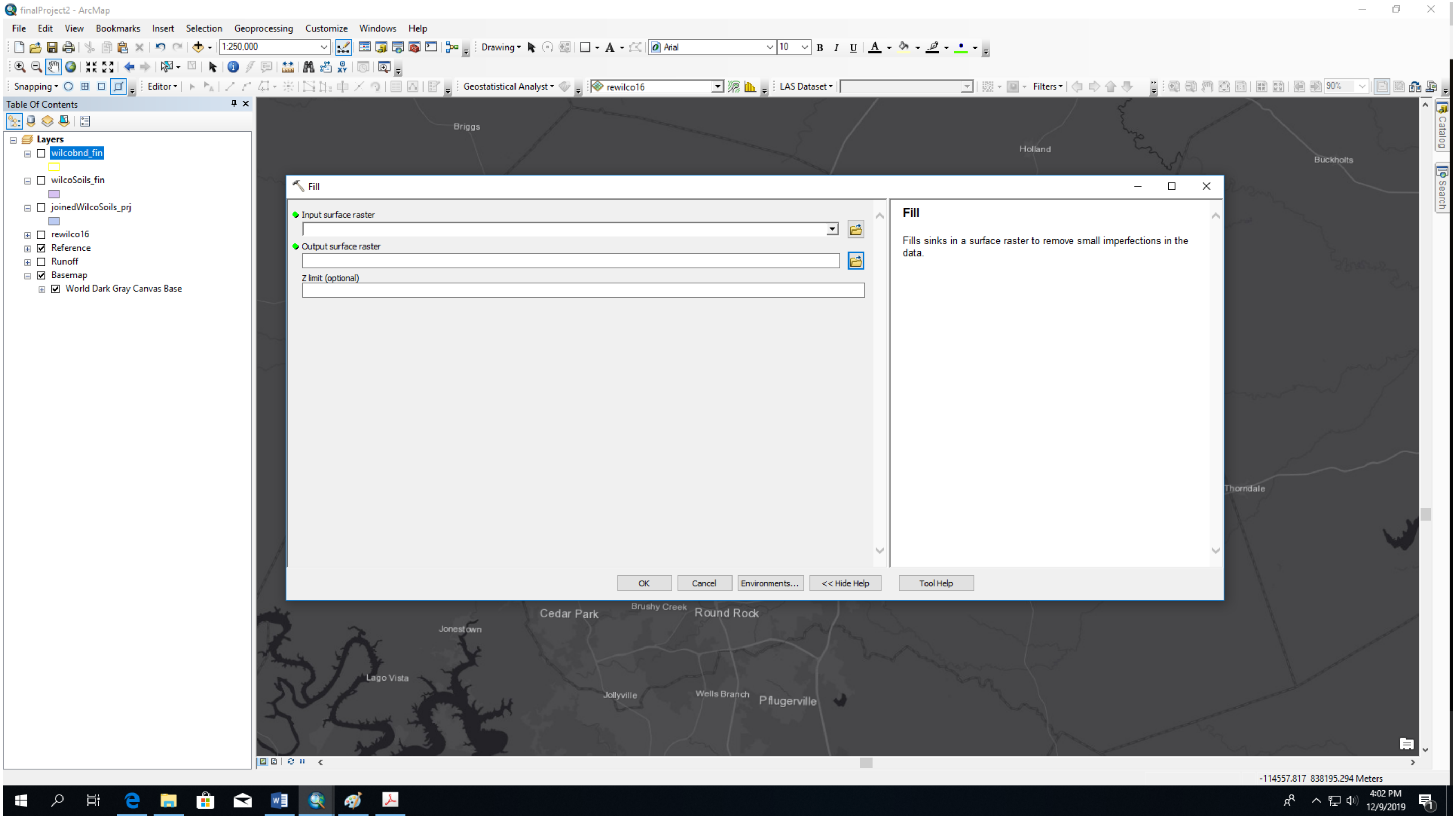
Split Mosaic Dataset Items (Data Man...
Splits mosaic dataset items that were **me**...
toolboxes\system toolboxes\data manage...

The soil data shapefile only needed reprojection.



Analysis

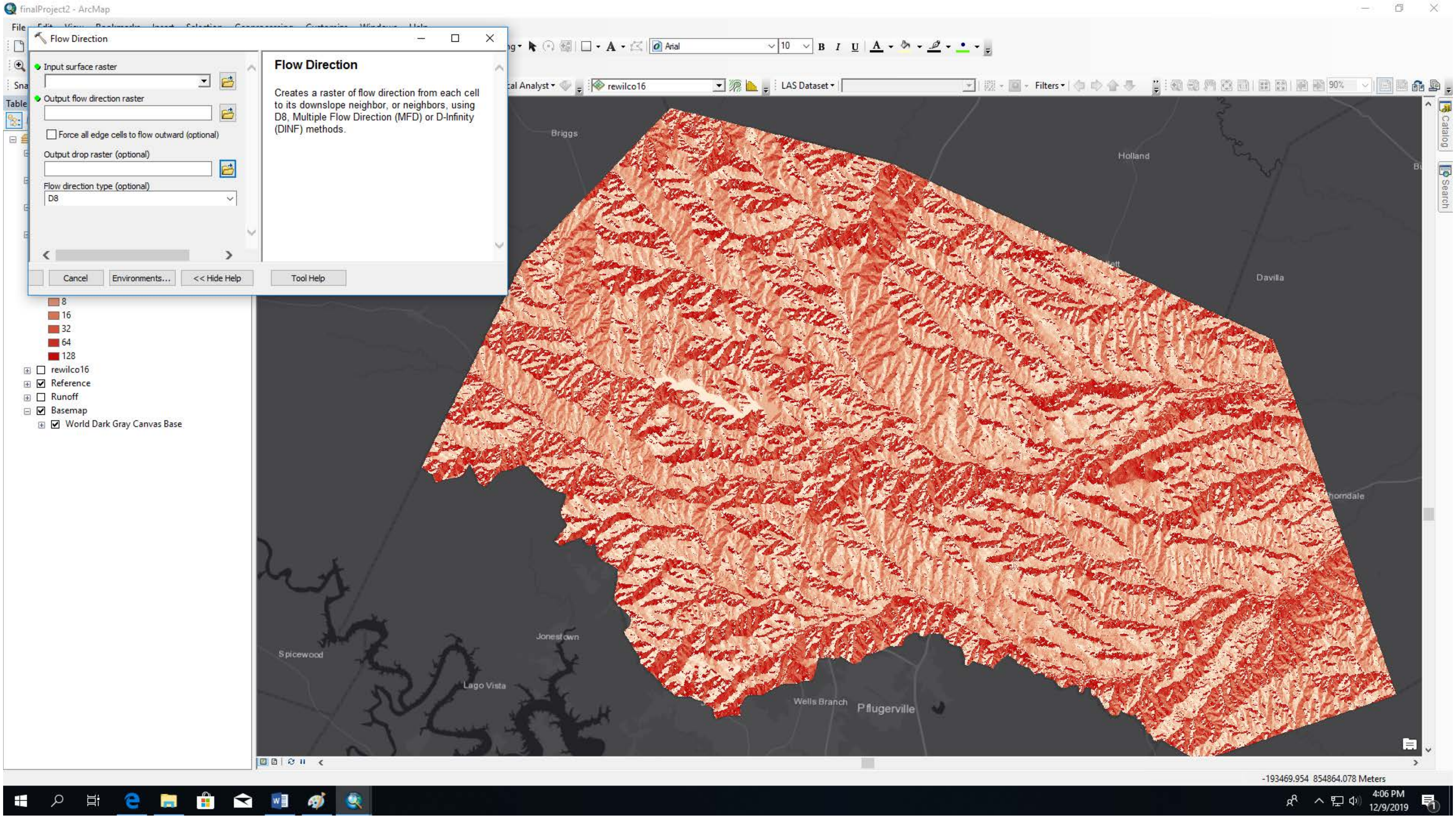
The mosaicked DEM was subjected to the Fill tool to remove any imperfections in the data.



Fill

Fills sinks in a surface raster to remove small imperfections in the data.

The DEM was then run through the Flow Direction to tool to assign a slope value and direction to each cell.



Flow Direction

Input surface raster

Output flow direction raster

☐ Force all edge cells to flow outward (optional)

Output drop raster (optional)

Flow direction type (optional): D8

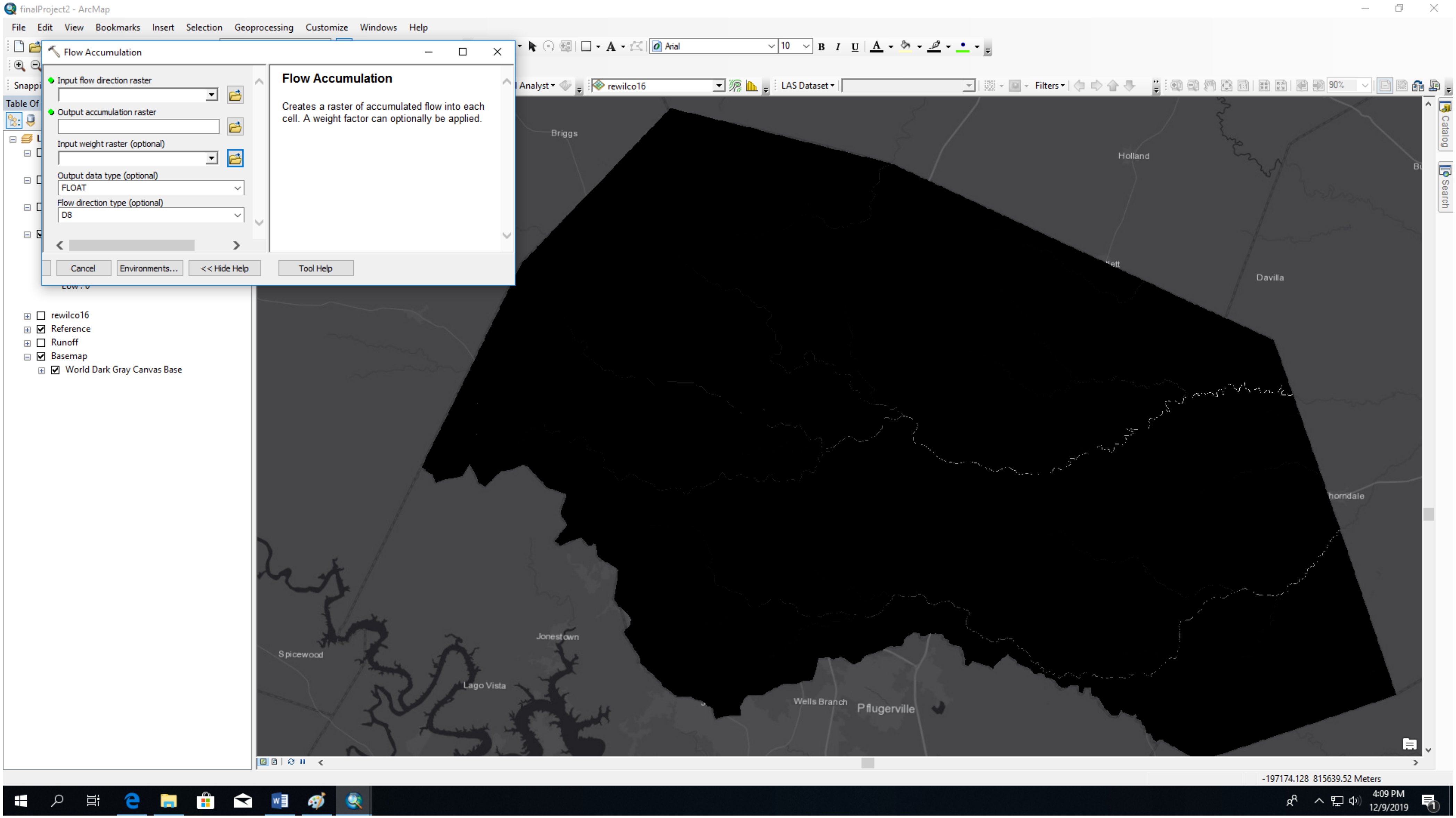
Flow Direction

Creates a raster of flow direction from each cell to its downslope neighbor, or neighbors, using D8, Multiple Flow Direction (MFD) or D-Infinity (DINF) methods.

- 🟥 8
- 🟥 16
- 🟥 32
- 🟥 64
- 🟥 128
- ☐ rewilco16
- ☑ Reference
- ☐ Runoff
- ☑ Basemap
  - ☑ World Dark Gray Canvas Base

-193469.954 854864.078 Meters

The resulting raster was then run through the Flow Accumulation tool then traced out probable stream paths based on the slope values.



Flow Accumulation

Input flow direction raster

Output accumulation raster

Input weight raster (optional)

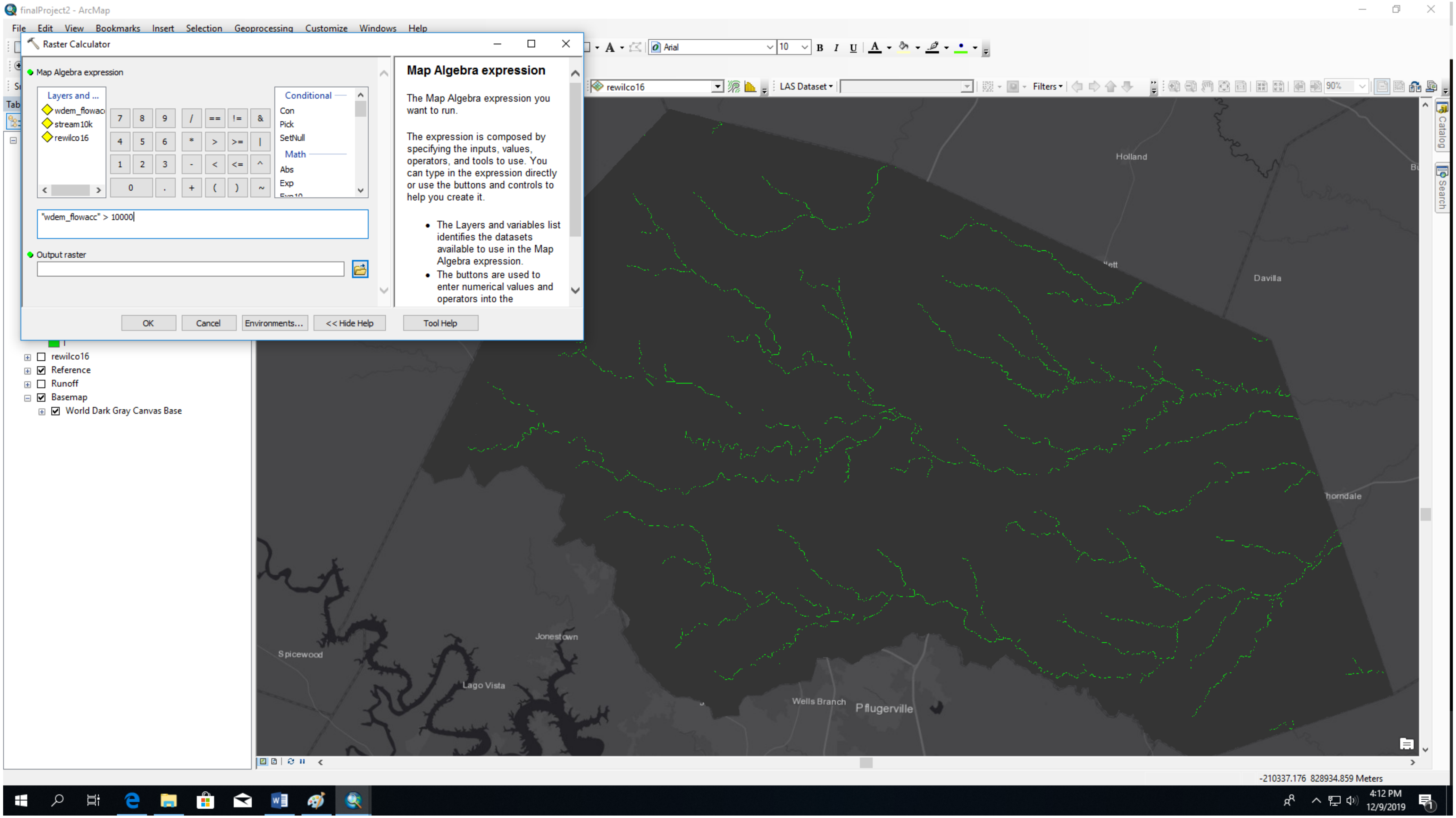
Output data type (optional): FLOAT

Flow direction type (optional): D8

Flow Accumulation

Creates a raster of accumulated flow into each cell. A weight factor can optionally be applied.

Streams were then delineated using the Raster Calculator. After some experimentation, only streams cells with a Flow Accumulation value of 10,000+ were selected for simplicity. The Stream Link tool then broke the streamlines into separate segments that would defined each catchment.



Map Algebra expression

"wdem_flowacc" > 10000

Output raster

Map Algebra expression

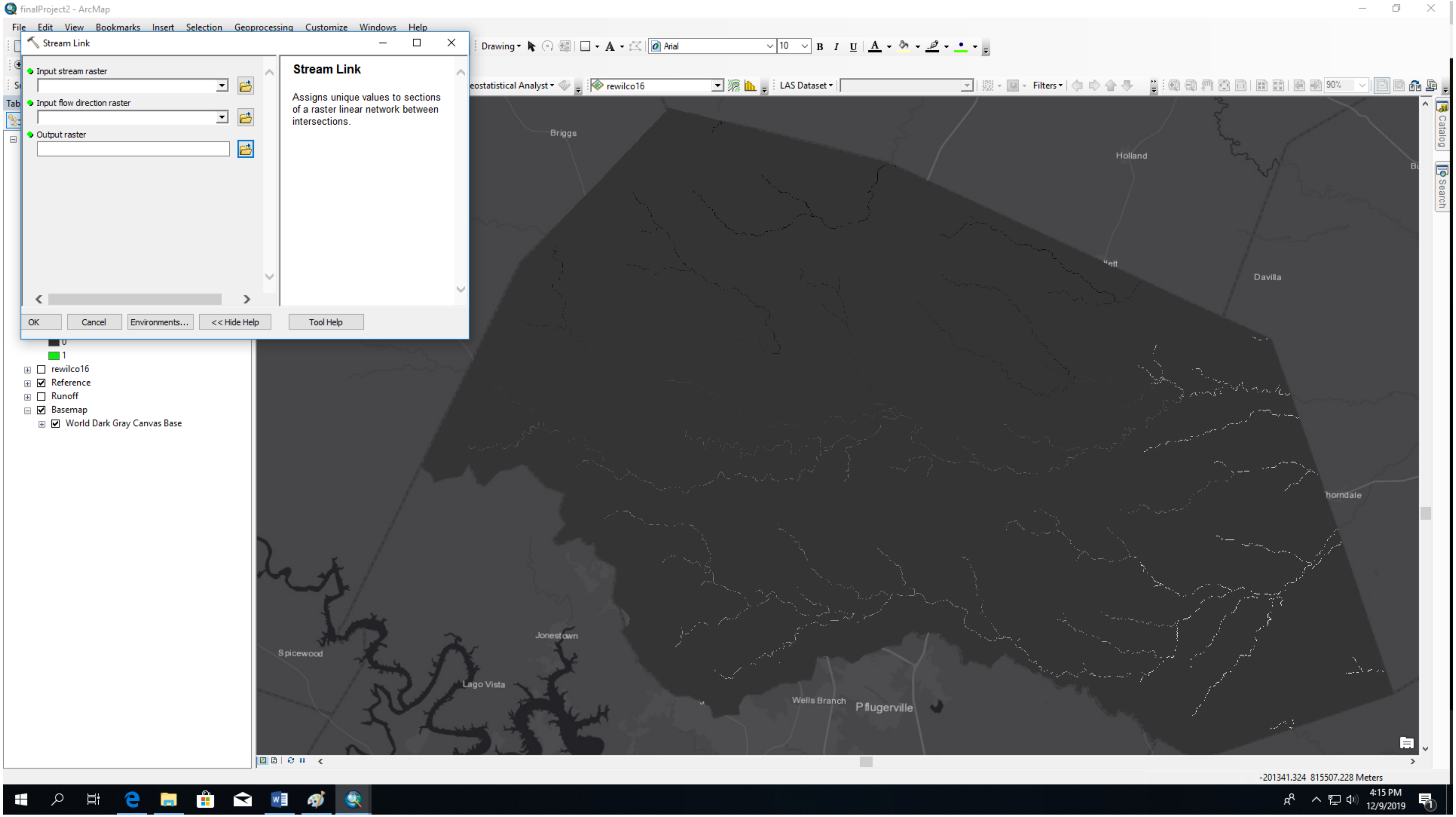
The Map Algebra expression you want to run.

The expression is composed by specifying the inputs, values, operators, and tools to use. You can type in the expression directly or use the buttons and controls to help you create it.

- The Layers and variables list identifies the datasets available to use in the Map Algebra expression.
- The buttons are used to enter numerical values and operators into the

☐ rewilco16
☑ Reference
☐ Runoff
☑ Basemap
  ☑ World Dark Gray Canvas Base

-210337.176 828934.859 Meters



Stream Link

Input stream raster

Input flow direction raster

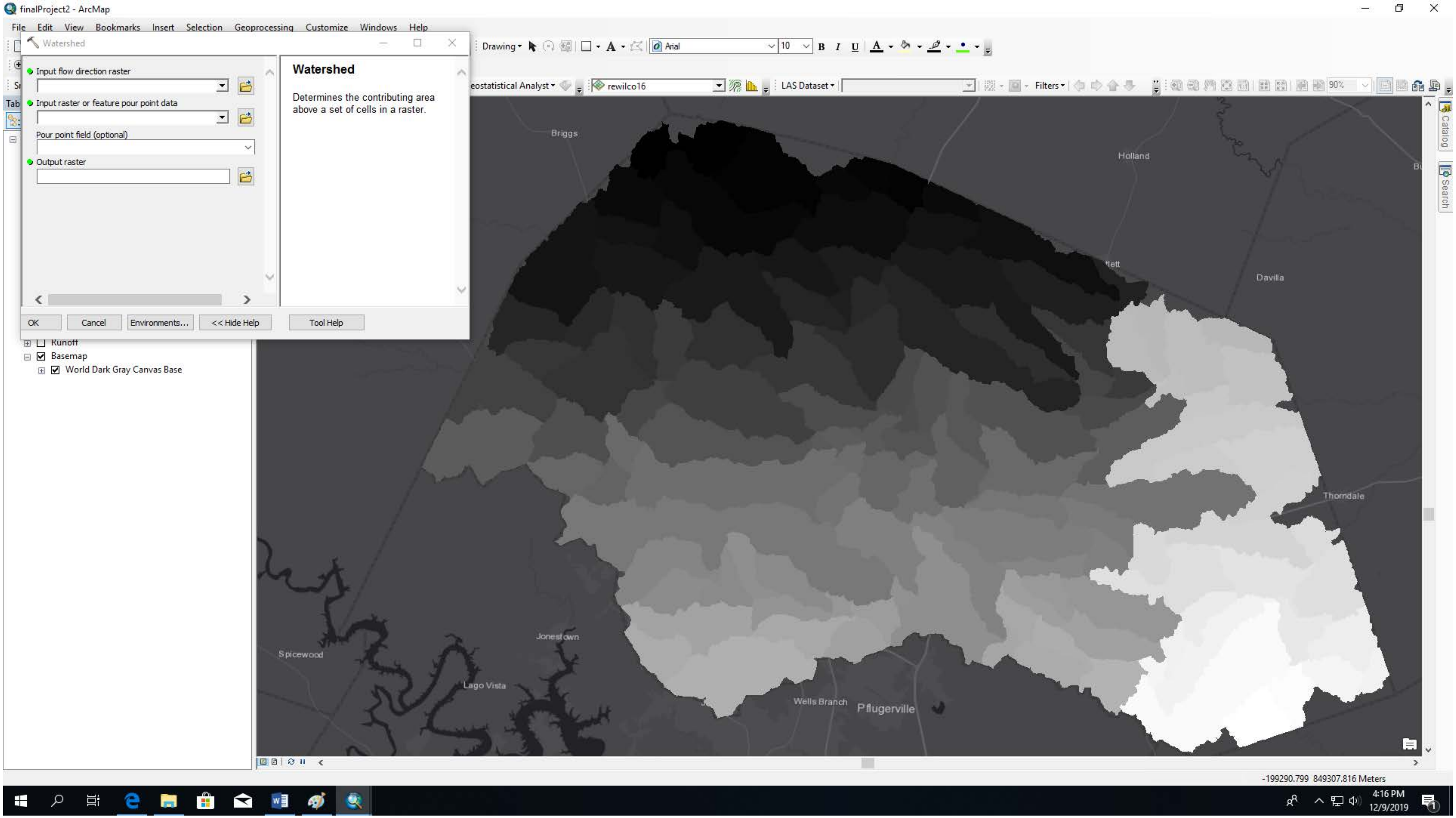
Output raster

Stream Link

Assigns unique values to sections of a raster linear network between intersections.

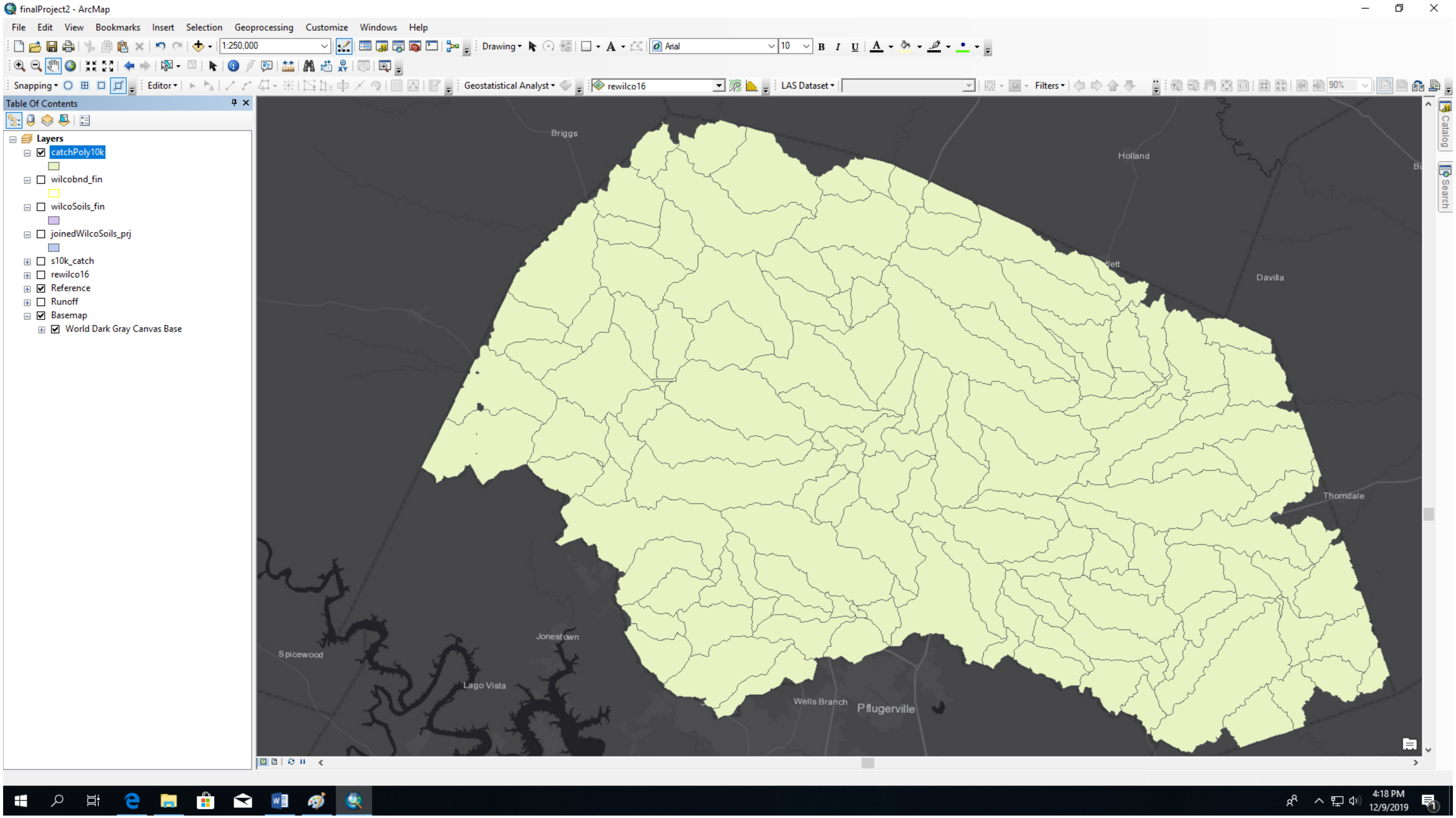
Finally, the resulting stream links raster was run through the Watershed tool was used to assign catchment areas (cell clusters) to each segment, which were converted to polygons using the Raster To Polygon tool.

Note that each of these steps used the default settings on each tool.

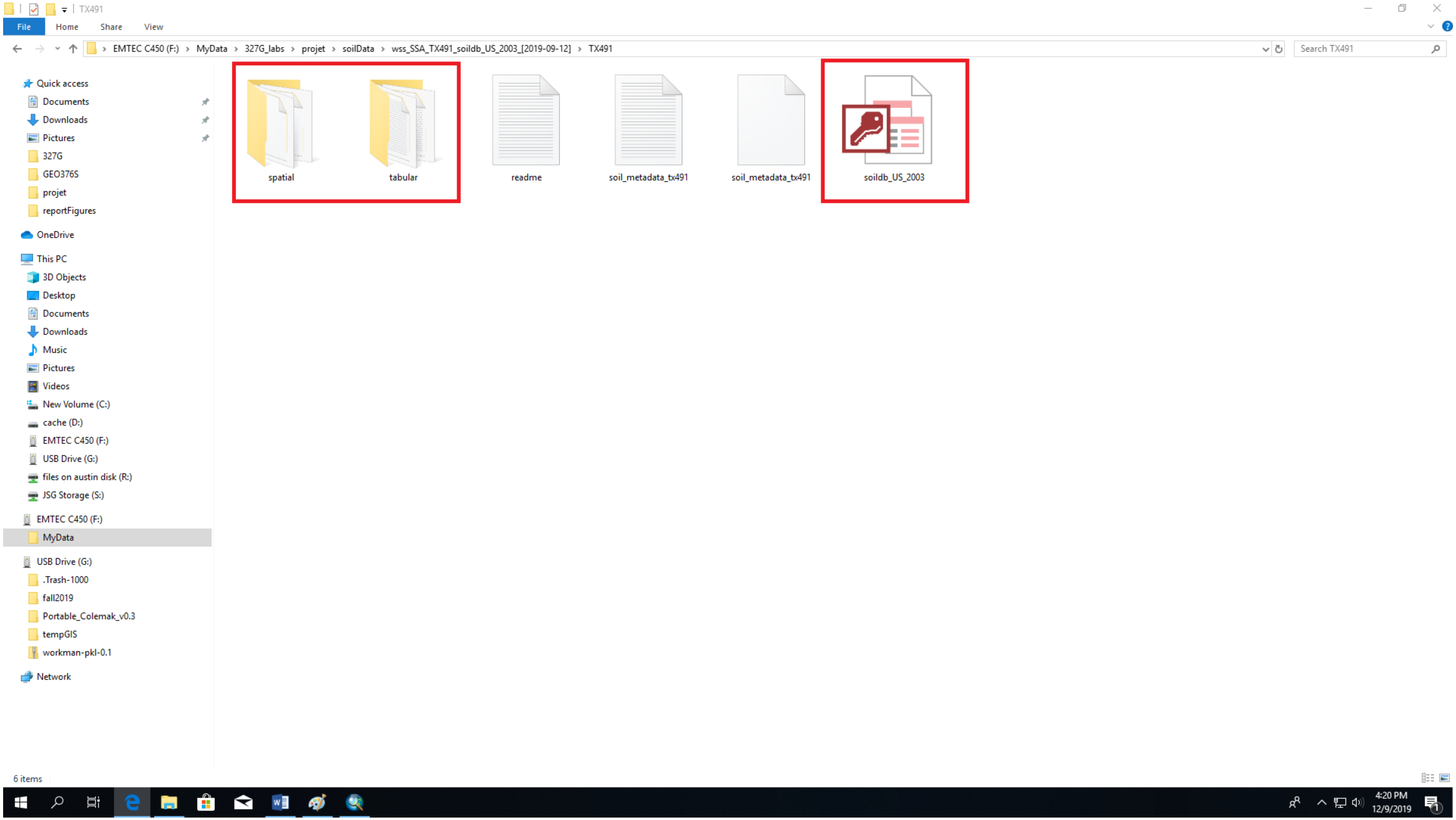


Watershed

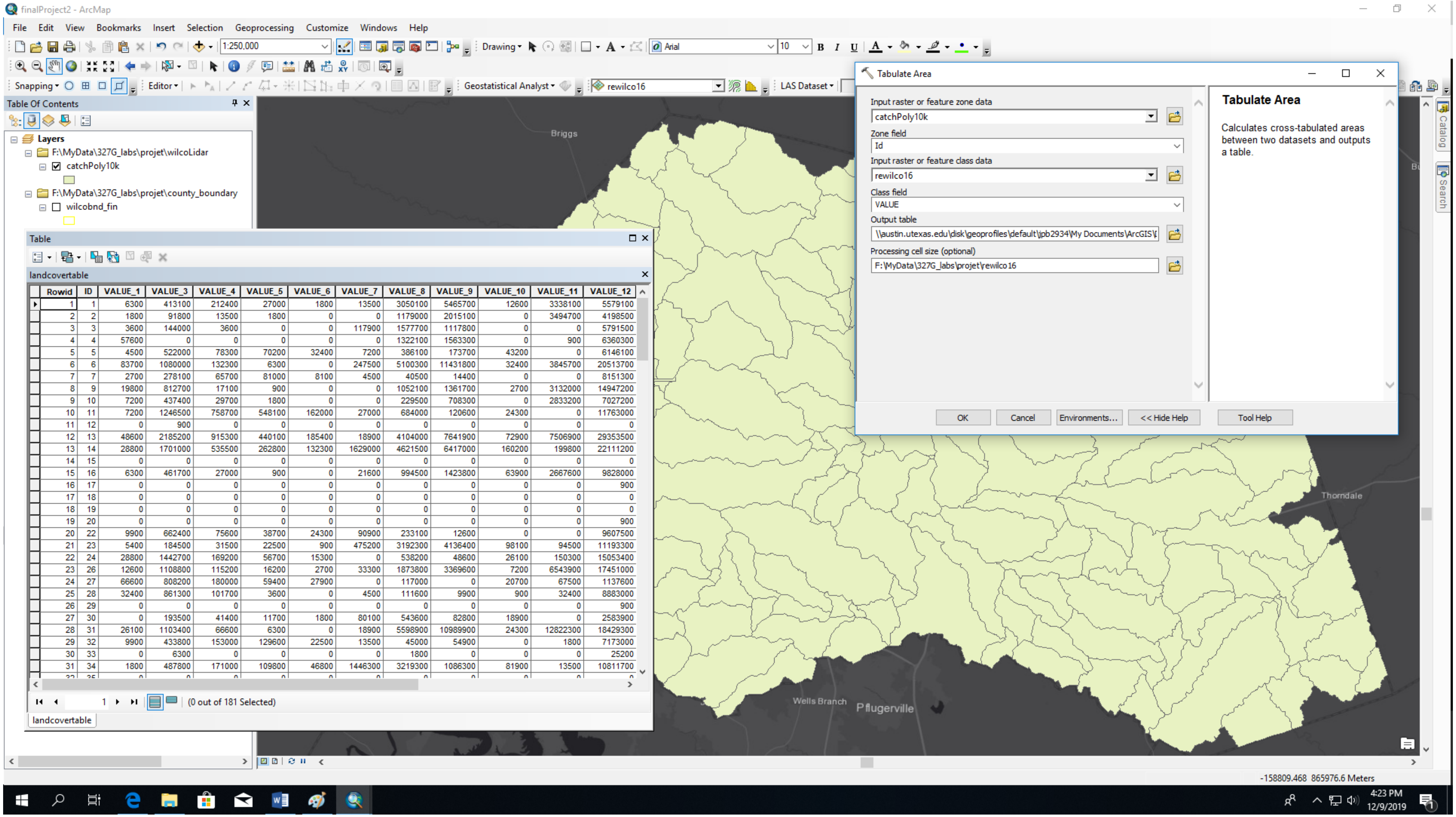
Determines the contributing area above a set of cells in a raster.



The soil data was split into tabular and spatial data. The tabular data had to be imported into a Microsoft Access database template that came with the download. To access it from within ArcMap, a custom add-in tool[5] from the USDA had to be installed and registered. Within ArcMap, the new tool allowed for linking the imported tabular data with the accompanying shapefile. The resulting soil layer had to be then be re-projected.



With the catchments, landcover, and soil data in place, two tables were created using the Tabulate Area tool; one detailing the number of cells for each landcover type per catchment and other detailing the area of each soil type per catchment. An example is given below of the table for landcover:



Table

landcovertable

Rowid	ID	VALUE_1	VALUE_3	VALUE_4	VALUE_5	VALUE_6	VALUE_7	VALUE_8	VALUE_9	VALUE_10	VALUE_11	VALUE_12
1	1	6300	413100	212400	27000	1800	13500	3050100	5465700	12600	3338100	5579100
2	2	1800	91800	13500	1800	0	0	1179000	2015100	0	3494700	4198500
3	3	3600	144000	3600	0	0	117900	1577700	1117800	0	0	5791500
4	4	57600	0	0	0	0	0	1322100	1563300	0	900	6360300
5	5	4500	522000	78300	70200	32400	7200	386100	173700	43200	0	6146100
6	6	83700	1080000	132300	6300	0	247500	5100300	11431800	32400	3845700	20513700
7	7	2700	278100	65700	81000	8100	4500	40500	14400	0	0	8151300
8	9	19800	812700	17100	900	0	0	1052100	1361700	2700	3132000	14947200
9	10	7200	437400	29700	1800	0	0	229500	708300	0	2833200	7027200
10	11	7200	1246500	758700	548100	162000	27000	684000	120600	24300	0	11763000
11	12	0	900	0	0	0	0	0	0	0	0	0
12	13	48600	2185200	915300	440100	185400	18900	4104000	7641900	72900	7506900	29353500
13	14	28800	1701000	535500	262800	132300	1629000	4621500	6417000	160200	199800	22111200
14	15	0	0	0	0	0	0	0	0	0	0	0
15	16	6300	461700	27000	900	0	21600	994500	1423800	63900	2667600	9828000
16	17	0	0	0	0	0	0	0	0	0	0	900
17	18	0	0	0	0	0	0	0	0	0	0	0
18	19	0	0	0	0	0	0	0	0	0	0	0
19	20	0	0	0	0	0	0	0	0	0	0	900
20	22	9900	662400	75600	38700	24300	90900	233100	12600	0	0	9607500
21	23	5400	184500	31500	22500	900	475200	3192300	4136400	98100	94500	11193300
22	24	28800	1442700	169200	56700	15300	0	538200	48600	26100	150300	15053400
23	26	12600	1108800	115200	16200	2700	33300	1873800	3369600	7200	6543900	17451000
24	27	66600	808200	180000	59400	27900	0	117000	0	20700	67500	1137600
25	28	32400	861300	101700	3600	0	4500	111600	9900	900	32400	8883000
26	29	0	0	0	0	0	0	0	0	0	0	900
27	30	0	193500	41400	11700	1800	80100	543600	82800	18900	0	2583900
28	31	26100	1103400	66600	6300	0	18900	5598900	10989900	24300	12822300	18429300
29	32	9900	433800	153000	129600	22500	13500	45000	54900	0	1800	7173000
30	33	0	6300	0	0	0	0	1800	0	0	0	25200
31	34	1800	487800	171000	109800	46800	1446300	3219300	1086300	81900	13500	10811700

1 (0 out of 181 Selected)

landcovertable

Tabulate Area

Input raster or feature zone data: catchPoly10k

Zone field: Id

Input raster or feature class data: rewilco16

Class field: VALUE

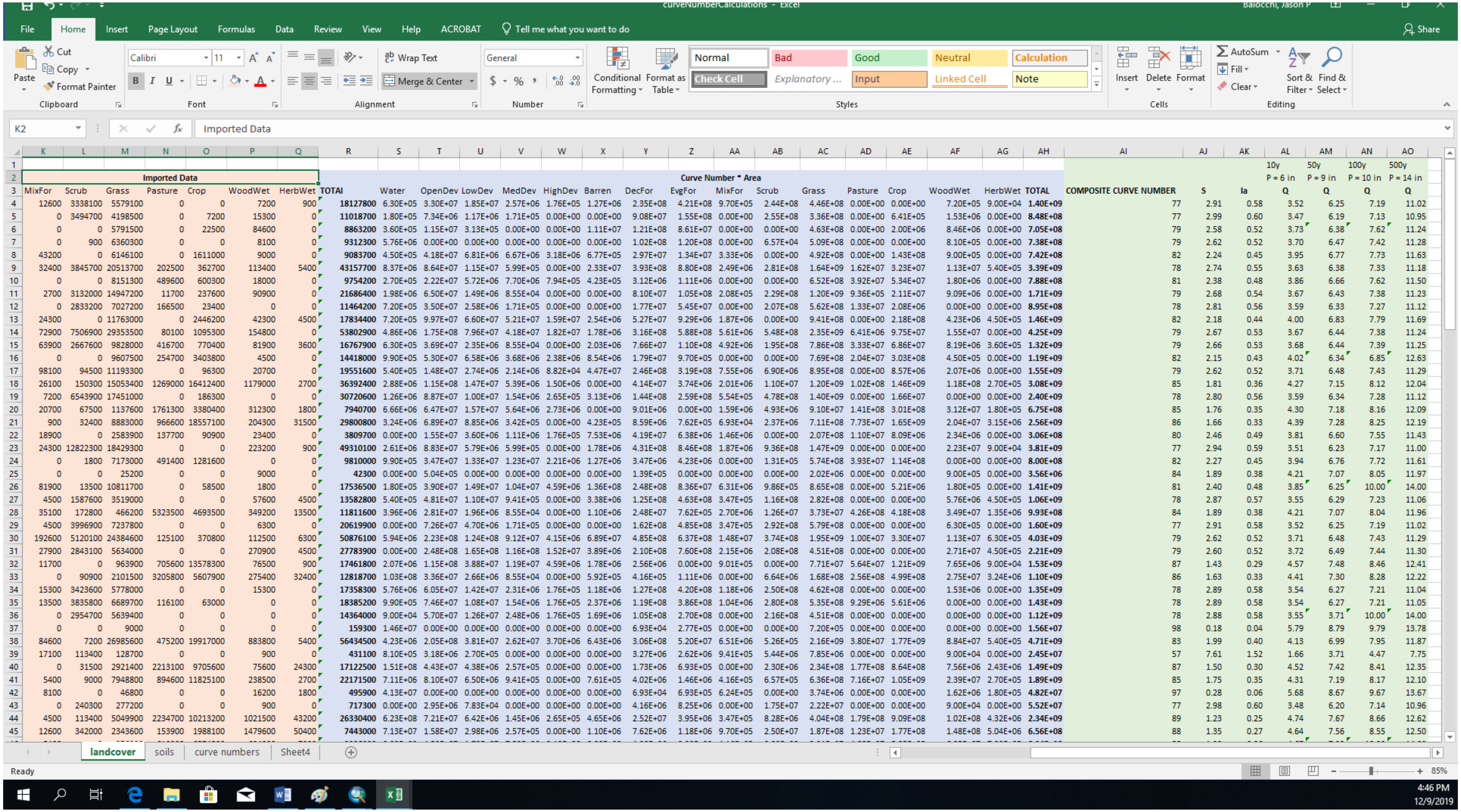
Output table: \\austin.utexas.edu\disk\geoprofiles\default\jpb2934\My Documents\ArcGIS\

Processing cell size (optional): F:\MyData\327G_labs\projet\rewilco16

Tabulate Area

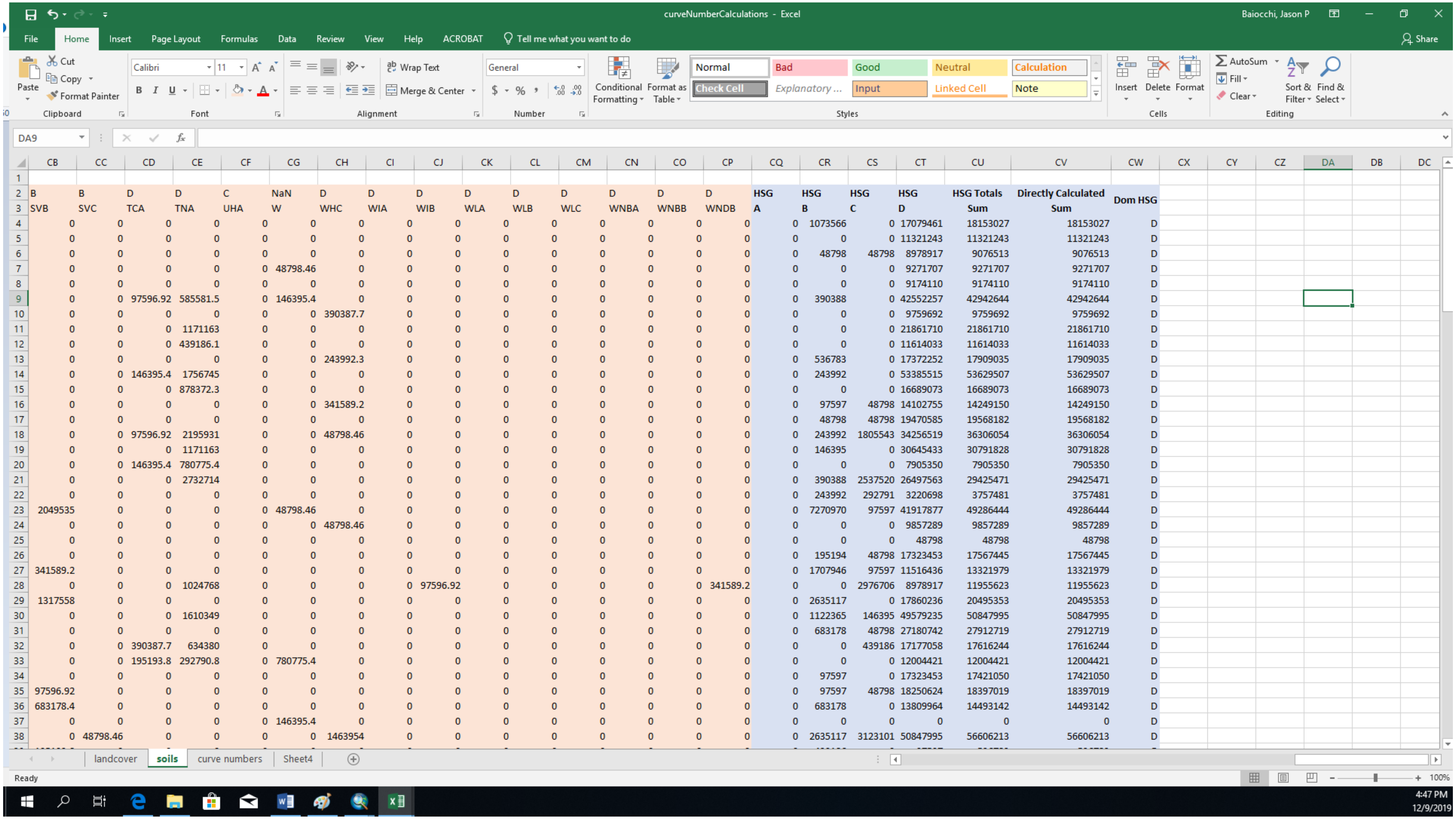
Calculates cross-tabulated areas between two datasets and outputs a table.

This data was then exported to Excel. Once the data was sorted, runoff calculations were performed within Excel, resulting in the final data for import back into ArcMap. Precipitation data was retrieved from an official source for Austin, TX[6]. While curve numbers an equations were provided by the TR-55[7] manual from the NRCS.

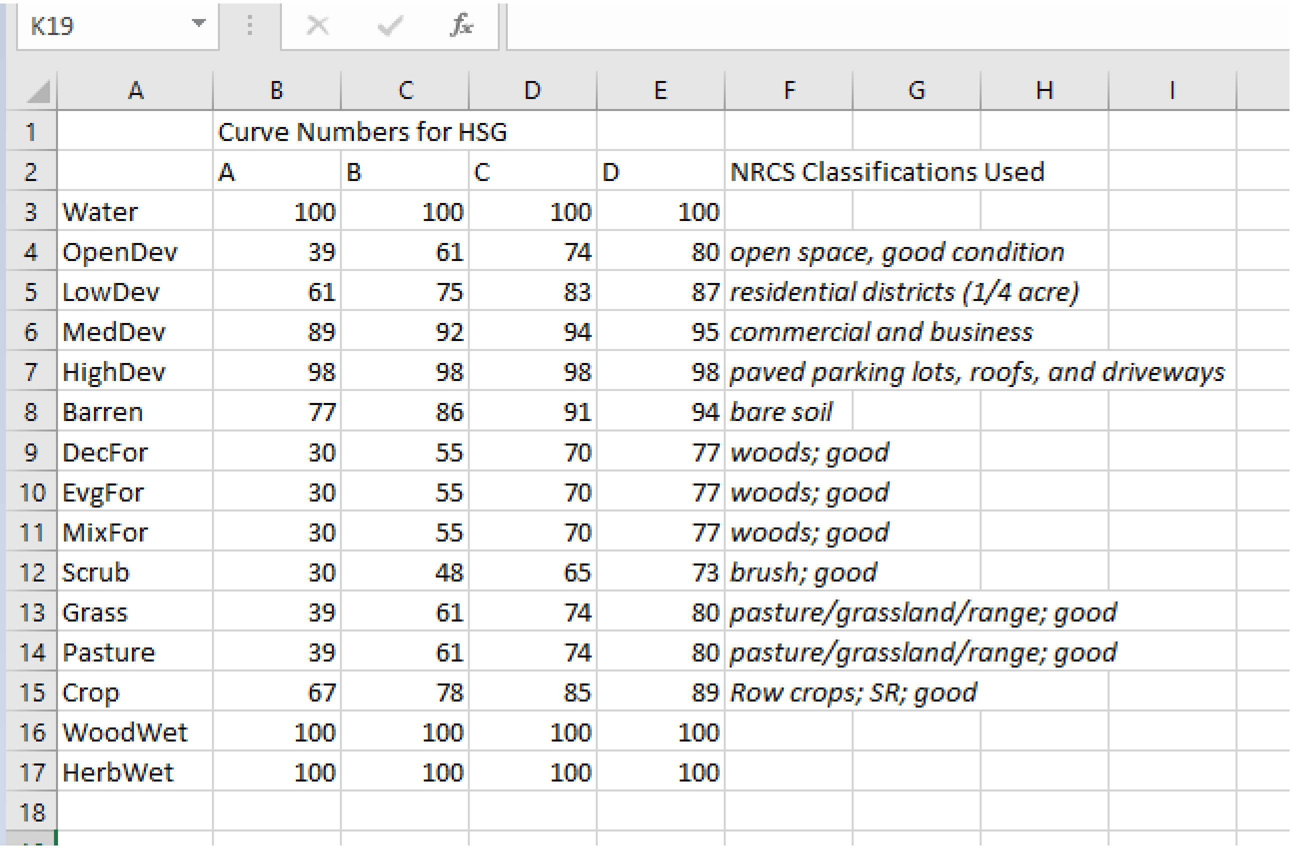


K2 — Imported Data

	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1																												10y	50y	100y	500y
2	Imported Data							Curve Number * Area																				P = 6 in	P = 9 in	P = 10 in	P = 14 in
3	MixFor	Scrub	Grass	Pasture	Crop	WoodWet	HerbWet	TOTAl	Water	OpenDev	LowDev	MedDev	HighDev	Barren	DecFor	EvgFor	MixFor	Scrub	Grass	Pasture	Crop	WoodWet	HerbWet	TOTAL	COMPOSITE CURVE NUMBER	S	Ia	Q	Q	Q	Q
4	12600	3338100	5579100	0	0	7200	900	18127800	6.30E+05	3.30E+07	1.85E+07	2.57E+06	1.76E+05	1.27E+06	2.35E+08	4.21E+08	9.70E+05	2.44E+08	4.46E+08	0.00E+00	0.00E+00	7.20E+05	9.00E+04	1.40E+09	77	2.91	0.58	3.52	6.25	7.19	11.02
5	0	3494700	4198500	0	7200	15300	0	11018700	1.80E+05	7.34E+06	1.17E+06	1.71E+05	0.00E+00	0.00E+00	9.08E+07	1.55E+08	0.00E+00	2.55E+08	3.36E+08	0.00E+00	6.41E+05	1.53E+06	0.00E+00	8.48E+08	77	2.99	0.60	3.47	6.19	7.13	10.95
6	0	0	5791500	0	22500	84600	0	8863200	3.60E+05	1.15E+07	3.13E+05	0.00E+00	0.00E+00	1.11E+07	1.21E+08	8.61E+07	0.00E+00	0.00E+00	4.63E+08	0.00E+00	2.00E+06	8.46E+06	0.00E+00	7.05E+08	79	2.58	0.52	3.73	6.38	7.62	11.24
7	0	900	6360300	0	0	8100	0	9312300	5.76E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+08	1.20E+08	0.00E+00	6.57E+04	5.09E+08	0.00E+00	0.00E+00	8.10E+05	0.00E+00	7.38E+08	79	2.62	0.52	3.70	6.47	7.42	11.28
8	43200	0	6146100	0	1611000	9000	0	9083700	4.50E+05	4.18E+07	6.81E+06	6.67E+06	3.18E+06	6.77E+05	2.97E+07	1.34E+07	3.33E+06	0.00E+00	4.92E+08	0.00E+00	1.43E+08	9.00E+05	0.00E+00	7.42E+08	82	2.24	0.45	3.95	6.77	7.73	11.63
9	32400	3845700	20513700	202500	362700	113400	5400	43157700	8.37E+06	8.64E+07	1.15E+07	5.99E+05	0.00E+00	2.33E+07	3.93E+08	8.80E+08	2.49E+06	2.81E+08	1.64E+09	1.62E+07	3.23E+07	1.13E+07	5.40E+05	3.39E+09	78	2.74	0.55	3.63	6.38	7.33	11.18
10	0	0	8151300	489600	600300	18000	0	9754200	2.70E+05	2.22E+07	5.72E+06	7.70E+06	7.94E+05	4.23E+05	3.12E+06	1.11E+06	0.00E+00	0.00E+00	6.52E+08	3.92E+07	5.34E+07	1.80E+06	0.00E+00	7.88E+08	81	2.38	0.48	3.86	6.66	7.62	11.50
11	2700	3132000	14947200	11700	237600	90900	0	21686400	1.98E+06	6.50E+07	1.49E+06	8.55E+04	0.00E+00	0.00E+00	8.10E+07	1.05E+08	2.08E+05	2.29E+08	1.20E+09	9.36E+05	2.11E+07	9.09E+06	0.00E+00	1.71E+09	79	2.68	0.54	3.67	6.43	7.38	11.23
12	0	2833200	7027200	166500	23400	0	0	11464200	7.20E+05	3.50E+07	2.58E+06	1.71E+05	0.00E+00	0.00E+00	1.77E+07	5.45E+07	0.00E+00	2.07E+08	5.62E+08	1.33E+07	2.08E+06	0.00E+00	0.00E+00	8.95E+08	78	2.81	0.56	3.59	6.33	7.27	11.12
13	24300	0	11763000	0	2446200	42300	4500	17834400	7.20E+05	9.97E+07	6.60E+07	5.21E+07	1.59E+07	2.54E+06	5.27E+07	9.29E+06	1.87E+06	0.00E+00	9.41E+08	0.00E+00	2.18E+08	4.23E+06	4.50E+05	1.46E+09	82	2.18	0.44	4.00	6.83	7.79	11.69
14	72900	7506900	29353500	80100	1095300	154800	0	53802900	4.86E+06	1.75E+08	7.96E+07	4.18E+07	1.82E+07	1.78E+06	3.16E+08	5.88E+08	5.61E+06	5.48E+08	2.35E+09	6.41E+06	9.75E+07	1.55E+07	0.00E+00	4.25E+09	79	2.67	0.53	3.67	6.44	7.38	11.24
15	63900	2667600	9828000	416700	770400	81900	3600	16767900	6.30E+05	3.69E+07	2.35E+06	8.55E+04	0.00E+00	2.03E+06	7.66E+07	1.10E+08	4.92E+06	1.95E+08	7.86E+08	3.33E+07	6.86E+07	8.19E+06	3.60E+05	1.32E+09	79	2.66	0.53	3.68	6.44	7.39	11.25
16	0	0	9607500	254700	3403800	4500	0	14418000	9.90E+05	5.30E+07	6.58E+06	3.68E+06	2.38E+06	8.54E+06	1.79E+07	9.70E+05	0.00E+00	0.00E+00	7.69E+08	2.04E+07	3.03E+08	4.50E+05	0.00E+00	1.19E+09	82	2.15	0.43	4.02	6.34	6.85	12.63
17	98100	94500	11193300	0	96300	20700	0	19551600	5.40E+05	1.48E+07	2.74E+06	2.14E+06	8.82E+04	4.47E+07	2.46E+08	3.19E+08	7.55E+06	6.90E+06	8.95E+08	0.00E+00	8.57E+06	2.07E+06	0.00E+00	1.55E+09	79	2.62	0.52	3.71	6.48	7.43	11.29
18	26100	150300	15053400	1269000	16412400	1179000	2700	36392400	2.88E+06	1.15E+08	1.47E+07	5.39E+06	1.50E+06	0.00E+00	4.14E+07	3.74E+06	2.01E+06	1.10E+07	1.20E+09	1.02E+08	1.46E+09	1.18E+08	2.70E+05	3.08E+09	85	1.81	0.36	4.27	7.15	8.12	12.04
19	7200	6543900	17451000	0	186300	0	0	30720600	1.26E+06	8.87E+07	1.00E+07	1.54E+06	2.65E+05	3.13E+06	1.44E+08	2.59E+08	5.54E+05	4.78E+08	1.40E+09	0.00E+00	1.66E+07	0.00E+00	0.00E+00	2.40E+09	78	2.80	0.56	3.59	6.34	7.28	11.12
20	20700	67500	1137600	1761300	3380400	312300	1800	7940700	6.66E+06	6.47E+07	1.57E+07	5.64E+06	2.73E+06	0.00E+00	9.01E+06	0.00E+00	1.59E+06	4.93E+06	9.10E+07	1.41E+08	3.01E+08	3.12E+07	1.80E+05	6.75E+08	85	1.76	0.35	4.30	7.18	8.16	12.09
21	900	32400	8883000	966600	18557100	204300	31500	29800800	3.24E+06	6.89E+07	8.85E+06	3.42E+05	0.00E+00	4.23E+05	8.59E+06	7.62E+05	6.93E+04	2.37E+06	7.11E+08	7.73E+07	1.65E+09	2.04E+07	3.15E+06	2.56E+09	86	1.66	0.33	4.39	7.28	8.25	12.19
22	18900	0	2583900	137700	90900	23400	0	3809700	0.00E+00	1.55E+07	3.60E+06	1.11E+06	1.76E+05	7.53E+06	4.19E+07	6.38E+06	1.46E+06	0.00E+00	2.07E+08	1.10E+07	8.09E+06	2.34E+06	0.00E+00	3.06E+08	80	2.46	0.49	3.81	6.60	7.55	11.43
23	24300	12822300	18429300	0	0	223200	900	49310100	2.61E+06	8.83E+07	5.79E+06	5.99E+05	0.00E+00	1.78E+06	4.31E+08	8.46E+08	1.87E+06	9.36E+08	1.47E+09	0.00E+00	0.00E+00	2.23E+07	9.00E+04	3.81E+09	77	2.94	0.59	3.51	6.23	7.17	11.00
24	0	1800	7173000	491400	1281600	0	0	9810000	9.90E+05	3.47E+07	1.33E+07	1.23E+07	2.21E+06	1.27E+06	3.47E+06	4.23E+06	0.00E+00	1.31E+05	5.74E+08	3.93E+07	1.14E+08	0.00E+00	0.00E+00	8.00E+08	82	2.27	0.45	3.94	6.76	7.72	11.61
25	0	0	25200	0	0	9000	0	42300	0.00E+00	5.04E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E+05	0.00E+00	0.00E+00	0.00E+00	2.02E+06	0.00E+00	0.00E+00	9.00E+05	0.00E+00	3.56E+06	84	1.89	0.38	4.21	7.07	8.05	11.97
26	81900	13500	10811700	0	58500	1800	0	17536500	1.80E+05	3.90E+07	1.49E+07	1.04E+07	4.59E+06	1.36E+08	2.48E+08	8.36E+07	6.31E+06	9.86E+05	8.65E+08	0.00E+00	5.21E+06	1.80E+05	0.00E+00	1.41E+09	81	2.40	0.48	3.85	6.25	10.00	14.00
27	4500	1587600	3519000	0	0	57600	4500	13582800	5.40E+05	4.81E+07	1.10E+07	9.41E+05	0.00E+00	3.38E+06	1.25E+08	4.63E+08	3.47E+05	1.16E+08	2.82E+08	0.00E+00	0.00E+00	5.76E+06	4.50E+05	1.06E+09	78	2.87	0.57	3.55	6.29	7.23	11.06
28	35100	172800	466200	5323500	4693500	349200	13500	11811600	3.96E+06	2.81E+07	1.96E+06	8.55E+04	0.00E+00	1.10E+06	2.48E+07	7.62E+05	2.70E+06	1.26E+07	3.73E+07	4.26E+08	4.18E+08	3.49E+07	1.35E+06	9.93E+08	84	1.89	0.38	4.21	7.07	8.04	11.96
29	4500	3996900	7237800	0	0	6300	0	20619900	0.00E+00	7.26E+07	4.70E+06	1.71E+05	0.00E+00	0.00E+00	1.62E+08	4.85E+08	3.47E+05	2.92E+08	5.79E+08	0.00E+00	0.00E+00	6.30E+05	0.00E+00	1.60E+09	77	2.91	0.58	3.52	6.25	7.19	11.02
30	192600	5120100	24384600	125100	370800	112500	6300	50876100	5.94E+06	2.23E+08	1.24E+08	9.12E+07	4.15E+06	6.89E+07	4.85E+08	6.37E+08	1.48E+07	3.74E+08	1.95E+09	1.00E+07	3.30E+07	1.13E+07	6.30E+05	4.03E+09	79	2.62	0.52	3.71	6.48	7.43	11.29
31	27900	2843100	5634000	0	0	270900	4500	27783900	0.00E+00	2.48E+08	1.65E+08	1.16E+08	1.52E+07	3.89E+06	2.10E+08	7.60E+08	2.15E+06	2.08E+08	4.51E+08	0.00E+00	0.00E+00	2.71E+07	4.50E+05	2.21E+09	79	2.60	0.52	3.72	6.49	7.44	11.30
32	11700	0	963900	705600	13578300	76500	900	17461800	2.07E+06	1.15E+08	3.88E+07	1.19E+07	4.59E+06	1.78E+06	2.56E+06	0.00E+00	9.01E+05	0.00E+00	7.71E+07	5.64E+07	1.21E+09	7.65E+06	9.00E+04	1.53E+09	87	1.43	0.29	4.57	7.48	8.46	12.41
33	0	90900	2101500	3205800	5607900	275400	32400	12818700	1.03E+08	3.36E+07	2.66E+06	8.55E+04	0.00E+00	5.92E+05	4.16E+05	1.11E+06	0.00E+00	6.64E+06	1.68E+08	2.56E+08	4.99E+08	2.75E+07	3.24E+06	1.10E+09	86	1.63	0.33	4.41	7.30	8.28	12.22
34	15300	3423600	5778000	0	0	15300	0	17358300	5.76E+06	6.05E+07	1.42E+07	2.31E+06	1.76E+05	1.18E+06	1.27E+08	4.20E+08	1.18E+06	2.50E+08	4.62E+08	0.00E+00	0.00E+00	1.53E+06	0.00E+00	1.35E+09	78	2.89	0.58	3.54	6.27	7.21	11.04
35	13500	3835800	6689700	116100	63000	0	0	18385200	9.90E+05	7.46E+07	1.08E+07	1.54E+06	1.76E+05	2.37E+06	1.19E+08	3.86E+08	1.04E+06	2.80E+08	5.35E+08	9.29E+06	5.61E+06	0.00E+00	0.00E+00	1.43E+09	78	2.89	0.58	3.54	6.27	7.21	11.05
36	0	2954700	5639400	0	0	0	0	14364000	9.00E+04	5.70E+07	1.26E+07	2.48E+06	1.76E+05	1.69E+06	1.05E+08	2.70E+08	0.00E+00	2.16E+08	4.51E+08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E+09	78	2.88	0.58	3.55	3.71	10.00	14.00
37	0	0	9000	0	0	0	0	159300	1.46E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.93E+04	2.77E+05	0.00E+00	0.00E+00	7.20E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E+07	98	0.18	0.04	5.79	8.79	9.79	13.78
38	84600	7200	26985600	475200	19917000	883800	5400	56434500	4.23E+06	2.05E+08	3.81E+07	2.62E+07	3.70E+06	6.43E+06	3.06E+08	5.20E+07	6.51E+06	5.26E+05	2.16E+09	3.80E+07	1.77E+09	8.84E+07	5.40E+05	4.71E+09	83	1.99	0.40	4.13	6.99	7.95	11.87
39	17100	113400	128700	0	0	900	0	431100	8.10E+05	3.18E+06	2.70E+05	0.00E+00	0.00E+00	0.00E+00	3.27E+06	2.62E+06	9.41E+05	5.44E+06	7.85E+06	0.00E+00	0.00E+00	9.00E+04	0.00E+00	2.45E+07	57	7.61	1.52	1.66	3.71	4.47	7.75
40	0	31500	2921400	2213100	9705600	75600	24300	17122500	1.51E+08	4.43E+07	4.38E+06	2.57E+05	0.00E+00	0.00E+00	1.73E+06	6.93E+05	0.00E+00	2.30E+06	2.34E+08	1.77E+08	8.64E+08	7.56E+06	2.43E+06	1.49E+09	87	1.50	0.30	4.52	7.42	8.41	12.35
41	5400	9000	7948800	894600	11825100	238500	2700	22171500	7.11E+06	8.10E+07	6.50E+06	9.41E+05	0.00E+00	7.61E+05	4.02E+06	1.46E+06	4.16E+05	6.57E+05	6.36E+08	7.16E+07	1.05E+09	2.39E+07	2.70E+05	1.89E+09	85	1.75	0.35	4.31	7.19	8.17	12.10
42	8100	0	46800	0	0	16200	1800	495900	4.13E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.93E+04	6.93E+05	6.24E+05	0.00E+00	3.74E+06	0.00E+00	0.00E+00	1.62E+06	1.80E+05	4.82E+07	97	0.28	0.06	5.68	8.67	9.67	13.67
43	0	240300	277200	0	0	900	0	717300	0.00E+00	2.95E+06	7.83E+04	0.00E+00	0.00E+00	0.00E+00	4.16E+06	8.25E+06	0.00E+00	1.75E+07	2.22E+07	0.00E+00	0.00E+00	9.00E+04	0.00E+00	5.52E+07	77	2.98	0.60	3.48	6.20	7.14	10.96
44	4500	113400	5049900	2234700	10213200	1021500	43200	26330400	6.23E+08	7.21E+07	6.42E+06	1.45E+06	2.65E+05	4.65E+06	2.52E+07	3.95E+06	3.47E+05	8.28E+06	4.04E+08	1.79E+08	9.09E+08	1.02E+08	4.32E+06	2.34E+09	89	1.23	0.25	4.74	7.67	8.66	12.62
45	12600	342000	2343600	153900	1988100	1479600	50400	7443000	7.13E+07	1.58E+07	2.98E+06	2.57E+05	0.00E+00	1.10E+06	7.62E+06	1.18E+06	9.70E+05	2.50E+07	1.87E+08	1.23E+07	1.77E+08	1.48E+08	5.04E+06	6.56E+08	88	1.35	0.27	4.64	7.56	8.55	12.50

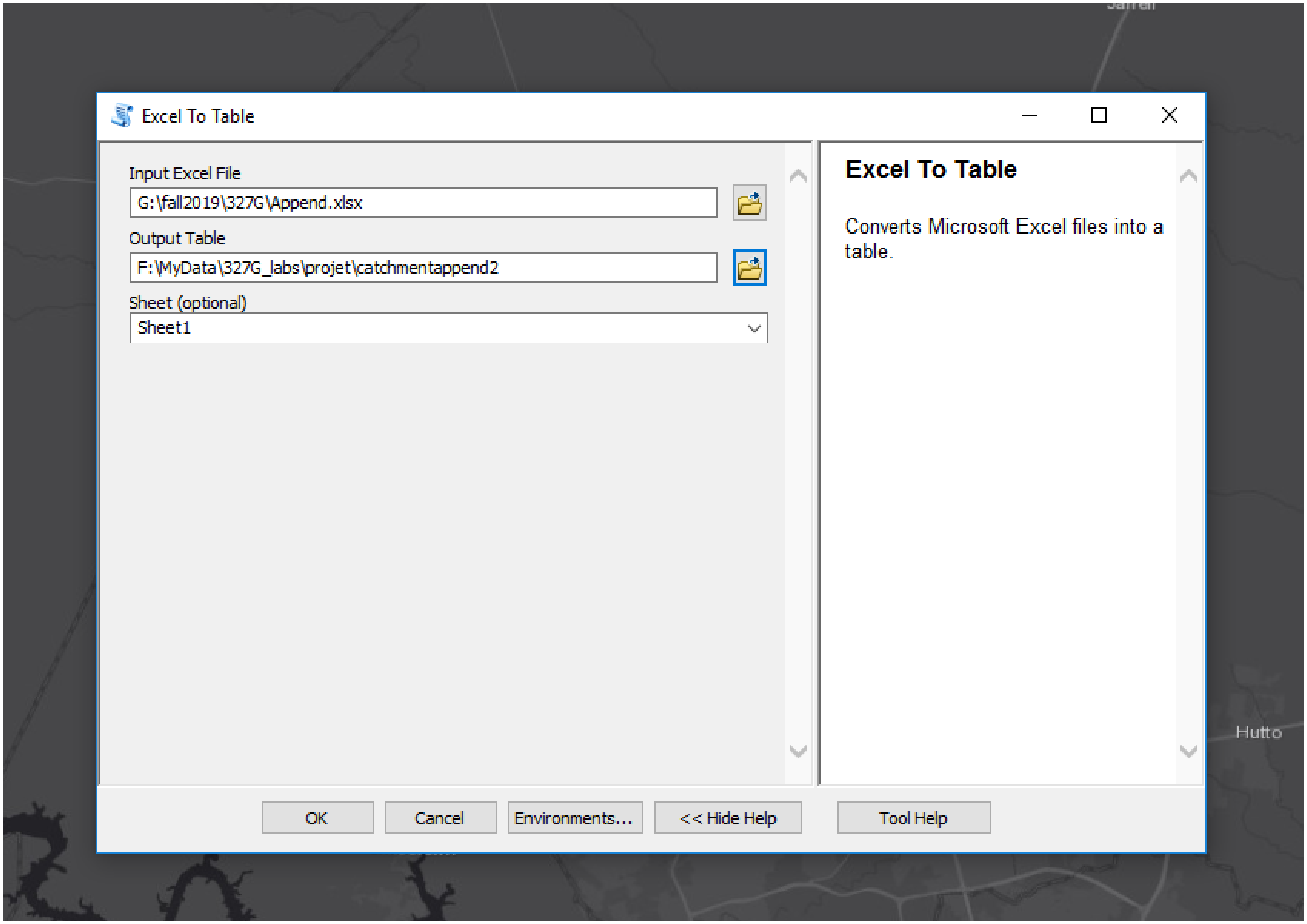


	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW
1																						
2	B	B	D	D	C	NaN	D	D	D	D	D	D	D	D	D	**HSG**	**HSG**	**HSG**	**HSG**	**HSG Totals**	**Directly Calculated**	**Dom HSG**
3	SVB	SVC	TCA	TNA	UHA	W	WHC	WIA	WIB	WLA	WLB	WLC	WNBA	WNBB	WNDB	**A**	**B**	**C**	**D**	**Sum**	**Sum**	
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1073566	0	17079461	18153027	18153027	D
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11321243	11321243	11321243	D
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48798	48798	8978917	9076513	9076513	D
7	0	0	0	0	0	48798.46	0	0	0	0	0	0	0	0	0	0	0	0	9271707	9271707	9271707	D
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9174110	9174110	9174110	D
9	0	0	97596.92	585581.5	0	146395.4	0	0	0	0	0	0	0	0	0	0	390388	0	42552257	42942644	42942644	D
10	0	0	0	0	0	0	390387.7	0	0	0	0	0	0	0	0	0	0	0	9759692	9759692	9759692	D
11	0	0	0	1171163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21861710	21861710	21861710	D
12	0	0	0	439186.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11614033	11614033	11614033	D
13	0	0	0	0	0	0	243992.3	0	0	0	0	0	0	0	0	0	536783	0	17372252	17909035	17909035	D
14	0	0	146395.4	1756745	0	0	0	0	0	0	0	0	0	0	0	0	243992	0	53385515	53629507	53629507	D
15	0	0	0	878372.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16689073	16689073	16689073	D
16	0	0	0	0	0	0	341589.2	0	0	0	0	0	0	0	0	0	97597	48798	14102755	14249150	14249150	D
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48798	48798	19470585	19568182	19568182	D
18	0	0	97596.92	2195931	0	0	48798.46	0	0	0	0	0	0	0	0	0	243992	1805543	34256519	36306054	36306054	D
19	0	0	0	1171163	0	0	0	0	0	0	0	0	0	0	0	0	146395	0	30645433	30791828	30791828	D
20	0	0	146395.4	780775.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7905350	7905350	7905350	D
21	0	0	0	2732714	0	0	0	0	0	0	0	0	0	0	0	0	390388	2537520	26497563	29425471	29425471	D
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	243992	292791	3220698	3757481	3757481	D
23	2049535	0	0	0	0	48798.46	0	0	0	0	0	0	0	0	0	0	7270970	97597	41917877	49286444	49286444	D
24	0	0	0	0	0	0	48798.46	0	0	0	0	0	0	0	0	0	0	0	9857289	9857289	9857289	D
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48798	48798	48798	D
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195194	48798	17323453	17567445	17567445	D
27	341589.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1707946	97597	11516436	13321979	13321979	D
28	0	0	0	1024768	0	0	0	0	97596.92	0	0	0	0	0	341589.2	0	0	2976706	8978917	11955623	11955623	D
29	1317558	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2635117	0	17860236	20495353	20495353	D
30	0	0	0	1610349	0	0	0	0	0	0	0	0	0	0	0	0	1122365	146395	49579235	50847995	50847995	D
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	683178	48798	27180742	27912719	27912719	D
32	0	0	390387.7	634380	0	0	0	0	0	0	0	0	0	0	0	0	0	439186	17177058	17616244	17616244	D
33	0	0	195193.8	292790.8	0	780775.4	0	0	0	0	0	0	0	0	0	0	0	0	12004421	12004421	12004421	D
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97597	0	17323453	17421050	17421050	D
35	97596.92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97597	48798	18250624	18397019	18397019	D
36	683178.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	683178	0	13809964	14493142	14493142	D
37	0	0	0	0	0	146395.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	D
38	0	48798.46	0	0	0	0	1463954	0	0	0	0	0	0	0	0	0	2635117	3123101	50847995	56606213	56606213	D



	A	B	C	D	E	F	G	H	I
1		Curve Numbers for HSG							
2		A	B	C	D	NRCS Classifications Used			
3	Water	100	100	100	100				
4	OpenDev	39	61	74	80	*open space, good condition*			
5	LowDev	61	75	83	87	*residential districts (1/4 acre)*			
6	MedDev	89	92	94	95	*commercial and business*			
7	HighDev	98	98	98	98	*paved parking lots, roofs, and driveways*			
8	Barren	77	86	91	94	*bare soil*			
9	DecFor	30	55	70	77	*woods; good*			
10	EvgFor	30	55	70	77	*woods; good*			
11	MixFor	30	55	70	77	*woods; good*			
12	Scrub	30	48	65	73	*brush; good*			
13	Grass	39	61	74	80	*pasture/grassland/range; good*			
14	Pasture	39	61	74	80	*pasture/grassland/range; good*			
15	Crop	67	78	85	89	*Row crops; SR; good*			
16	WoodWet	100	100	100	100				
17	HerbWet	100	100	100	100				
18									

The new data was saved in a separate file and converted to a table via the Excel To Table tool.



Excel To Table

Input Excel File: G:\fall2019\327G\Append.xlsx

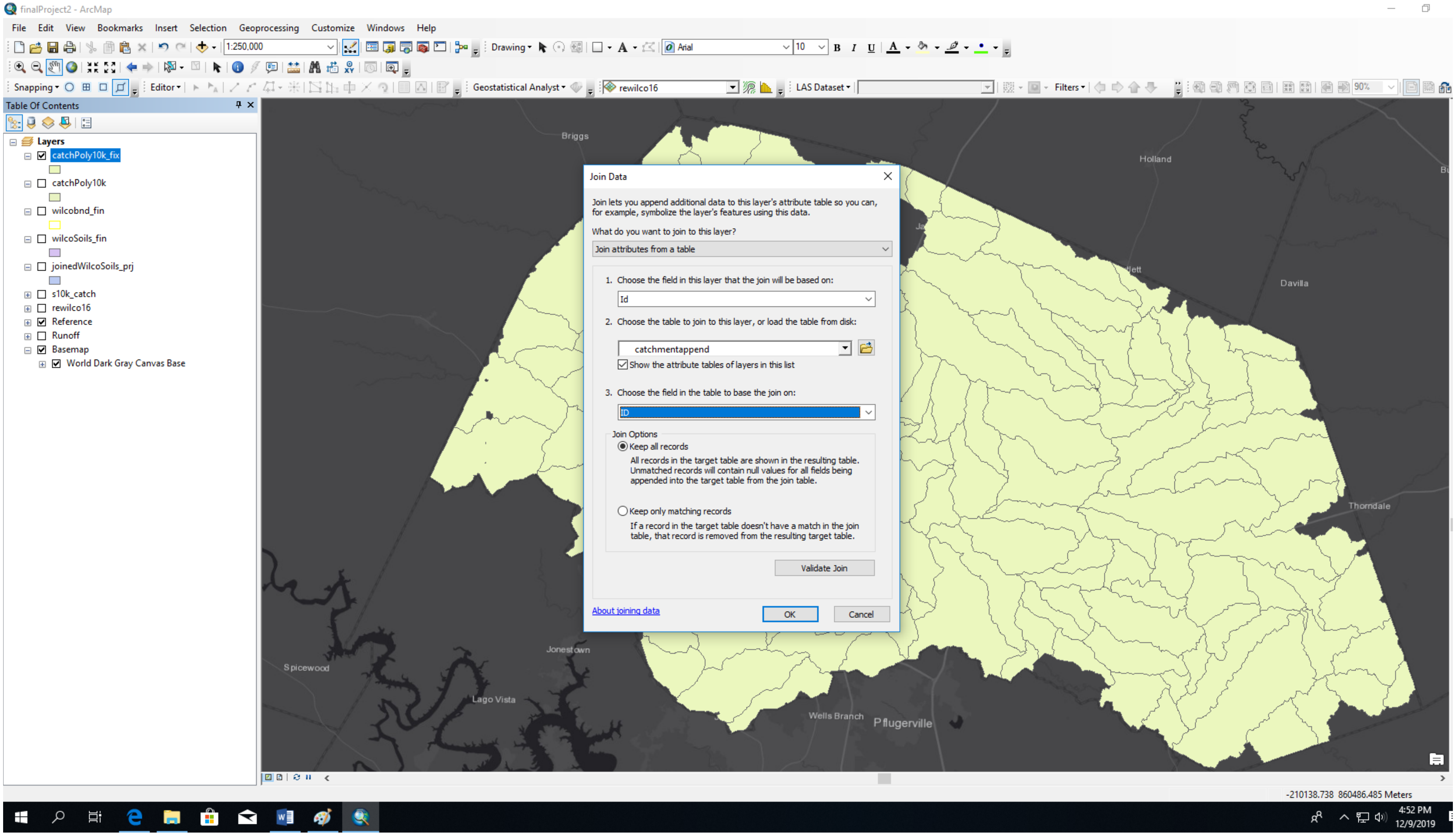
Output Table: F:\MyData\327G_labs\projet\catchmentappend2

Sheet (optional): Sheet1

Excel To Table

Converts Microsoft Excel files into a table.

It was subsequently joined to the catchment layer where the newly appended data was used to create the runoff maps below.



Join Data

Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.

What do you want to join to this layer?

Join attributes from a table

1. Choose the field in this layer that the join will be based on:
   Id
2. Choose the table to join to this layer, or load the table from disk:
   catchmentappend
   ☑ Show the attribute tables of layers in this list
3. Choose the field in the table to base the join on:
   ID

Join Options

● Keep all records

All records in the target table are shown in the resulting table. Unmatched records will contain null values for all fields being appended into the target table from the join table.

○ Keep only matching records

If a record in the target table doesn't have a match in the join table, that record is removed from the resulting target table.

Error

Some of the data was found to be lacking in the tabulated data for a number of minor and one major catchment. Due to time constraints, these catchments had to be removed in the analysis and all relevant map layers.

References

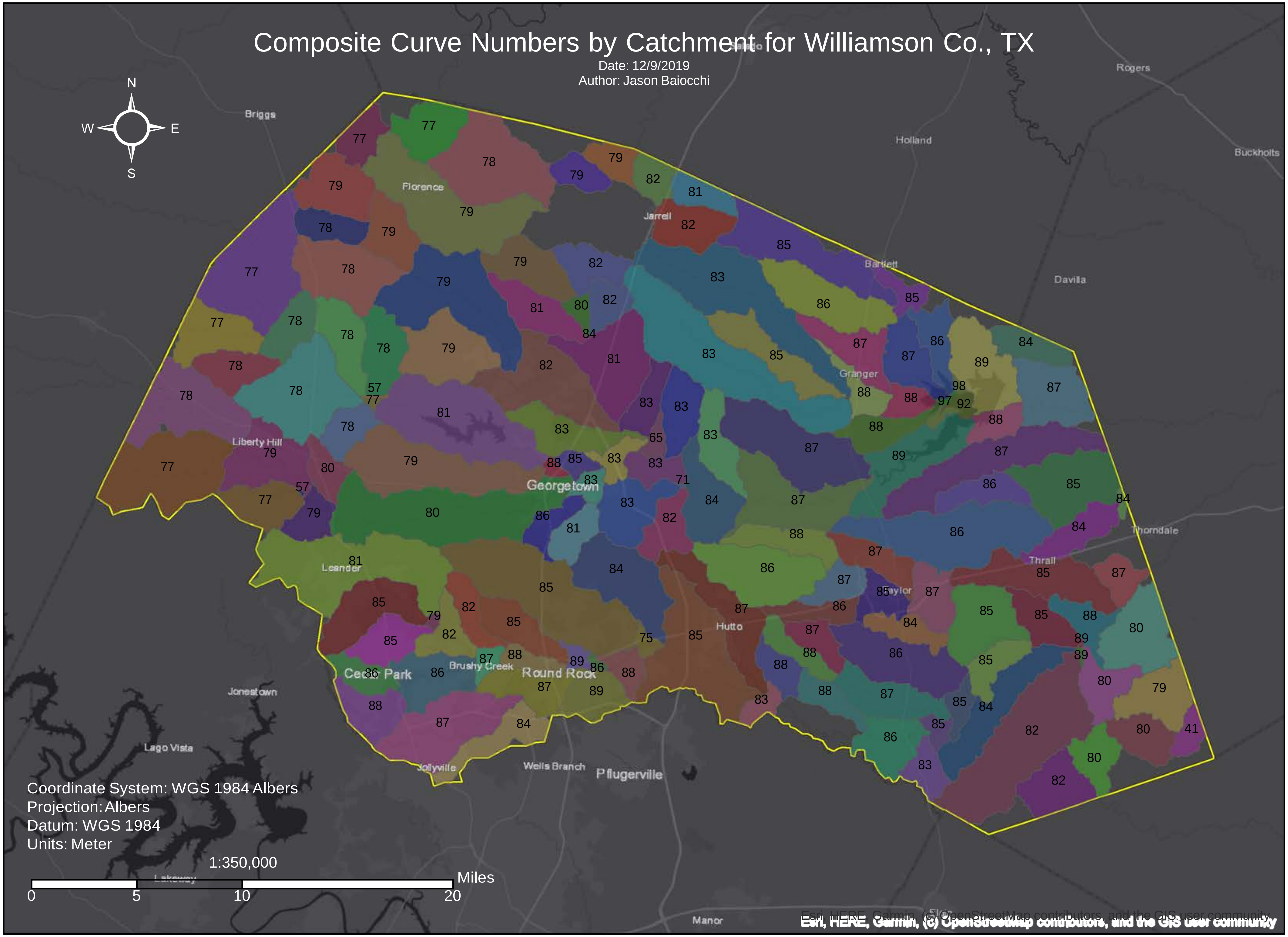
1. http://hydrology.usu.edu/giswr/Archive10/emajor/termproject/
2. https://data.tnris.org/
3. https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
4. https://www.wilco.org/Departments/GIS/GIS-Maps-Data
5. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcseprd337066
6. https://library.municode.com/TX/Austin/codes/Drainage_Criteria_Manual?nodeId=15305
7. Natural Resources Conservation Service (NRCS). 1986. Urban Hydrology for Small Watersheds. Technical Release 55. June 1986.

Results (begin on the next page)

Composite Curve Numbers by Catchment for Williamson Co., TX

Date: 12/9/2019

Author: Jason Baiocchi



Coordinate System: WGS 1984 Albers
Projection: Albers
Datum: WGS 1984
Units: Meter

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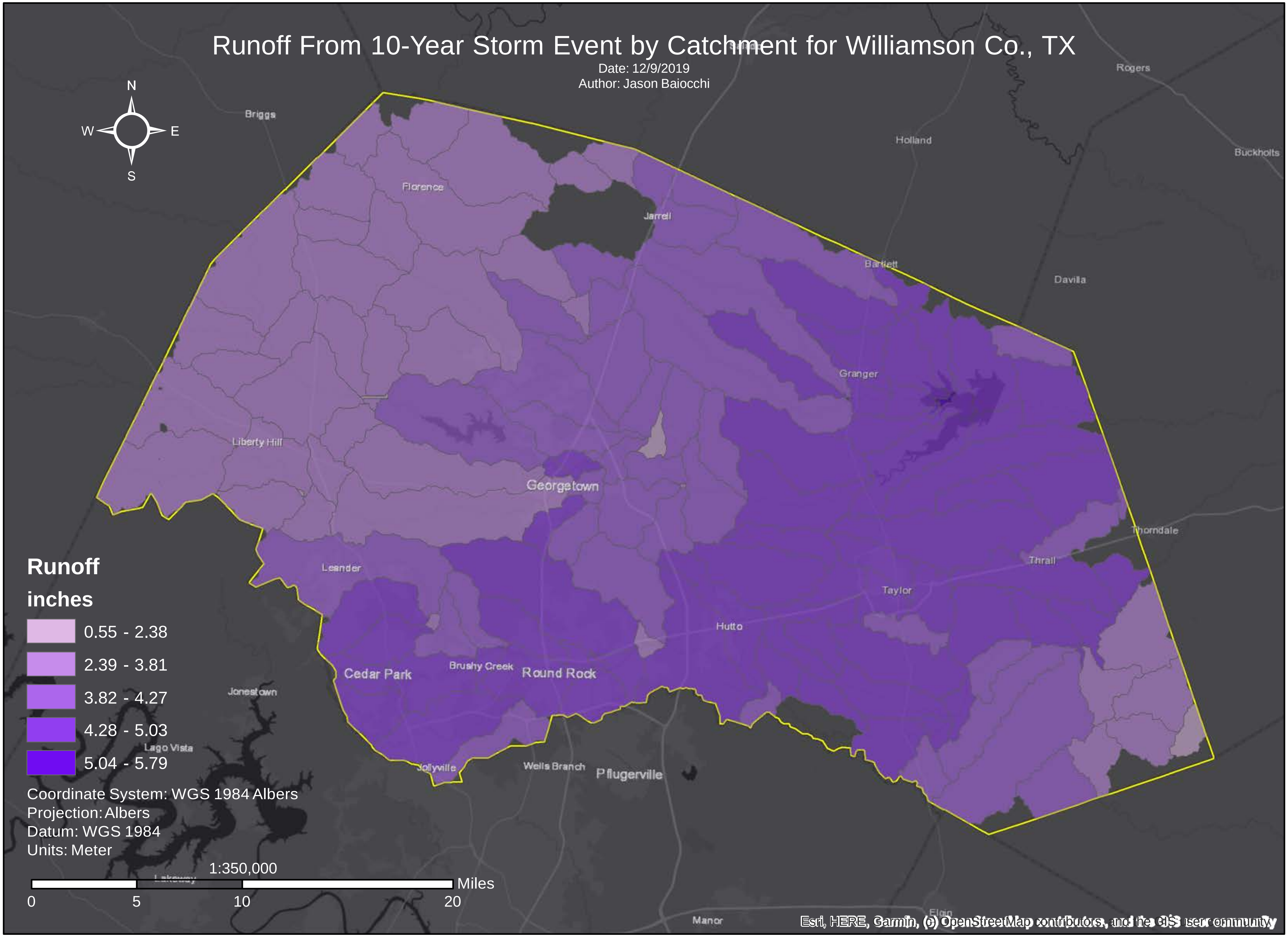


Runoff From 10-Year Storm Event by Catchment for Williamson Co., TX

Date: 12/9/2019
Author: Jason Baiocchi

Runoff

inches

▨	0.55 - 2.38
▨	2.39 - 3.81
▨	3.82 - 4.27
▨	4.28 - 5.03
▨	5.04 - 5.79

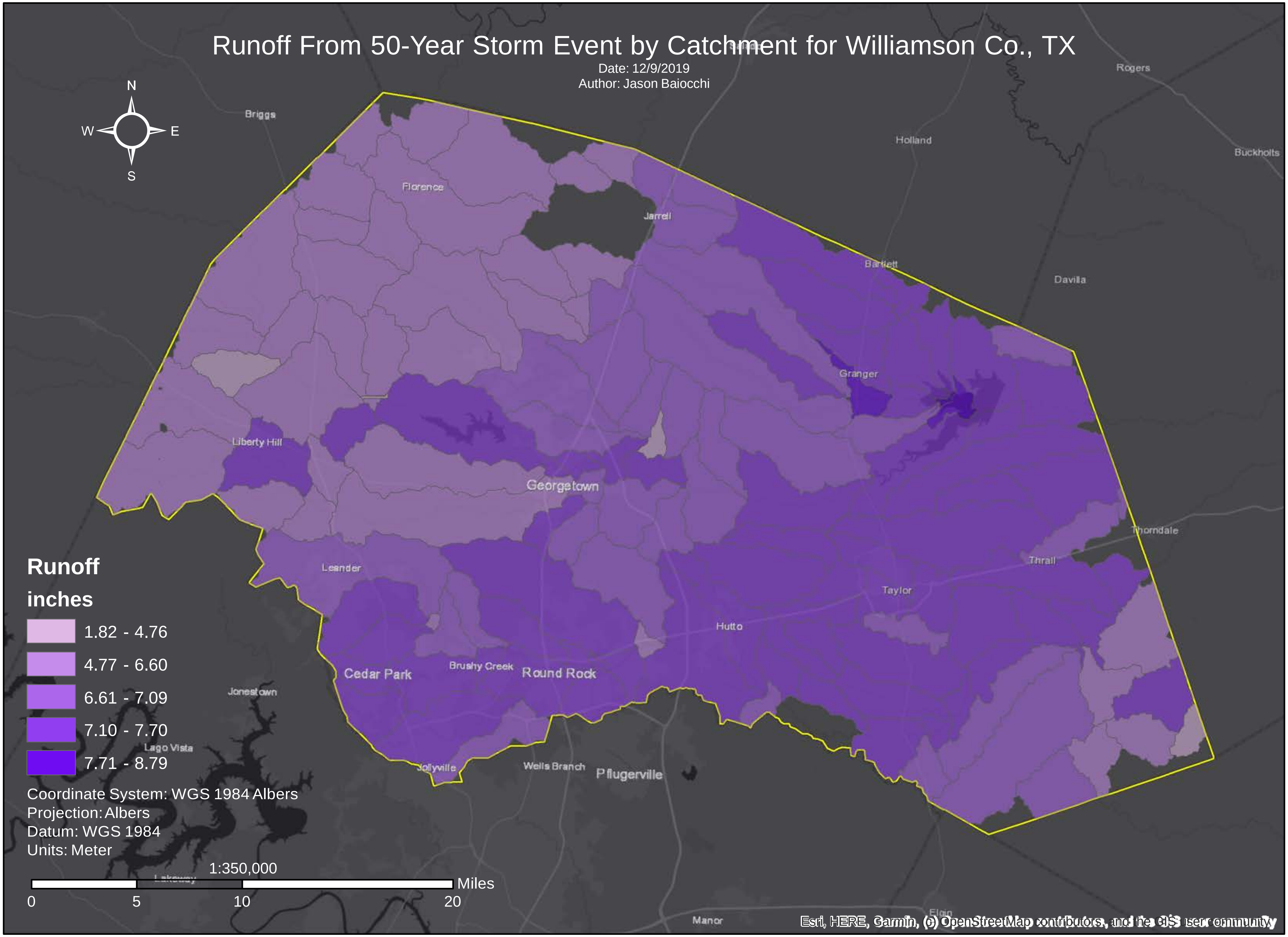
Coordinate System: WGS 1984 Albers
Projection: Albers
Datum: WGS 1984
Units: Meter

1:350,000

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

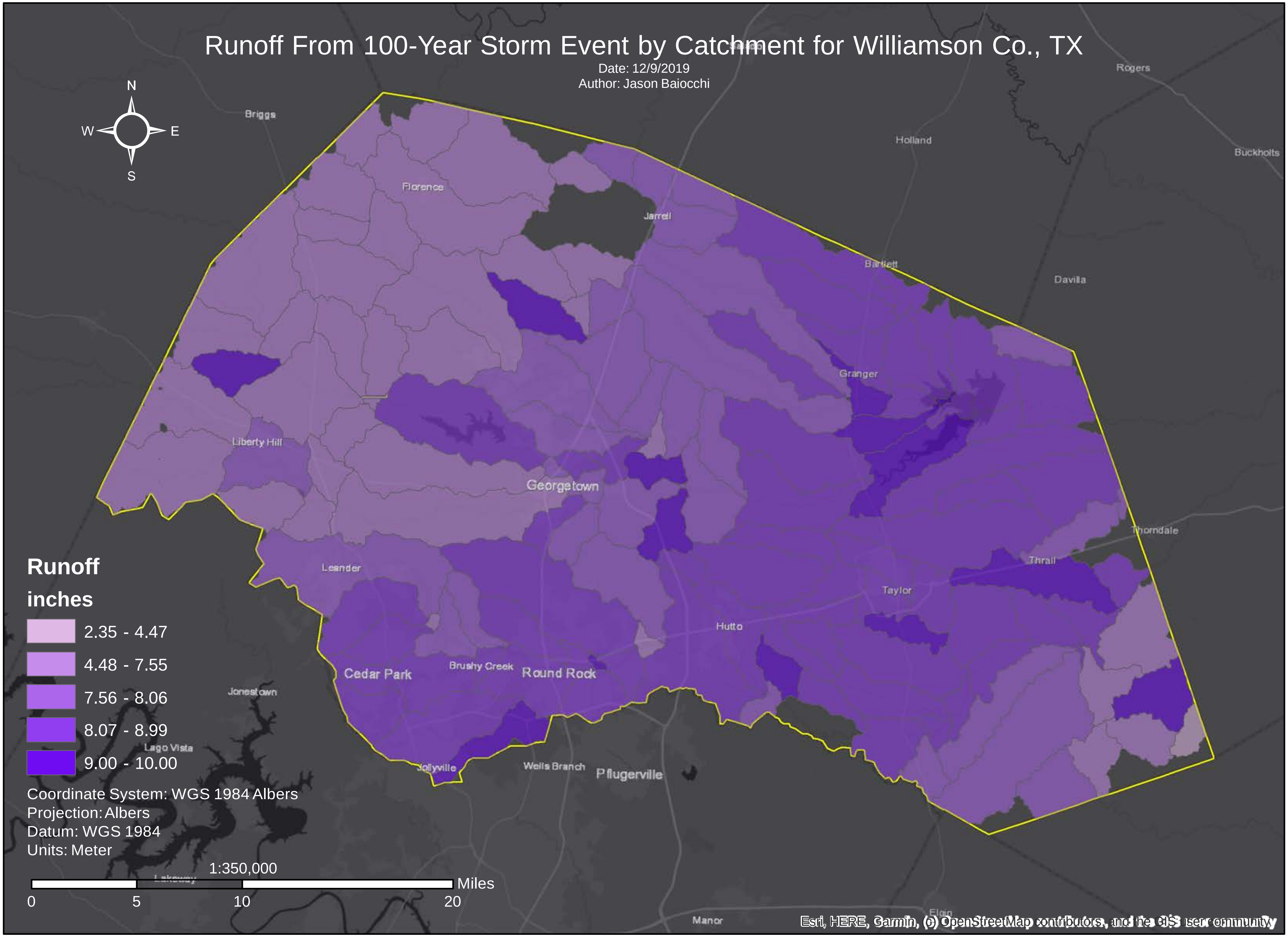
Runoff From 50-Year Storm Event by Catchment for Williamson Co., TX

Date: 12/9/2019
Author: Jason Baiocchi



Coordinate System: WGS 1984 Albers
Projection: Albers
Datum: WGS 1984
Units: Meter

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



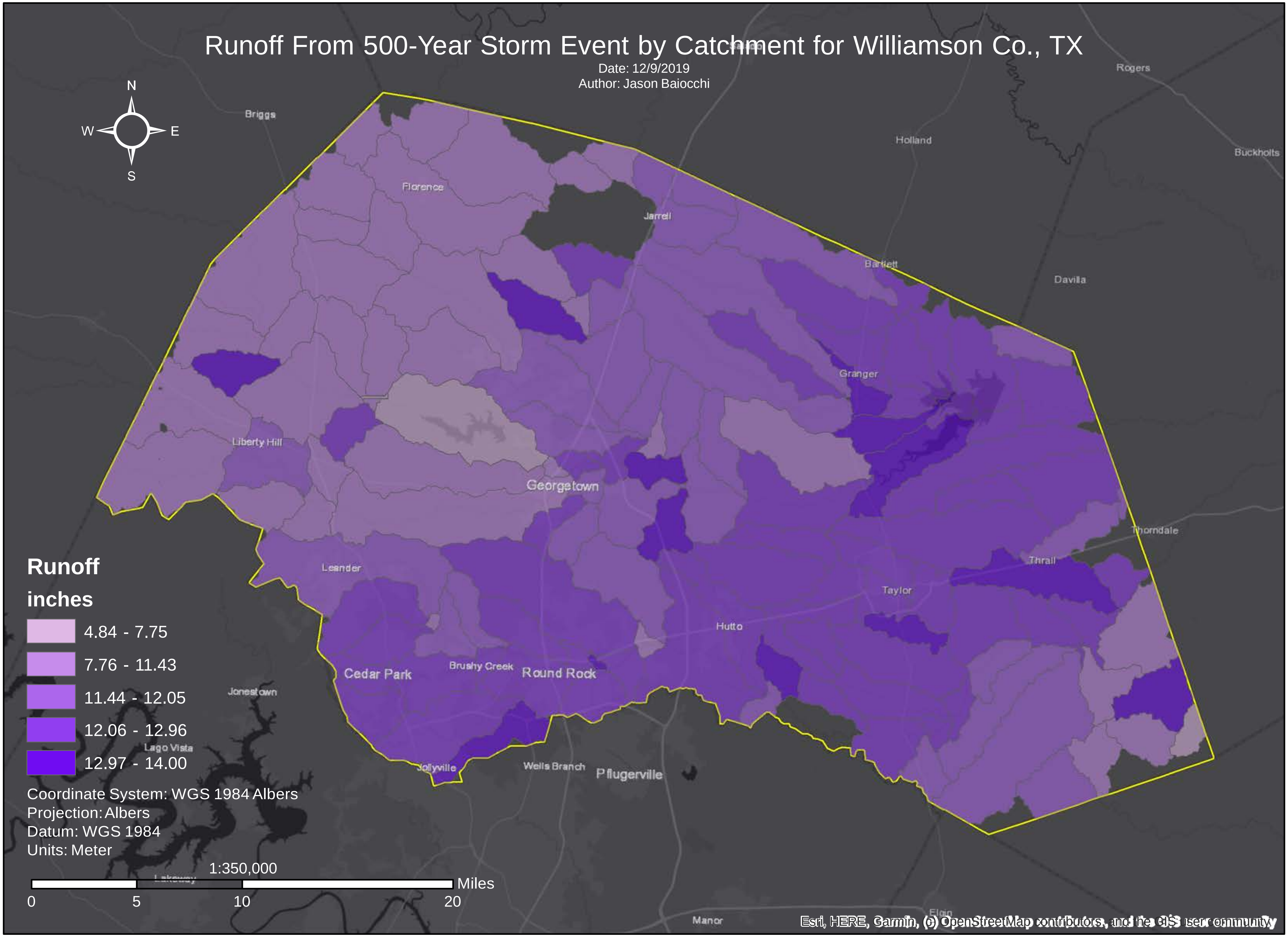
Runoff From 100-Year Storm Event by Catchment for Williamson Co., TX

Date: 12/9/2019

Author: Jason Baiocchi

Coordinate System: WGS 1984 Albers
Projection: Albers
Datum: WGS 1984
Units: Meter

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



Runoff From 500-Year Storm Event by Catchment for Williamson Co., TX

Date: 12/9/2019

Author: Jason Baiocchi

Coordinate System: WGS 1984 Albers
Projection: Albers
Datum: WGS 1984
Units: Meter

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