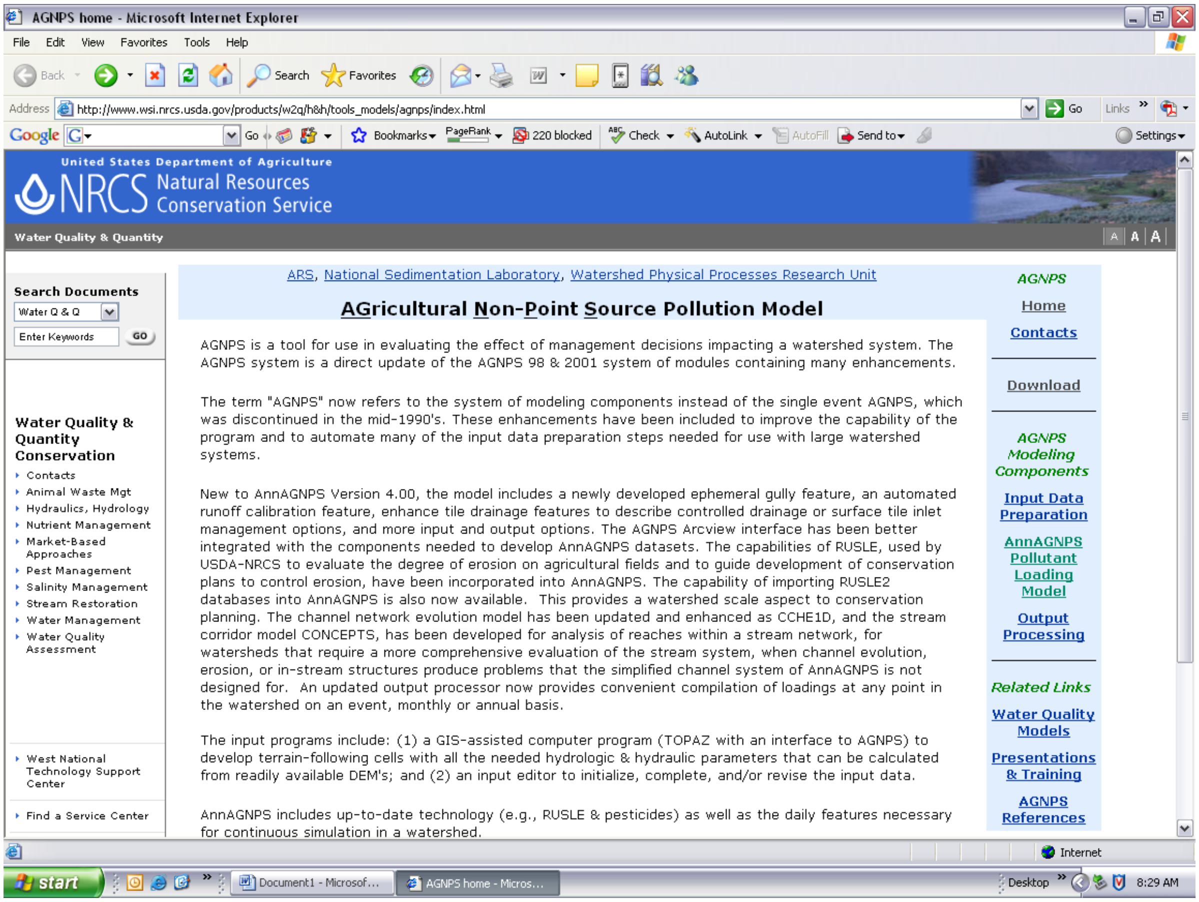
1. Download the AnnAGNPS pollutant loading model from the following website:
http://www.wsi.nrcs.usda.gov/products/w2q/h&h/tools_models/agnps/index.html



2. Click “Download”

3. Click “Continue to Download Page”

4. Download “AGNPS_Installation_Procedures.pdf”

5. Download “AGNPS_Complete.exe”

6. Follow the instructions from the “AGNPS_Installation_Procedures.pdf” to properly install all the “AGNPS_Complete.exe” components previously installed.

a. Extract all “AGNPS_Complete.exe” files to the C:\ drive

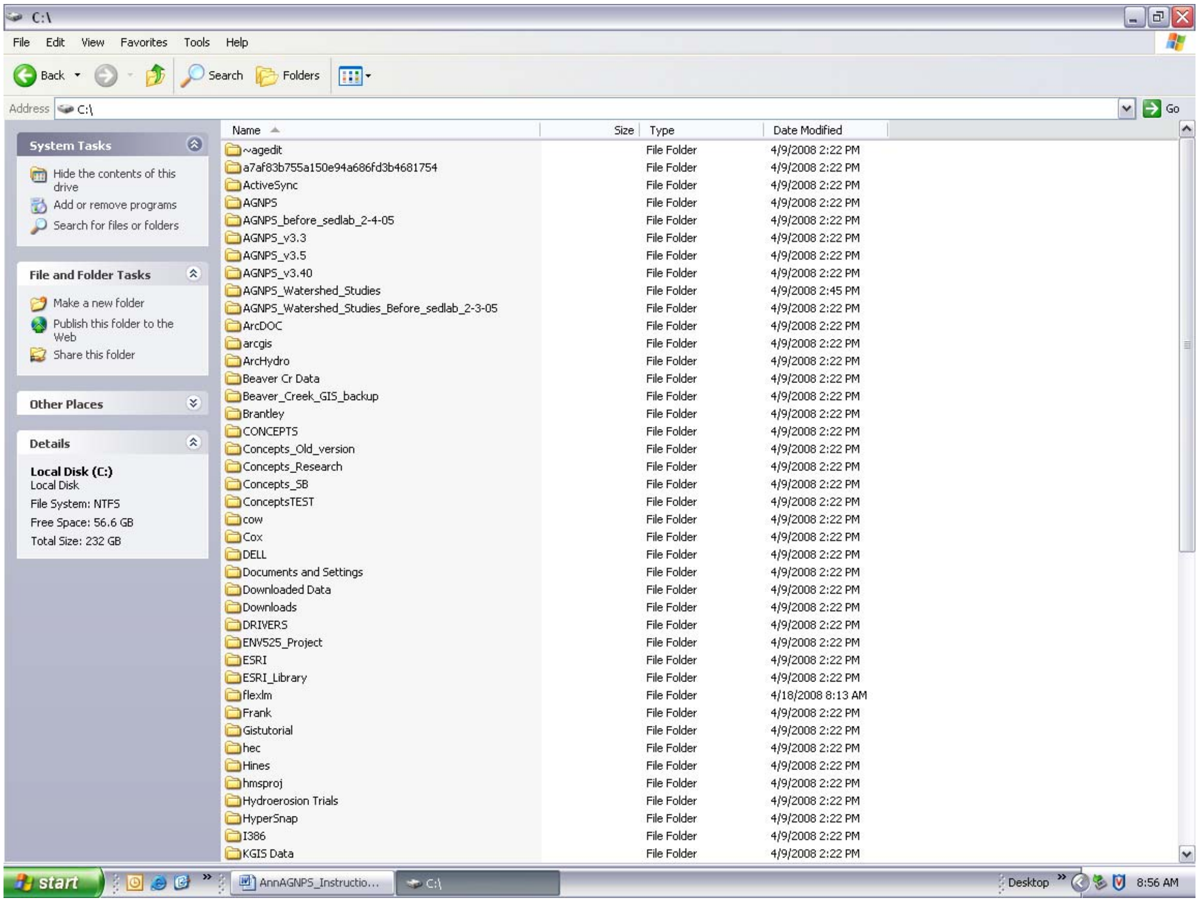
b. Install the Input Editor at C:\AGNPS\DataPrep\Editor\Execute\Setup and by double clicking the “Input_Editor_Setup.msi” and going through the setup wizard. The Input Editor should be installed to C:\AGNPS\DataPrep\Editor\Execute

c. If the Input Editor requires “.net Framework”, the AnnAGNPS installation procedures should direct the user to the following website where the “.net Framwork” version 2.0 Redistributable Package and download “x 86 Version”.
http://msdn2.microsoft.com/en-us/netframework/aa731542.aspx

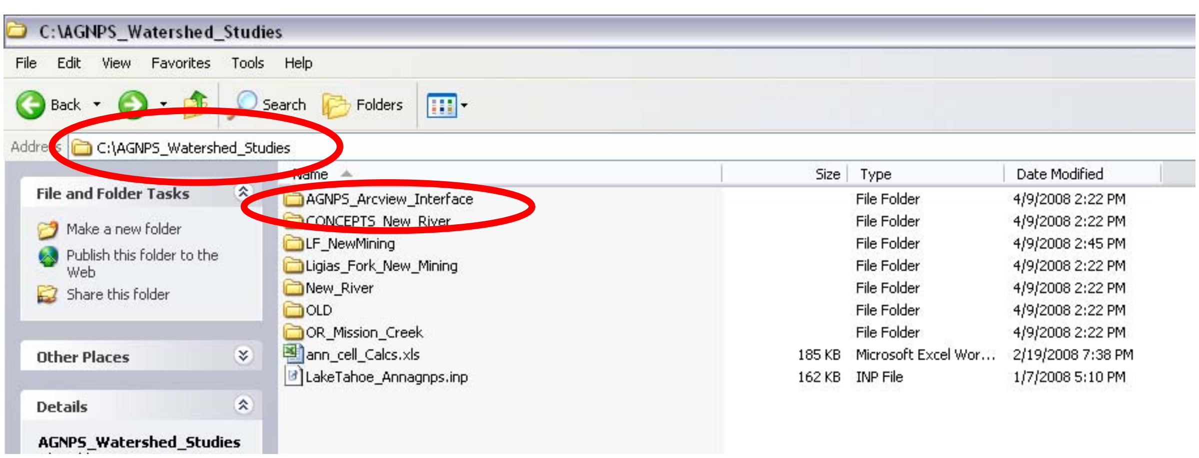
d. Extract the watershed example files at C:\AGNPS\Example_AGNPS_Watershed_Studies\OR_Mission_Creek.exe and double click on "OR_Mission_Creek.exe" and follow the instructions to Unzip these files.

e. Extract template for AGNPS ArcView Interface at C:\AGNPS\Utility\AGNPS_Arcview_Interface\AGNPS_Arcview_Interface.exe and unzip all files.

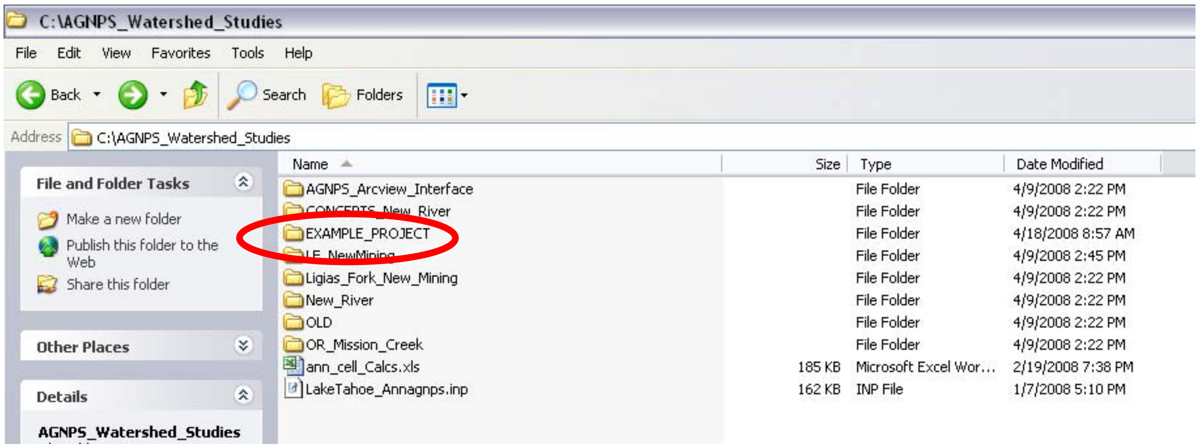
As can be seen here, the extracted AnnAGNPS files create an "AGNPS" folder that contains documentation on how the model functions and the "AGNPS_Watershed_Studies" folder which is where the actual model stores data for a specific project.



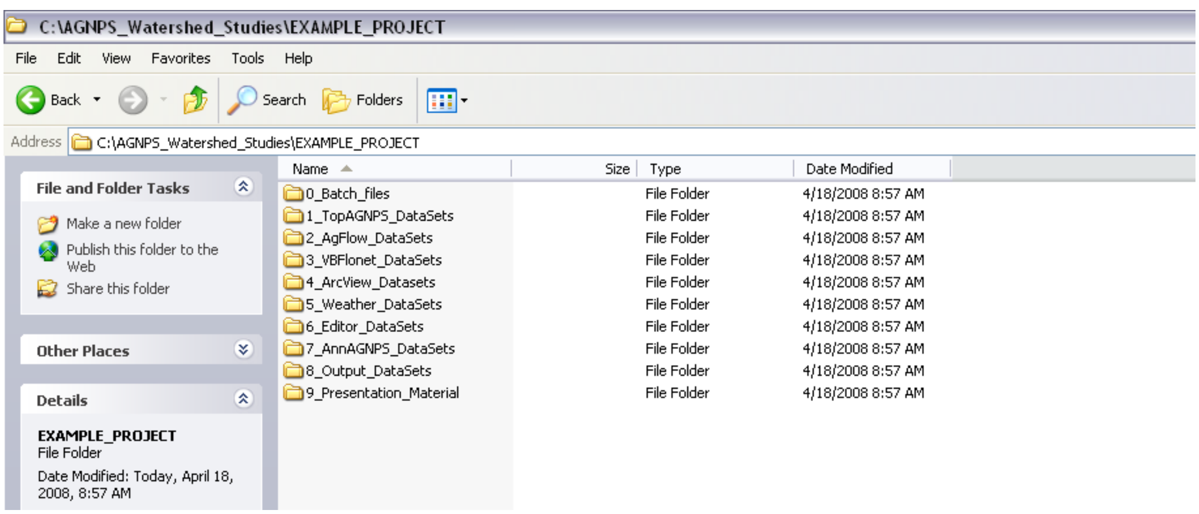
Once you open the "AGNPS_Watershed_Studies" folder you will find the "AGNPS_Arcview_Interface" folder which is used as a template for new projects. Every time you have a different project, it is suggested that this folder is copied, pasted, and given a new title. This folder contains a set of sub-directories that the model uses to store specific data and look for other data such as GIS and Climate files.



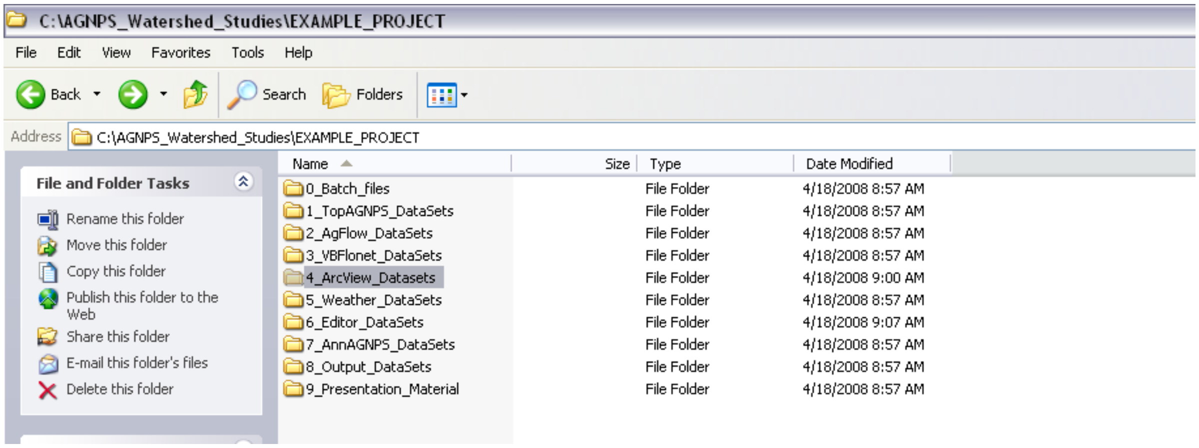
For this demonstration, the “AGNPS_Arcview_Interface” folder is copied and pasted in the “AGNPS_Watershed_Studies” directory. This copied folder is then given a name, which is called “Example_Project”. You can see that there are other projects contained in the “AGNPS_Watershed_Studies” folder such as “New_River” which is the OSM Contract 2 Calibrated AnnAGNPS Model for 4 different sub-watersheds in the New River.



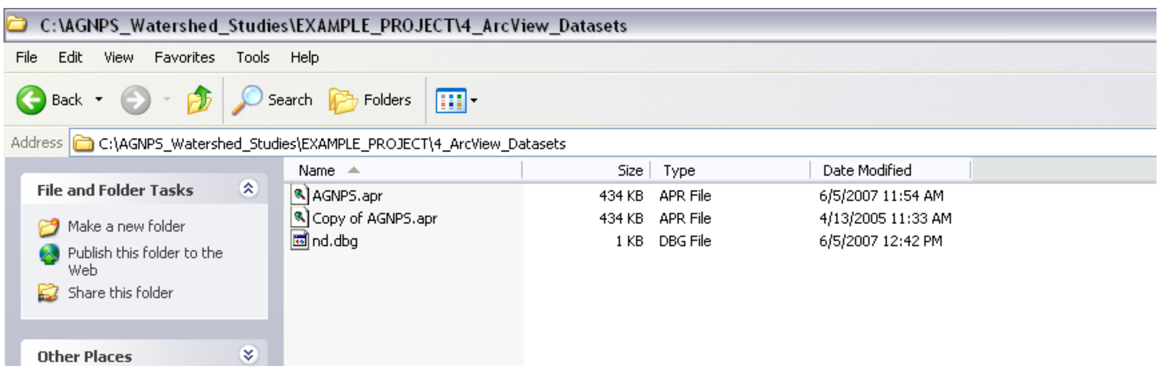
You can see from opening the “Example_Project” , there are many different folders that the model uses to store and search for specific data.



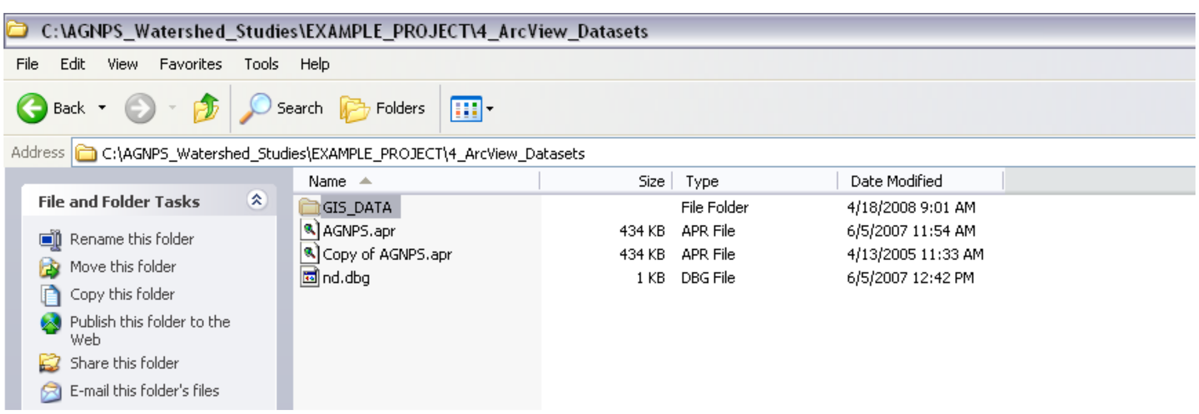
First, lets look at the #4 folder which is highlighted. This folder is used to open the AnnAGNPS program and to store the GIS data for a specific project.



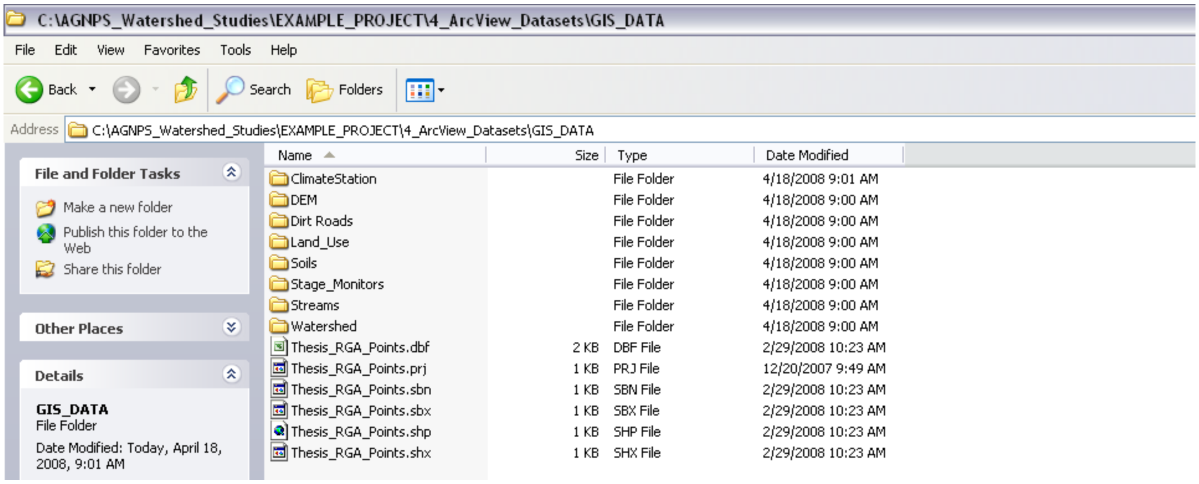
By opening the #4 folder, you will see the execution file to actually open up the AnnAGNPS model which is identified as "AGNPS.apr".



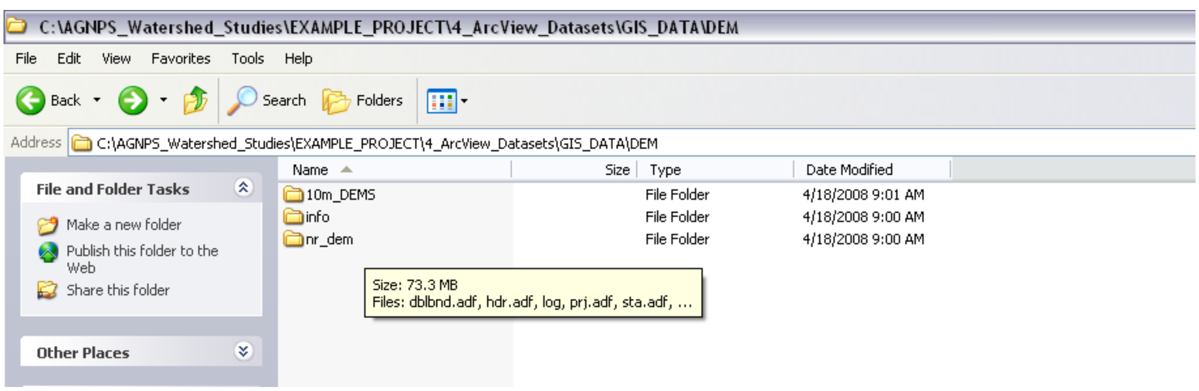
With in the folder, the GIS data folder must be created to keep all the GIS data in one place. For all the required GIS DEM and shape files used for this example within the New River are placed in a "GIS_Data" folder as shown.



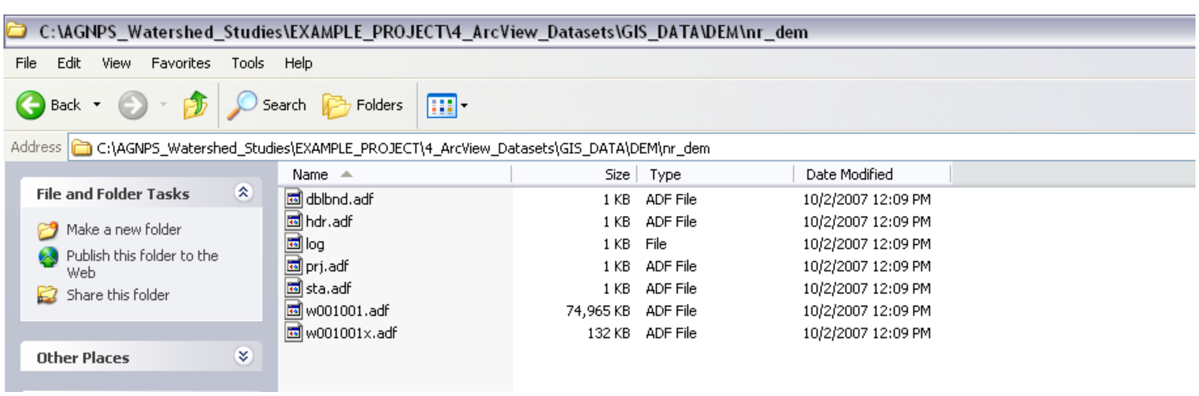
Opening the “GIS_Data” folder, you can see all the GIS DEM and shape files that are used within the AnnAGNPS GIS interface for the model. The model must have DEMs, land use activities, and soil data to properly work. Other GIS data sets are useful in defining the outlet of a sub-watershed or other areas of interest.



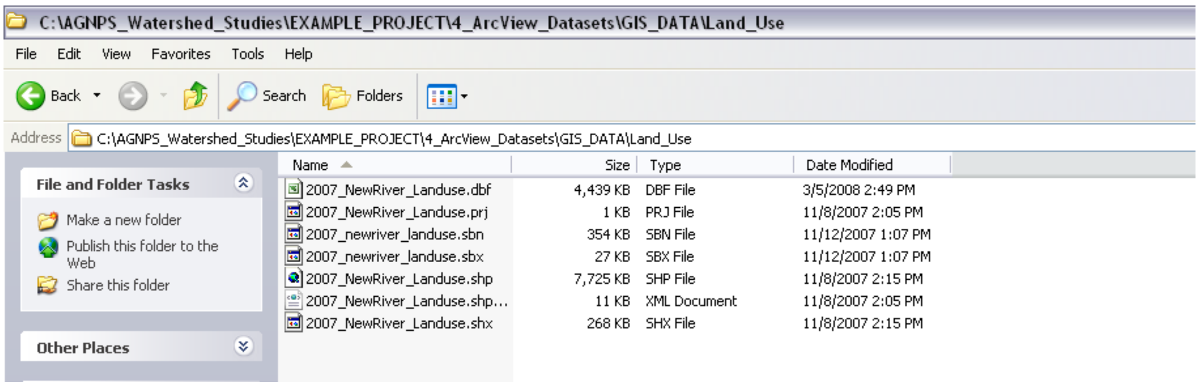
Opening up the DEM folder, there are a set of 10-meter DEM quad maps and a “nr_DEM” folder that contains a set of the 10-meter DEMs that have been merged to create one single grid for the areas of interest. The directions to merge DEM’s into one file are described in the “Agnps_Arcview_Interface_Procedures.pdf” document found within the C:\AGNPS\Utility\AGNPS_Arcview_Interface folder.



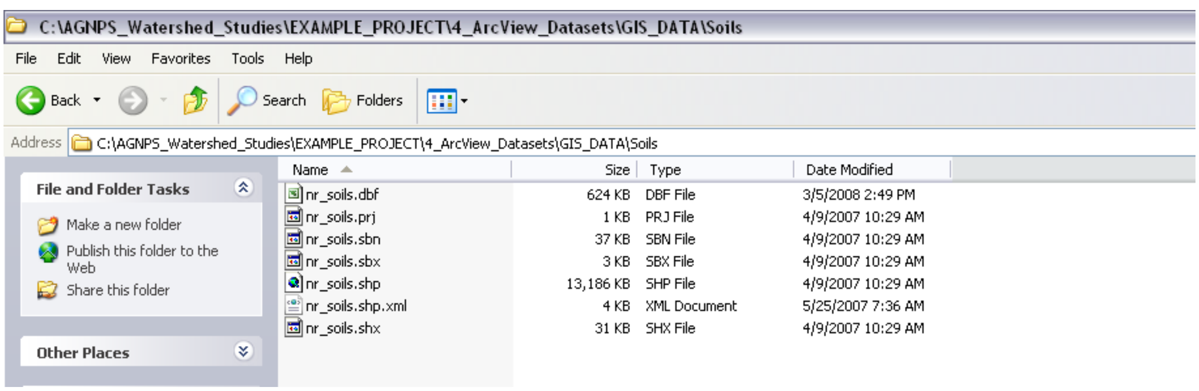
Opening the merged 10-meter DEMs folder, you can see the DEM files created for the AnnAGNPS model using ArcView 3.x.



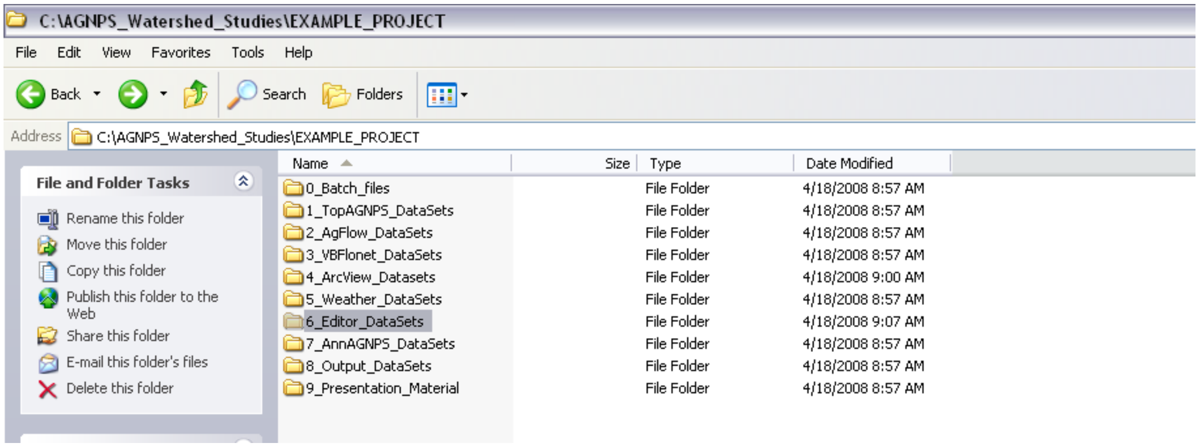
Next, opening up the “Land_Use” folder, you can see the GIS files placed in this folder to represent the general land use activities in one single set. For the model, all the shape files, as well as the DEMs should be one single layer. The GIS layers do not need to have an abundance of information within their attribute tables, but must have some common way of being identified and must be set in a correct coordinate system and uniform unit system.



Opening up the “Soils” folder, you can see one single set of GIS shape files to represent the soil types found within the New River Basin.



Going back to the other folders used by the model, lets look at folder #6. Folder #6 is another folder for containing other types of data used by the model. Basically, this folder contains the tabular data to represent the different soil types and their properties as well as the AnnAGNPS Climate and Input Editor File.



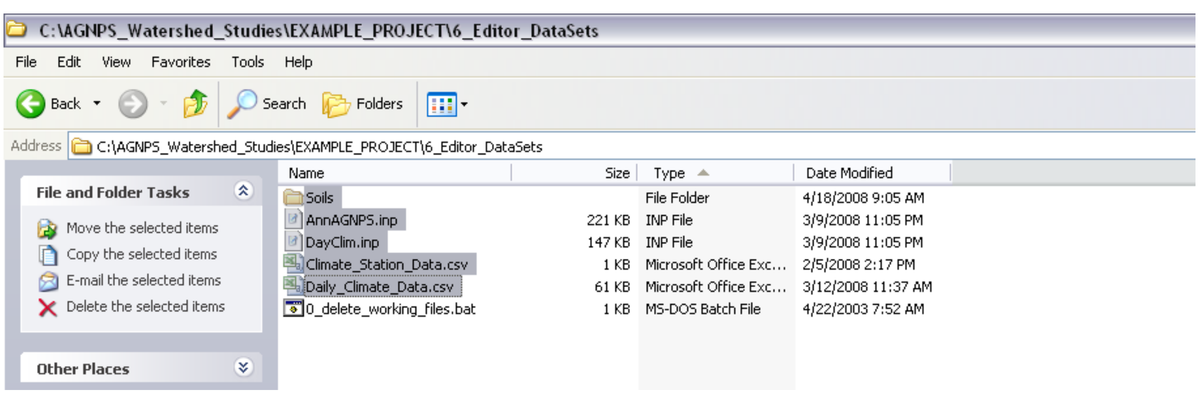
From previous projects, the "Soils" Folder, "AnnAGNPS.inp", "DayClim.inp", "Climate_Station_Data.csv", and "Daily_Climate_Data.csv" are copied and pasted into this folder.

The Soils folder contains two .csv files that contain all the tabular data for the soil GIS shape files used in the model. This data was collected from NRCS and is structured to communicate with the model.

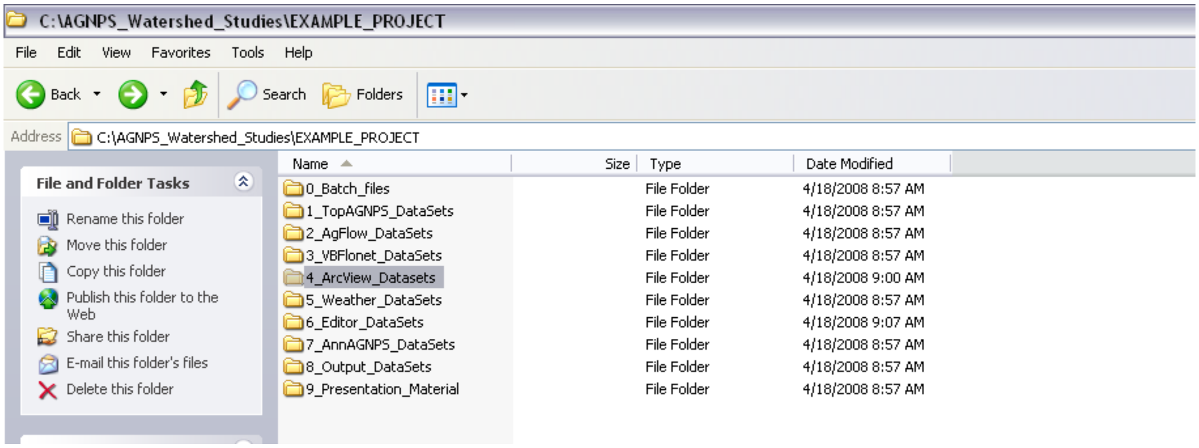
The AnnAGNPS.inp file is a text file that is structured to store the Input Editor data sets for a specific project. I have found that it is easier to copy older AnnANGPS.inp files from other projects and just modify the data within the program for a specific project. This will be shown later.

The DayClim.inp file is similar to the AnnAGNPS.inp file and is copied over from a previous project. This file will be updated within the program, but is properly structured to communicate with the model.

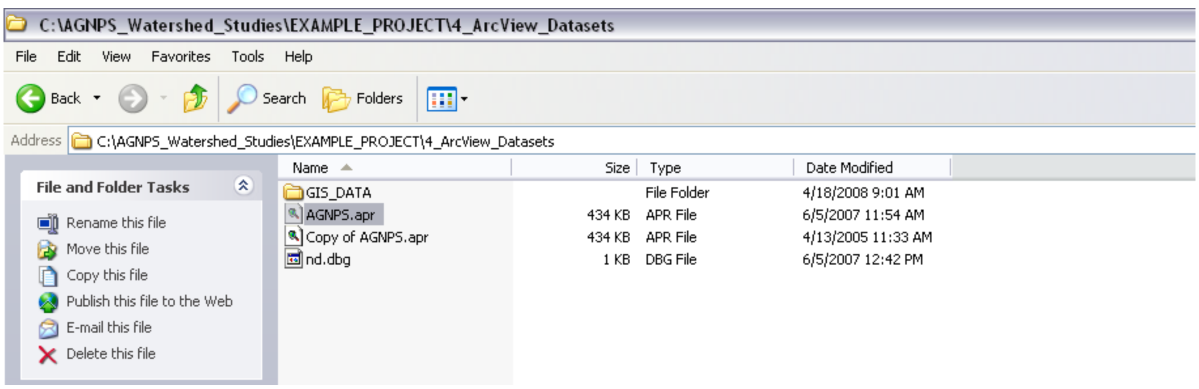
Finally, the two climate .csv files are actual weather data summarized in Excel, which will be placed into the DayClim.inp file with the AnnAGNPS model to better represent the area.



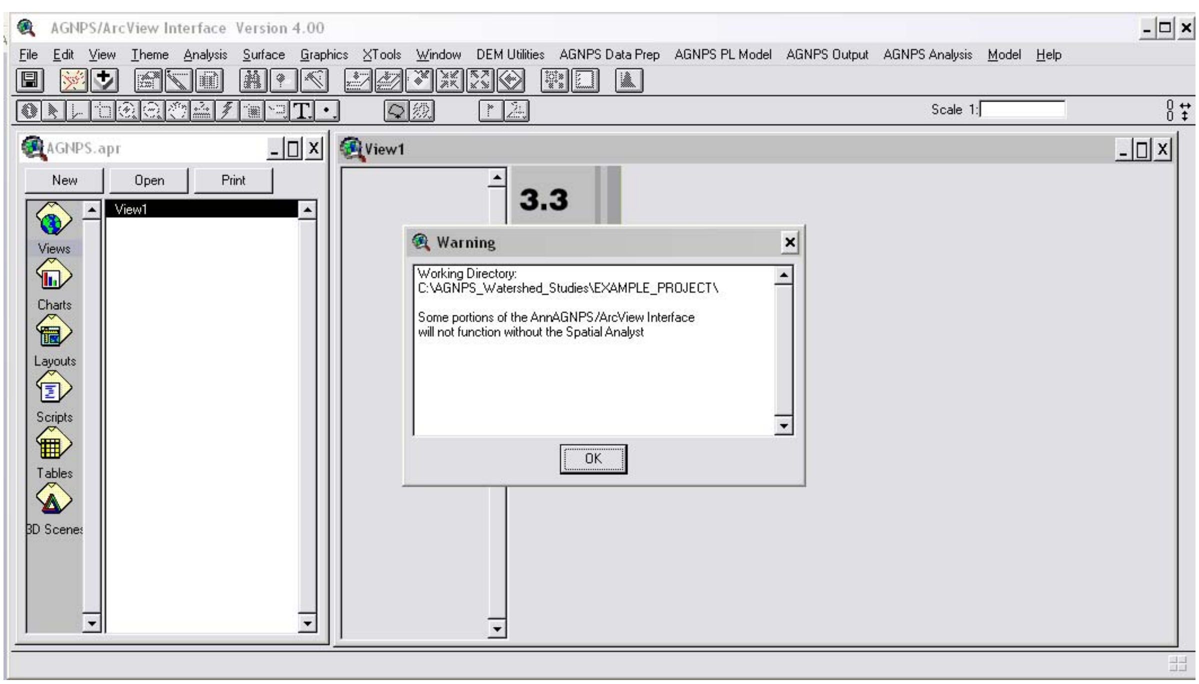
So, we have placed all the necessary data within the required folders and are ready to execute the model. To do this, lets go back to the numbered folders and open folder #4.



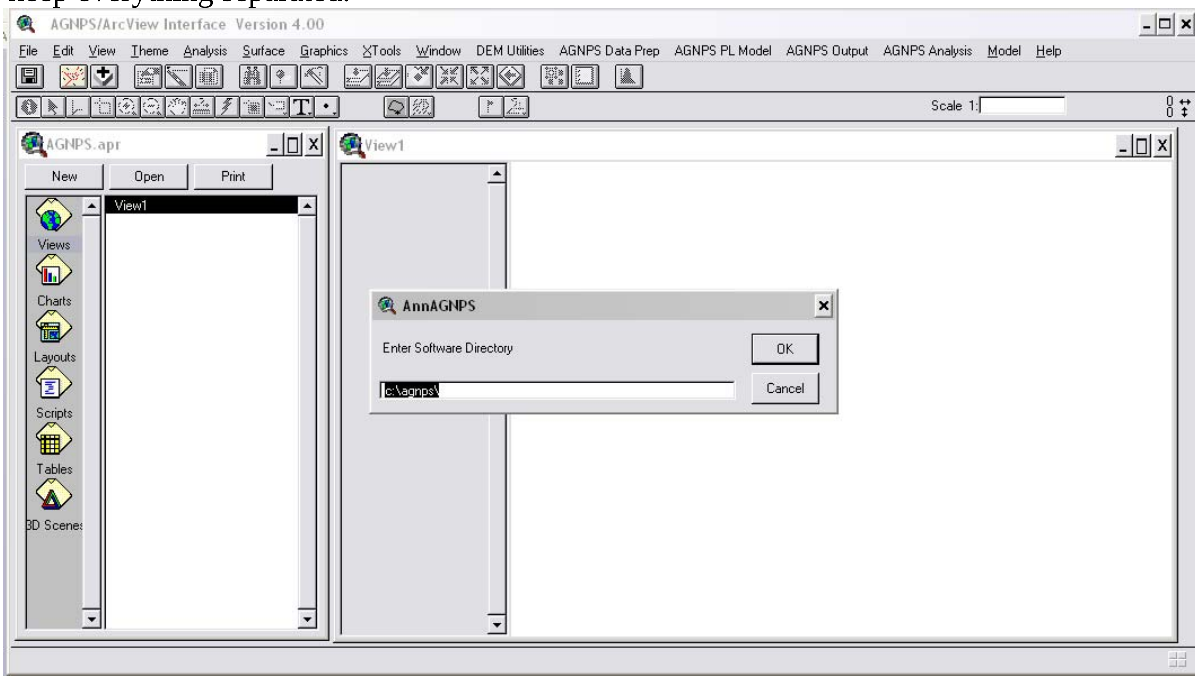
In folder #4, open the "AGNPS.apr" to execute the model.



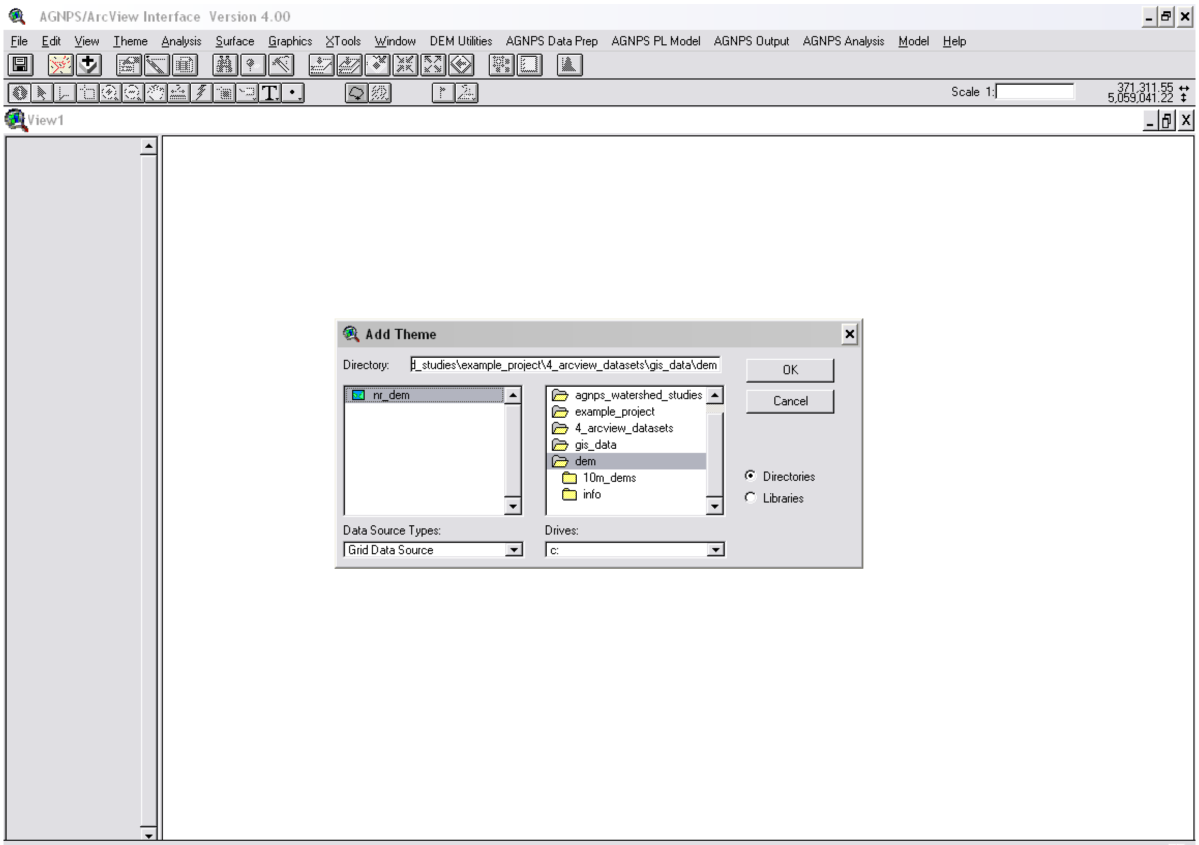
Once you execute the model, this is the opening screen. Click OK and continue.



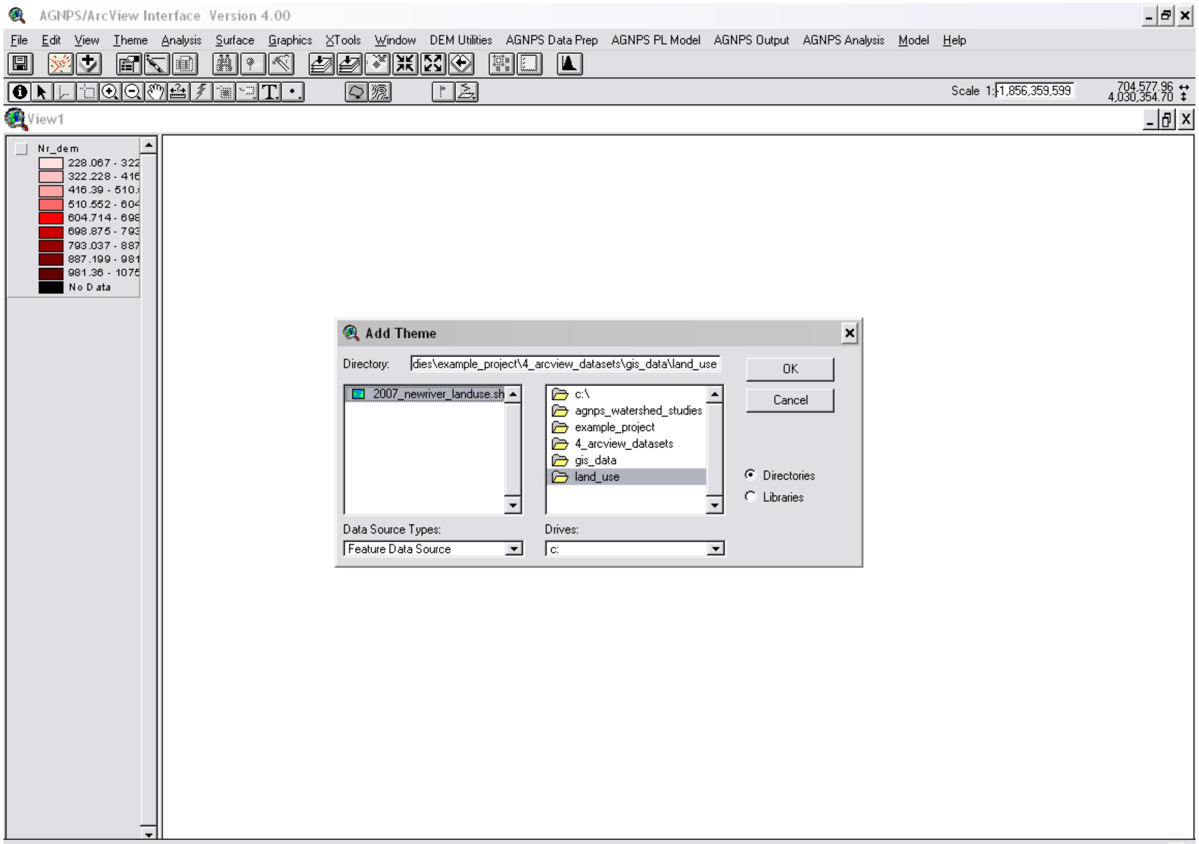
Next, this screen shows where the model is directed to run all of its programs. It should be directed to the C:\agnps\ as shown. If you have older projects that used previous versions, such as AGNPS v. 3.5, you would need to change this directory location to the folder in the C:\ drive that you have stored older AGNPS programs. For this computer, the last downloaded AGNPS program was changed to "AGNPS_v3.5" because when you download the newest AGNPS model from the internet, it down loads the files as into an "AGNPS" folder, therefore, it is good to keep everything separated.



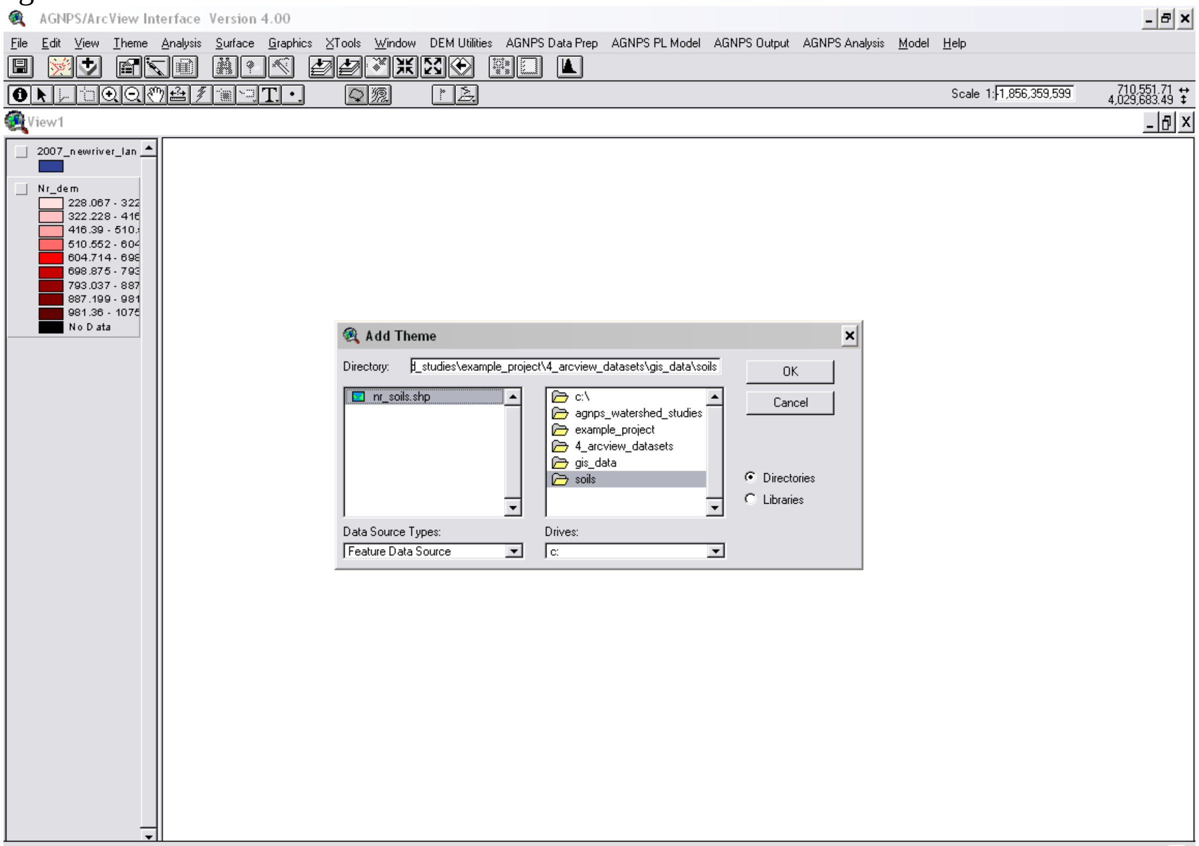
Next, go the “Add Themes” button that has a “+” under View. This will allow the user to begin importing the GIS DEM and shape files into the program. First, the DEM is found by selecting the Data Source Type as a “Grid Data Source” and opening #4 folder to find the NR_DEM which is the DEM file with Merged Quad Maps.



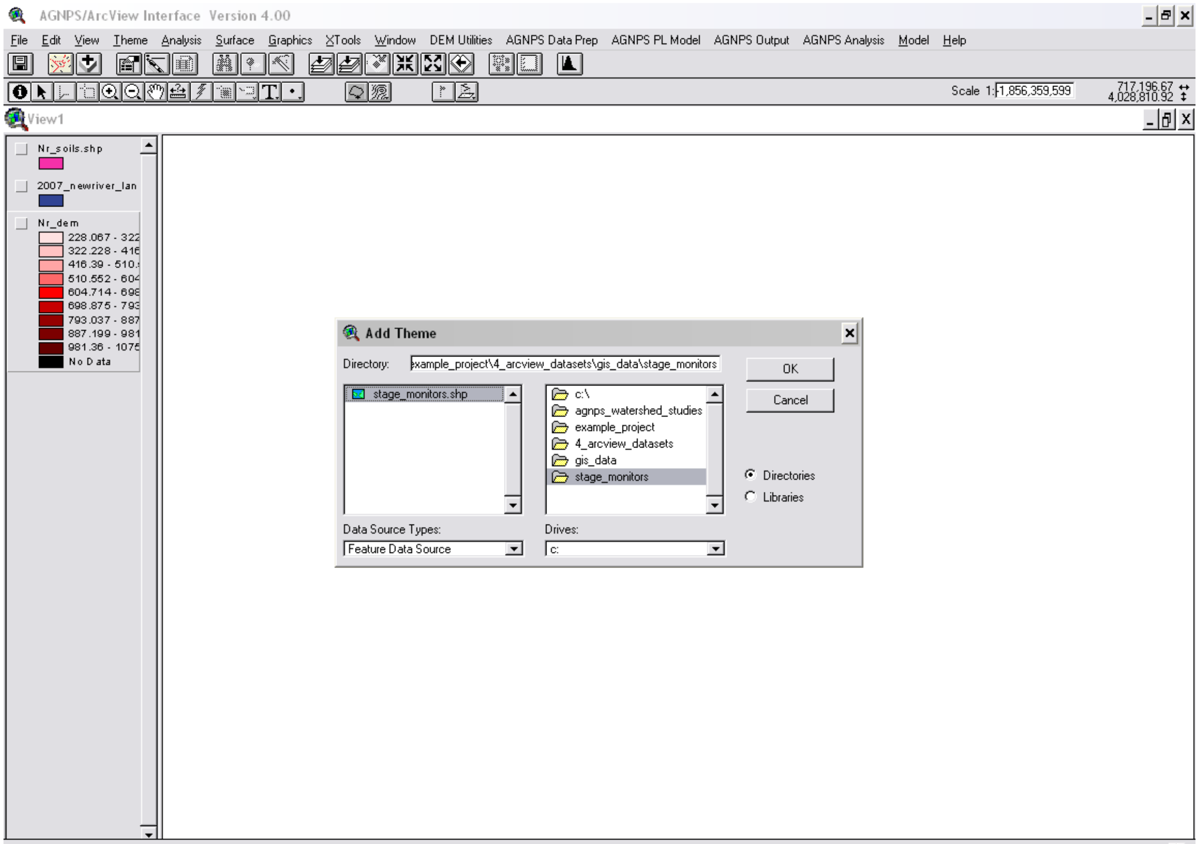
Next, the Land Use shape file is uploaded into the program by changing the Data Source Type as “Feature Data Source” and going to the #4 Folder where the GIS data is stored.



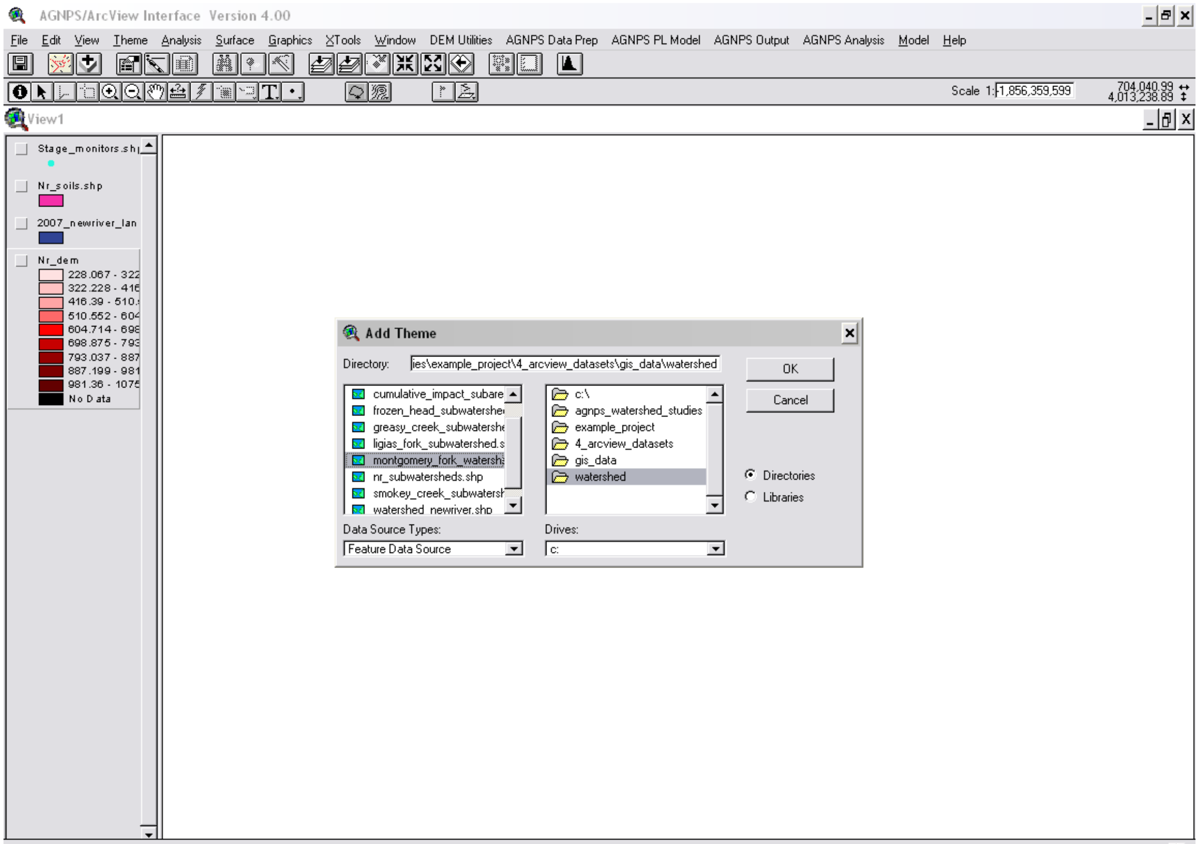
Similar to importing the Land Use shape file, the soil file for the New River is loaded into the program as shown.



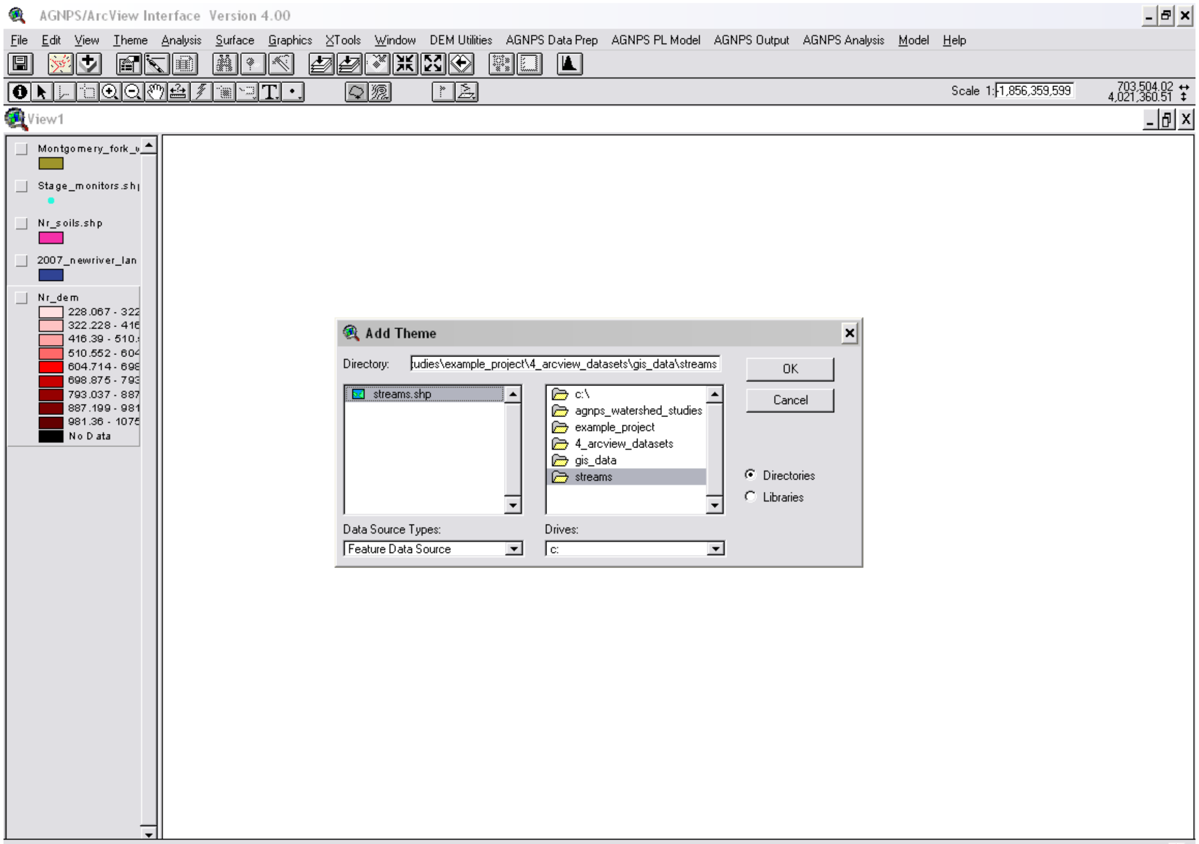
To locate the outlet of the sub-watershed of interest ran in this example, the location of the stage-recorders used to calibrate the runoff is uploaded.



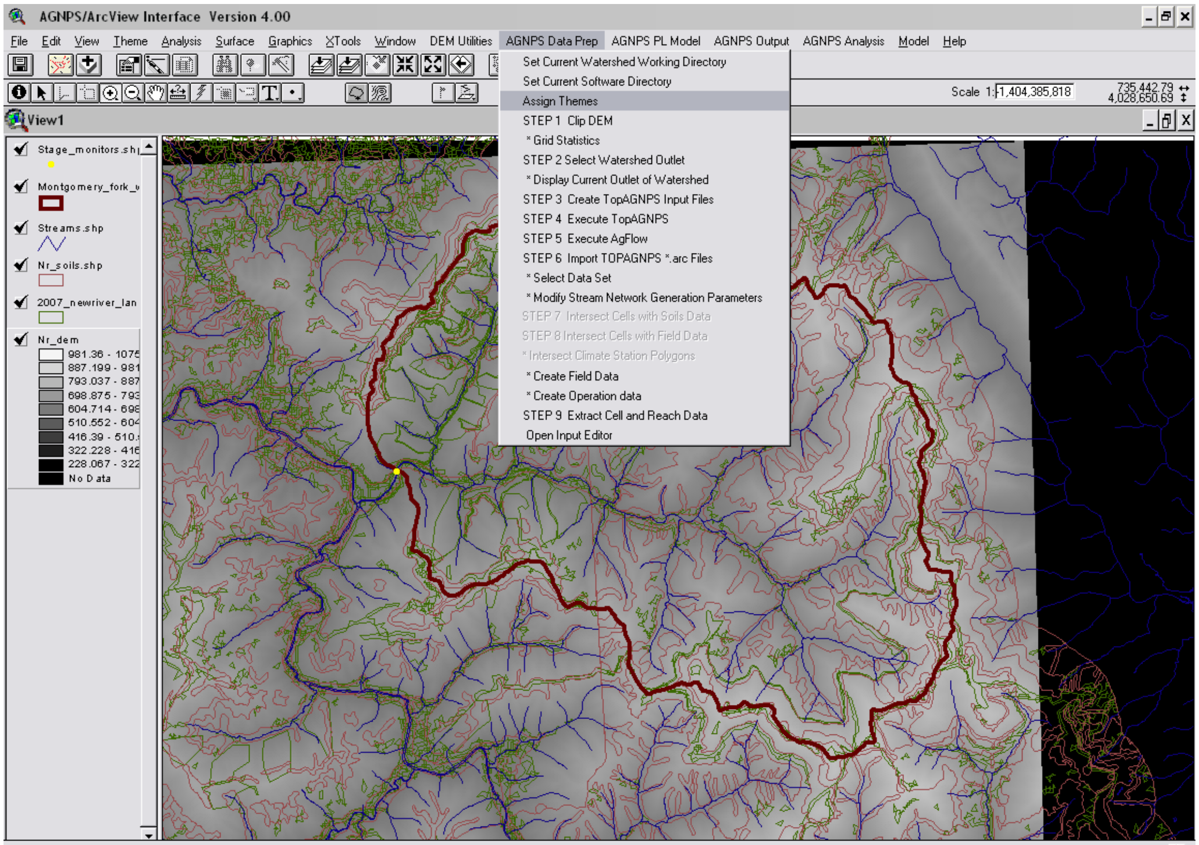
This example will look at the Montgomery Fork sub-watershed, so its sub-watershed outline is imported to help visualize the area of interest in the program.



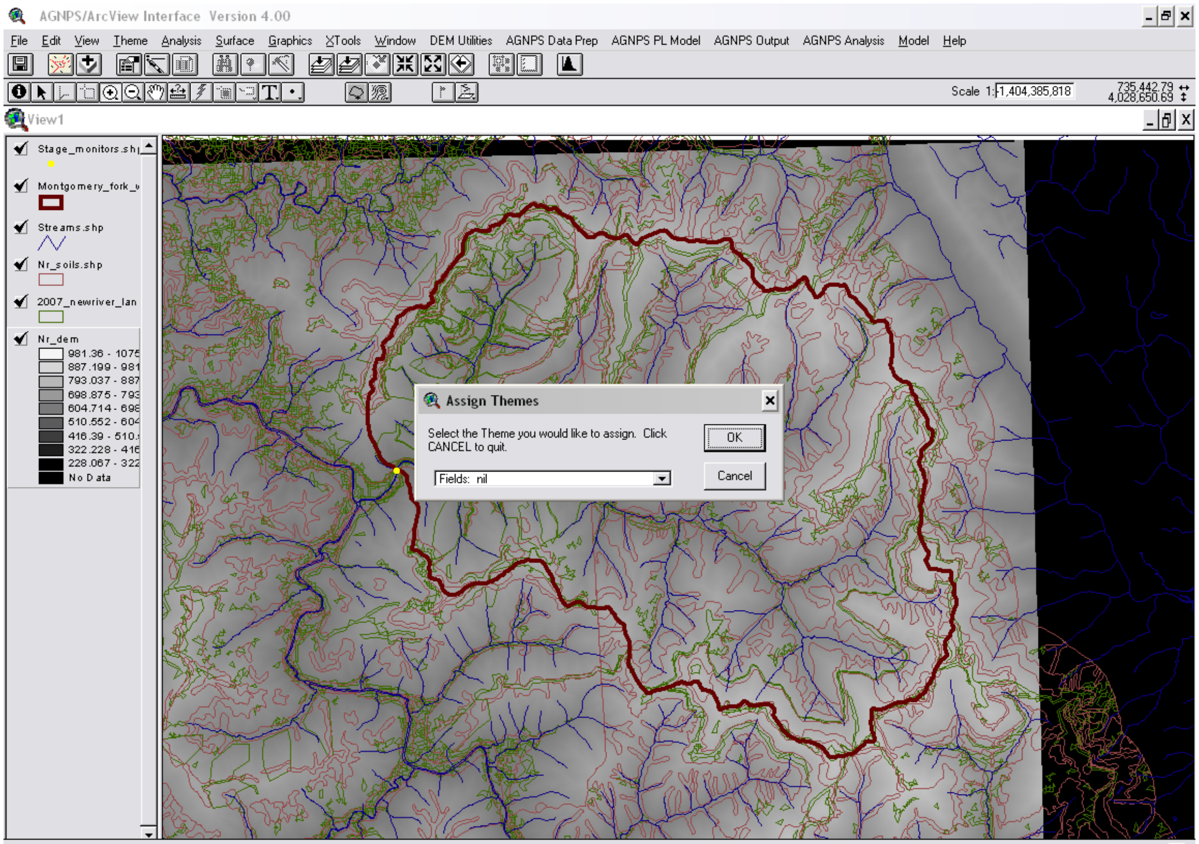
Finally, the streams in the New River region are imported to help select the stream outlet when running the model.



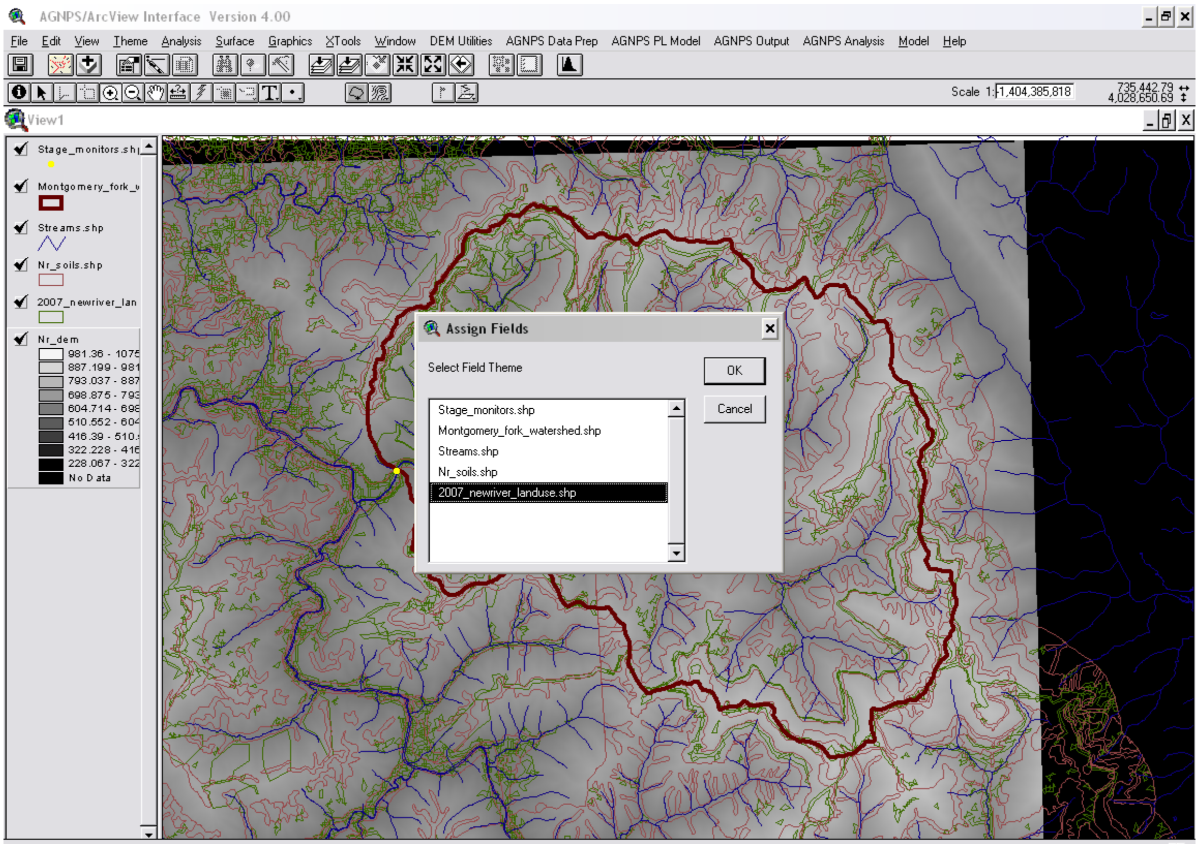
So, after all the GIS data has been placed into the model, turn the files on and go to the “AGNPS Data Prep” button. Open this up and select “Assign Themes”.



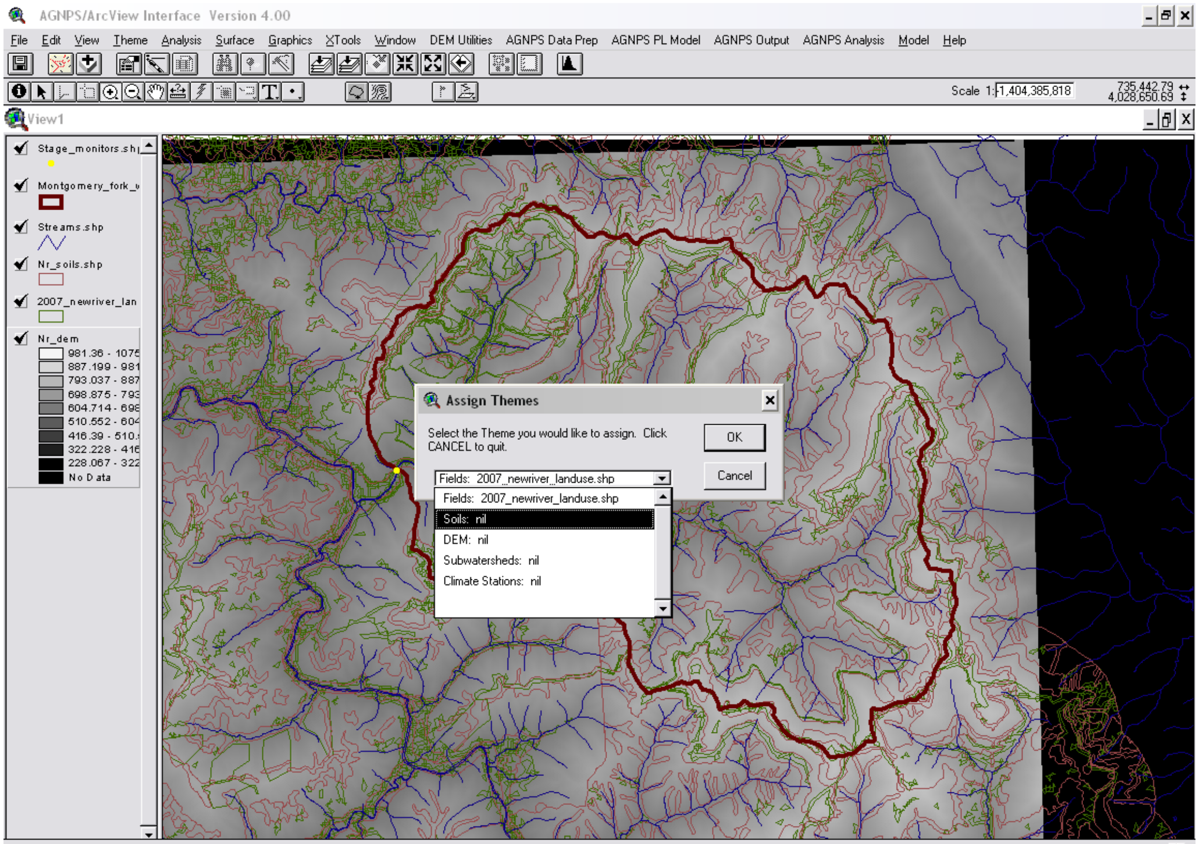
The “Assign Themes” command is used to inform the model what specific GIS data is. This command will be used to assign the Land use (aka: Fields), Soils, and DEM to the model. To operate this command, click the drop down menu till you get “Fields: nil”and click OK.



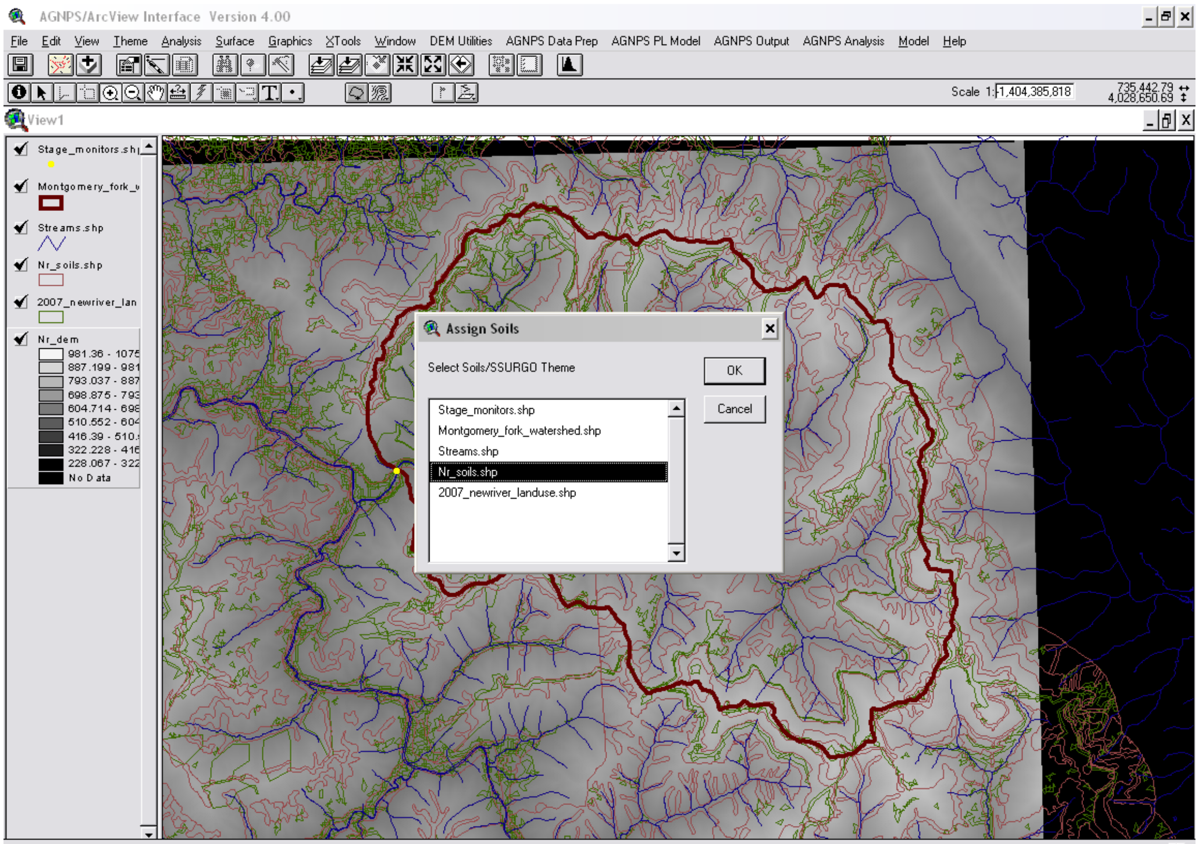
Next, click the GIS layer that represents the land use and click OK.



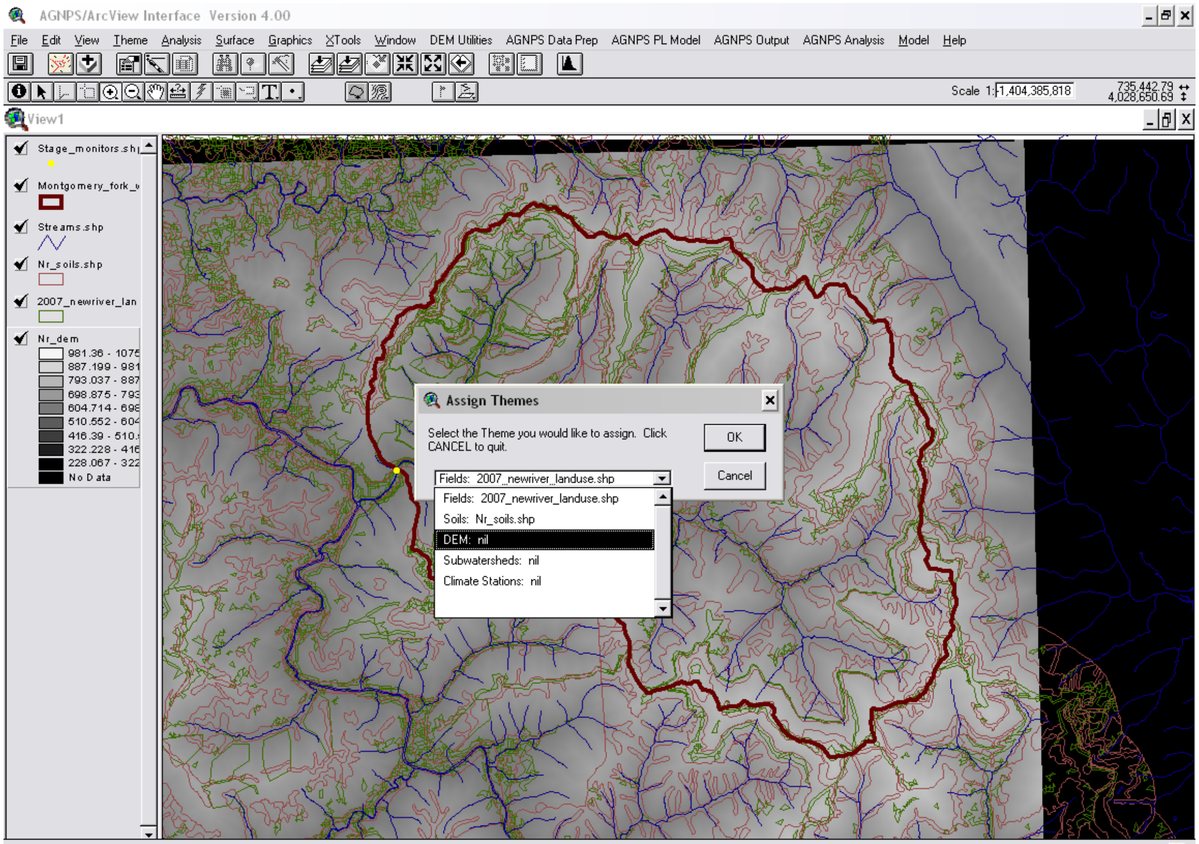
Next, click "Soils: nil" and then hit OK.



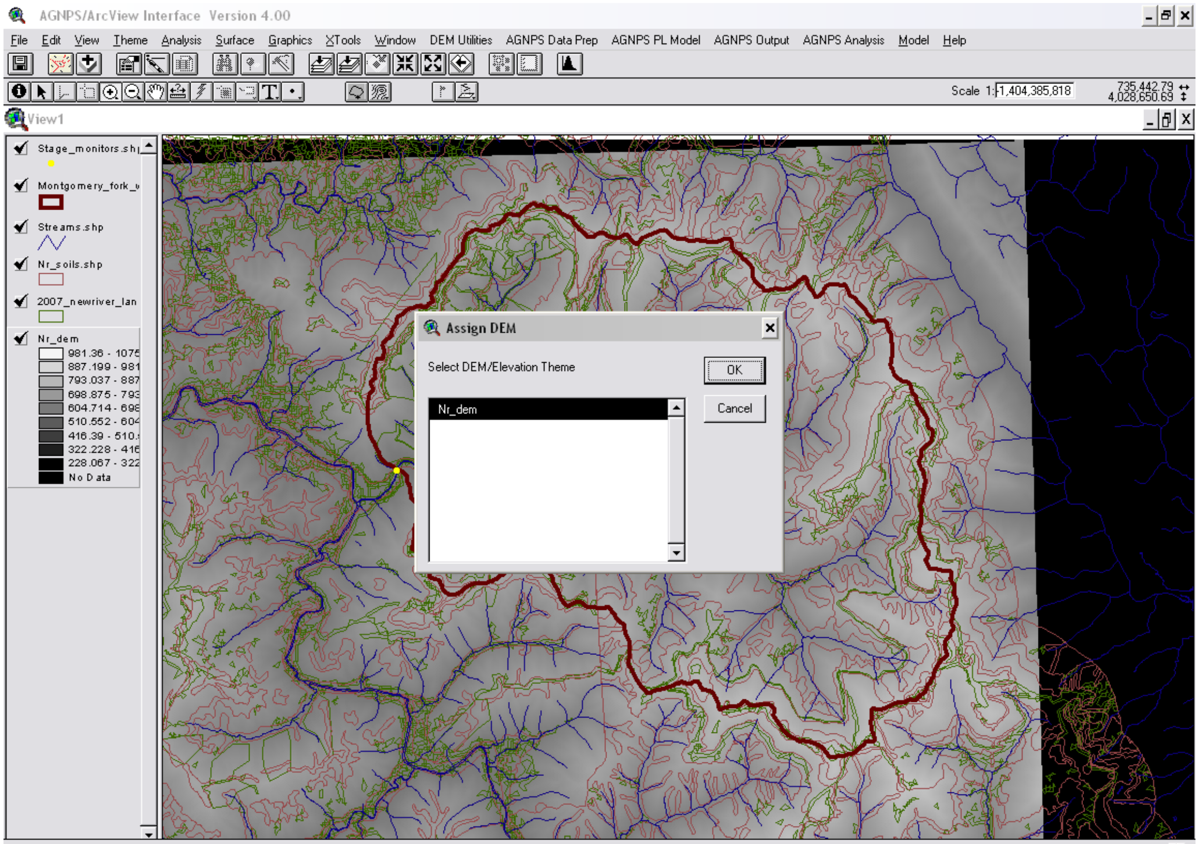
Next, click the Soils GIS file that was imported into the program and click OK.



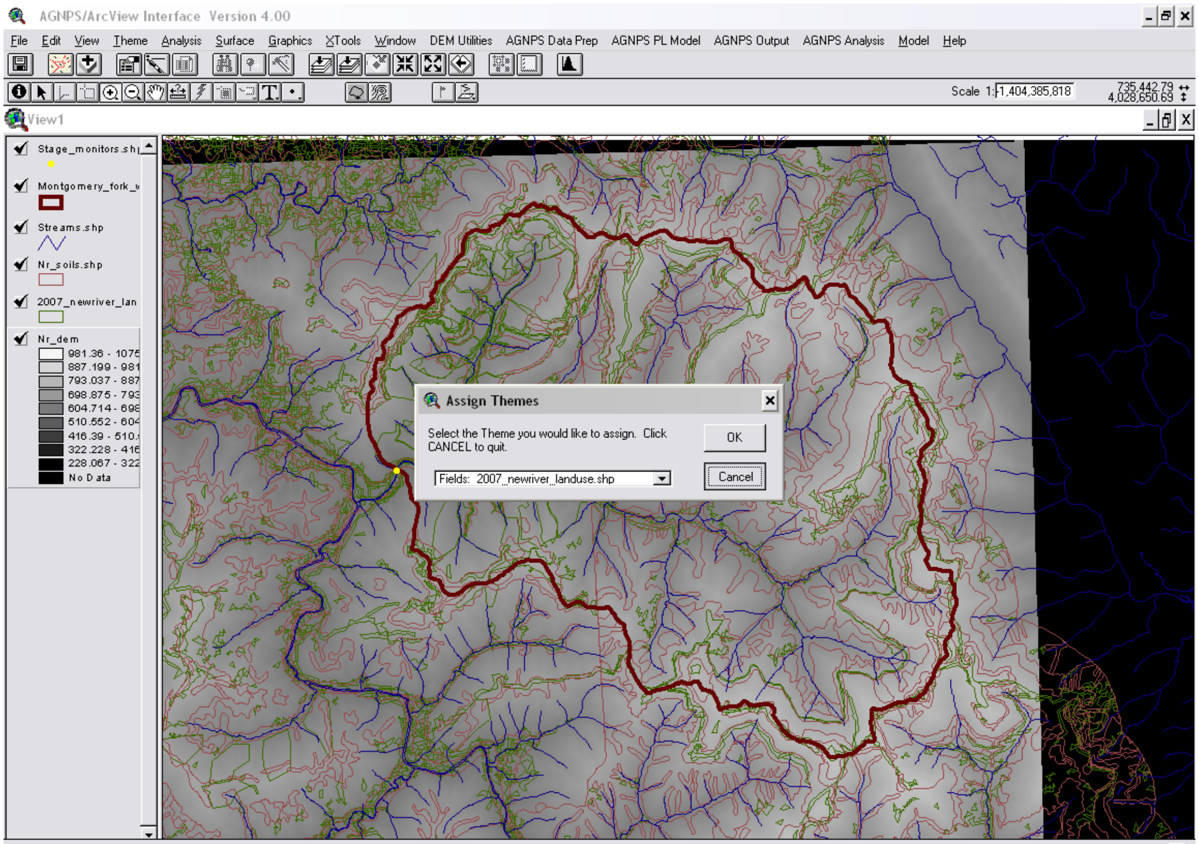
Next, Click “DEM: nil” and select OK.



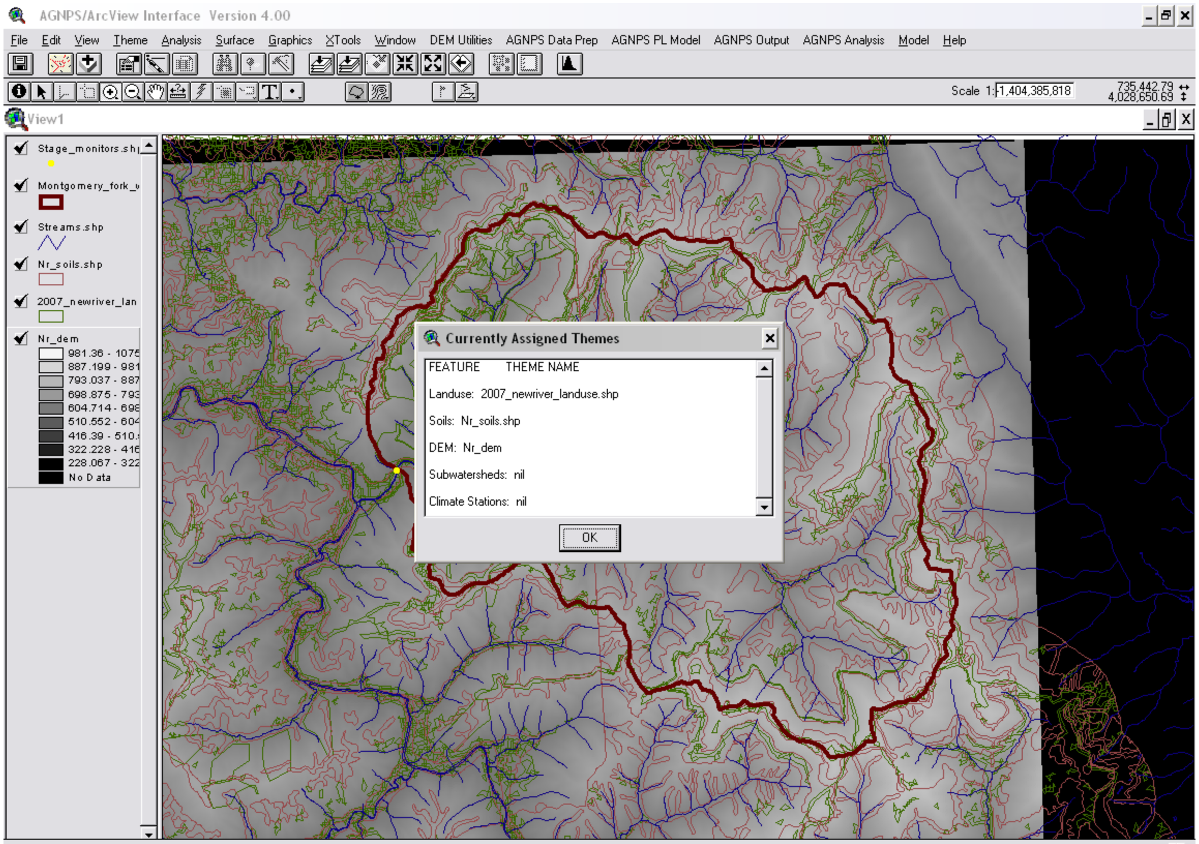
Next, click the GIS merged DEM file imported into the program and click OK.



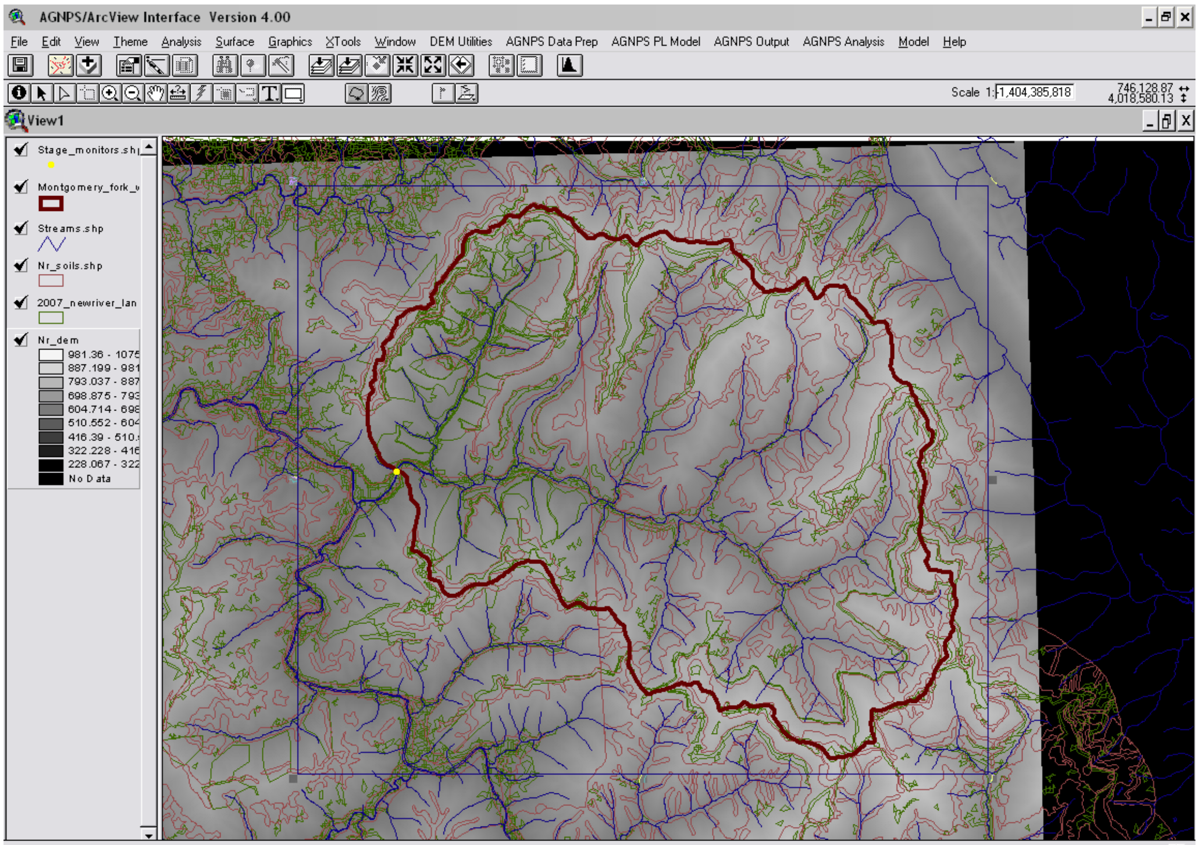
Finally, you can check to see what GIS files were defined as various categories, but do not select anything in the dropdown box unless you need to upload it again. Then click CANCEL to continue. If you click OK, the program will opt to define/redefine a GIS layer like before.



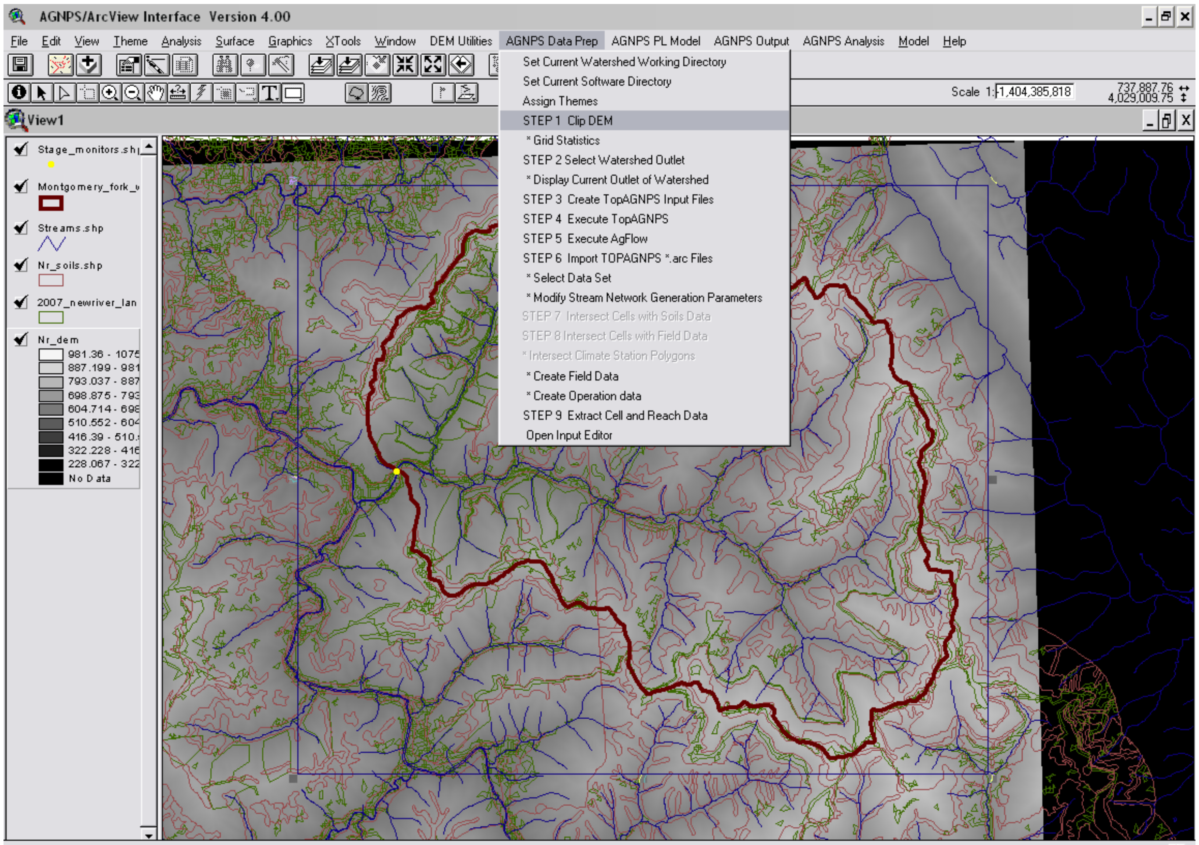
Next, a summary box of different GIS files defined for different categories will be presented. Click OK.



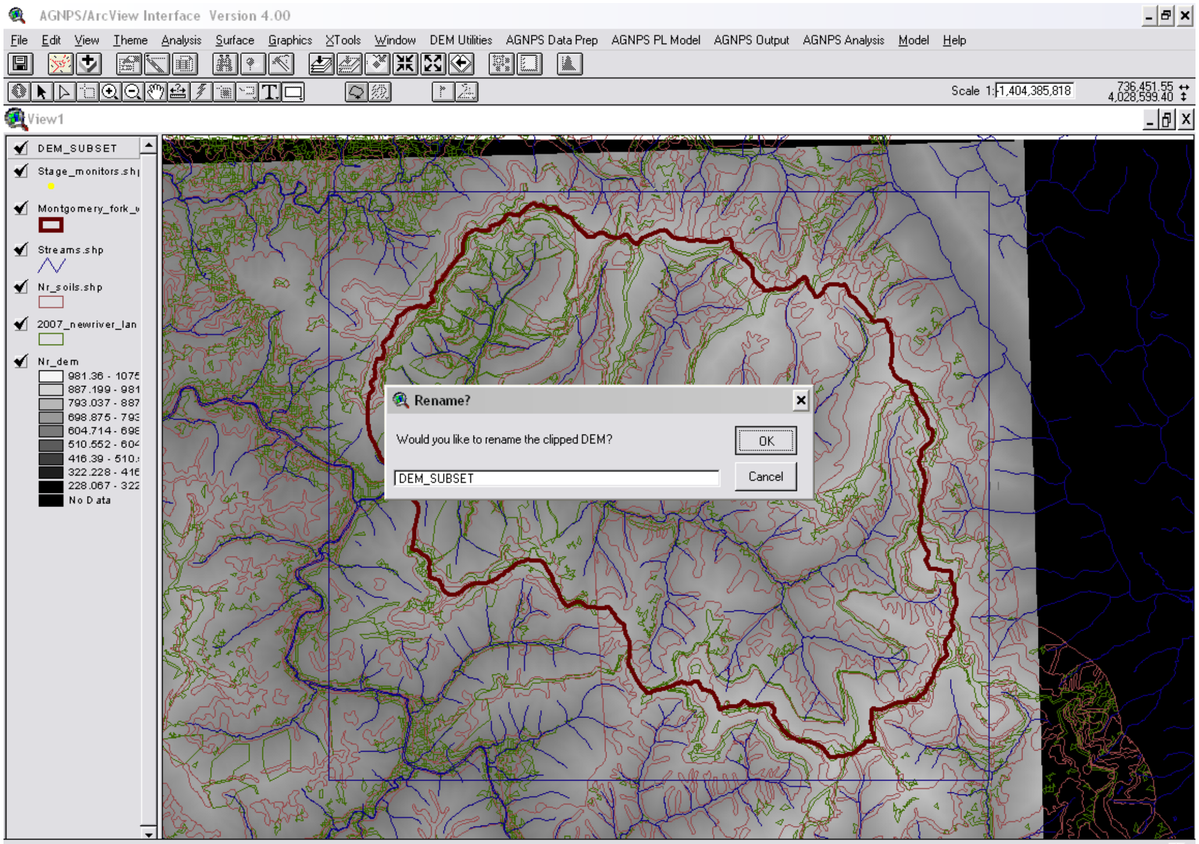
Next, go to the drawing button, which is beside a quick button that contains a “T” for textbox. It may appear as a dot. Right Click and HOLD on this button and different shapes should appear. Select the rectangular shape and draw a box over the entire watershed. This is used to cut out a specific DEM area for faster computations of runoff and sediment yield. Make sure you make the box cover the entire watershed.



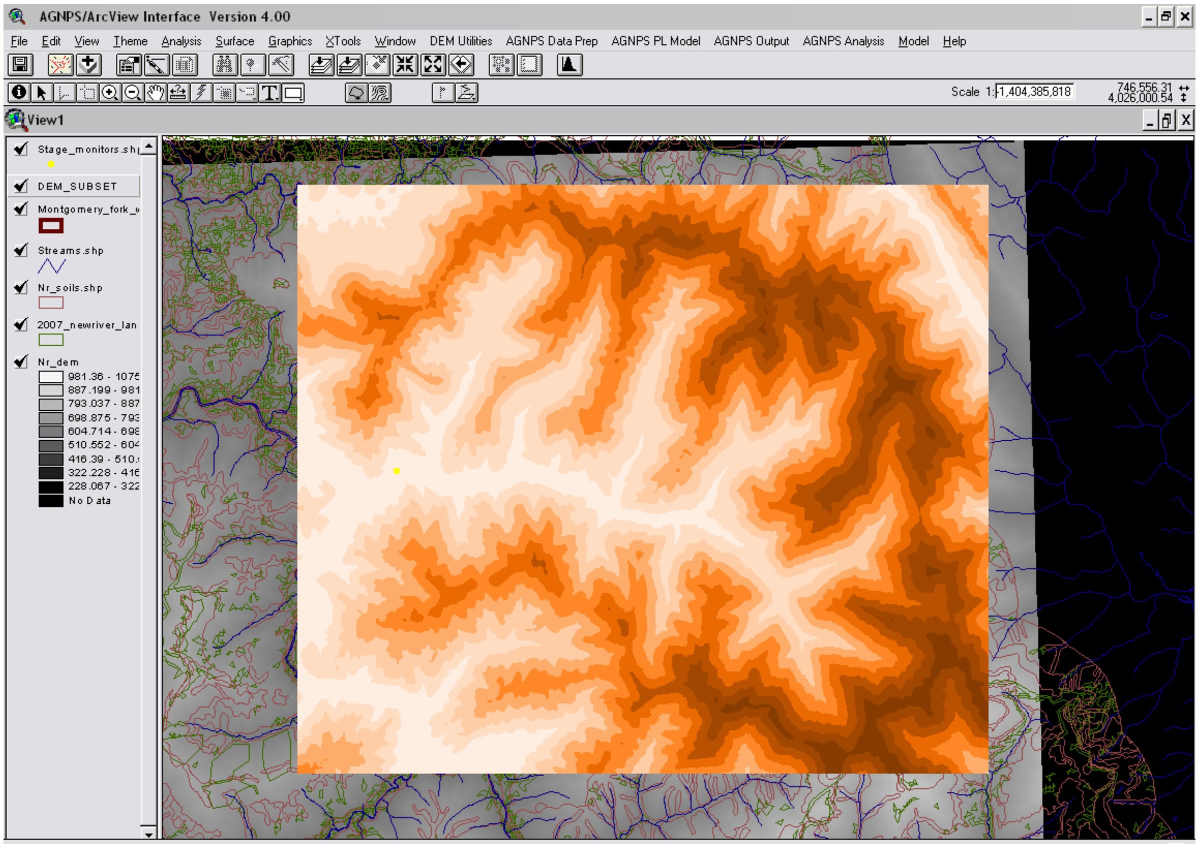
Go back up to the “AGNPS Data Prep” button and select STEP 1 after you have drawn a box around the entire watershed.



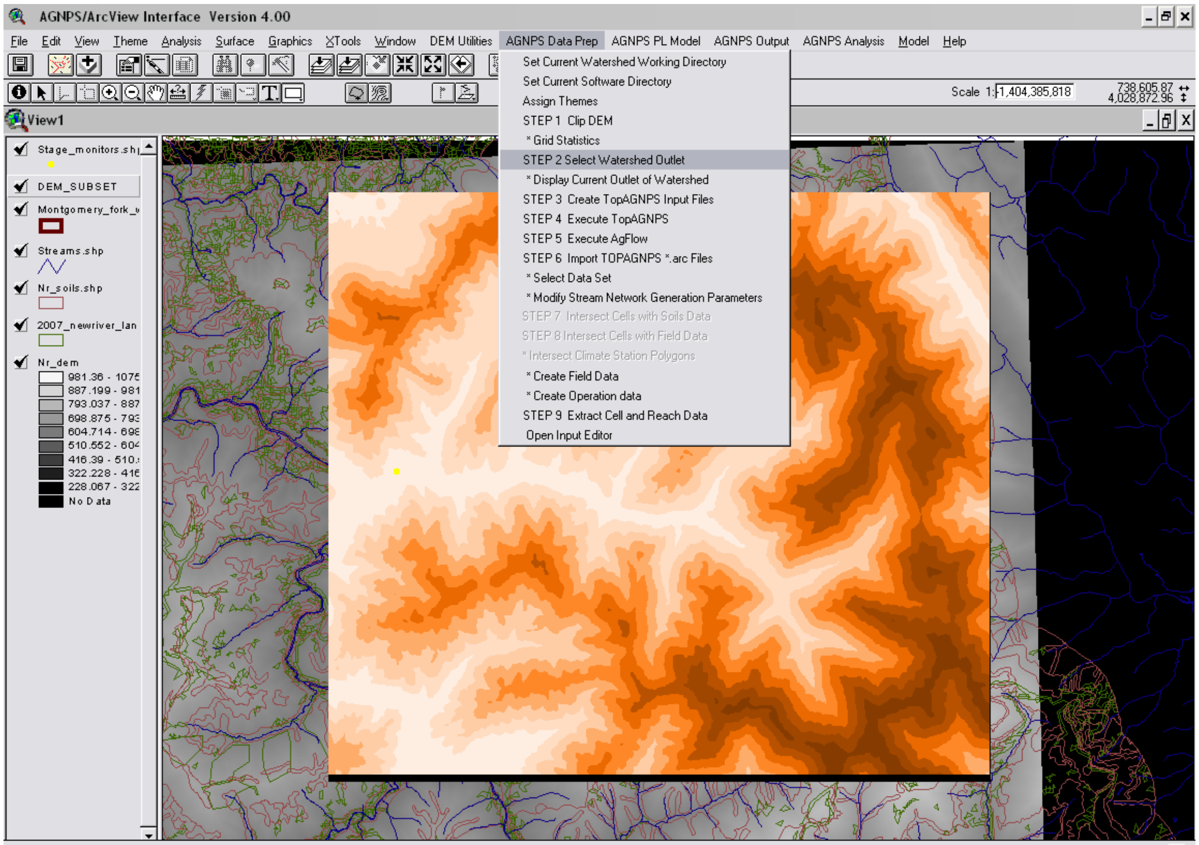
You can give the clipped DEM a name, but usually, it is best to just use the default name and click OK.



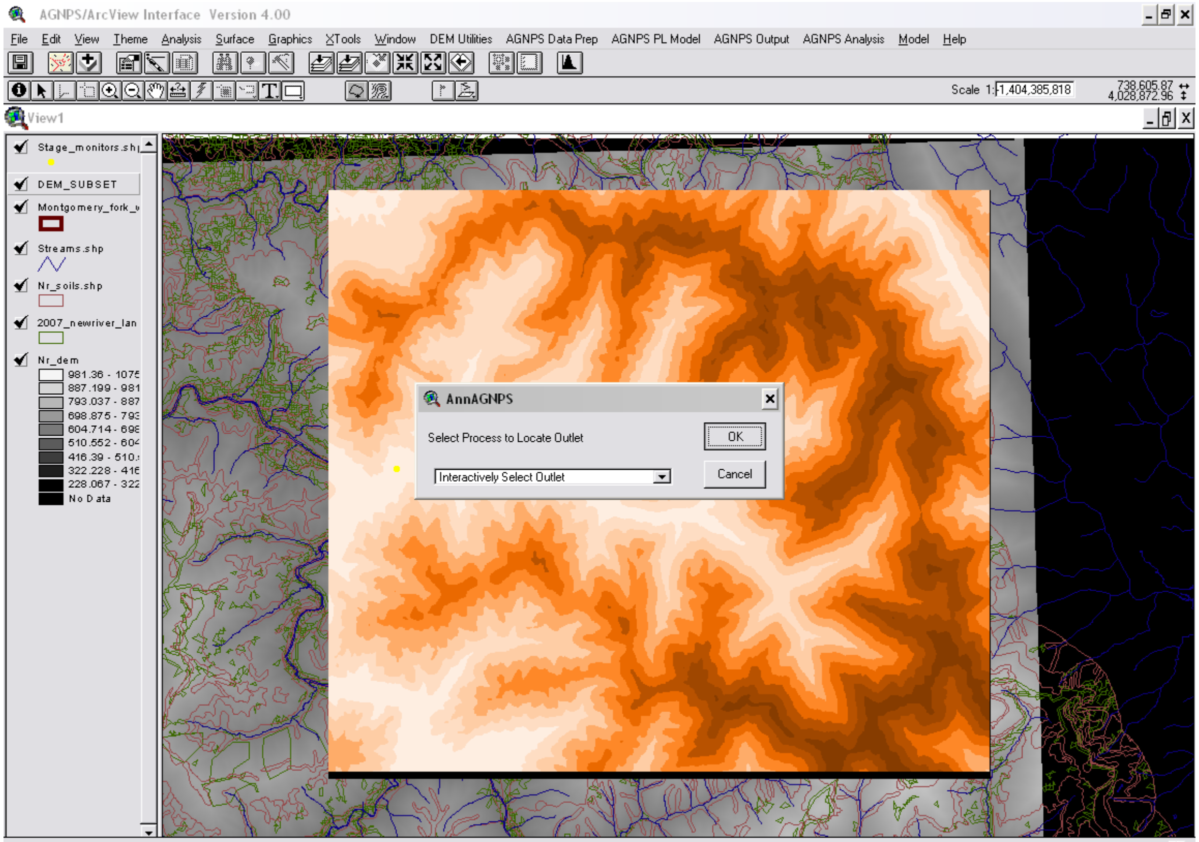
After clicking OK, you can see the clipped DEM that is created from the drawn box.



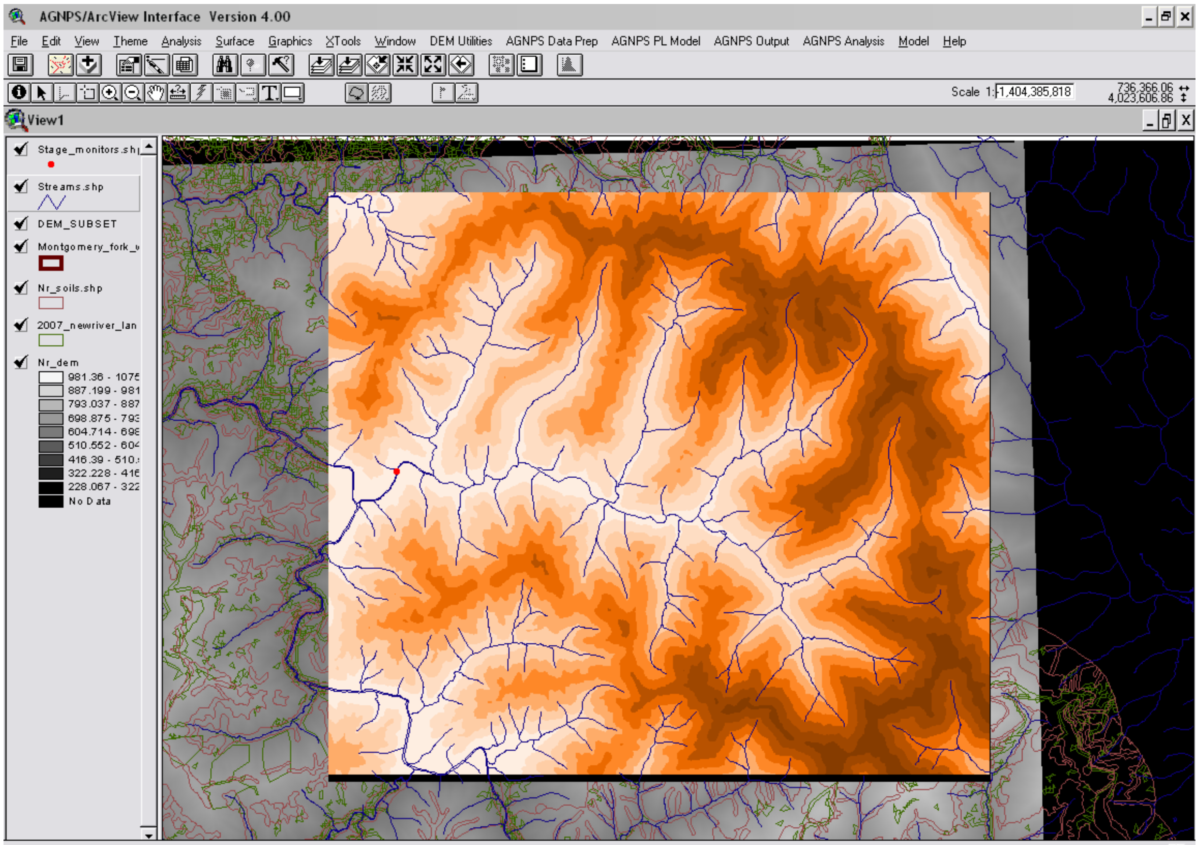
After the DEM is clipped for the area of interest, Step 2 from the AGNPS Data Prep heading is selected as shown. This procedure allows the user to define the outlet of the watershed or define a point of interest where a cumulative amount of runoff and sediment yield is delivered on a daily basis.



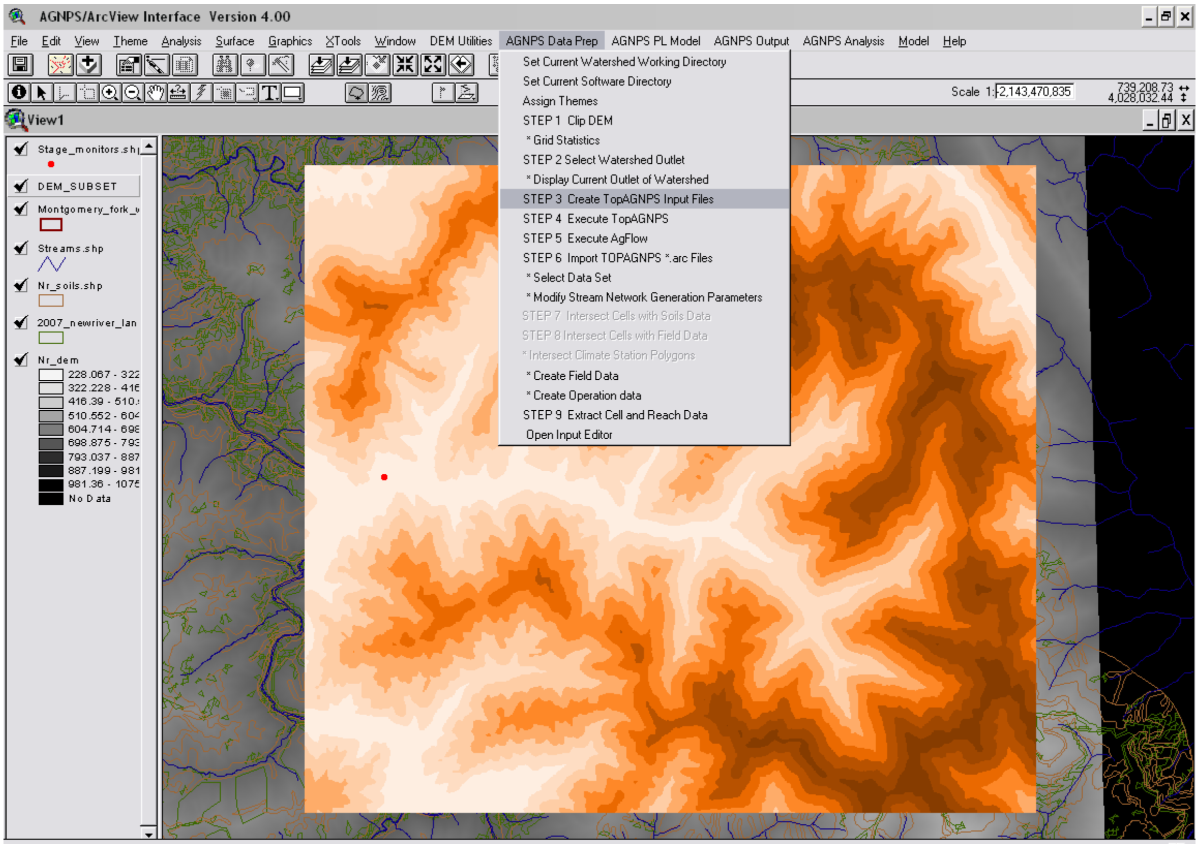
After selecting Step 2, click OK for the “Interactively Select Outlet”.



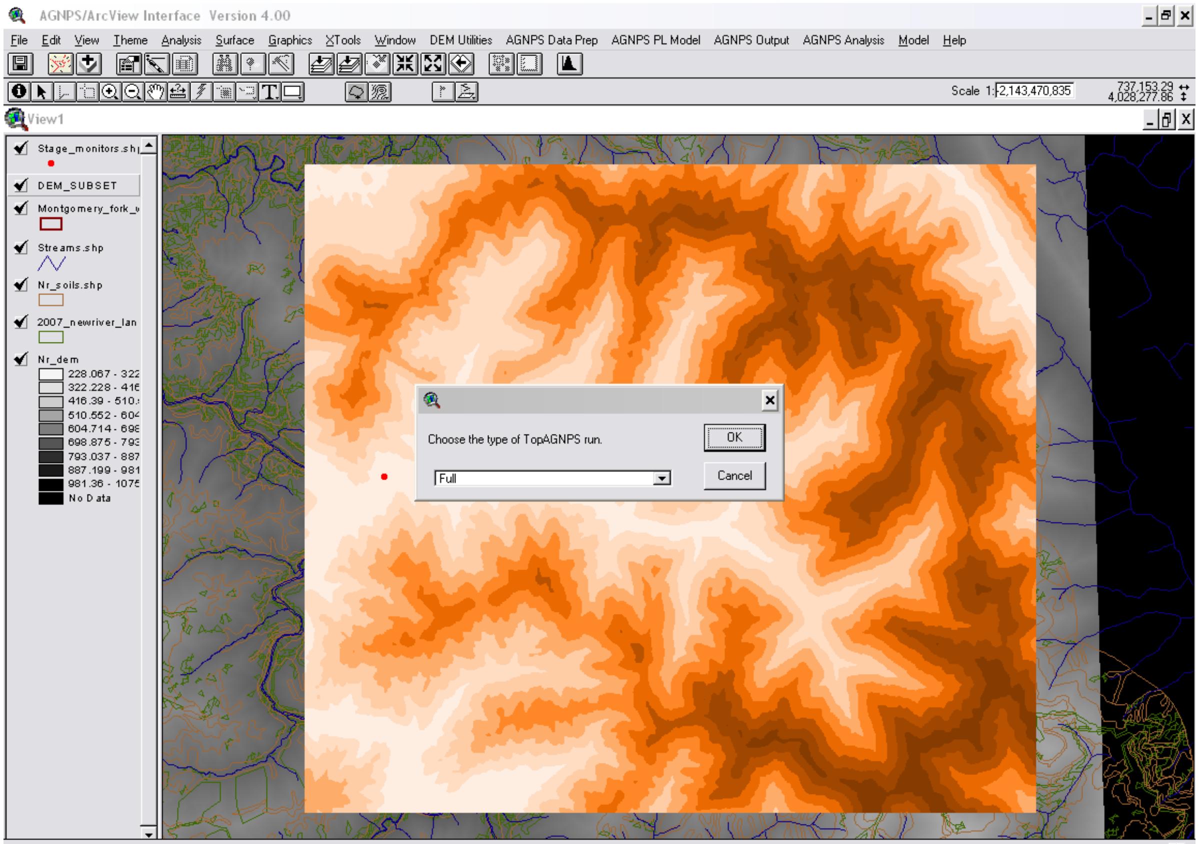
Next, use the mouse to select a point to delineate the outlet of the watershed. For calibration purposes, it is useful to have a point where stage data is being recorded, such as the red dot found in the image below for Montgomery Fork. So for this example, I would click on the red dot where the stage recorder is located.



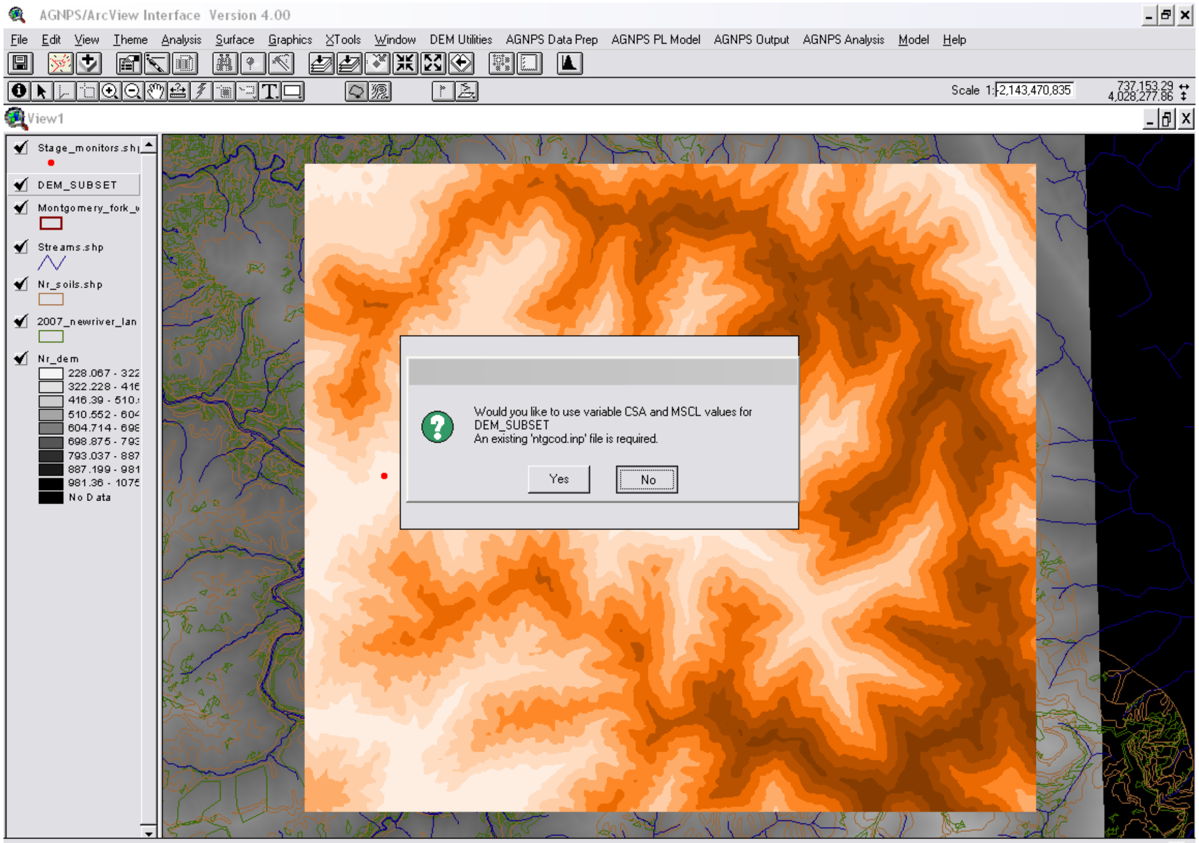
Next, go back to the “AGNPS Data Prep” heading and select Step 3.



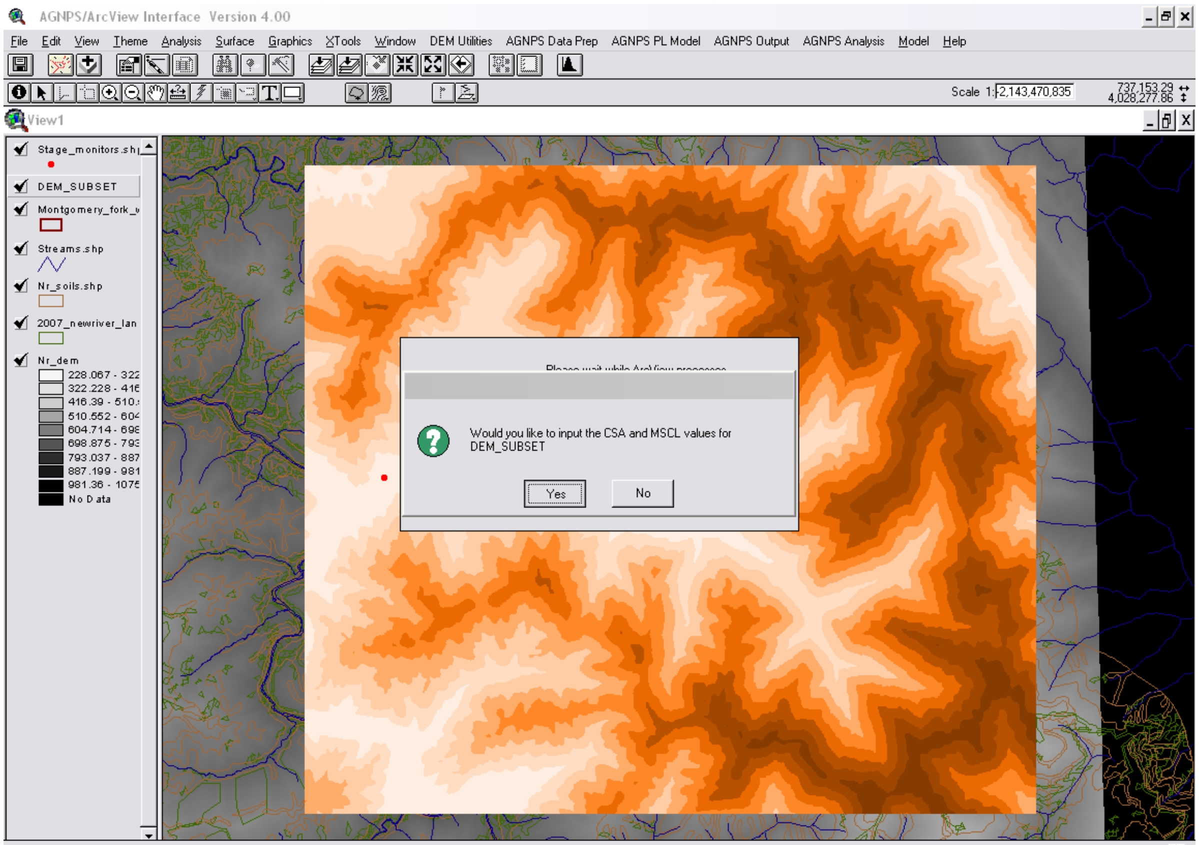
Make sure the type of TopAGNPS run is set to "Full" and click OK. TopAGNPS is used to create a grid of cells and reaches for the watershed.



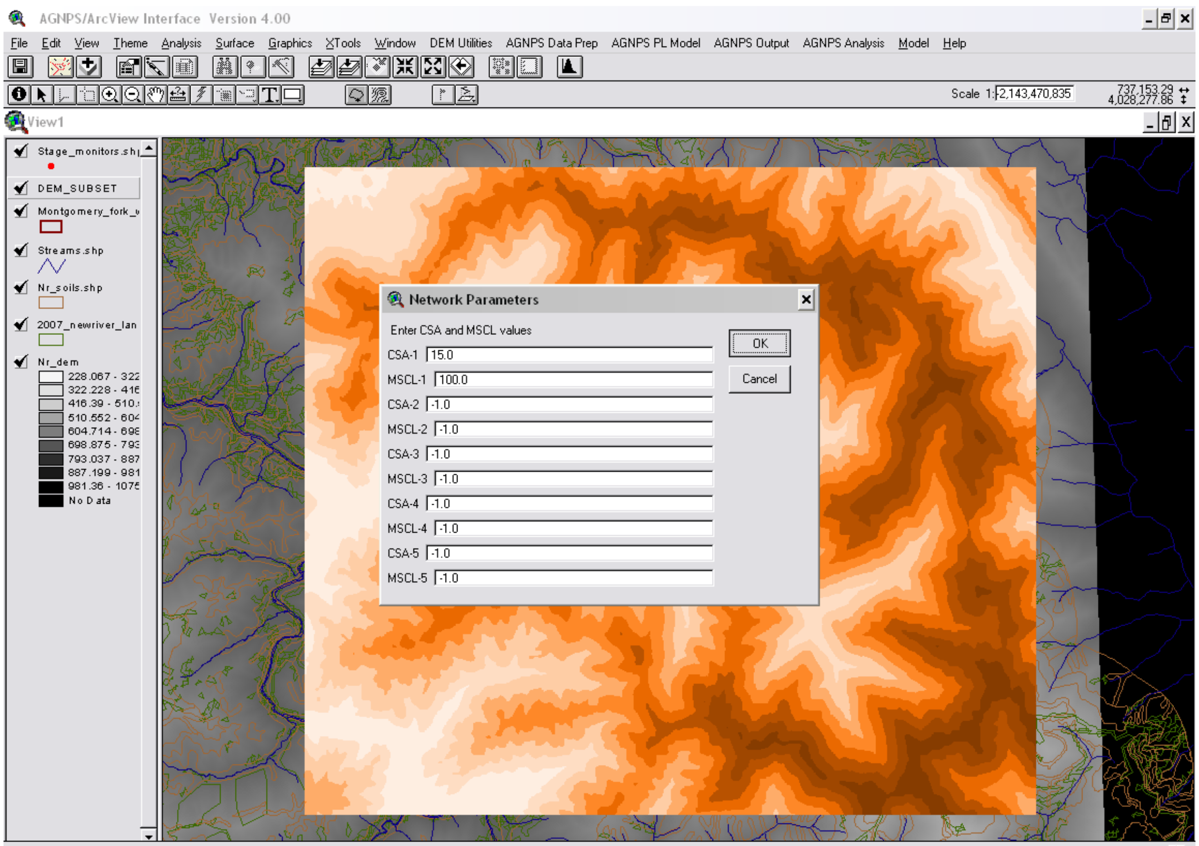
After the model performs some computations, an option to use variable CSA and MSCL for the clipped DEM appears. Click “NO”. CSA and MSCL are two parameters used to size the cells and reaches in the AnnAGNPS grid. Variable CSA and MSCL values allow the computer to generate a basic grid for the area, which is normally not suggested.



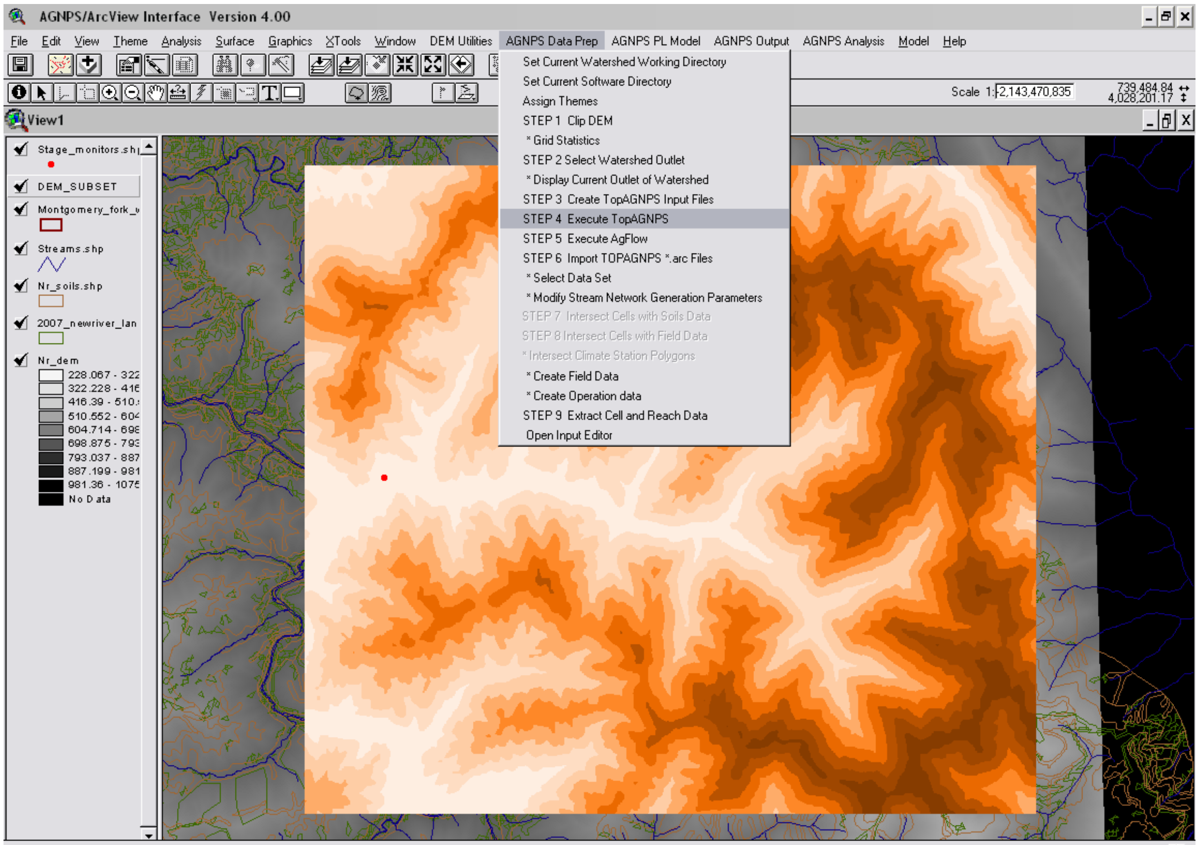
Next, the option to define the CSA and MSCL values for the DEM appears. Click “YES”.



Next, the user is requested to provide the sizes of CSA and MSCL used in the grid. There are multiple options to create a series of different minimum sizes of cells and reaches in the grid as seen by the multiple options for CSA and MSCL values shown. Most of the time, it is sufficient to leave all the multiple CSA and MSCL values (other than the first set) as the default -1.0 value, which sets all the minimum cell and reach sizes to match the first set of values defined. CSA stands for critical source area of the cells in units of hectares while the MSCL is the minimum source channel length in terms of meters. If the minimum area and length are defined smaller than the DEM resolution, the program will not run properly. This exercise is a trial and error approach to better define the area. For the size of these watersheds, a CSA of 15.0 ha and a MSCL of 100 m was used. The smallest CSA an MSCL that could probably be used for these watersheds would be 5.0 ha and 50.0 m respectively. Click “OK” when finished.



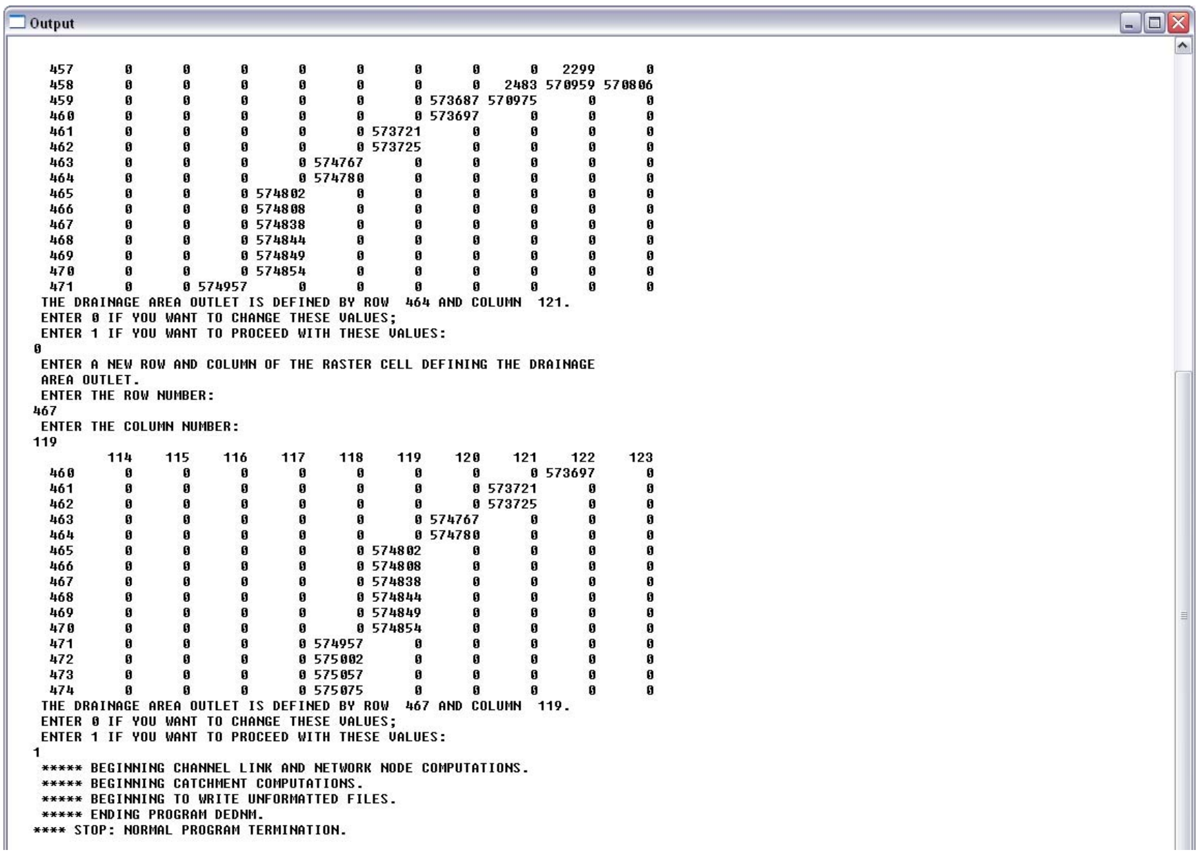
Next, go back to the “AGNPS Data Prep” command and select Step 4. After you choose this option, a series of 4 programs will be ran and shown to the user.



For the first set of computations, you will see a matrix of the streams capacity represented with a set of numbers in a grid of zeros. This first helps the program set the outlet of the watershed in the stream near the outlet was previously defined with the mouse in Step 2. For the program to run, the outlet must be embedded within the stream or real numbers in the matrix. As the numbers increase, the stream moves further downstream. Sometimes you will see a tributary connecting to a main stream channel which has smaller numbers.

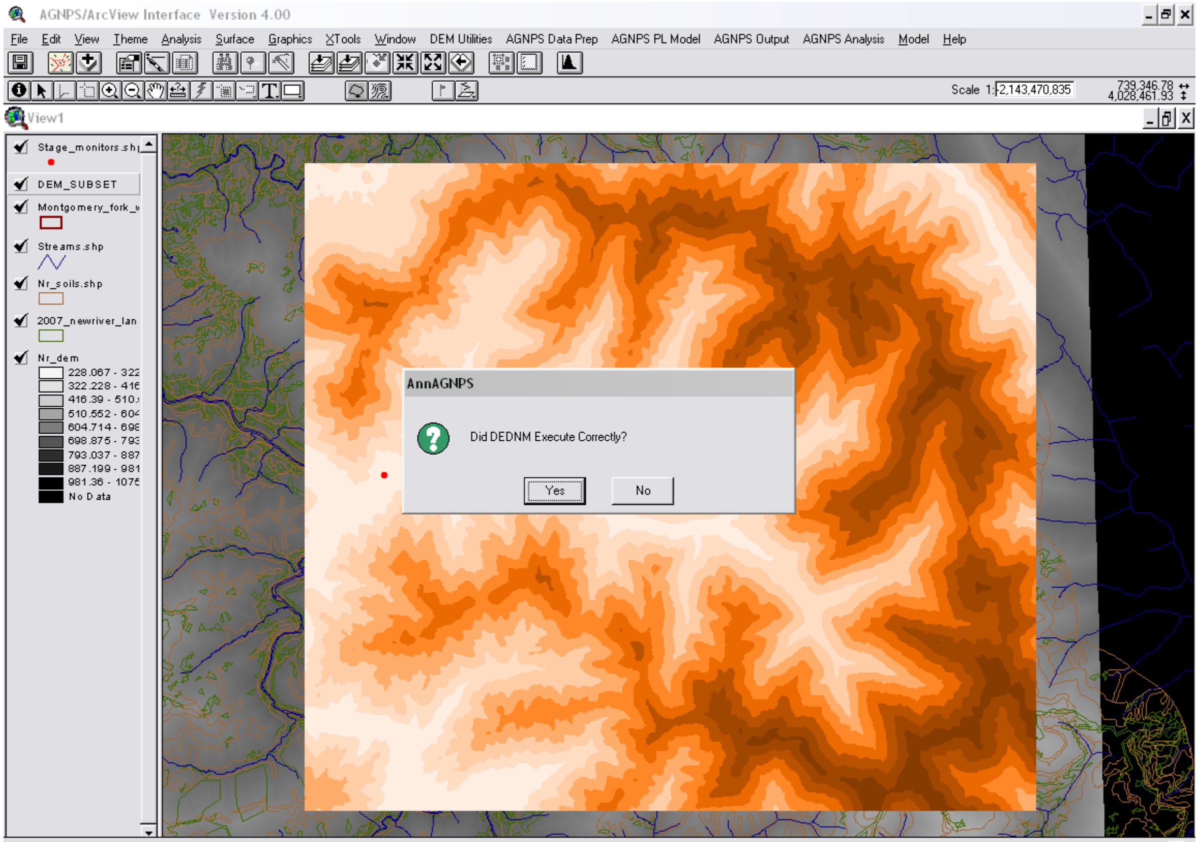
So, in this example the Row and Column set as the default from Step 2 lands on zero. Therefore, we must slightly adjust this so the Row and Column read by the program is on the stream. So, type “0” and hit enter. Then enter “467” for the new Row Number and “119” for the new Column Number which places the outlet on the stream near the point we previously chose.

If the values are acceptable, then the program should state “Normal Program Termination”. After this is shown, exit the screen by clicking the X at the top right hand corner.

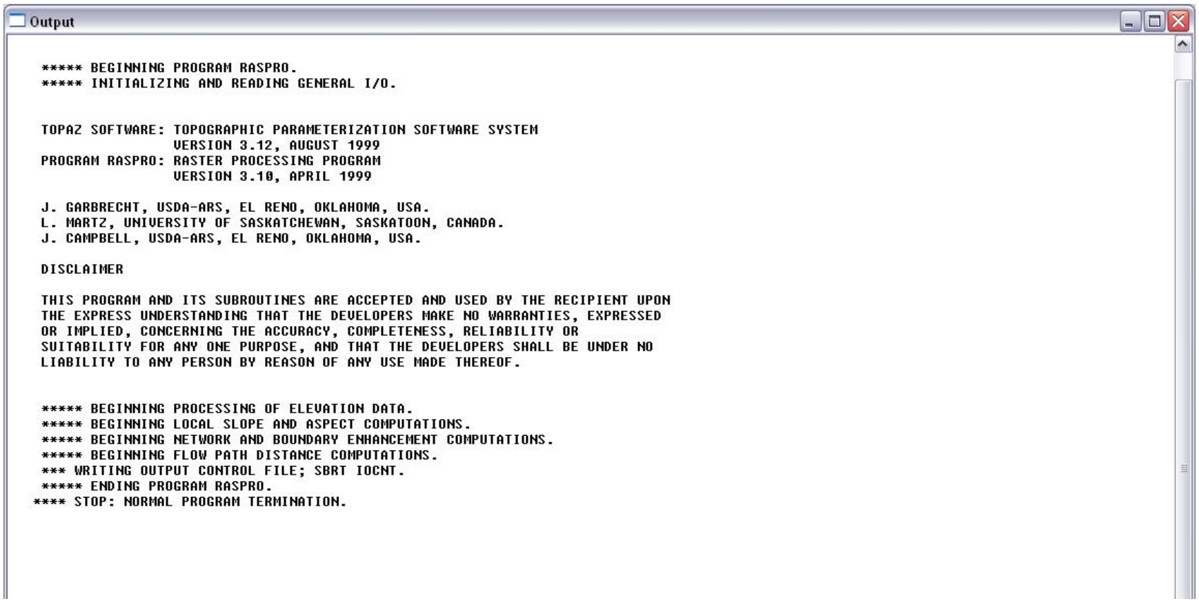


```
Output

   457      0      0      0      0      0      0      0      0   2299      0
   458      0      0      0      0      0      0      0   2483 570959 570806
   459      0      0      0      0      0      0 573687 570975      0      0
   460      0      0      0      0      0      0 573697      0      0      0
   461      0      0      0      0      0 573721      0      0      0      0
   462      0      0      0      0      0 573725      0      0      0      0
   463      0      0      0      0 574767      0      0      0      0      0
   464      0      0      0      0 574780      0      0      0      0      0
   465      0      0      0 574802      0      0      0      0      0      0
   466      0      0      0 574808      0      0      0      0      0      0
   467      0      0      0 574838      0      0      0      0      0      0
   468      0      0      0 574844      0      0      0      0      0      0
   469      0      0      0 574849      0      0      0      0      0      0
   470      0      0      0 574854      0      0      0      0      0      0
   471      0      0 574957      0      0      0      0      0      0      0
 THE DRAINAGE AREA OUTLET IS DEFINED BY ROW  464 AND COLUMN  121.
 ENTER 0 IF YOU WANT TO CHANGE THESE VALUES;
 ENTER 1 IF YOU WANT TO PROCEED WITH THESE VALUES:
0
 ENTER A NEW ROW AND COLUMN OF THE RASTER CELL DEFINING THE DRAINAGE
 AREA OUTLET.
 ENTER THE ROW NUMBER:
467
 ENTER THE COLUMN NUMBER:
119
          114    115    116    117    118    119    120    121    122    123
   460      0      0      0      0      0      0      0      0 573697      0
   461      0      0      0      0      0      0      0 573721      0      0
   462      0      0      0      0      0      0      0 573725      0      0
   463      0      0      0      0      0      0 574767      0      0      0
   464      0      0      0      0      0      0 574780      0      0      0
   465      0      0      0      0      0 574802      0      0      0      0
   466      0      0      0      0      0 574808      0      0      0      0
   467      0      0      0      0      0 574838      0      0      0      0
   468      0      0      0      0      0 574844      0      0      0      0
   469      0      0      0      0      0 574849      0      0      0      0
   470      0      0      0      0      0 574854      0      0      0      0
   471      0      0      0      0 574957      0      0      0      0      0
   472      0      0      0      0 575002      0      0      0      0      0
   473      0      0      0      0 575057      0      0      0      0      0
   474      0      0      0      0 575075      0      0      0      0      0
 THE DRAINAGE AREA OUTLET IS DEFINED BY ROW  467 AND COLUMN  119.
 ENTER 0 IF YOU WANT TO CHANGE THESE VALUES;
 ENTER 1 IF YOU WANT TO PROCEED WITH THESE VALUES:
1
 ***** BEGINNING CHANNEL LINK AND NETWORK NODE COMPUTATIONS.
 ***** BEGINNING CATCHMENT COMPUTATIONS.
 ***** BEGINNING TO WRITE UNFORMATTED FILES.
 ***** ENDING PROGRAM DEDNM.
**** STOP: NORMAL PROGRAM TERMINATION.
```

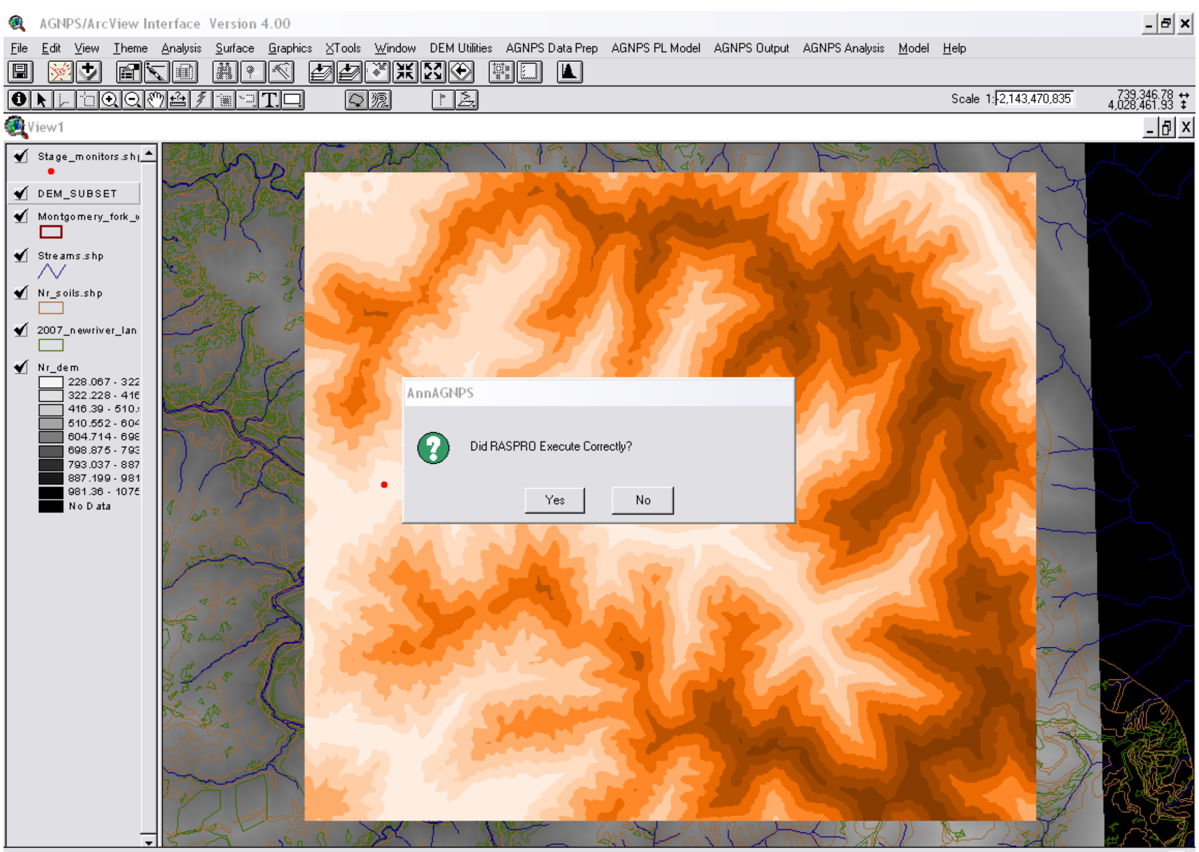
Next, click “Yes” and the second program should pop up.



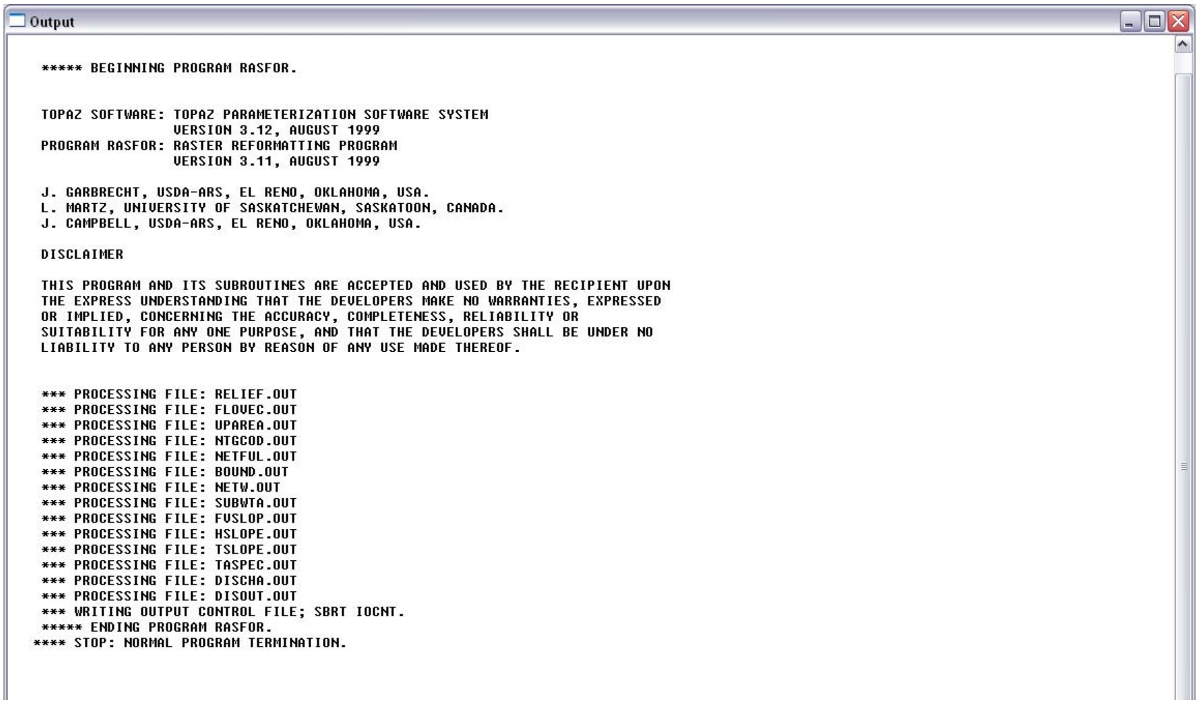
Allow this program to run till you see "Normal Program Termination" at the bottom and exit this screen.



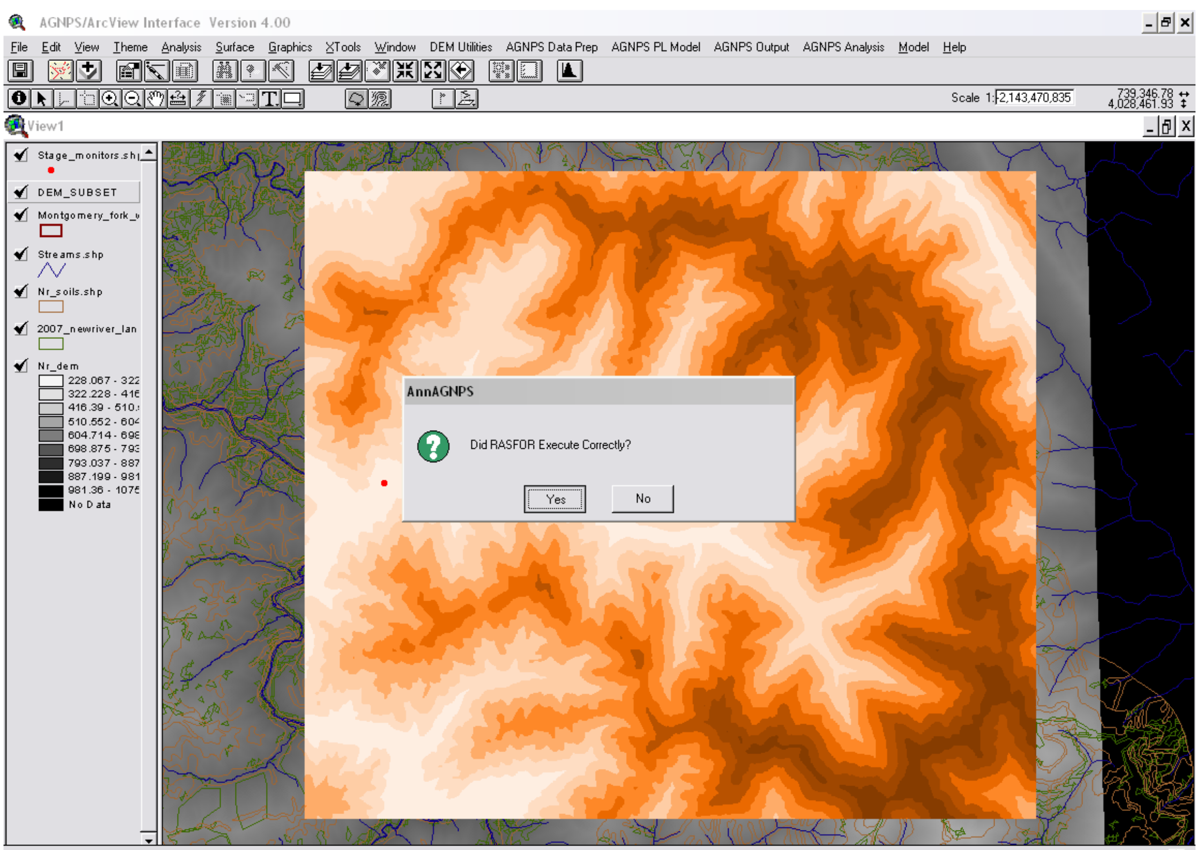
Next click "YES" and the next program will begin.



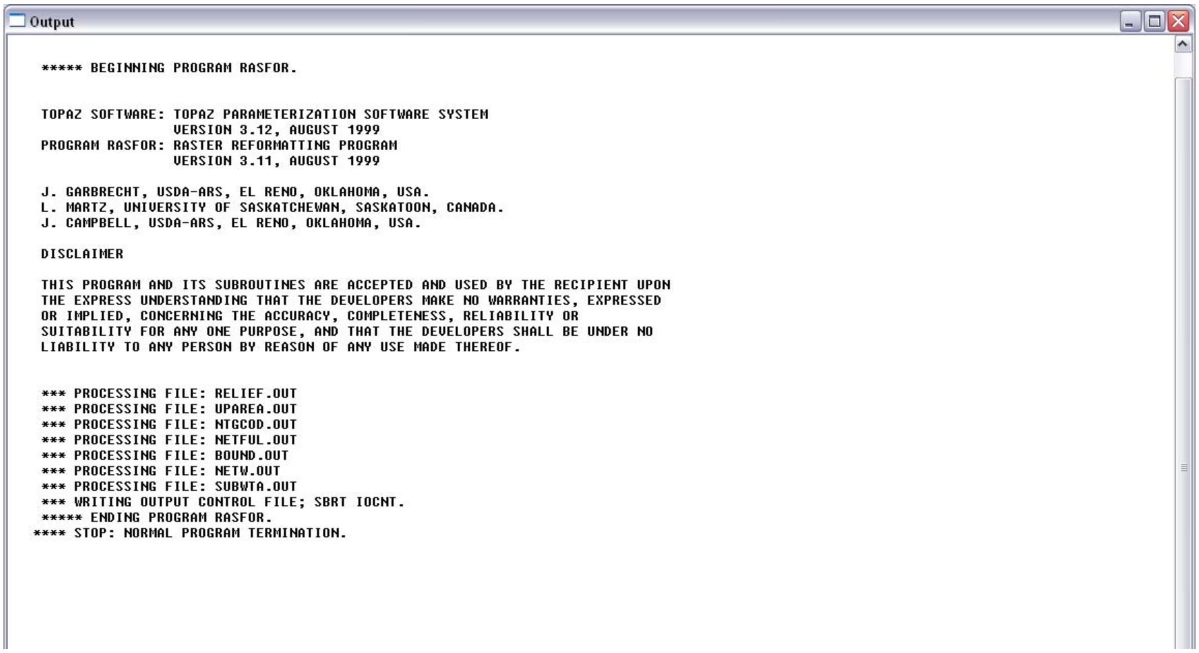
Allow this program to run till you see “Normal Program Termination” at the bottom and exit this screen.



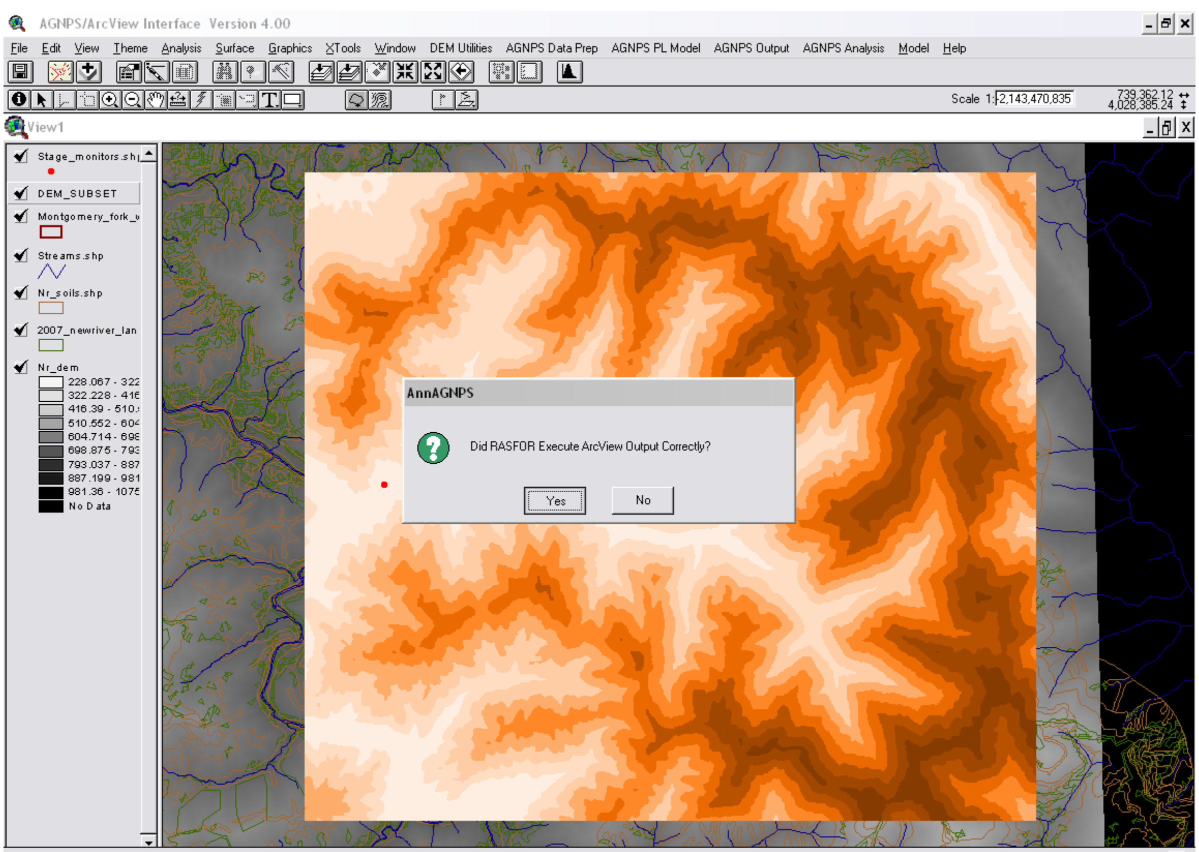
Click “YES” and the last program should run.



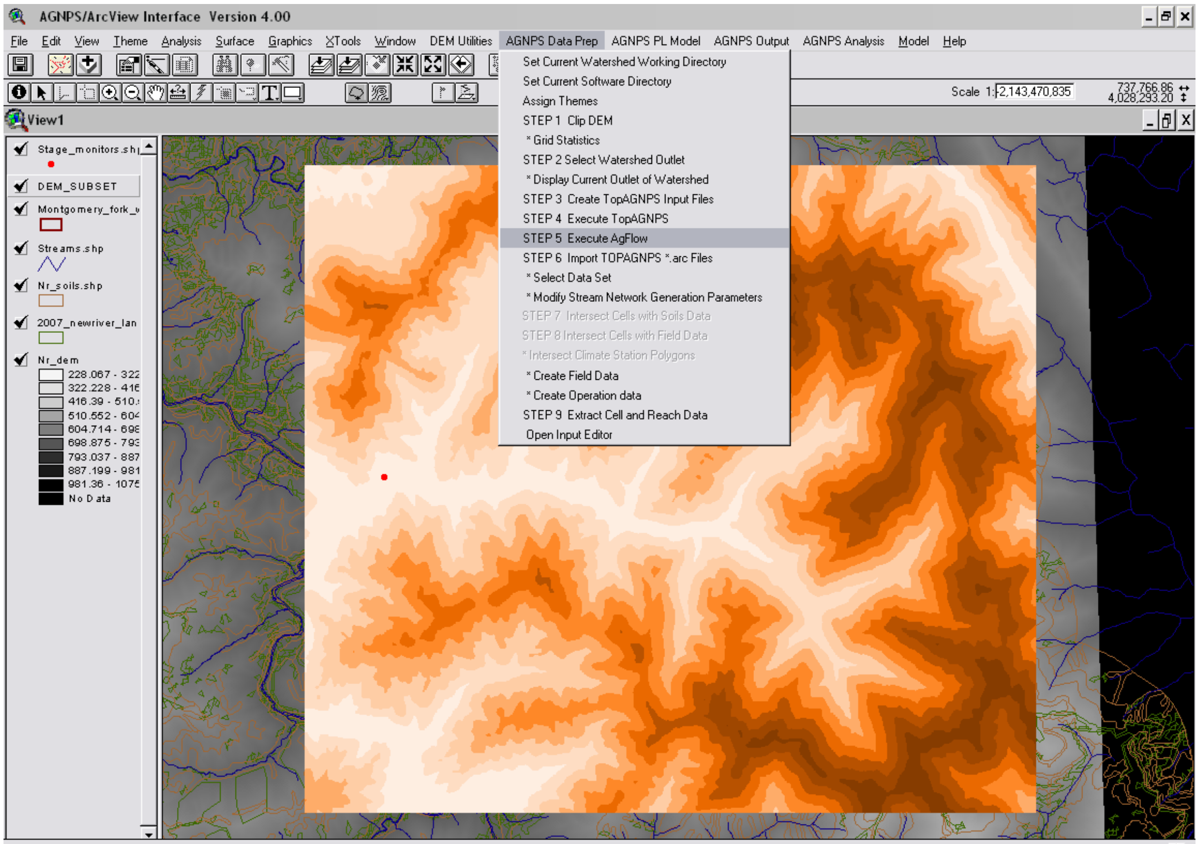
Allow this program to run till you see “Normal Program Termination” at the bottom and exit this screen.



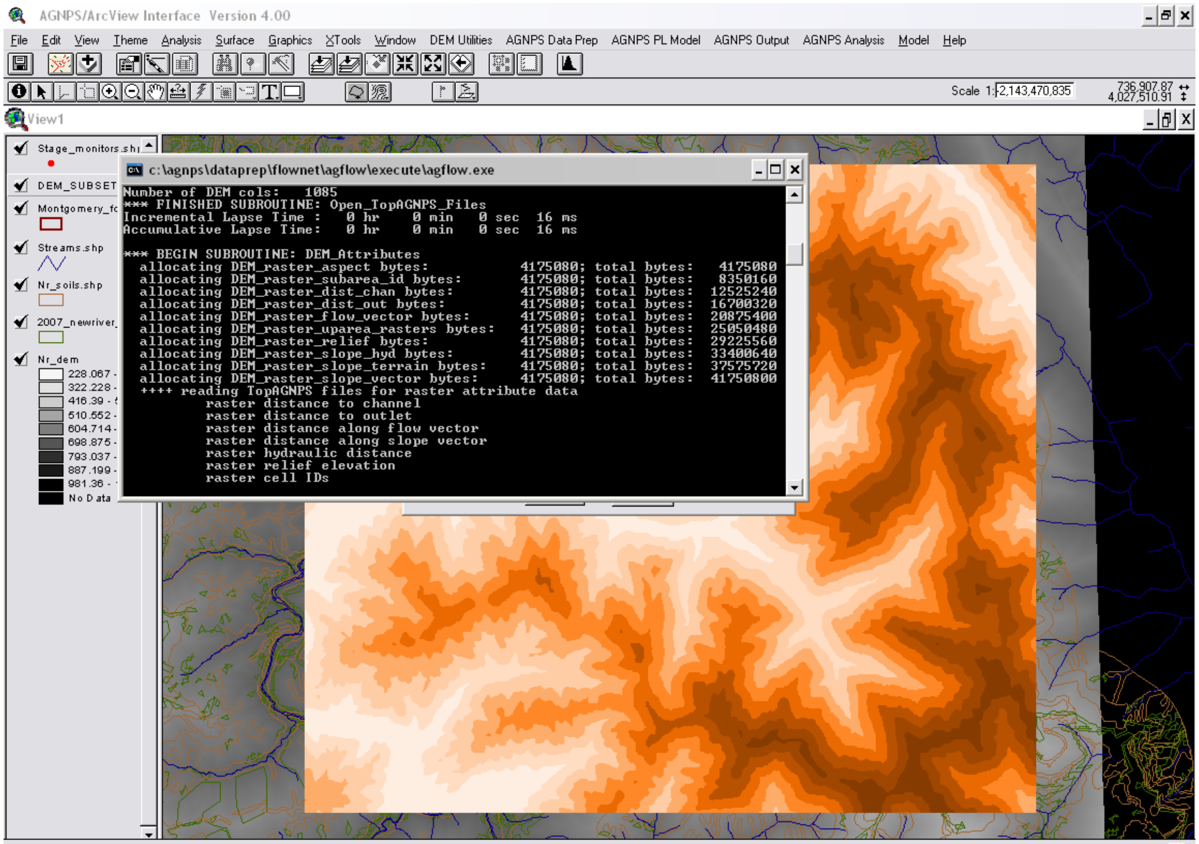
Click “YES” and Step 4 is complete.



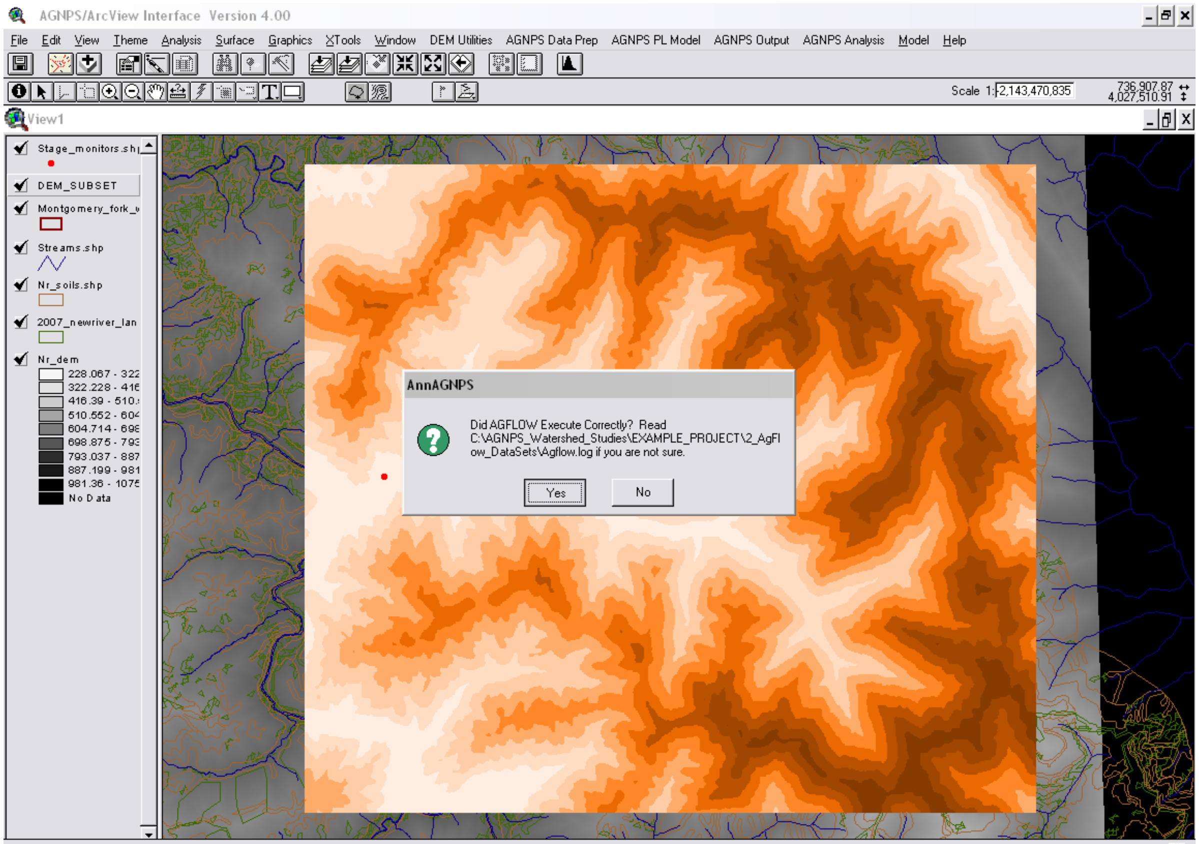
Next go to the “AGNPS Data Prep” command and choose Step 5.



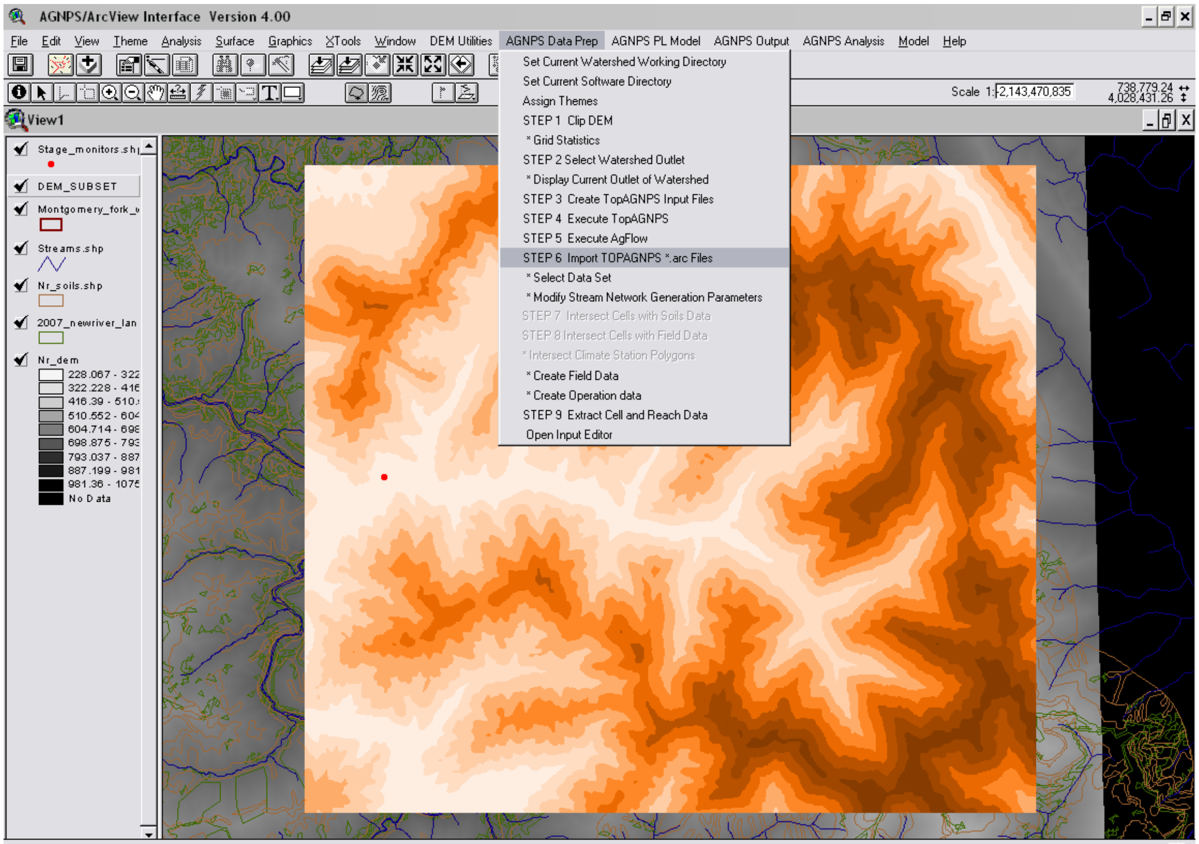
A black DOS screen should pop up briefly to show that this step is running. After the program makes some computations, a window will pop up asking if AgFLOW properly executed.



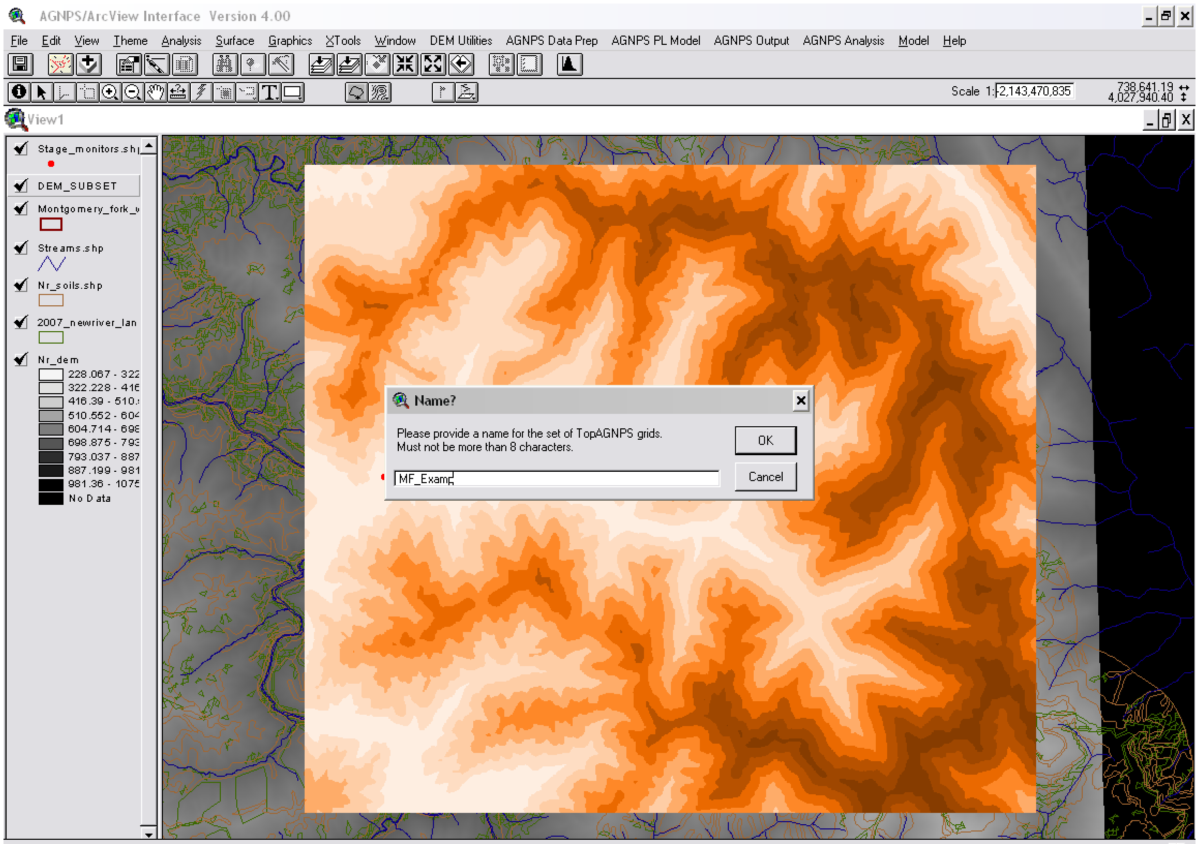
After AgFLOW has finished, click “YES” and Step 5 is completed.



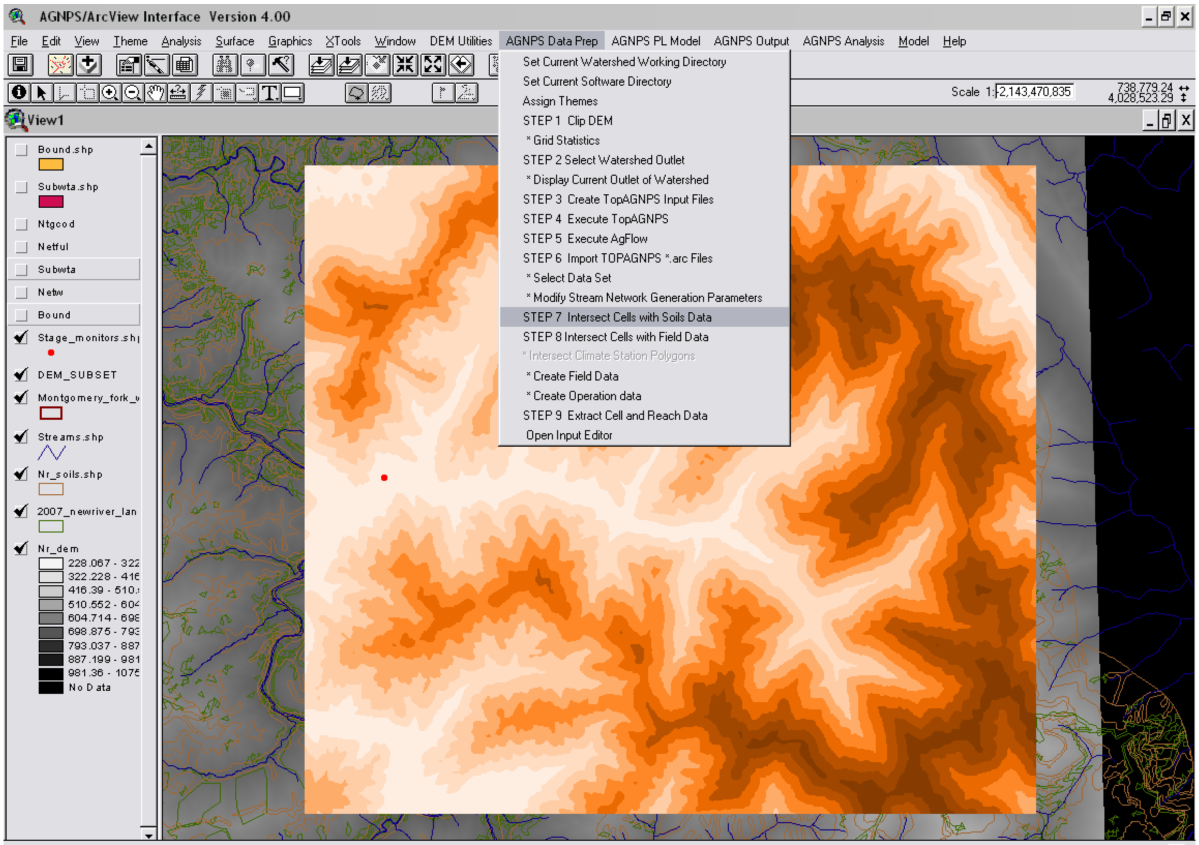
Next, go to “AGNPS Data Prep” and choose Step 6.



Give the project a name that is simple and is no more than 8 characters long. After giving the project a unique name, click “OK”. This creates a project folder in the #4 Folder which stores the computations and information related to this simulation.

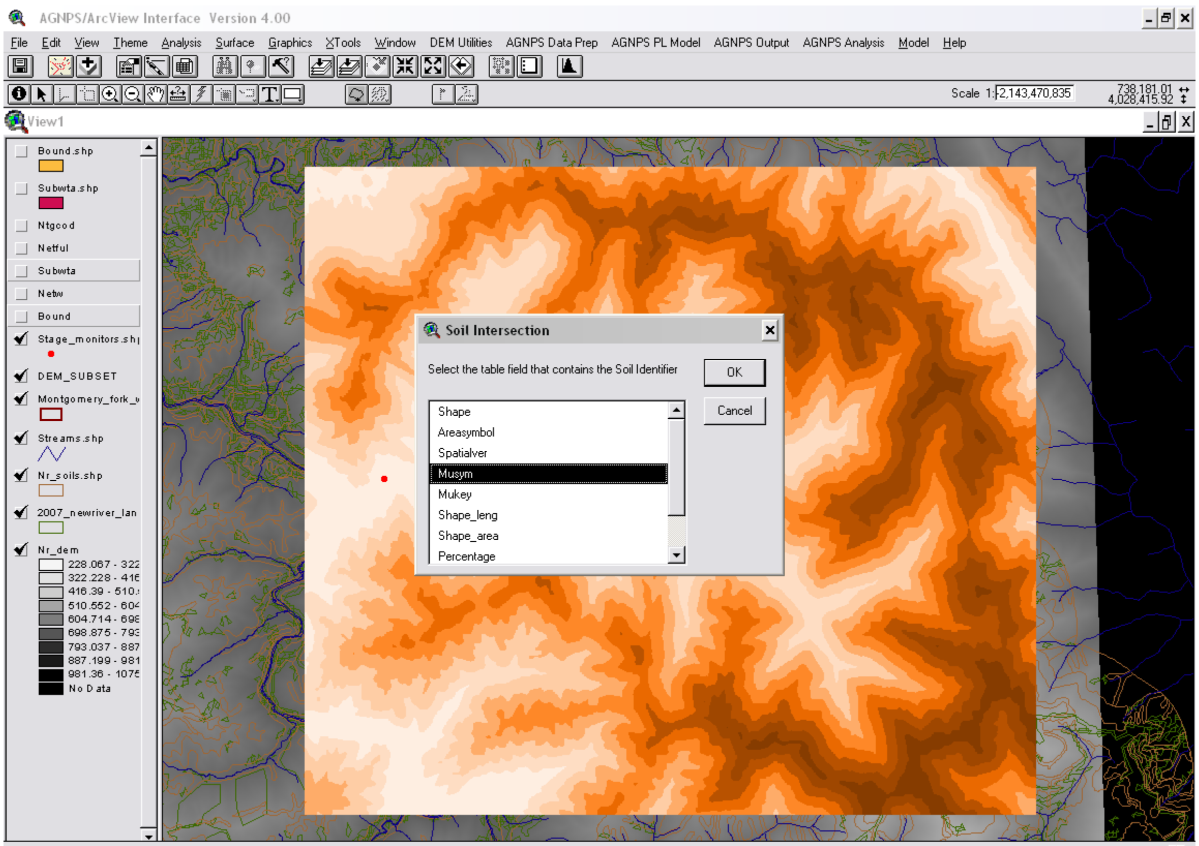


So far, the model has created the cells and reaches for the watershed, based on the topography. Go to “AGNPS Data Prep” and select Step 7 to assign the soil data to each cell.

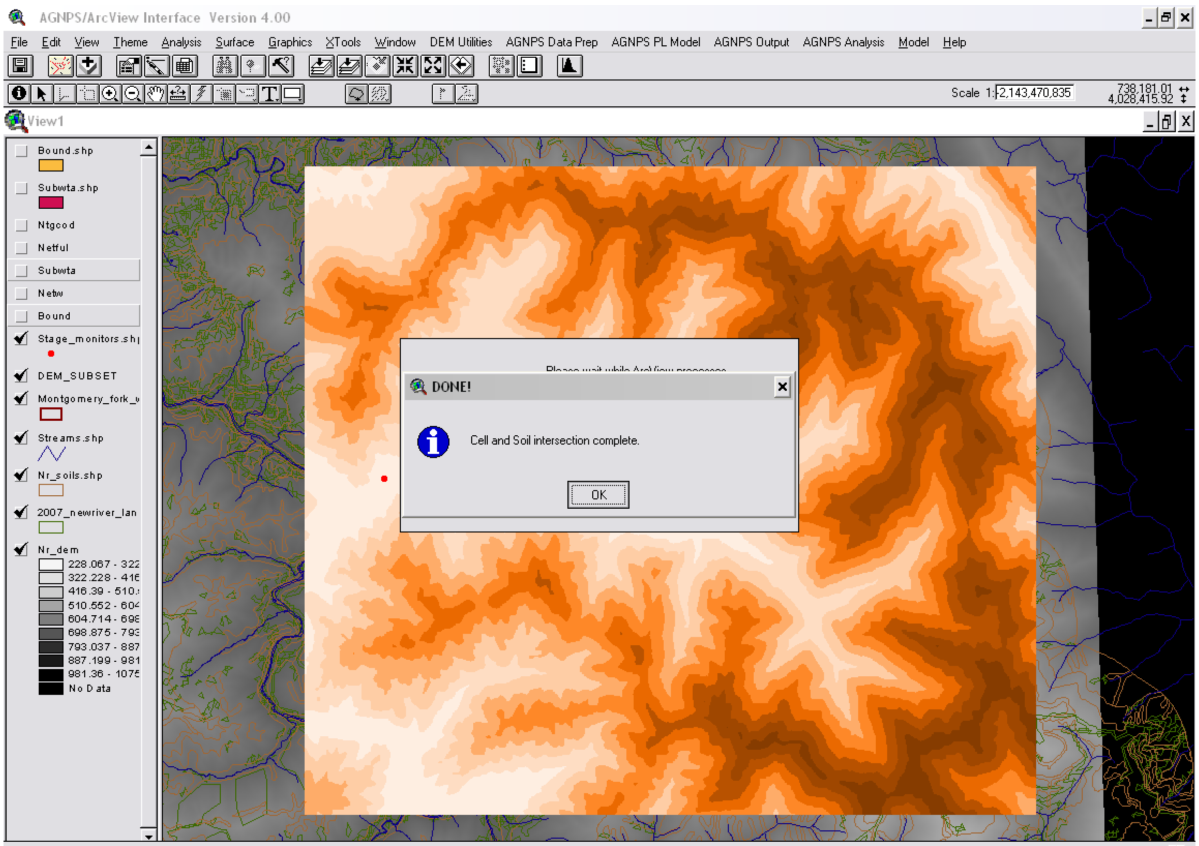


For most soil data obtained by NRCS, the “MUSYM” identification for each soil type is a good feature for the AnnAGNPS to categorize the different soil types. This is like an identification tool for the soils. Note that this identification must be in the attributes table for the soil GIS shape file as well as in the tabular data set that is found in Folder #6 for this project, which was mentioned earlier. By having a similar way of identifying the same features in shape files swell as in tabular (spreadsheet) data sets which show each soils chemical and physical properties, the AnnAGNPS program can perform its erosion and runoff computations.

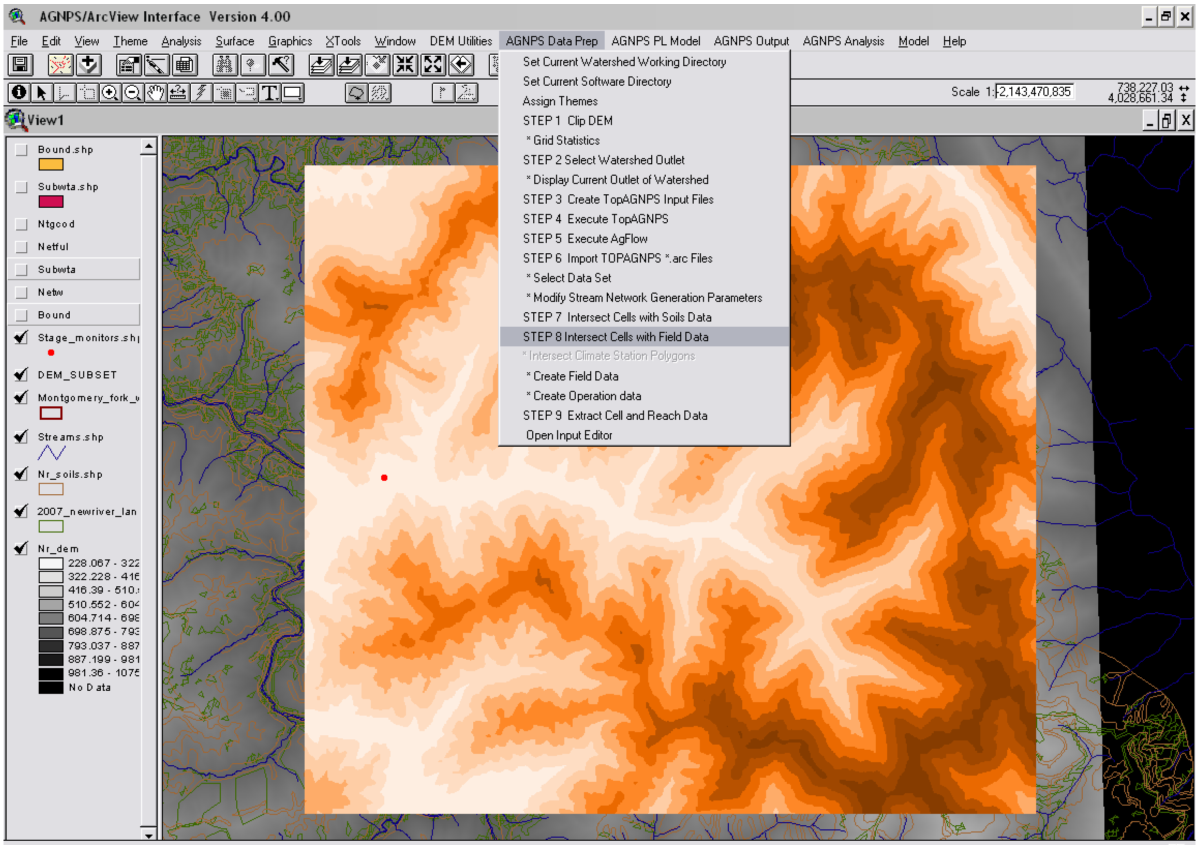
So select “MUSYM” for the soils GIS file and click “OK”.



After the model finds the dominate soil types for each cell, a window will appear to confirm this operation. Click "OK".

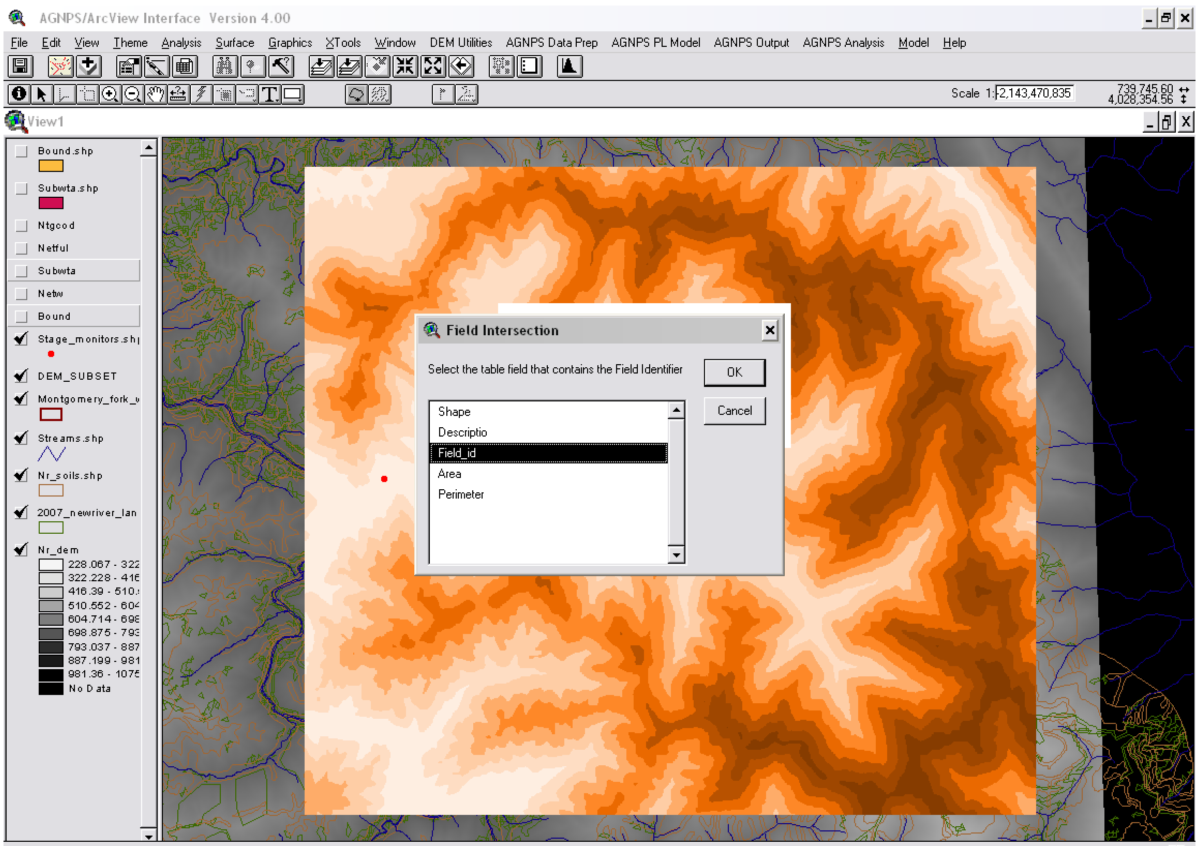


Next, go to “AGNPS Data Prep” and select Step 8 to merge the dominant land use types with each cell.

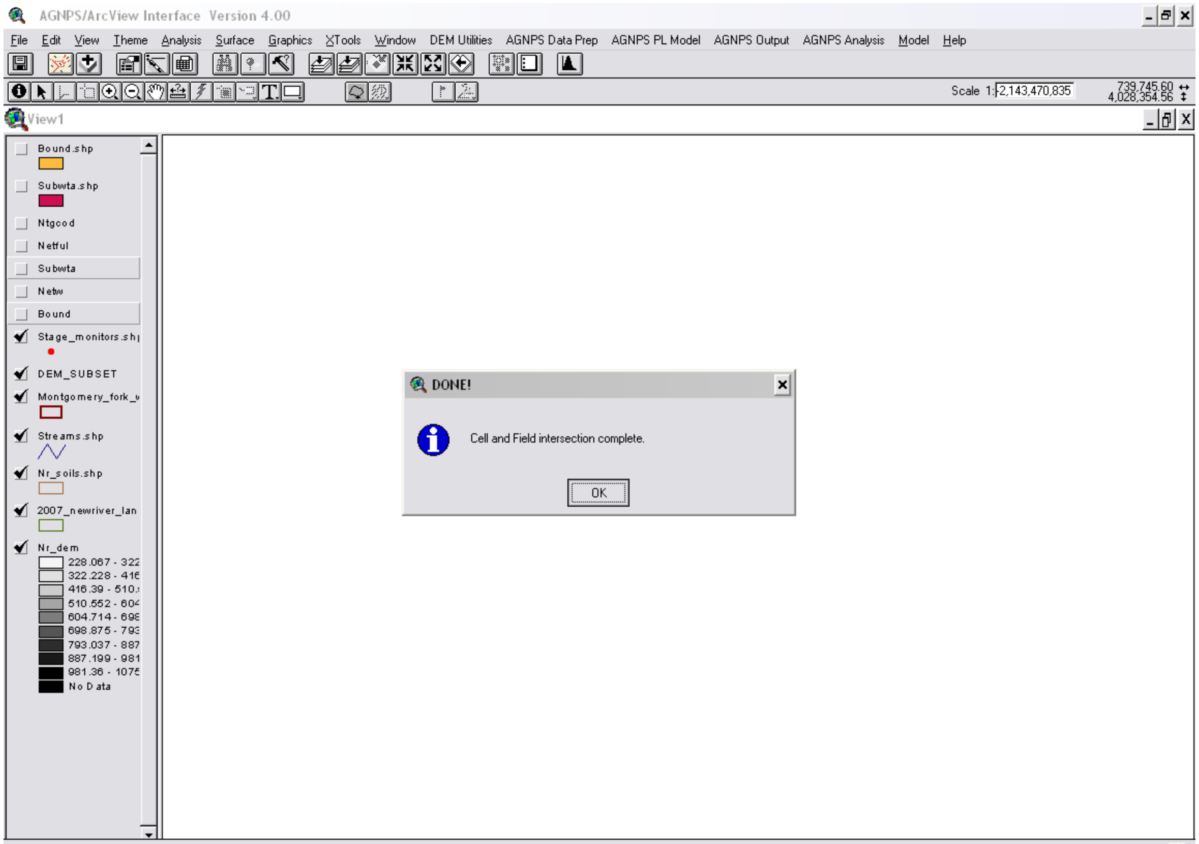


For the land use data created, I inserted a TEXT based "Field_ID" to give each land use type a simple numerical value like 2, 3, 101,102, 301, etc. This numerical value must be in a TEXT format for the GIS attribute table. Therefore, make a new column in the GIS shape file that has the different land use types. When creating a new field column in ArcGIS, you will be asked to select a type of format for the information. So select TEXT and put in any value you wish to identify the different land use activities. Anyway….

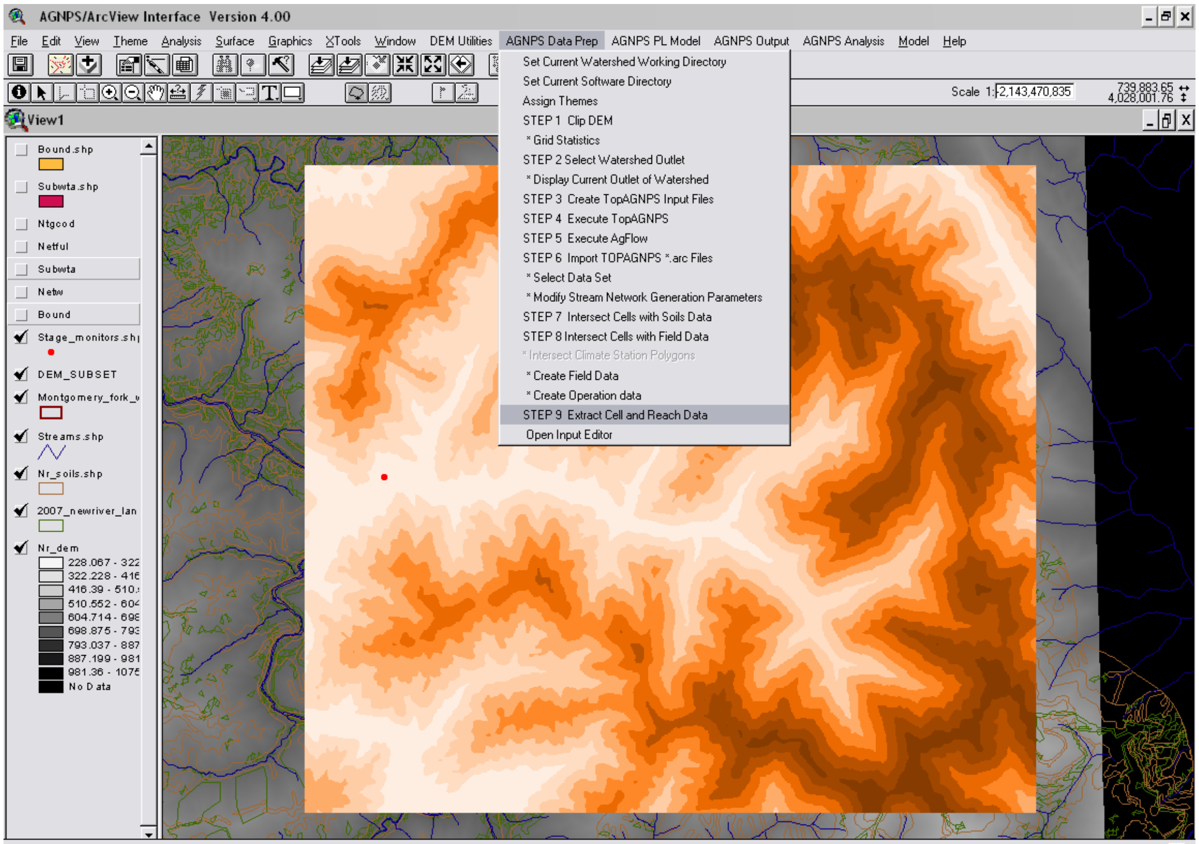
For the land use data in the New River, click on "Field_ID" and select "OK".



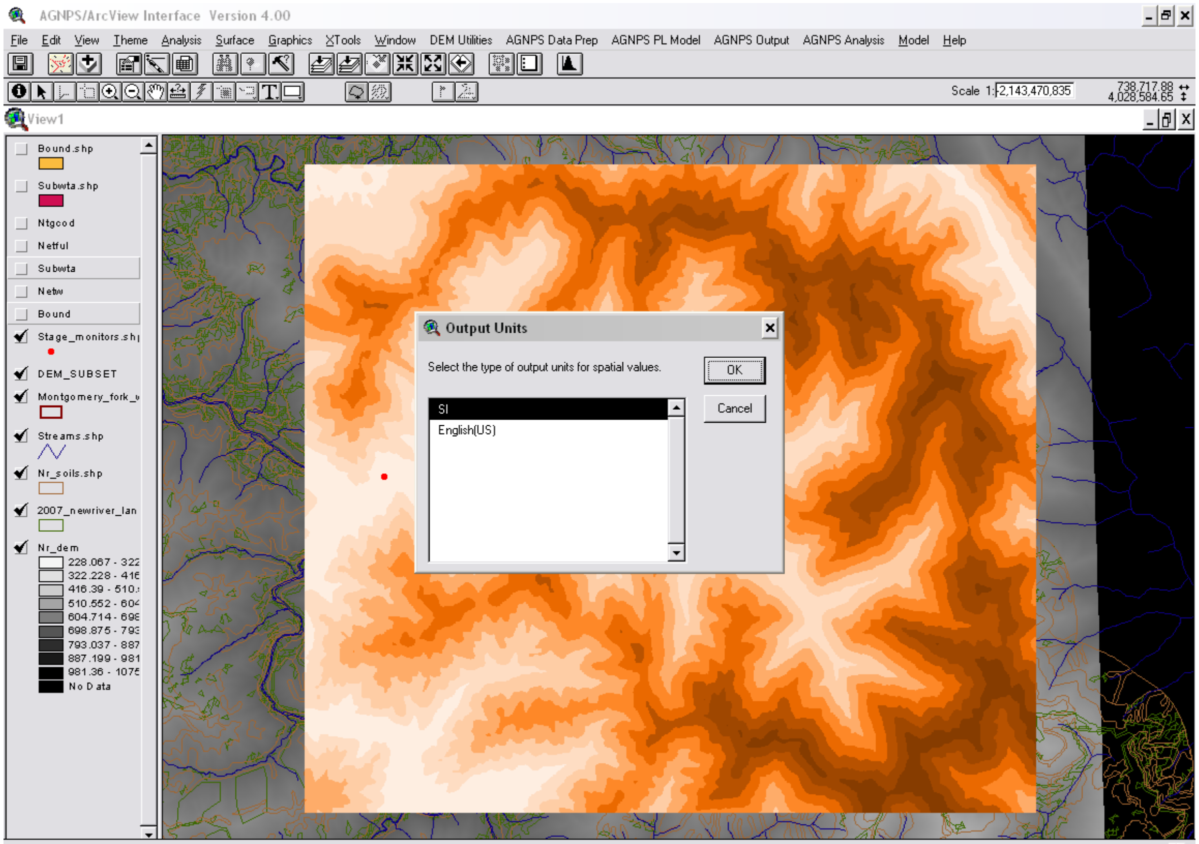
After the program merges the dominant land use type into each cell with the soil data, a window will appear to complete the process. Click “OK”.



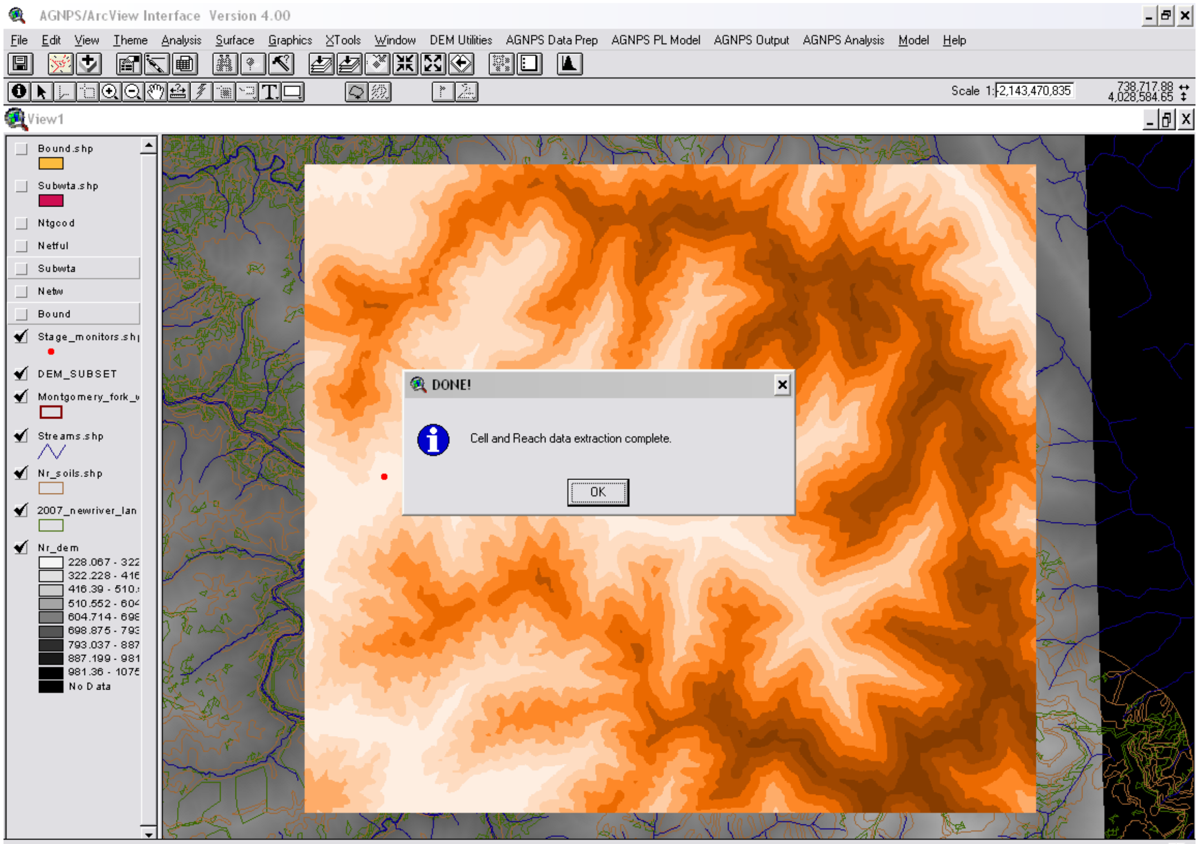
Next, go to “AGNPS Data Prep” and choose Step 9.



Choose “SI” units and click “OK”.

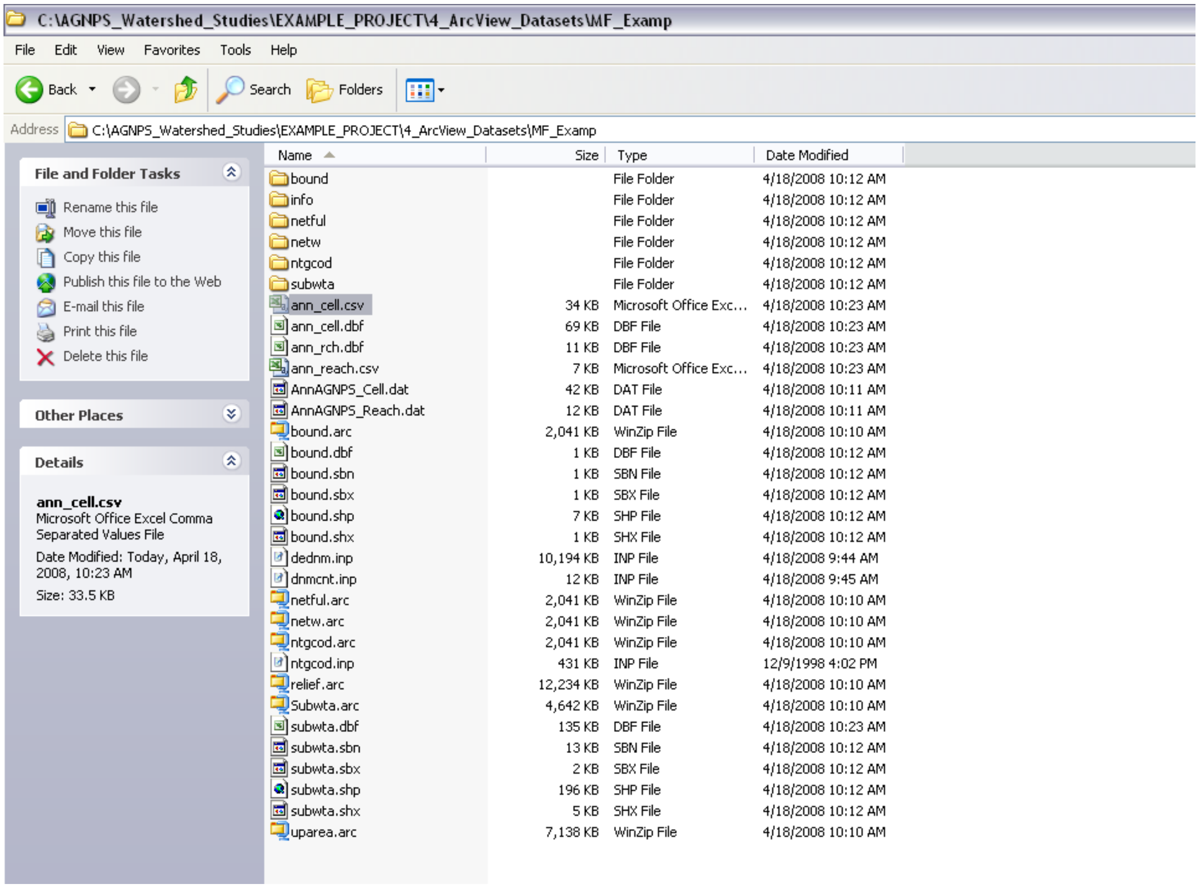


After the program combines all the topography, cells, reaches, soil, and land use data into one file, a window appears to complete this step. Click “OK”.

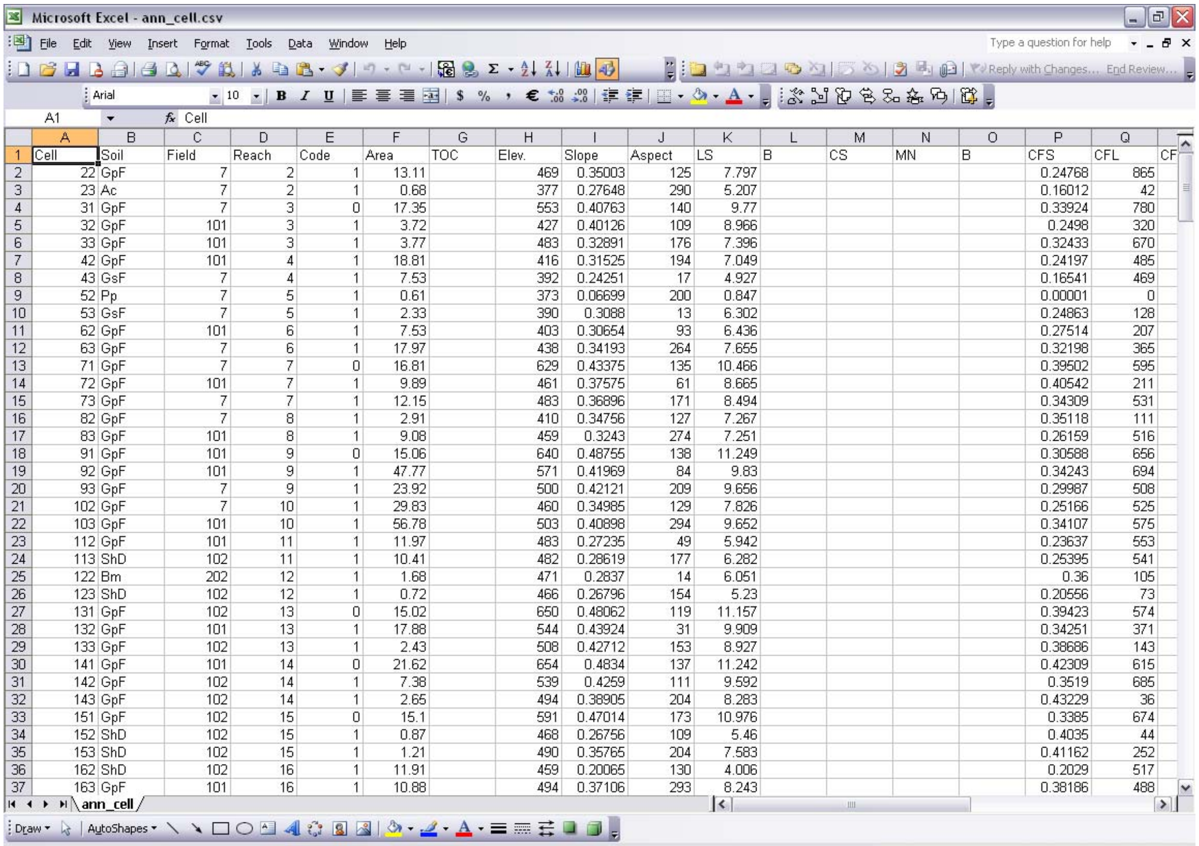


Minimizing the AnnAGNPS program, we need to go modify some of the files just created before the program is fully ran. The Manning's n values for sheet, shallow, and concentrated flow were calibrated for this area and have to be placed into the cell and reach files that are used for further runoff and sediment yield computations.

So, go Folder #4 of the project and open the "MF_Examp" folder that we created in Step 6. Open the "ann_cell.csv" file which contains the cell data for the watershed.

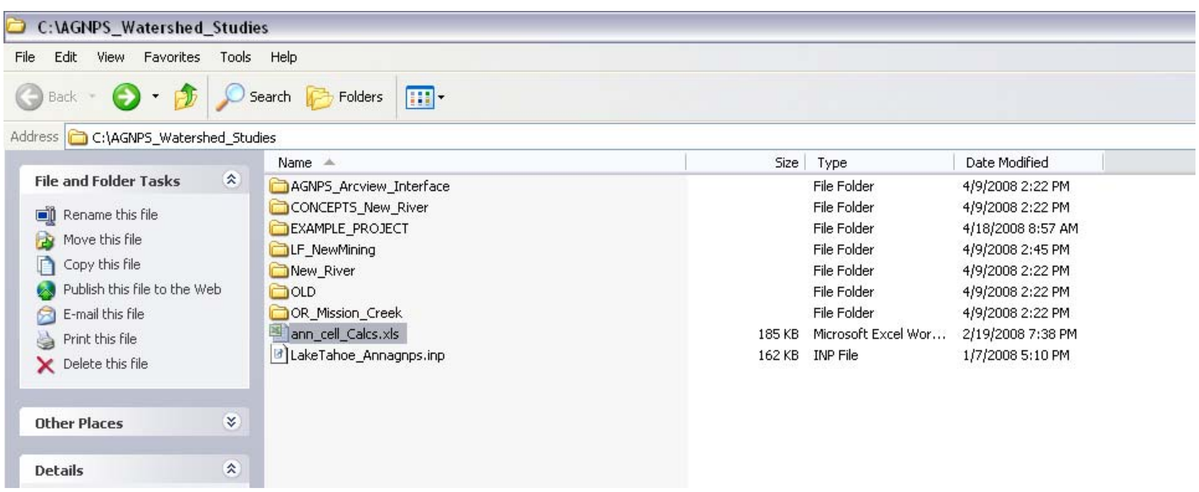


Opening the “ann_cell.csv” files, you can see the values assigned to each cell. The “MN” represents the Manning’s n value for sheet flow. We need to provide a set of values for each land use here.

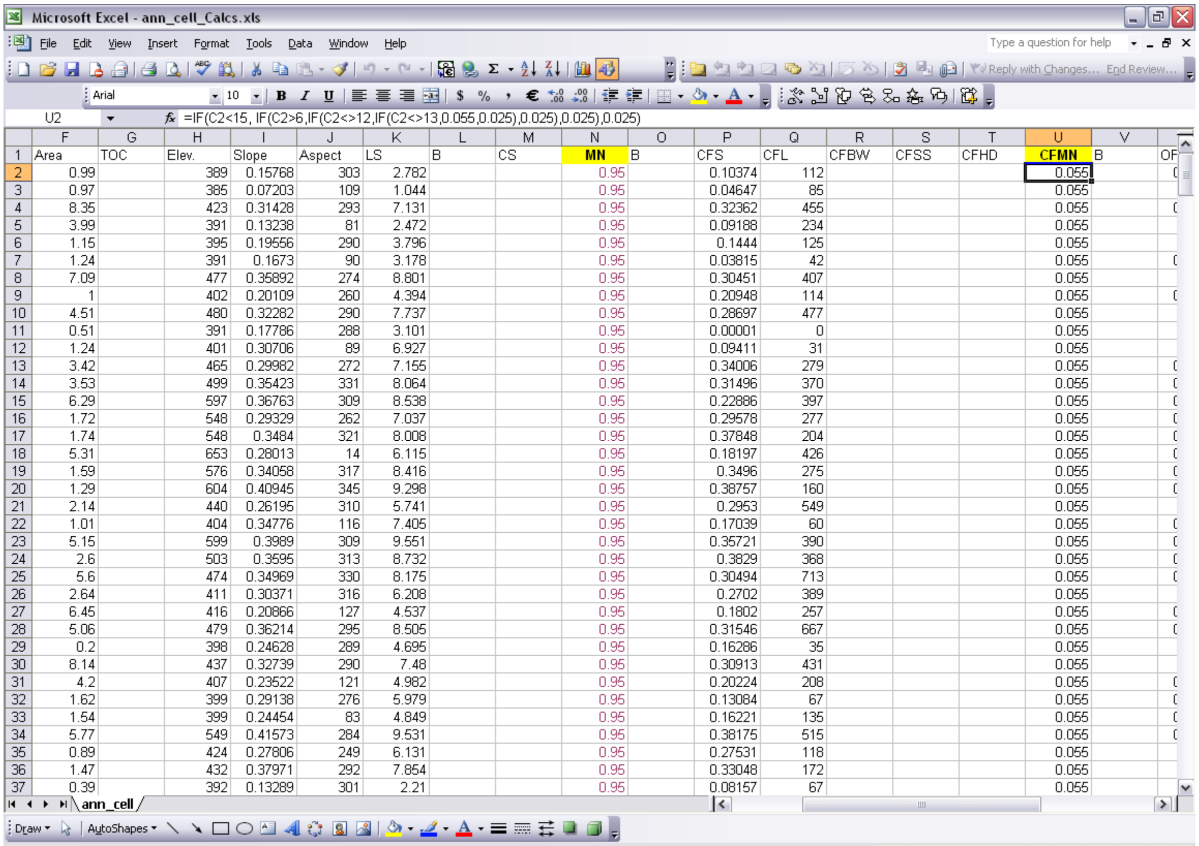


Cell	Soil	Field	Reach	Code	Area	TOC	Elev.	Slope	Aspect	LS	B	CS	MN	B	CFS	CFL	CF
22	GpF	7	2	1	13.11		469	0.35003	125	7.797					0.24768	865	
23	Ac	7	2	1	0.68		377	0.27648	290	5.207					0.16012	42	
31	GpF	7	3	0	17.35		553	0.40763	140	9.77					0.33924	780	
32	GpF	101	3	1	3.72		427	0.40126	109	8.966					0.2498	320	
33	GpF	101	3	1	3.77		483	0.32891	176	7.396					0.32433	670	
42	GpF	101	4	1	18.81		416	0.31525	194	7.049					0.24197	485	
43	GsF	7	4	1	7.53		392	0.24251	17	4.927					0.16541	469	
52	Pp	7	5	1	0.61		373	0.06699	200	0.847					0.00001	0	
53	GsF	7	5	1	2.33		390	0.3088	13	6.302					0.24863	128	
62	GpF	101	6	1	7.53		403	0.30654	93	6.436					0.27514	207	
63	GpF	7	6	1	17.97		438	0.34193	264	7.655					0.32198	365	
71	GpF	7	7	0	16.81		629	0.43375	135	10.466					0.39502	595	
72	GpF	101	7	1	9.89		461	0.37575	61	8.665					0.40542	211	
73	GpF	7	7	1	12.15		483	0.36896	171	8.494					0.34309	531	
82	GpF	7	8	1	2.91		410	0.34756	127	7.267					0.35118	111	
83	GpF	101	8	1	9.08		459	0.3243	274	7.251					0.26159	516	
91	GpF	101	9	0	15.06		640	0.48755	138	11.249					0.30588	656	
92	GpF	101	9	1	47.77		571	0.41969	84	9.83					0.34243	694	
93	GpF	7	9	1	23.92		500	0.42121	209	9.656					0.29987	508	
102	GpF	7	10	1	29.83		460	0.34985	129	7.826					0.25166	525	
103	GpF	101	10	1	56.78		503	0.40898	294	9.652					0.34107	575	
112	GpF	101	11	1	11.97		483	0.27235	49	5.942					0.23637	553	
113	ShD	102	11	1	10.41		482	0.28619	177	6.282					0.25395	541	
122	Bm	202	12	1	1.68		471	0.2837	14	6.051					0.36	105	
123	ShD	102	12	1	0.72		466	0.26796	154	5.23					0.20556	73	
131	GpF	102	13	0	15.02		650	0.48062	119	11.157					0.39423	574	
132	GpF	101	13	1	17.88		544	0.43924	31	9.909					0.34251	371	
133	GpF	102	13	1	2.43		508	0.42712	153	8.927					0.38686	143	
141	GpF	101	14	0	21.62		654	0.4834	137	11.242					0.42309	615	
142	GpF	102	14	1	7.38		539	0.4259	111	9.592					0.3519	685	
143	GpF	102	14	1	2.65		494	0.38905	204	8.283					0.43229	36	
151	GpF	102	15	0	15.1		591	0.47014	173	10.976					0.3385	674	
152	ShD	102	15	1	0.87		468	0.26756	109	5.46					0.4035	44	
153	ShD	102	15	1	1.21		490	0.35765	204	7.583					0.41162	252	
162	ShD	102	16	1	11.91		459	0.20065	130	4.006					0.2029	517	
163	GpF	101	16	1	10.88		494	0.37106	293	8.243					0.38186	488	

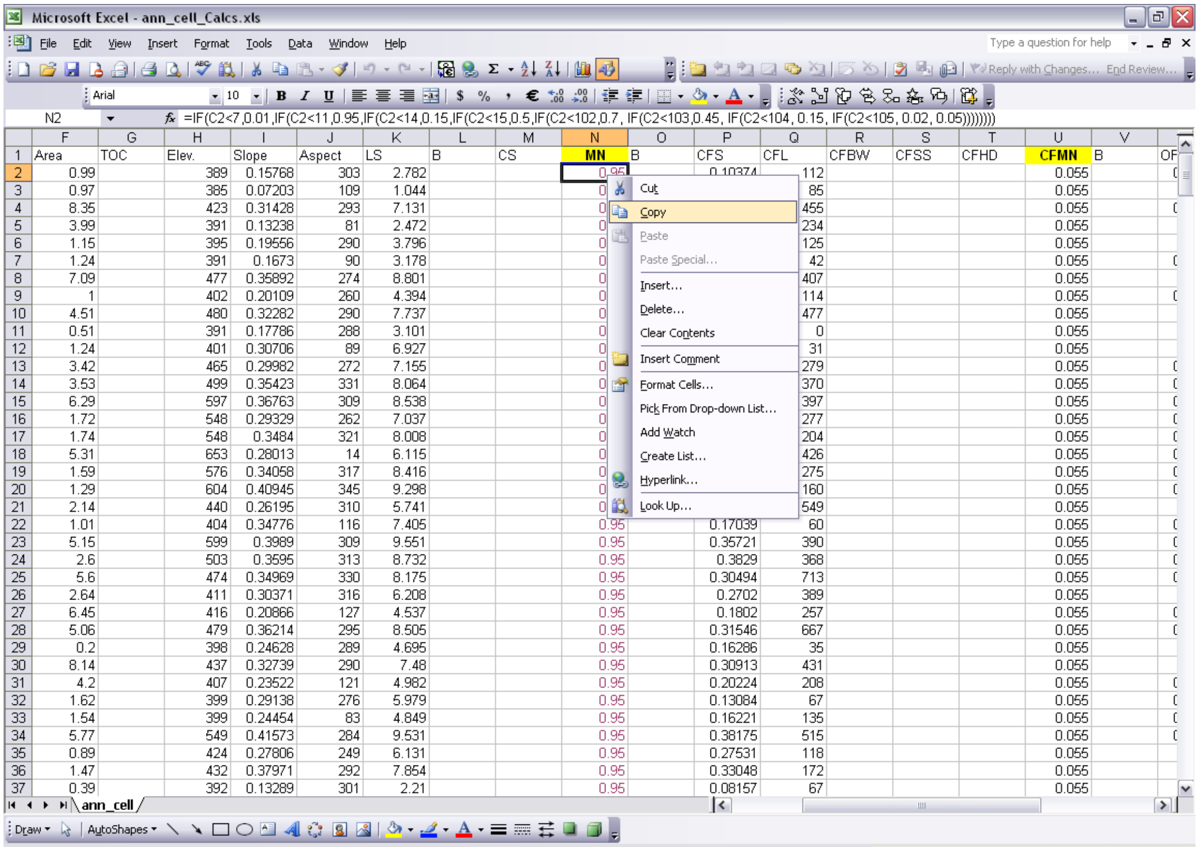
I have created a way to copy and paste a formula in the “ann_cell.csv” file for the Manning’s n values. To obtain this formula, go the “AGNPS_Watershed_Studies” folder and open the “ann_cell_calc.xls” file.



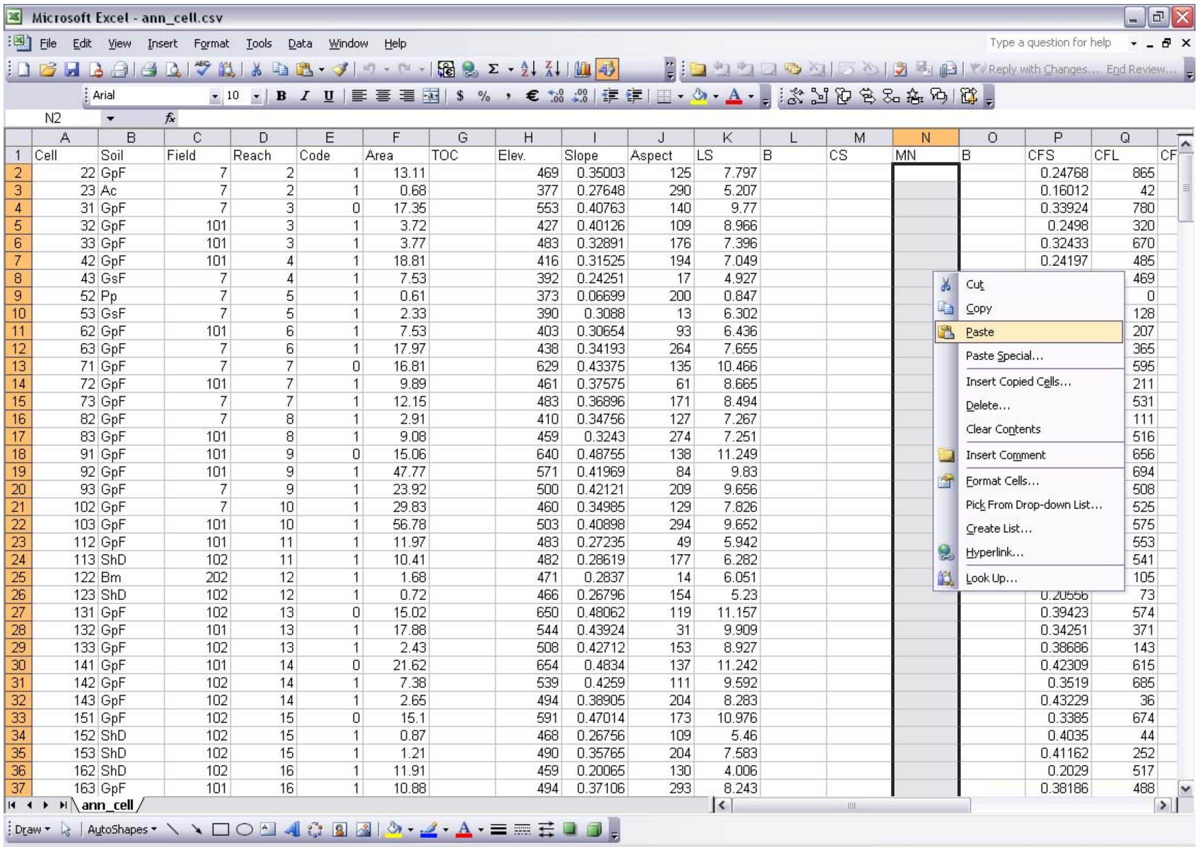
Go to the any cell under the “MN” column in the “ann_cells_calc.xls” file and copy the formula.



	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Area	TOC	Elev.	Slope	Aspect	LS	B	CS	MN	B	CFS	CFL	CFBW	CFSS	CFHD	CFMN	B
2	0.99		389	0.15768	303	2.782			0.95		0.10374	112				0.055	
3	0.97		385	0.07203	109	1.044			0.95		0.04647	85				0.055	
4	8.35		423	0.31428	293	7.131			0.95		0.32362	455				0.055	
5	3.99		391	0.13238	81	2.472			0.95		0.09188	234				0.055	
6	1.15		395	0.19556	290	3.796			0.95		0.1444	125				0.055	
7	1.24		391	0.1673	90	3.178			0.95		0.03815	42				0.055	
8	7.09		477	0.35892	274	8.801			0.95		0.30451	407				0.055	
9	1		402	0.20109	260	4.394			0.95		0.20948	114				0.055	
10	4.51		480	0.32282	290	7.737			0.95		0.28697	477				0.055	
11	0.51		391	0.17786	288	3.101			0.95		0.00001	0				0.055	
12	1.24		401	0.30706	89	6.927			0.95		0.09411	31				0.055	
13	3.42		465	0.29982	272	7.155			0.95		0.34006	279				0.055	
14	3.53		499	0.35423	331	8.064			0.95		0.31496	370				0.055	
15	6.29		597	0.36763	309	8.538			0.95		0.22886	397				0.055	
16	1.72		548	0.29329	262	7.037			0.95		0.29578	277				0.055	
17	1.74		548	0.3484	321	8.008			0.95		0.37848	204				0.055	
18	5.31		653	0.28013	14	6.115			0.95		0.18197	426				0.055	
19	1.59		576	0.34058	317	8.416			0.95		0.3496	275				0.055	
20	1.29		604	0.40945	345	9.298			0.95		0.38757	160				0.055	
21	2.14		440	0.26195	310	5.741			0.95		0.2953	549				0.055	
22	1.01		404	0.34776	116	7.405			0.95		0.17039	60				0.055	
23	5.15		599	0.3989	309	9.551			0.95		0.35721	390				0.055	
24	2.6		503	0.3595	313	8.732			0.95		0.3829	368				0.055	
25	5.6		474	0.34969	330	8.175			0.95		0.30494	713				0.055	
26	2.64		411	0.30371	316	6.208			0.95		0.2702	389				0.055	
27	6.45		416	0.20866	127	4.537			0.95		0.1802	257				0.055	
28	5.06		479	0.36214	295	8.505			0.95		0.31546	667				0.055	
29	0.2		398	0.24628	289	4.695			0.95		0.16286	35				0.055	
30	8.14		437	0.32739	290	7.48			0.95		0.30913	431				0.055	
31	4.2		407	0.23522	121	4.982			0.95		0.20224	208				0.055	
32	1.62		399	0.29138	276	5.979			0.95		0.13084	67				0.055	
33	1.54		399	0.24454	83	4.849			0.95		0.16221	135				0.055	
34	5.77		549	0.41573	284	9.531			0.95		0.38175	515				0.055	
35	0.89		424	0.27806	249	6.131			0.95		0.27531	118				0.055	
36	1.47		432	0.37971	292	7.854			0.95		0.33048	172				0.055	
37	0.39		392	0.13289	301	2.21			0.95		0.08157	67				0.055	

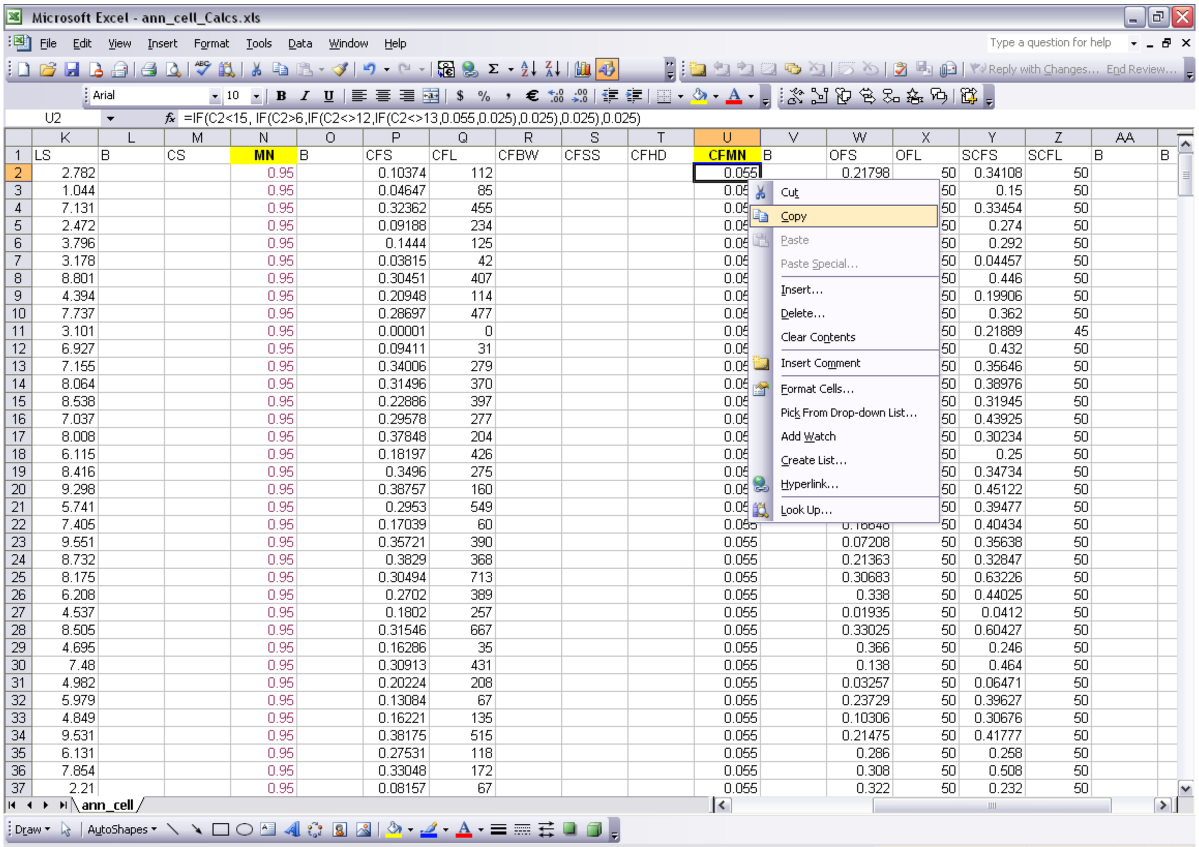

Microsoft Excel - ann_cell_Calcs.xls
File Edit View Insert Format Tools Data Window Help
N2
=IF(C2<7,0.01,IF(C2<11,0.95,IF(C2<14,0.15,IF(C2<15,0.5,IF(C2<102,0.7, IF(C2<103,0.45, IF(C2<104, 0.15, IF(C2<105, 0.02, 0.05))))))))
Area TOC Elev. Slope Aspect LS B CS MN B CFS CFL CFBW CFSS CFHD CFMN B
Cut
Copy
Paste
Paste Special...
Insert...
Delete...
Clear Contents
Insert Comment
Format Cells...
Pick From Drop-down List...
Add Watch
Create List...
Hyperlink...
Look Up...
ann_cell

Next, go back to the "ann_cell.csv" file and paste the formula in the empty MN column for all cells to calculate an appropriate Manning's n value for each land use.

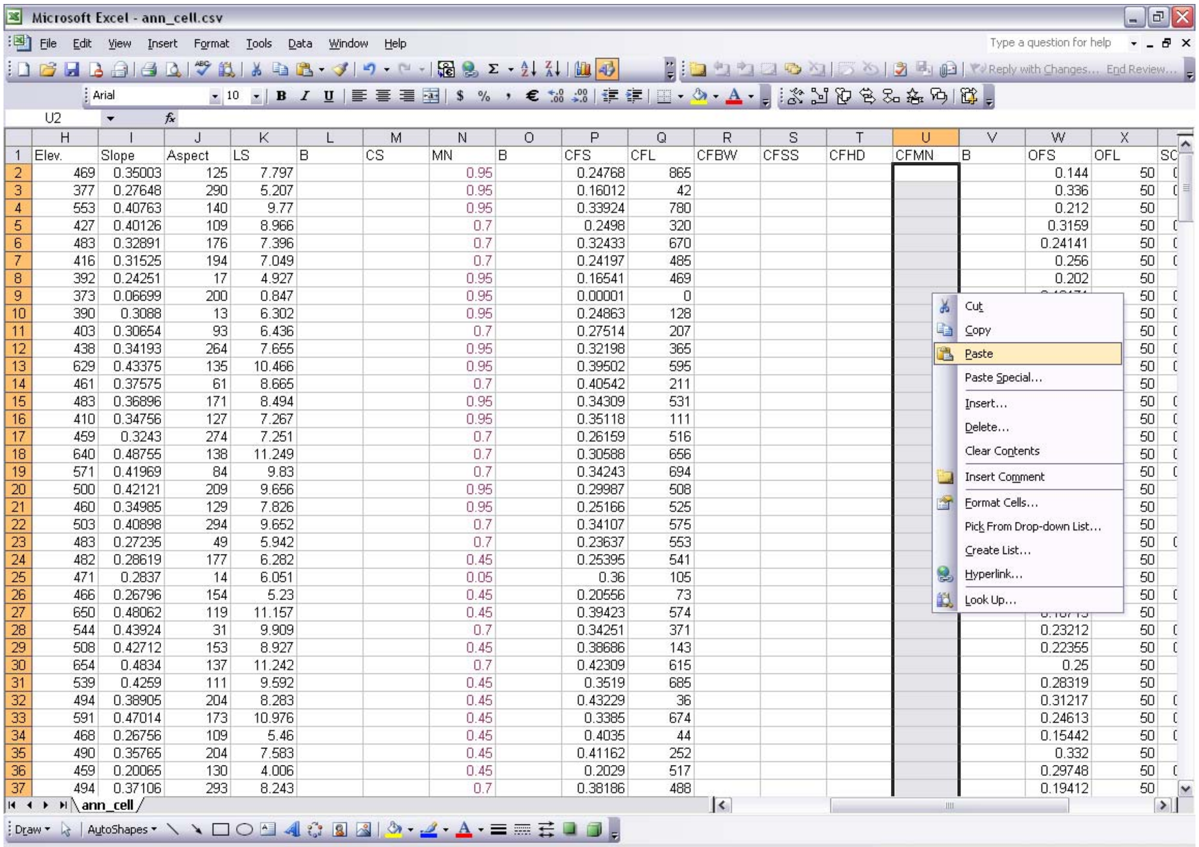


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Cell	Soil	Field	Reach	Code	Area	TOC	Elev.	Slope	Aspect	LS	B	CS	MN	B	CFS	CFL
2	22	GpF	7	2	1	13.11		469	0.35003	125	7.797					0.24768	865
3	23	Ac	7	2	1	0.68		377	0.27648	290	5.207					0.16012	42
4	31	GpF	7	3	0	17.35		553	0.40763	140	9.77					0.33924	780
5	32	GpF	101	3	1	3.72		427	0.40126	109	8.966					0.2498	320
6	33	GpF	101	3	1	3.77		483	0.32891	176	7.396					0.32433	670
7	42	GpF	101	4	1	18.81		416	0.31525	194	7.049					0.24197	485
8	43	GsF	7	4	1	7.53		392	0.24251	17	4.927						469
9	52	Pp	7	5	1	0.61		373	0.06699	200	0.847						0
10	53	GsF	7	5	1	2.33		390	0.3088	13	6.302						128
11	62	GpF	101	6	1	7.53		403	0.30654	93	6.436						207
12	63	GpF	7	6	1	17.97		438	0.34193	264	7.655						365
13	71	GpF	7	7	0	16.81		629	0.43375	135	10.466						595
14	72	GpF	101	7	1	9.89		461	0.37575	61	8.665						211
15	73	GpF	7	7	1	12.15		483	0.36896	171	8.494						531
16	82	GpF	7	8	1	2.91		410	0.34756	127	7.267						111
17	83	GpF	101	8	1	9.08		459	0.3243	274	7.251						516
18	91	GpF	101	9	0	15.06		640	0.48755	138	11.249						656
19	92	GpF	101	9	1	47.77		571	0.41969	84	9.83						694
20	93	GpF	7	9	1	23.92		500	0.42121	209	9.656						508
21	102	GpF	7	10	1	29.83		460	0.34985	129	7.826						525
22	103	GpF	101	10	1	56.78		503	0.40898	294	9.652						575
23	112	GpF	101	11	1	11.97		483	0.27235	49	5.942						553
24	113	ShD	102	11	1	10.41		482	0.28619	177	6.282						541
25	122	Bm	202	12	1	1.68		471	0.2837	14	6.051						105
26	123	ShD	102	12	1	0.72		466	0.26796	154	5.23					0.20556	73
27	131	GpF	102	13	0	15.02		650	0.48062	119	11.157					0.39423	574
28	132	GpF	101	13	1	17.88		544	0.43924	31	9.909					0.34251	371
29	133	GpF	102	13	1	2.43		508	0.42712	153	8.927					0.38686	143
30	141	GpF	101	14	0	21.62		654	0.4834	137	11.242					0.42309	615
31	142	GpF	102	14	1	7.38		539	0.4259	111	9.592					0.3519	685
32	143	GpF	102	14	1	2.65		494	0.38905	204	8.283					0.43229	36
33	151	GpF	102	15	0	15.1		591	0.47014	173	10.976					0.3385	674
34	152	ShD	102	15	1	0.87		468	0.26756	109	5.46					0.4035	44
35	153	ShD	102	15	1	1.21		490	0.35765	204	7.583					0.41162	252
36	162	ShD	102	16	1	11.91		459	0.20065	130	4.006					0.2029	517
37	163	GpF	101	16	1	10.88		494	0.37106	293	8.243					0.38186	488

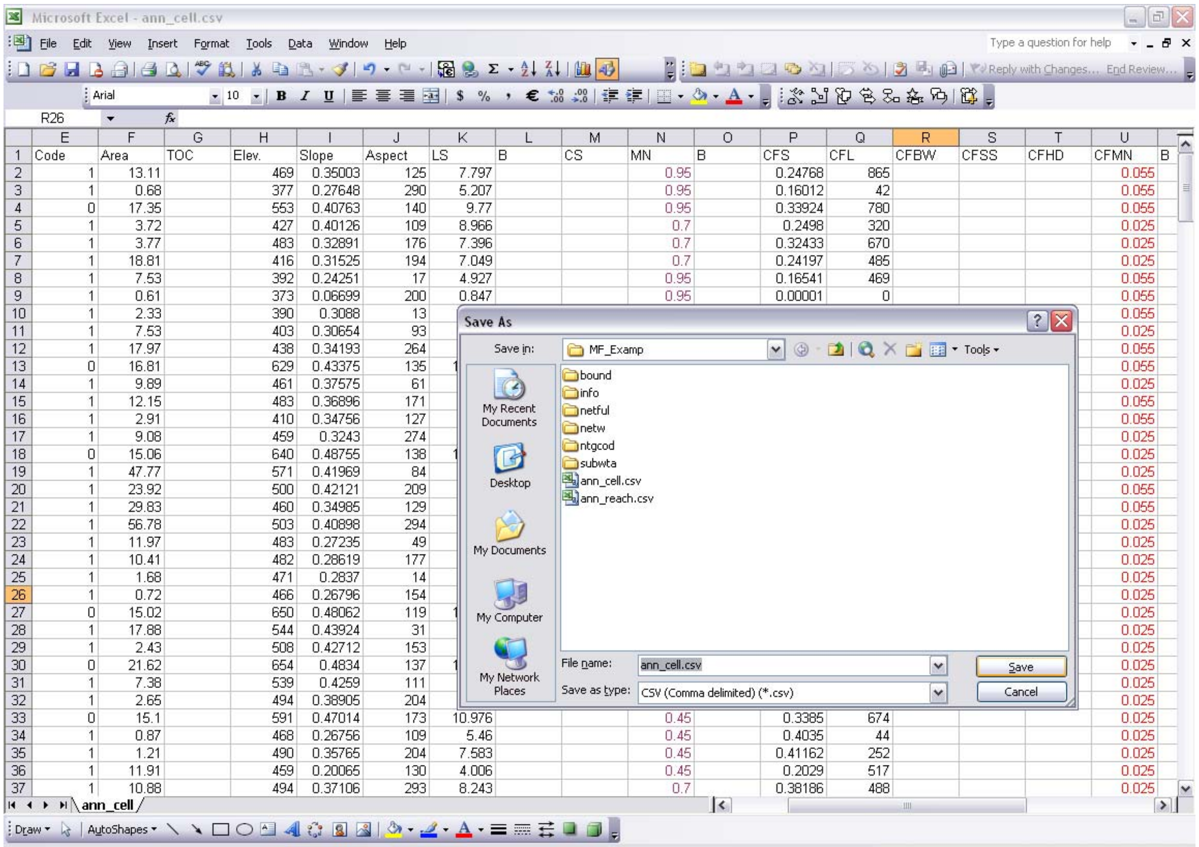
Go back to the “ann_cell_calc.xls” and copy the formula in the CFMN column. CFMN is the Manning’s n value for concentrated flow based on different land use activities.



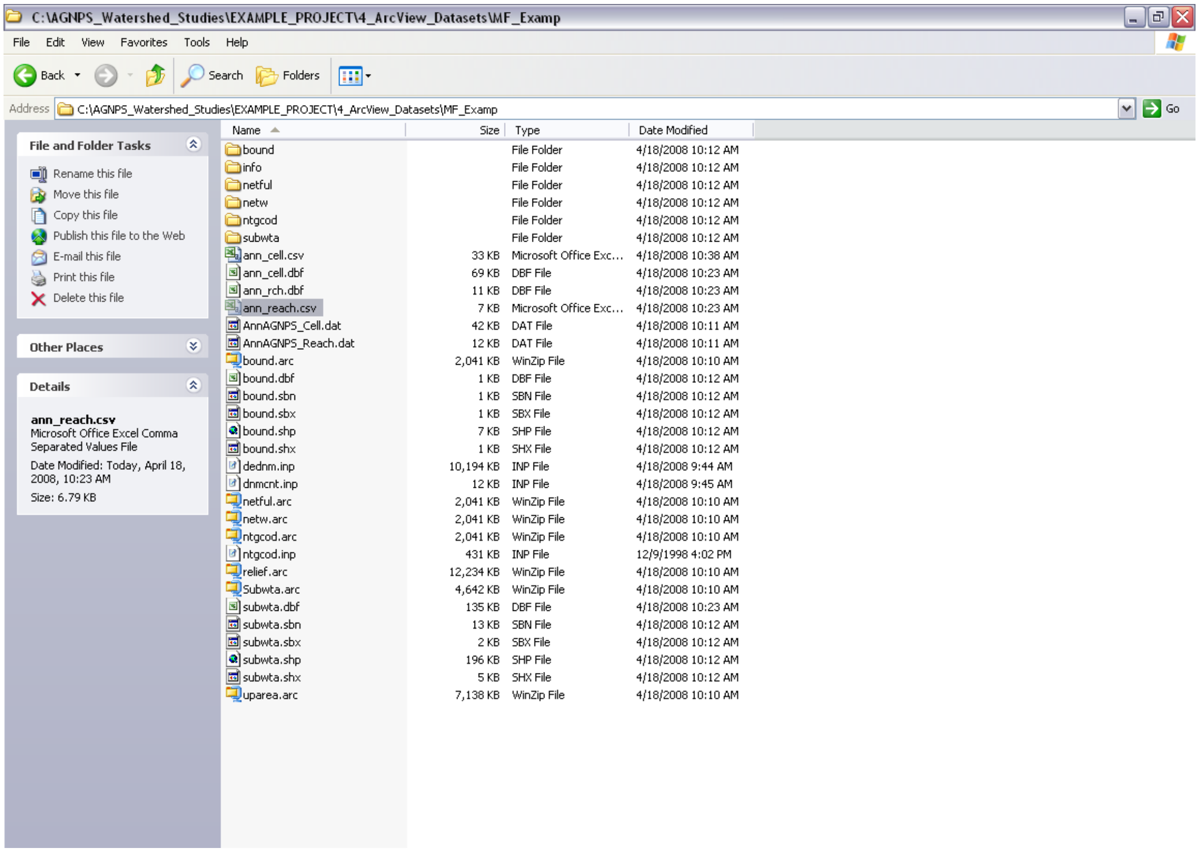
Go back to the "ann_cell.csv" file and past the formula into the blank CFMN column for all cells.



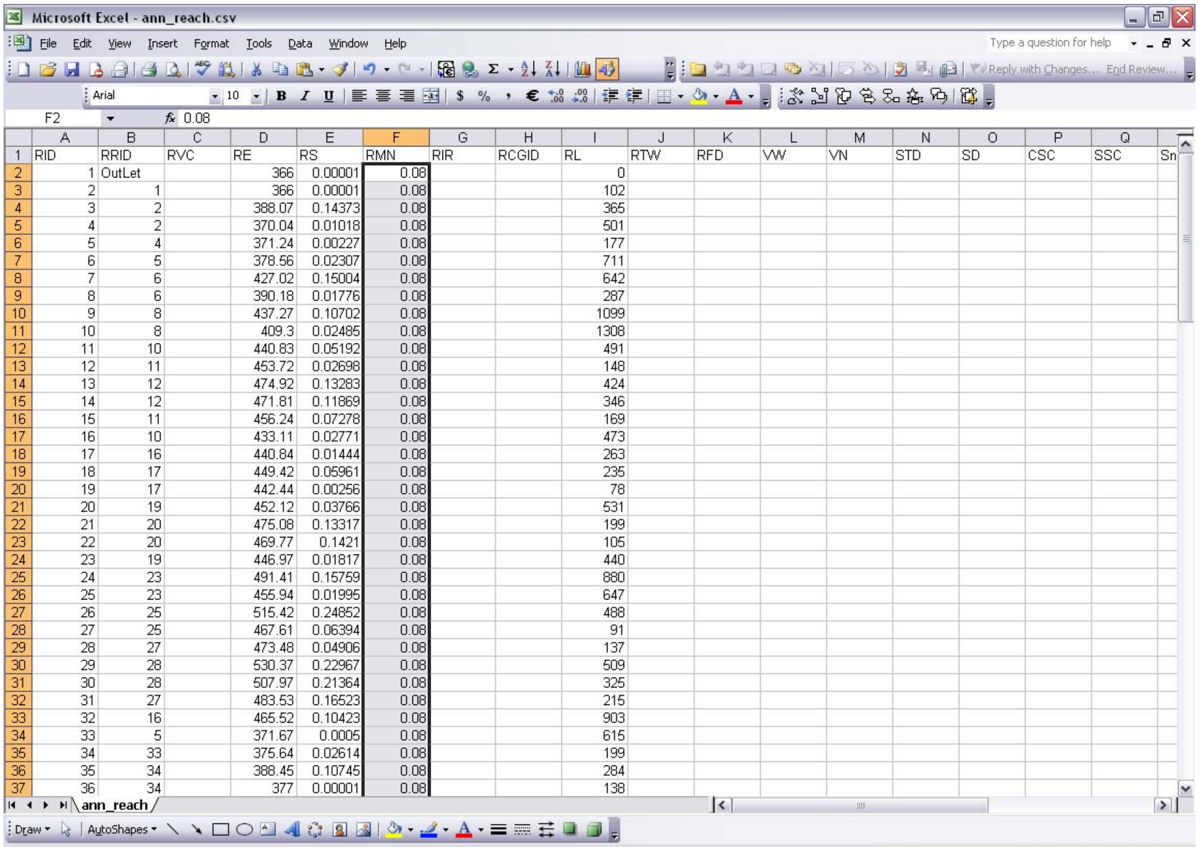
Save the “ann_cell.csv” file and exit out of the spreadsheet. Also, do not change the “ann_cell_calc.xls” file so you can use the formulas for other projects.



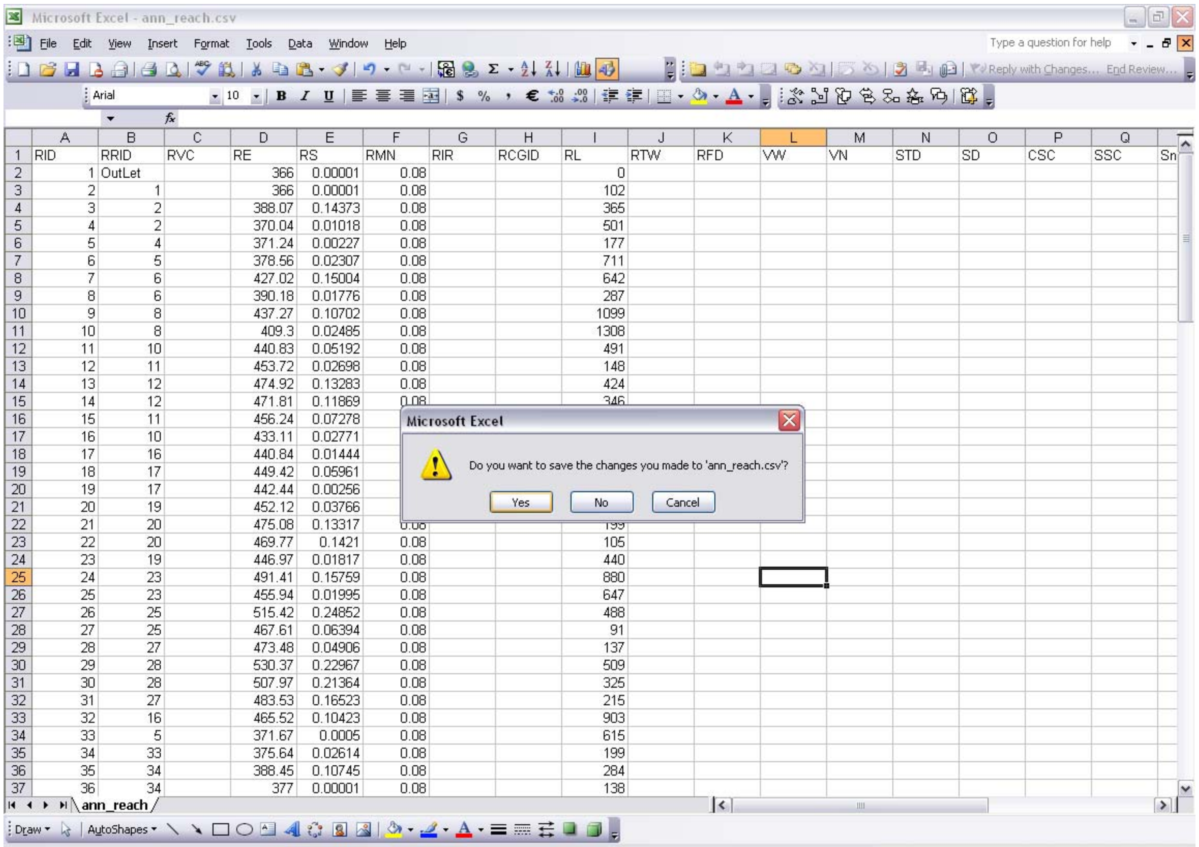
Now, lets open the reaches file that was created. This file is found in the same folder that the "ann_cell.csv" file is located. The reach file created from AnnAGNPS is called the "ann_reach.csv" file. Open this file.



The RMN column will be blank when you open this file. RMN stands for the channel's Manning n value. For this mountainous area, an appropriate Manning's n value for all reaches was determined to be 0.08. For all the reaches in this file, enter this value. Be sure to save the changes to the file when you have entered this value into RMN.

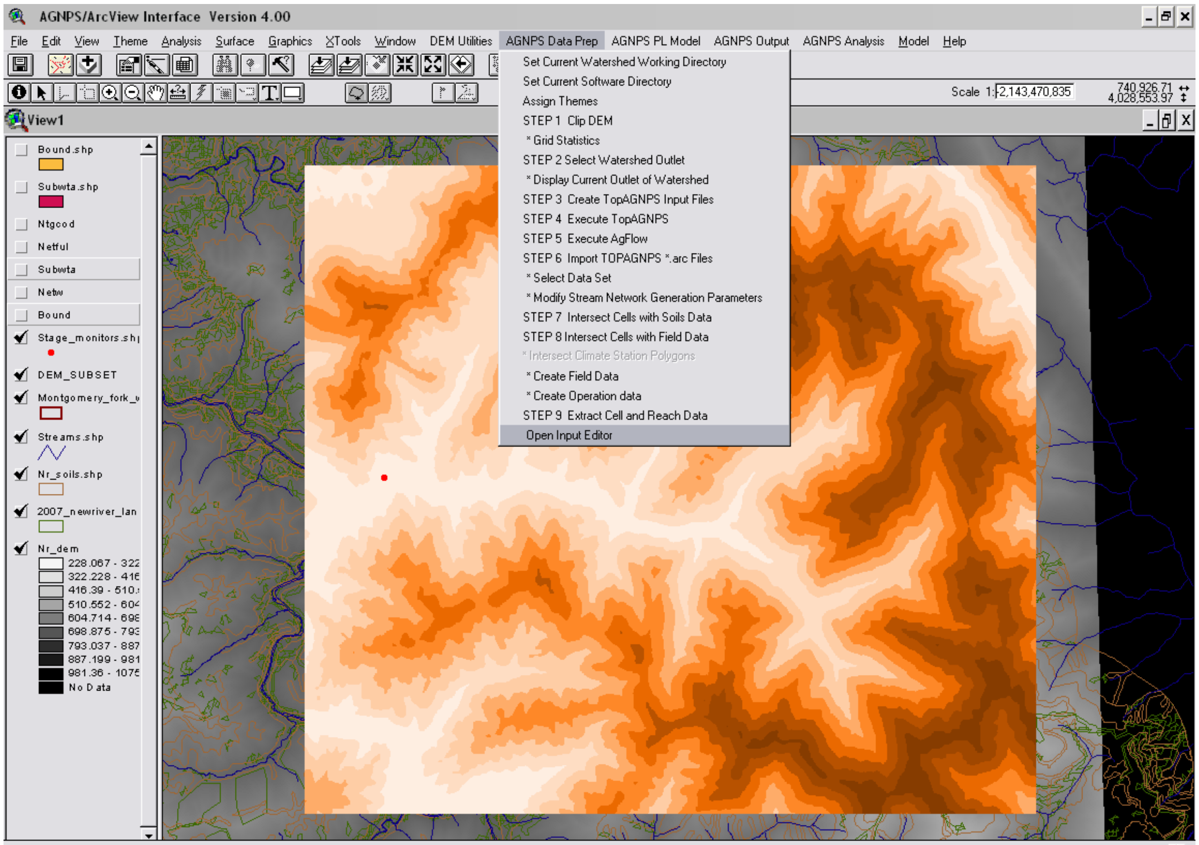


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
1	RID	RRID	RVC	RE	RS	RMN	RIR	RCGID	RL	RTW	RFD	VW	VN	STD	SD	CSC	SSC	Sn
2	1	OutLet		366	0.00001	0.08			0									
3	2	1		366	0.00001	0.08			102									
4	3	2		388.07	0.14373	0.08			365									
5	4	2		370.04	0.01018	0.08			501									
6	5	4		371.24	0.00227	0.08			177									
7	6	5		378.56	0.02307	0.08			711									
8	7	6		427.02	0.15004	0.08			642									
9	8	6		390.18	0.01776	0.08			287									
10	9	8		437.27	0.10702	0.08			1099									
11	10	8		409.3	0.02485	0.08			1308									
12	11	10		440.83	0.05192	0.08			491									
13	12	11		453.72	0.02698	0.08			148									
14	13	12		474.92	0.13283	0.08			424									
15	14	12		471.81	0.11869	0.08			346									
16	15	11		456.24	0.07278	0.08			169									
17	16	10		433.11	0.02771	0.08			473									
18	17	16		440.84	0.01444	0.08			263									
19	18	17		449.42	0.05961	0.08			235									
20	19	17		442.44	0.00256	0.08			78									
21	20	19		452.12	0.03766	0.08			531									
22	21	20		475.08	0.13317	0.08			199									
23	22	20		469.77	0.1421	0.08			105									
24	23	19		446.97	0.01817	0.08			440									
25	24	23		491.41	0.15759	0.08			880									
26	25	23		455.94	0.01995	0.08			647									
27	26	25		515.42	0.24852	0.08			488									
28	27	25		467.61	0.06394	0.08			91									
29	28	27		473.48	0.04906	0.08			137									
30	29	28		530.37	0.22967	0.08			509									
31	30	28		507.97	0.21364	0.08			325									
32	31	27		483.53	0.16523	0.08			215									
33	32	16		465.52	0.10423	0.08			903									
34	33	5		371.67	0.0005	0.08			615									
35	34	33		375.64	0.02614	0.08			199									
36	35	34		388.45	0.10745	0.08			284									
37	36	34		377	0.00001	0.08			138									

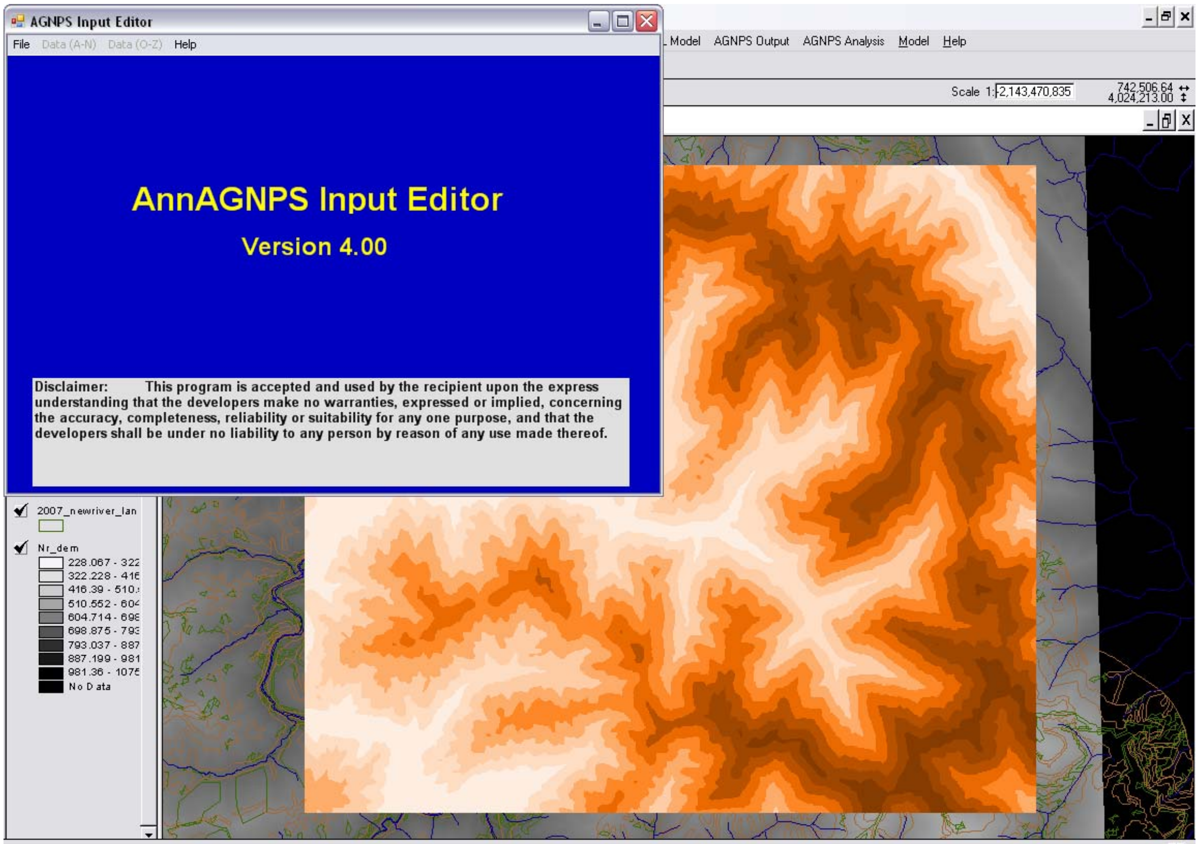


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	RID	RRID	RVC	RE	RS	RMN	RIR	RCGID	RL	RTW	RFD	VW	VN	STD	SD	CSC	SSC
2	1	OutLet		366	0.00001	0.08			0								
3	2	1		366	0.00001	0.08			102								
4	3	2		388.07	0.14373	0.08			365								
5	4	2		370.04	0.01018	0.08			501								
6	5	4		371.24	0.00227	0.08			177								
7	6	5		378.56	0.02307	0.08			711								
8	7	6		427.02	0.15004	0.08			642								
9	8	6		390.18	0.01776	0.08			287								
10	9	8		437.27	0.10702	0.08			1099								
11	10	8		409.3	0.02485	0.08			1308								
12	11	10		440.83	0.05192	0.08			491								
13	12	11		453.72	0.02698	0.08			148								
14	13	12		474.92	0.13283	0.08			424								
15	14	12		471.81	0.11869	0.08			346								
16	15	11		456.24	0.07278												
17	16	10		433.11	0.02771												
18	17	16		440.84	0.01444												
19	18	17		449.42	0.05961												
20	19	17		442.44	0.00256												
21	20	19		452.12	0.03766												
22	21	20		475.08	0.13317	0.08			199								
23	22	20		469.77	0.1421	0.08			105								
24	23	19		446.97	0.01817	0.08			440								
25	24	23		491.41	0.15759	0.08			880								
26	25	23		455.94	0.01995	0.08			647								
27	26	25		515.42	0.24852	0.08			488								
28	27	25		467.61	0.06394	0.08			91								
29	28	27		473.48	0.04906	0.08			137								
30	29	28		530.37	0.22967	0.08			509								
31	30	28		507.97	0.21364	0.08			325								
32	31	27		483.53	0.16523	0.08			215								
33	32	16		465.52	0.10423	0.08			903								
34	33	5		371.67	0.0005	0.08			615								
35	34	33		375.64	0.02614	0.08			199								
36	35	34		388.45	0.10745	0.08			284								
37	36	34		377	0.00001	0.08			138								

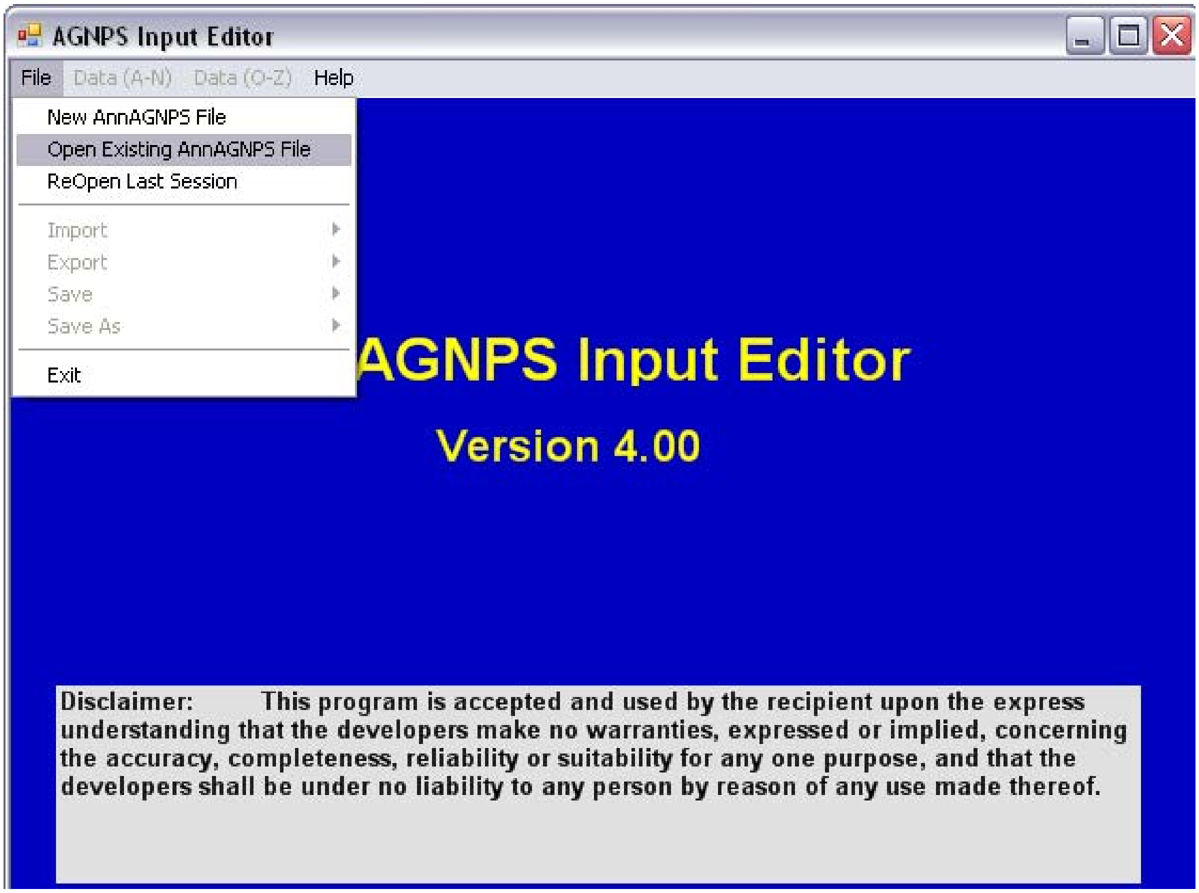
Going back to the AnnAGNPS model, lets open the "Input Editor" as shown below. The Input Editor is used to store all the numerical values of land use types, soil types, and management practices found in the cells and reaches created. These numerical values assigned to the different layers are used for further computations of runoff and sediment yield.



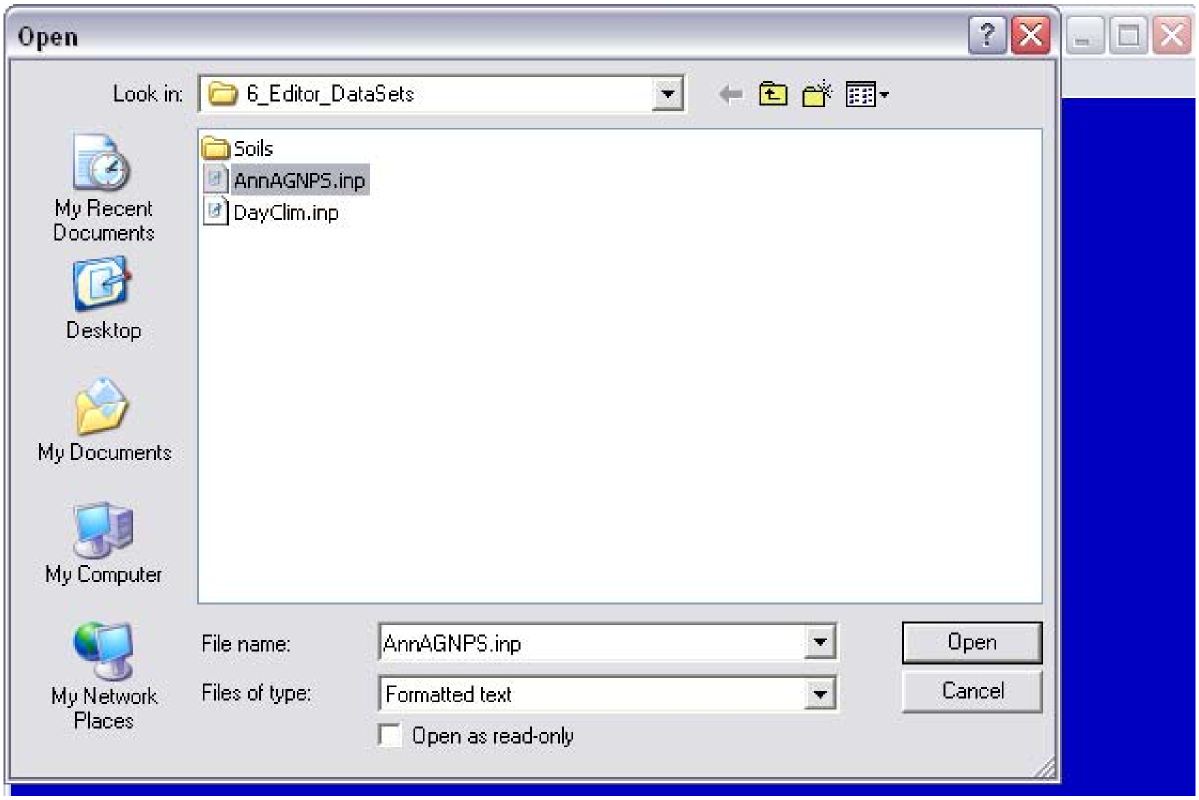
When you open the Input Editor, this is what should appear.



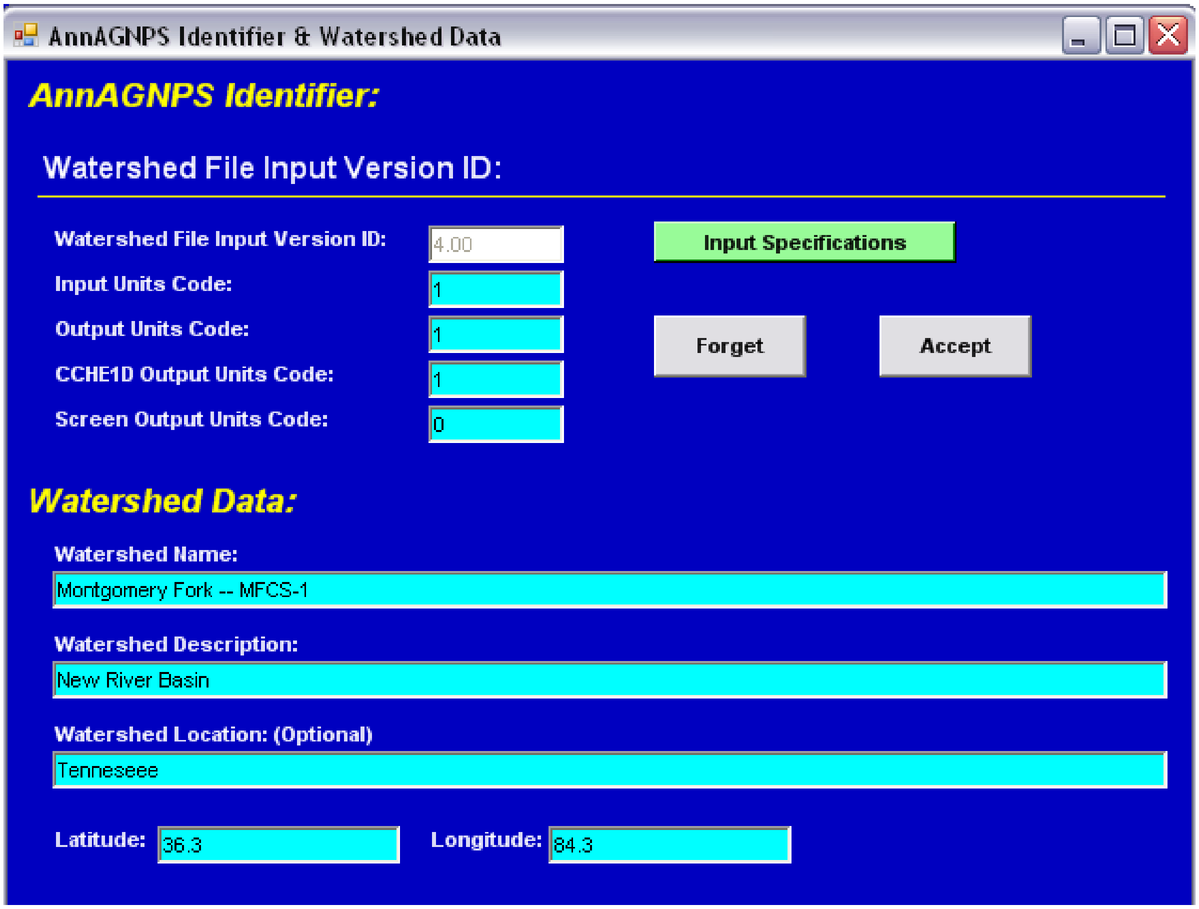
First, go to File and select “Open Existing AnnAGNPS File”. If you want to start from scratch, you can create a new Input Editor file which you have to call “AnnAGNPS.inp” and place it in Folder #6.



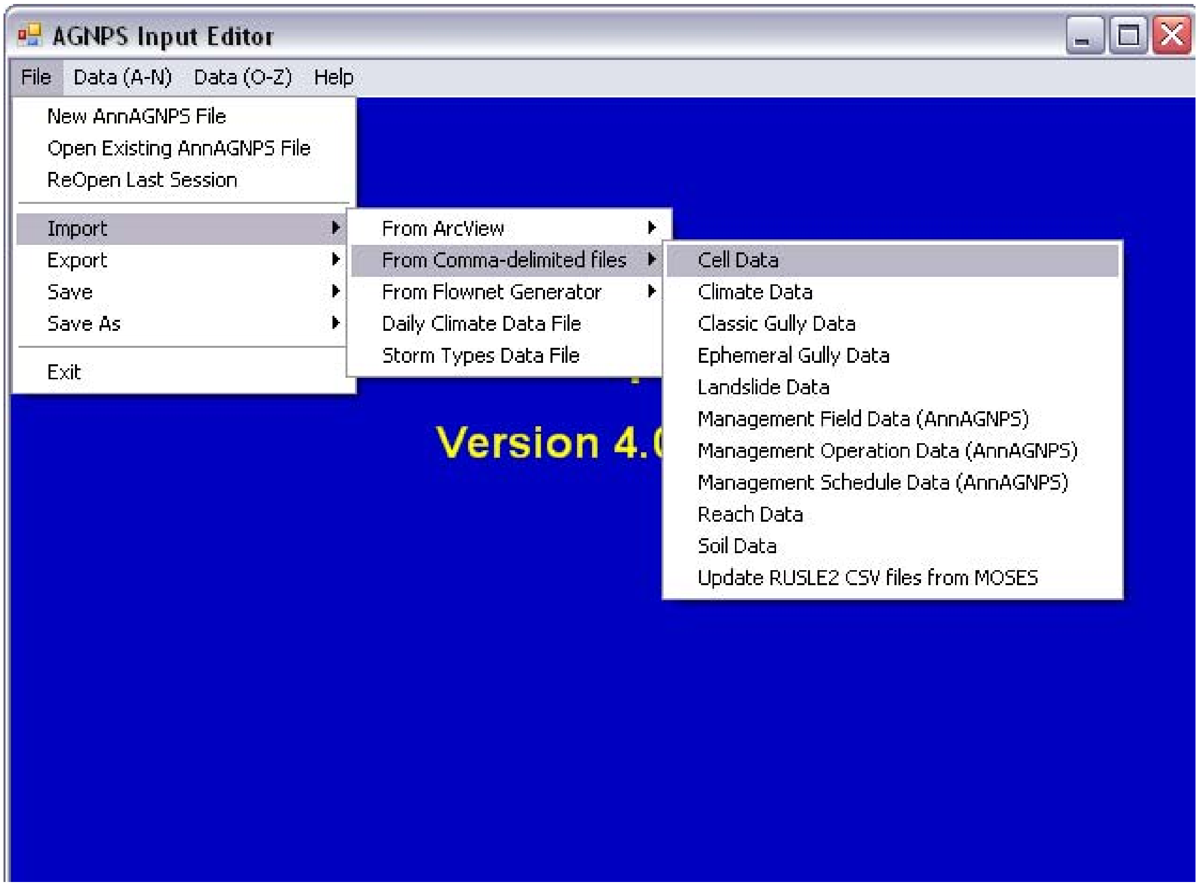
For the existing Input Editor that was previously placed in Folder #6 of this project from another project, lets open this file and we will adjust the values to represent this project. So, click the “AnnAGNPS.inp” and click “OPEN”.



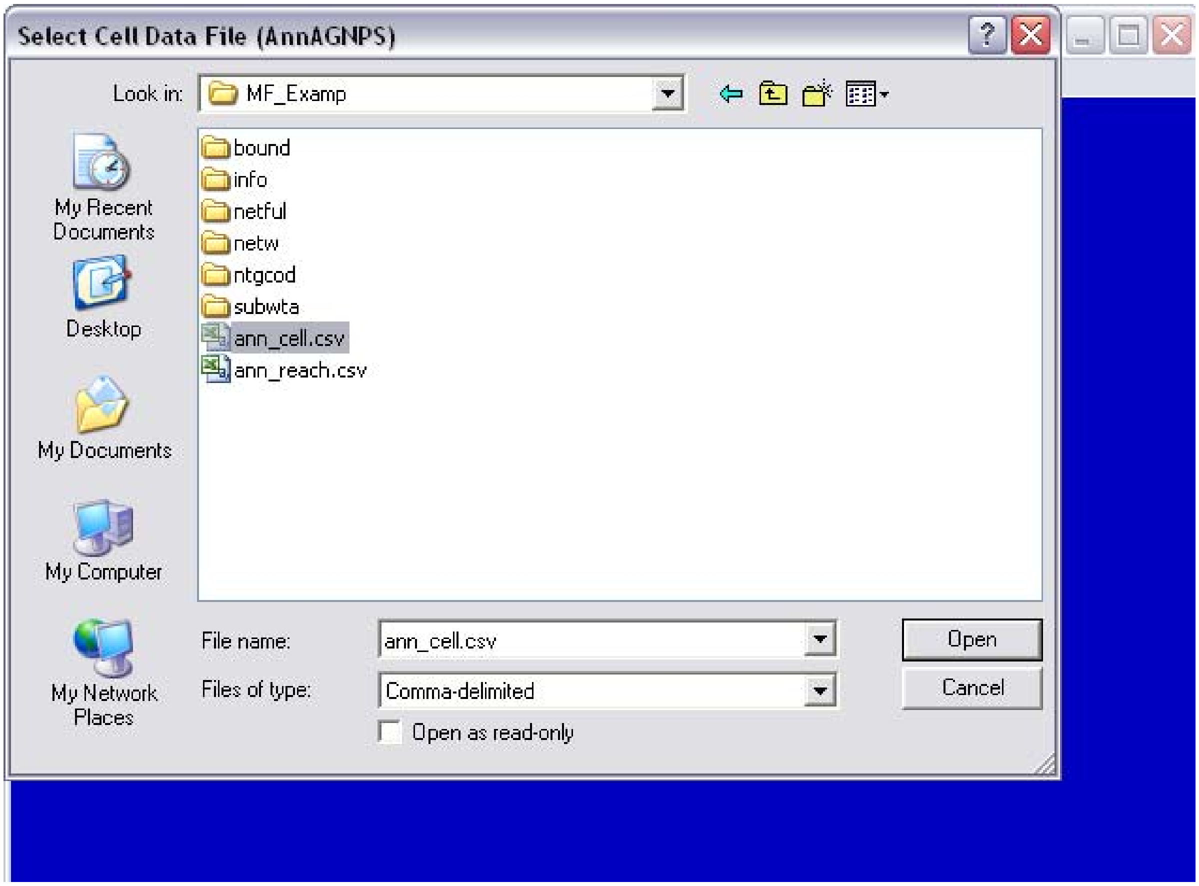
This window will appear when you open the existing file. Adjust the name and location of the current project and click “Accept”. NOTE: if you need more information about what values should be inserted into any box, right click on the white letters of the information being asked for.



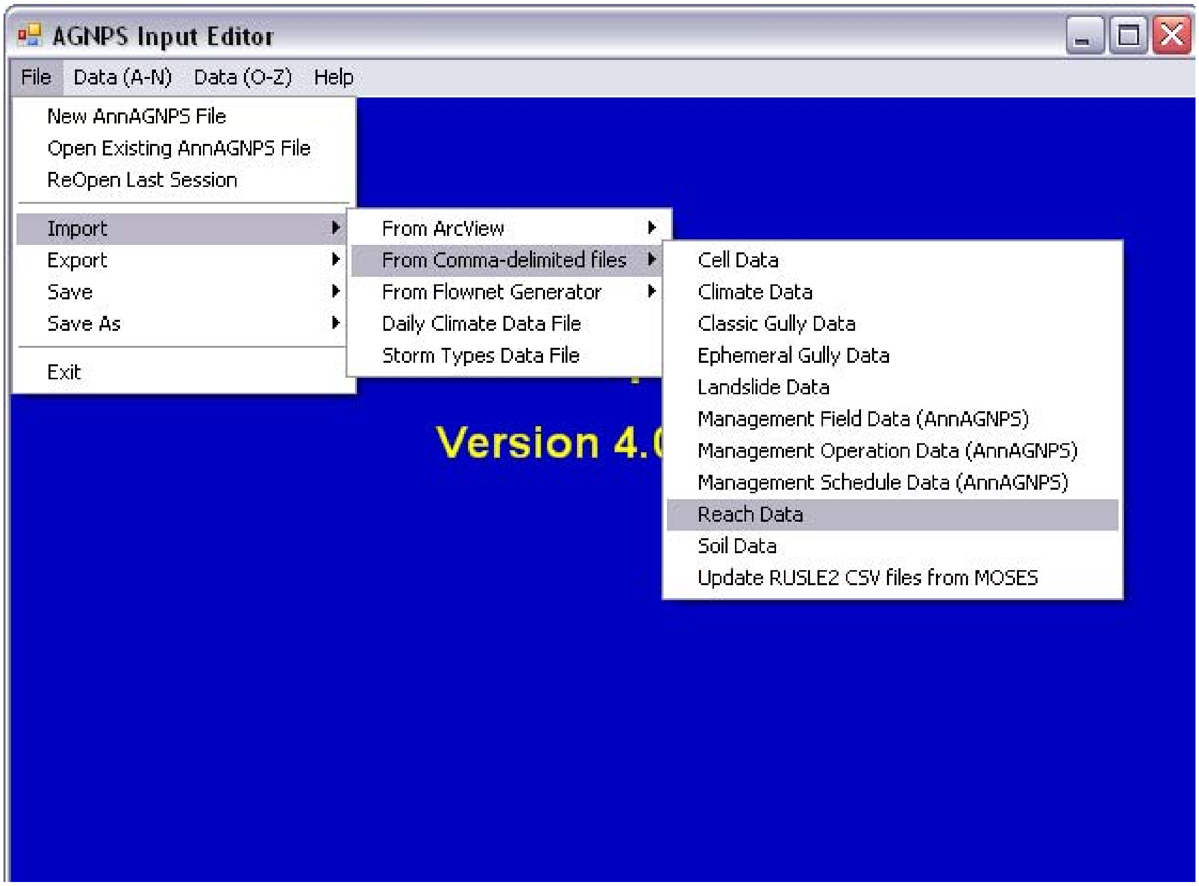
To download the cell data for the project:
Go to: File – Import – From Comma-delimited files – Cell Data



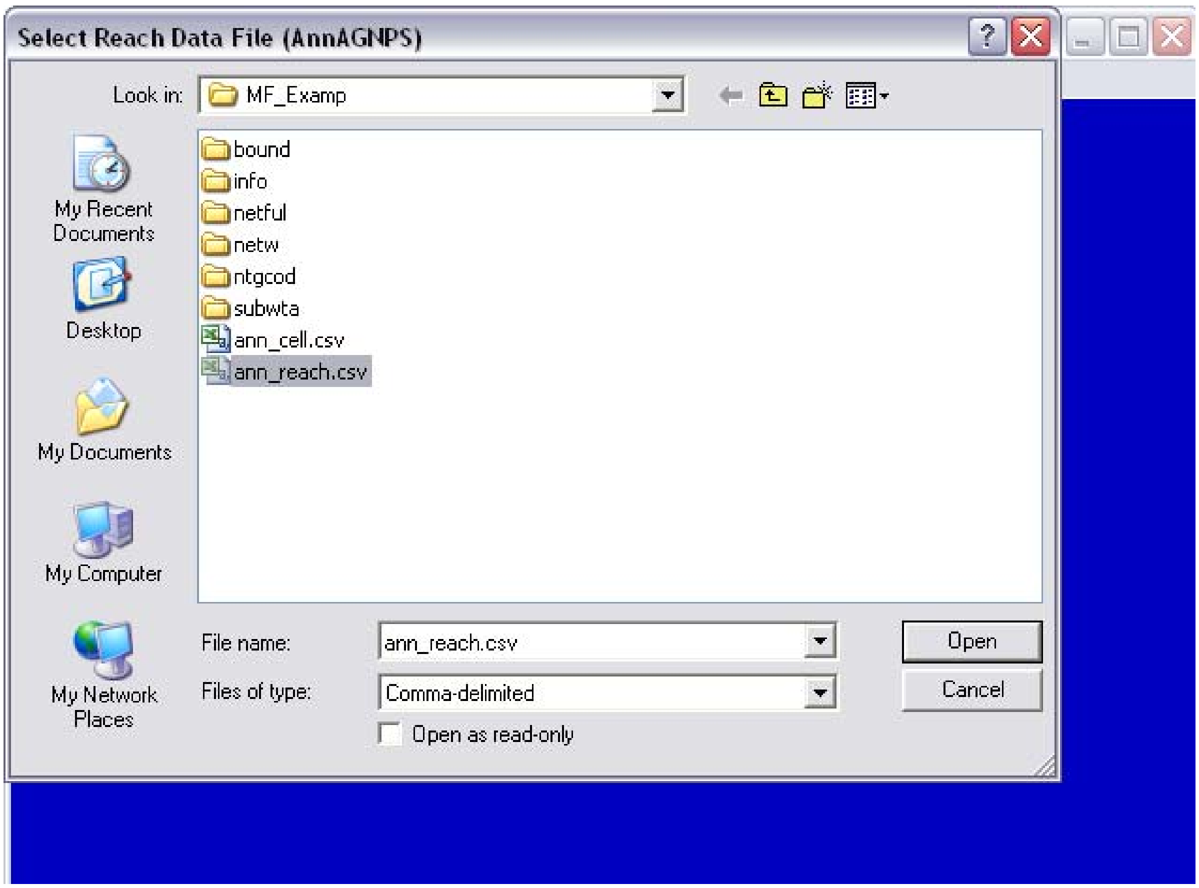
Go to Folder #4 of the project, then to the folder created in Step 6, which is called “MF_Examp” for this project, and import the “ann_cell.csv” file previously modified. Click “Open” when finished.



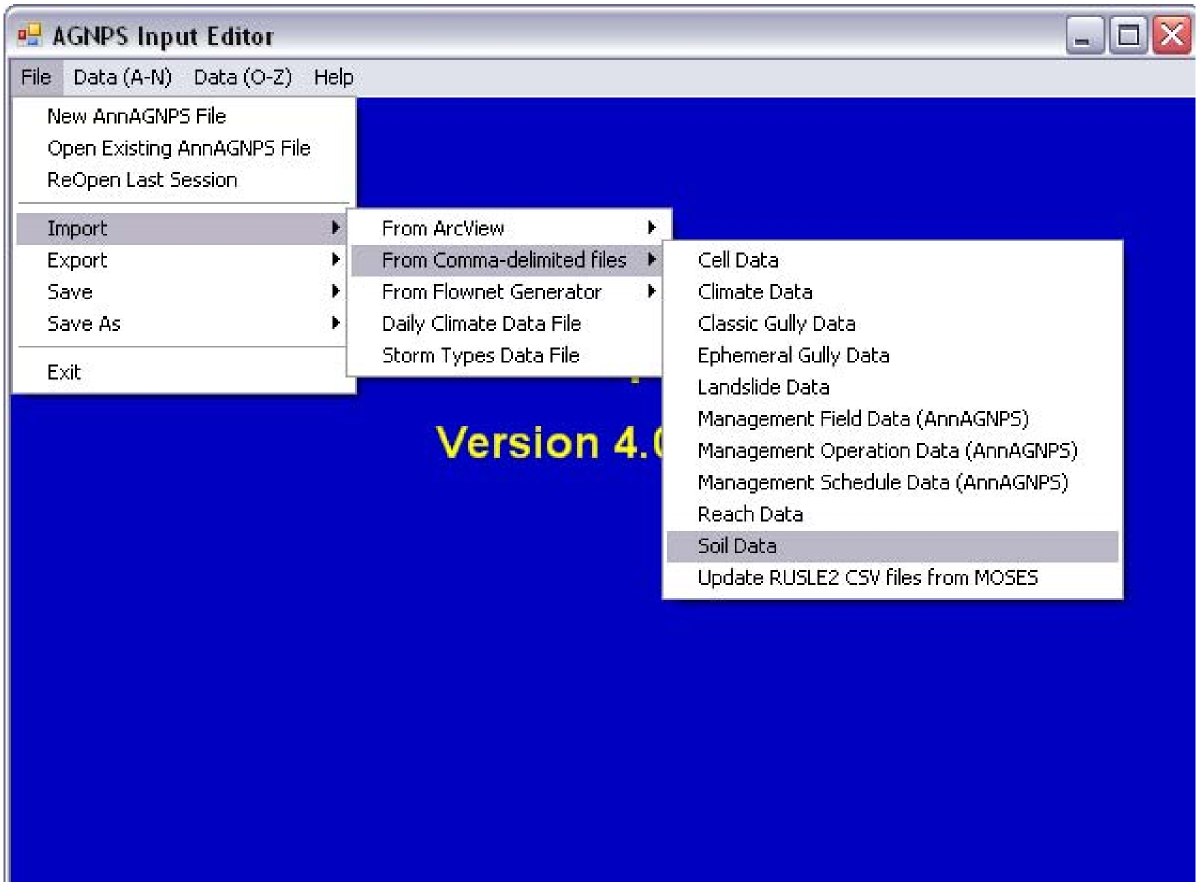
To download the reach data for the project:
Go to: File – Import – From Comma-delimited files – Reach Data



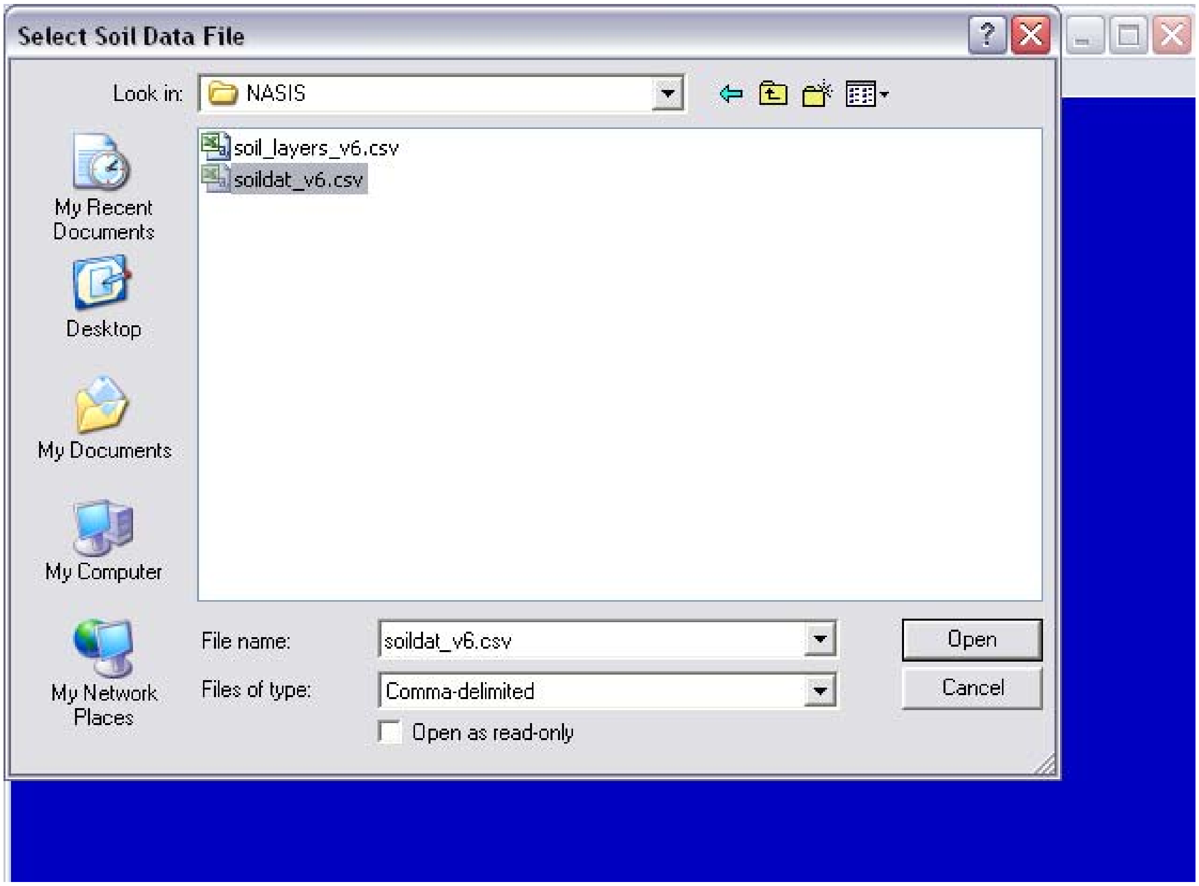
Go to Folder #4 of the project, then to the folder created in Step 6, which is called “MF_Examp” for this project, and import the “ann_reach.csv” file previously modified. Click “Open” when finished.



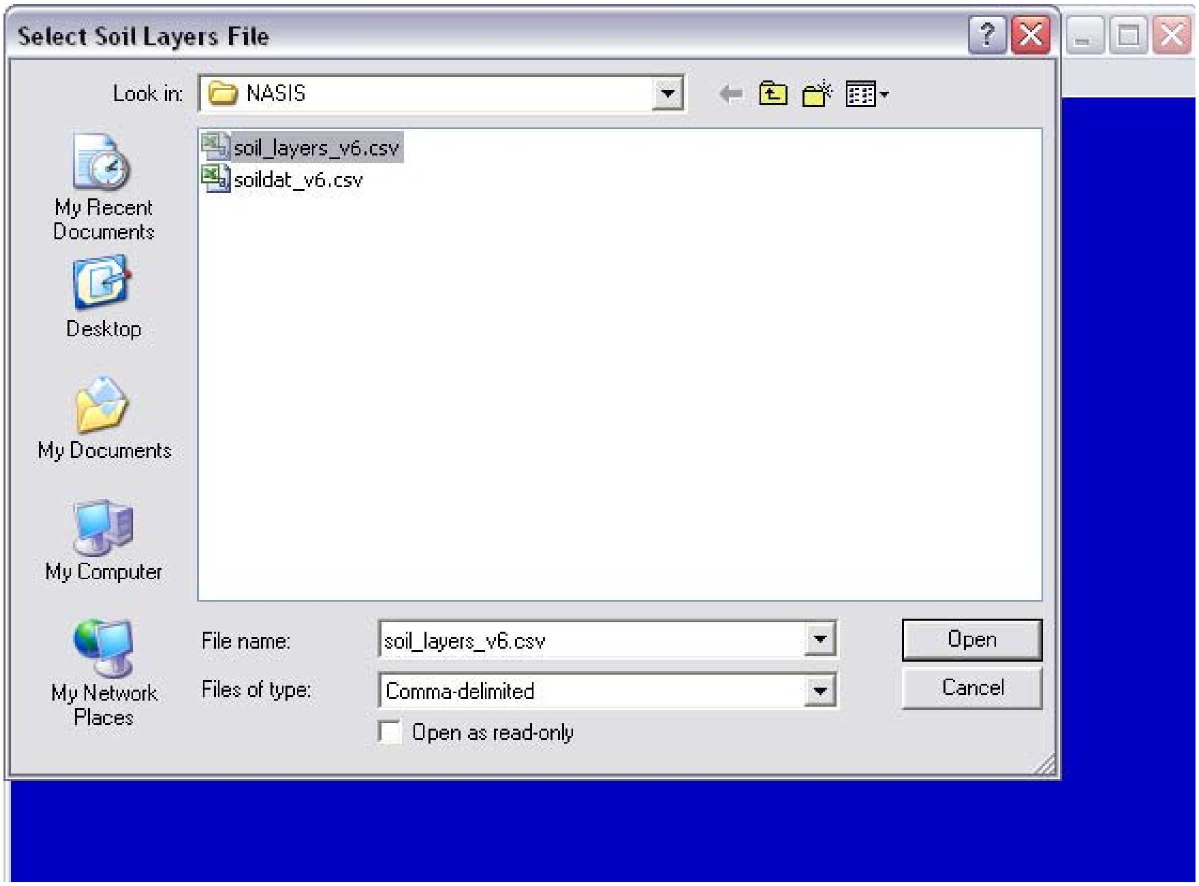
To download the soil data for the project:
Go to: File – Import – From Comma-delimited files – Soil Data



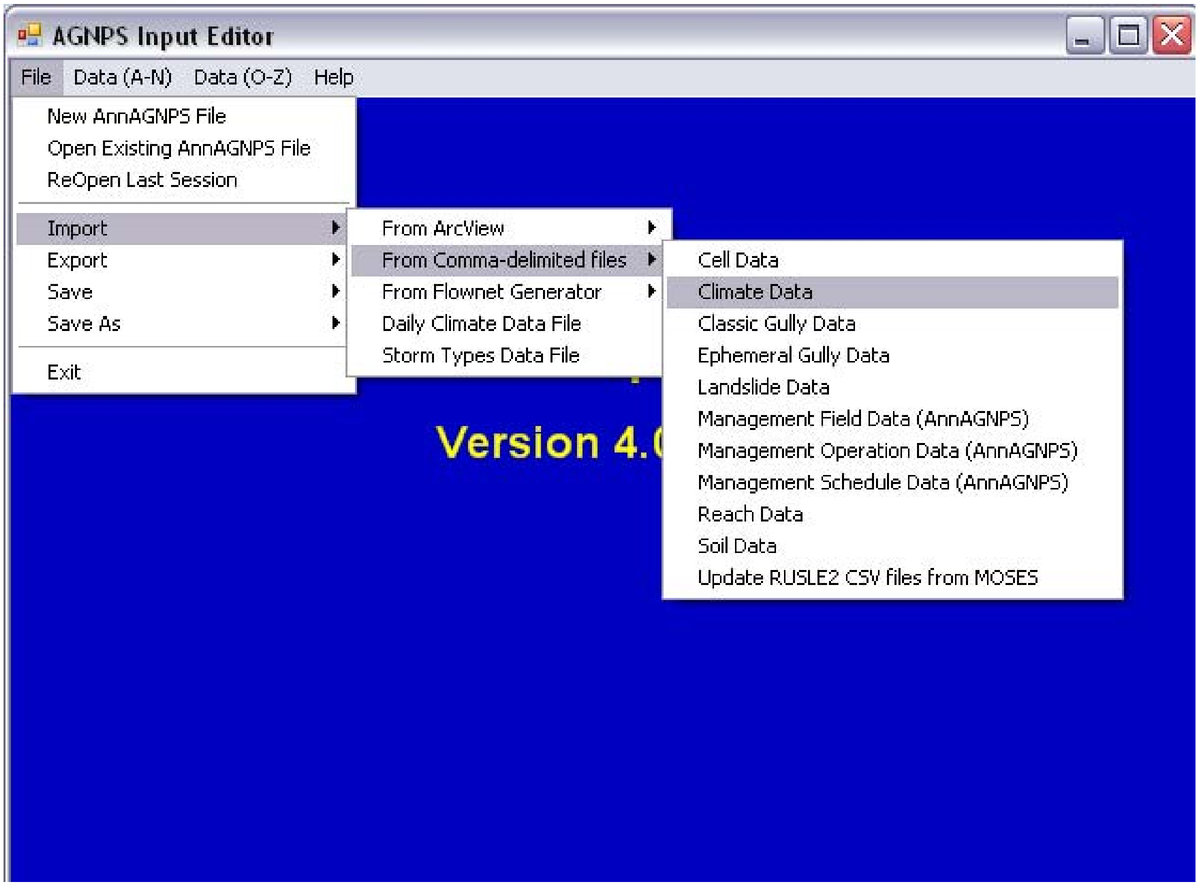
Go to Folder #6 of the project, then to the soils folder and import the “soildat_v6.csv” file and click “Open” for the Soil Data File.



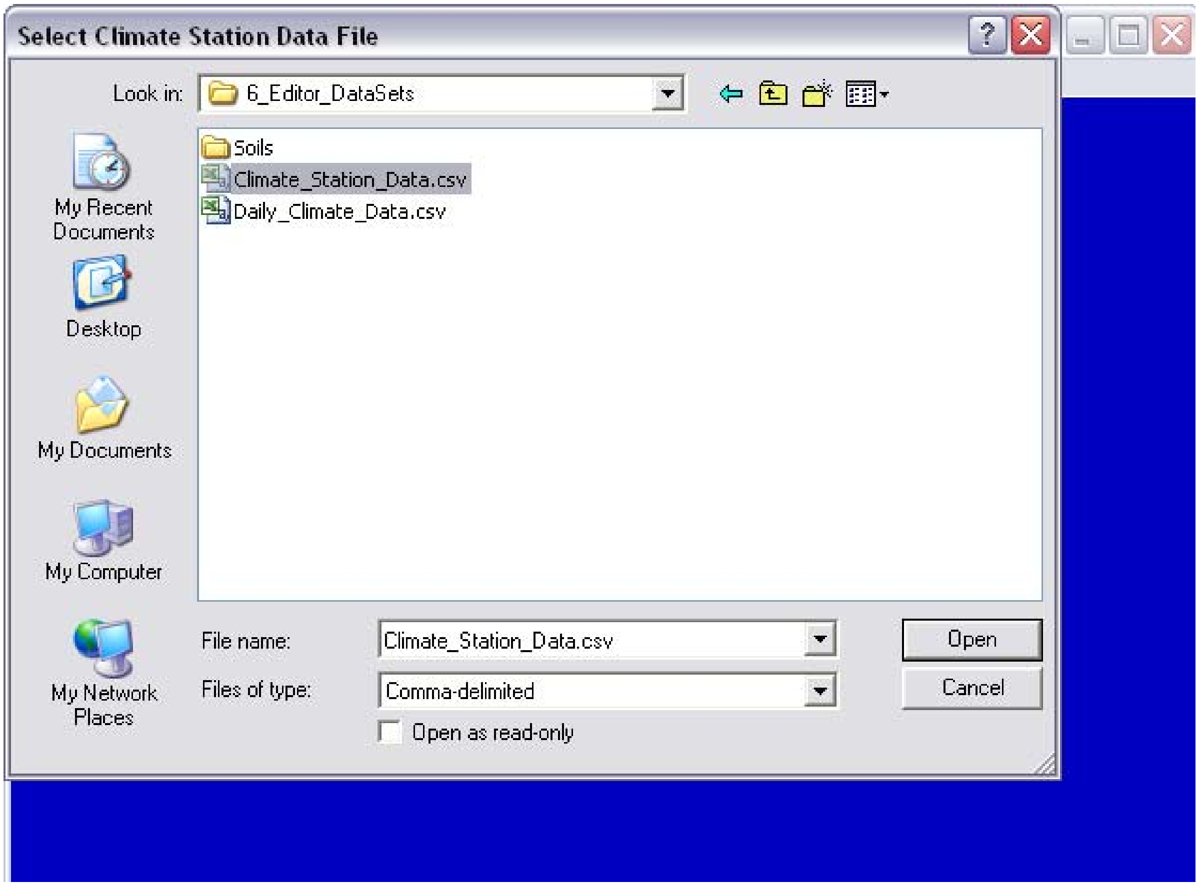
Go to Folder #6 of the project, then to the soils folder and import the "soil_layers_v6.csv" file and click "Open" for the Soil Layers File.



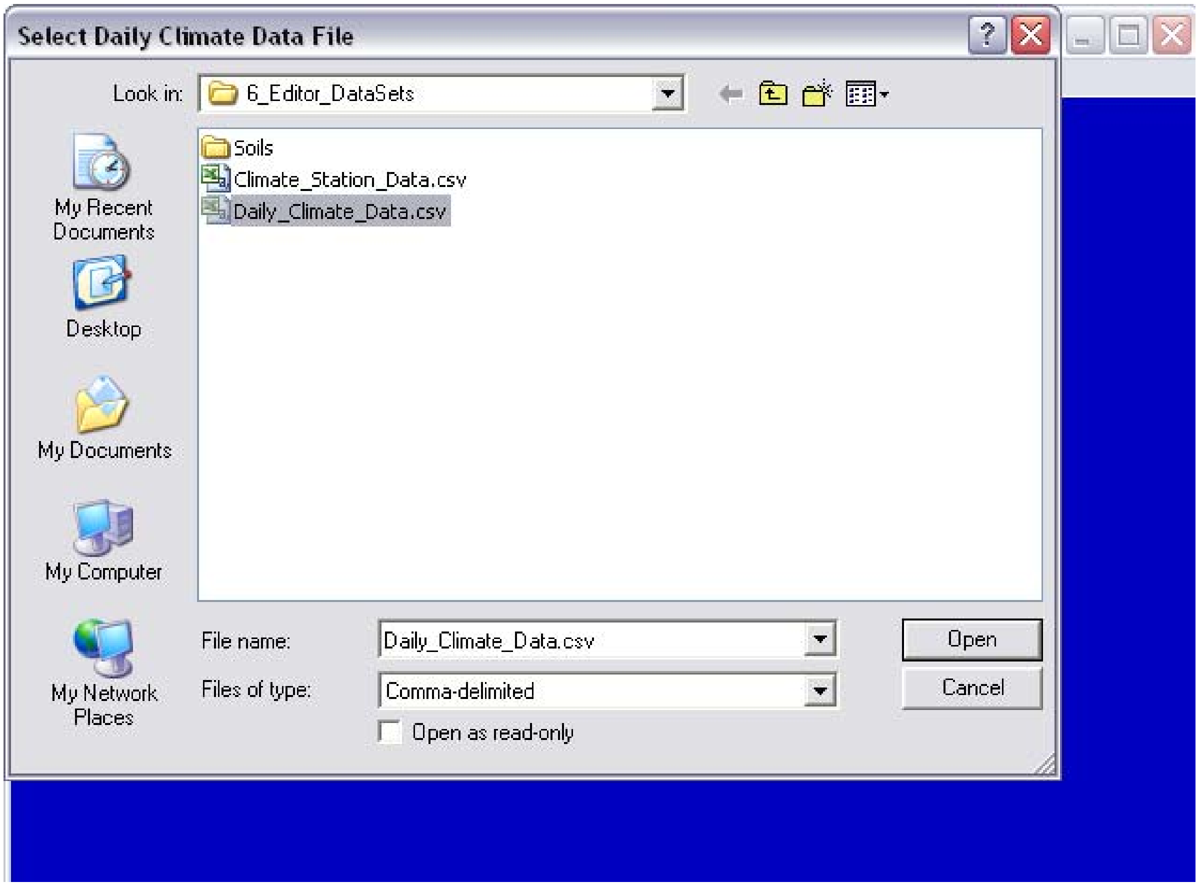
To download the climate data for the project:
Go to: File – Import – From Comma-delimited files – Climate Data



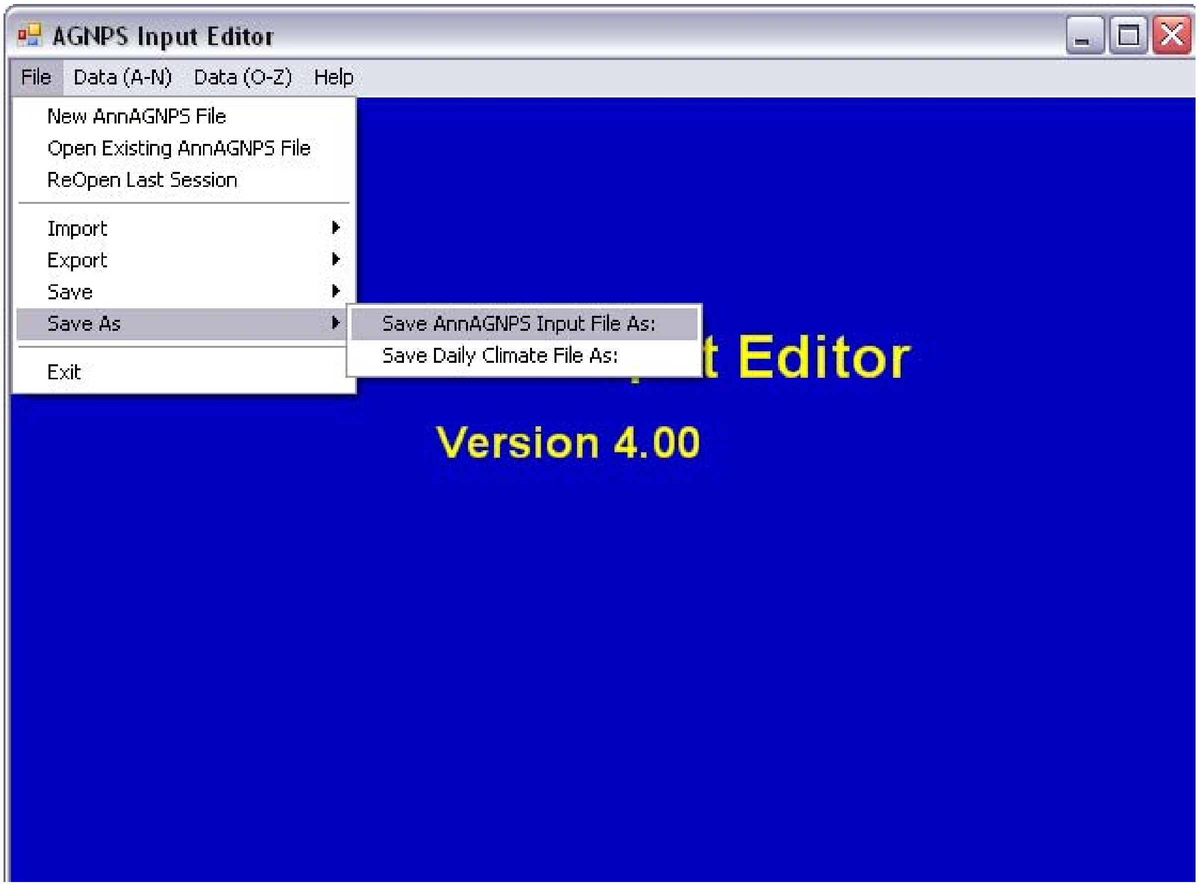
Go to Folder #6 of the project, then import the “Climate_Station_Data.csv” file and click “Open” for the Climate Station Data.



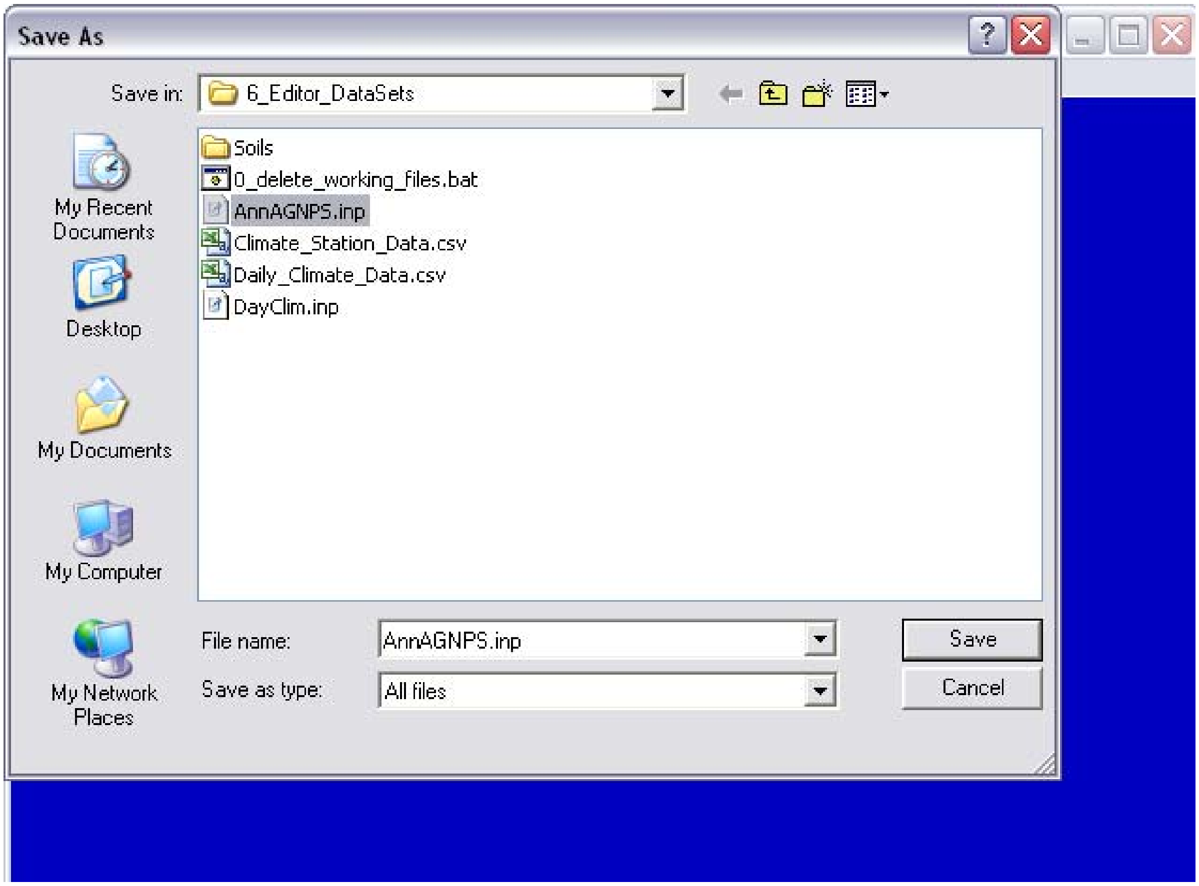
Next, go to Folder #6 of the project, then import the “Daily_Climate_Data.csv” file and click “Open” for the Daily Climate Data.



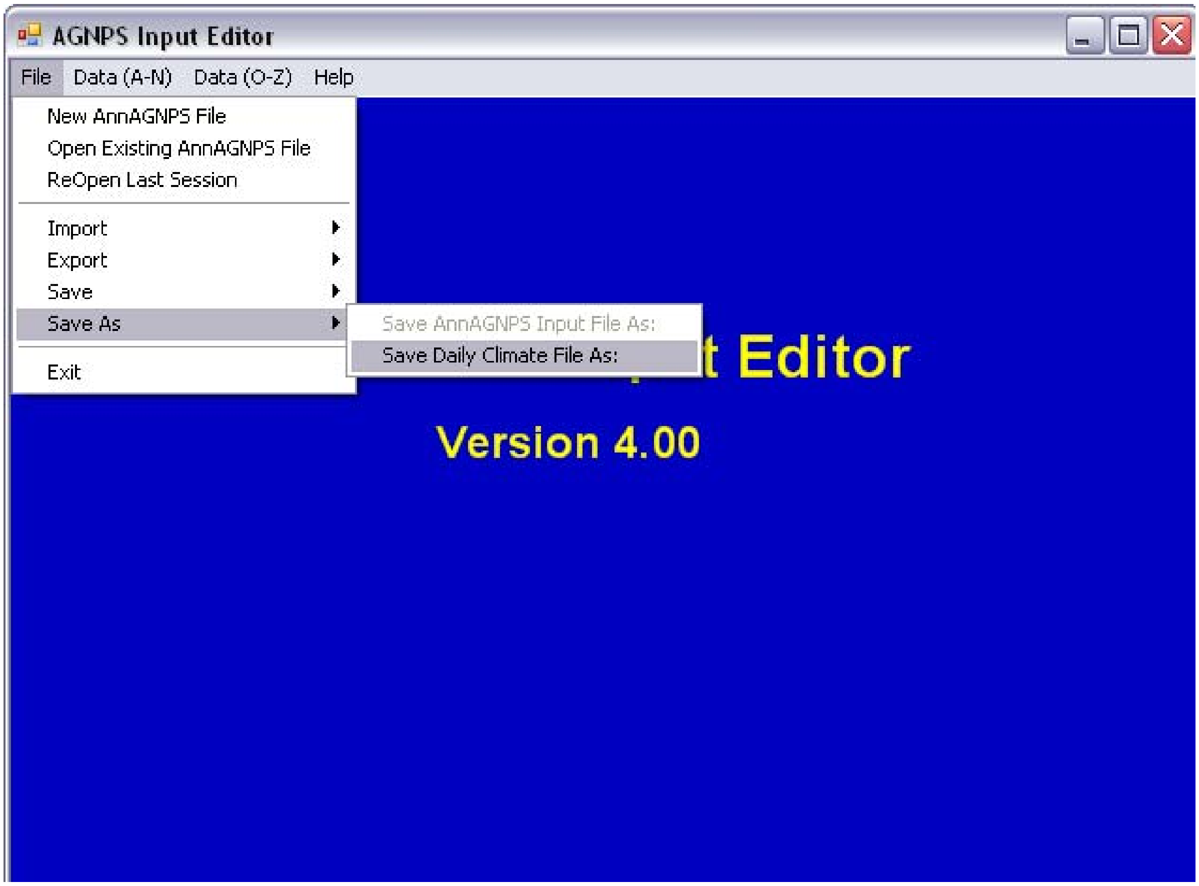
After importing the cell, reach, soil, and climate data from .csv files for the specific area and project, go to Save As – Save AnnAGNPS Input File.



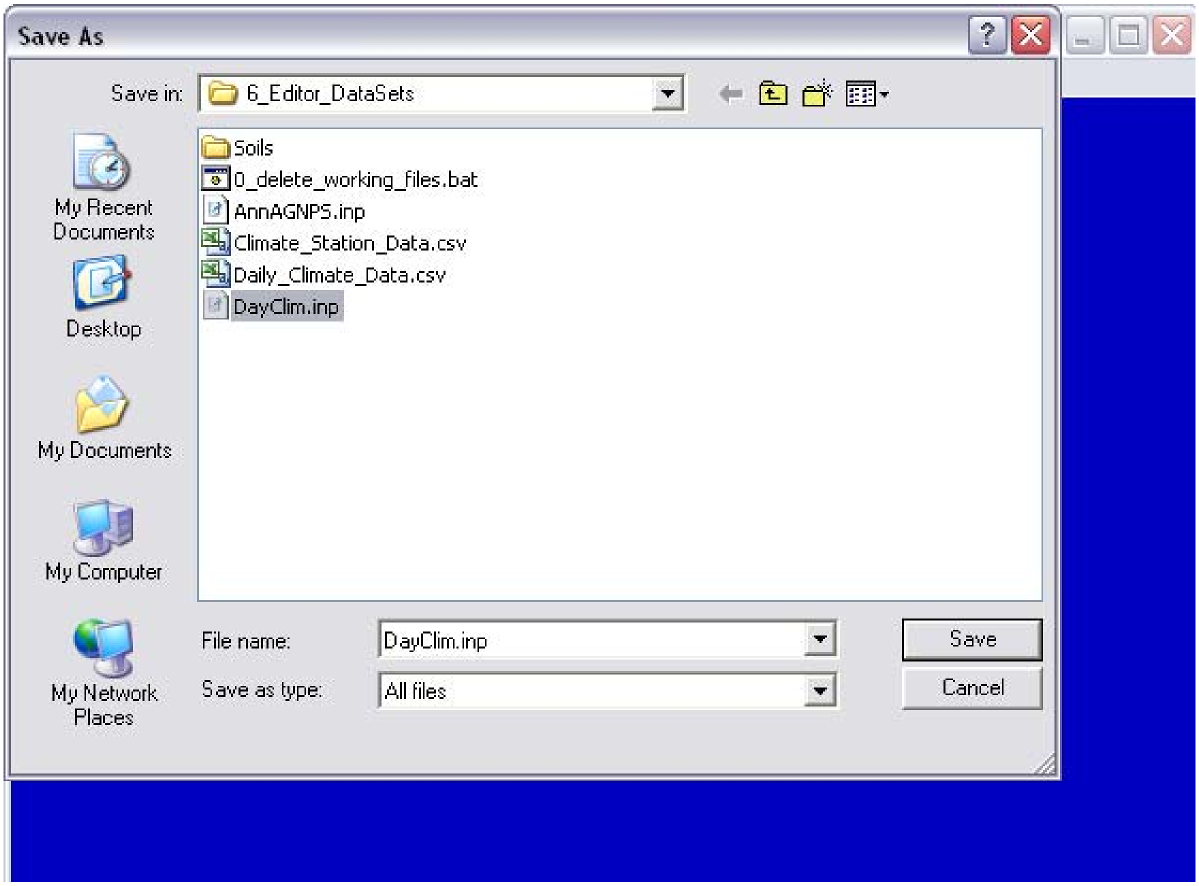
Go to “Save as type” in the bottom of the window and select “All Files”. You should then see the AnnAGNPS.inp file in Folder #6. Click the AnnAGNPS.inp file and then push Save.



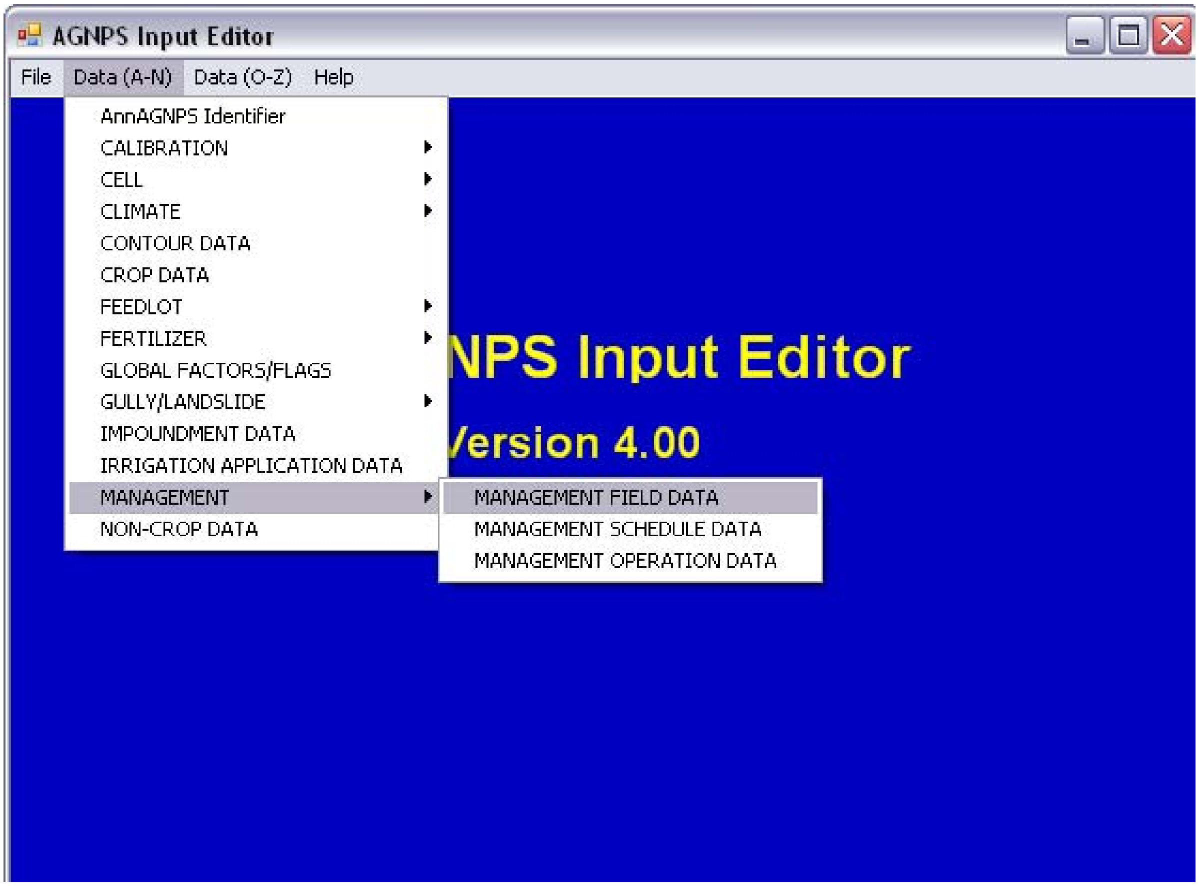
After saving the AnnAGNPS Input File. Go to Save As – Save Daily Climate File.



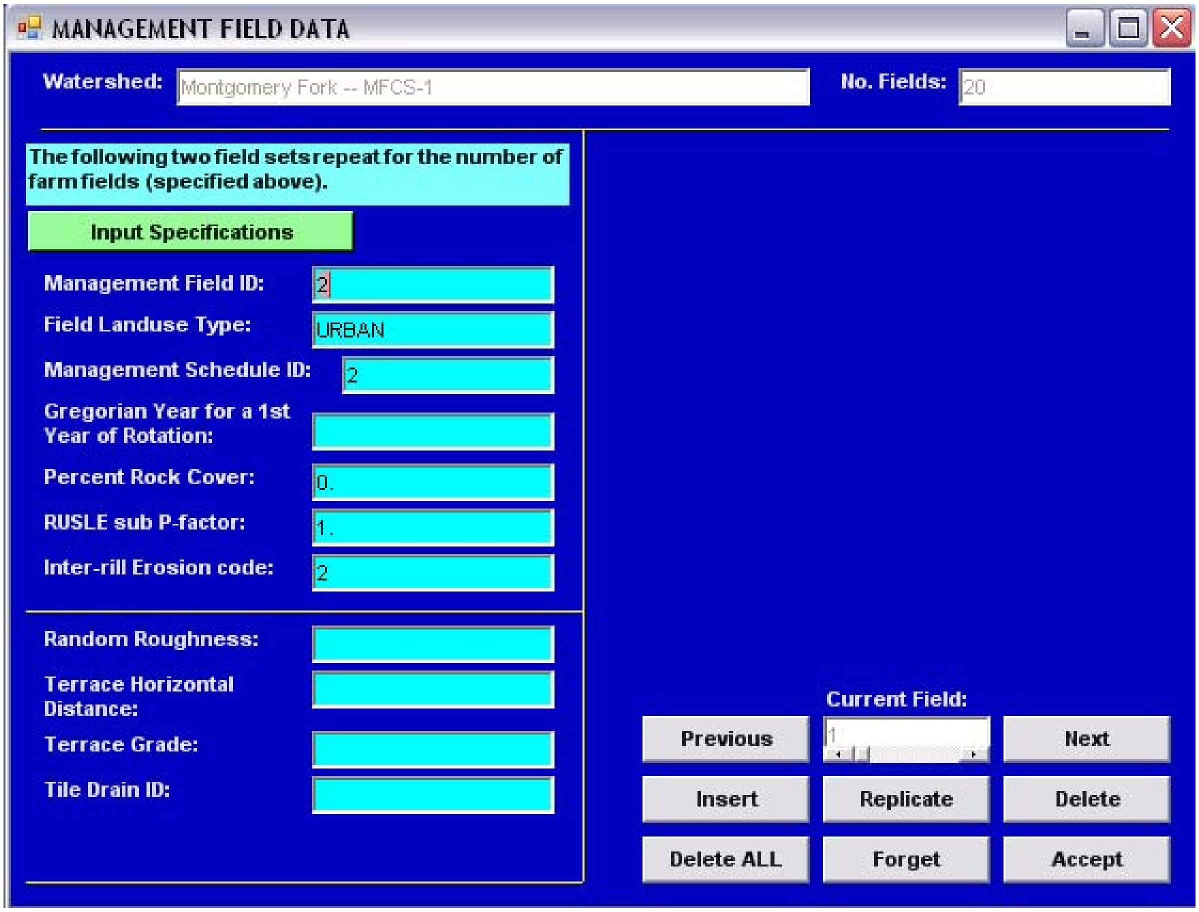
Go to “Save as type” in the bottom of the window and select “All Files”. You should then see the DayClim.inp file in Folder #6. Click the DayClim.inp file and then push Save.



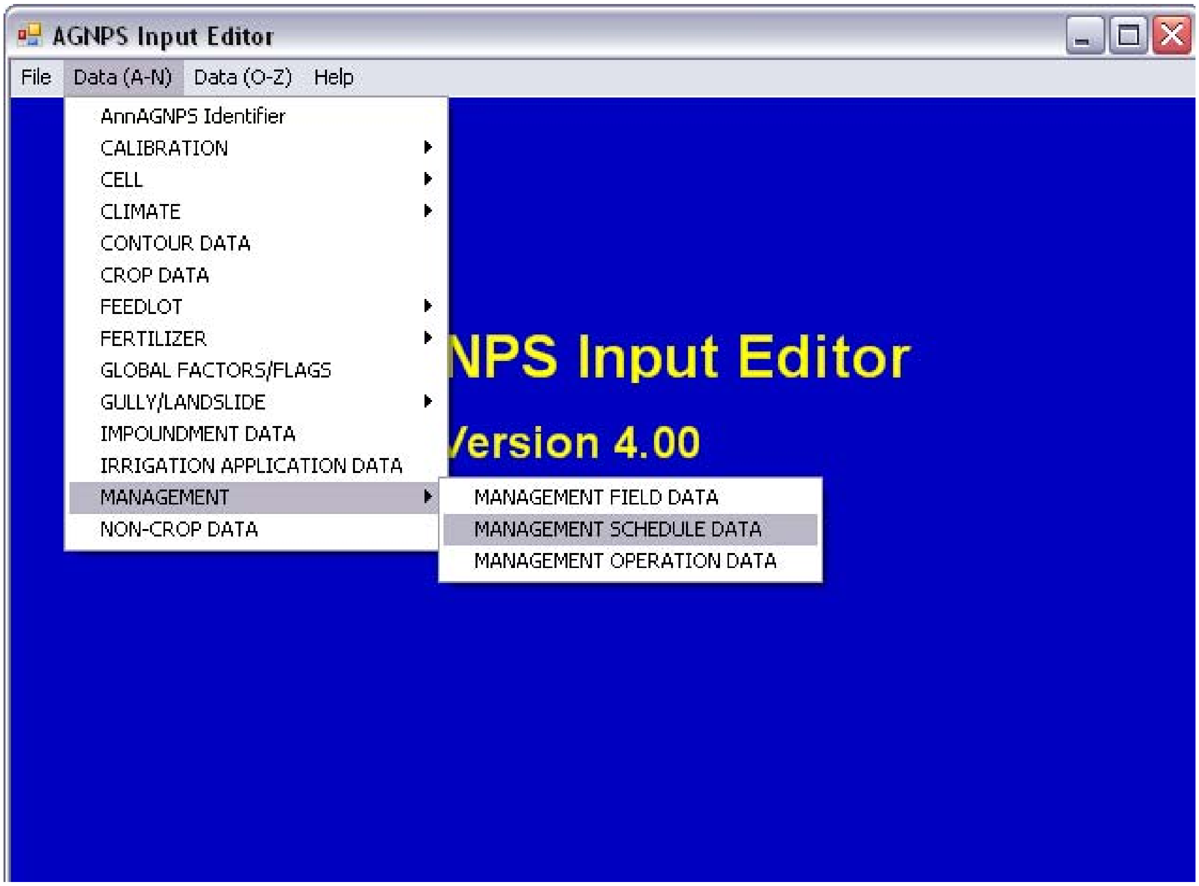
Next, there are several data sets to represent the different characteristic of the land use activities to compute the runoff and sediment yield. First, go to Management – Management Field Data.



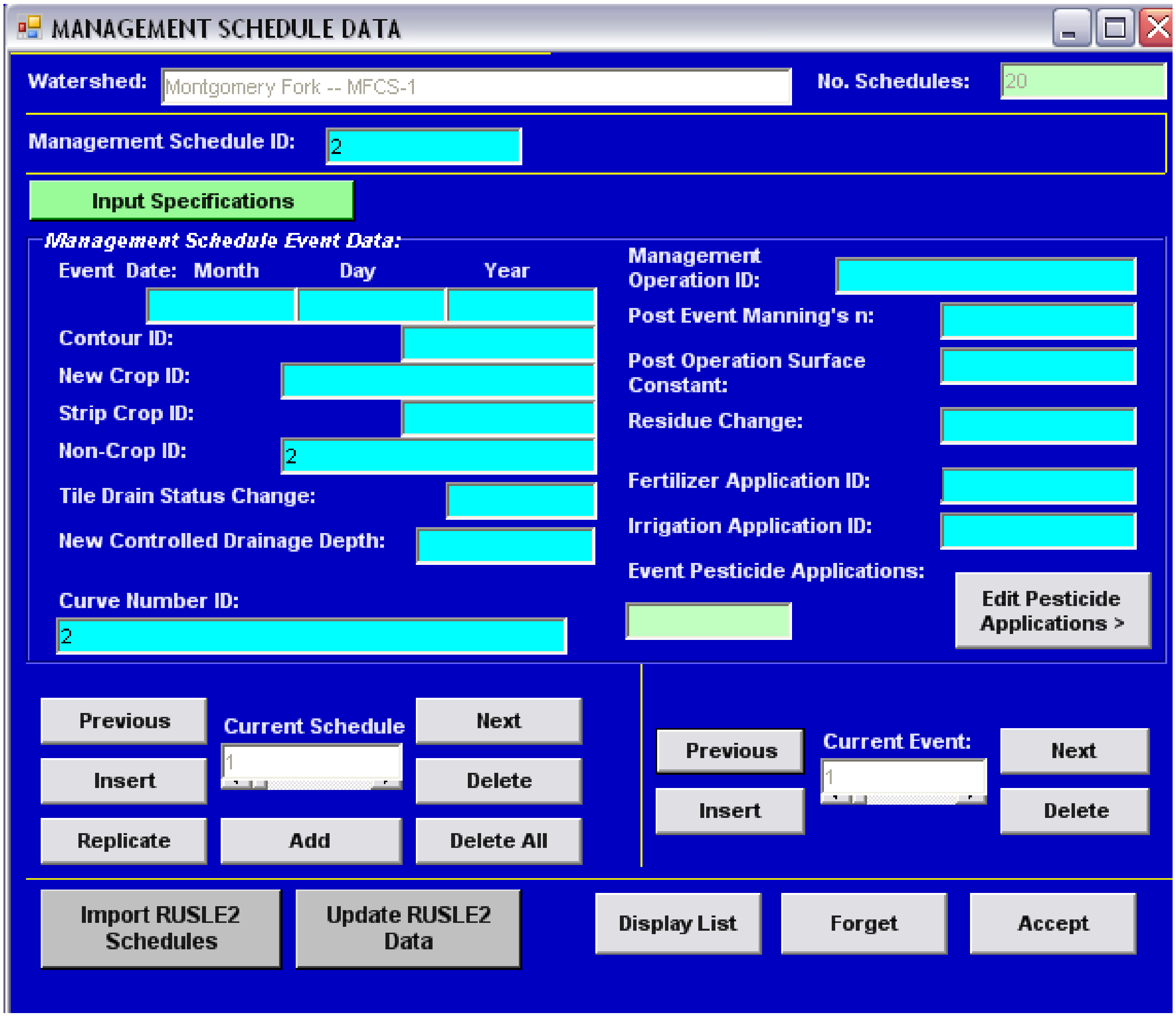
For each Land use, there is a Field ID associated with each, as seen in the land use GIS shape file attributes. For each land use field ID, the following data must be typed in, if not already existent from previously files. After the required data fields are completed for each land use in the Management Field Data category, select “Accept”. Note that if a data is missing for a required blank, it will be highlighted in red.



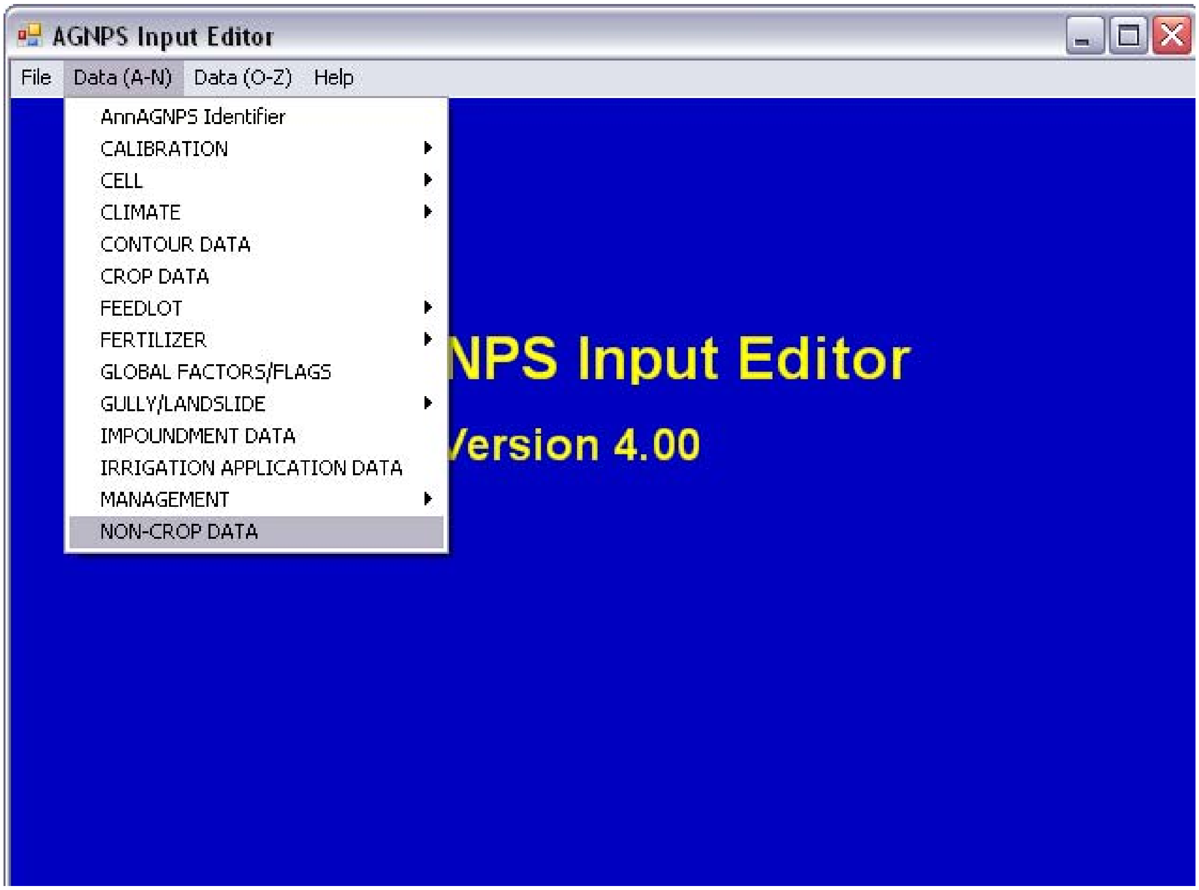
Next, go to Management – Management Schedule Data



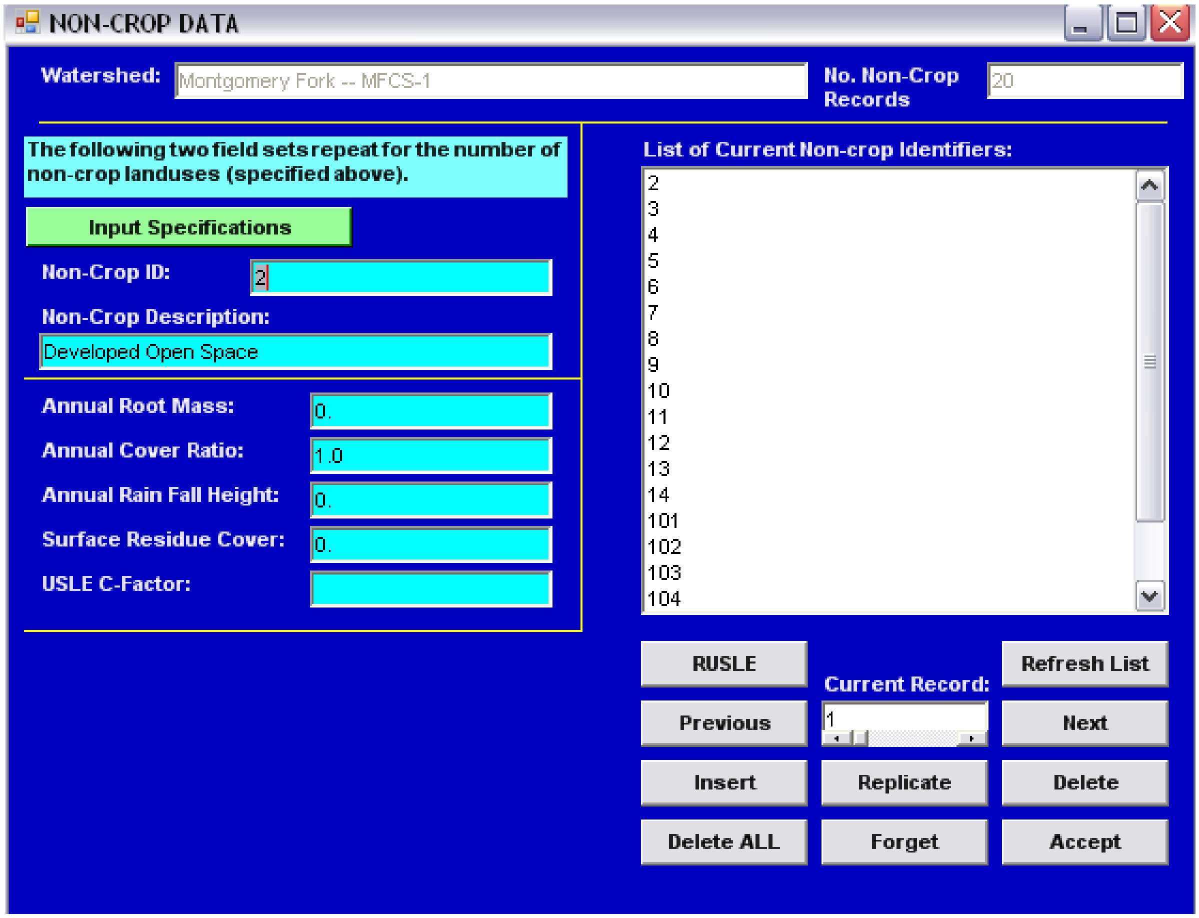
For this category, the blanks that contain all the land use Field ID are only required as shown. For runoff and sediment yield, each field ID must be entered into the 3 blanks shown below. Click “Accept” when finished.



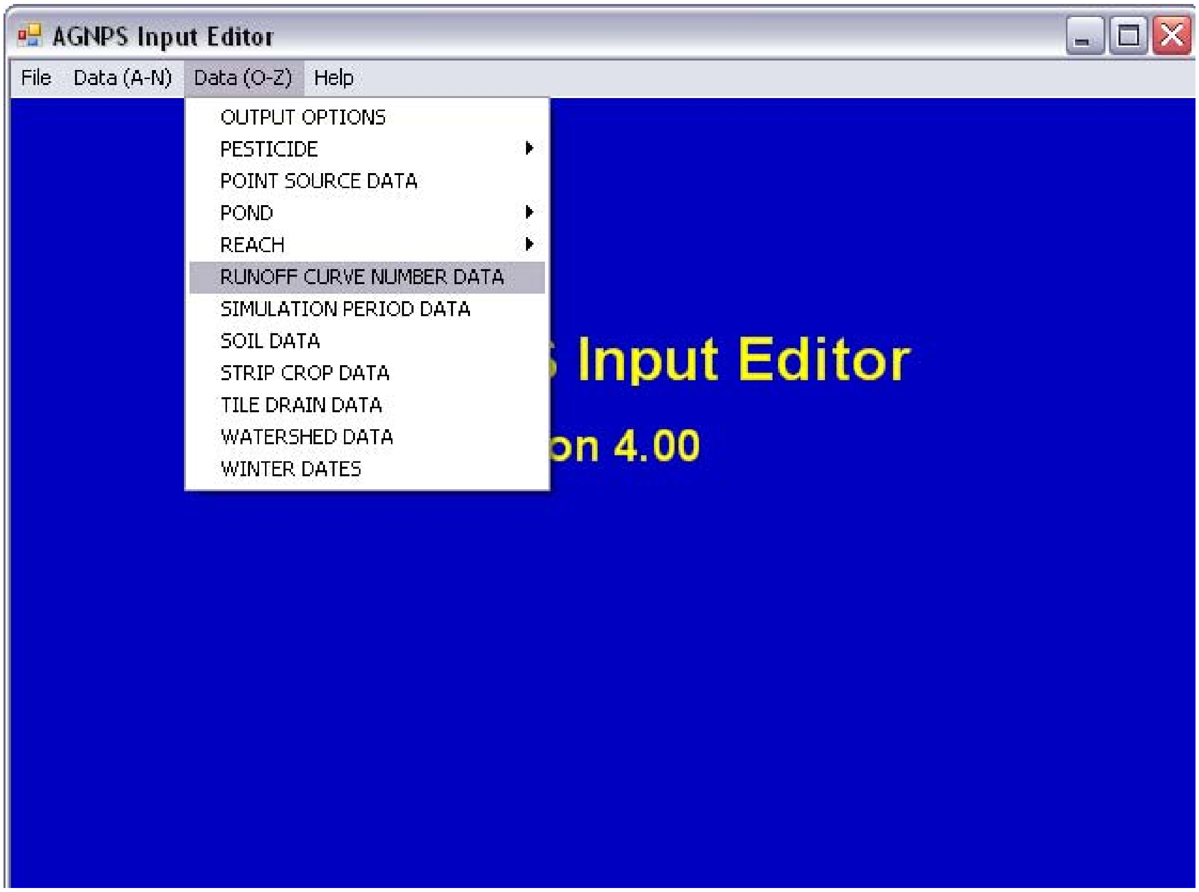
Next, go to Non-Crop Data.



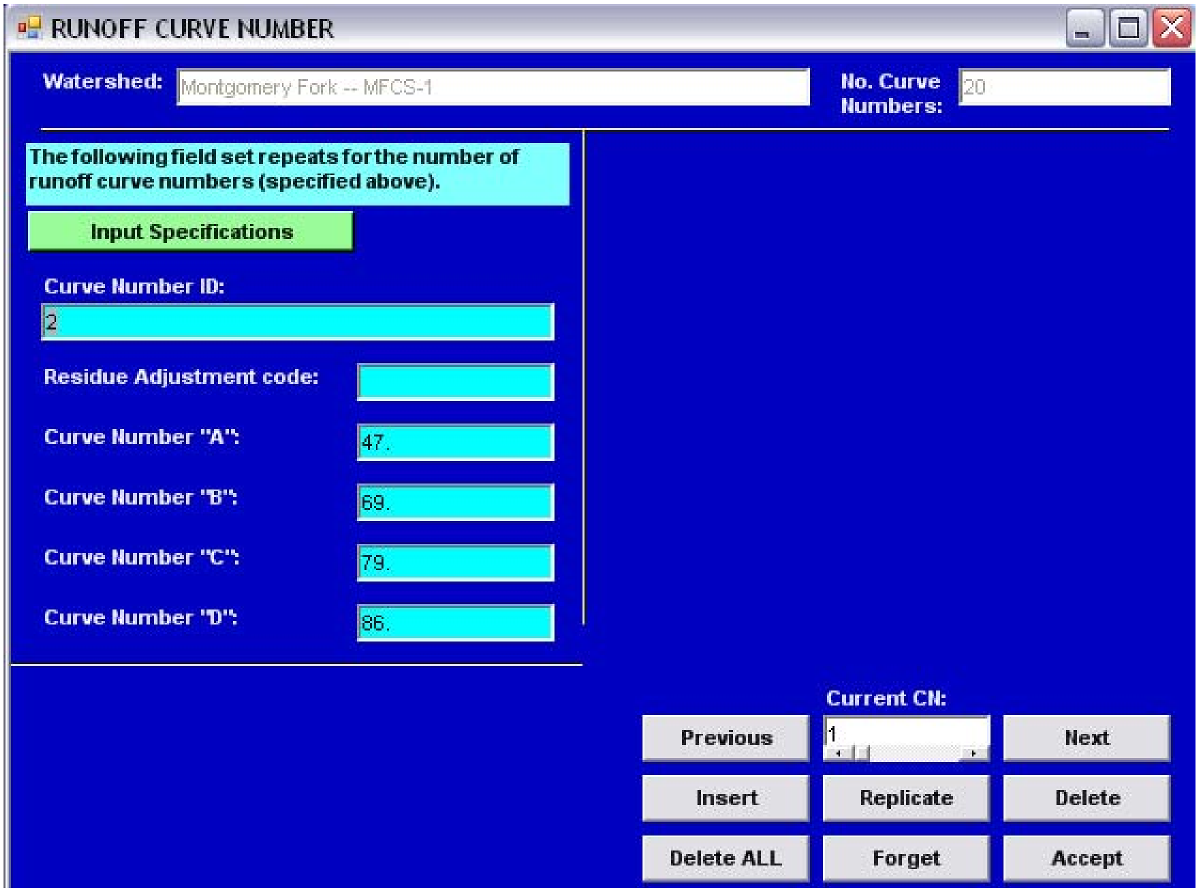
As seen here, all the land use activity's field ID must be stated and given representative data to describe the following 4 RUSLE C Sub-factors. This previous input editor contains calibrated values for each land use already programmed into it, but they can be altered if wished. Click "Accepted" when finished.



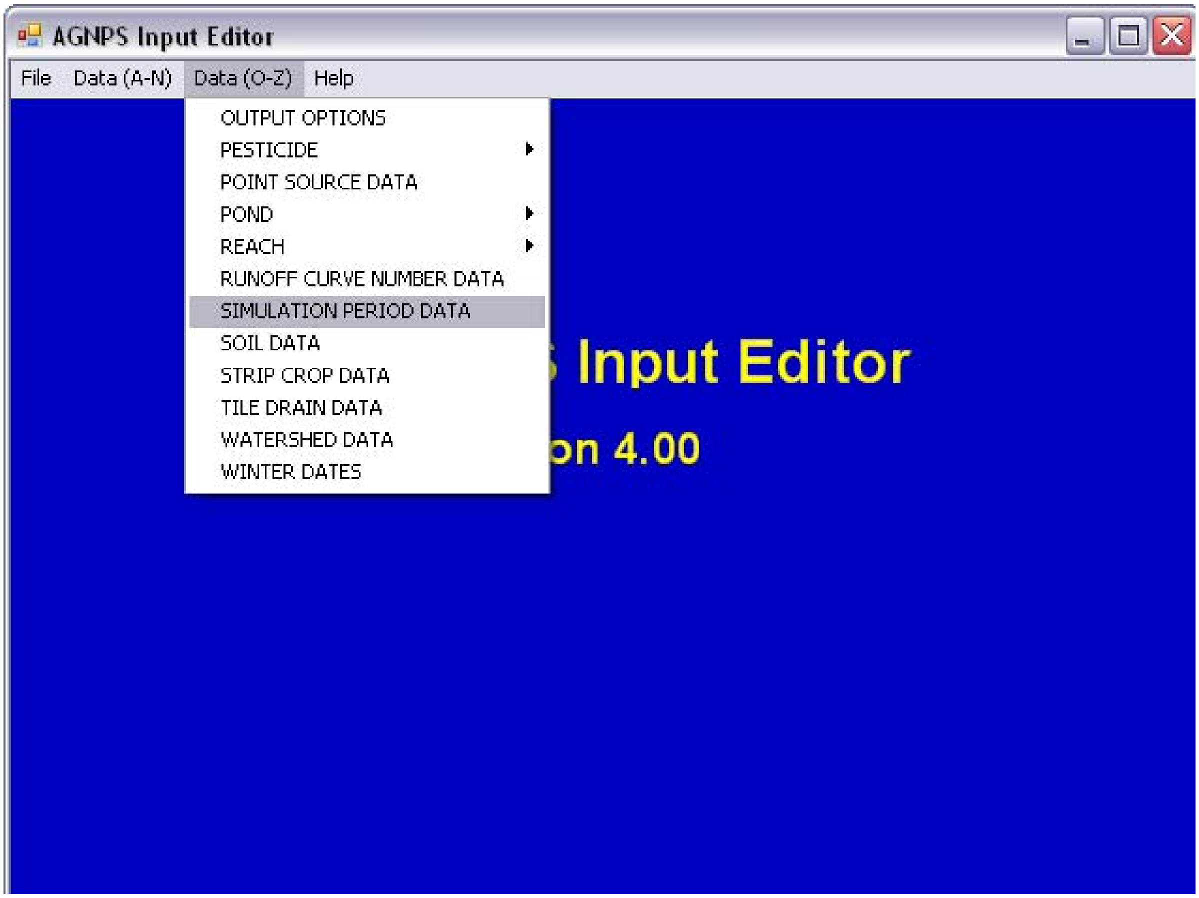
Next, go to Runoff Curve Number Data.



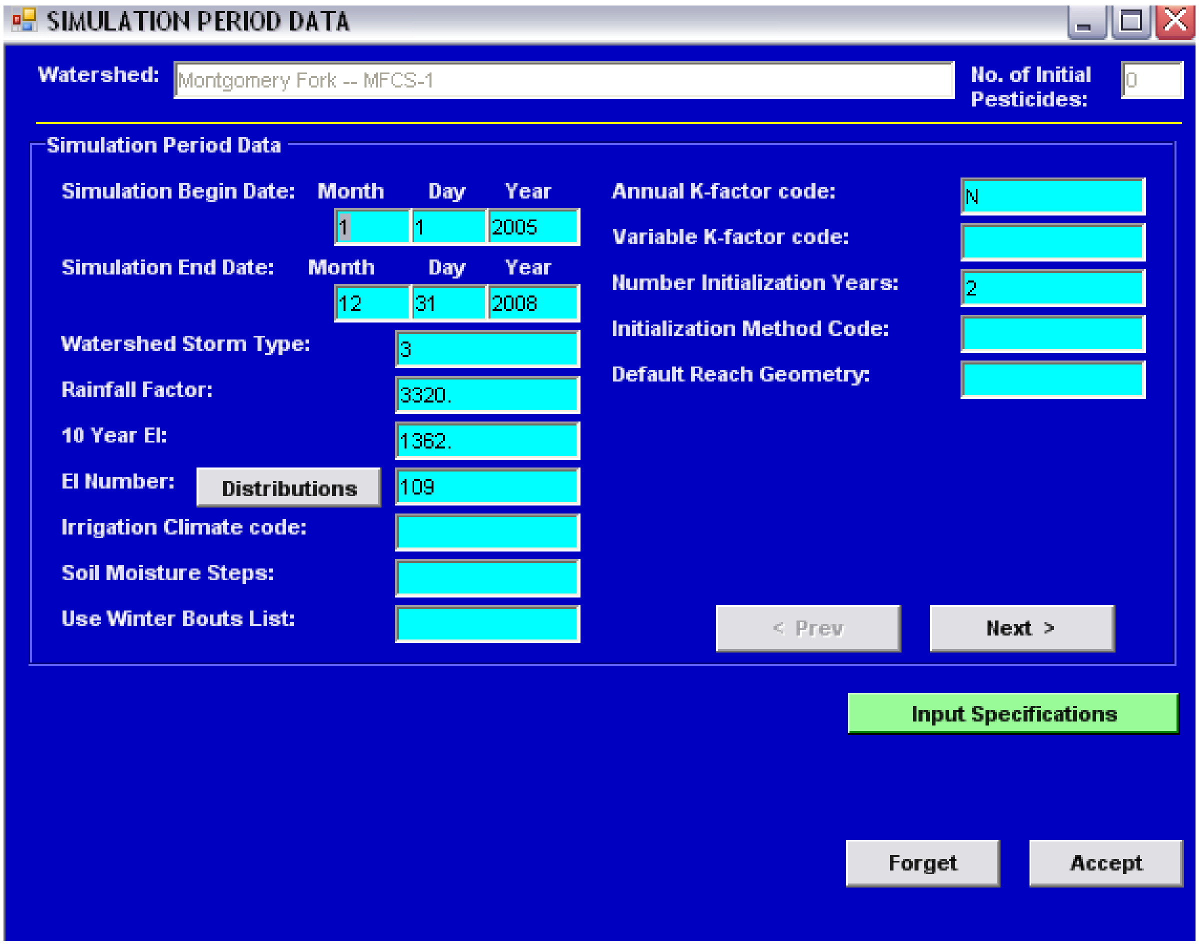
Again, each land use is identified by its designated Field ID and each activity has Curve Numbers from the NRCS (SCS) TR-55 Manual. From the existing AnnAGNPS Input Editor used, each land use has calibrated CN values for the New River Basin. Click “Accept” when finished.



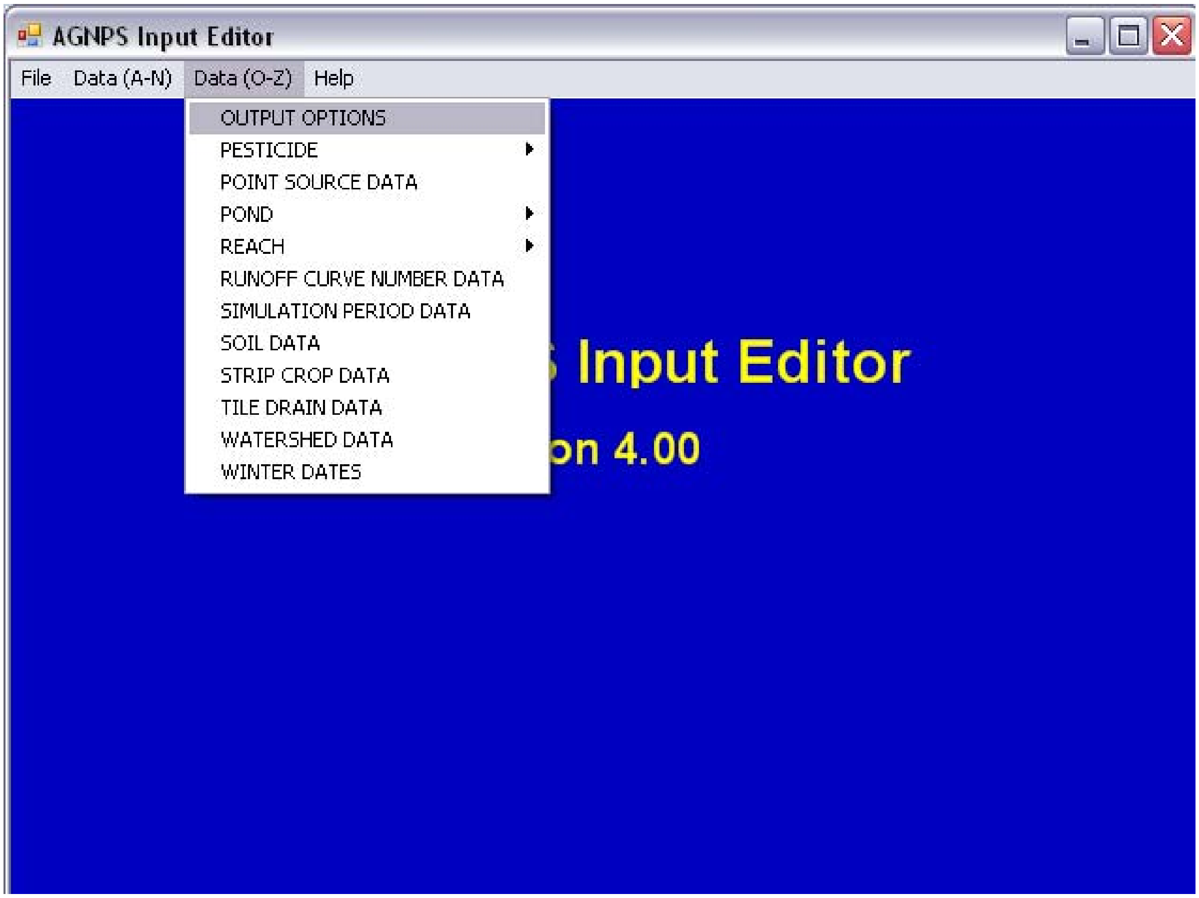
Next, go to the Simulation Period Data.



The simulation period data should match the same dates of the climate data previously uploaded. This tells the model how long to simulate the watershed's characteristics for runoff and sediment yield. Also contained in this table are TR-55 and RUSLE variables that represent the location of this project. Click "Accept" when finished. Remember to click on the white letters of the information required to see what units or choices are available for

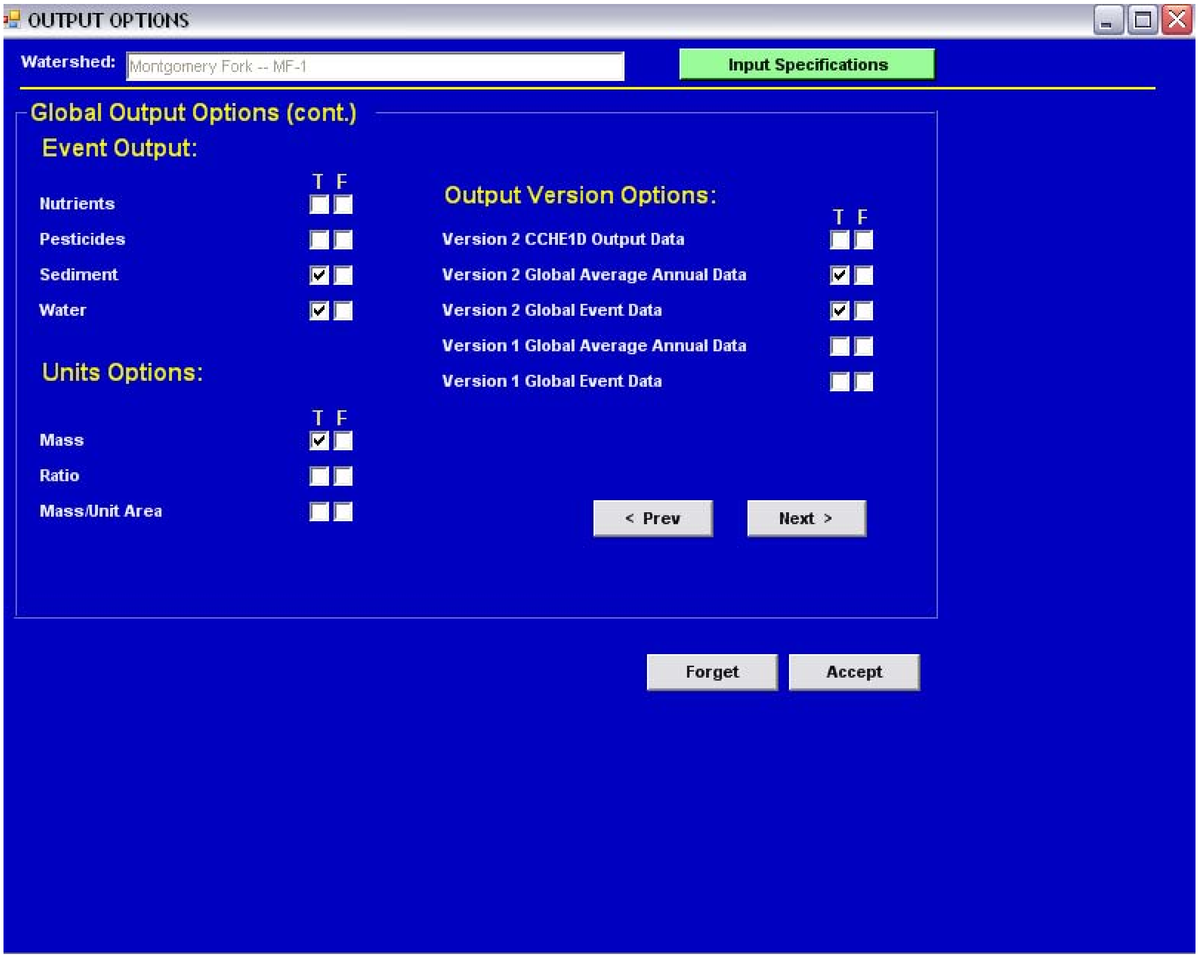


Finally, go to Output Options. In the Output Options, select the specific program output data you would like to view. For runoff and sediment, place a check in the output options show in the next few slides.

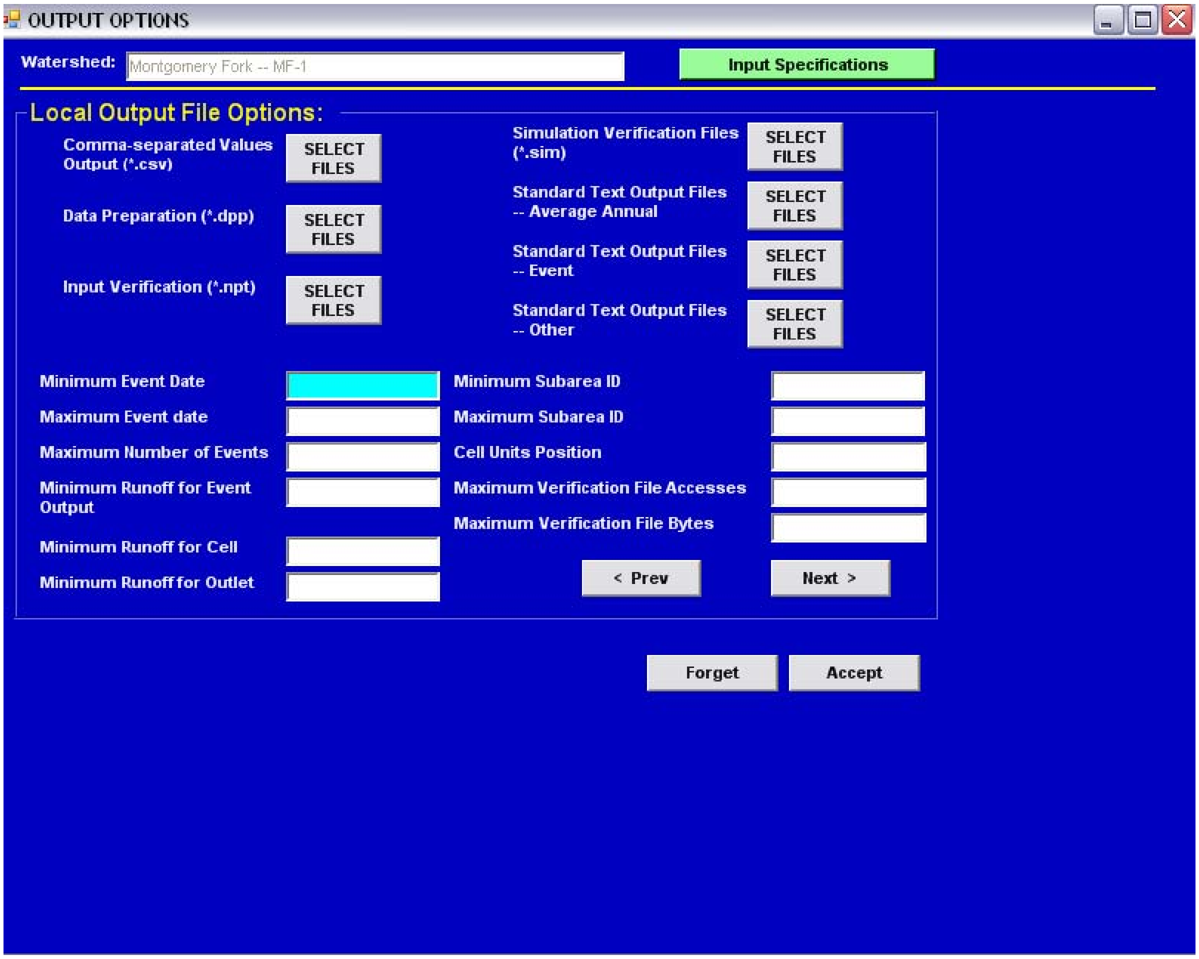


Output Options – Page 1

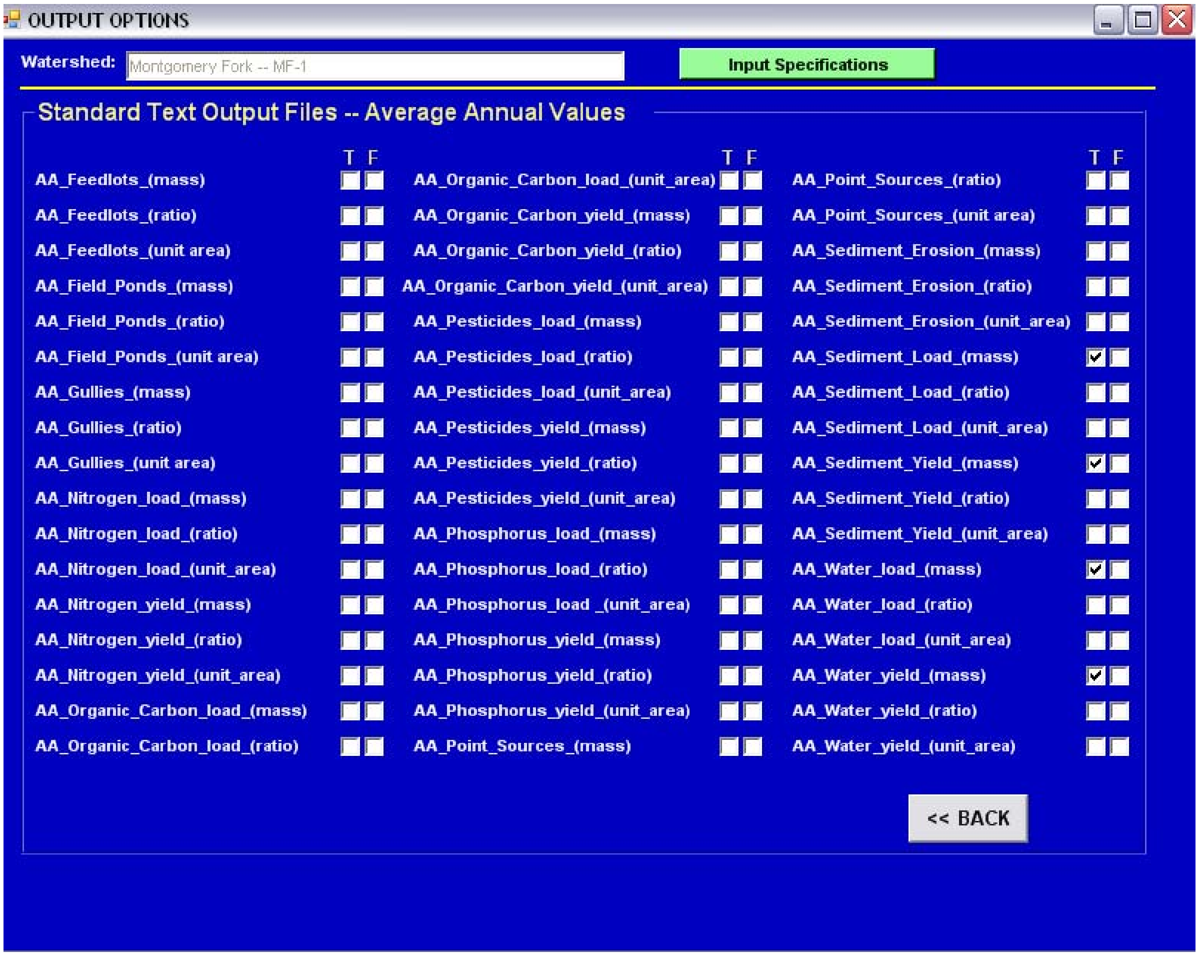
Output Options – Page 2



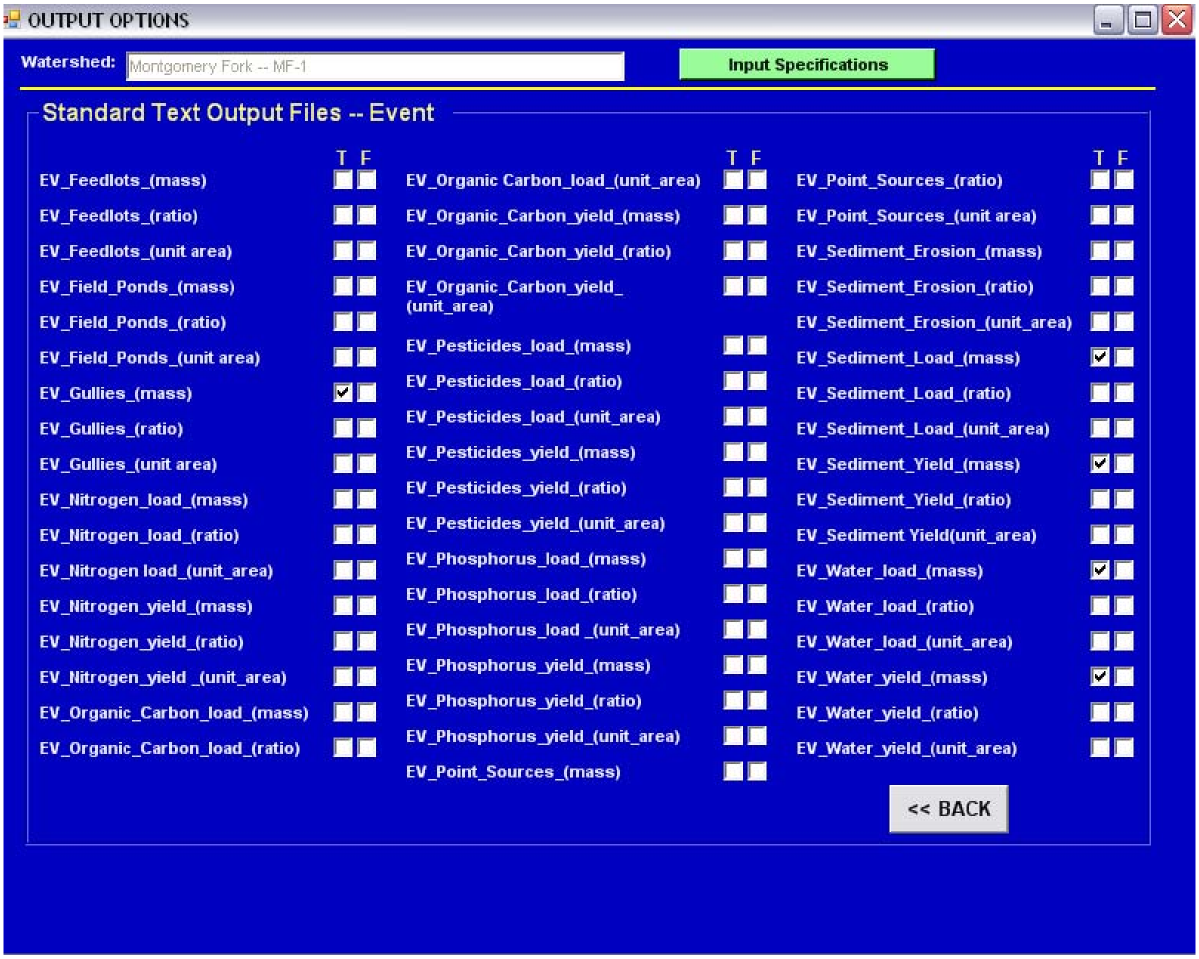
Output Options – Page 3
Found on this page, you can click on 7 different types of output files. For the New River Study, the “Standard Text Output Files – Average Annual”, “Standard Text Output Files – Events”, and “Standard Text Output Files – Other” contained output specifications shown below.



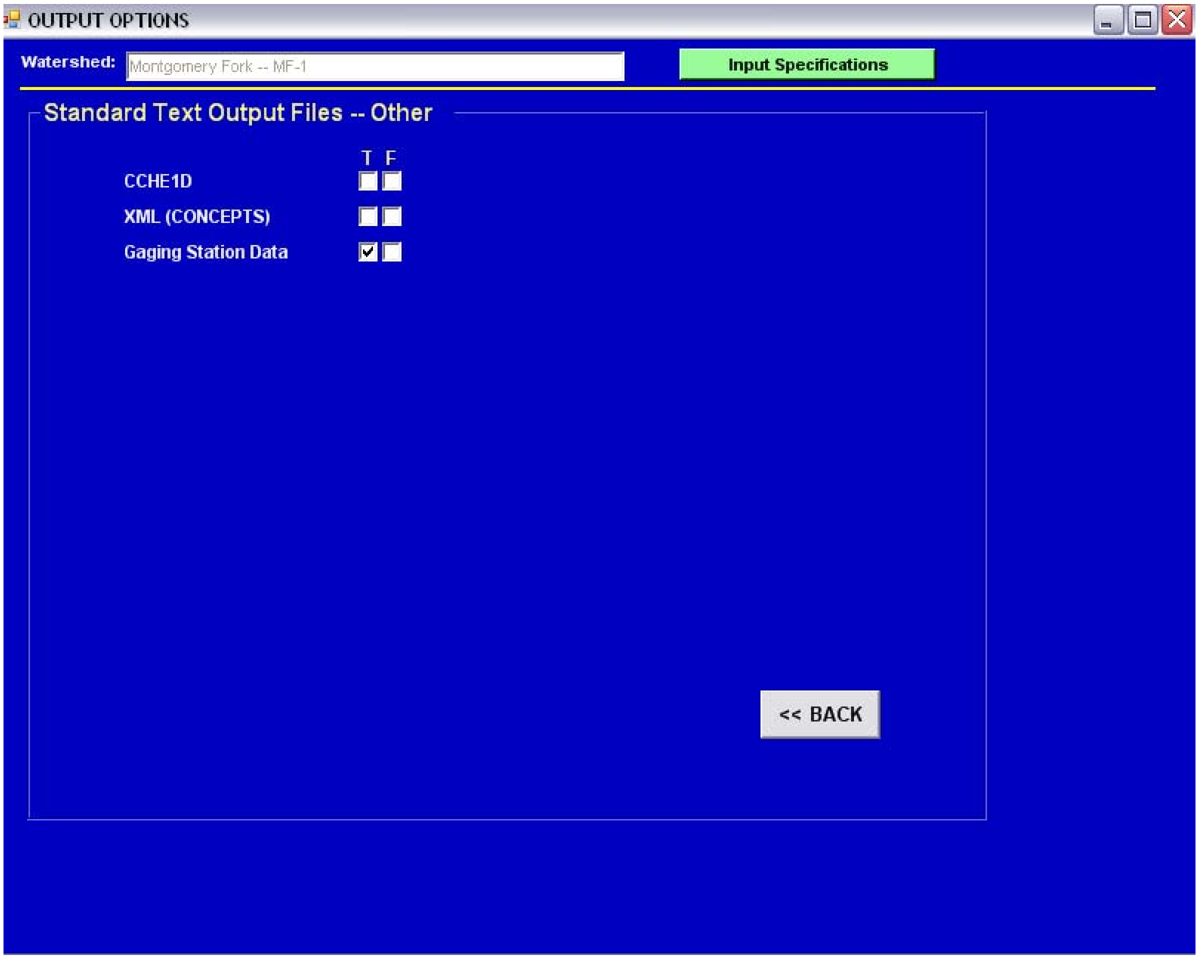
Output Options – Page 3
Standard Text Output Files



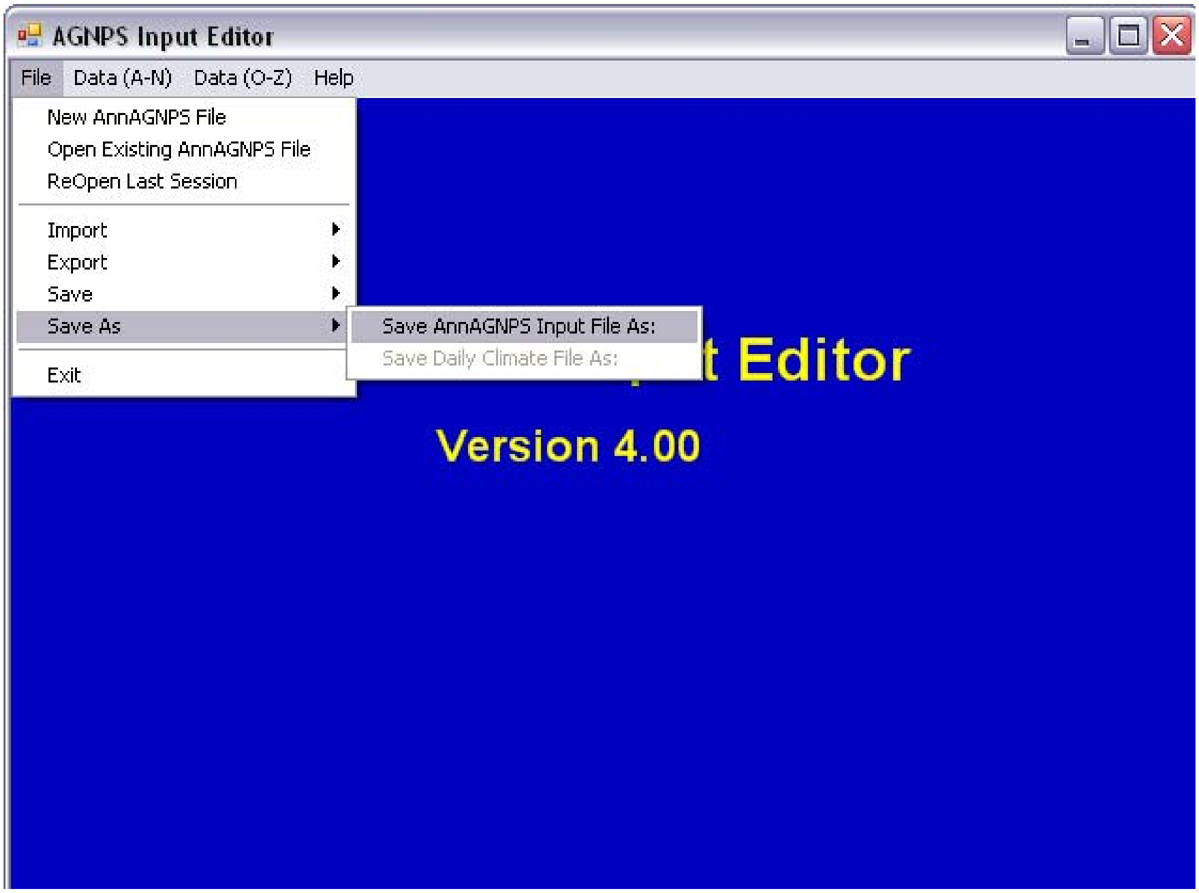
Output Options – Page 3
Standard Text Output Files – Events

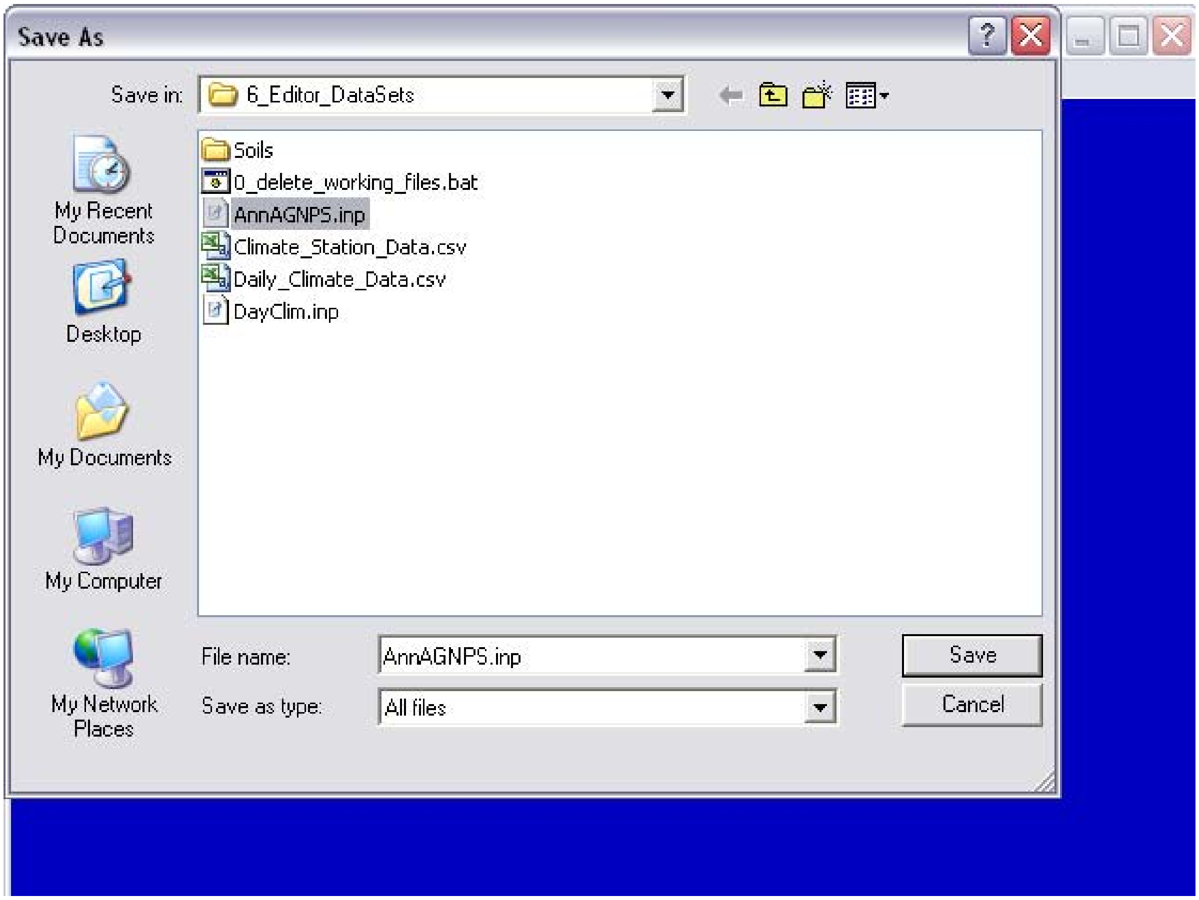


Output Options – Page 3
Standard Text Output Files – Other



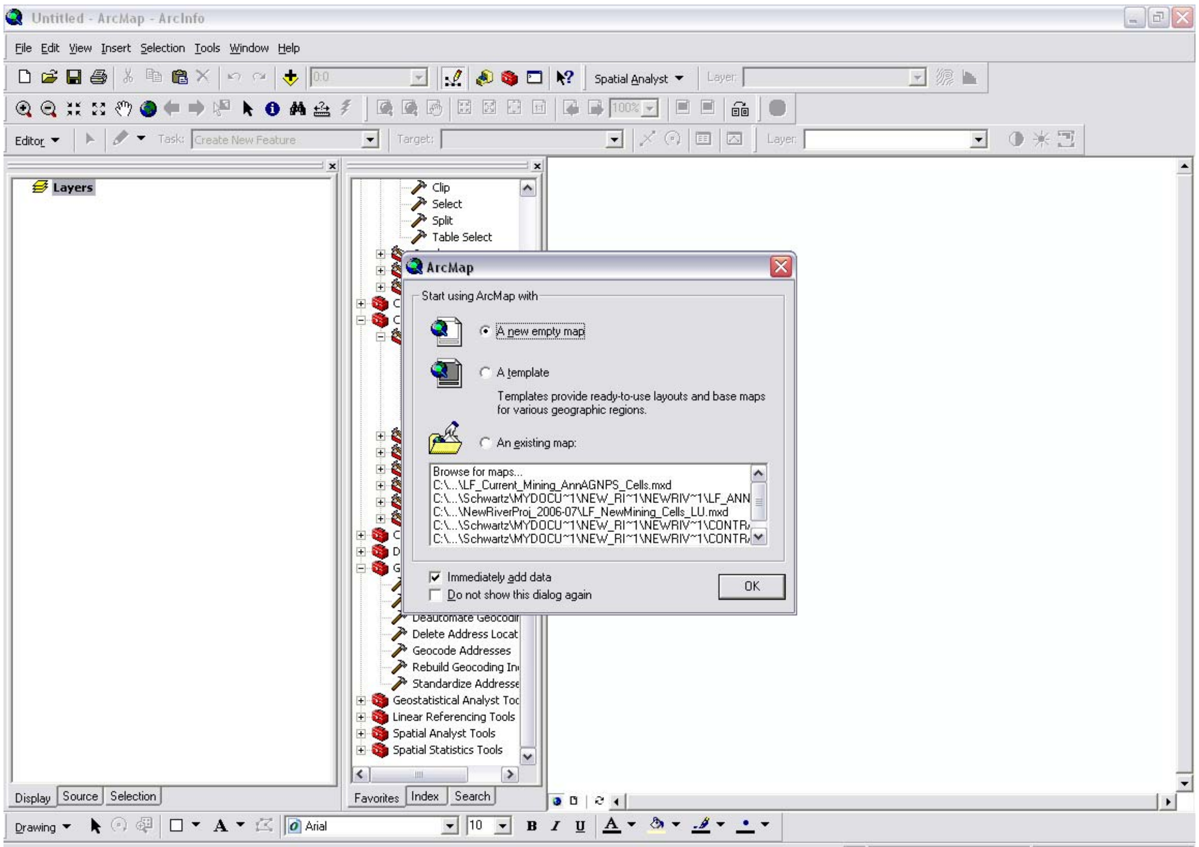
After specifying the output options, Save the AnnAGNPS Input Editor as shown below. Remember to Save the file in the #6 Folder as “AnnAGNPS.inp”.




Save As
Save in:
6_Editor_DataSets
Soils
0_delete_working_files.bat
AnnAGNPS.inp
Climate_Station_Data.csv
Daily_Climate_Data.csv
DayClim.inp
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
File name:
AnnAGNPS.inp
Save as type:
All files
Save
Cancel

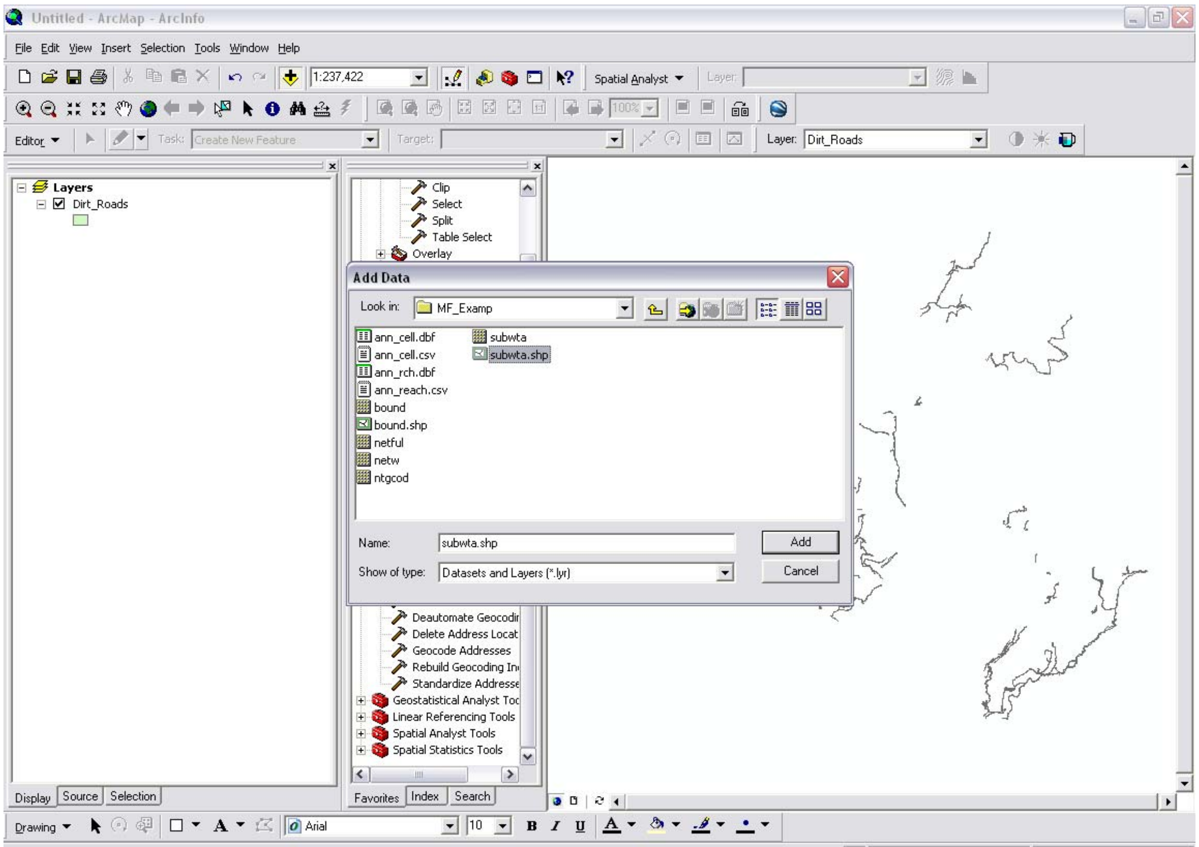
After you have saved the AnnAGNPS Input Editor, minimize the screen (don't close the window). Next, open the ESRI ArcMap GIS system. Here we will determine which cells contain dirt roads and how much dirt road area in within each cell created by AnnAGNPS.

So, open up a blank map in ArcMap or some other equivalent GIS software as shown.

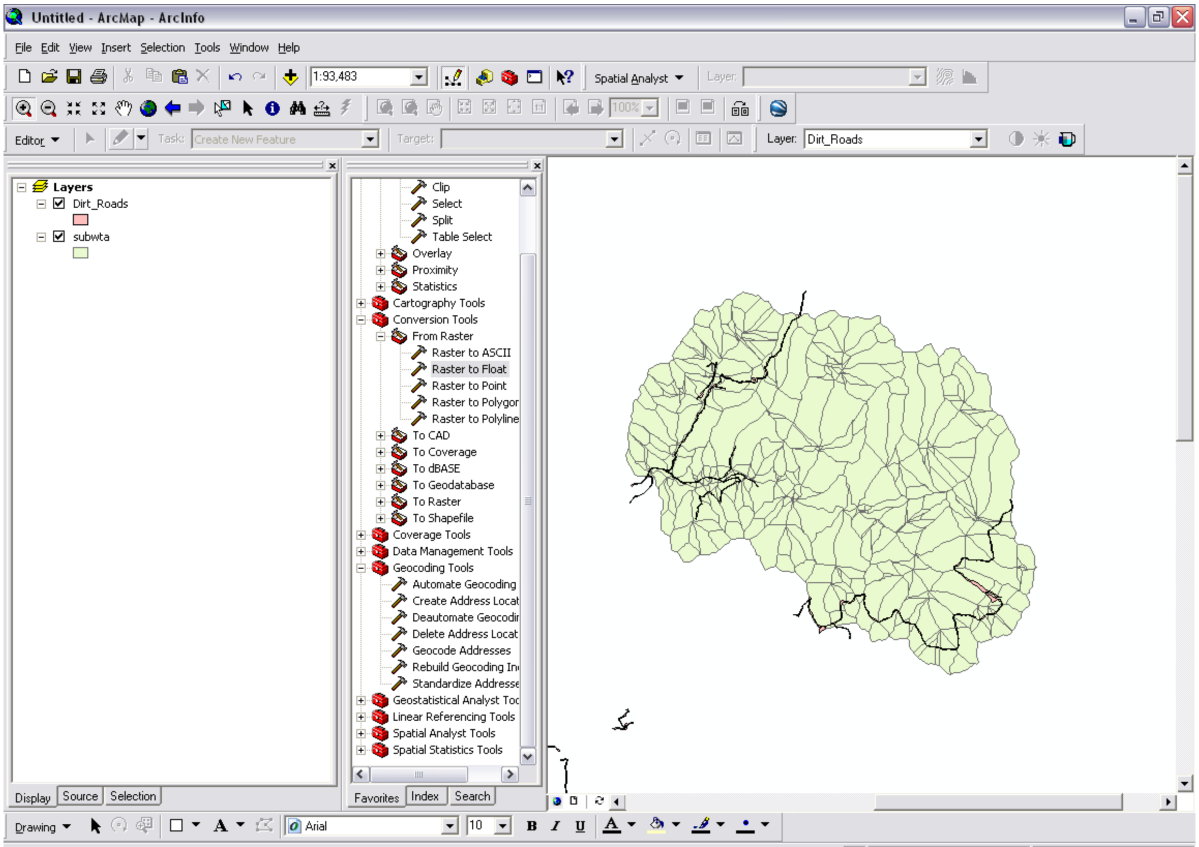


Next, go to the #4 folder of the project that you created. For this example, go to "Example_Project" in the "AGNPS_Watershed_Studies" folder, then open the #4 Folder, and then find the "MF_Example" folder created by the AnnAGNPS program. With the cells and reach data, the cells grid shape files (created by AnnAGNPS) is found in the #4 Folder. This shape file is called "subwta.shp". Open this file.

Next, grab the dirt roads GIS shape file for the New River. This shape file is placed in the #4 Folder under "GIS_DATA". Open this shape file as well.



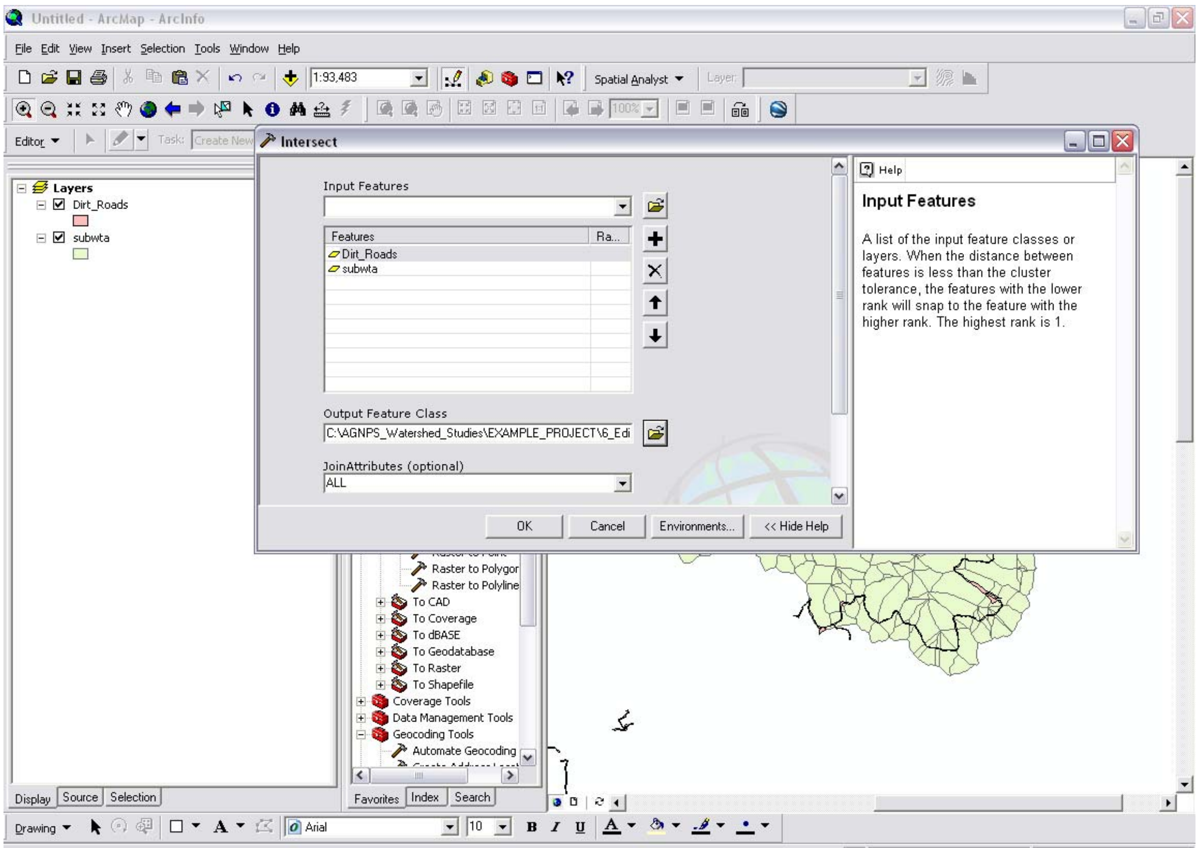
When both shape files are placed in ArcMap, you should see all the cells created with the program and the dirt roads passing through all the cells.



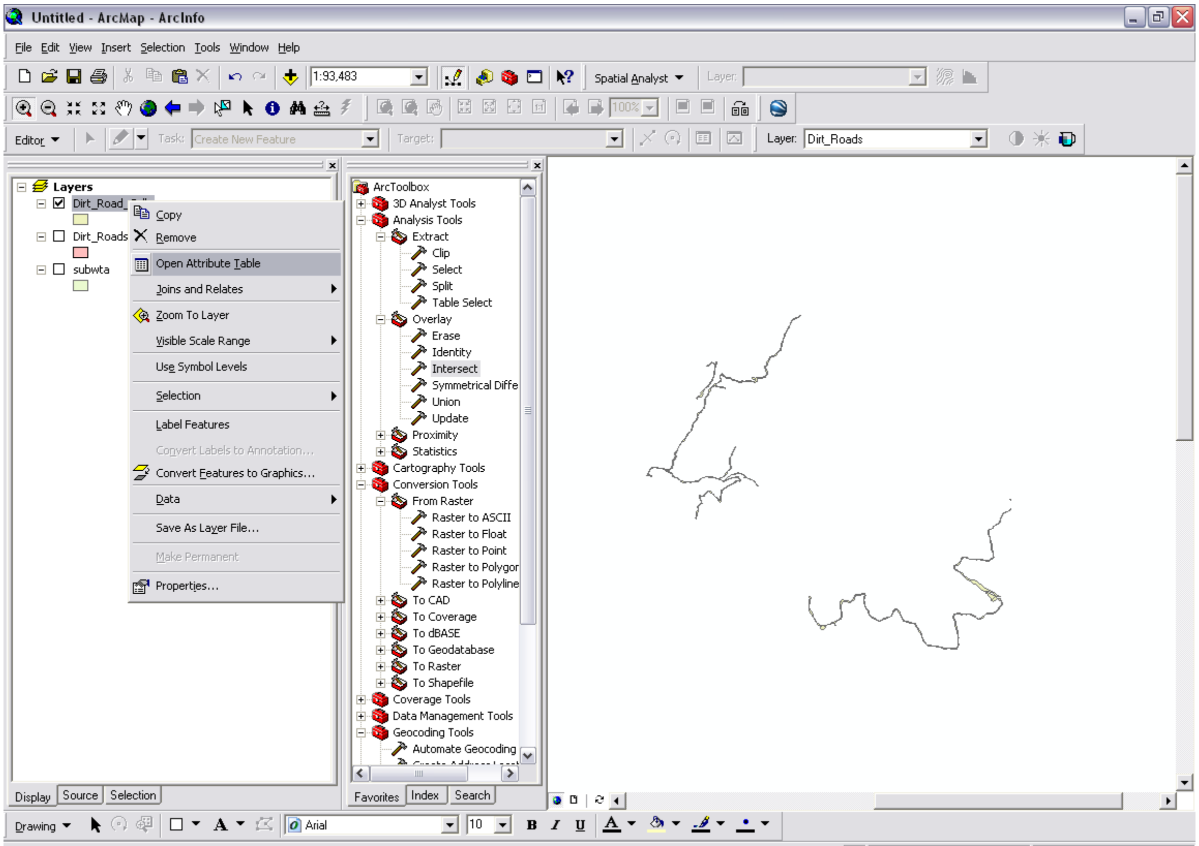
Open Arc Toolbox (shortcut key with a red toolbox). In Arc Toolbox, open the “Analysis Tools”, the open “Overlay”, and select “Intersect”.

Add the “subwta.shp” and dirt road shape files. Provide a location to create a merged GIS shape file of both these features and click OK.

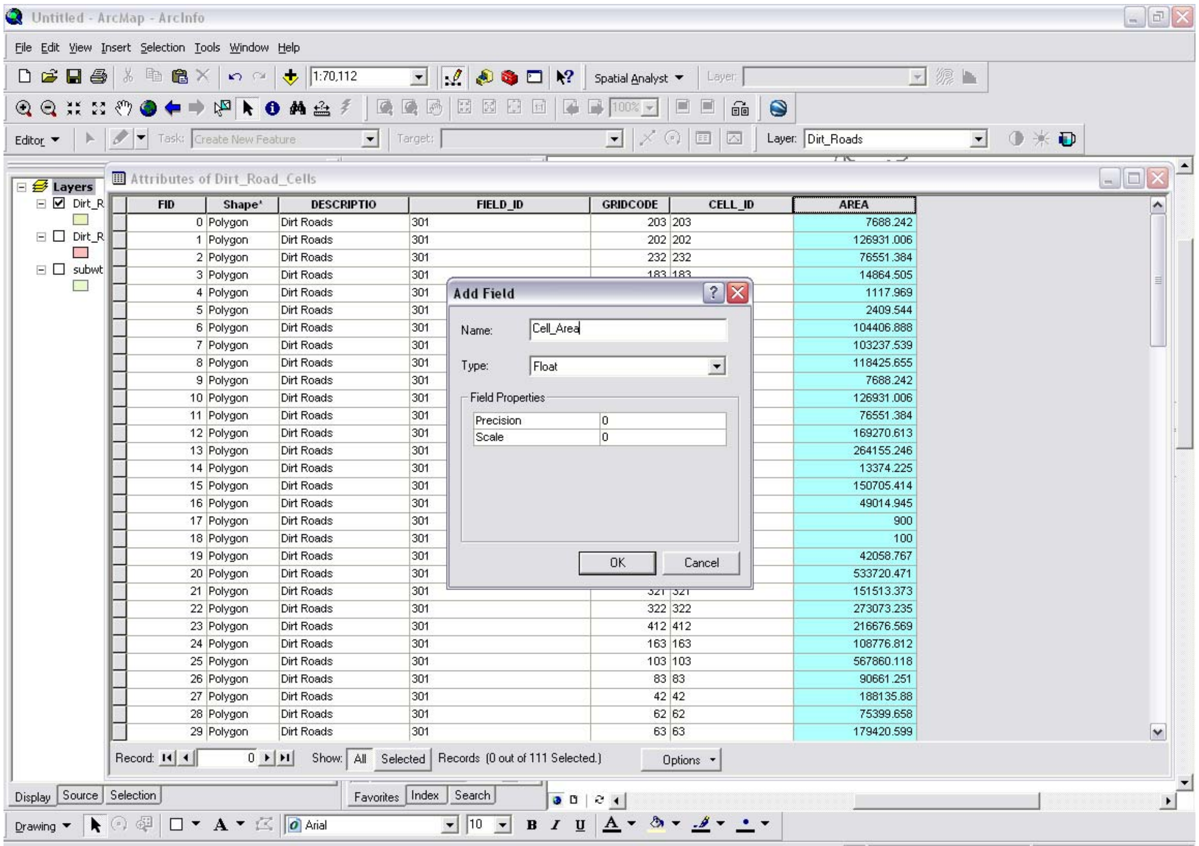
This will create a single shape file with all the cells that intersect the same area as the dirt roads.



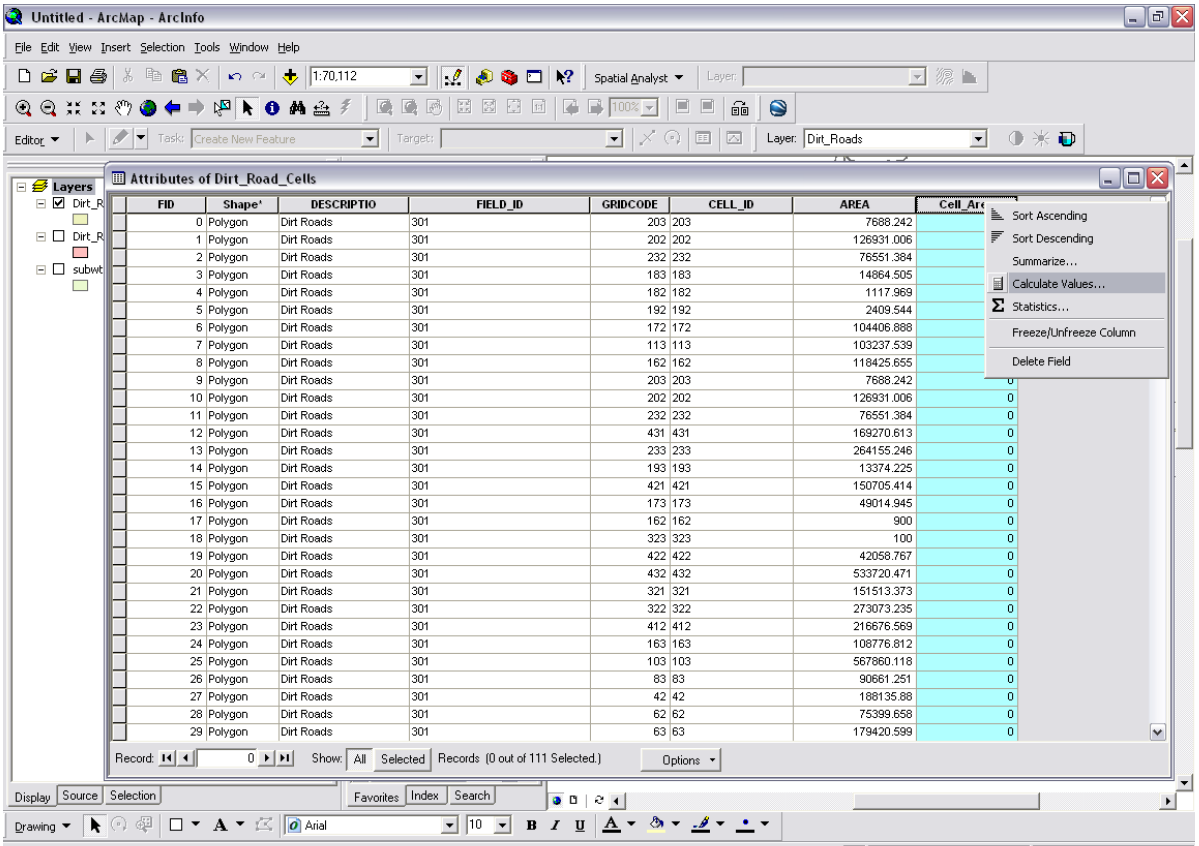
After the intersection command executes, add the new file to the ArcMap screen. Highlight this new file by right clicking on its name on the left hand side of the screen. After right clicking on the layer name, choose the "Open Attributes" option.



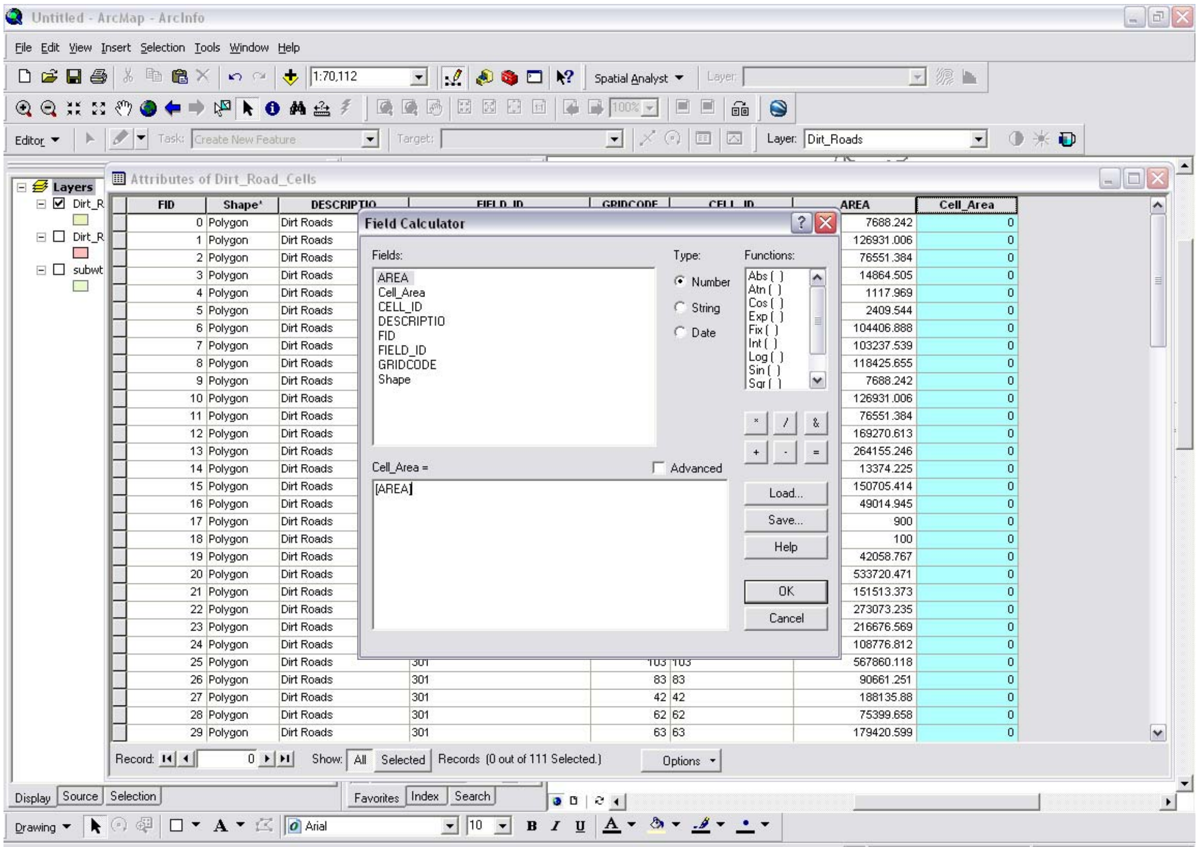
After you intersect shape files, it is necessary to update the new layer's area. The "subwta.shp" file already contained the Area of each cell with its corresponding ID number, but we are also interested in the area of roads within each cell. As highlighted below, you see the area of all the original cells that have dirt roads within them. We do not need to change this, but we need distinguish the areas of the original cells and the amount of road area in each cell. So we need to create two new columns of data. To do this, go to "Options" and click "Add Field". Lets call this new column "Cell_Area". This new column will basically take the values in the "Area" field highlighted and put these values in a new column to differentiate the cell area from the road area in each cell.



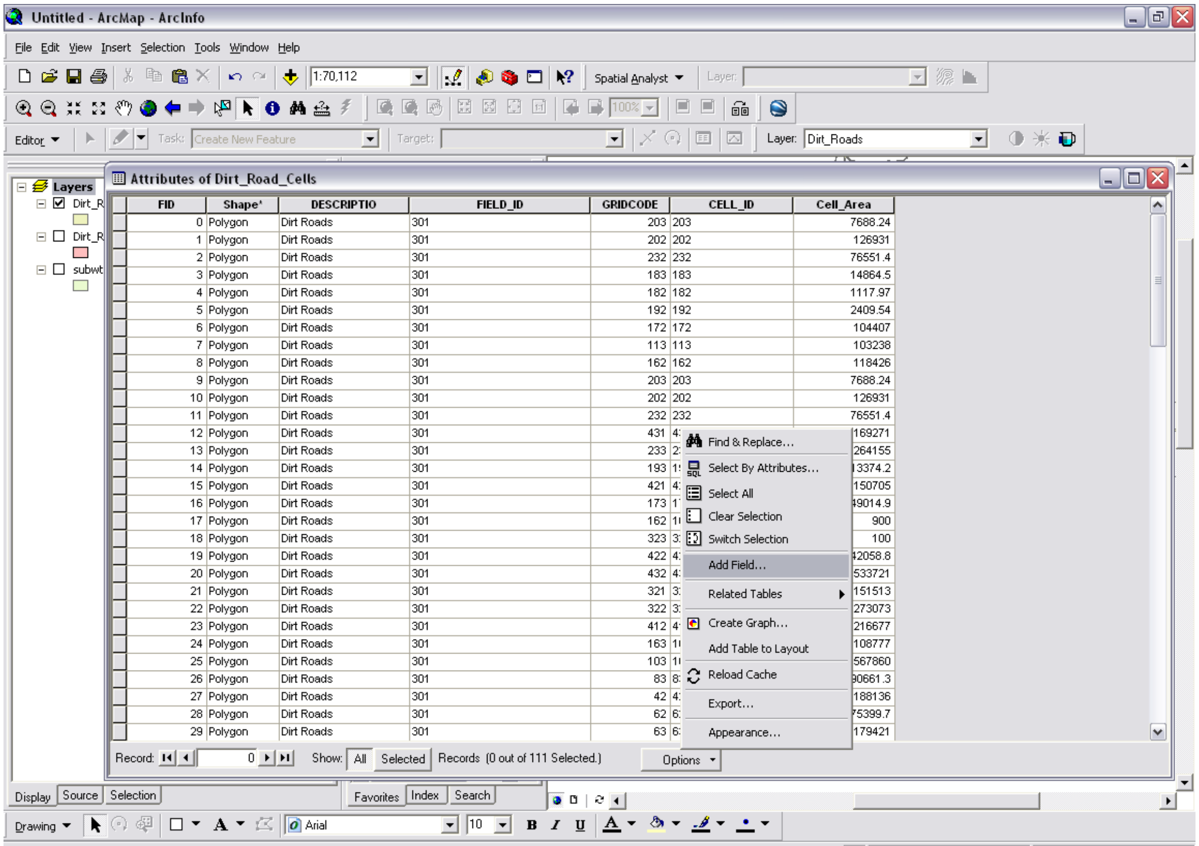
Right click the heading of this new column and choose “Calculate Values”.



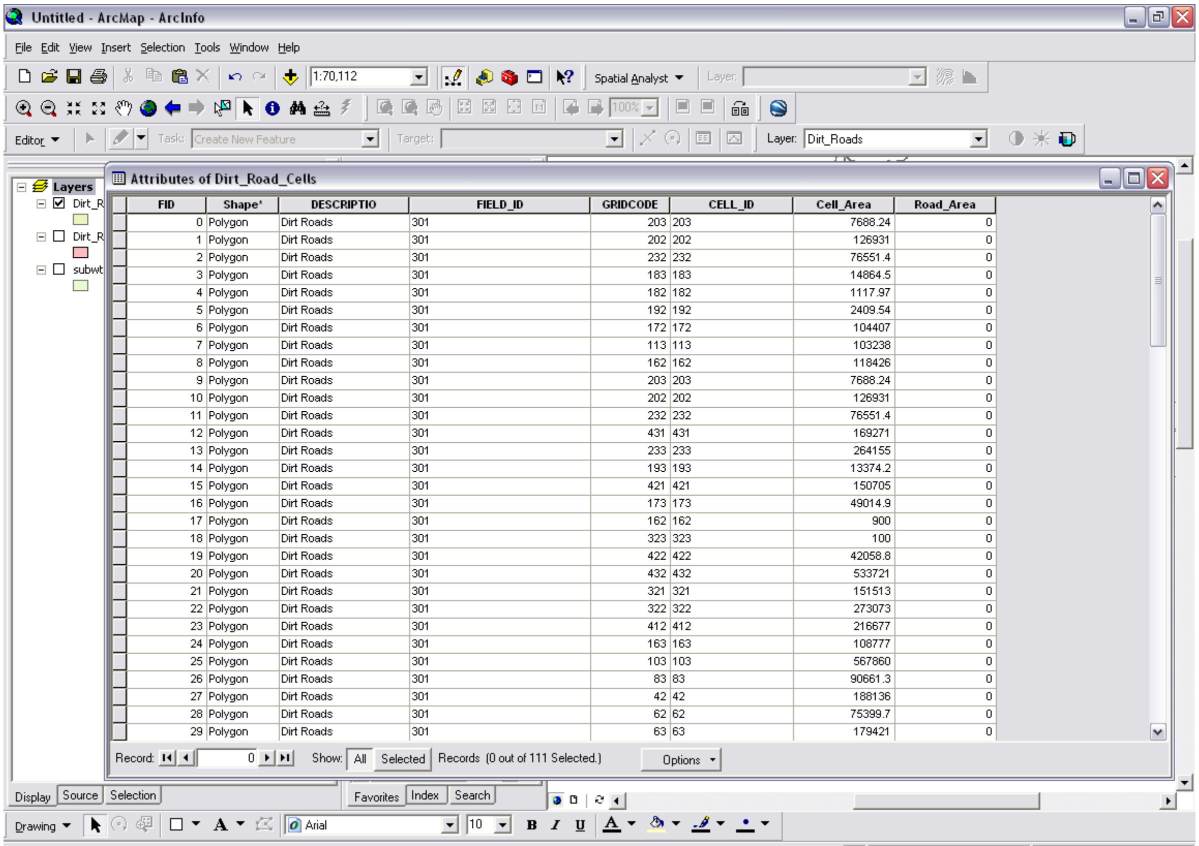
Double click AREA from the list and it should be placed in the large bottom box so that the Cell_Area = [AREA]. Click OK.



After the Cell_Area contains the values from the Area column, delete the Area column by right clicking on its heading and choosing delete. Next, we need to add one more field to represent the area of the dirt roads. So, go to “Options” and select “Add Field”.

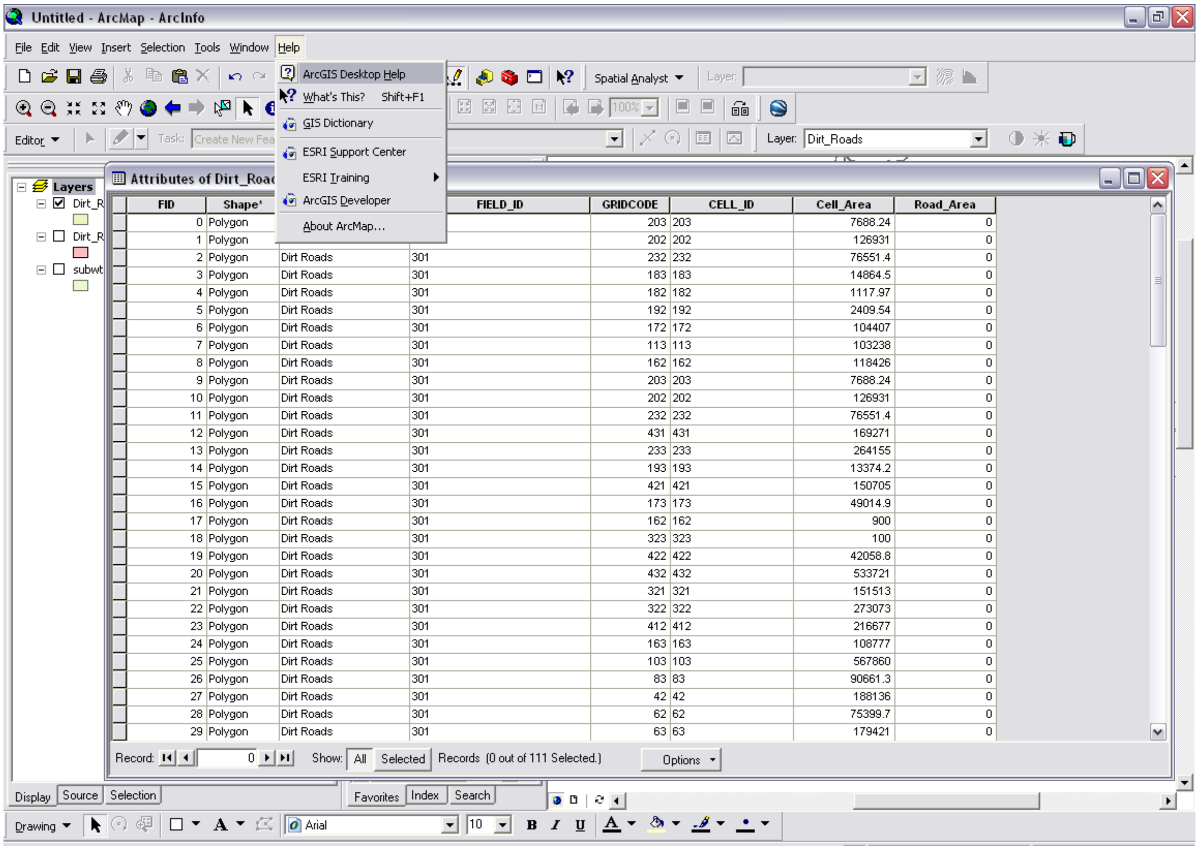


Call the new field “Road_Area” as shown.

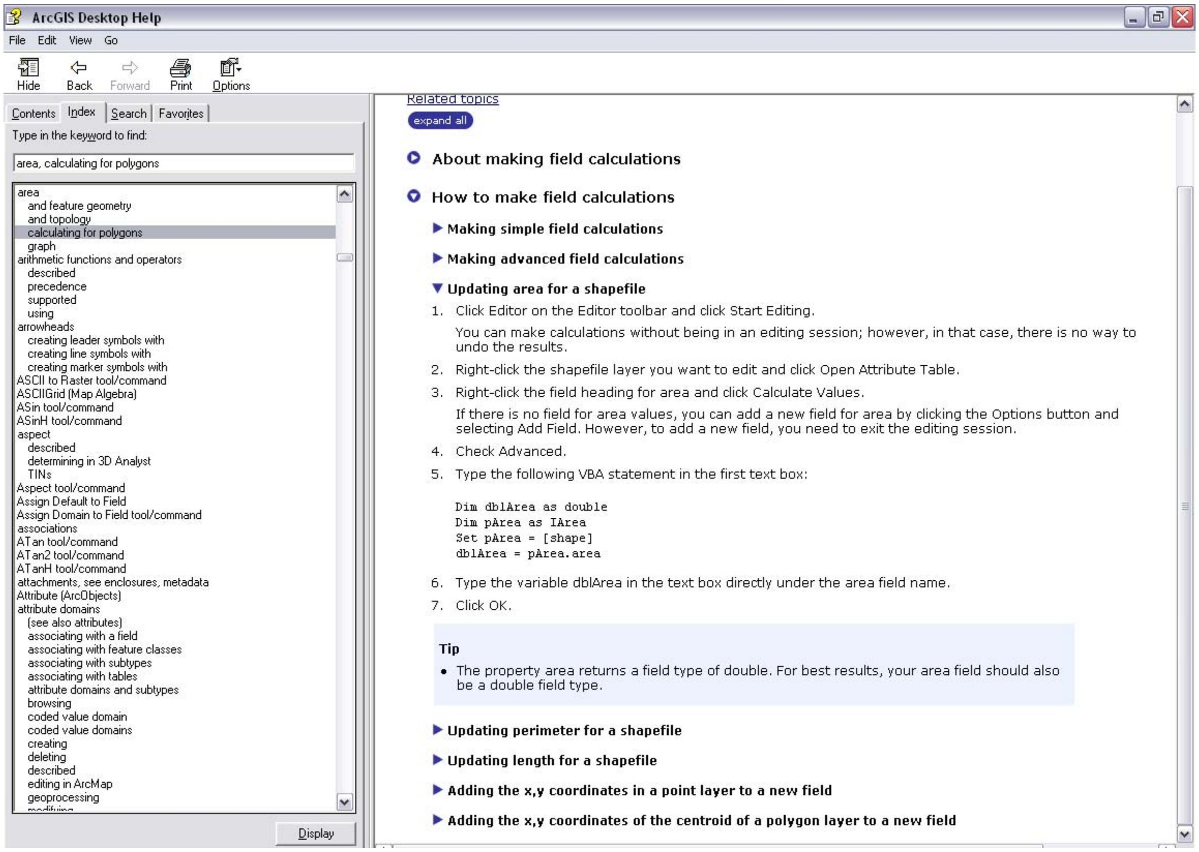


FID	Shape*	DESCRIPTIO	FIELD_ID	GRIDCODE	CELL_ID	Cell_Area	Road_Area
0	Polygon	Dirt Roads	301	203	203	7688.24	0
1	Polygon	Dirt Roads	301	202	202	126931	0
2	Polygon	Dirt Roads	301	232	232	76551.4	0
3	Polygon	Dirt Roads	301	183	183	14864.5	0
4	Polygon	Dirt Roads	301	182	182	1117.97	0
5	Polygon	Dirt Roads	301	192	192	2409.54	0
6	Polygon	Dirt Roads	301	172	172	104407	0
7	Polygon	Dirt Roads	301	113	113	103238	0
8	Polygon	Dirt Roads	301	162	162	118426	0
9	Polygon	Dirt Roads	301	203	203	7688.24	0
10	Polygon	Dirt Roads	301	202	202	126931	0
11	Polygon	Dirt Roads	301	232	232	76551.4	0
12	Polygon	Dirt Roads	301	431	431	169271	0
13	Polygon	Dirt Roads	301	233	233	264155	0
14	Polygon	Dirt Roads	301	193	193	13374.2	0
15	Polygon	Dirt Roads	301	421	421	150705	0
16	Polygon	Dirt Roads	301	173	173	49014.9	0
17	Polygon	Dirt Roads	301	162	162	900	0
18	Polygon	Dirt Roads	301	323	323	100	0
19	Polygon	Dirt Roads	301	422	422	42058.8	0
20	Polygon	Dirt Roads	301	432	432	533721	0
21	Polygon	Dirt Roads	301	321	321	151513	0
22	Polygon	Dirt Roads	301	322	322	273073	0
23	Polygon	Dirt Roads	301	412	412	216677	0
24	Polygon	Dirt Roads	301	163	163	108777	0
25	Polygon	Dirt Roads	301	103	103	567860	0
26	Polygon	Dirt Roads	301	83	83	90661.3	0
27	Polygon	Dirt Roads	301	42	42	188136	0
28	Polygon	Dirt Roads	301	62	62	75399.7	0
29	Polygon	Dirt Roads	301	63	63	179421	0

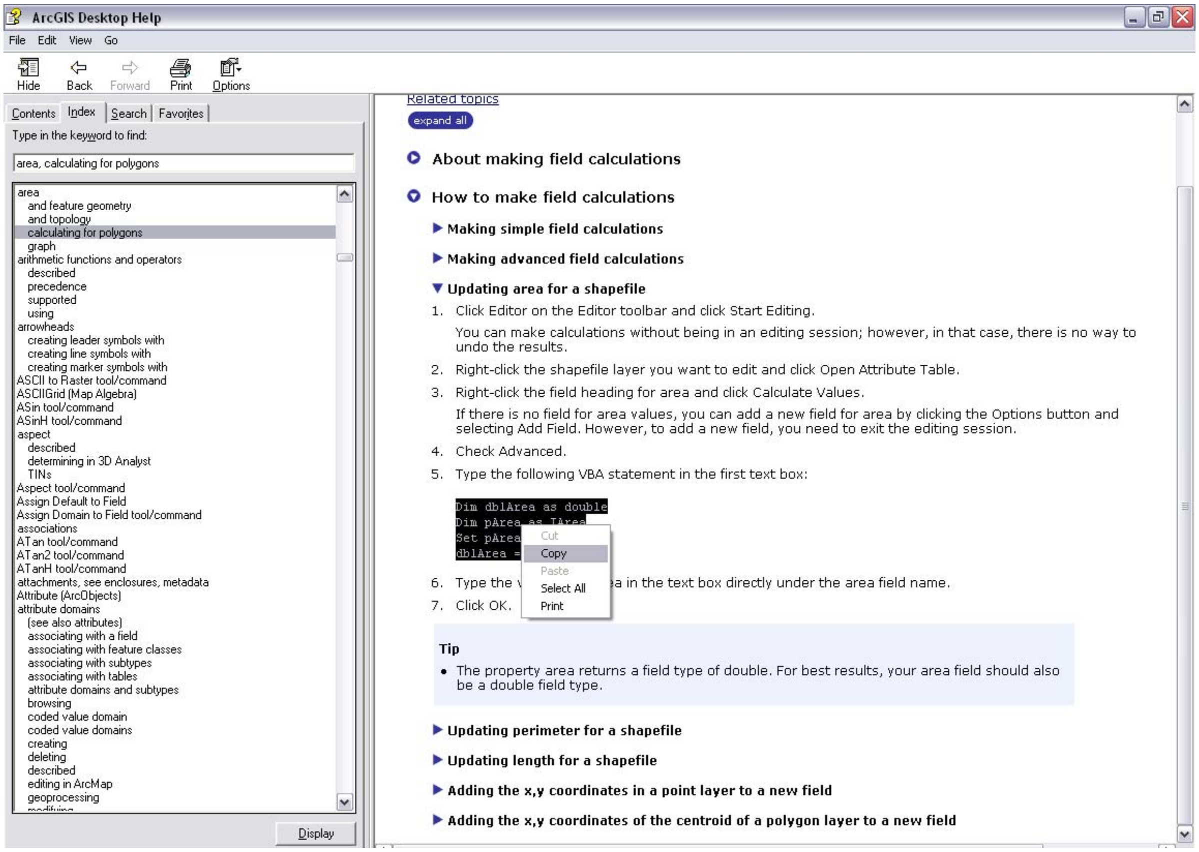
Go to “Help” at the top of the screen and choose “ArcGIS Desktop Help”.



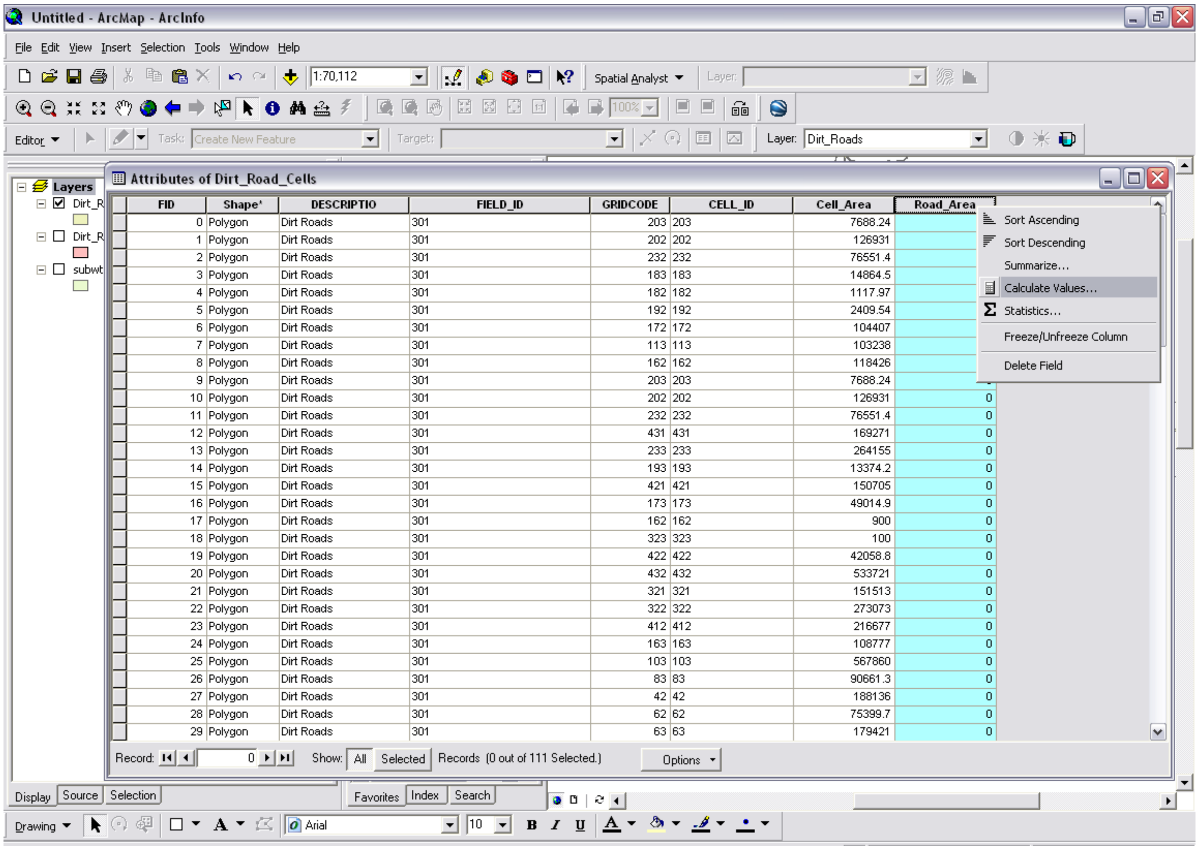
In the Help Index, type in “area” and select “calculating for polygons” under “area”.



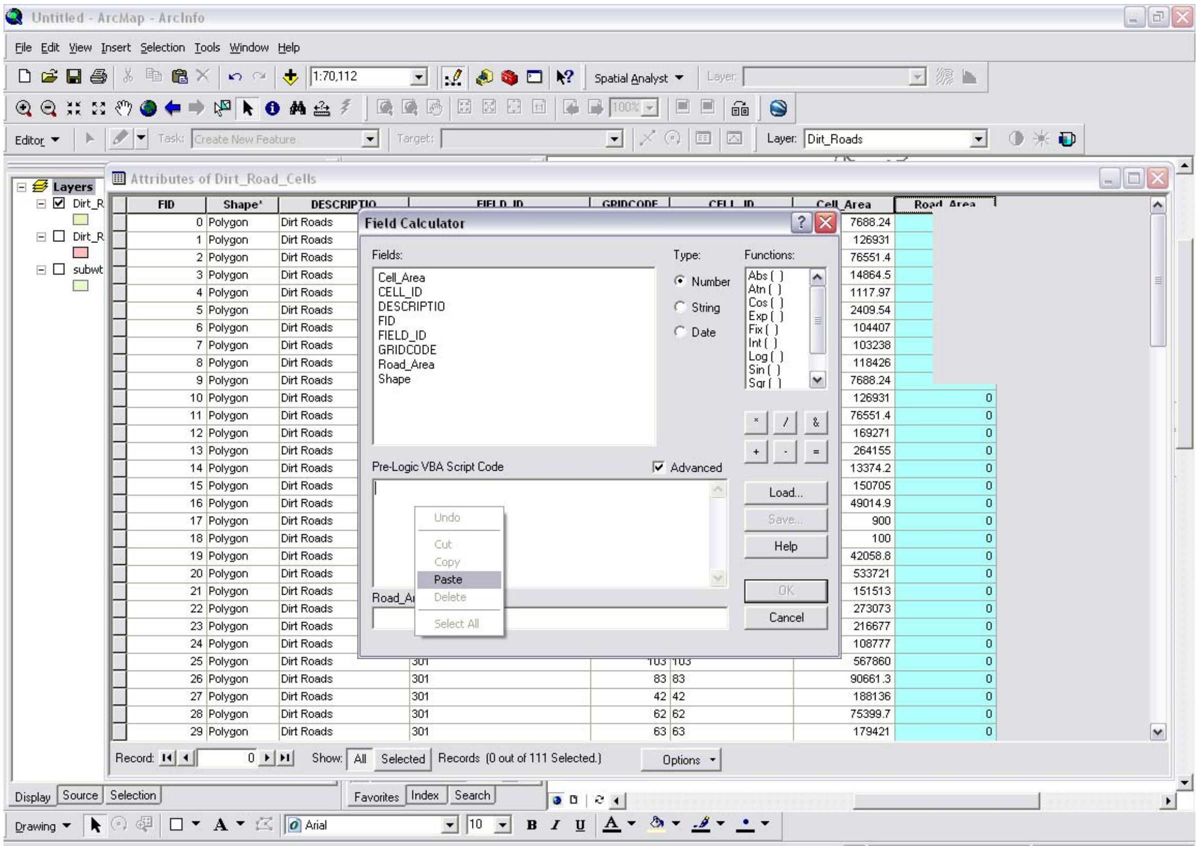
Go to "How to make field calculations", then select "Updating area for shape file". Under step 5, copy the VBA statement to update a polygons area. This is the equation that we will use to calculate the dirt road area in each cell.



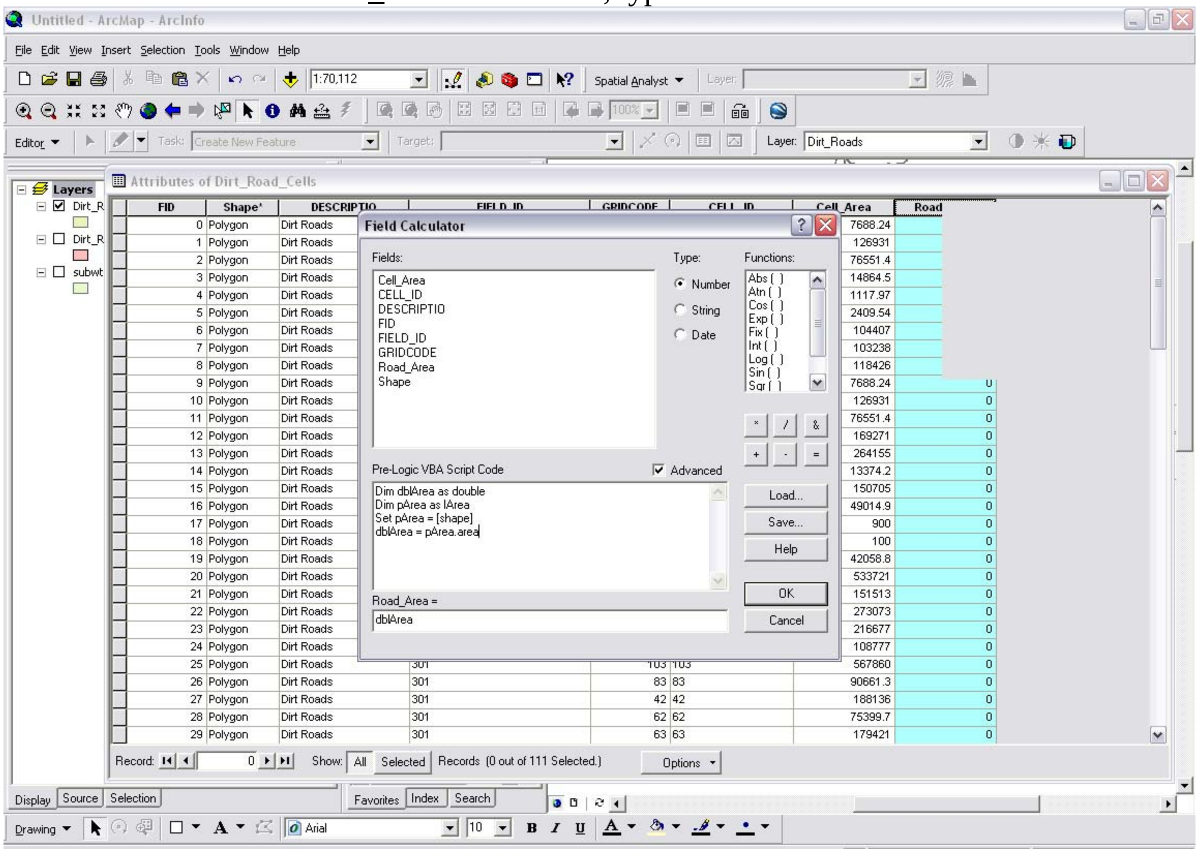
Right click the “Road_Area” heading and choose “Calculate Values”.



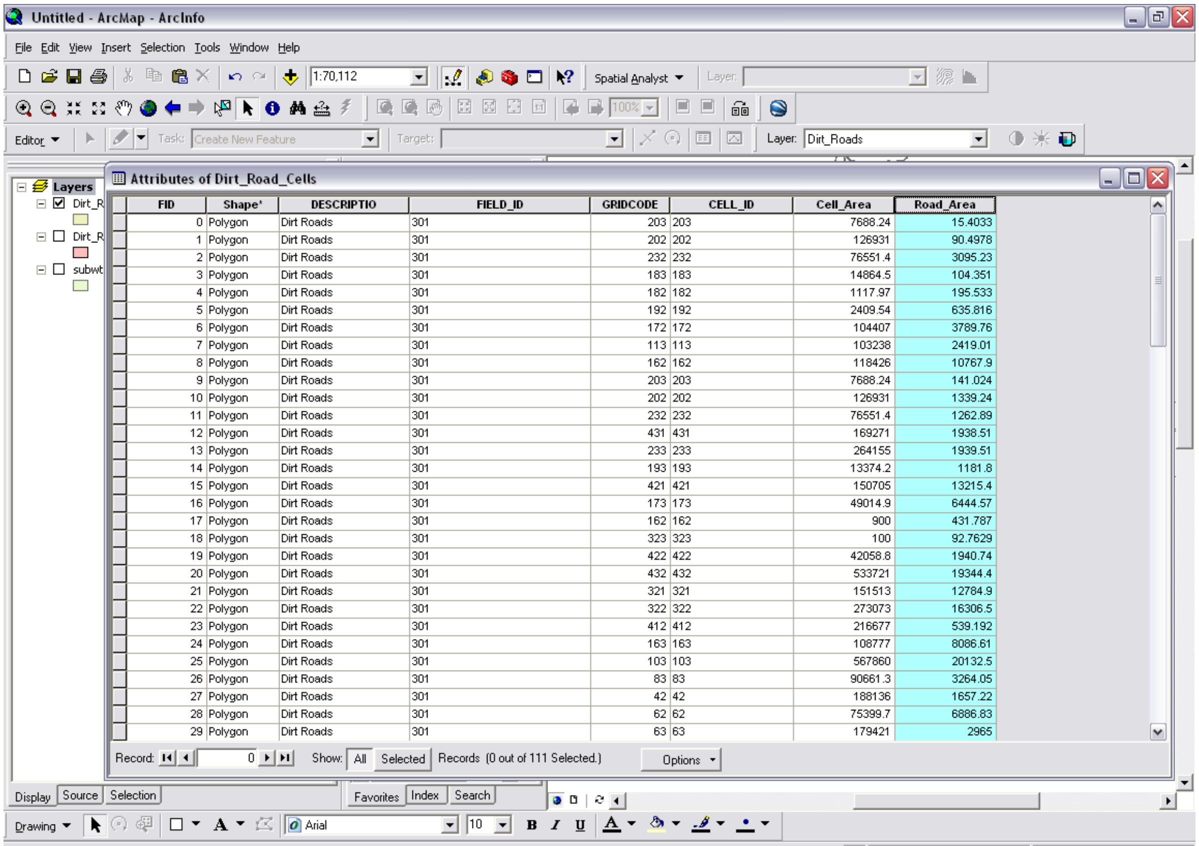
When the Field Calculator opens up, place a check mark in the Advanced option. In the Pre-Logic VBA Script Code box, right click into the open box and Paste the copied formula that was just copied from the help section.



In the “Road_Area” box below, type in “dblArea”. Click OK.



Now the Road_Area column shows the amount of dirt roads in each cell.

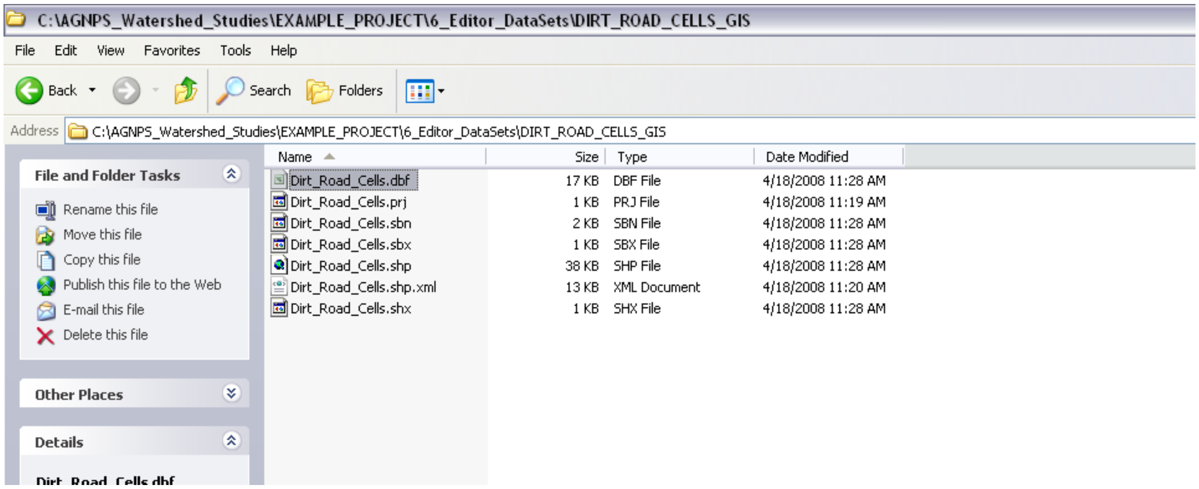


Attributes of Dirt_Road_Cells

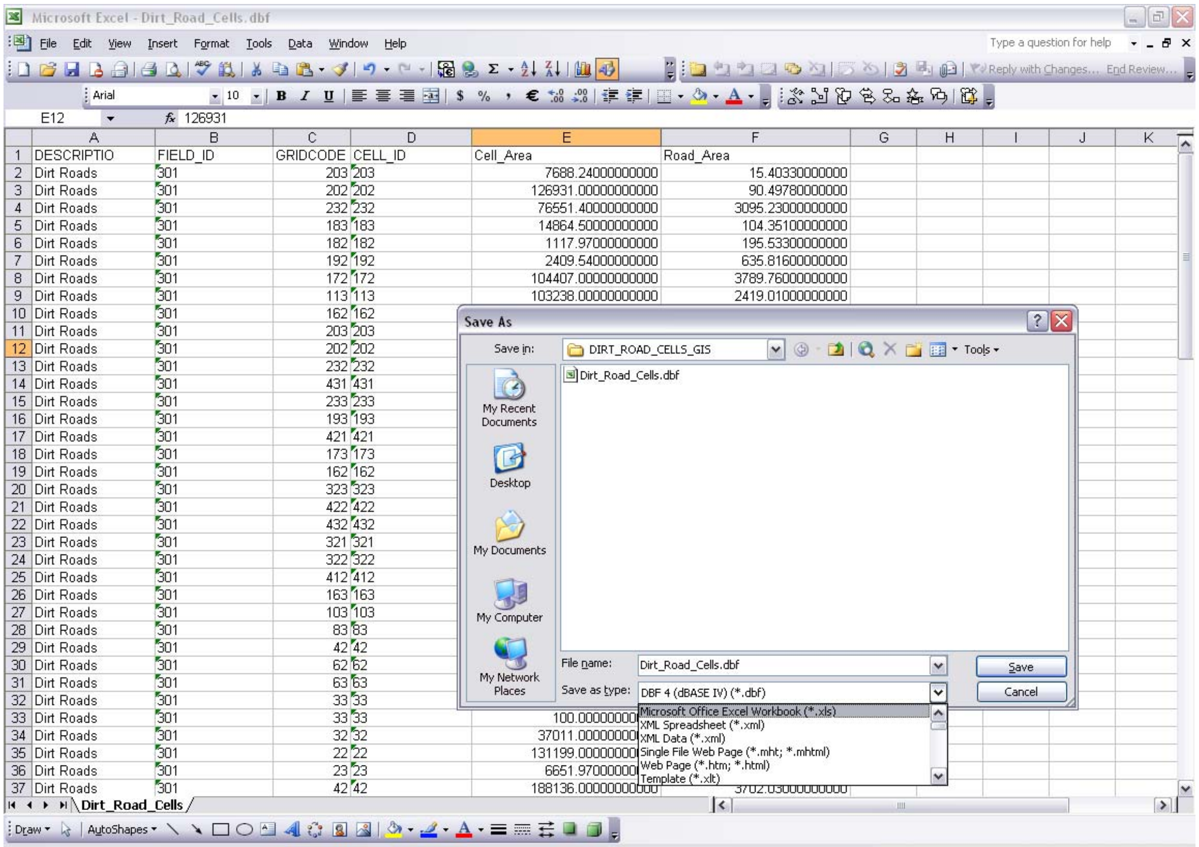
FID	Shape*	DESCRIPTIO	FIELD_ID	GRIDCODE	CELL_ID	Cell_Area	Road_Area
0	Polygon	Dirt Roads	301	203	203	7688.24	15.4033
1	Polygon	Dirt Roads	301	202	202	126931	90.4978
2	Polygon	Dirt Roads	301	232	232	76551.4	3095.23
3	Polygon	Dirt Roads	301	183	183	14864.5	104.351
4	Polygon	Dirt Roads	301	182	182	1117.97	195.533
5	Polygon	Dirt Roads	301	192	192	2409.54	635.816
6	Polygon	Dirt Roads	301	172	172	104407	3789.76
7	Polygon	Dirt Roads	301	113	113	103238	2419.01
8	Polygon	Dirt Roads	301	162	162	118426	10767.9
9	Polygon	Dirt Roads	301	203	203	7688.24	141.024
10	Polygon	Dirt Roads	301	202	202	126931	1339.24
11	Polygon	Dirt Roads	301	232	232	76551.4	1262.89
12	Polygon	Dirt Roads	301	431	431	169271	1938.51
13	Polygon	Dirt Roads	301	233	233	264155	1939.51
14	Polygon	Dirt Roads	301	193	193	13374.2	1181.8
15	Polygon	Dirt Roads	301	421	421	150705	13215.4
16	Polygon	Dirt Roads	301	173	173	49014.9	6444.57
17	Polygon	Dirt Roads	301	162	162	900	431.787
18	Polygon	Dirt Roads	301	323	323	100	92.7629
19	Polygon	Dirt Roads	301	422	422	42058.8	1940.74
20	Polygon	Dirt Roads	301	432	432	533721	19344.4
21	Polygon	Dirt Roads	301	321	321	151513	12784.9
22	Polygon	Dirt Roads	301	322	322	273073	16306.5
23	Polygon	Dirt Roads	301	412	412	216677	539.192
24	Polygon	Dirt Roads	301	163	163	108777	8086.61
25	Polygon	Dirt Roads	301	103	103	567860	20132.5
26	Polygon	Dirt Roads	301	83	83	90661.3	3264.05
27	Polygon	Dirt Roads	301	42	42	188136	1657.22
28	Polygon	Dirt Roads	301	62	62	75399.7	6886.83
29	Polygon	Dirt Roads	301	63	63	179421	2965

Record: 0 Show: All Selected Records (0 out of 111 Selected.) Options

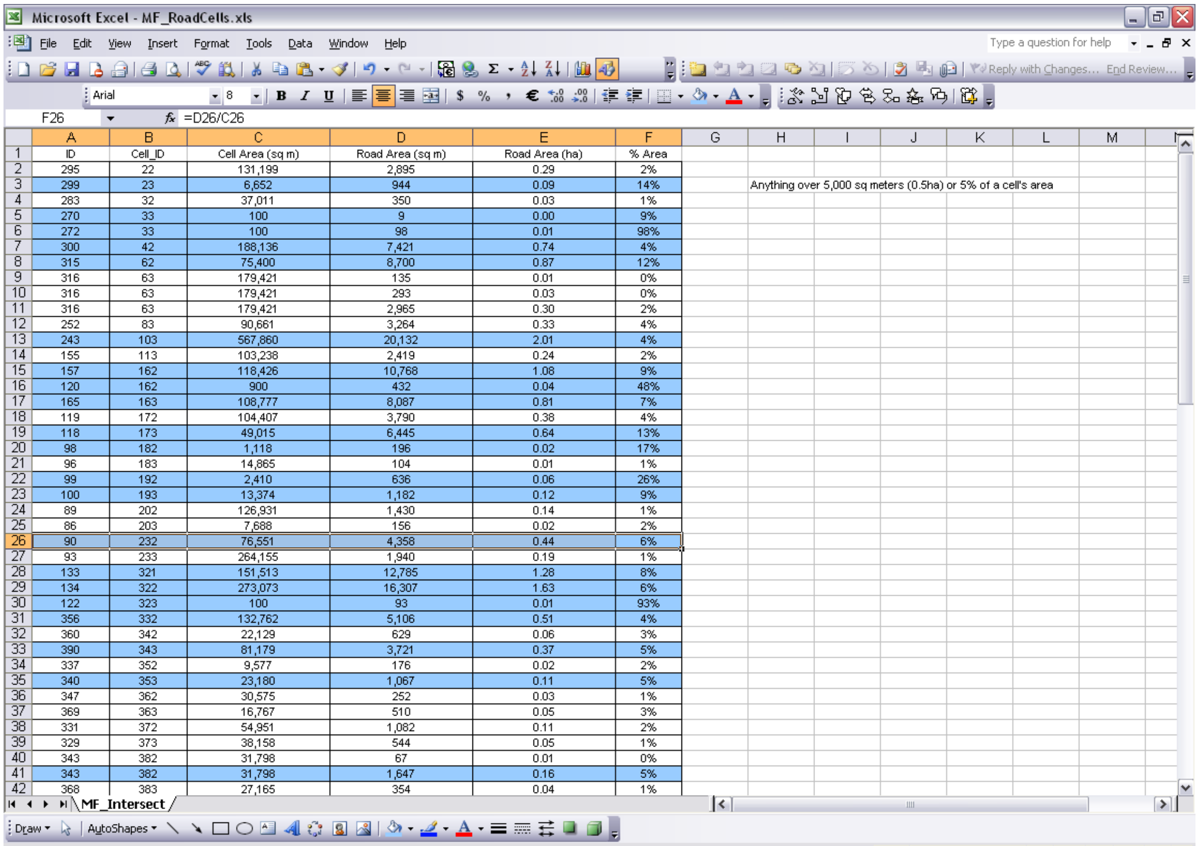
Close out ArcMap and locate the intersected dirt roads and AnnAGNPS cells file previous created and updated. Open the .dbf file of this GIS layer with Excel.



When opened, go to “File” and click “Save As”. Save this file as an .xls file to make it eaiser to work in.

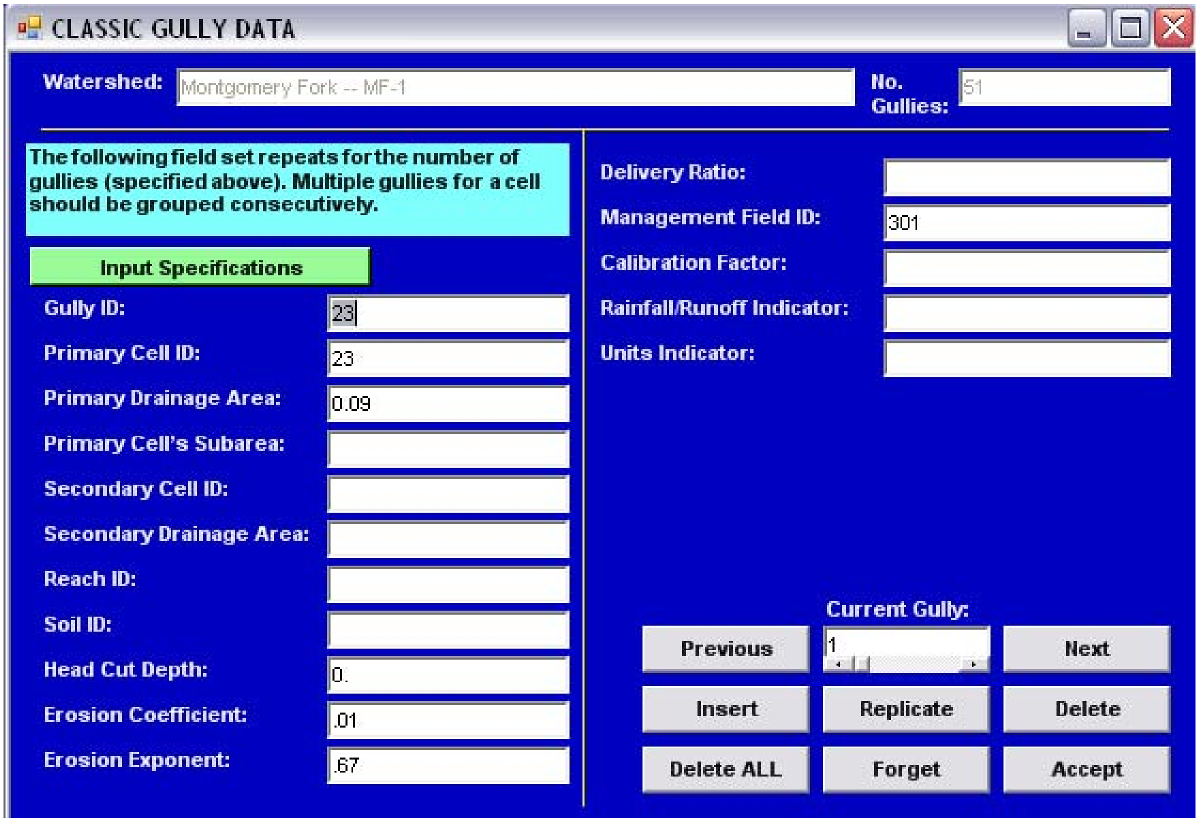


After saving this intersected cells and roads file in a spreadsheet format, you can determine what Cell Numbers (or IDs) have dirt roads, and how much of the cells are occupied by dirt roads. For my analysis with the New River, I only referenced the cells that contained major amounts of dirt roads. Therefore, the cells that contained over 5 hectares or 5% of a cells area with dirt roads were placed in the AnnAGNPS model.

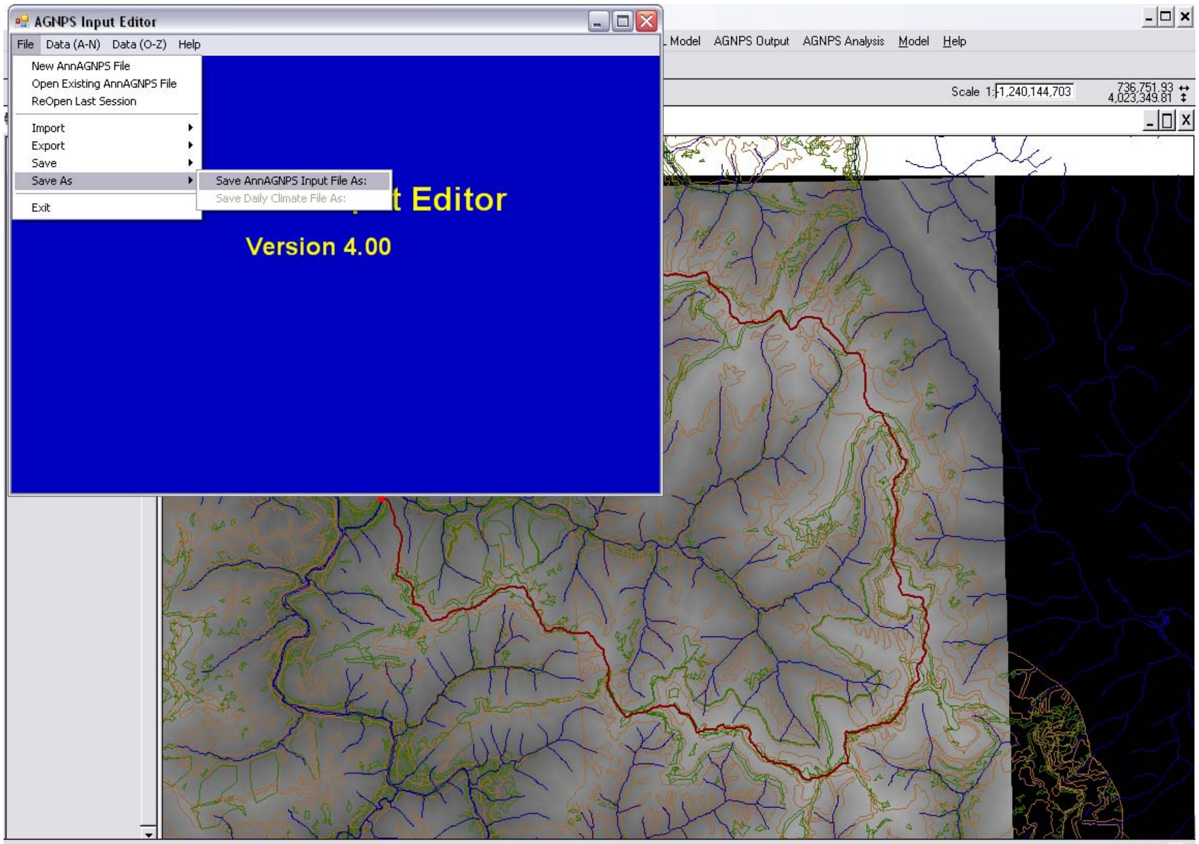


ID	Cell_ID	Cell Area (sq m)	Road Area (sq m)	Road Area (ha)	% Area
295	22	131,199	2,895	0.29	2%
299	23	6,652	944	0.09	14%
283	32	37,011	350	0.03	1%
270	33	100	9	0.00	9%
272	33	100	98	0.01	98%
300	42	188,136	7,421	0.74	4%
315	62	75,400	8,700	0.87	12%
316	63	179,421	135	0.01	0%
316	63	179,421	293	0.03	0%
316	63	179,421	2,965	0.30	2%
252	83	90,661	3,264	0.33	4%
243	103	567,860	20,132	2.01	4%
155	113	103,238	2,419	0.24	2%
157	162	118,426	10,768	1.08	9%
120	162	900	432	0.04	48%
165	163	108,777	8,087	0.81	7%
119	172	104,407	3,790	0.38	4%
118	173	49,015	6,445	0.64	13%
98	182	1,118	196	0.02	17%
96	183	14,865	104	0.01	1%
99	192	2,410	636	0.06	26%
100	193	13,374	1,182	0.12	9%
89	202	126,931	1,430	0.14	1%
86	203	7,688	156	0.02	2%
90	232	76,551	4,358	0.44	6%
93	233	264,155	1,940	0.19	1%
133	321	151,513	12,785	1.28	8%
134	322	273,073	16,307	1.63	6%
122	323	100	93	0.01	93%
356	332	132,762	5,106	0.51	4%
360	342	22,129	629	0.06	3%
390	343	81,179	3,721	0.37	5%
337	352	9,577	176	0.02	2%
340	353	23,180	1,067	0.11	5%
347	362	30,575	252	0.03	1%
369	363	16,767	510	0.05	3%
331	372	54,951	1,082	0.11	2%
329	373	38,158	544	0.05	1%
343	382	31,798	67	0.01	0%
343	382	31,798	1,647	0.16	5%
368	383	27,165	354	0.04	1%

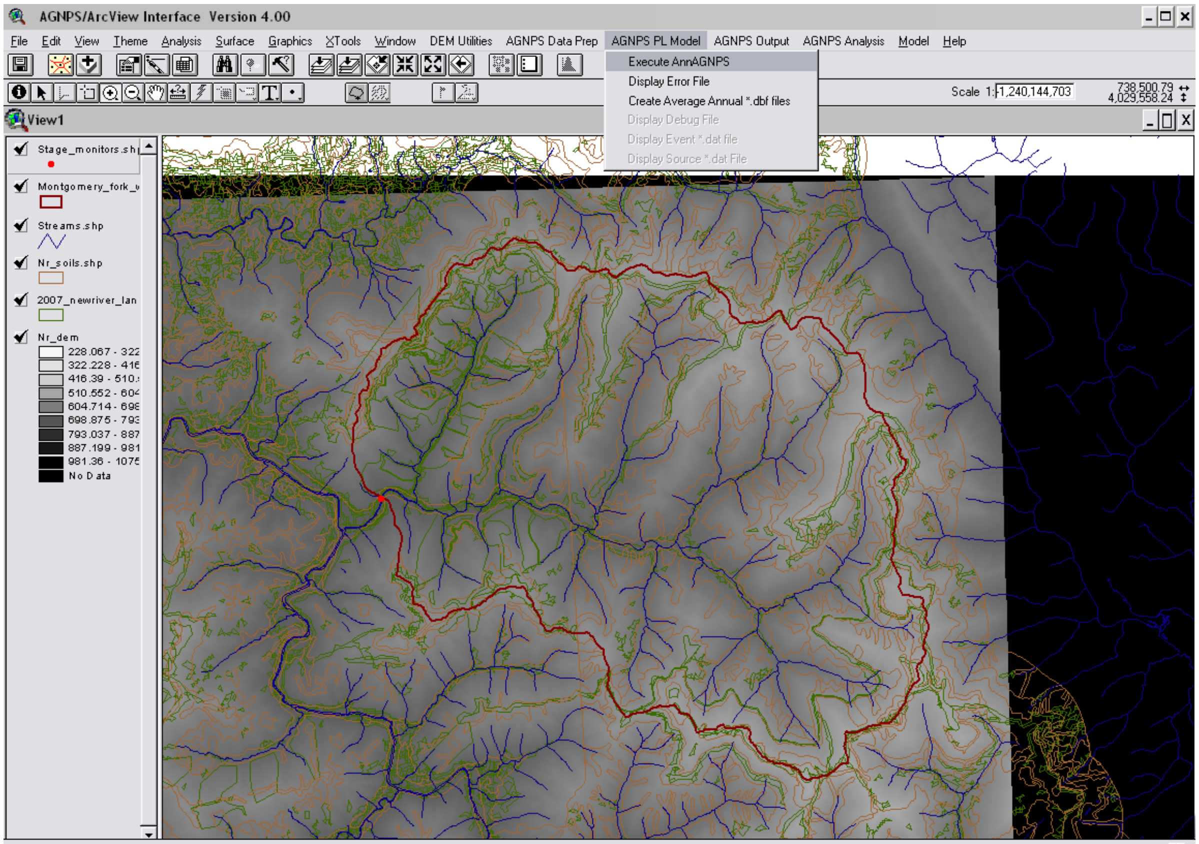
After the ID of each cell that contained a certain area was found, the areas of dirt roads were identified in the AnnAGNPS Input Editor's Classic Gully Data as shown below. Note that the "Gully ID" and the "Primary Cell ID" are the cell number. "Primary Drainage Area" is the area of the cell occupied by dirt roads. The head cut depth should always be set to 0.0. The erosion coefficient was found to be 0.01 while the erosion exponent was found to be 0.67 for dirt roads in the New River. In the land use classifications, the Dirt Roads field ID was 301 which must be included in the Management Field ID for each cell. After all the cells and dirt roads area are filled out in the Classic Gully Data file, click Accept.



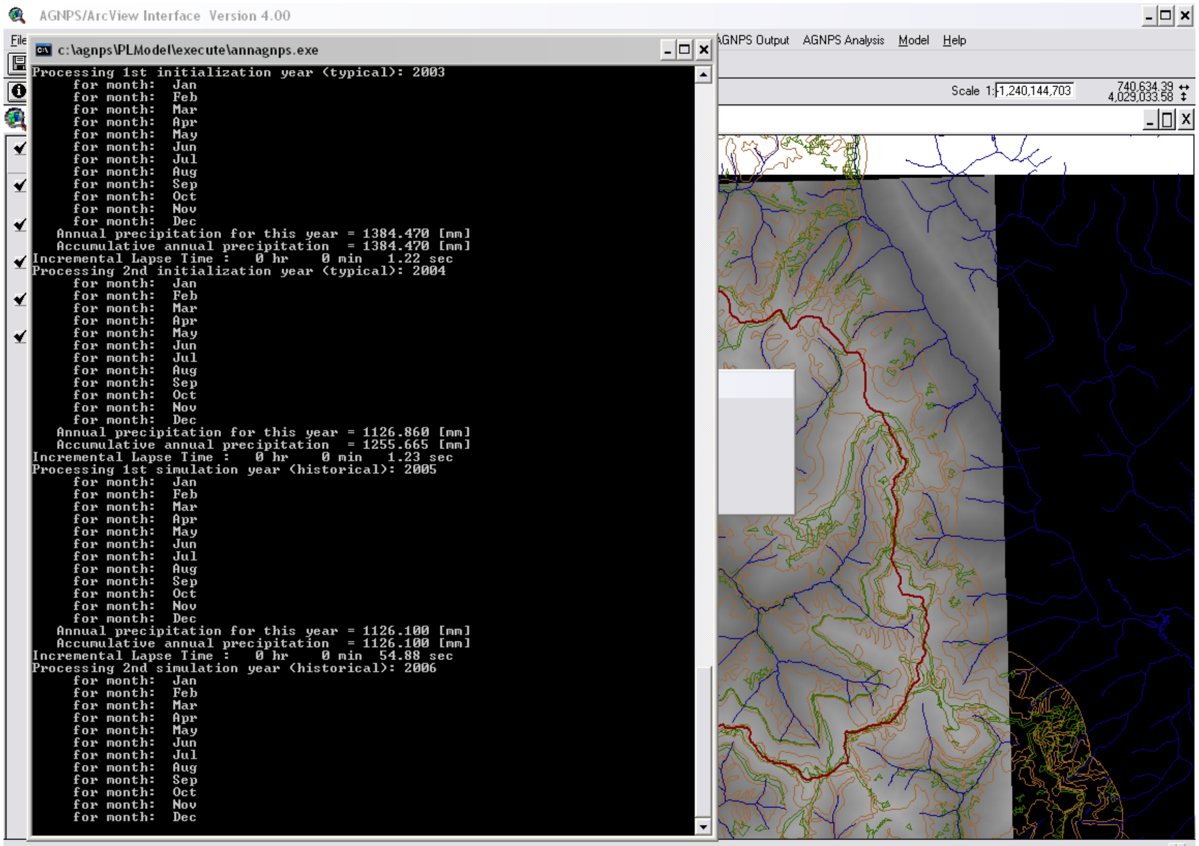
After the Classic Gully Data is entered into the AnnAGNPS Input Editor, go to File and Save the updated AnnAGNPS Input Editor. Minimize the Input Editor after saving. Don't close this window out till the program finishes its computations.



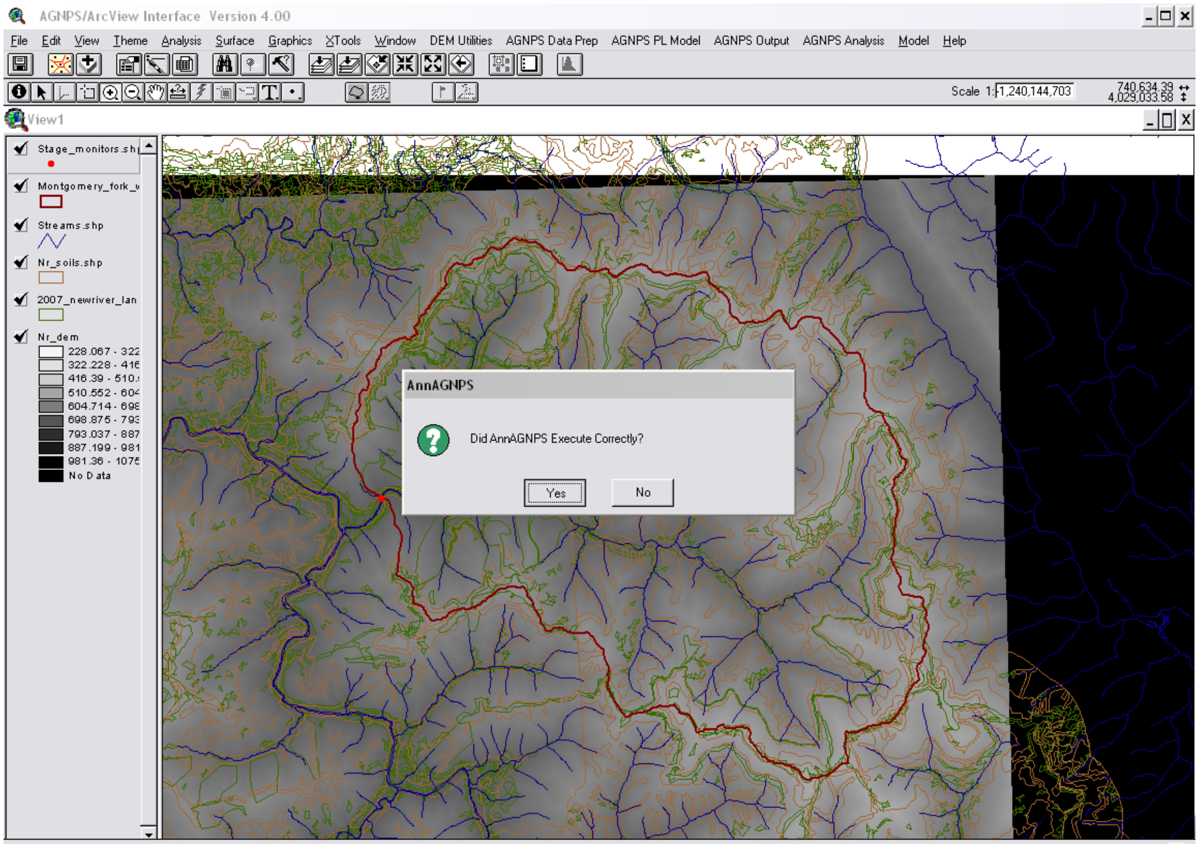
Finally, we can execute the model. To execute, go to “AGNPS PL Model” and choose “Execute AnnAGNPS”.



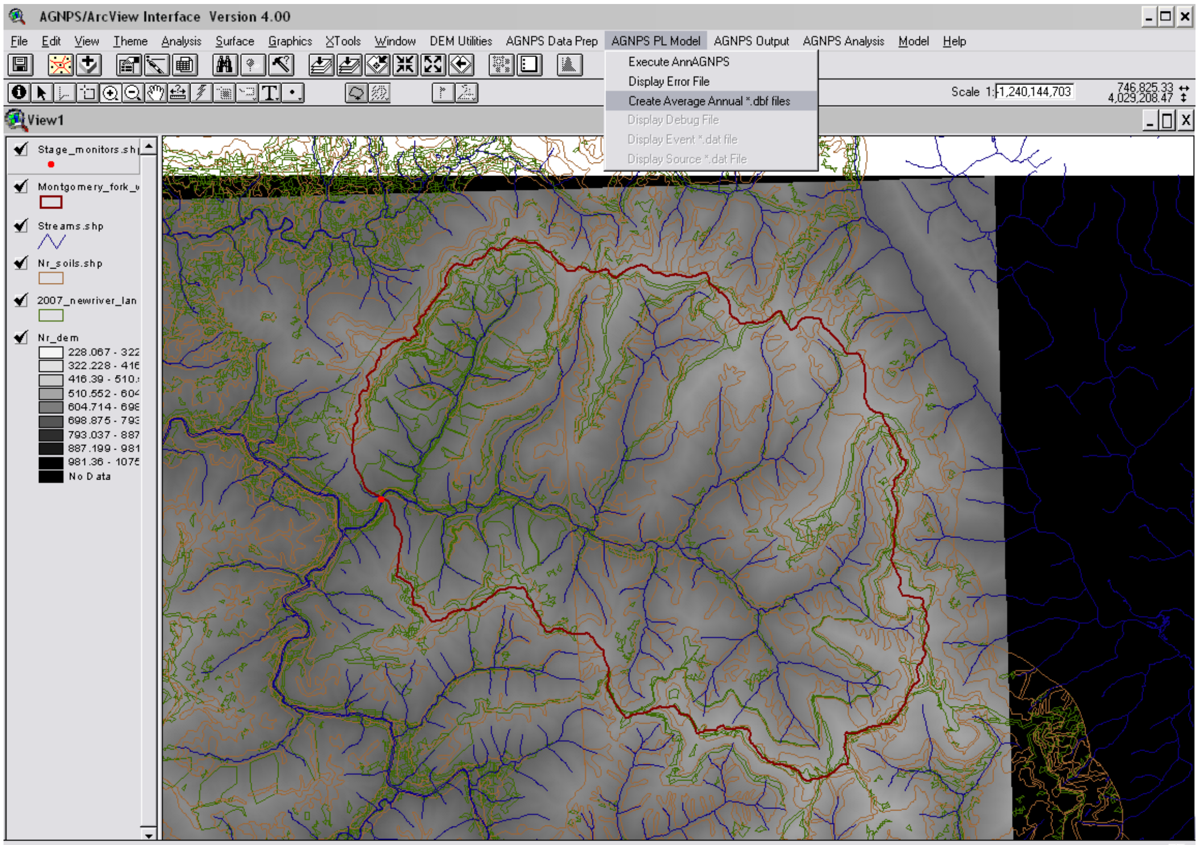
Next, a DOS screen will appear to go through all the calculations as shown. After the model finishes its calculations, the DOS screen will disappear.



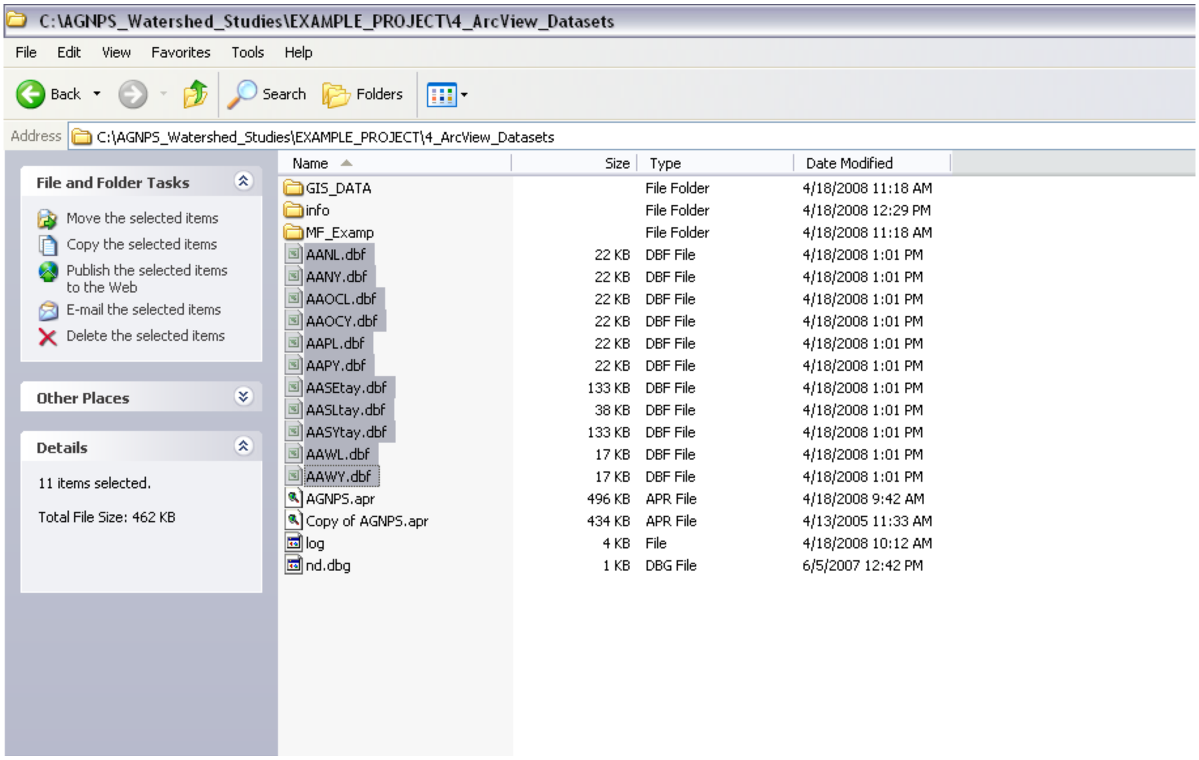
After the model finishes its computations, click YES when the program asks you if the AnnAGNPS model executed properly. If you feel like the program didn't execute correctly, choose No and go to AGNPS PL Model and select the Display Error File.



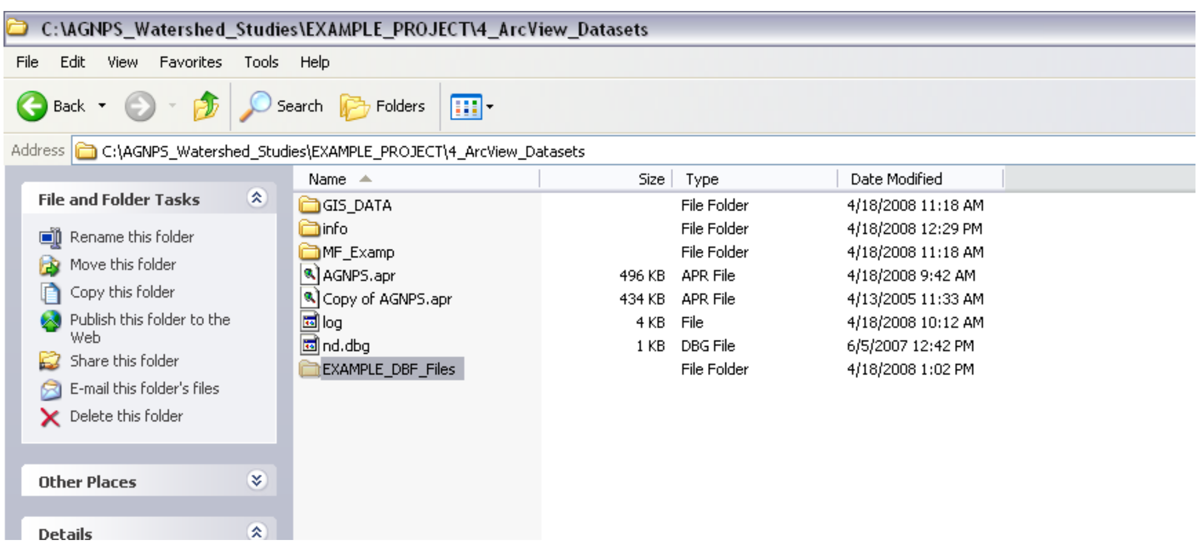
To create the .dbf files for critical areas of sediment yield and other processes go to “AGNPS PL Model” and choose the “Create Average Annual *.dbf files”.



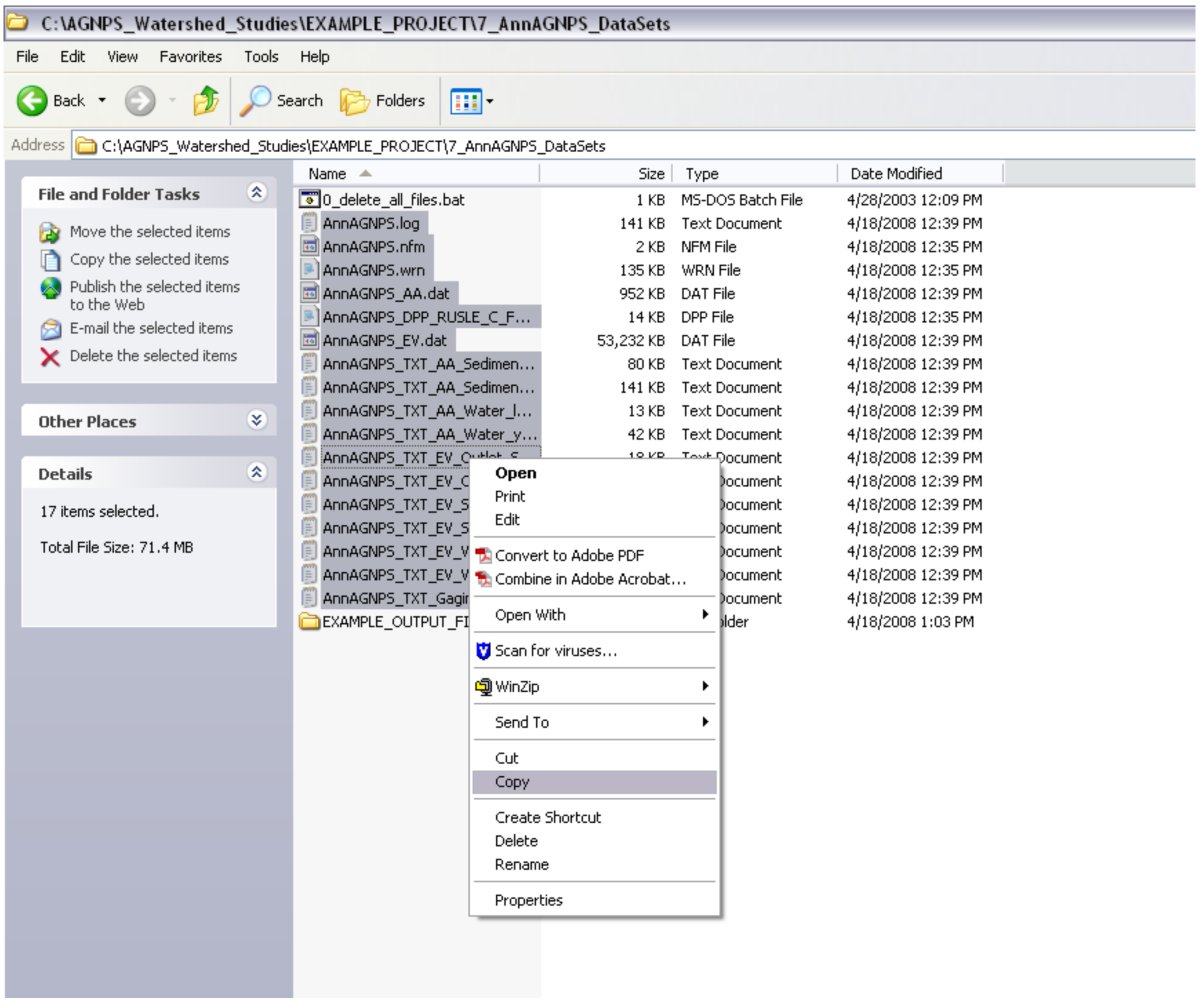
Go the #4 folder of the project and the newly created .dbf files for this project are placed here. Every time you run the program, it places new .dbf files in the same place, so we need to create a new folder to move these files so they aren't overwritten the next time the program is ran.



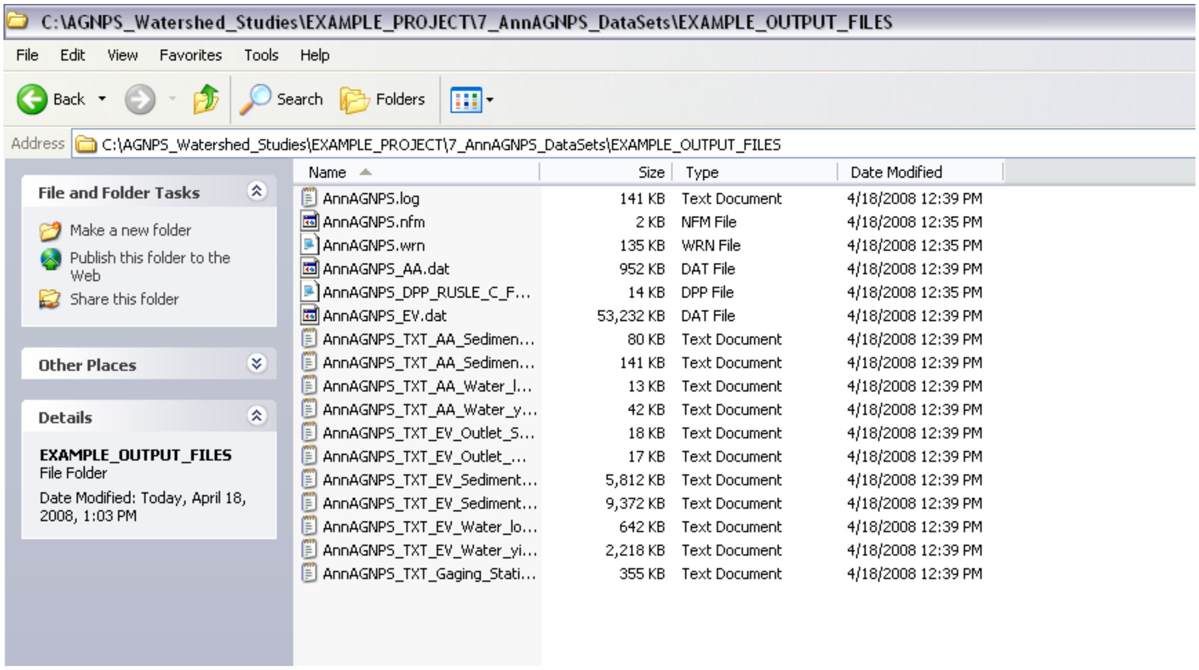
Create a new folder with a unique name for the project in the #4 folder and move the new .dbf files to this folder.



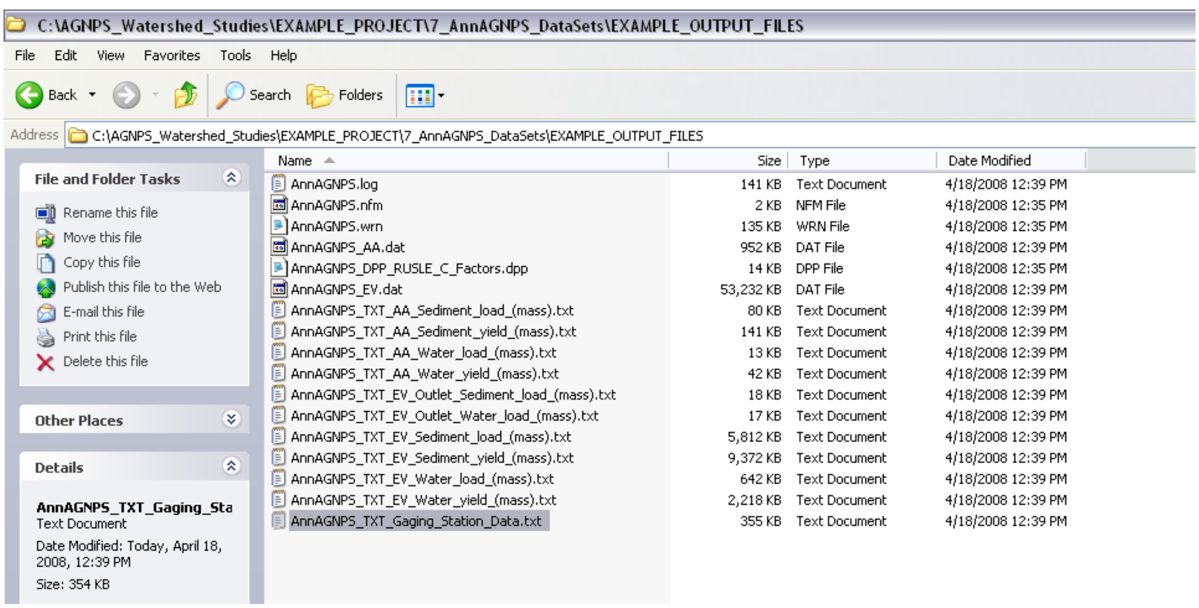
Go to the #7 folder of the project and you will see all the text files created from the execution of the AnnAGNPS program. The program places the text output files in the same location at the end of each run. Therefore, we must create a unique folder to store these files so they aren't overwritten when the program is ran again. So create a new folder with a unique name and copy and paste the files into the folder.



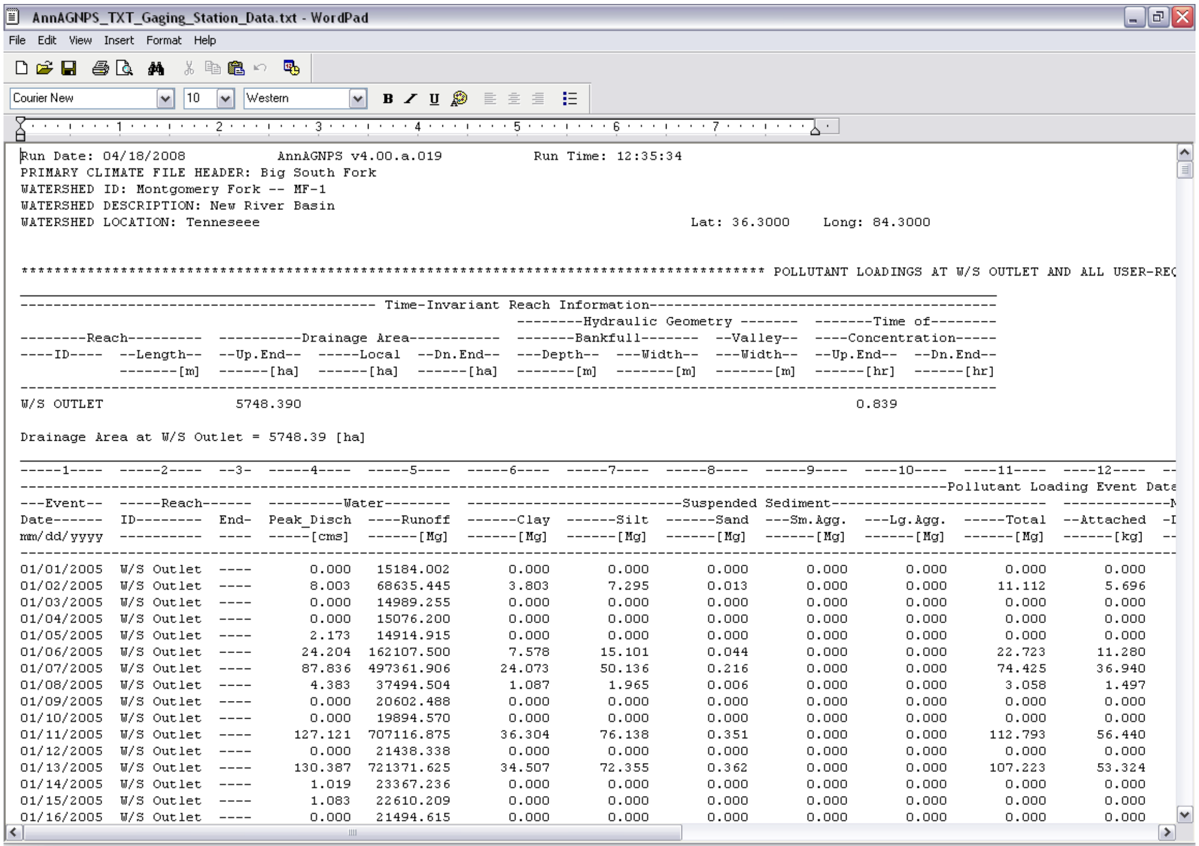
After moving the output files into a new folder in the #7 folder directory, you can begin to analyze all the sediment and runoff values produced by the model.



First, lets look at the Gauging Station output. This is a useful file for daily runoff and sediment yield values approximated on a daily basis for the defined outlet of the watershed. This file is useful for calibration purposes.

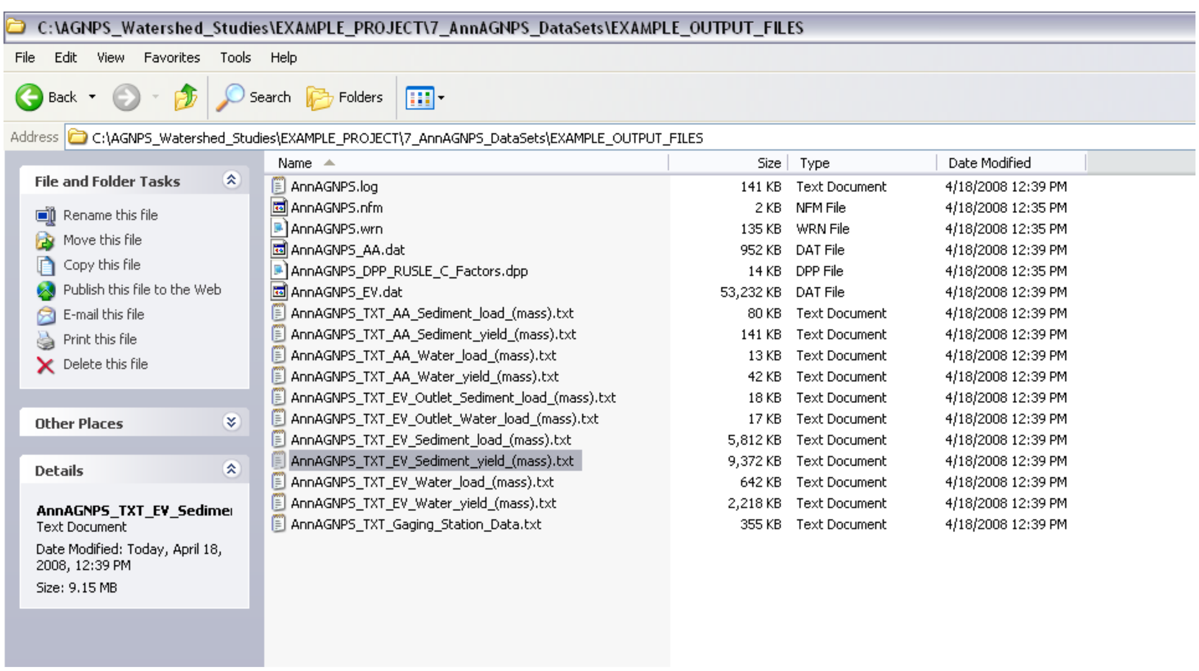


Open the Gauging Station text file in WordPad to view the results.

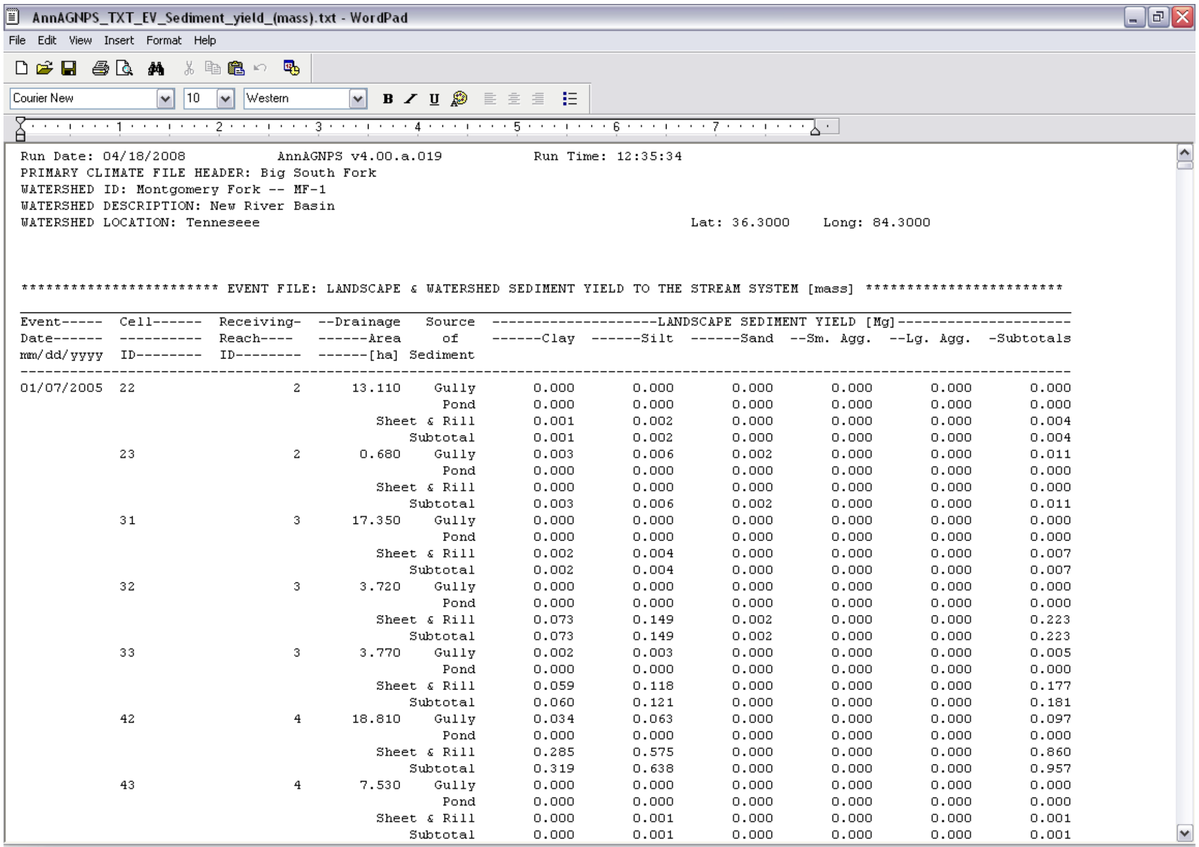



```
Run Date: 04/18/2008          AnnAGNPS v4.00.a.019          Run Time: 12:35:34
PRIMARY CLIMATE FILE HEADER: Big South Fork
WATERSHED ID: Montgomery Fork -- MF-1
WATERSHED DESCRIPTION: New River Basin
WATERSHED LOCATION: Tenneseee                                         Lat: 36.3000     Long: 84.3000

****************************************************************************************** POLLUTANT LOADINGS AT W/S OUTLET AND ALL USER-REQ

------------------------------------------- Time-Invariant Reach Information------------------------------------------
                                                           --------Hydraulic Geometry -------  -------Time of--------
--------Reach---------  ----------Drainage Area-----------  -------Bankfull-------  --Valley--  ----Concentration-----
----ID----  --Length--  --Up.End--  -----Local  --Dn.End--  ---Depth--  ---Width--  ---Width--  --Up.End--  --Dn.End--
            -------[m]  ------[ha]  ------[ha]  ------[ha]  -------[m]  -------[m]  -------[m]  ------[hr]  ------[hr]
------------------------------------------------------------------------------------------------------------------------
W/S OUTLET                5748.390                                                                   0.839

Drainage Area at W/S Outlet = 5748.39 [ha]

-----1----  -----2----  --3-  -----4----  -----5----  -----6----  -----7----  -----8----  -----9----  ----10----  ----11----  ----12----  --
-----------------------------------------------------------------------------------------------------------------Pollutant Loading Event Data
---Event--  -----Reach------  ---------Water--------  --------------------------Suspended Sediment-------------------------  ------------N
Date------  ID--------  End-  Peak_Disch  ----Runoff  ------Clay  ------Silt  ------Sand  ---Sm.Agg.  ---Lg.Agg.  -----Total  --Attached  -D
mm/dd/yyyy  ----------  ----  -----[cms]  ------[Mg]  ------[Mg]  ------[Mg]  ------[Mg]  ------[Mg]  ------[Mg]  ------[Mg]  ------[kg]  --
-----------------------------------------------------------------------------------------------------------------------------------------------
01/01/2005  W/S Outlet  ----       0.000   15184.002       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/02/2005  W/S Outlet  ----       8.003   68635.445       3.803       7.295       0.013       0.000       0.000      11.112       5.696
01/03/2005  W/S Outlet  ----       0.000   14989.255       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/04/2005  W/S Outlet  ----       0.000   15076.200       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/05/2005  W/S Outlet  ----       2.173   14914.915       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/06/2005  W/S Outlet  ----      24.204  162107.500       7.578      15.101       0.044       0.000       0.000      22.723      11.280
01/07/2005  W/S Outlet  ----      87.836  497361.906      24.073      50.136       0.216       0.000       0.000      74.425      36.940
01/08/2005  W/S Outlet  ----       4.383   37494.504       1.087       1.965       0.006       0.000       0.000       3.058       1.497
01/09/2005  W/S Outlet  ----       0.000   20602.488       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/10/2005  W/S Outlet  ----       0.000   19894.570       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/11/2005  W/S Outlet  ----     127.121  707116.875      36.304      76.138       0.351       0.000       0.000     112.793      56.440
01/12/2005  W/S Outlet  ----       0.000   21438.338       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/13/2005  W/S Outlet  ----     130.387  721371.625      34.507      72.355       0.362       0.000       0.000     107.223      53.324
01/14/2005  W/S Outlet  ----       1.019   23367.236       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/15/2005  W/S Outlet  ----       1.083   22610.209       0.000       0.000       0.000       0.000       0.000       0.000       0.000
01/16/2005  W/S Outlet  ----       0.000   21494.615       0.000       0.000       0.000       0.000       0.000       0.000       0.000
```

Next, look at the Event Sediment Yield (Mass) output file in WordPad.

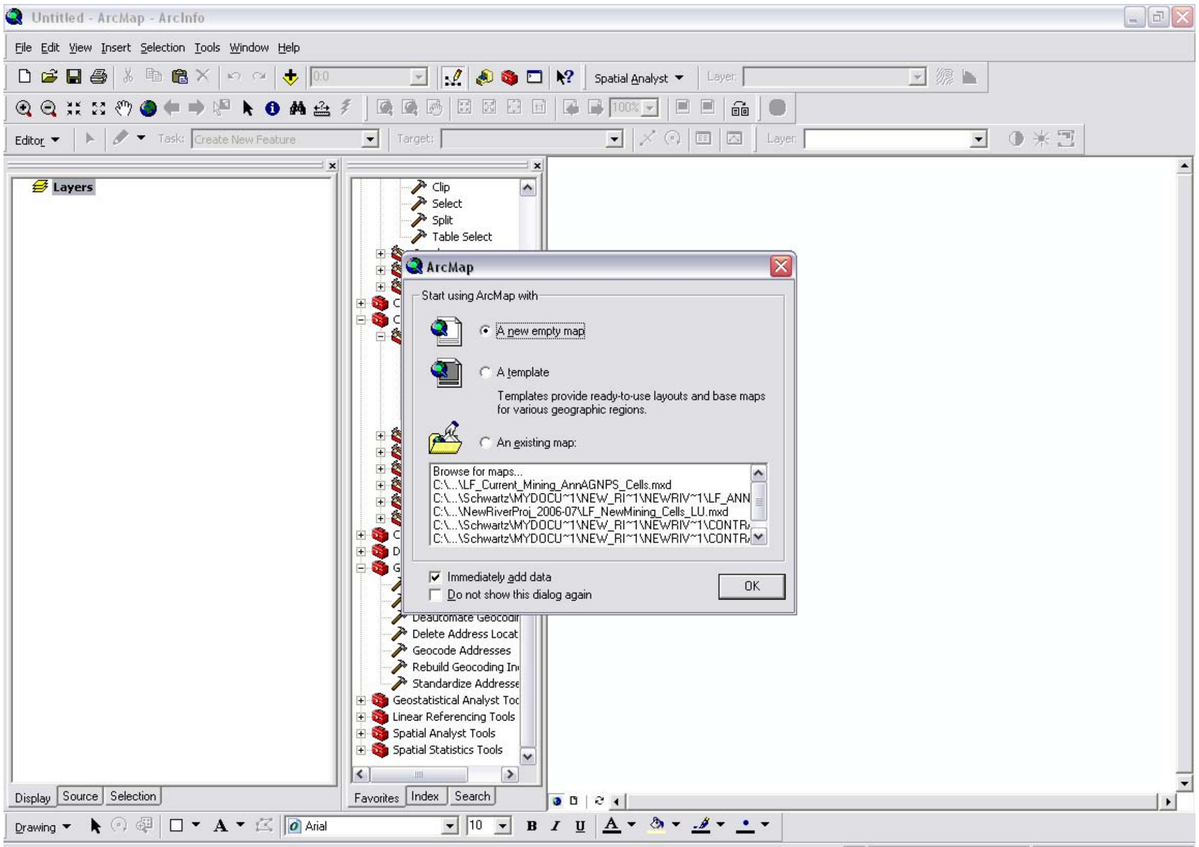


This is an example of the Event Sediment Yield (Mass) output file. This is useful to analyze the sediment yield produced during large storm events for individual cells.

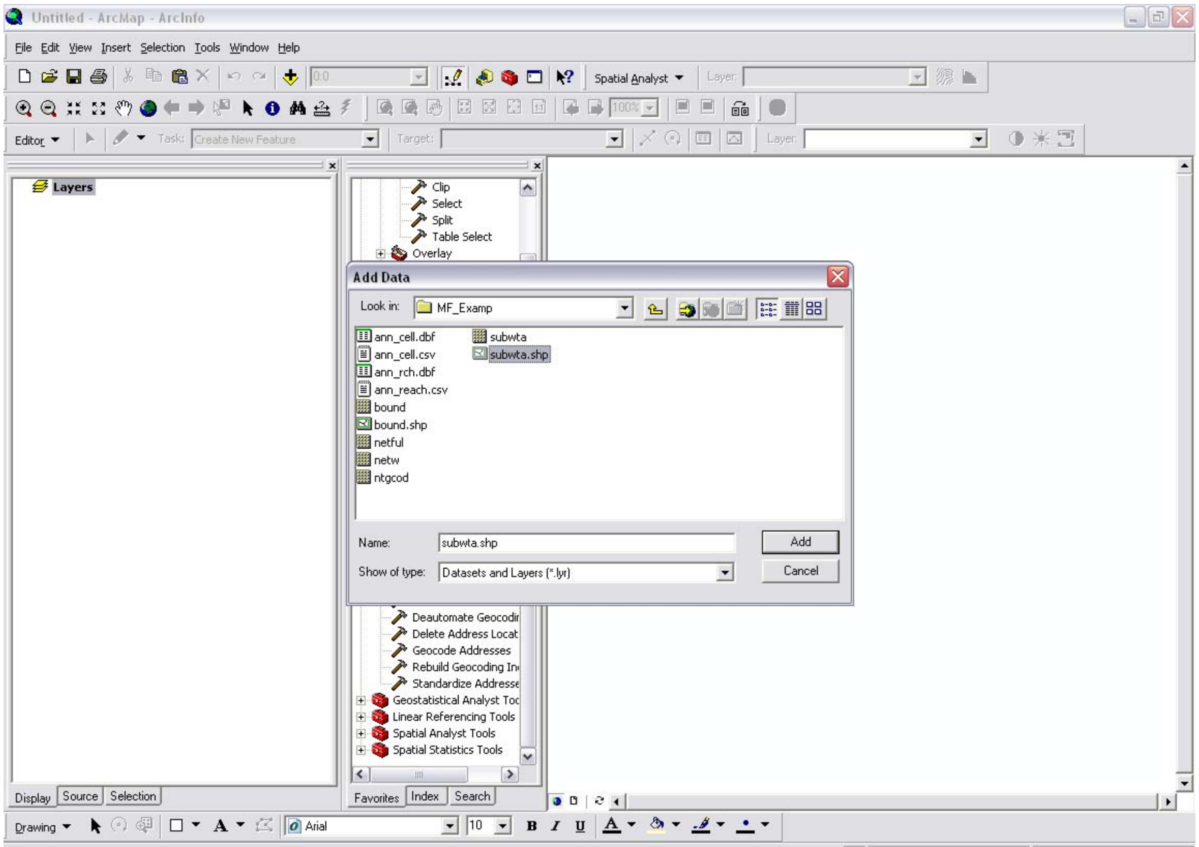

AnnAGNPS_TXT_EV_Sediment_yield_(mass).txt - WordPad

```
Run Date: 04/18/2008          AnnAGNPS v4.00.a.019          Run Time: 12:35:34
PRIMARY CLIMATE FILE HEADER: Big South Fork
WATERSHED ID: Montgomery Fork -- MF-1
WATERSHED DESCRIPTION: New River Basin
WATERSHED LOCATION: Tenneseee                                              Lat: 36.3000    Long: 84.3000


************************ EVENT FILE: LANDSCAPE & WATERSHED SEDIMENT YIELD TO THE STREAM SYSTEM [mass] ************************

Event-----  Cell------  Receiving-  --Drainage  Source  --------------------LANDSCAPE SEDIMENT YIELD [Mg]---------------------
Date------  ----------  Reach----   ------Area    of    ------Clay  ------Silt  ------Sand  --Sm. Agg.  --Lg. Agg.  -Subtotals
mm/dd/yyyy  ID--------  ID--------  ------[ha] Sediment
--------------------------------------------------------------------------------------------------------------------------------
01/07/2005  22                   2      13.110    Gully      0.000       0.000       0.000       0.000       0.000       0.000
                                                   Pond      0.000       0.000       0.000       0.000       0.000       0.000
                                           Sheet & Rill      0.001       0.002       0.000       0.000       0.000       0.004
                                               Subtotal      0.001       0.002       0.000       0.000       0.000       0.004
            23                   2       0.680    Gully      0.003       0.006       0.002       0.000       0.000       0.011
                                                   Pond      0.000       0.000       0.000       0.000       0.000       0.000
                                           Sheet & Rill      0.000       0.000       0.000       0.000       0.000       0.000
                                               Subtotal      0.003       0.006       0.002       0.000       0.000       0.011
            31                   3      17.350    Gully      0.000       0.000       0.000       0.000       0.000       0.000
                                                   Pond      0.000       0.000       0.000       0.000       0.000       0.000
                                           Sheet & Rill      0.002       0.004       0.000       0.000       0.000       0.007
                                               Subtotal      0.002       0.004       0.000       0.000       0.000       0.007
            32                   3       3.720    Gully      0.000       0.000       0.000       0.000       0.000       0.000
                                                   Pond      0.000       0.000       0.000       0.000       0.000       0.000
                                           Sheet & Rill      0.073       0.149       0.002       0.000       0.000       0.223
                                               Subtotal      0.073       0.149       0.002       0.000       0.000       0.223
            33                   3       3.770    Gully      0.002       0.003       0.000       0.000       0.000       0.005
                                                   Pond      0.000       0.000       0.000       0.000       0.000       0.000
                                           Sheet & Rill      0.059       0.118       0.000       0.000       0.000       0.177
                                               Subtotal      0.060       0.121       0.000       0.000       0.000       0.181
            42                   4      18.810    Gully      0.034       0.063       0.000       0.000       0.000       0.097
                                                   Pond      0.000       0.000       0.000       0.000       0.000       0.000
                                           Sheet & Rill      0.285       0.575       0.000       0.000       0.000       0.860
                                               Subtotal      0.319       0.638       0.000       0.000       0.000       0.957
            43                   4       7.530    Gully      0.000       0.000       0.000       0.000       0.000       0.000
                                                   Pond      0.000       0.000       0.000       0.000       0.000       0.000
                                           Sheet & Rill      0.000       0.001       0.000       0.000       0.000       0.001
                                               Subtotal      0.000       0.001       0.000       0.000       0.000       0.001
```

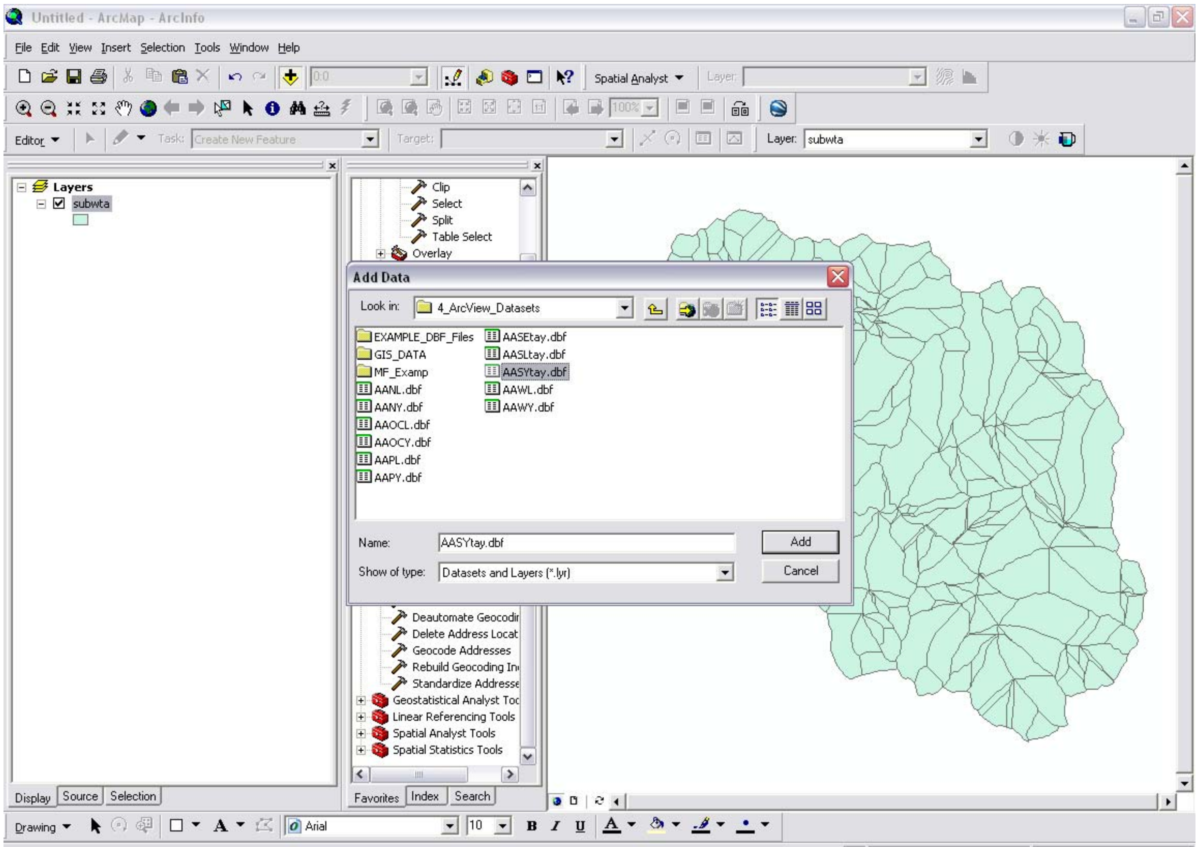
Next, we can analyze the critical sources of sediment yield for the watershed. To do this, open ArcMap or equivalent GIS software as shown.



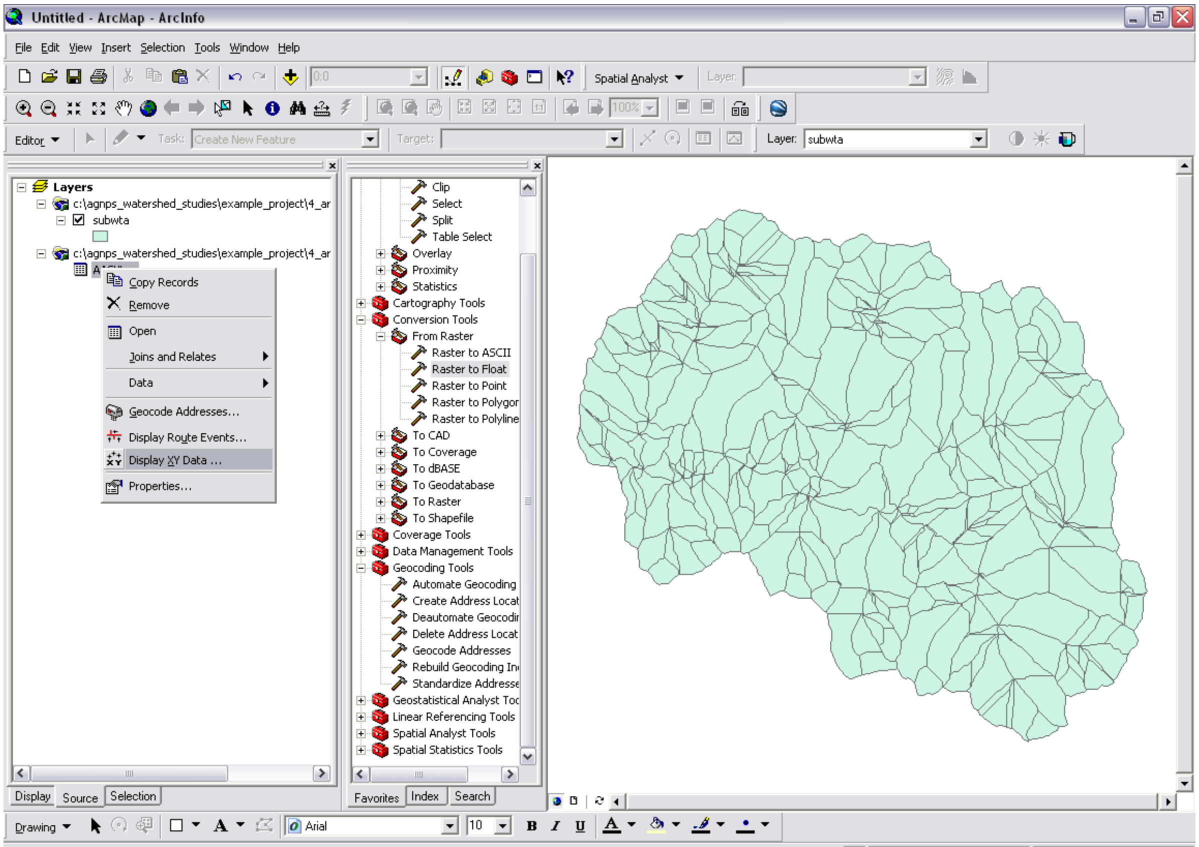
Add the “subwta.shp” file from the project folder in the #4 Folder. This is the shape file with the AnnAGNPS grid of flow cells.



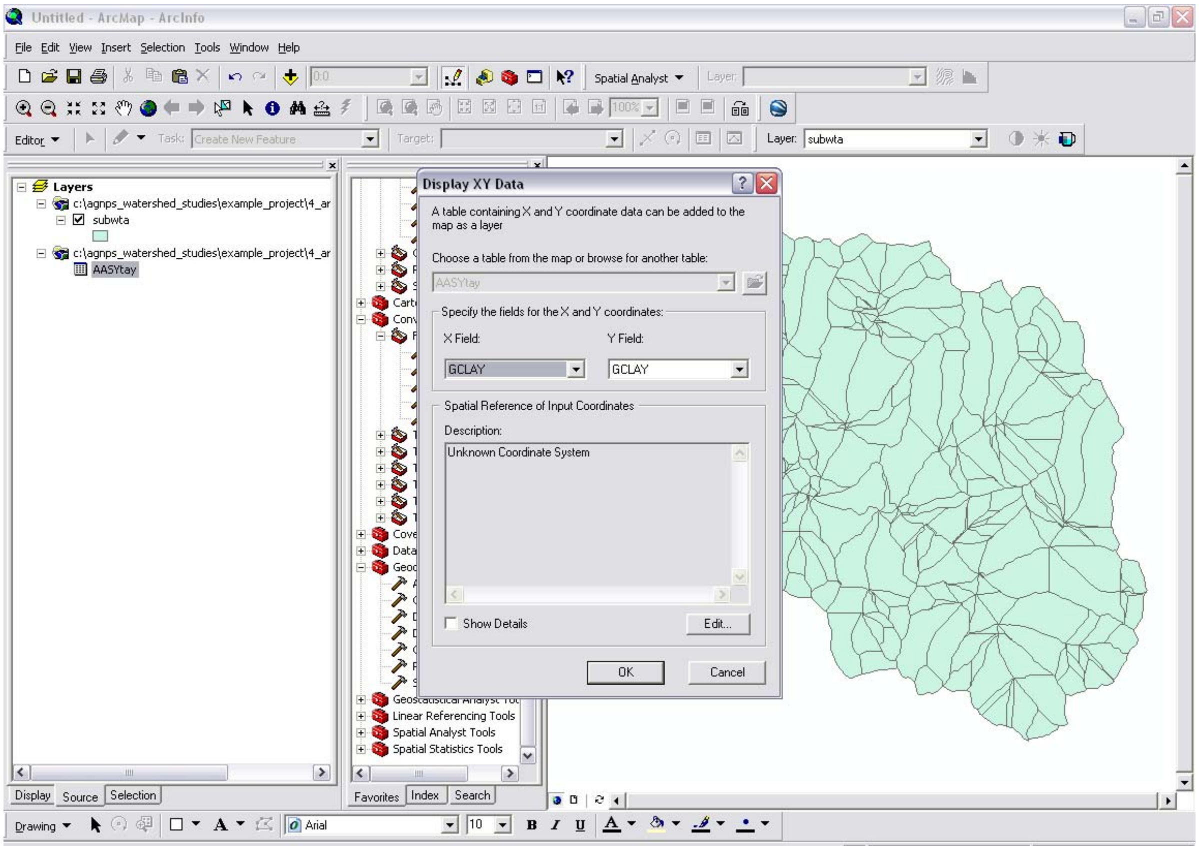
Next, Open “AASYtay.dbf” file that was created by the model. This file will be located in the unique folder where the .dbf files were moved earlier in the #4 folder.



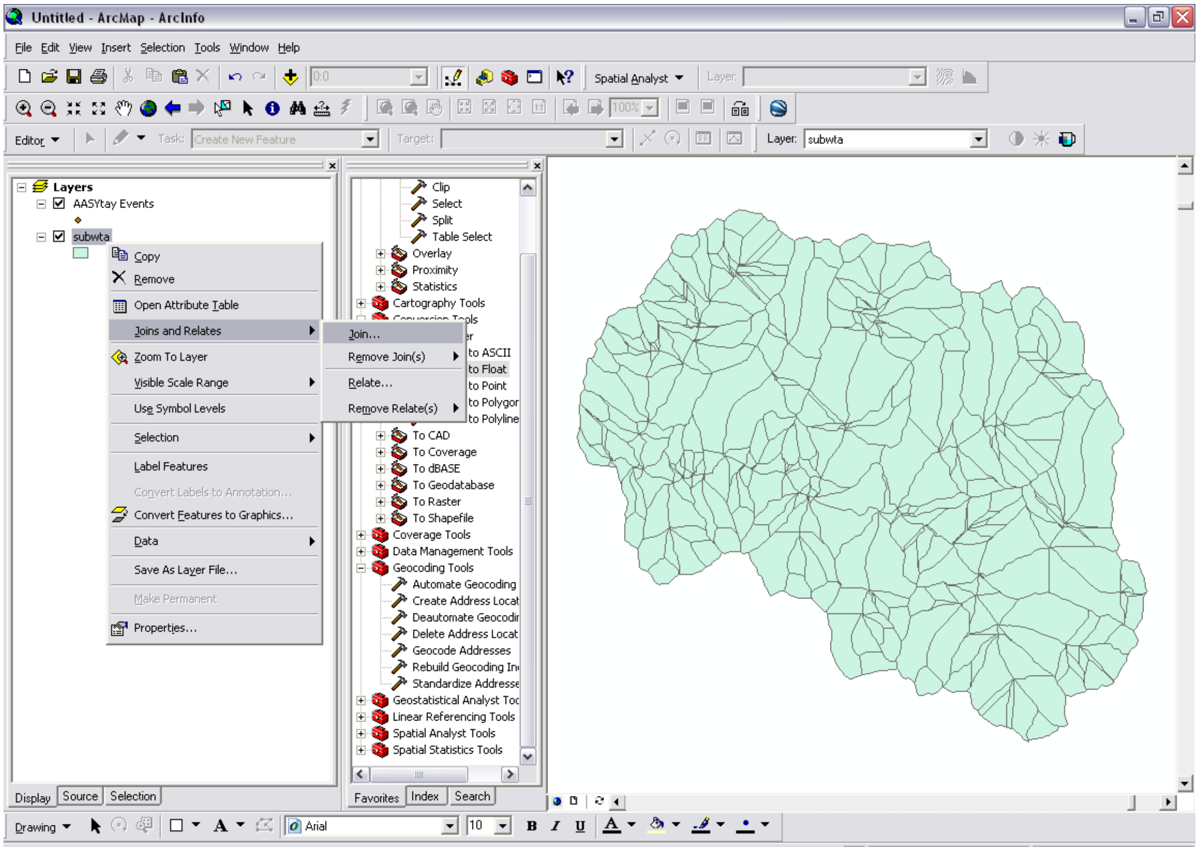
After the .dbf file is added, right click the AASYtay.dbf layer on the left side of the screen and click the “Display XY Data…”.



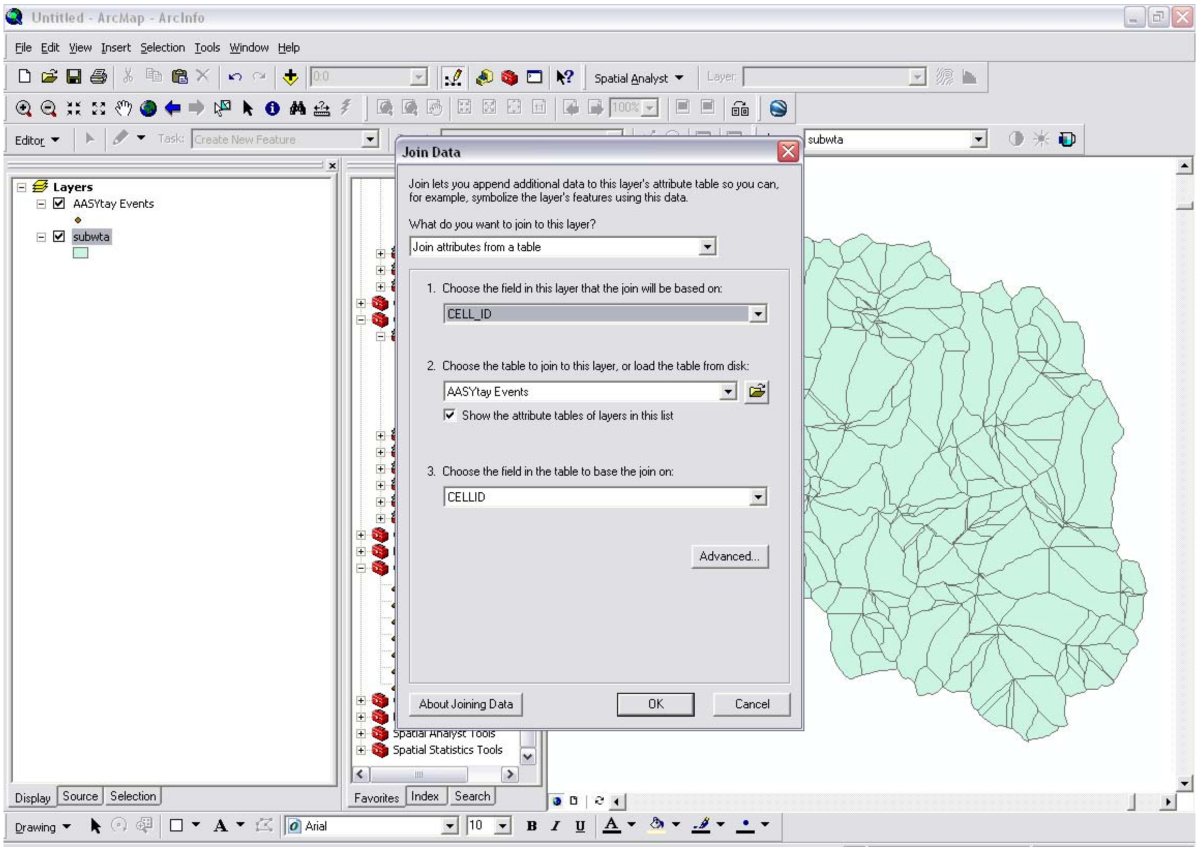
Select anything for the X Field and Y Field and select OK.



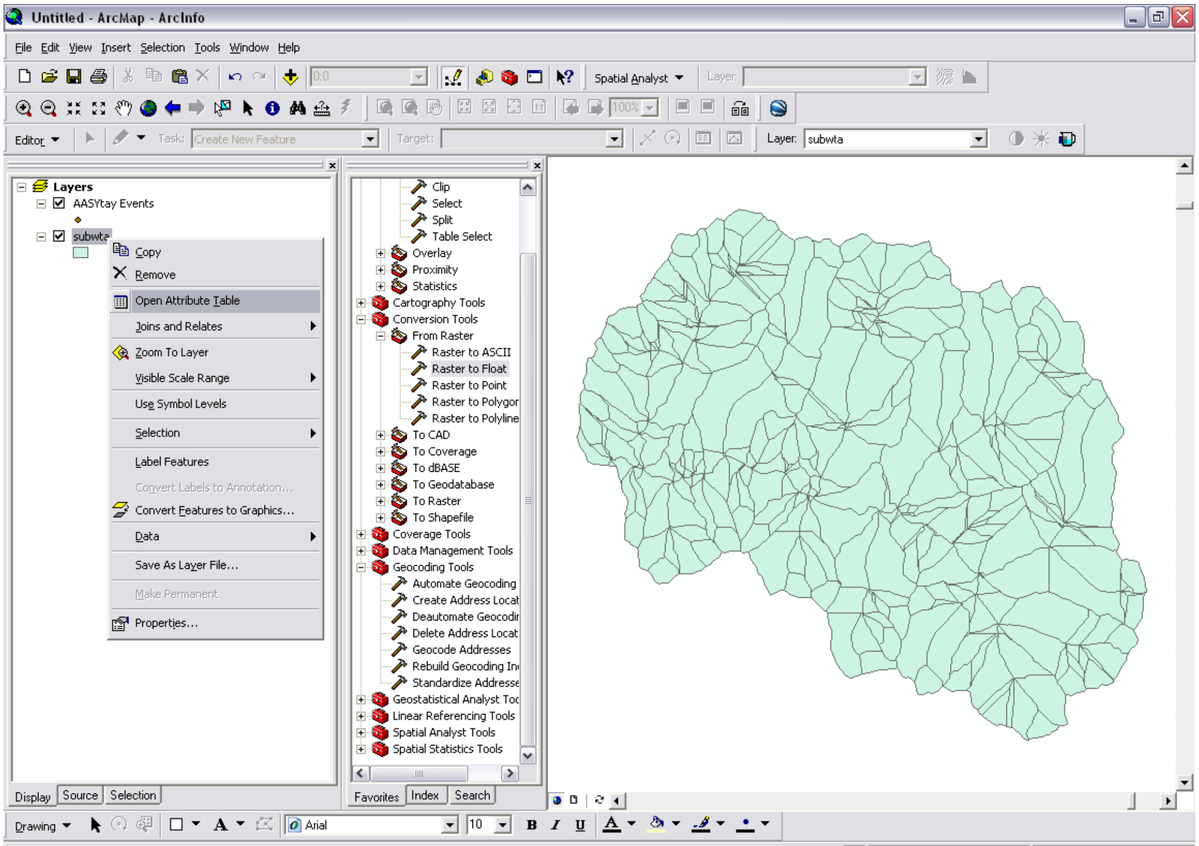
After a point file is created for the AASYtay Events, right click the “subwta” layer and choose “Joins and Relates” then “Join” as shown.



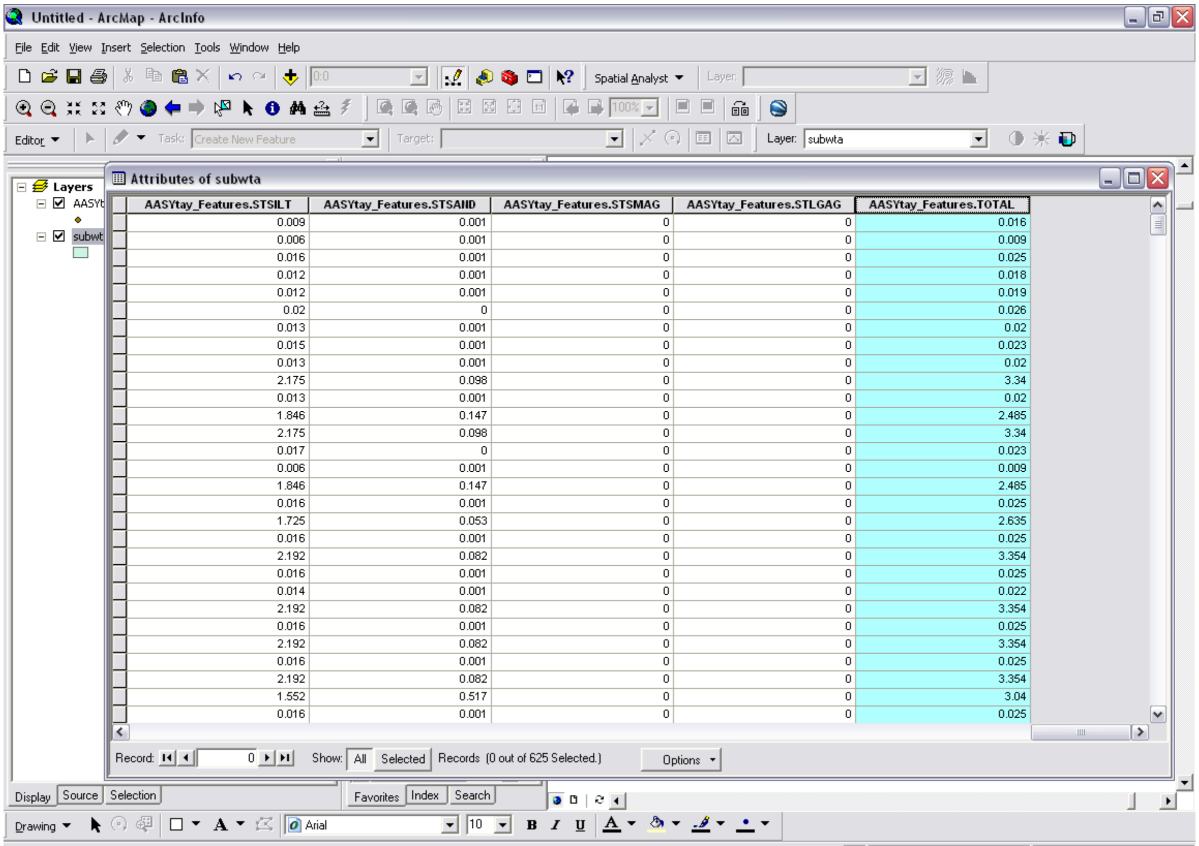
Choose “Join Attributes from a table”, and then choose “Cell_ID” as the field that the layer will join both sets of data. In the second field, choose the “AASYtay Events” data table to be joined with the layer. Finally, choose “CELLID” in the third field to have a common way of linking both sets of files. Click OK.



Now, go to the “subwta” layer and open its Attributes Table as shown.

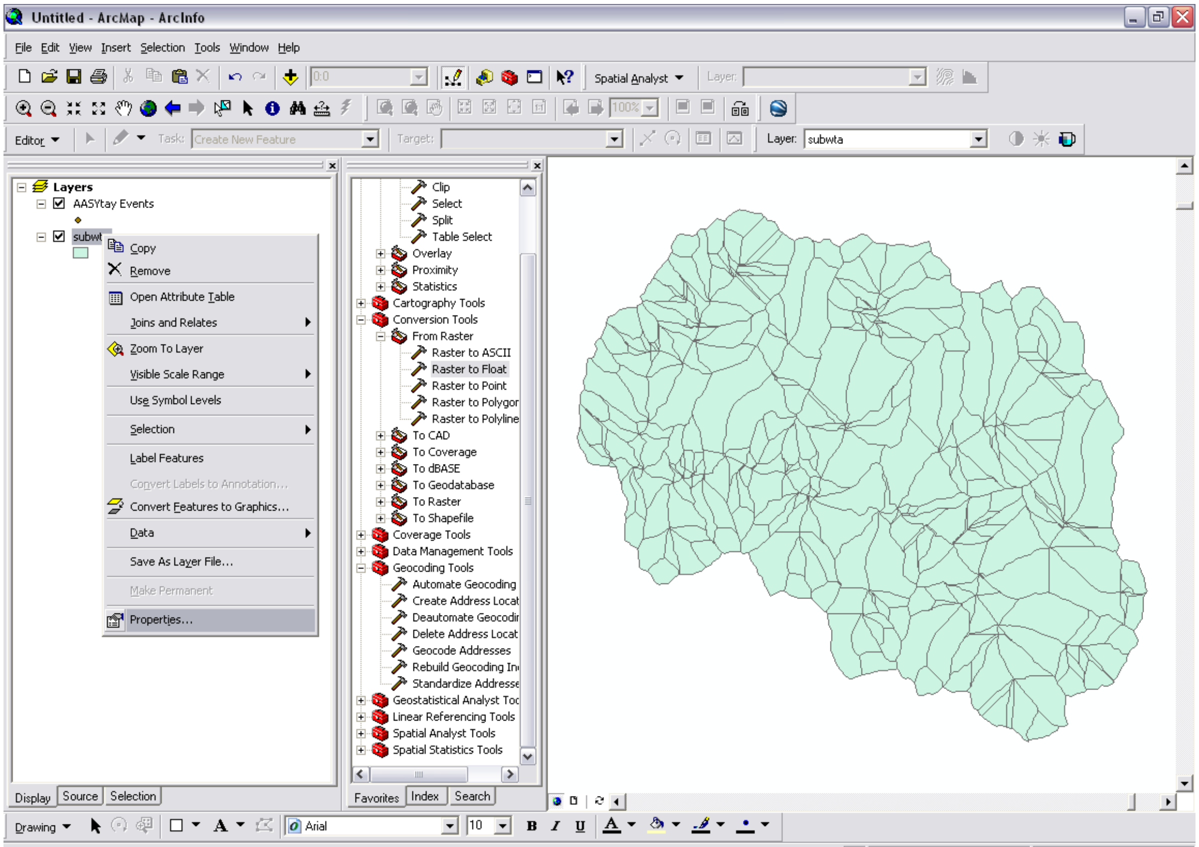


In the attributes table, scroll to the right till you see the “AASYtay_Features.TOTAL” heading. This represents the average annual sediment yield in Mg/yr for each cell. Exit the attributes table after viewing this data.

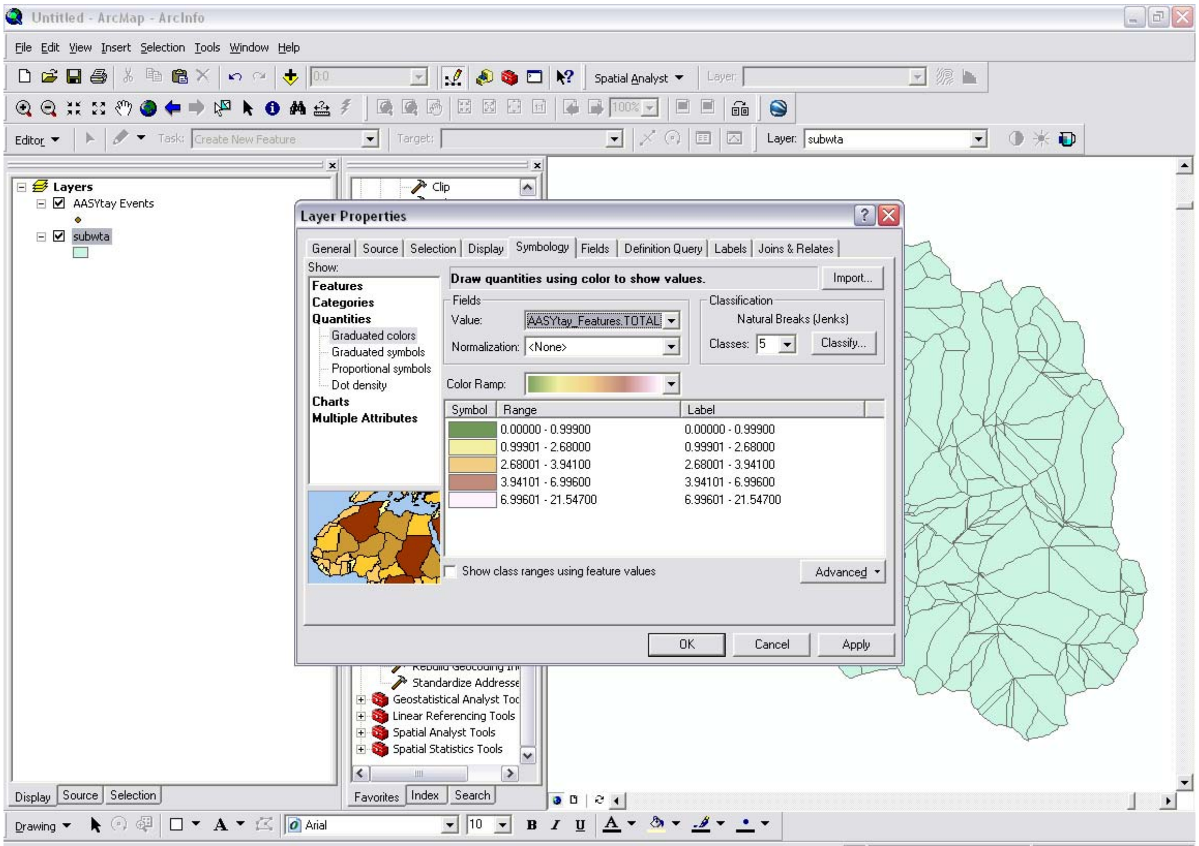


AASYtay_Features.STSILT	AASYtay_Features.STSAND	AASYtay_Features.STSMAG	AASYtay_Features.STLGAG	AASYtay_Features.TOTAL
0.009	0.001	0	0	0.016
0.006	0.001	0	0	0.009
0.016	0.001	0	0	0.025
0.012	0.001	0	0	0.018
0.012	0.001	0	0	0.019
0.02	0	0	0	0.026
0.013	0.001	0	0	0.02
0.015	0.001	0	0	0.023
0.013	0.001	0	0	0.02
2.175	0.098	0	0	3.34
0.013	0.001	0	0	0.02
1.846	0.147	0	0	2.485
2.175	0.098	0	0	3.34
0.017	0	0	0	0.023
0.006	0.001	0	0	0.009
1.846	0.147	0	0	2.485
0.016	0.001	0	0	0.025
1.725	0.053	0	0	2.635
0.016	0.001	0	0	0.025
2.192	0.082	0	0	3.354
0.016	0.001	0	0	0.025
0.014	0.001	0	0	0.022
2.192	0.082	0	0	3.354
0.016	0.001	0	0	0.025
2.192	0.082	0	0	3.354
0.016	0.001	0	0	0.025
2.192	0.082	0	0	3.354
1.552	0.517	0	0	3.04
0.016	0.001	0	0	0.025

Next, right click on the “subwta” layer and choose “Properties”.



In the properties, go to “Symbology”. Click on “Quantities” and select the “Graduate Colors”. For the Fields Value, choose the “AASYtay_Features.TOTAL”. This will classify the different amounts of average annual sediment yield occurring on each cell. Click OK.



Now you can see the critical sources of sediment yield occurring in the Montgomery Fork sub-watershed.