NMSIM Standard Operating Procedure

How-to: create files for NMSIM & upload files to NMSIM

Written by Kathryn Nuessly, updated 3/12/2015, 4/28/2015 KNN

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To easily navigate this document, go into the "view" menu of Word and in the section titled "show," check the box next to "navigation pane." This will pull up a menu on the left side of your Word window and will allow you to click on navigation links that will bring you directly to the section of interest.

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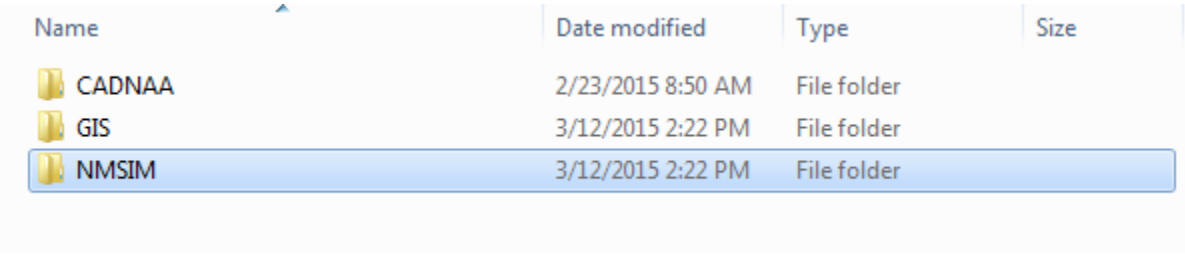
INSTALLING AND RUNNING NMSIM

NMSIM is used to generate models that illustrate the noise footprint (generally a 12-hour L_{eq}) of a moving source. NMSIM can be "tricked" into modeling the noise footprint of a stationary source, if need be. This program is best used to show parks the noise footprint that different sources (cars, trucks, planes) create from an existing or planned road or flight path (trajectory).

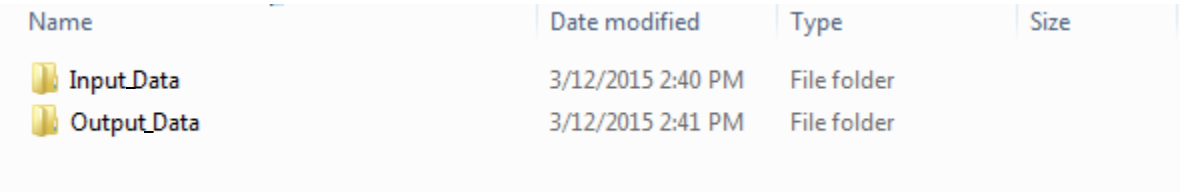
1. Navigate to: T:\NSNSD\Sounds\Records\2. Science\2.2 Program Development\Modeling\NMSim\NMSim_2014 (COPY TO YOUR OWN PROGRAM FILE)
2. Copy this file ("NMSim_2014 (COPY TO YOUR OWN PROGRAM FILE)") to your own drive (one like a C or data drive).
3. Double click on the program to start.
4. To run a NMSIM model, you will need:
    a. ArcGIS –install this program.
        Go see or call Stephani Schupbach if you need assistance (she is very helpful and located in the Fort Collins office, IMD, 970.267.2172).
    b. GIS data – using two USGS sites:
        http://www.mrlc.gov/viewerjs/
        http://nationalmap.gov/viewer.html
    c. Geospatial Sound Model – to use this in ArcGIS: T:\NSNSD\Sounds\StaffSpace\Dan\GSM
    d. R scripts to determine spatial resolution of desired results and to process NMSIM output:
        Save copies of these scripts to each project file: T:\NSNSD\Sounds\Records\2. Science\2.2 Program Development\Modeling\NMSim\RScripts_for_NMSIM
    e. The following NMSIM inputs or layers (the process for obtaining and using these files is described in the following pages):
        Elevation (Digital Elevation Model file)
        Impedance (land cover file)
        Trajectory (road or flight path)
        Source (the noise the car or bus or airplane makes)
        Ambient (natural ambient sound level)
5. To process the output of NMSIM you will need:
    R – download and install from: http://cran.r-project.org/bin/windows/base/
    R Studio (this makes the R interface user-friendly) – download and install from: http://www.rstudio.com/products/rstudio/download/
        Click on the link for Windows (currently titled: RStudio 0.98.1103 - Windows XP/Vista/7/8)
6. Follow the directions below to create and upload these files.
7. Helpful other documents
    a. NMSIM manual: T:\NSNSD\Sounds\Records\2. Science\2.2 Program Development\Modeling\NMSim\NMSim Manual

PROJECT FILE STRUCTURE

1. Start a new folder for each modelling project that contains a GIS folder for your map data layers and a NMSIM folder. The NMSIM folder should contain two other folders labeled 'Input_Data' and 'Output_Data.'

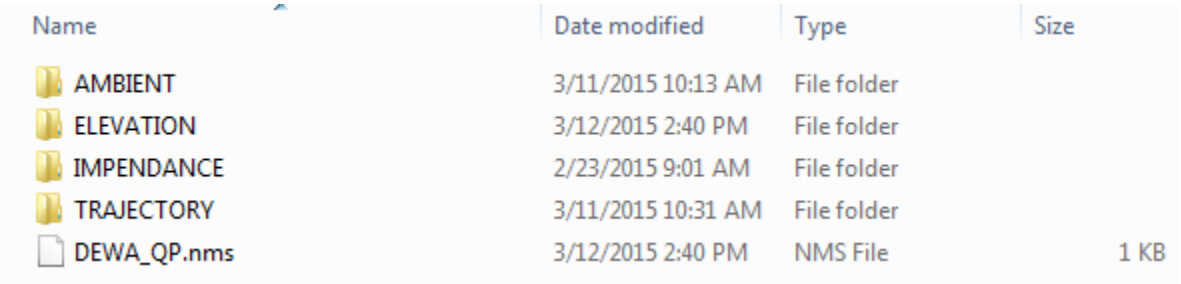


Name	Date modified	Type	Size
CADNAA	2/23/2015 8:50 AM	File folder	
GIS	3/12/2015 2:22 PM	File folder	
NMSIM	3/12/2015 2:22 PM	File folder	



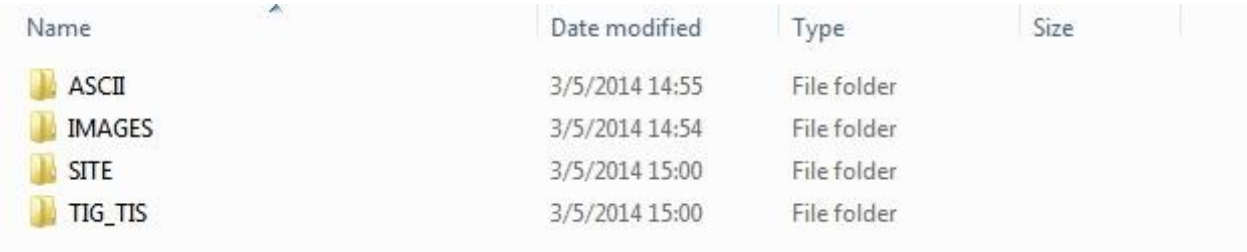
Name	Date modified	Type	Size
Input_Data	3/12/2015 2:40 PM	File folder	
Output_Data	3/12/2015 2:41 PM	File folder	

2. Input Data should have the following folders and metadata template file:
   If you have more than one trajectory, they all go in the same folder, but with different names.



Name	Date modified	Type	Size
AMBIENT	3/11/2015 10:13 AM	File folder	
ELEVATION	3/12/2015 2:40 PM	File folder	
IMPENDANCE	2/23/2015 9:01 AM	File folder	
TRAJECTORY	3/11/2015 10:31 AM	File folder	
DEWA_QP.nms	3/12/2015 2:40 PM	NMS File	1 KB

3. The output data folder can look like this, corresponding to each data type:



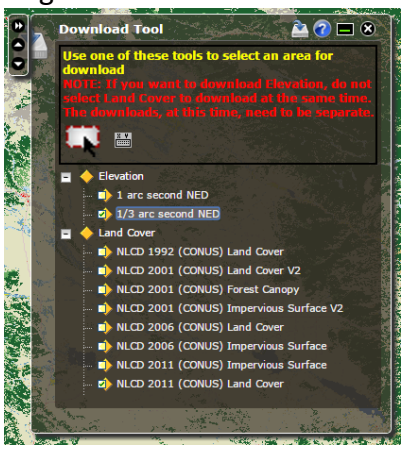
Name	Date modified	Type	Size
ASCII	3/5/2014 14:55	File folder	
IMAGES	3/5/2014 14:54	File folder	
SITE	3/5/2014 15:00	File folder	
TIG_TIS	3/5/2014 15:00	File folder	

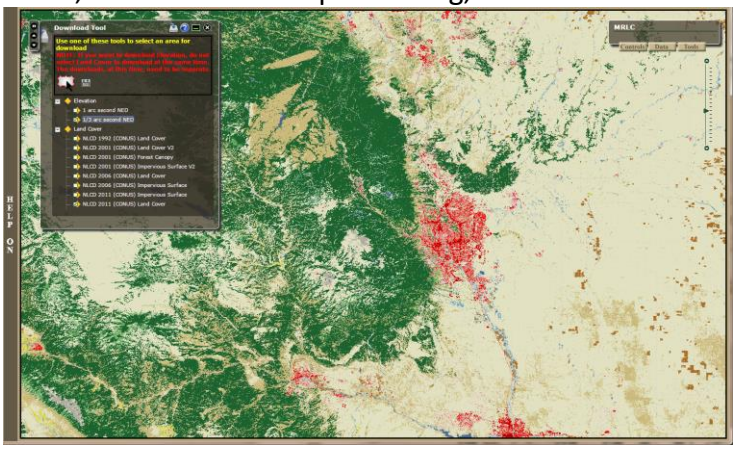
ELEVATION

HOW-TO: CREATE ELEVATION FILE FOR NMSIM

There are two main ways to download maps from USGS. The new way, using the National Map Viewer, and an older path, using the MRLC site. Downloading elevation maps from the new site for a park may result in several quads/pieces in order to cover the area of interest or the whole park. In my experience, importing more than ONE elevation map crashes NMSIM. So, though its user interface is archaic, I would use the old site (http://www.mrlc.gov/viewerjs/) in order to generate the ONE file NMSIM likes (this old site will output one seamless elevation file for the entire area of interest). The directions below outline this process.

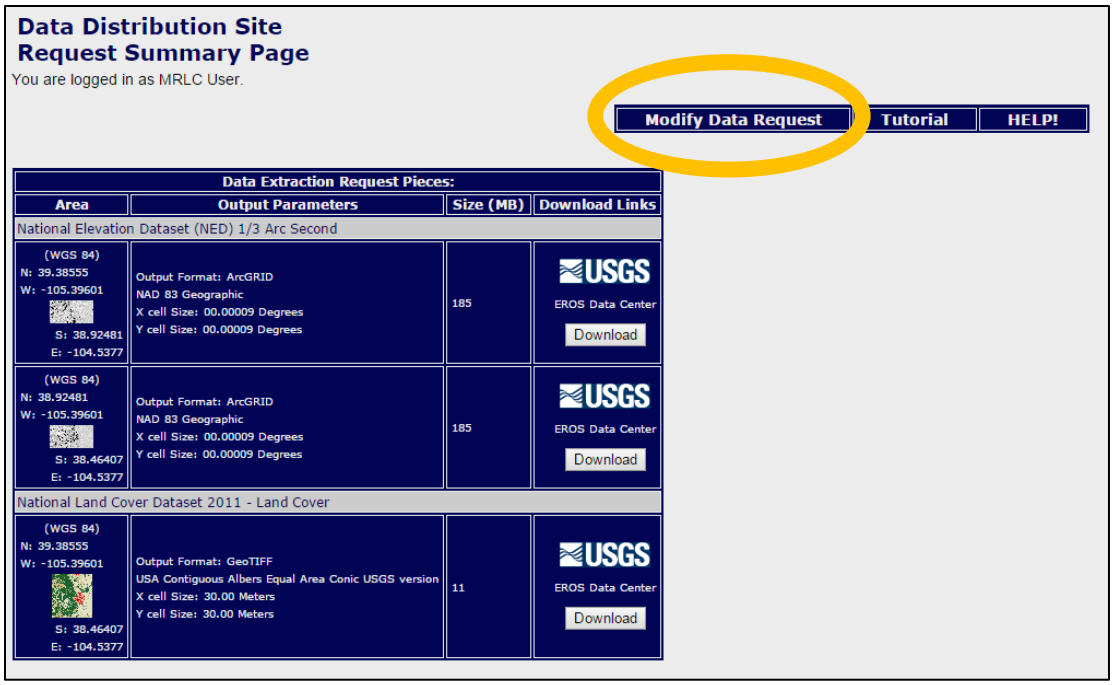
1. Navigate to the MRLC map at: http://www.mrlc.gov/viewerjs/. Using a combination of google map and the MRLC viewer, find the piece of land or park. You can use google maps to orient your park in regards to roads, which will show up on the MRLC map. The MRLC map does not currently have a layer to show park boundaries, so you'll need to approximate this.
2. Zoom to Park or area of interest. To turn on road and boundary layers, find the brown "Data" tab on the upper right corner of the MRLC screen. Click "Data" and then select "Layer Manager." Use your mouse to check the layers in the box that pops up on the left side of the screen that you need (within the layer manager: roads are found under "transportation," county and state lines are found under "boundaries").
3. Download the data. To do this, click once more on the brown "Data" button found on the upper right corner of the MRLC screen. On the menu that pops up under "Data", click on "Download Tool." In the Download Tool box that pops up on the right side of the screen (shown below), choose 1/3 arc second (finer resolution than 1 arc second). I have been able to get this fine scale to work in NMSIM, but if NMSIM keeps crashing, choose 1 arc second.



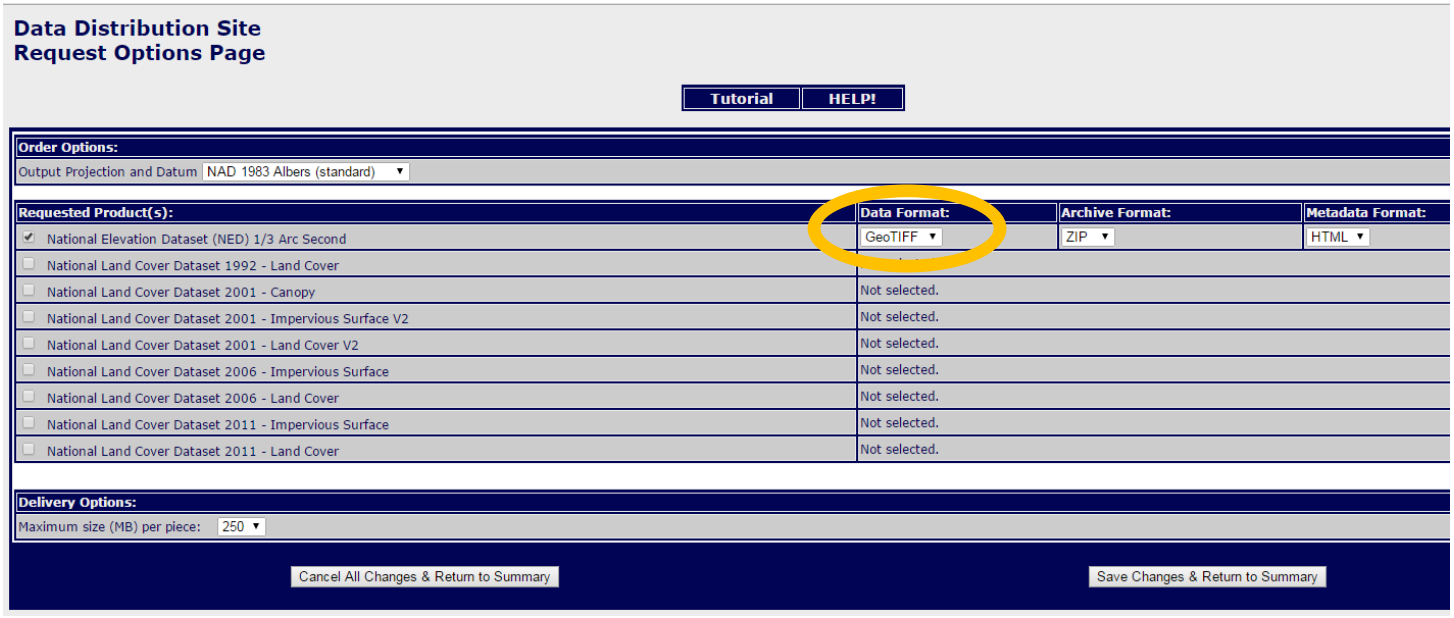


4. Click on the dotted-red box icon in the "Download Tool" box (if you mouse over this icon, a grey text box should come up saying "Define Rectangular Download Area for Seamless Data"). The box is circled in yellow below.

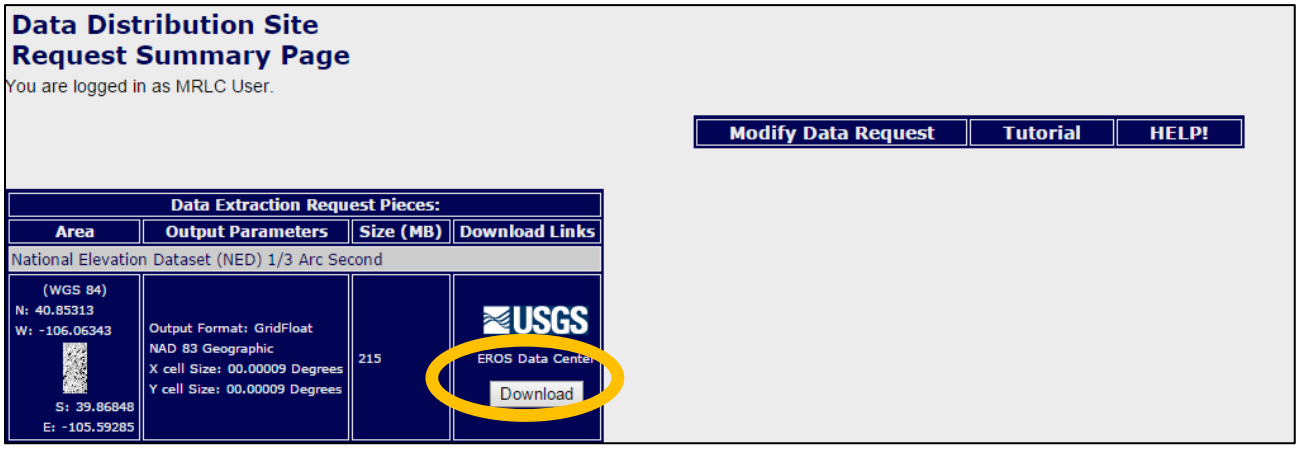
5. Use your mouse to draw a red box around the area of interest. Let go of the mouse clicker when you are done.
6. A separate window will open called “Request Summary Page.”



7. Click the “Modify Data Request” on the single line blue bar above the data download box (circled in yellow above). Look in the “elevation” table to see what data is checked to download. Ensure this is the file you want (National Elevation Dataset (NED) 1/3 arc second). In the first dropdown menu to the right of your selected dataset, choose “GridFloat” (circled in yellow below). This is the file type (.flt) that NMSIM will accept. The other two dropdown menus are fine as they are (“ZIP” and “HTML”). You could also grab the land cover dataset (impedance NMSIM file) now – jump to the Impedance section for those directions.



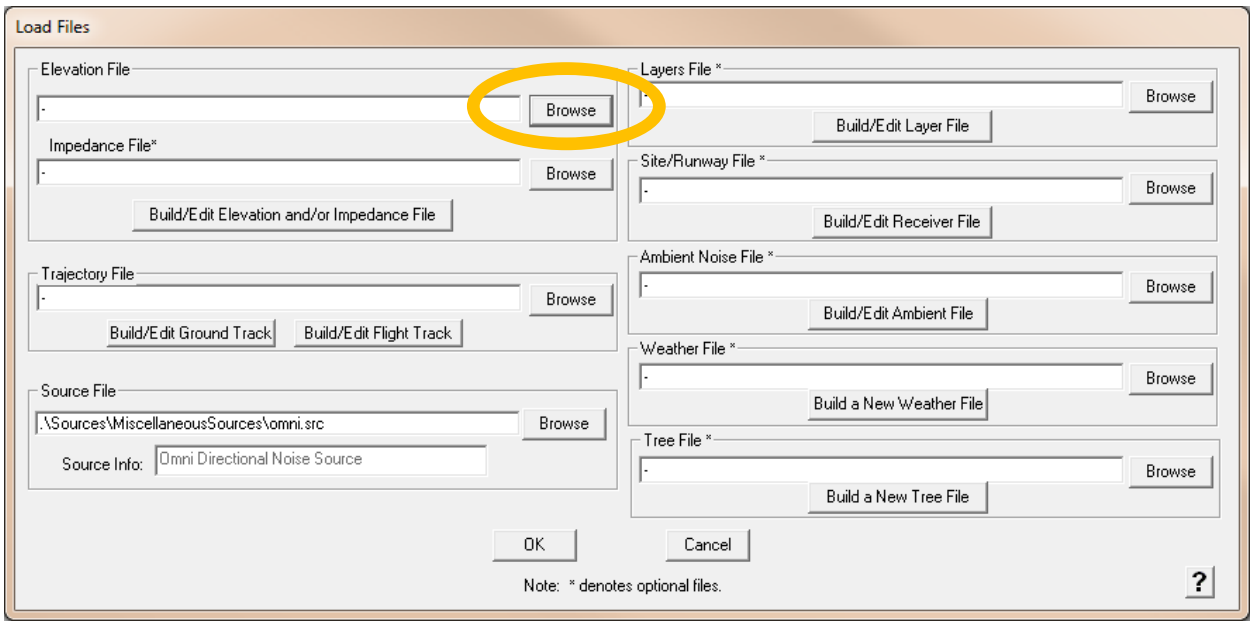
8. Click the white box that reads “Save Changes & Return to Summary.”
9. Ensure the output format is in GridFloat. Click the gray “Download” button next to the dataset.



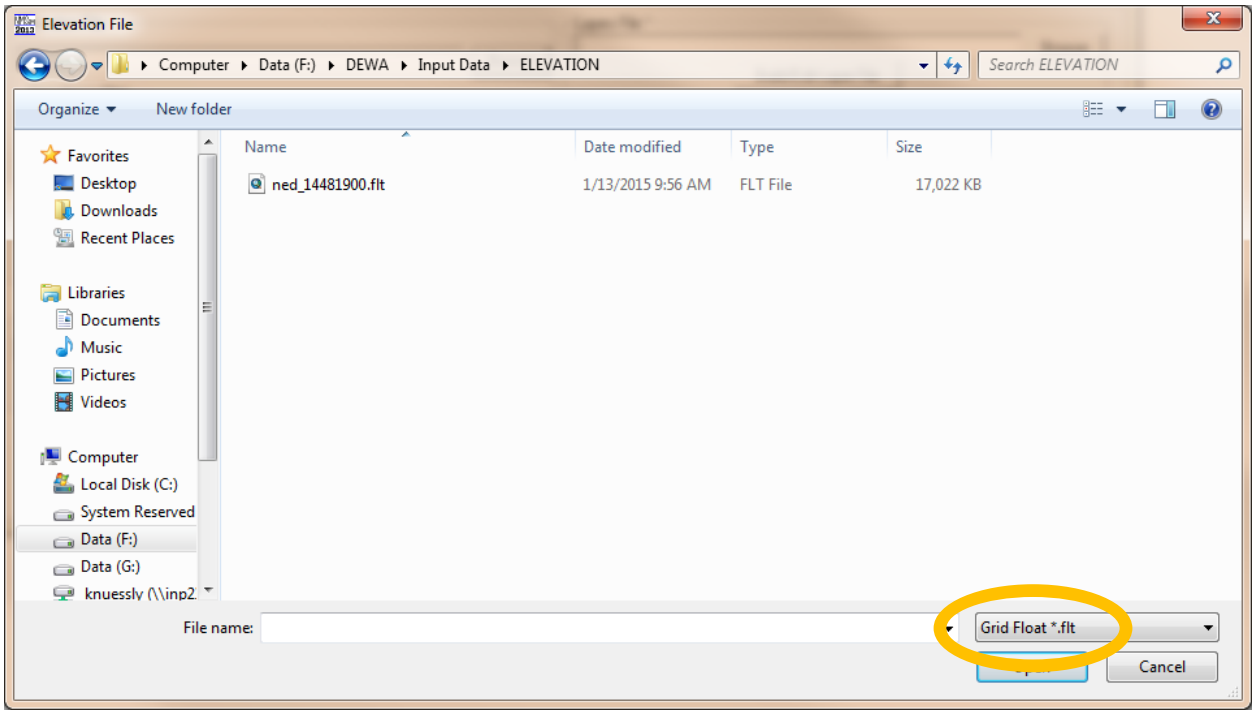
10. A separate window will open that will show updates on the status of the file. It will take a few seconds, even minutes if it’s a big file.
11. Once you see "the data extraction has completed" screen, click the resulting download tile in your main browser window. If an error occurs, click the link provided in the small browser window. Sometimes the download has time-out issues.
12. Access the file in your Downloads folder. Unzip and save the file in your ELEVATION folder.
13. Import the .flt file to ArcMap. Check that you have the correct area and that the elevation lines match the area. (You can use other layers in ArcMap relevant to your park like roads or park boundaries to check the file for accuracy.)
14. If the file/area looks correct in ArcMap, the file is ready for use in NMSIM. You do NOT need to do ANY file conversion. The .flt file you downloaded from the MRLC website is ready to be imported to NMSIM.

HOW-TO: UPLOAD ELEVATION FILE TO NMSIM

1. Open NMSIM and start a new project by going to “File,” then type in a file name, then hit “Save.” A grey box will pop up titled “Load Files.”



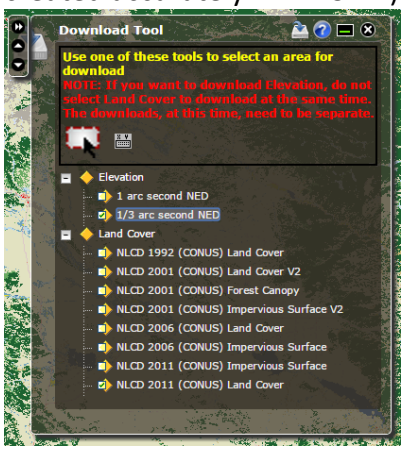
2. Click on the “Browse” button next to the white box underneath “Elevation File.” Ensure the grey box next to “File Name” is set on “Grid Float *.flt” (It will be on “Elevation *.elv” by default; see yellow circle below). Select the .flt file that you downloaded from the procedure above and click “Open.” This will upload the file to NMSIM. Continue on to Impedance instructions.



IMPENDANCE

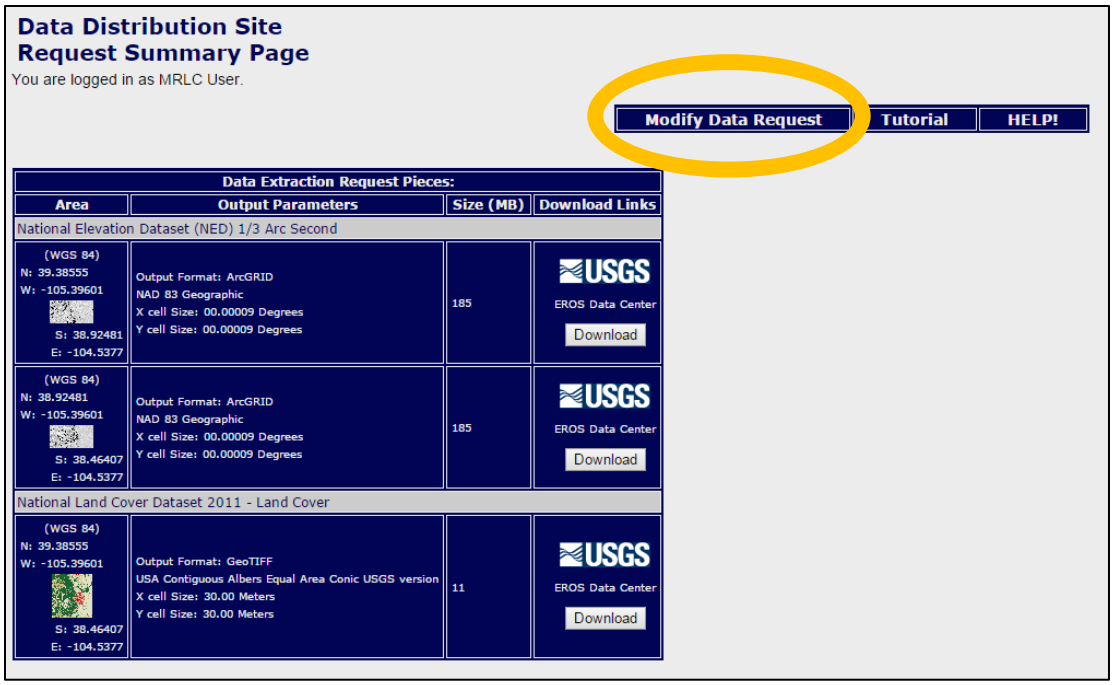
HOW-TO: CREATE IMPEDANCE FILE FOR NMSIM

1. Navigate to the MRLC map at: http://www.mrlc.gov/viewerjs/. Using a combination of google map and the MRLC viewer, find the piece of land or park. You can use google maps to orient your park in regards to roads, which will show up on the MRLC map. The MRLC map does not currently have a layer to show park boundaries, so you'll need to approximate this.
2. Zoom to Park or area of interest. To turn on road and boundary layers, find the brown "Data" tab on the upper right corner of the MRLC screen. Click "Data" and then select "Layer Manager." Use your mouse to check the layers in the box that pops up on the left side of the screen that you need (within the layer manager: roads are found under "transportation," county and state lines are found under "boundaries").
3. Download the data. Click once more on the brown "Data" button found on the upper right corner of the MRLC screen. On the menu that pops up under "Data", click on "Download Tool." In the Download Tool box that pops up on the right side of the screen, choose 1/3 arc second (finer resolution than 1 arc second). I have been able to get this fine scale to work in NMSIM, but if NMSIM keeps crashing, choose 1 arc second. DO NOT SELECT ANY OF THE LANDCOVER FILES AT THIS STEP. THE ONLY BOX THAT SHOULD CONTAIN A CHECK-MARK IS THE ELEVATION FILE. (If you don't follow the advice in caps, you WILL NOT be able to download a "grid float *.flt" file – which is absolutely necessary for the impedance file to be created accurately in NMSIM.)

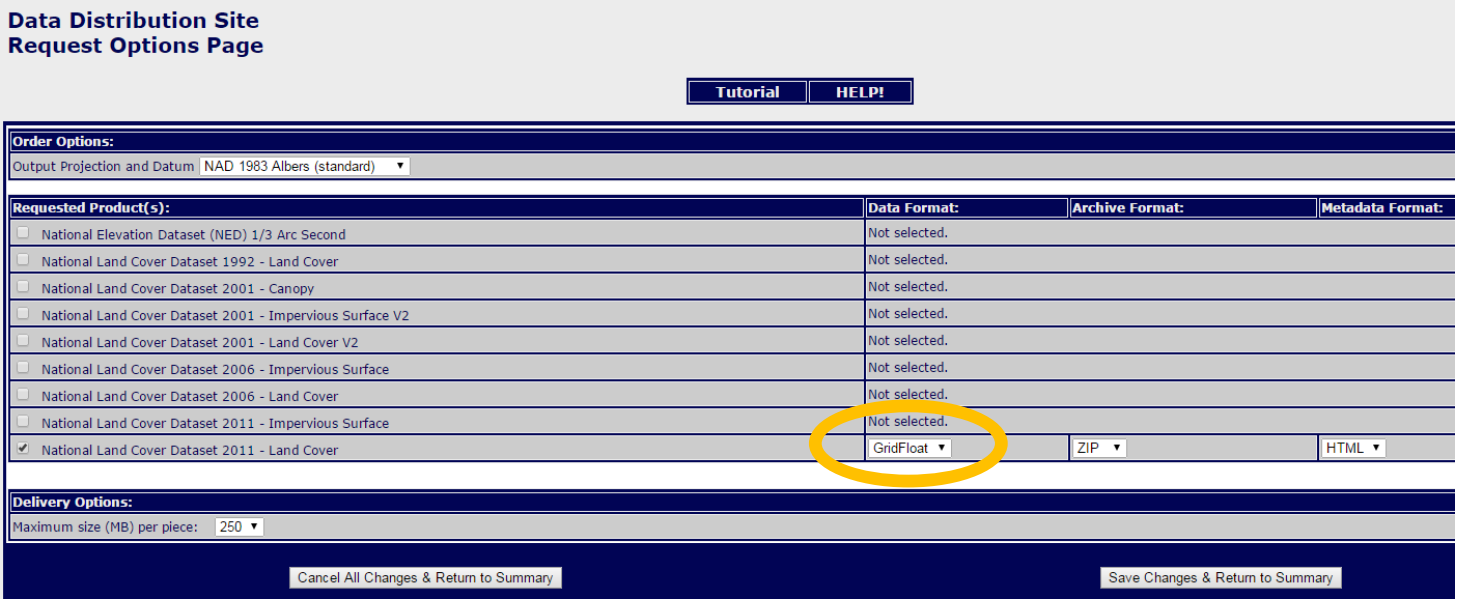


4. Click on the dotted-red box icon in the "Download Tool" box (if you mouse over this icon, a grey text box should come up saying "Define Rectangular Download Area for Seamless Data").

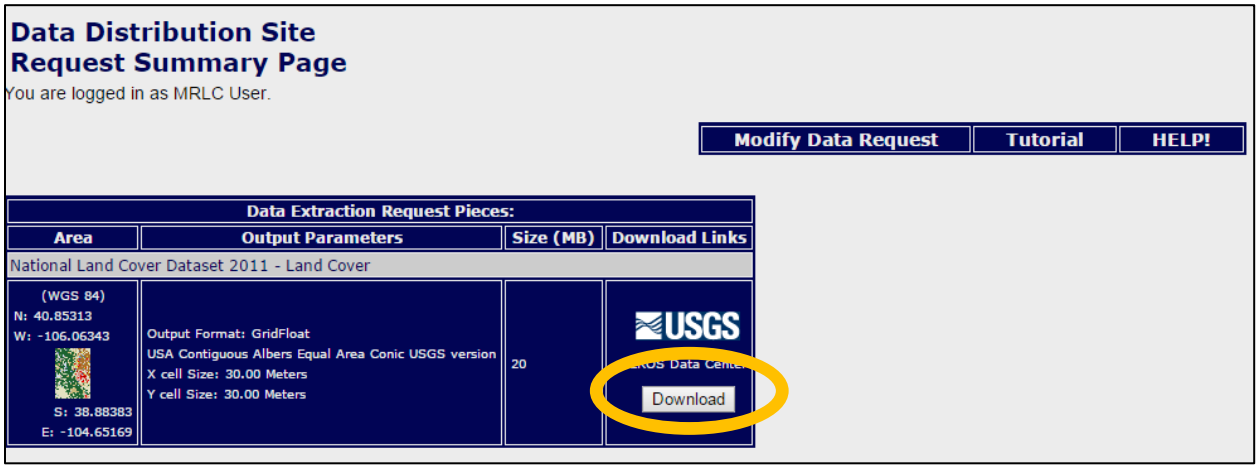
5. Use your mouse to draw a red box around the area of interest. Let go of the mouse clicker when you are done.
6. A separate window will open called “Request Summary Page.”



7. Click the “Modify Data Request” on the single line blue bar above the data download box. Look in the “requested products” table to see what data is checked to download. Ensure this is the file you want (National Land Cover Dataset 2011 – Land Cover). In the first dropdown menu to the right of your selected dataset, choose “GridFloat” (circled in yellow below). This is the file type (.flt) that NMSIM will accept. The other two dropdown menus are fine as they are (“ZIP” and “HTML”).



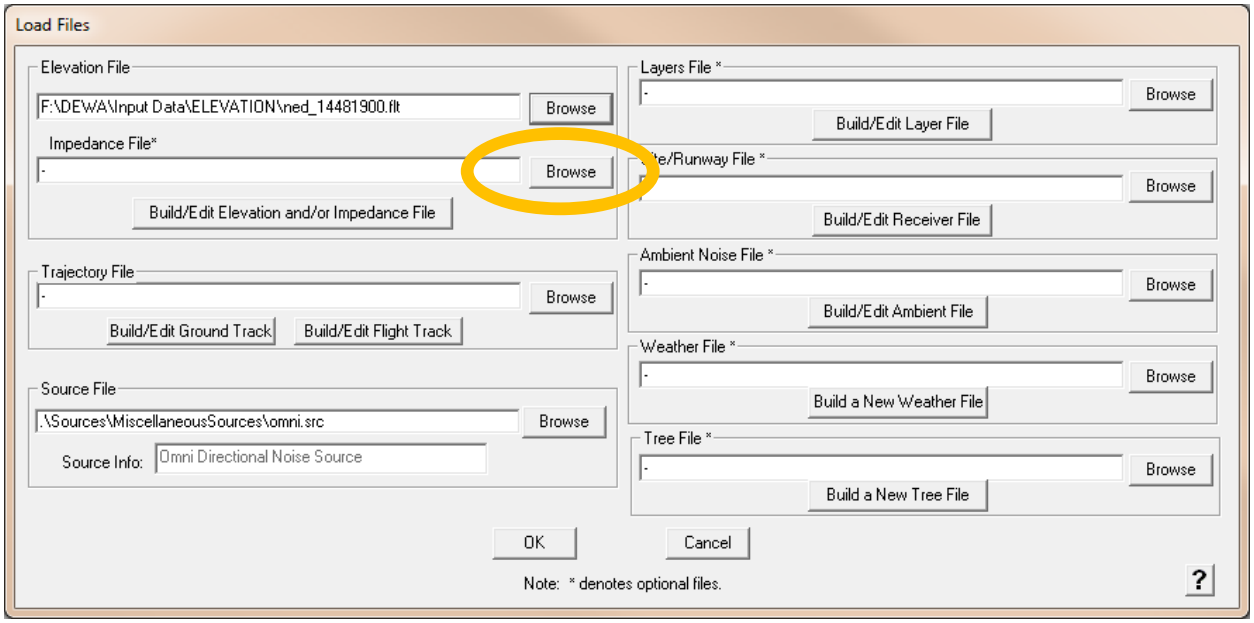
8. Click the white box that reads “Save Changes & Return to Summary.”
9. Ensure the output format is in GridFloat. Click the gray “Download” button next to the dataset.



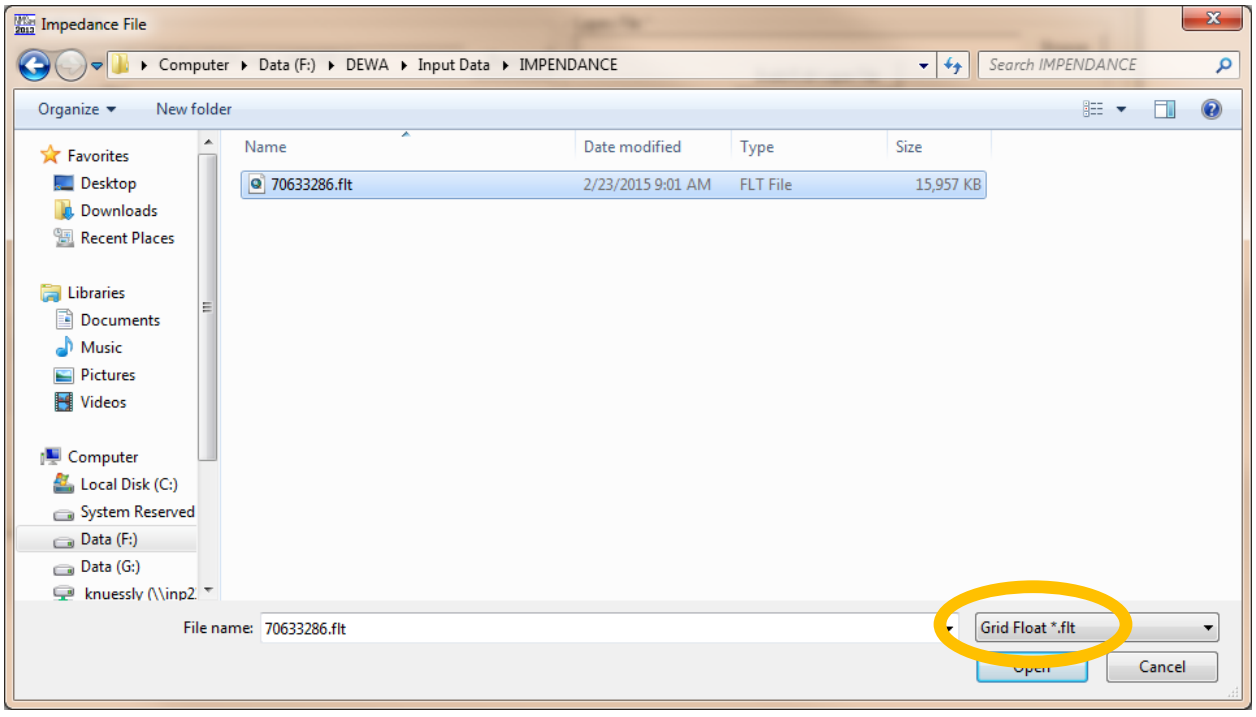
10. A separate window will open that will show updates on the status of the file. It will take a few seconds, even minutes if it’s a big file.
11. Once you see "the data extraction has completed" screen, click the resulting download tile in your main browser window. If an error occurs, click the link provided in the small browser window. Sometimes the download has time-out issues.
12. Access the file in your Downloads folder. Unzip and save the file in your IMPEDANCE folder.
13. Import the .flt file to ArcMap. Check that you have the correct area and that the elevation lines match the area. (You can use other layers in ArcMap relevant to your park like roads or park boundaries to check the file for accuracy.)
14. If the file/area looks correct in ArcMap, the file is ready for use in NMSIM. You do NOT need to do ANY file conversion. The .flt file you downloaded from the MRLC website is ready to be imported to NMSIM.

HOW-TO: UPLOAD IMPEDANCE FILE TO NMSIM

1. Continue working in the grey box titled “Load Files” after you have uploaded the elevation file. Click on the “Browse” button next to the white box underneath “Impedance File” (see yellow circle below).



3. Ensure the grey box next to “File Name” is set on “Grid Float *.flt” (It will be on “Impedance *.imp” by default; see yellow circle below). Select the .flt file that you downloaded from the procedure above and click “Open.” This will upload the file to NMSIM. Continue on to Trajectory instructions.

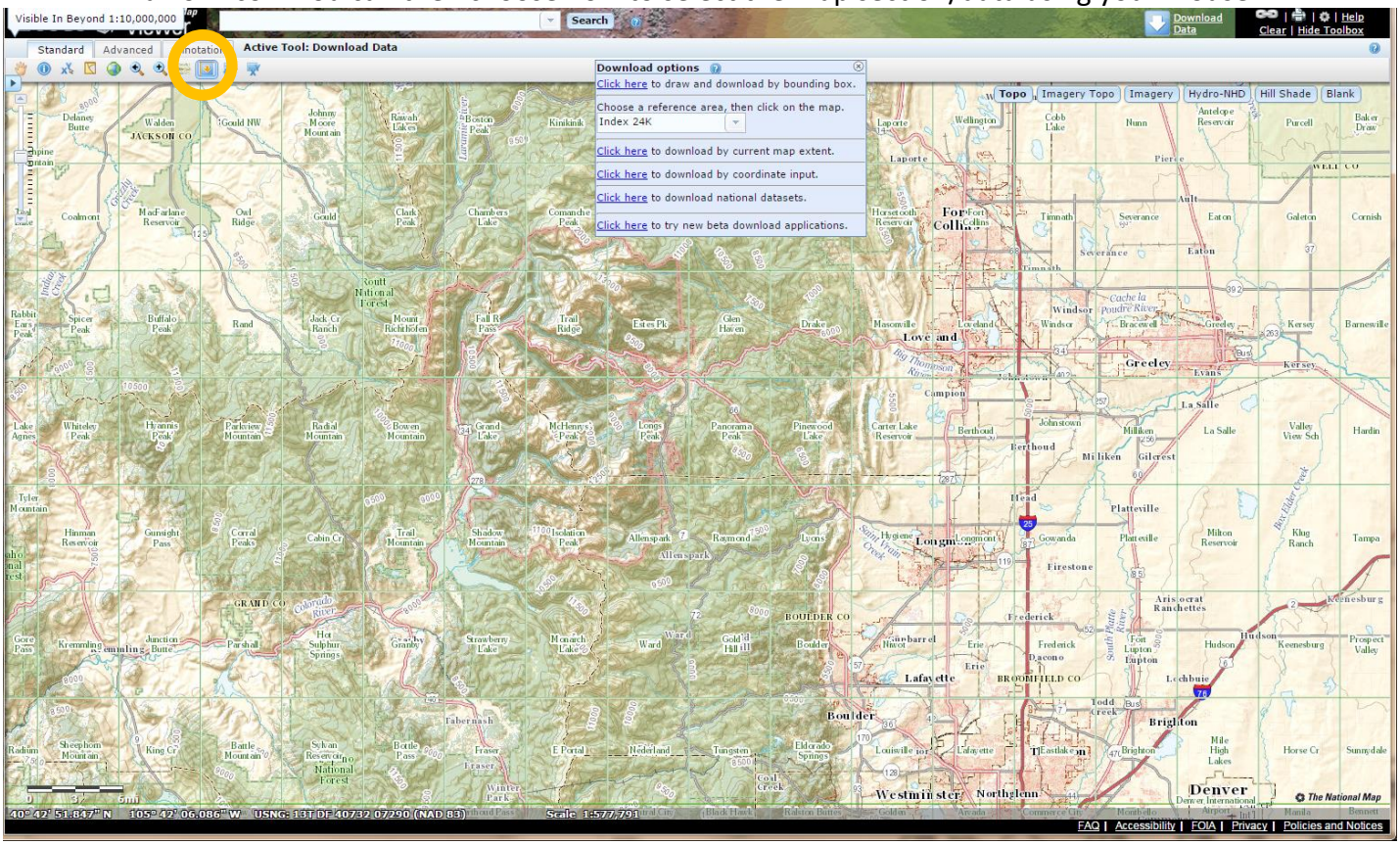


HOW-TO: CREATE A TRAJECTORY FILE FOR NMSIM

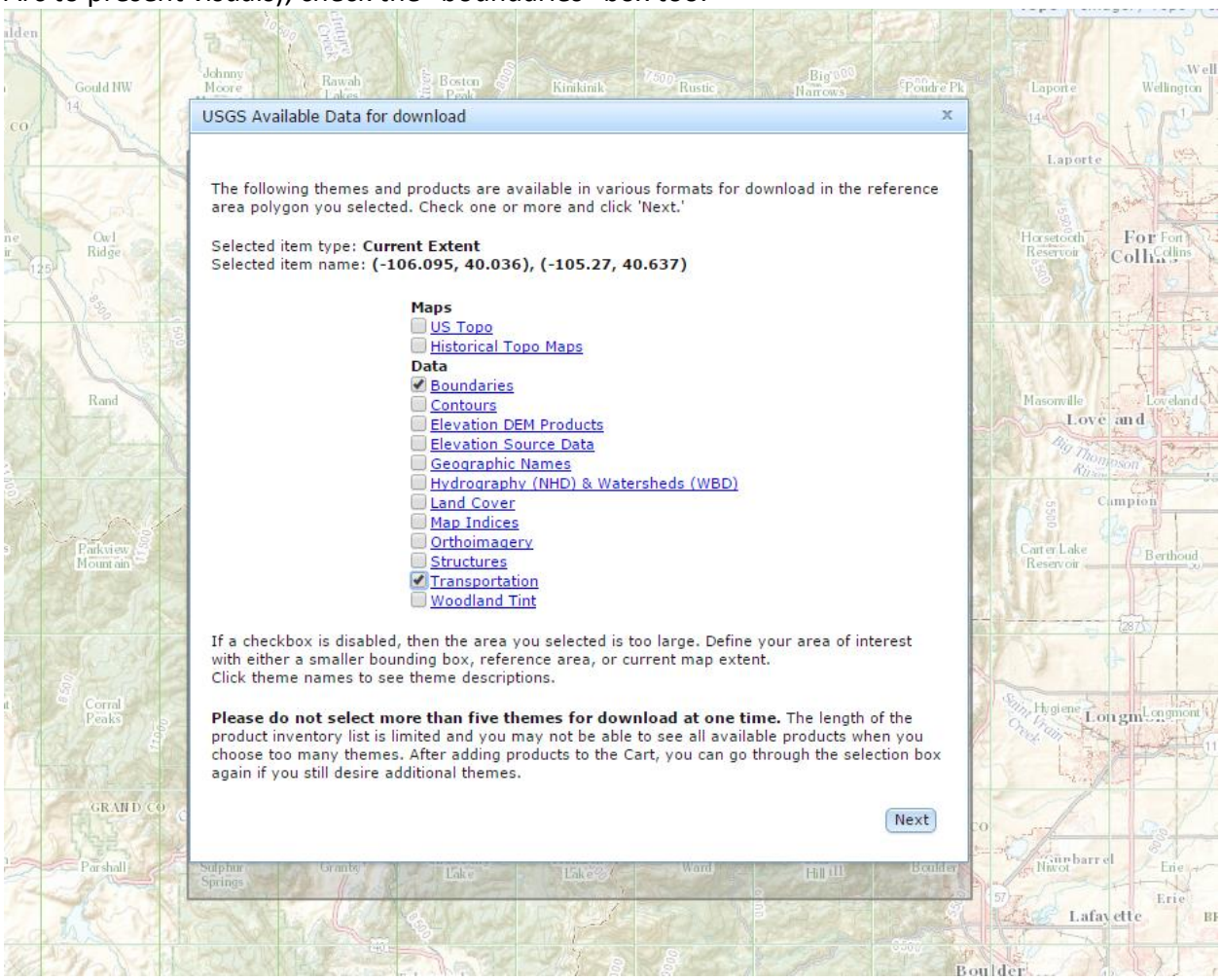
The trajectory file is the track for the vehicle or sound source to follow in the simulation. Often, this is a road. You can pull this information from the National Map Viewer (NMV) site, but I've found that if you can get this layer from the park, it's often more accurate. Also, sometimes the GIS folks here in the Fort Collins Office have road, boundaries, and trails data.

The following steps provide guidance on downloading a trajectory file from the NMV site. Skip to the uploading trajectory section if you have obtained this file elsewhere.

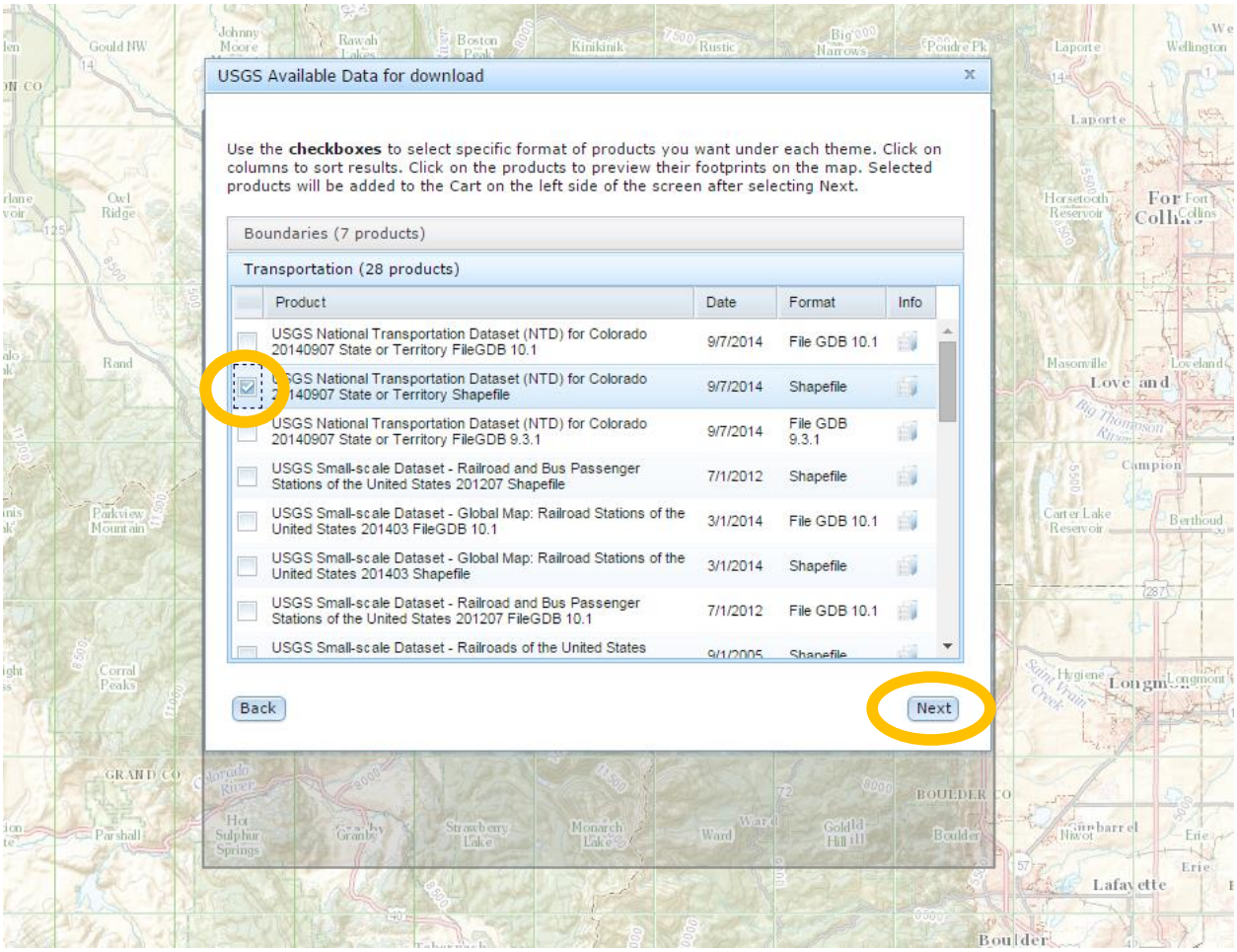
1. Navigate to the National Map Viewer at: http://viewer.nationalmap.gov/viewer/. In the search bar on top, search for the park of interest.
2. Zoom in to the park or area of interest. Park boundaries should be in a light pink/red color. (If not, navigate to the menu on the left side of the screen. Click on "overlays." Then, click on the word "content" just below "overlays." Open the folder called "governmental unit boundaries." Expand "features." Make sure to check the box "reserve.") You can search for the park using the search bar and make sure that the pink boundaries are within your view in order to include the entire park.
3. To select the particular section of map for download, go to the toolbar just above the active map. Below the word "standard," click on the blue box with the white downward facing arrow icon. You can then choose how to select the map section/data using your mouse.



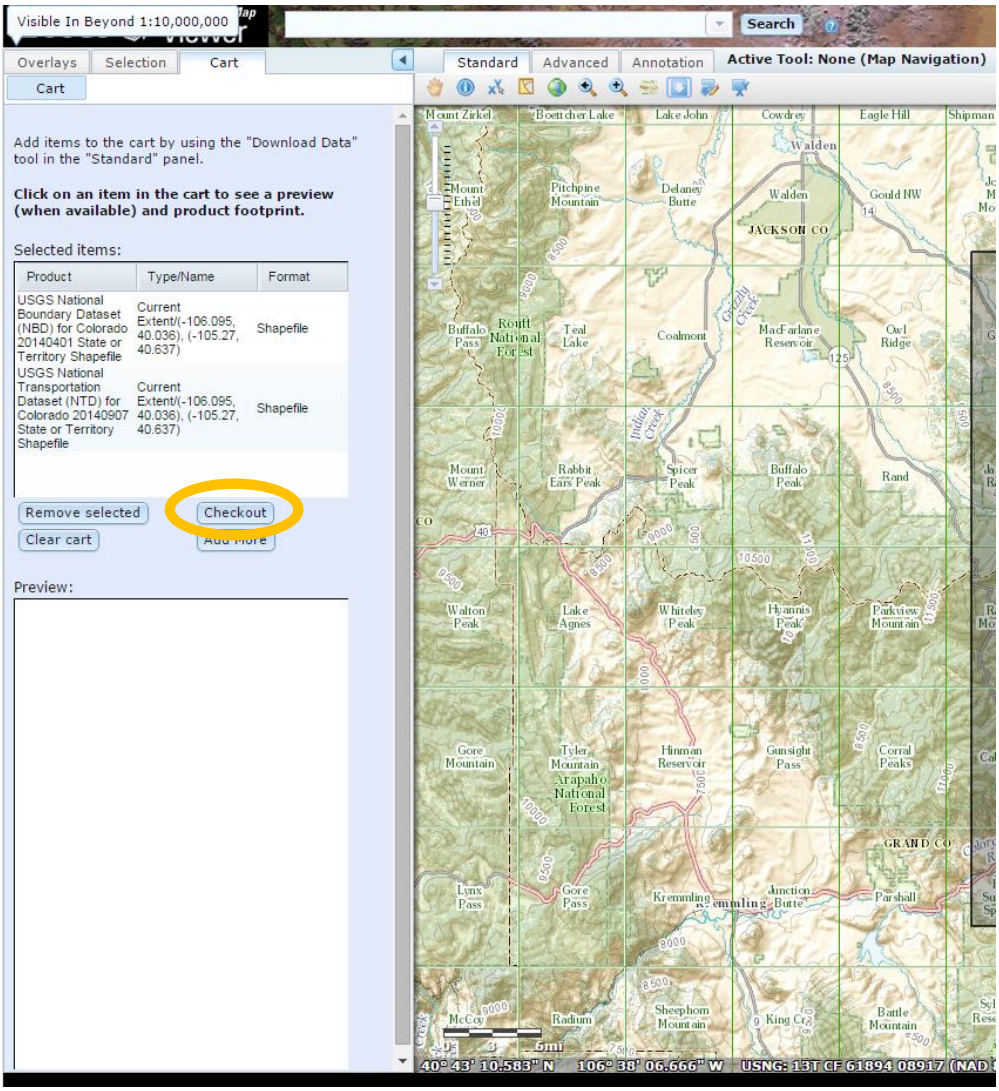
4. A box labeled “USGS Available data for download” will pop up. Check the transportation layer box. If you are also grabbing the park boundary here (or any other layer for use later in Arc to present visuals), check the “boundaries” box too.



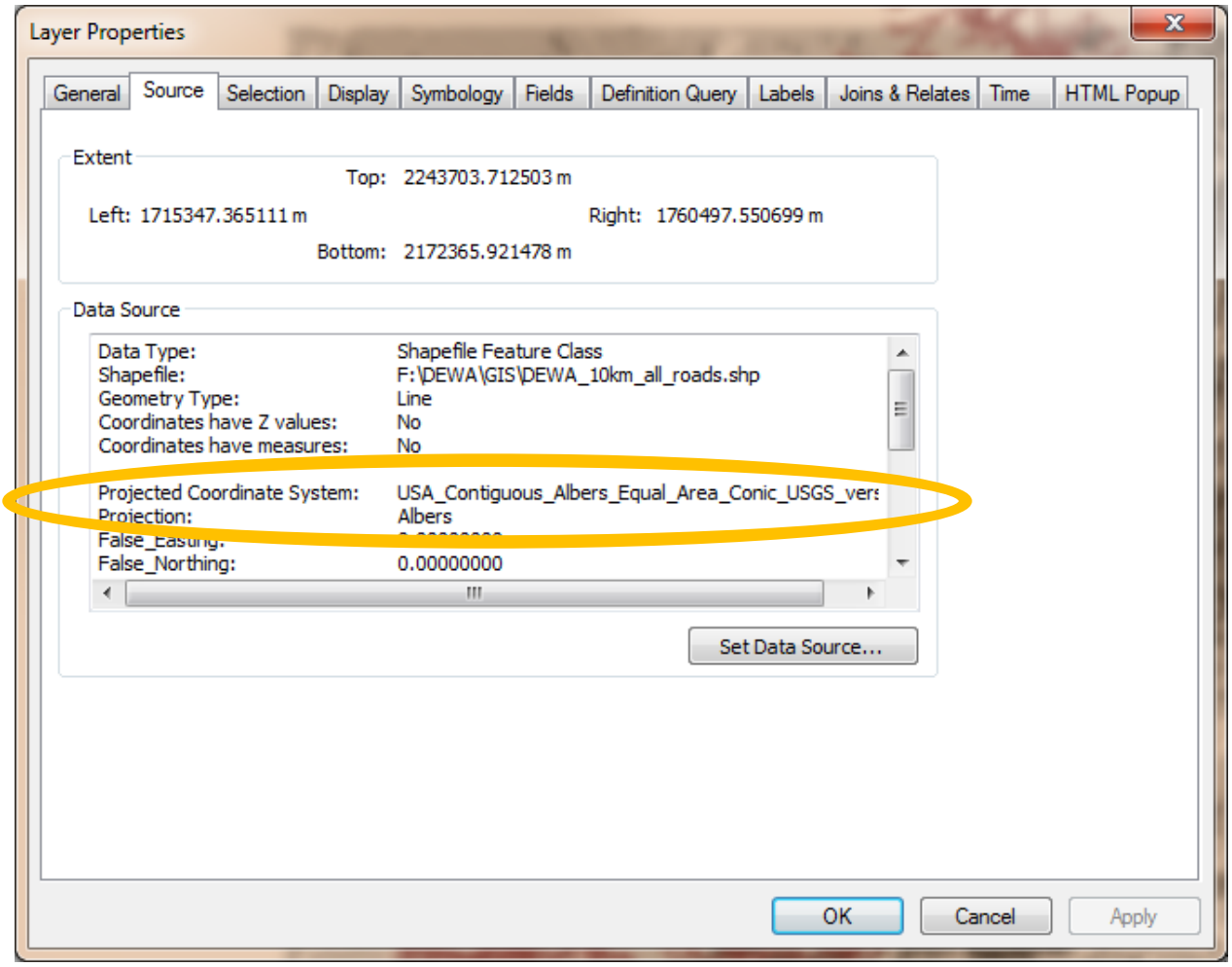
5. Click “next.”
6. Scroll through the presented data sets. For roads, this may be a shapefile (or geodatabase) called “USGS National Transportation Dataset (NTD) for…” For boundaries, this may be a shapefile (or geodatabase) called “Federal Land Features of the US…”



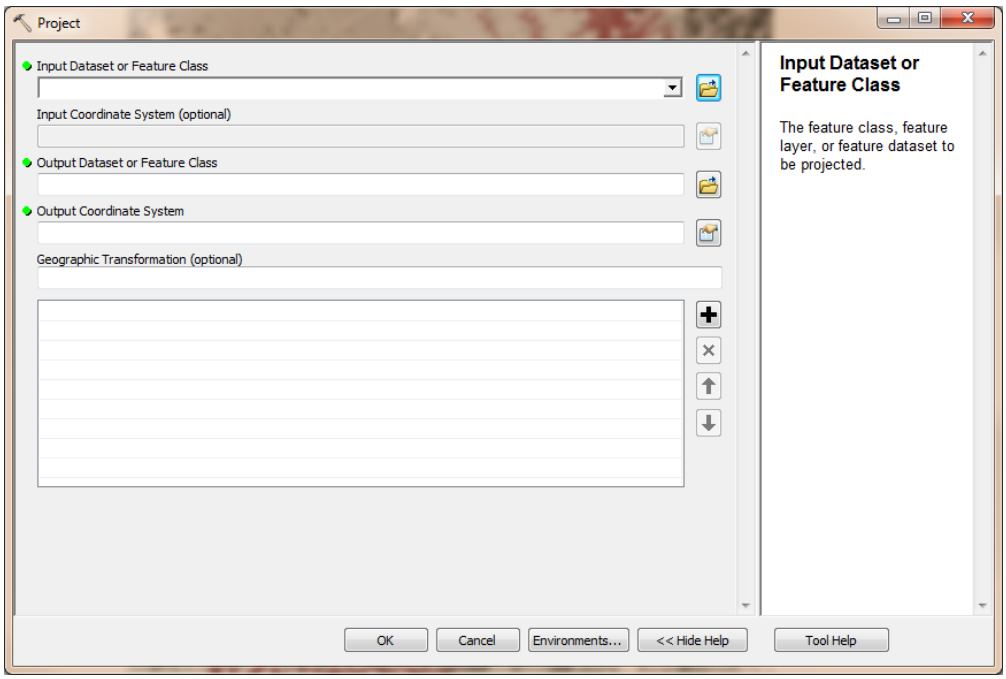
7. Check the box next to your data set. Click “next.”
8. Underneath the first white box that contains your requested data, select the blue button “Checkout.”



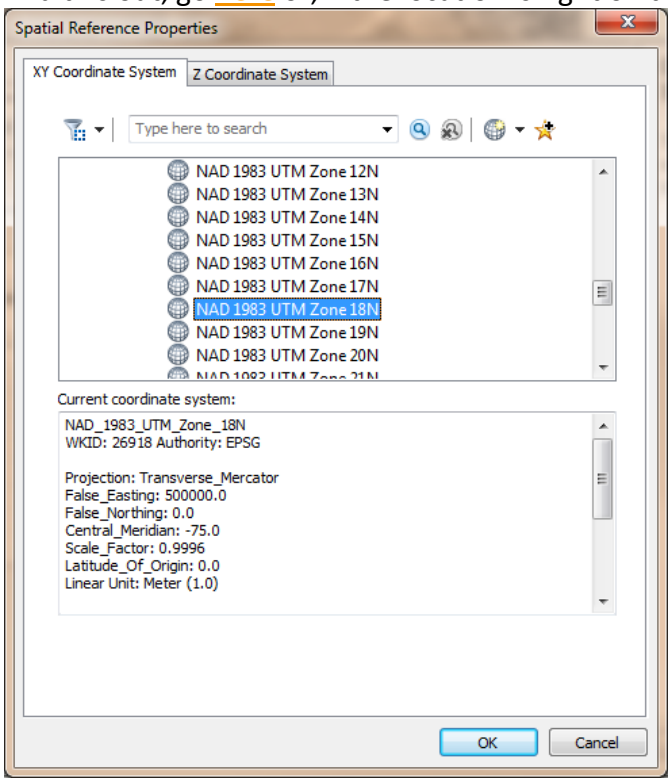
9. Type in your email address and press “Place Order.” The files will be sent to your email address and may take several to many minutes.
10. Access the file in your email. Download, unzip, and save the file in your project folder.
11. Import the .shp file to ArcMap. Check that you have the correct area and that the elevation lines match the area. The figure below shows that the roads align with the elevation file. If we look specifically at the road of interest, we see that it follows the contours of the river. (You can use Google Map or Google Earth to compare where the road of interest lies in relation to the surrounding topography.)
12. Make sure your road shapefile is in the projection: NAD_1983_UTM_Zone_(zone number here). (The elevation and landcover files should be in the NAD1983 projection already, as this is the projection they are in when taken from the USGS site.)



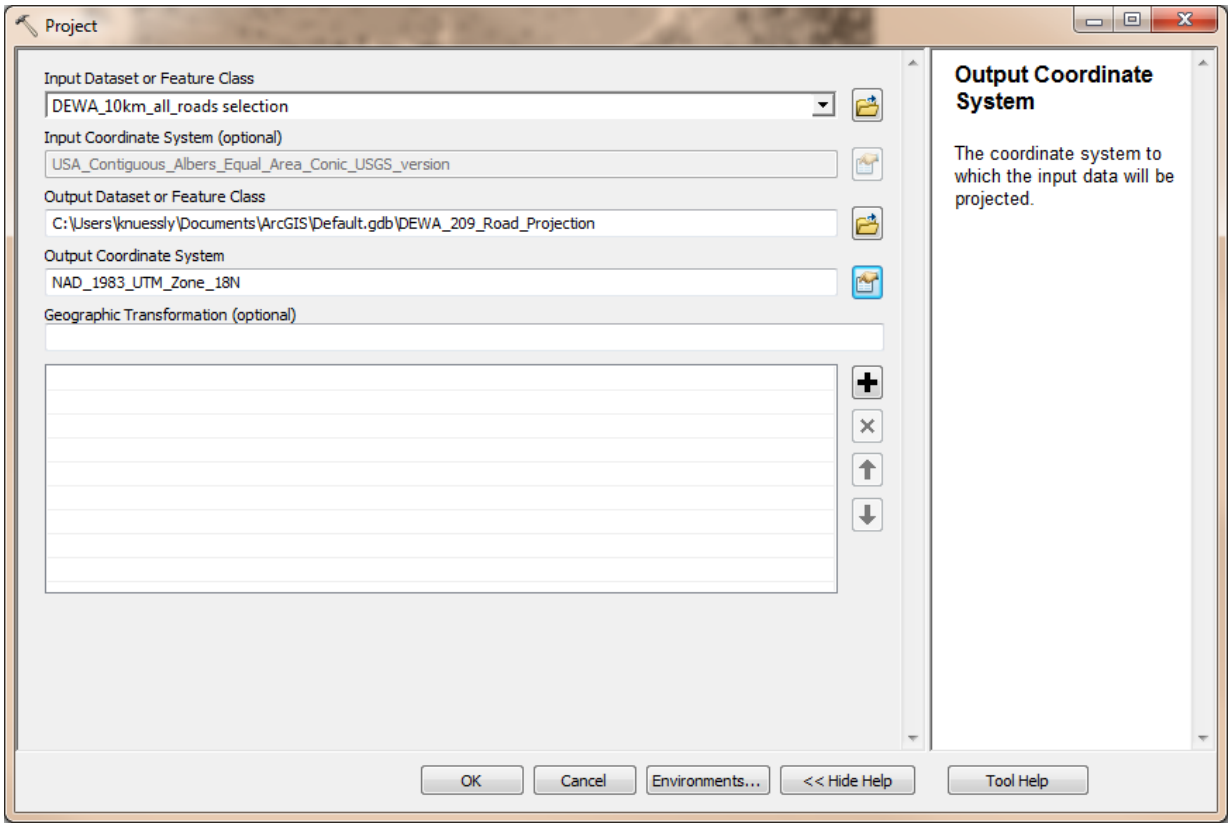
If it is not, do this: Navigate to the project tool through this path: ArcToolbox\Data Management Tools\Projections and Transformations\Raster\Project (you can also use the search tool to find this).



Include the shapefile in the "input raster." Fill in the box "output raster dataset" with the name and location you want the file stored in. In the "output raster," press the button directly to the right (this looks like a hand holding a piece of paper). Navigate the path: Projected Coordinate Systems\UTM\NAD1983. Chose the zone your project is located in (to find this out, go here or, if the location is right on the border of a zone, go here).

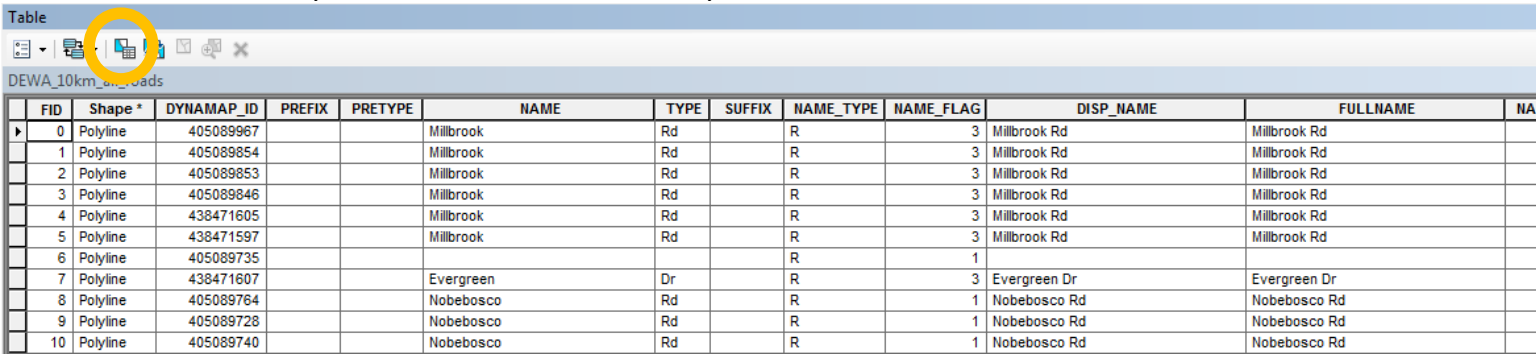


Press "OK."



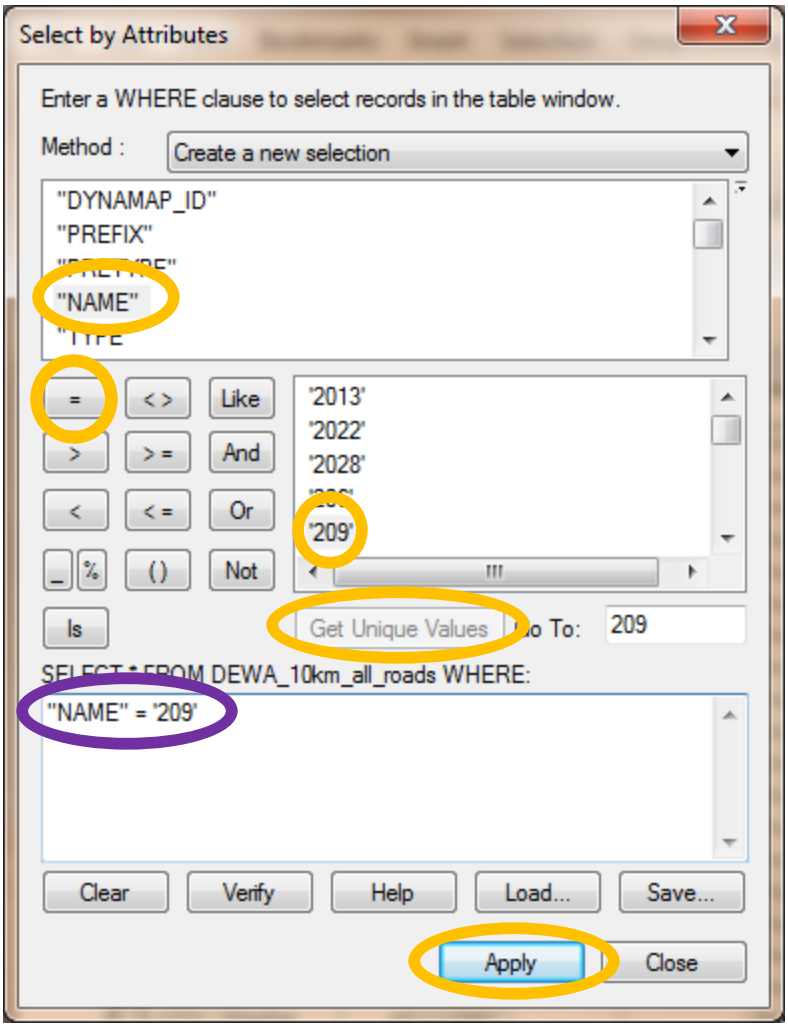
To finish and project the raster, press "OK."

13. Select your road of interest and create a new layer with this road selection. To do this: click the "Select by Attributes" button circled in yellow below.



FID	Shape *	DYNAMAP_ID	PREFIX	PRETYPE	NAME	TYPE	SUFFIX	NAME_TYPE	NAME_FLAG	DISP_NAME	FULLNAME	NA
0	Polyline	405089967			Millbrook	Rd		R	3	Millbrook Rd	Millbrook Rd	
1	Polyline	405089854			Millbrook	Rd		R	3	Millbrook Rd	Millbrook Rd	
2	Polyline	405089853			Millbrook	Rd		R	3	Millbrook Rd	Millbrook Rd	
3	Polyline	405089846			Millbrook	Rd		R	3	Millbrook Rd	Millbrook Rd	
4	Polyline	438471605			Millbrook	Rd		R	3	Millbrook Rd	Millbrook Rd	
5	Polyline	438471597			Millbrook	Rd		R	3	Millbrook Rd	Millbrook Rd	
6	Polyline	405089735						R	1			
7	Polyline	438471607			Evergreen	Dr		R	3	Evergreen Dr	Evergreen Dr	
8	Polyline	405089764			Nobebosco	Rd		R	1	Nobebosco Rd	Nobebosco Rd	
9	Polyline	405089728			Nobebosco	Rd		R	1	Nobebosco Rd	Nobebosco Rd	
10	Polyline	405089740			Nobebosco	Rd		R	1	Nobebosco Rd	Nobebosco Rd	

Using the Select by Attributes box, double-click the column name that you will search and then the equal sign (all circled in yellow). Then, click the "Get Unique Values" button and then type in the "Go To:" box the name that you are looking for (both circled in yellow). When that name is found and highlighted, double click it to add it to the working window. The query should now look like the one circled in purple below. Then, click "Apply."



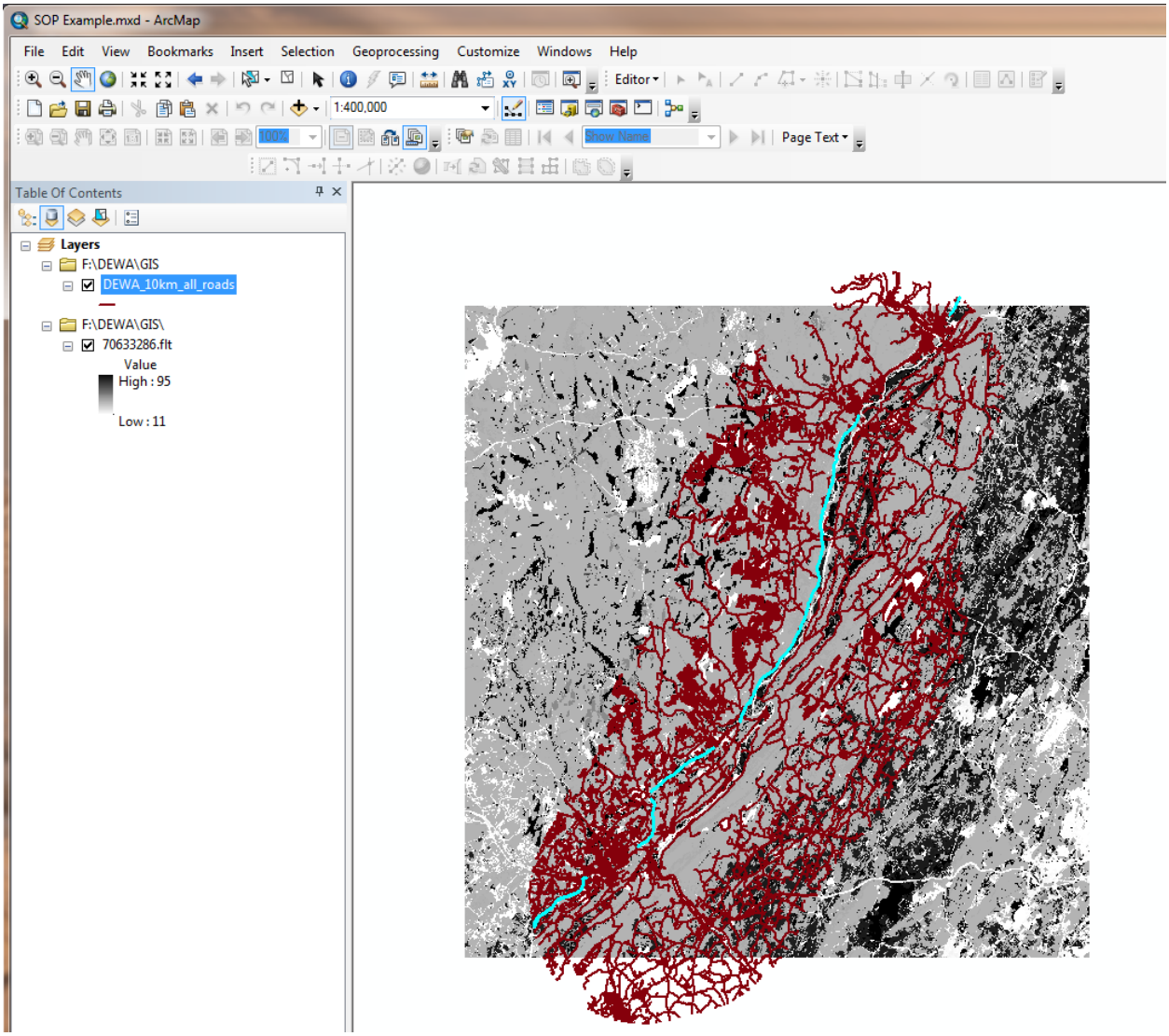
Your attribute table should now have the road of interest highlighted in light blue (see below figure).

Table

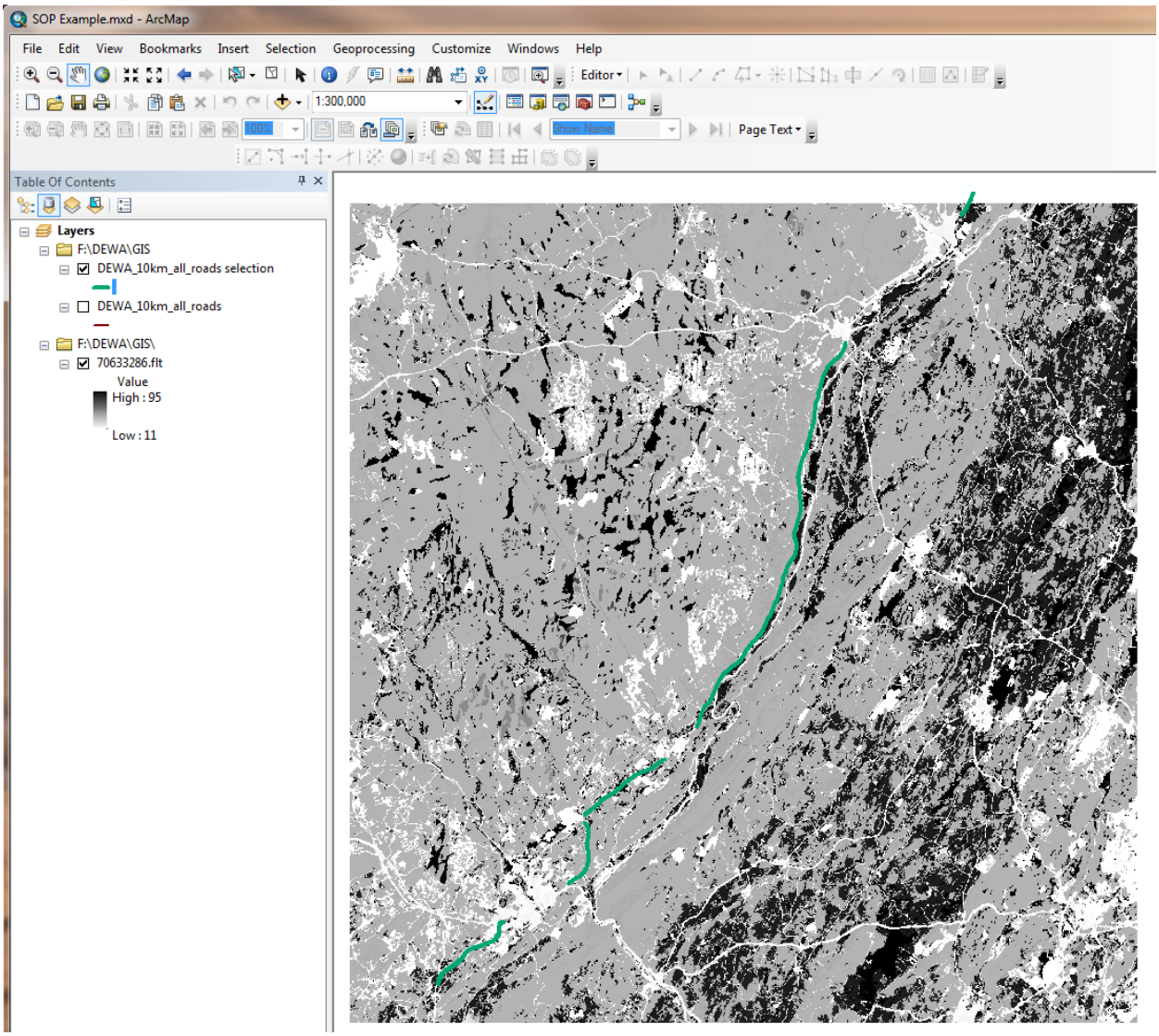
DEWA_10km_all_roads

FID	Shape *	DYNAMAP_ID	PREFIX	PRETYPE	NAME	TYPE	SUFFIX	NAME_TYPE	NAME_FLAG	DISP_NAME	FULLNAME
1252	Polyline	406039632		RT	2001			R	3	Route 2001	Route 2001
1253	Polyline	406039636		RT	2001			R	3	Route 2001	Route 2001
1253	Polyline	406039658		RT	2001			R	3	Route 2001	Route 2001
6894	Polyline	442462610		RT	209			G	2	Route 209	Route 209
6895	Polyline	437356874		RT	209			G	2	Route 209	Route 209
6896	Polyline	437383673		RT	209			G	2	Route 209	Route 209
6897	Polyline	437383680		RT	209			G	2	Route 209	Route 209
6898	Polyline	437383678		RT	209			G	2	Route 209	Route 209
6899	Polyline	437356350		RT	209			G	2	Route 209	Route 209
6900	Polyline	442462513		RT	209			G	2	Route 209	Route 209
6901	Polyline	442462421		RT	209			G	2	Route 209	Route 209
6902	Polyline	437355512		RT	209			G	2	Route 209	Route 209
4798	Polyline	438479965		RT	560			R	1	Route 560	Route 560

The selected road should also be highlighted on the map (see below figure).



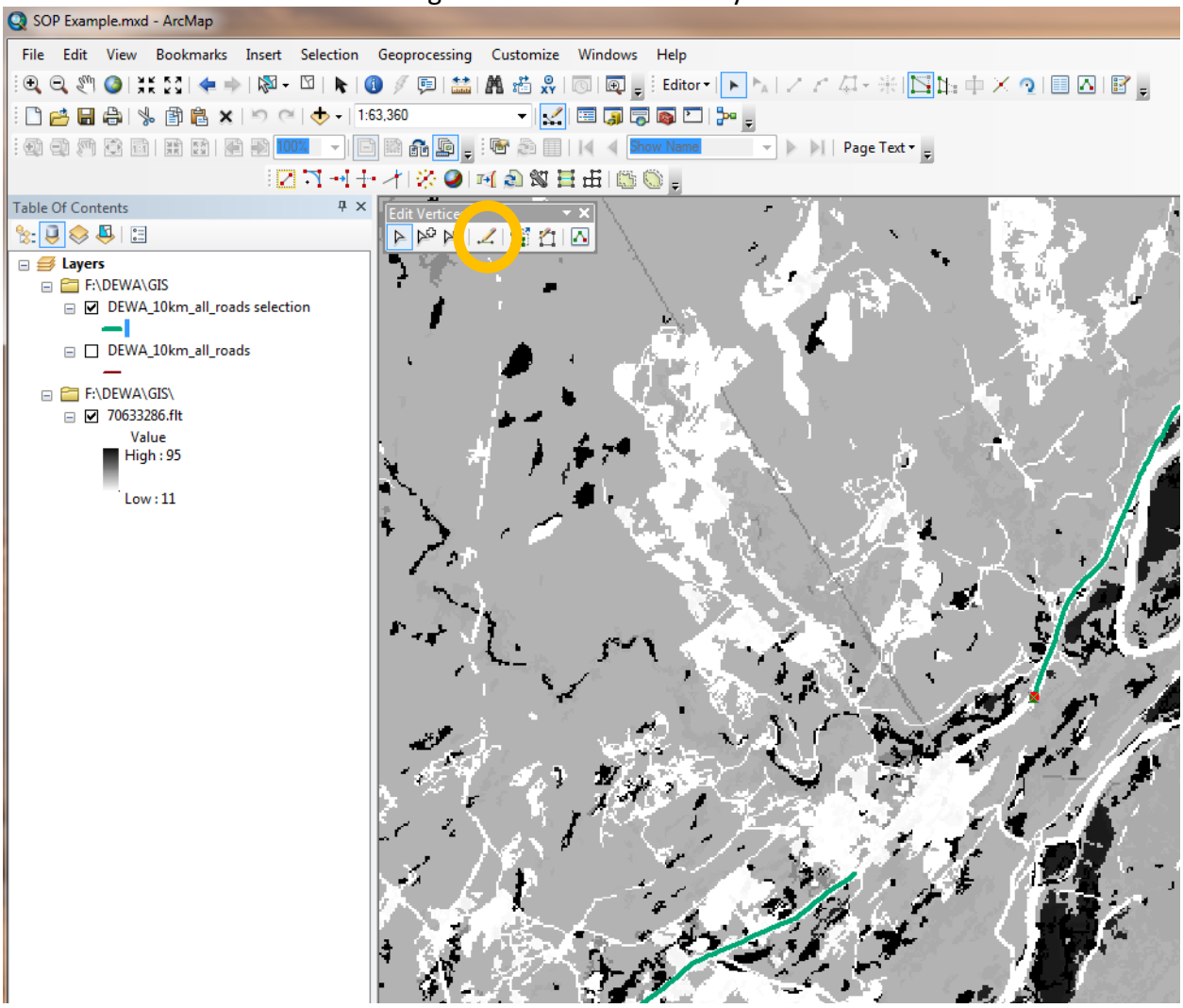
Right click on the data layer. Mouse over “Selection” and click on “Create Layer from Selected Features.” Turn this new layer on and continue working with it (the map will now look like the below).



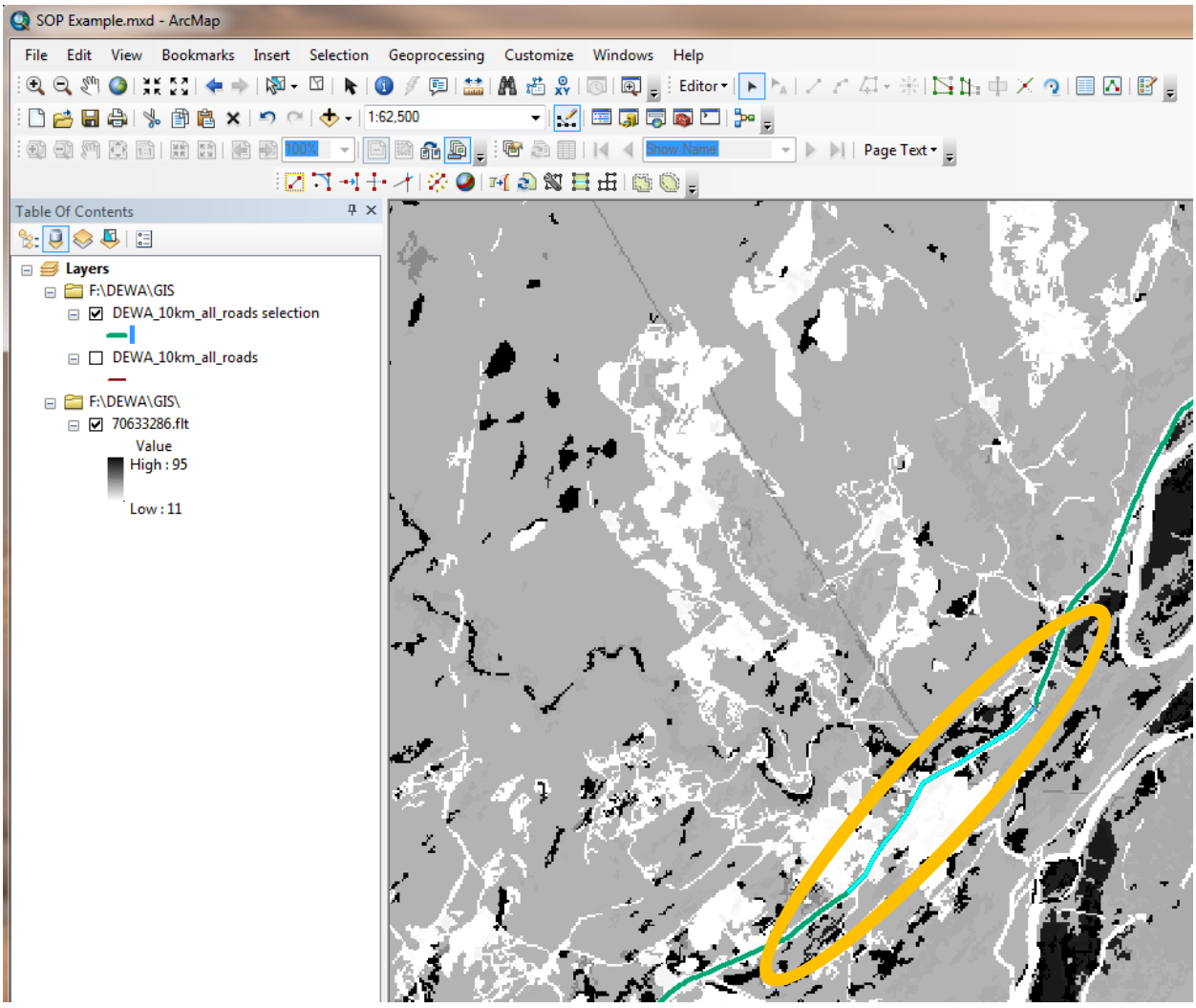
14. Zoom in to the road on your map screen. Ensure that the road is one continuous line. If not, use the Editor Tool to connect all line segments. (If there are ANY breaks in the line, this will cause NMSIM to crash.) See the gaps in the road in the figure above? You need to make sure your road is one continuous line. Also, ensure you remove any pullouts from the road file. NMSIM wants one continuous track for the trajectory file.

    To do this: go to the Editor toolbar and in the drop-down menu, click “start editing.” Click on the Edit Tool (circled in yellow below).

Use the Continued Feature Tool (circled in yellow below). Click on the one end of the existing line segment and then click the mouse once as you go along and lay down the road. Connect the two line segments and double click your mouse to end the current line.



The road will now look like the figure below. The new line segment is circled in yellow.

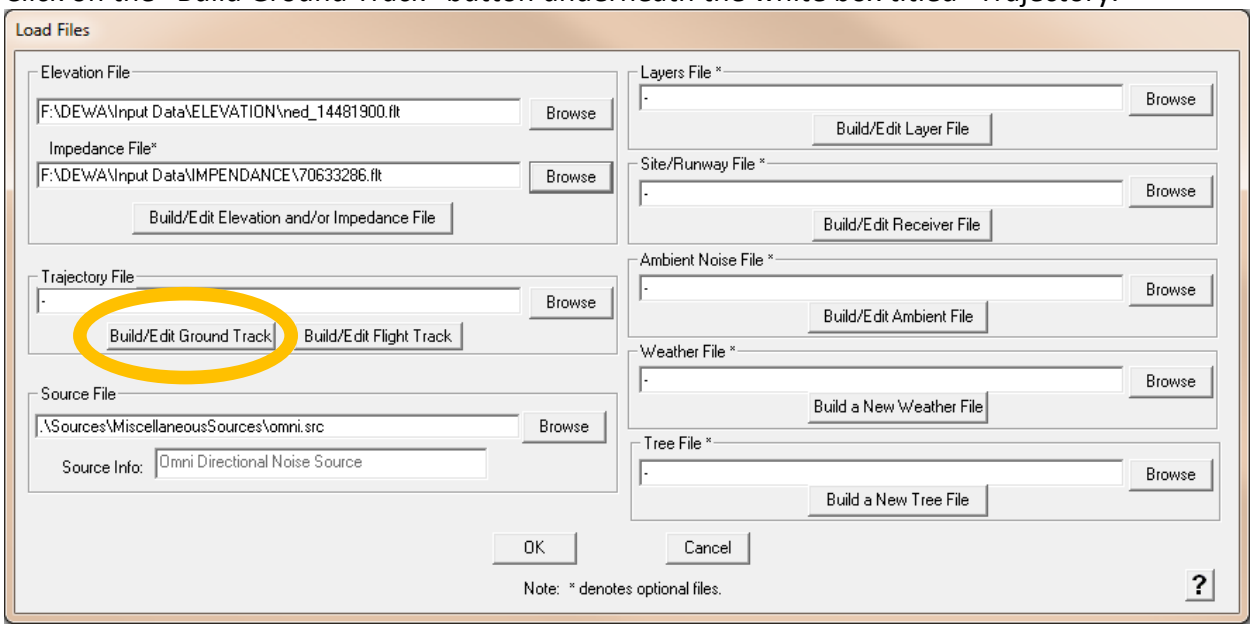


Repeat the whole of step 14 for each missing line segment, using the Edit tool to select the vertex that you want to start your line from before you go the draw the line with the Continue Feature Tool. Delete any floating segments of road or any turn outs. Save the edits and then stop the editing tool.

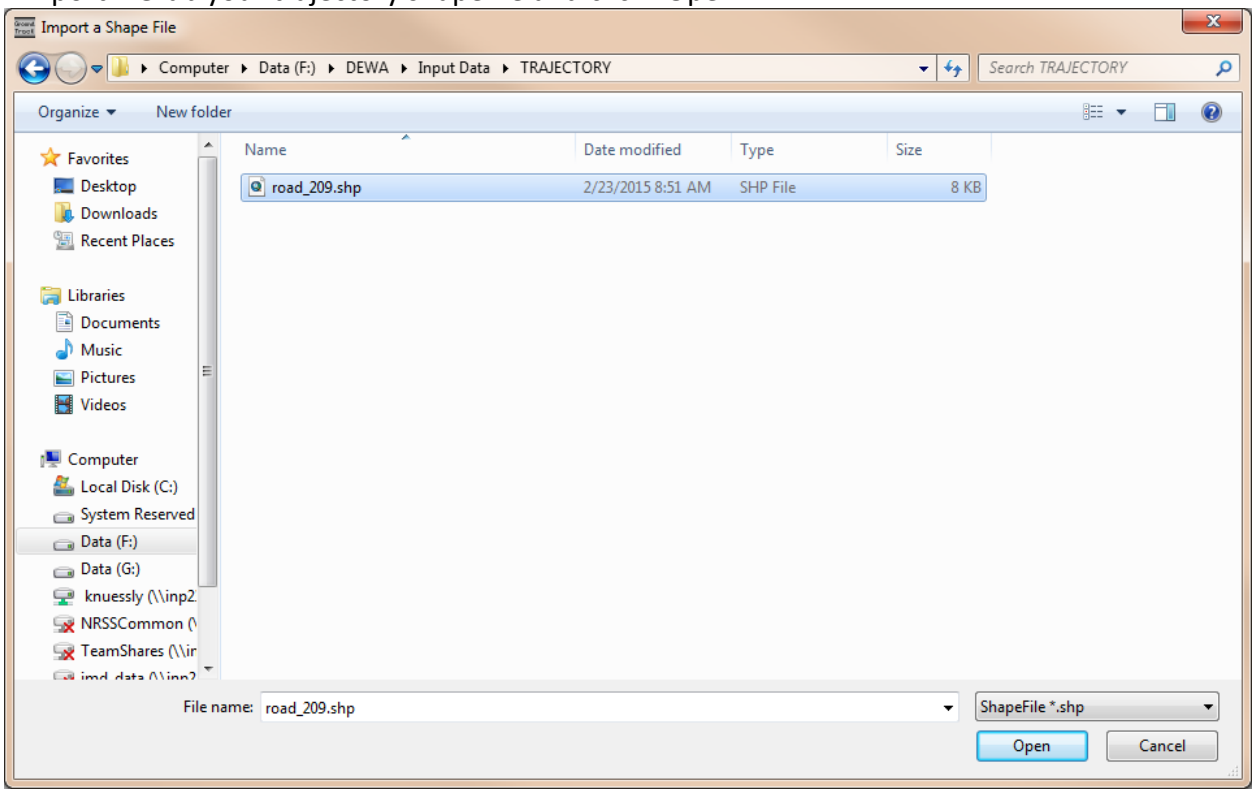
15. This new road layer (that was selected from the transportation layer and then projected) is the file you will use in NMSIM. Make sure this shapefile is saved in your TRAJECTORY folder.

HOW-TO: UPLOAD TRAJECTORY FILE TO NMSIM

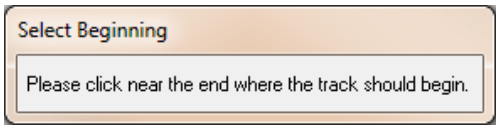
1. Continue working in the grey box titled “Load Files” after you have uploaded the elevation and impedance file.
2. Click on the “Build Ground Track” button underneath the white box titled “Trajectory.”

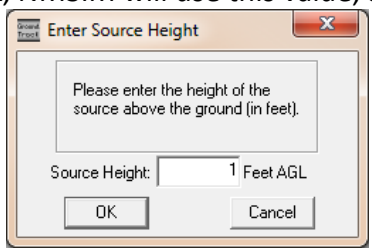


3. In the screen that pops up, your elevation file should show. Go to “File” and choose “Import.” Grab your trajectory shapefile and click “Open.”

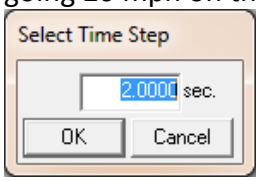


4. NMSIM will then prompt you to click the end point of the track file (choose an end), then to specify the height of the source from the ground, or AGL (for cars this is "1"). The AGL contained in the source files NMSIM uses is "1." If you enter a value less than 1 into the "enter source height" box (like "0"), NMSIM will default to 1. However, if you put in an AGL of 4 into the "enter source height" box, NMSIM will use this value, as it is greater than 1.

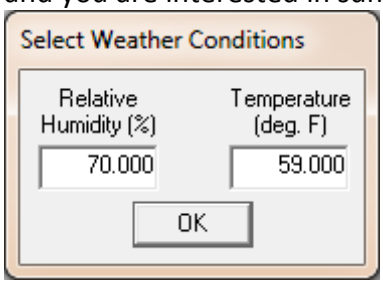




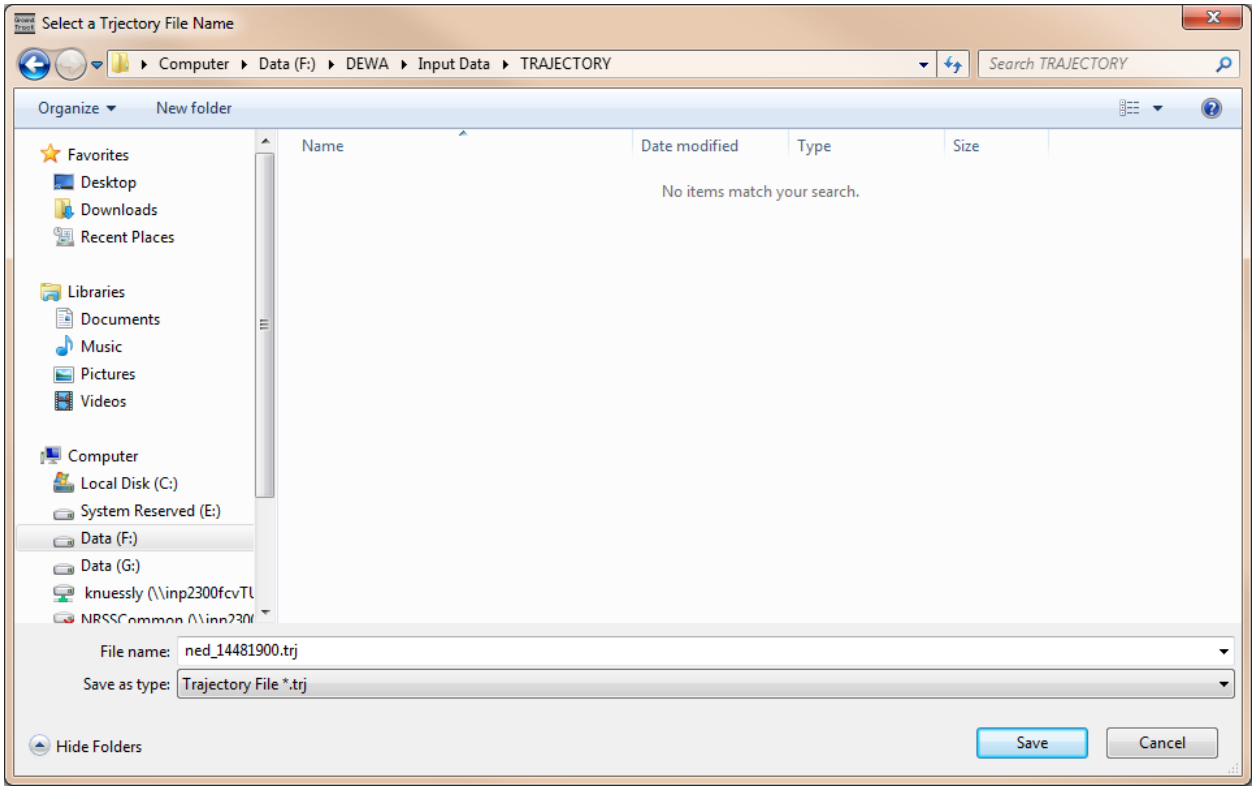
5. Next, you'll input the desired time step. The time step box will tell the model how often to take a sample (or, how often to measure the noise footprint/output along the trajectory path). With a 2-second time step, the model will take a sample every two seconds as the car is traveling down the road. The time step you choose will vary depending on the length of your road and the speed of the traveling object (car). You want a time step that will ensure the model samples enough times along the trajectory to get an adequate picture of noise footprint. A 10 km road with a car going 100 mph will need a smaller time step than a car going 20 mph on the 10 km road.



Then input or verify the temperature and humidity. This data should come from local averages during the season you are interested in. For example, in the YELL winter use plan, local weather data was pulled for the winter months. If you are modeling a road in COLM and you are interested in summer traffic levels, use local summer averages.



6. Finally, NMSIM will ask you to save the file. Save this file to your project folder, in the TRAJECTORY folder.


Select a Trjectory File Name
Computer ▸ Data (F:) ▸ DEWA ▸ Input Data ▸ TRAJECTORY
Search TRAJECTORY
Organize
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Computer
Local Disk (C:)
System Reserved (E:)
Data (F:)
Data (G:)
Name
Date modified
Type
Size
No items match your search.
File name: ned_14481900.trj
Save as type: Trajectory File *.trj
Hide Folders
Save
Cancel

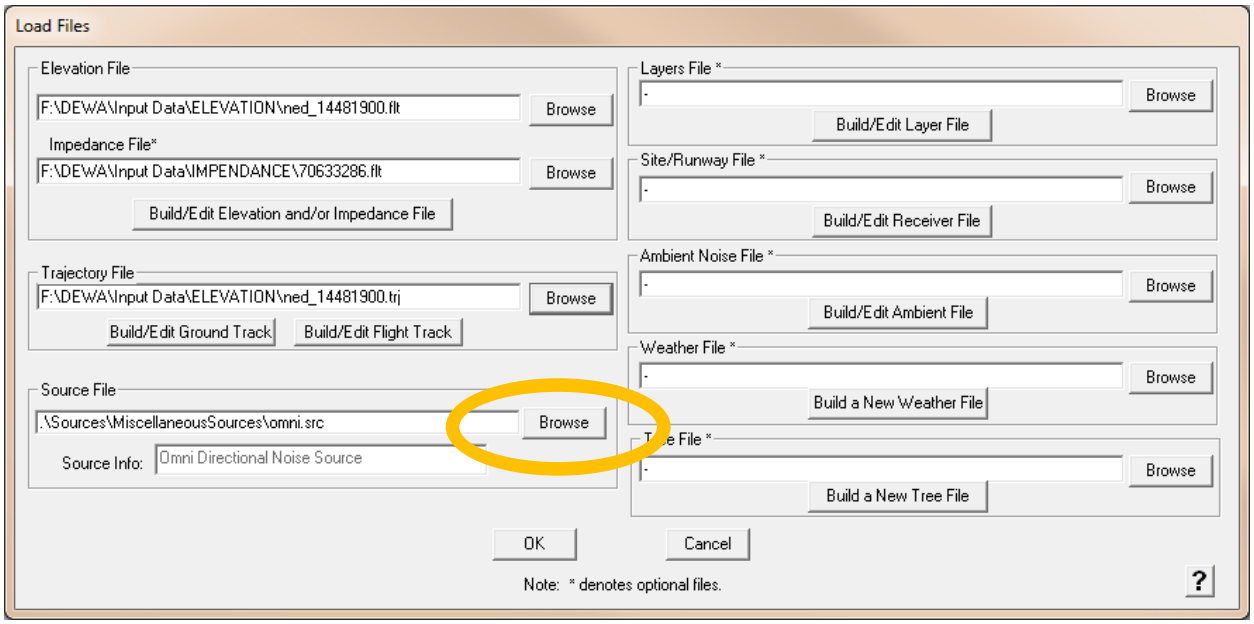
GROUND SOURCE

You can choose to use a NMSIM source file, or to build your own. If you are using a source that is already defined by a NMSIM source file (motorcycle, passenger car, medium truck, heavy truck, etc.), use the NMSIM source file. Go to “How-to: choose a ground source file in NMSIM” below.

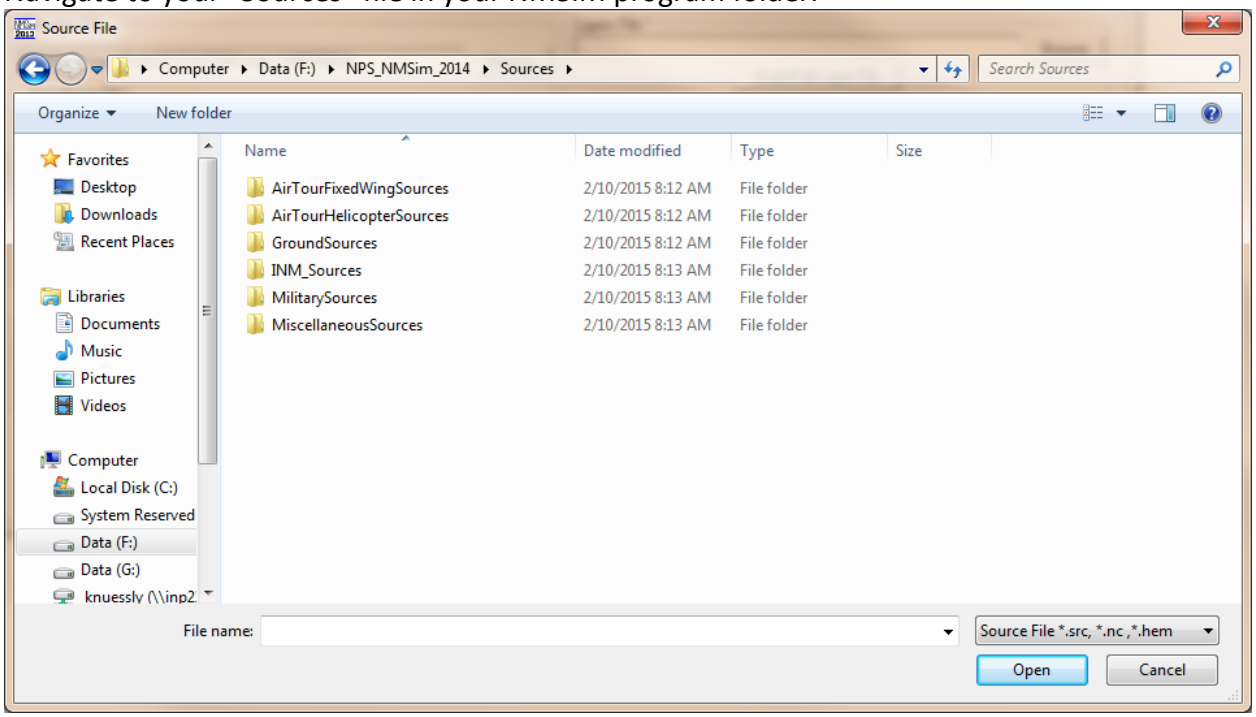
If you are modeling a source not defined by a NMSIM source file, you will need to build your own. Similarly, if you are modeling a specific source, like a particular brand of motorcycle, you may need to build a source file to reflect the actual noise specs. Go to “How-to: build a ground source file in NMSIM” below.

HOW-TO: CHOOSE A GROUND SOURCE FILE IN NMSIM

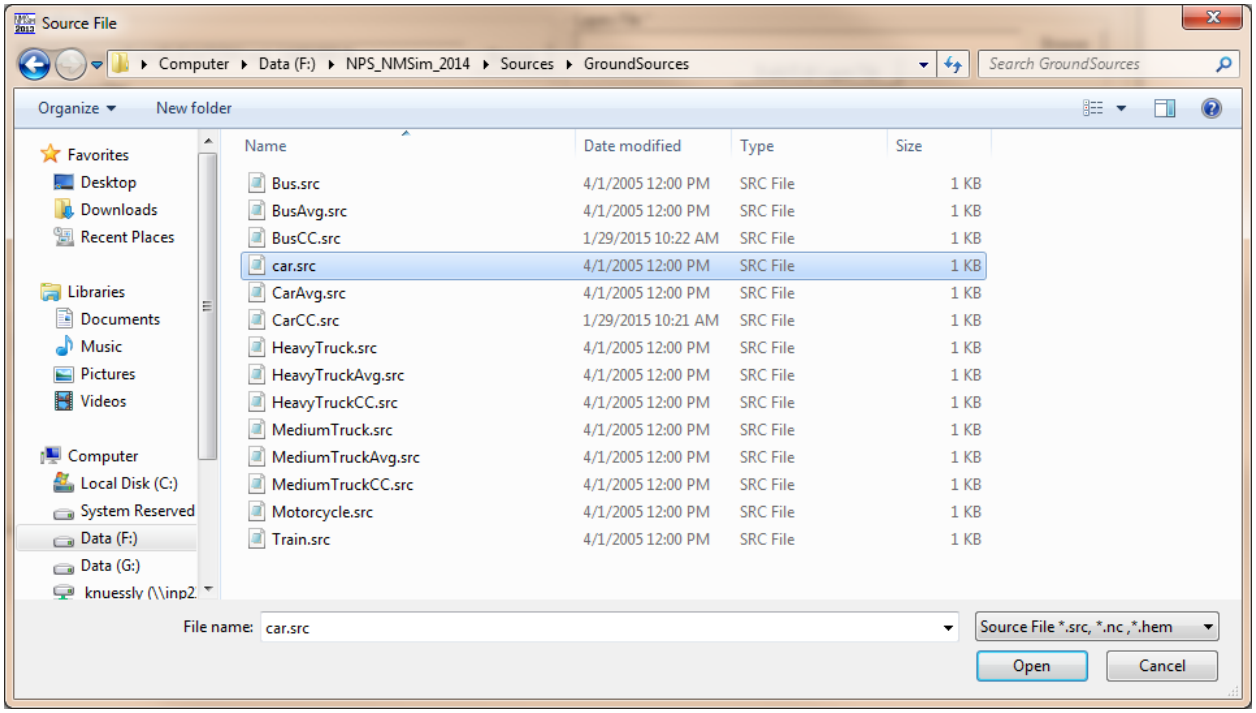
1. Continue working in the grey box titled “Load Files” after you have uploaded the elevation, impedance, and trajectory files.
2. Click on the “Browse” button next to the white box underneath “Source File.”



3. Navigate to your “Sources” file in your NMSIM program folder.



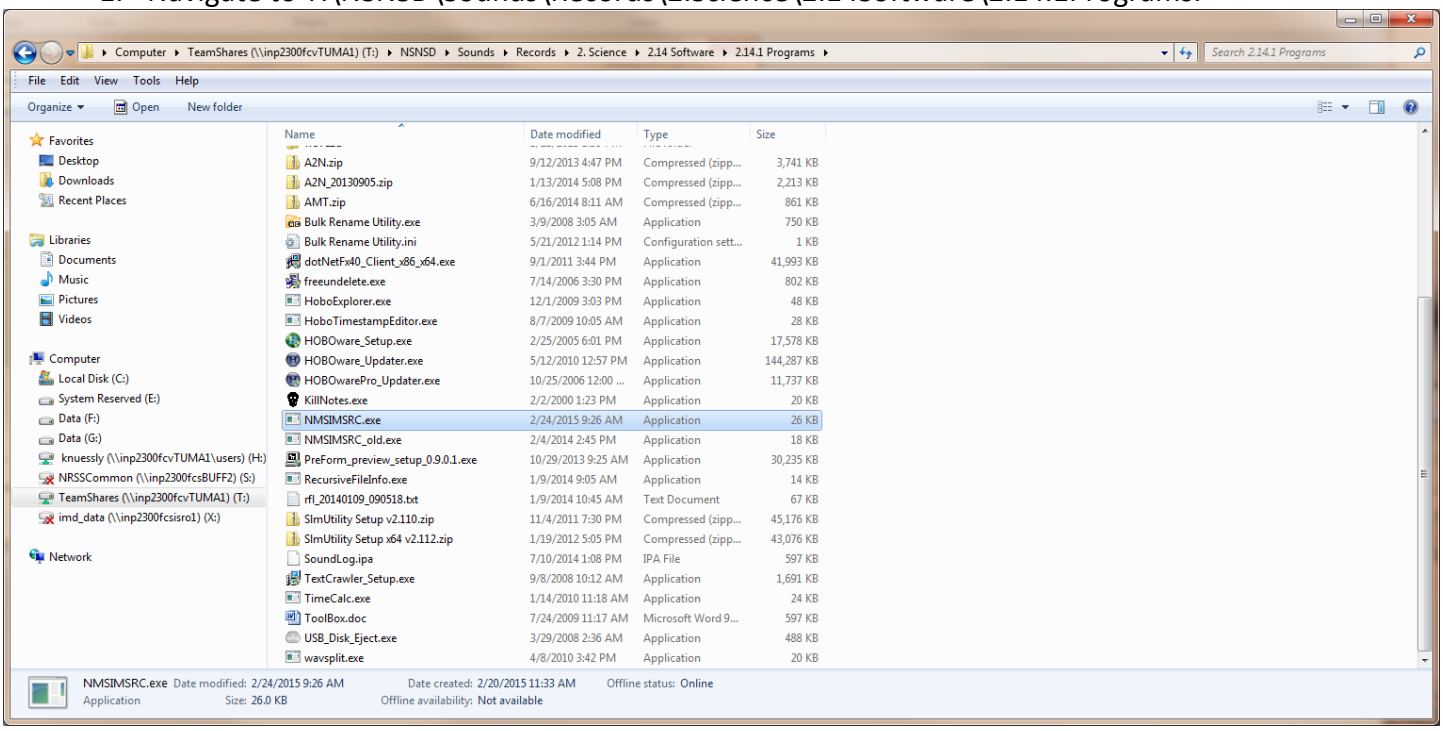
4. Click “Ground Sources” and choose “car.src.” This will provide the necessary source information for a car on standard pavement. (The “CarAvg.src” file is written incorrectly and will cause errors in NMSIM (due to spacing issues with Fortran code). The “CarCC.src” file is for a car on concrete, NOT for use with most park roads.)



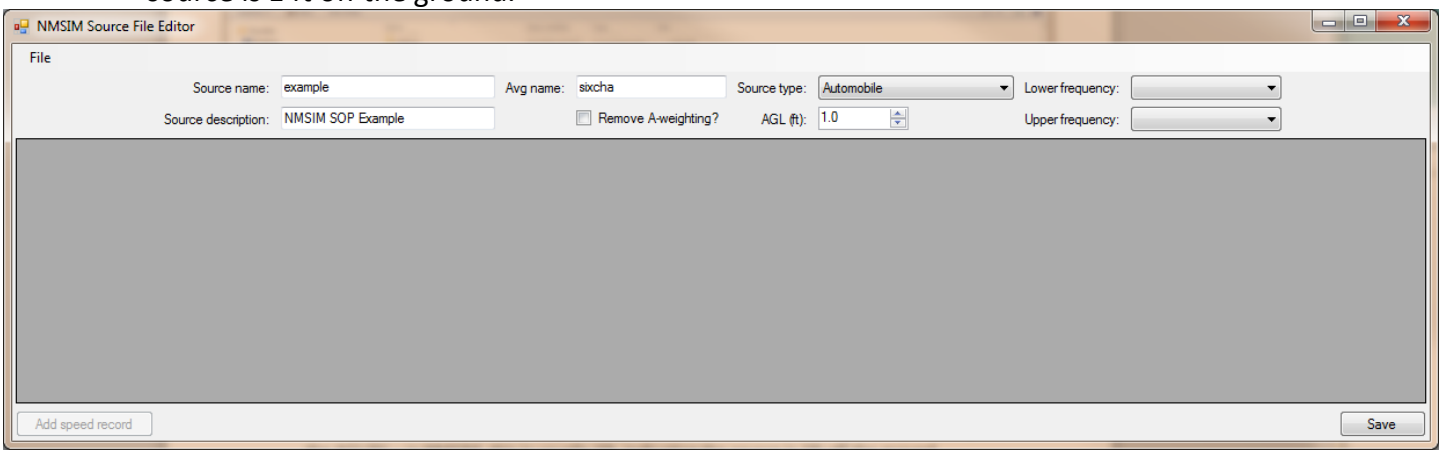
5. Click “Open.” This will upload the file to NMSIM. Continue on to Ambient Noise instructions.

HOW-TO: BUILD A GROUND SOURCE FILE FOR NMSIM

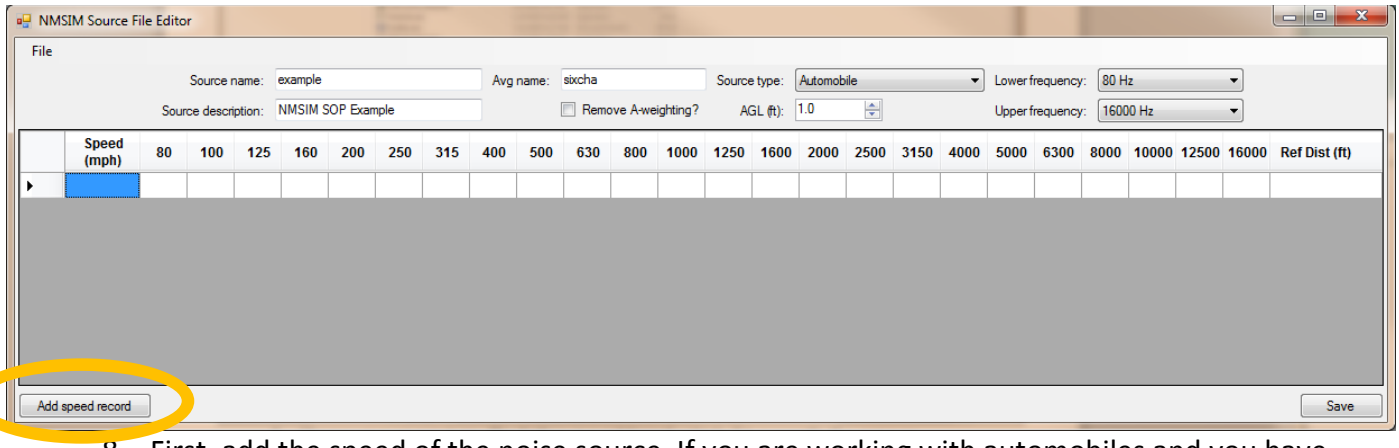
1. Navigate to T:\NSNSD\Sounds\Records\2.Science\2.14Software\2.14.1Programs.



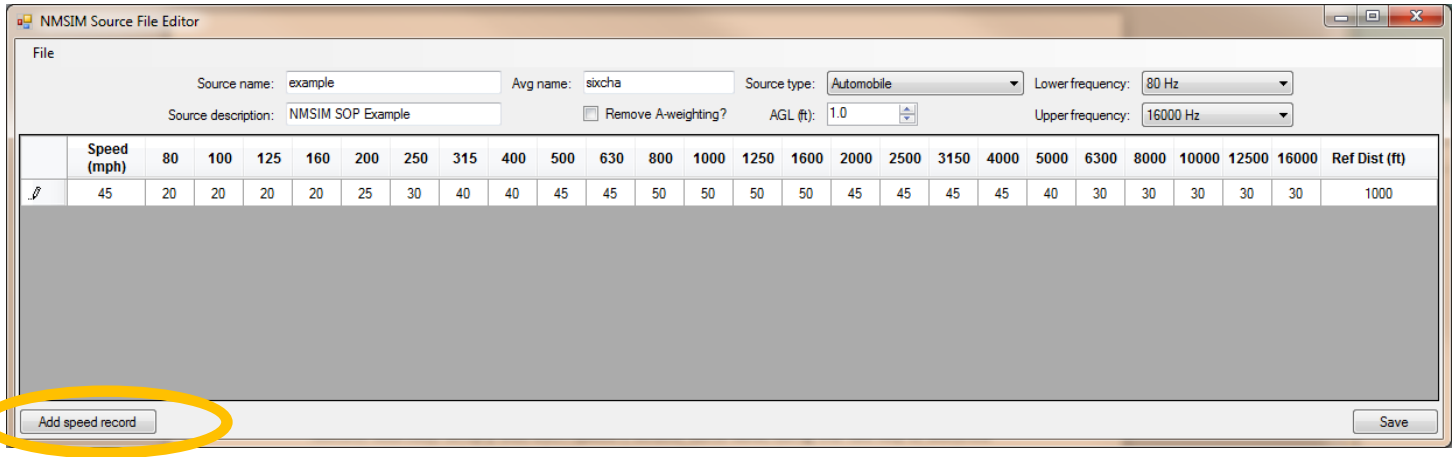
2. Save the file “NMSIMSRC.exe” to your own data drive.
3. Open NMSIMSRC.
4. Fill in the boxes titled Source Name, Avg Name (6 characters only), and Source Description. Make your Source name and your Avg name are the same (this will make things easier later when calling on files). Adjust the AGL (ft) – in NMSIM, this is usually 1 ft, indicating the source is 1 ft off the ground.



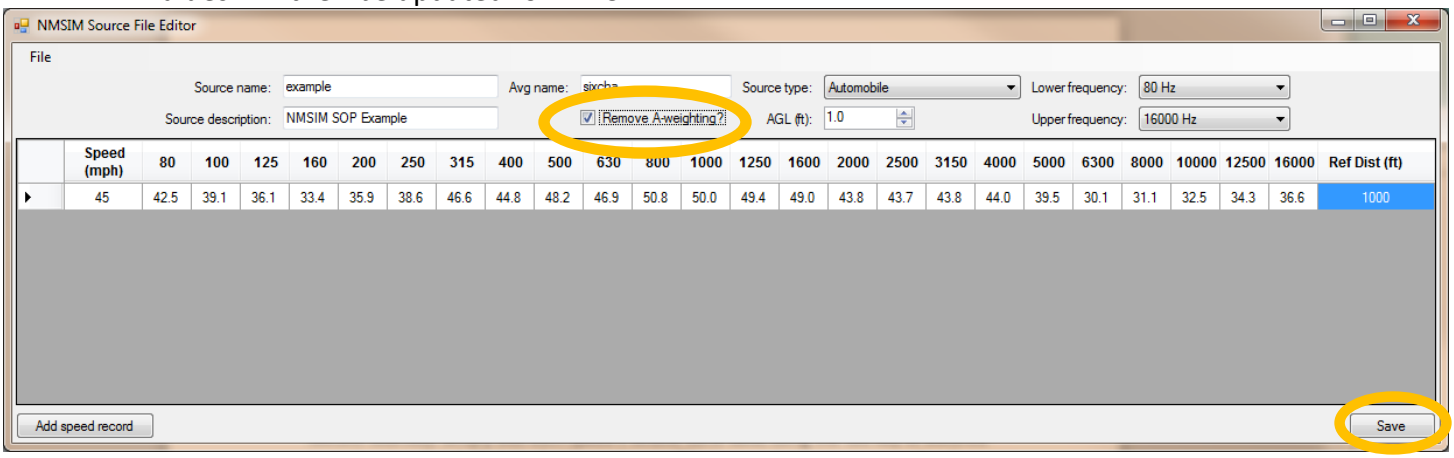
5. Choose your source type. The “other ground-based vehicle,” is currently the same as “automobile.”
6. Choose a lower and upper frequency. This allows you to use data from other sources that may not contain all 33 one-third octave bands.
7. Click “Add speed record” button to add in your data.



8. First, add the speed of the noise source. If you are working with automobiles and you have 3 speed records, they can all be input into this one source file (as is done with the standard NMSIM sources). Simply add each speed's octave band data (in dB – the program will convert this data to cB after you save the file (NMSIM requires source data in cB)), using the tab key to advance to each octave band. Click the "add speed record" button each time to start another line.



9. If the values you entered were A-weighted, click the "remove A-weighting" button. The values will then be updated for NMSIM.



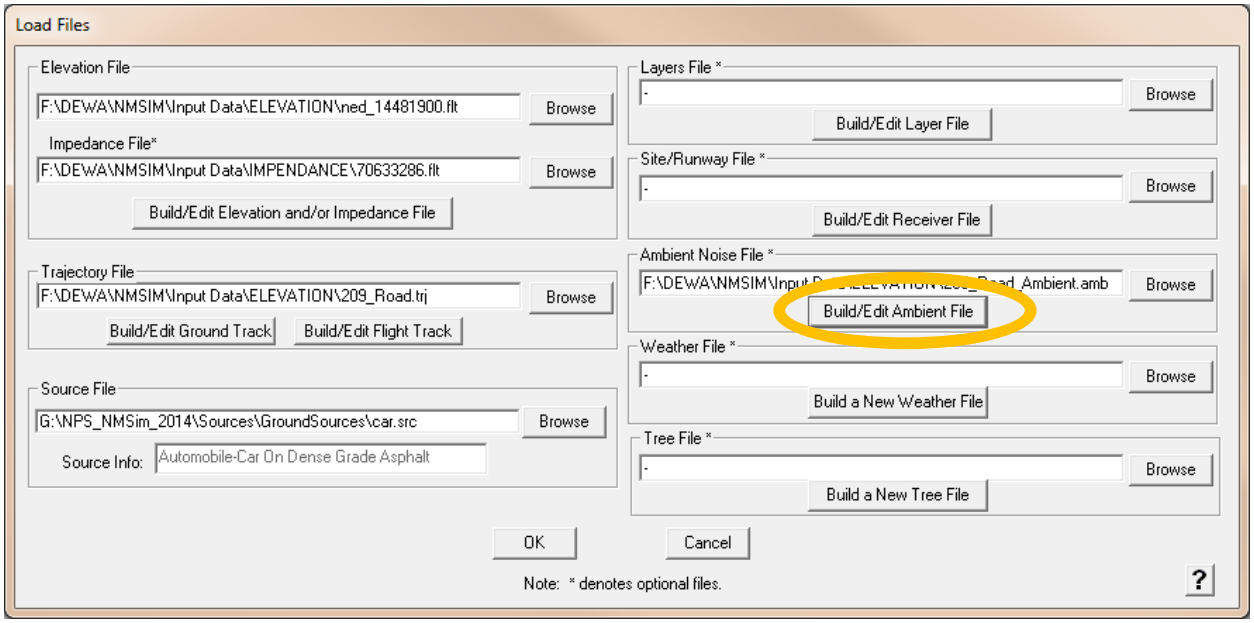
10. When finished, click "Save."
11. This file will be saved to your Documents folder in a folder named "NMSIMsrcs."

12. Each of the speed records will be saved in a separate ".avg" file (so if you put in 3 speeds, you will have 3 ".avg" files). You will see your source file as a ".src" file.

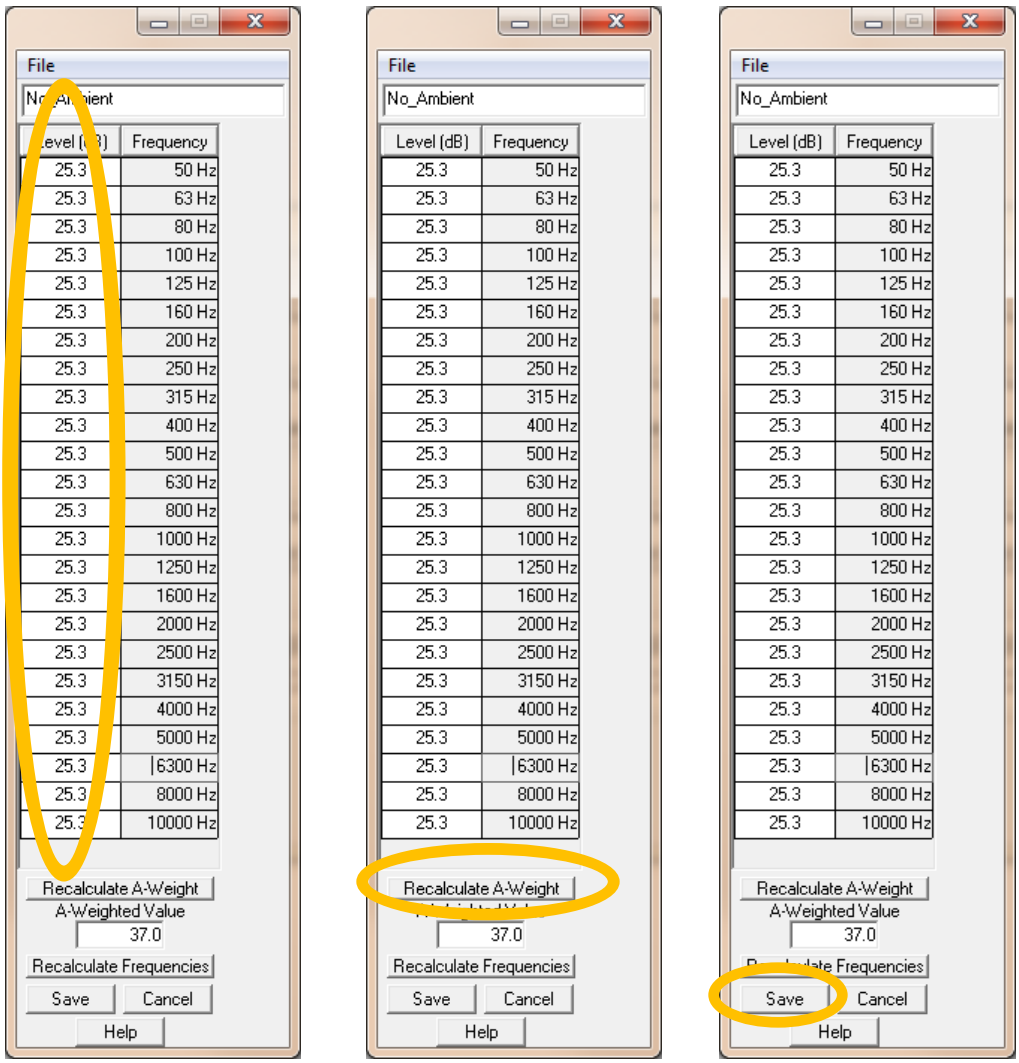
    To use this source file you have created in NMSIM, follow the steps in How-to: **Choose a Ground Source File in NMSIM** (the section above this one). You will navigate to your Documents folder, instead of the directions in step #3.

AMBIENT NOISE

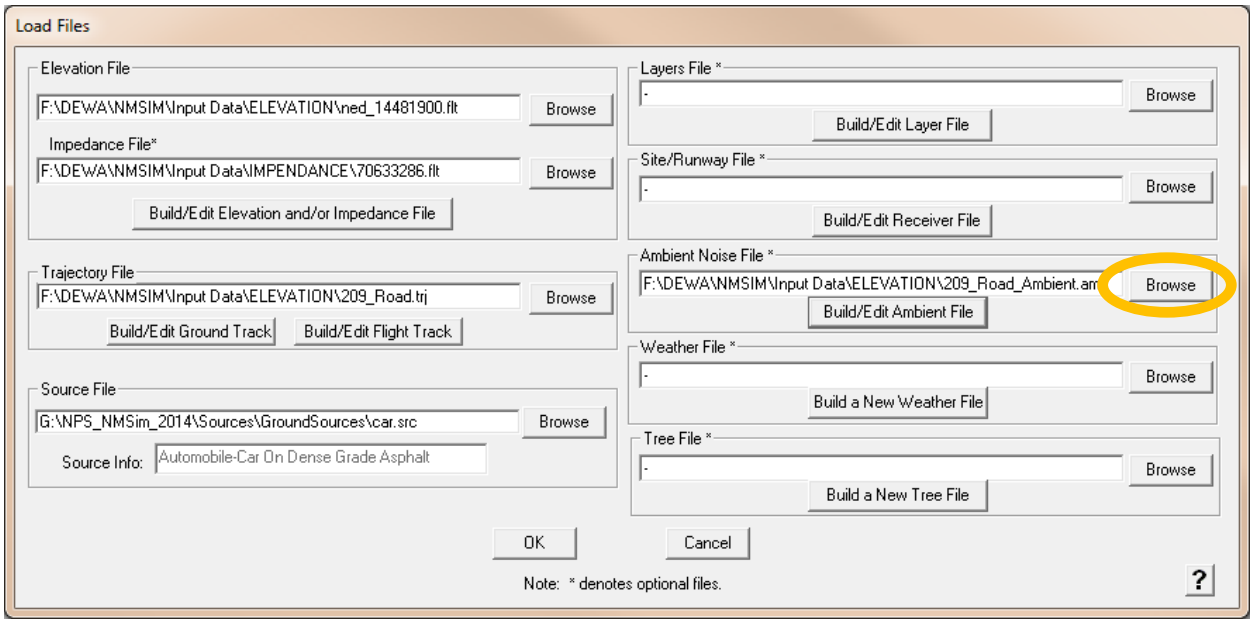
1. If you have sampled right near the area of concern or there is monitoring data for the park, use a specific set of octave band data for the ambient file in NMSIM. For example, in COLM, we had sampled at a site on the road in question, so this data was used instead of the geospatial model. To use this type of specific ambient data, continue working in the grey box titled “Load Files” after you have uploaded the source file. Click on the “Build/Edit Ambient File” button under the white box underneath “Ambient Noise File” (see yellow circle below).



2. In the resulting window (figures below), input the natural ambient sound level for each frequency band in the white box titled “Level (dB)” (circled in yellow below). Then, push the button “Recalculate A-weight.” Finally, press the “save” button.

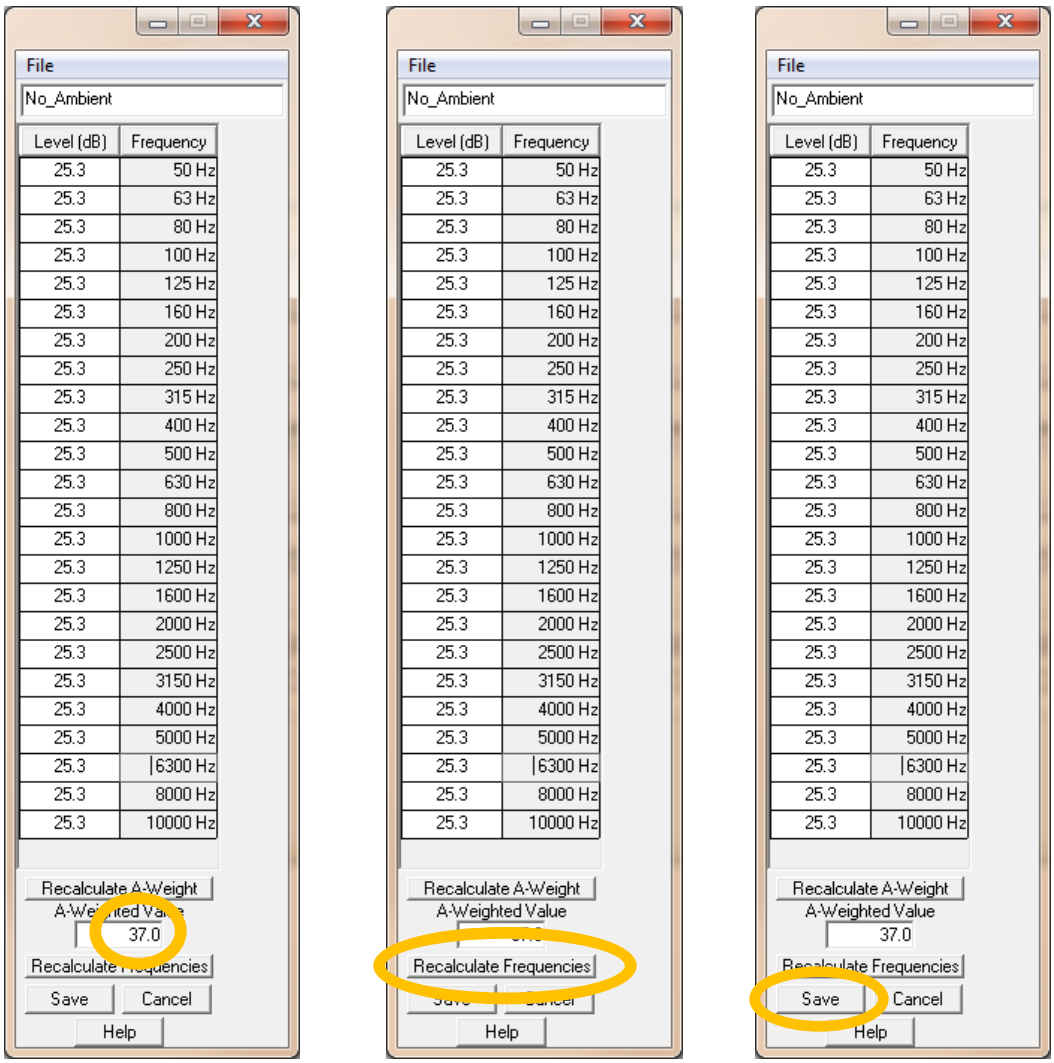


3. If you don't have monitoring data specific to the area of interest, you can use the natural ambient from the geospatial model, found here: T:\NSNSD\Sounds\StaffSpace\Dan\GSM. You can try to upload this as a map layer into the "Ambient Noise File" box below.

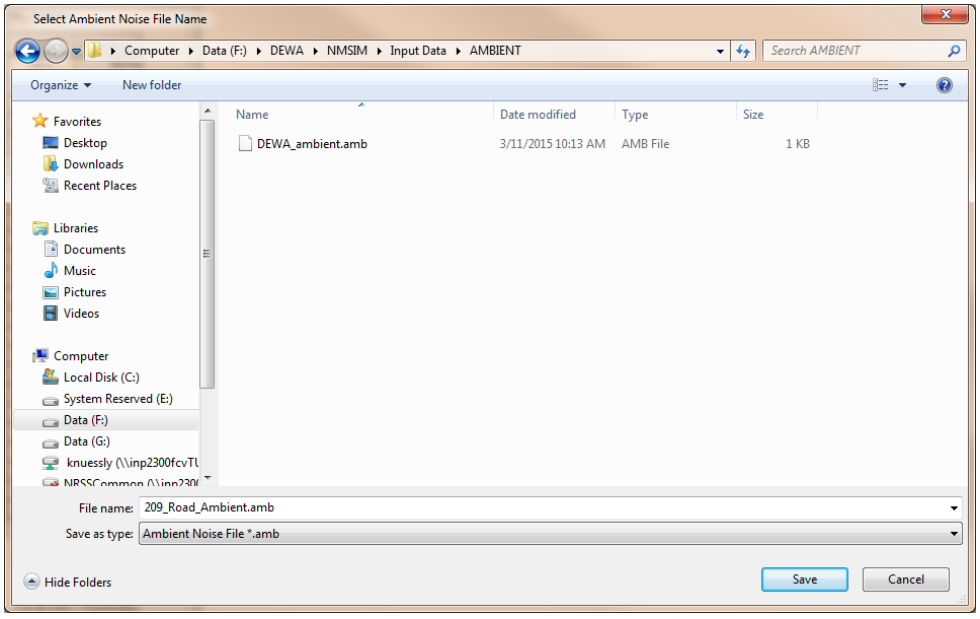


If that doesn't work, you can use the average natural ambient in the area of interest or near a specific sensitive point. Click on the "Build/Edit Ambient File" button (shown in step #1).

4. In the resulting window (figures below), input the average natural ambient in the white box titled "A-weighted value" (circled in yellow below). Then, push the button "recalculate frequencies." Finally, press the "save" button.

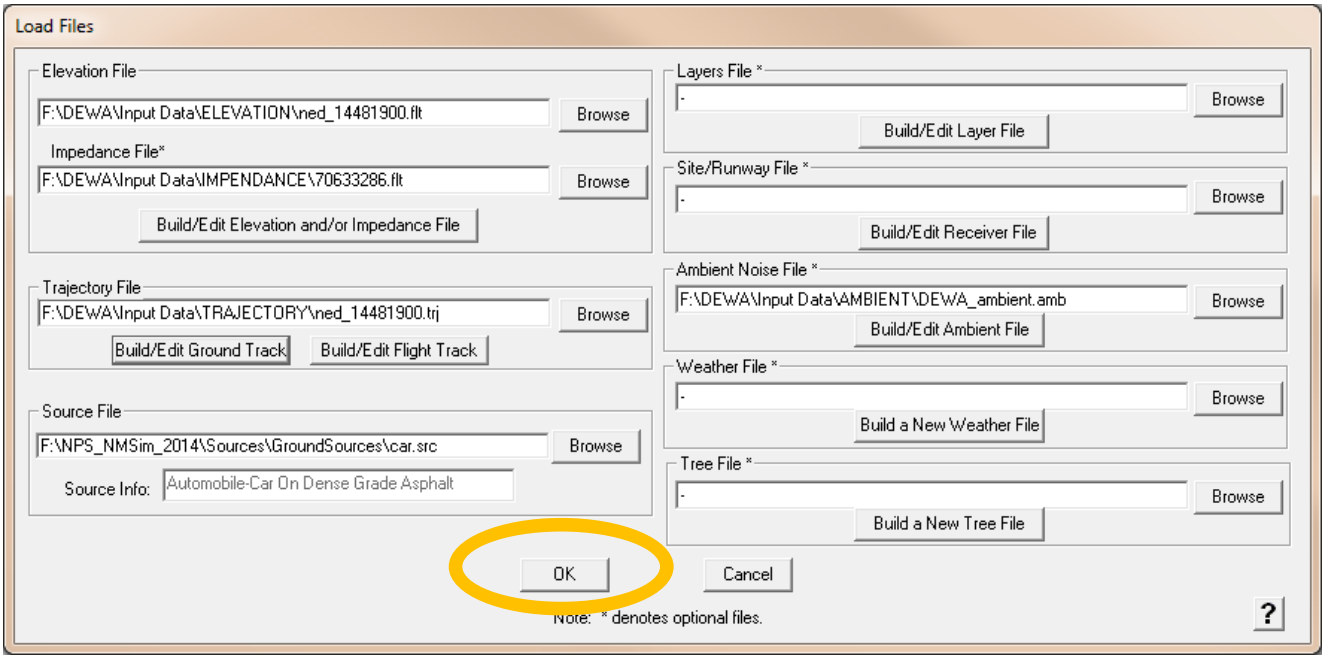


5. Save the file in your AMBIENT folder.

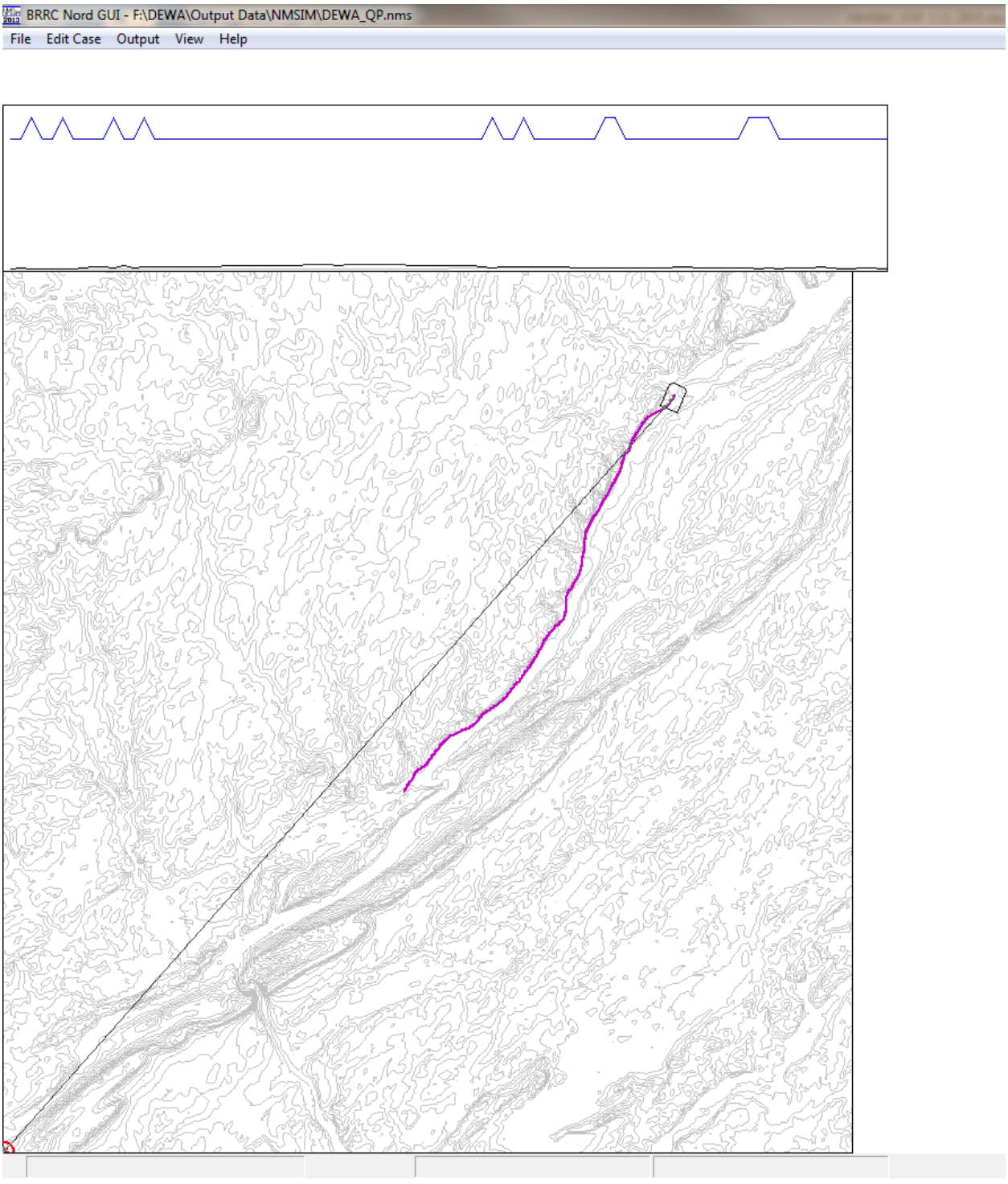


RUN A MODEL, VISUALIZE OUTPUT, & CREATE OUTPUT FOR FUTHER ANALYSIS

1. Once you've input all the necessary data (Elevation, Impedance, Trajectory, Source, and Ambient), you're ready to run the model. Press "OK."

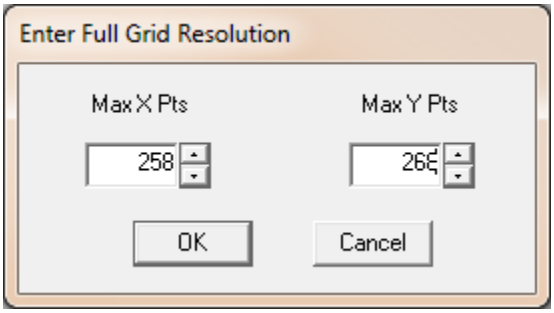


2. The resulting window will look similar to the one below. The pink line shows the trajectory and the box outlined in black is the traveling object (car). The red circle is the receiver you defined in the elevation file. This is only specifically placed when you are asking a question about noise levels at a specific point. NMSIM has to have one receiver to run, so having one at the origin (also defined in the elevation file) is fine. The black line between the car and the receiver shows the line of sight. The rectangular window above the elevation map shows the terrain elevation profile from the source to the receiver in black and the line in blue shows the ground impedance profile.



3. To visualize your data, go to “Output” in the NMSIM menu bar. Choose “Visualizer.” This will lead you to both see your data visually (in the NMSIM Visualizer, where you can sight check the data) and to create an output/data file that can be loaded into Arc for additional spatial analyses and nice report visuals (this is via an R script, written by Damon Joyce, NSNSD, March 2015). Continue following the steps.

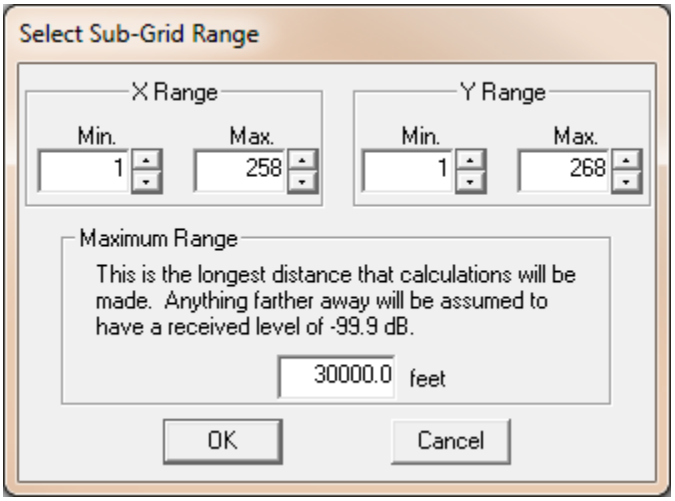
4. NMSIM will prompt you to “Enter a Full Grid Resolution” (see below). “40” and “40” may very well not result in the correct grid resolution for your project. To fill this in with appropriate numbers, follow the next steps.



Use the R script titled “determineNMSIMgridandpoints” (found here: T:\NSNSD\Sounds\Records\2. Science\2.2 Program Development\Modeling\NMSim\RScripts_for_NMSIM) to determine your max x and max y points. This R script attempts to ensure that your grid contains square boxes (e.g. 60 meters squared boxes, or 60m^2 resolution), much easier for ArcGIS to work with during post processing.

5. The next box that pops up will ask for X and Y range. This is the range of points on your elevation map that the program will sample at. Generally, your elevation file contains all the spatial points that you want sampled, thus, you will have the min at 1 and the max at the Max X or Y Pts from above for both X and Y.

   In the Maximum Range sub-box, NMSIM is asking for how far out from the trajectory you want it to calculate noise spread at. In this example below, NMSIM will calculate noise at all x and y receiver points 30,000 feet out from the road in all directions. You will want to ensure you measure in ArcGIS how far out you want or need the model to sample.



6. Then, press the “OK” button. The model will run. Depending on how many points you asked NMSIM to sample at, the model may take a long while to run.
7. Once this has run, a *.tig file will be created in your Output folder. BEFORE YOU USE THE SCRIPTS DETAILED BELOW, MAKE YOUR OWN COPY TO YOUR PROJECT FILE (YOU WON’T CORRUPT THE MASTER R FILE THIS WAY.
8. Use the R Script called “convertTIGtoRData20171129” (located here T:\NSNSD\Sounds\Records\2. Science\2.2 Program Development\Modeling\NMSim\RScripts_for_NMSIM) to convert this to an *.RData file.
9. Then, use the R Script called “compressRDatatoArc20171129” (located here T:\NSNSD\Sounds\Records\2. Science\2.2 Program Development\Modeling\NMSim\RScripts_for_NMSIM) to convert the *.RData files to *.csv files. This script will also calculate noise metrics.
10. Then, upload this file to your ArcMap project and make result maps.