2016

Laboratory Exercise – Ideal Locations for a Family

Benjamin Barrett

Colin Esplin

Chris Garcia

Colin Esplin, Chris Garcia, Benjamin Barrett
CE En – 414
Lab Assignment

Laboratory Exercise – Ideal Locations for a Family

Background

Upon the successful completion of a college degree, many students (and their families) are offered job positions in various locations throughout the Unites States. As a result, these young families are tasked with the challenge of finding a suitable place to live in an area they are completely unfamiliar with. By using a model in ArcMap this task can be made much easier. In this lab a model will be created in ArcGIS Model Builder along with a corresponding map showing suitable locations.

Problem Statement

Presume that you are a recent BYU graduate and have been offered a job by a prestigious company in Miami Florida. The company wants you to begin work within the next month and you need to quickly find a place to move you and your small family of three. However, you don't want to move just anywhere - there are several criteria you have for your new home. You want to find a location that is in close proximity to a public school, a park, bus stops, a hospital, and you also would prefer to be in an area with low crime rate.

A model can be created using ArcGIS Model Builder that will determine the best possible locations within the county of Miami-Dade according to the criteria mentioned above.

Spatial Considerations

For the purpose of this lab you will limit the factors with which you are concerned to:

- Proximity to schools: you are to find locations that will be within 0.5 miles of elementary schools.
- Proximity to hospitals: you are to find locations that will be within 5 miles of a hospital.
- Proximity to family recreation: you are to find locations that are within 2.5 miles of a park.
- Safety: you are to find locations in which there are less than 2 sexual predators per square mile.

Data

Navigate to the following webpage:

- http://gisweb.miamidade.gov/GISSelfServices/GeographicData/MDGeographicData.html

Locate and download shape files for the following:

- Public Schools
- Hospitals
- Registered sex offenders
- Municipal parks

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ModelBuilder Tools

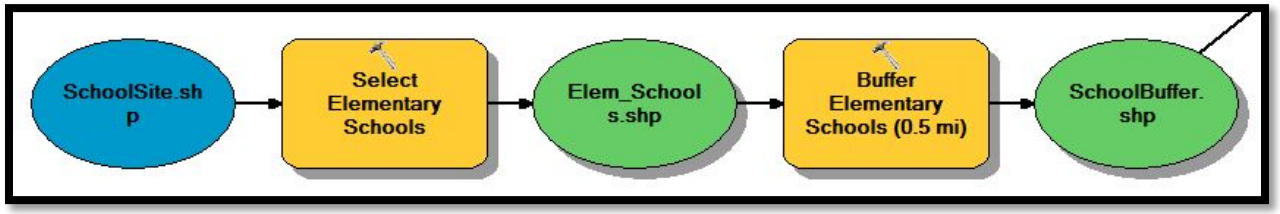
In this laboratory exercise you will be using the following tools:

- Kernel Density – creates a smooth surface from points or polyline features using a kernel function.
- Reclassify – this tool changes values in a raster.
- Extract by Mask – extracts cells that are either partially or totally within a mask, and creates a new raster with only those cells.
- Buffer – a proximity operation which creates a specified distance from a feature.
- Select – finds and selects features from your data layers based on attributes.

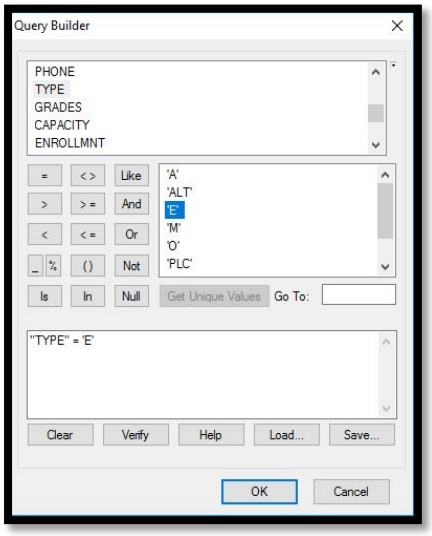
Step by Step Solution

For an advanced GIS student, the information up to this point is all you need to complete the assignment and create an output map from the results. Feel free to try conducting the analysis using only the information provided above. As a resource to assist you, specific steps are provided below.

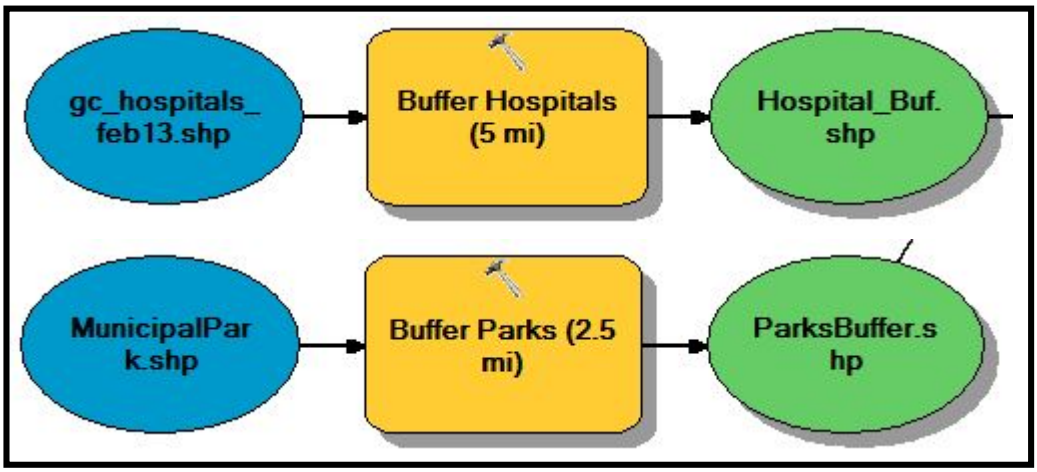
Step 1



Use the select tool on the schools shapefile to select elementary schools. To do this, use the Expression option to open up the Query Builder dialogue box. Choose the “TYPE” field and click on “Get Unique Values”. Create an expression to select elementary schools as shown in the figure below. After you run the select tool, create a 0.5-mile buffer around the elementary schools. Within the buffer tool, be sure that “ALL” is set for the Dissolve Type option.

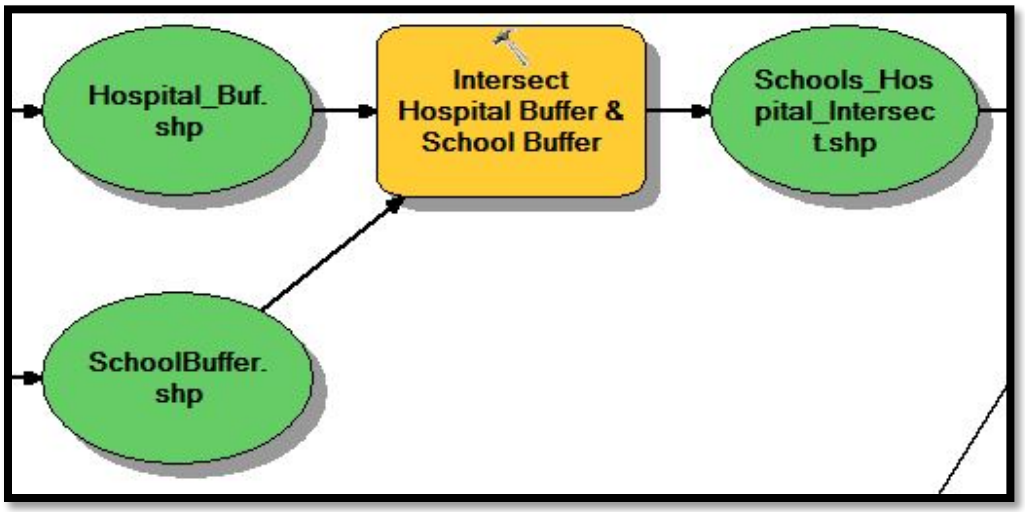


Step 2



Buffer the hospital and park shapefiles with 5-mile and 2.5 mile distances, respectively.

Step 3



Use the Intersect tool to create a shapefile representing locations that are both close to a school and close to a hospital.

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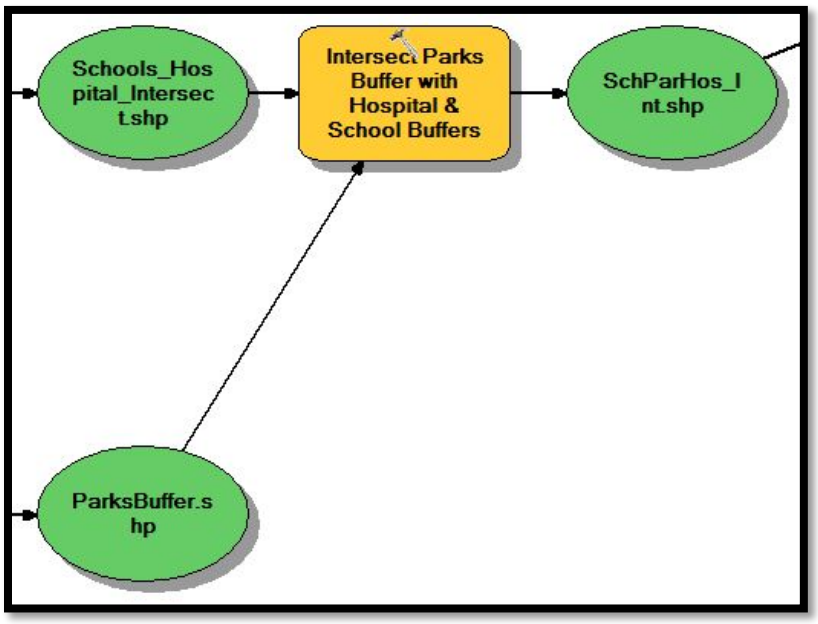
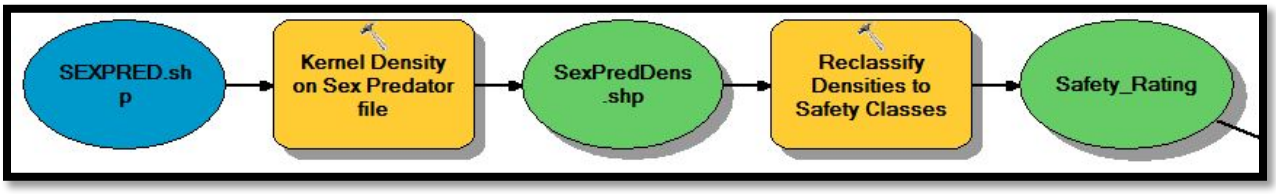
Step 4



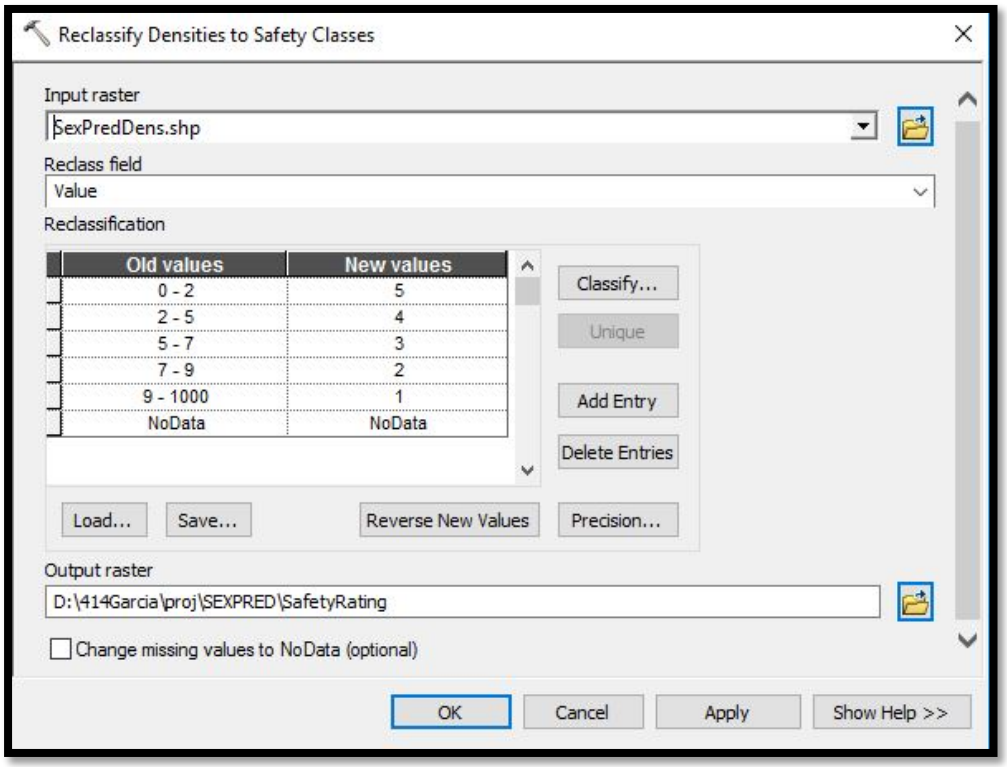
Use the Intersect tool with the parks shapefile and the Schools_Hospitals_Intersect shapefile to create a new shapefile representing locations that are close to a school, a hospital, and a park.

Step 5

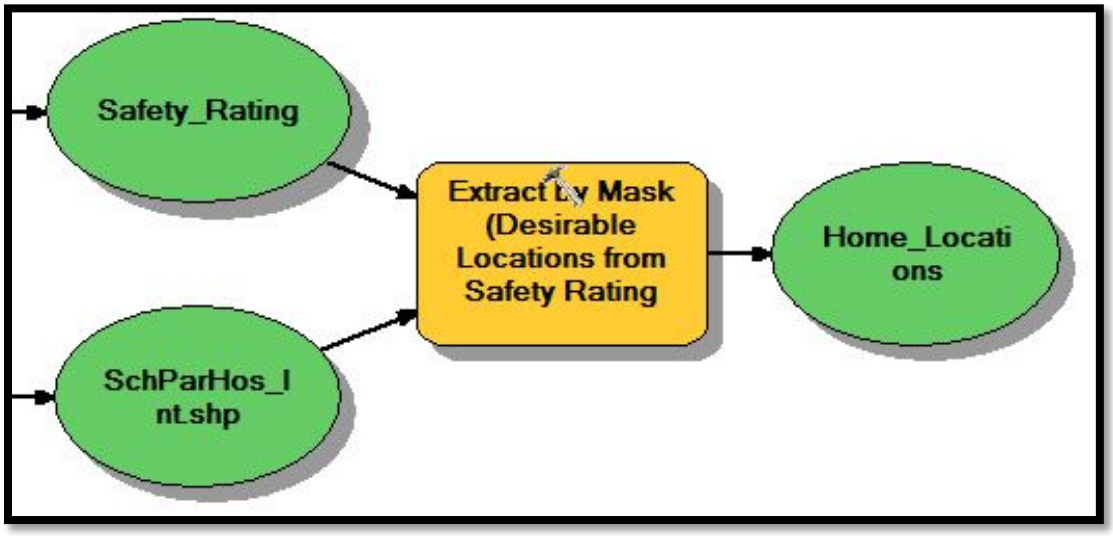


Use the Kernel Density tool on the Sex Predators shapefile to create a raster dataset showing the density of registered sex offenders per square mile. The Area units should be set to "SQUARE_MILES". The Kernel Density tool calculates an Output cell size based on the inputs and map properties. The default cell size will likely be a little pixelated. For a sharper model, adjust the cell size to about 75. A suitable Search radius is 10,000. The other defaults for the tool are acceptable for our analysis.

After Running the Kernel Density tool, use the Reclassify tool on the Sex Offenders Density raster dataset to classify areas having few registered sex offenders as being relatively safe and areas having many registered sex offenders as being relatively dangerous. Reclassify your data by repopulating the Old values column and the New values column to reflect a high safety rating for relatively few registered sex offenders per square mile. An example reclassification is shown in the figure below.



Step 6



Use the Extract by Mask tool with the safety rating raster and the shapefile representing locations near a school, a hospital, and a park. The resulting raster dataset shows areas that are close to a school, a hospital, and a park and displays a measure of the relative safety of those locations. Add the resulting dataset to the display and inspect!

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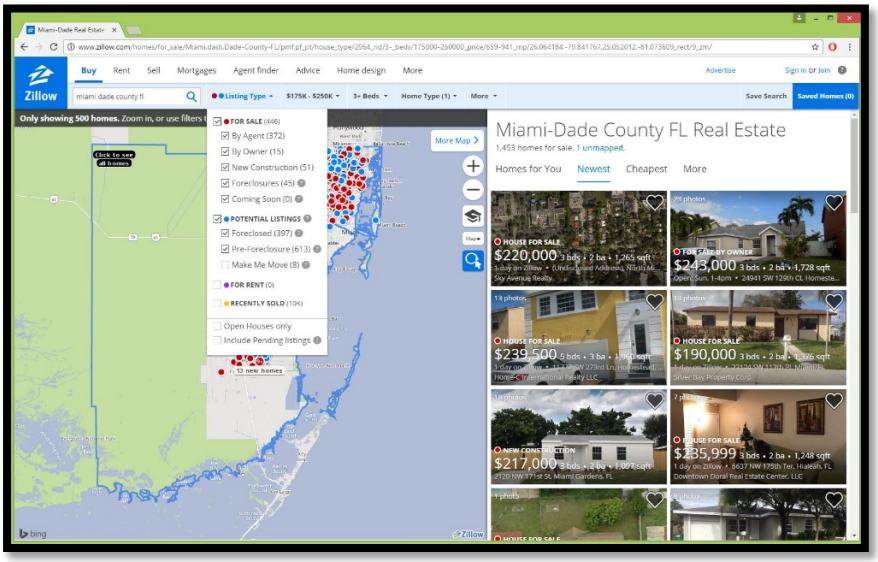
Step 7



Perform a search using a real estate listing site such as Zillow.com or Trulia.com to find 4-6 homes you like in the Miami-Dade, FL area. Open up Google Earth. Create a folder in My Places called “Selected Homes” or something similar. For each home that you want to locate on our map, copy and paste the address into the Google Earth search bar, save to My Places, and move the place into the Selected Homes folder you just created. Repeat the process for each of the homes. When you are finished, left click on the folder and click “Save As”. Choose an output location and save the Selected Homes folder as a KML file. See the figures below for reference.

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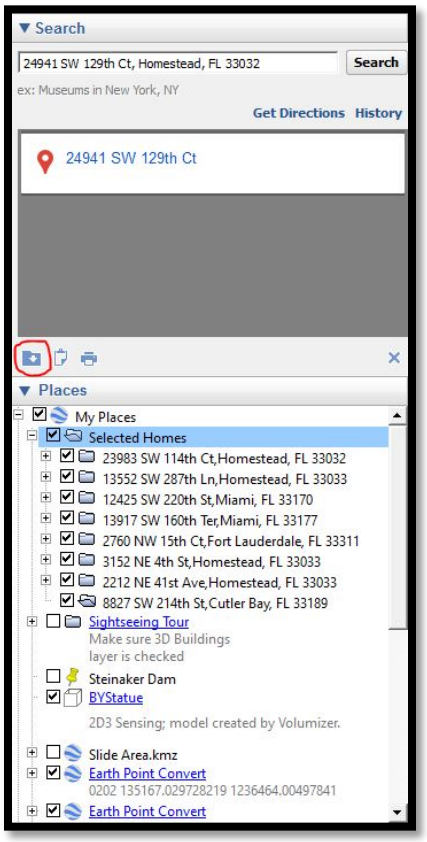
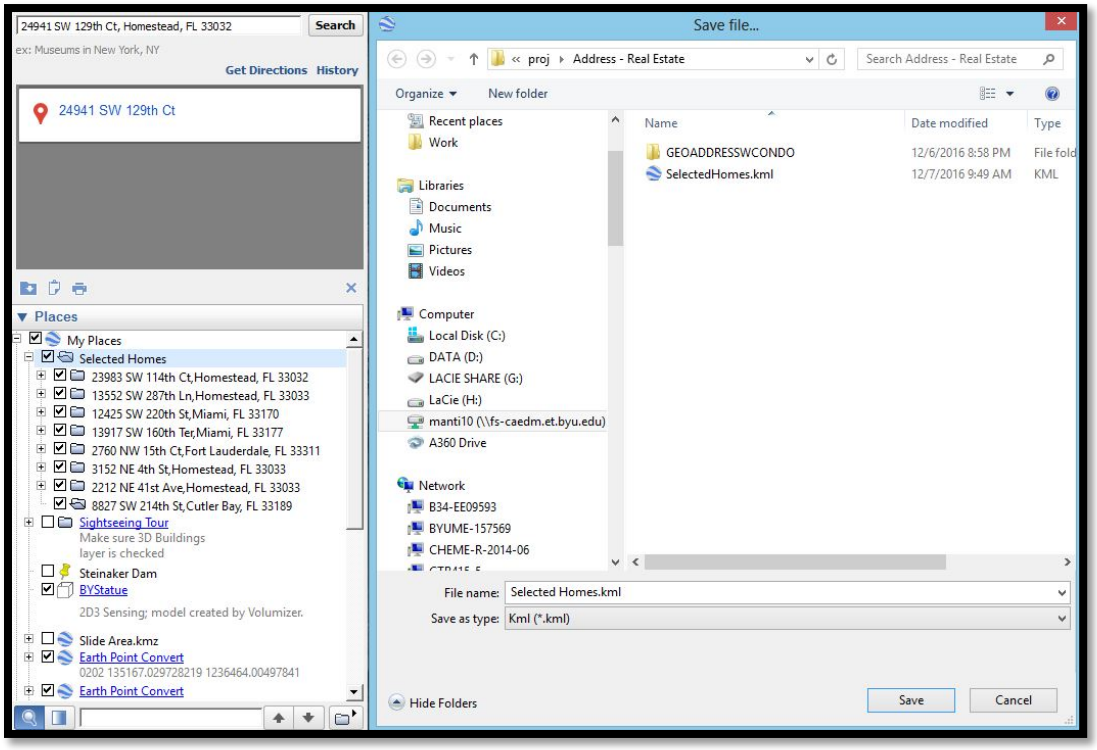
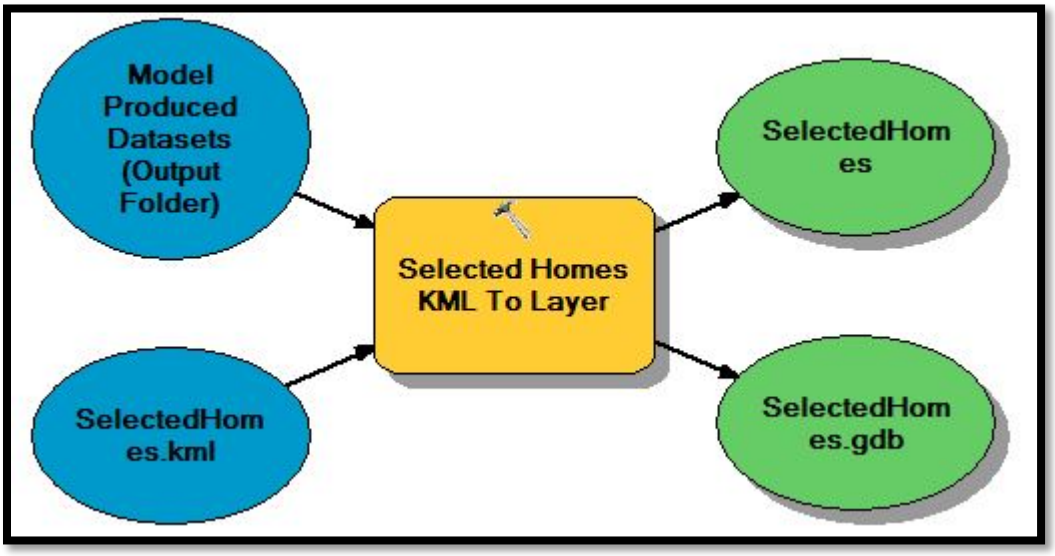




Step 8



Back in your model, use the KML to Layer tool to convert your selected home points to a layer. Choose an output location and name the output data. After running the tool, add the layer to the display and inspect! Which of the homes seems to be in the best area based on your analysis?

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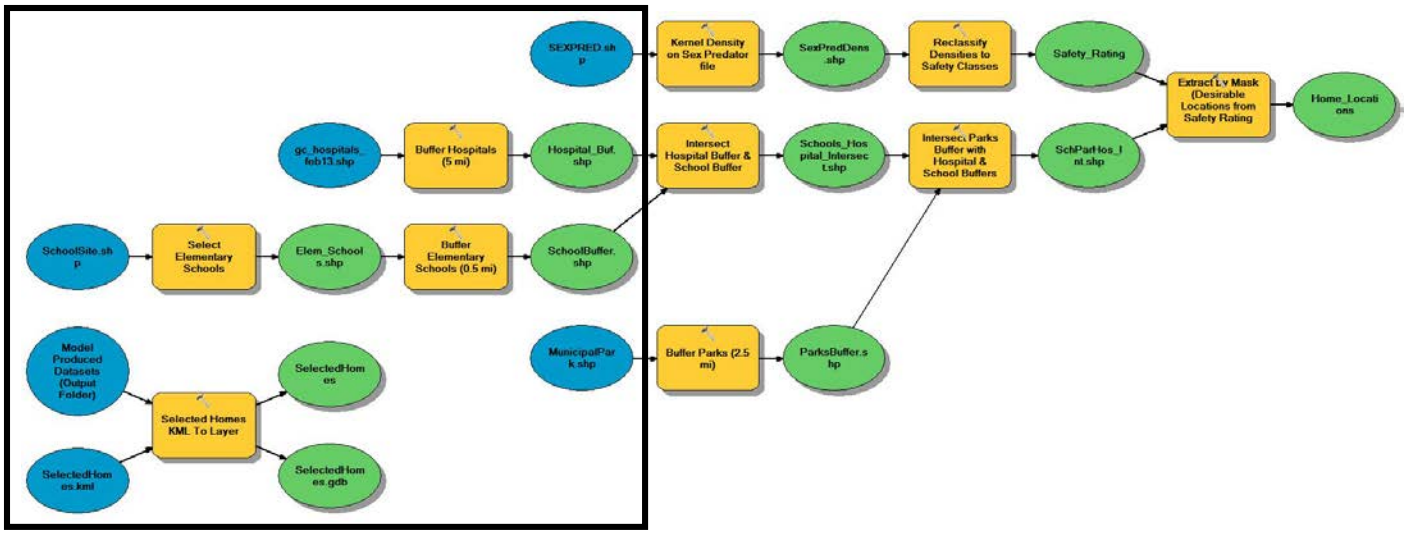
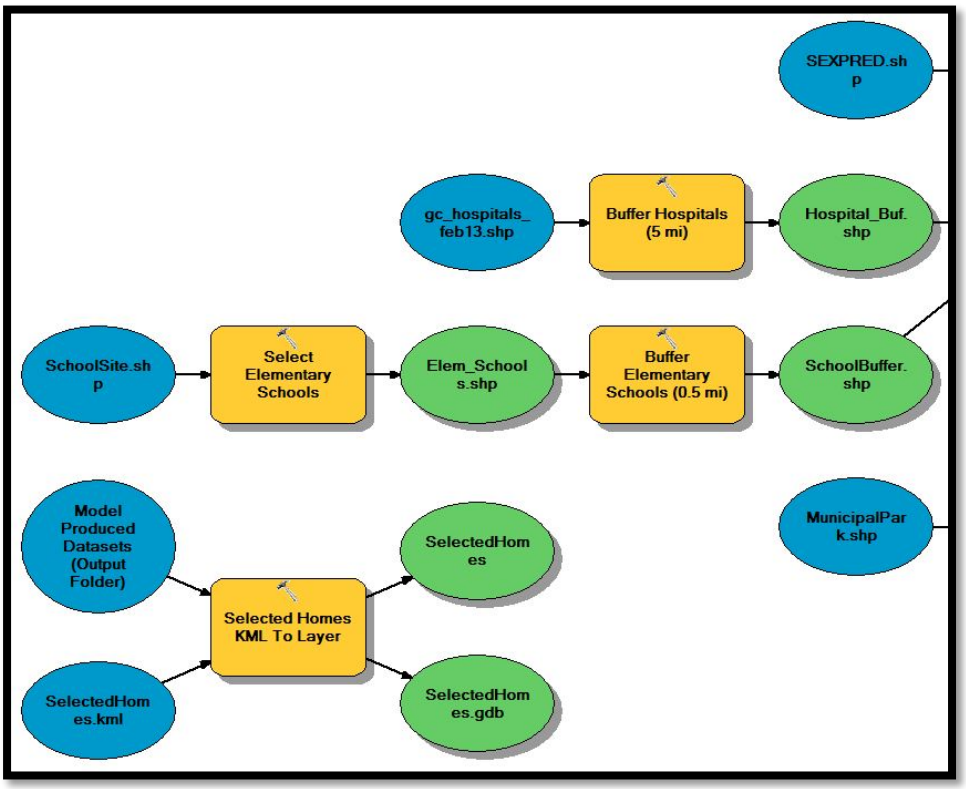
Example Model





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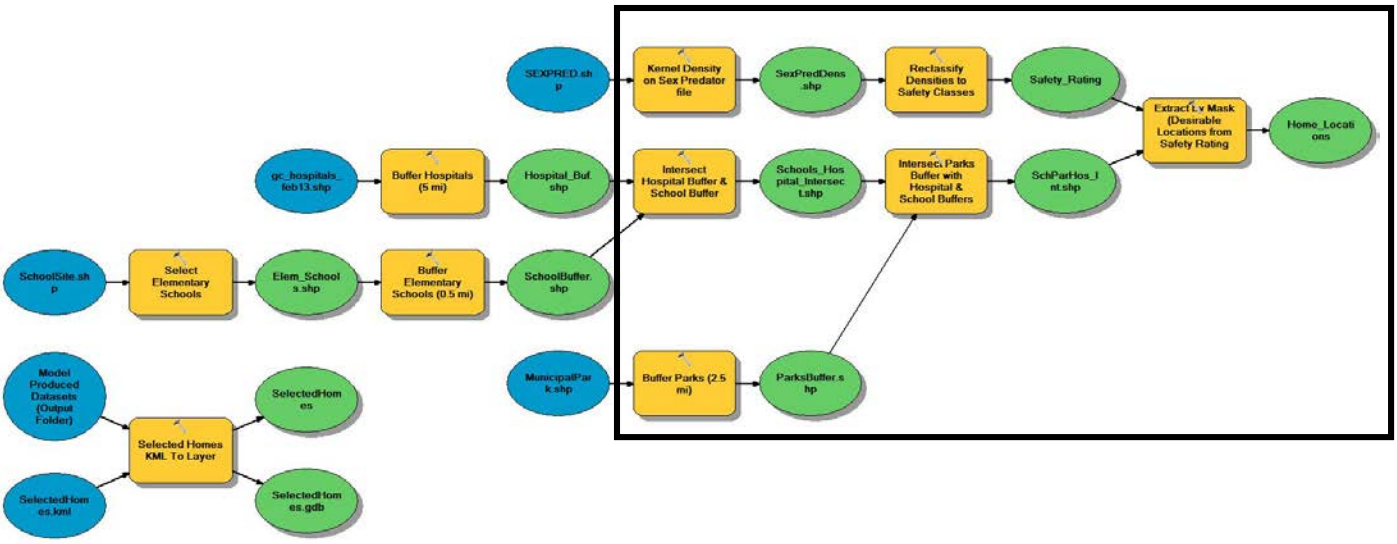

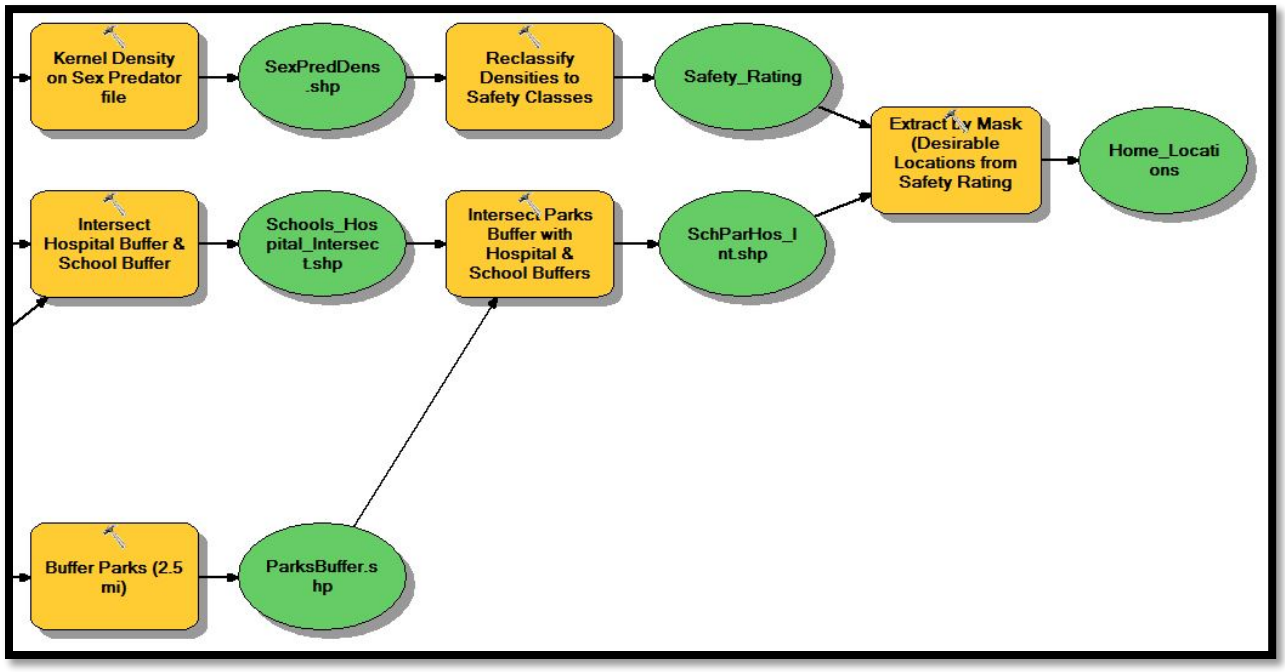

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Deliverables

Once you have completed and run your model, you should provide a sharp looking map displaying your results. Your map should include at minimum a scale bar, north arrow, and legend. In addition to these items also include a text box with your name, date, and map projection, a map title, and a neat line. In your report please provide an introduction to the lab exercise, explain your Model Builder process and the logic behind it, and summarize your results.

Be sure to save your model as you may need it for future laboratory exercises.

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Example Map