

## GIS II: Data Management: Creation, edition and maintenance of geographic data

### Module 4: Basic Geoprocessing Tasks

\*\*\* Files needed for exercise: *ma\_cty.shp*, *ma\_bus.shp*

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**Goals:** After completing this exercise, you will understand how to use geoprocessing tools in ArcGIS.

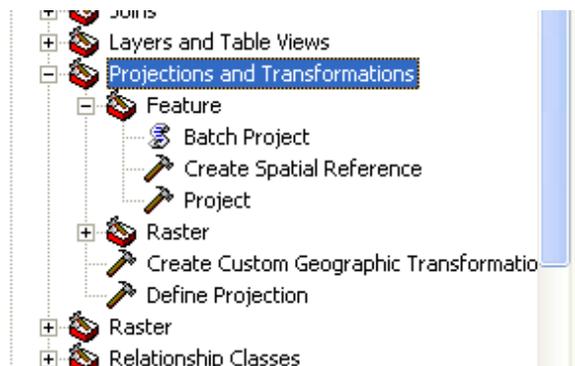
**Skills:** After completing this exercise, you will be able to use the Project, Select, Buffer, and Clip tools to perform basic geoprocessing tasks in ArcGIS.

#### Getting Started:

1. The goal of this exercise is to produce a map showing the parts of Hampshire County which are within five miles of a pediatrician's office.
2. Open ArcMap.
3. Click the Add Data button  and choose to add the *ma\_cty.shp* and *ma\_bus.shp* shapefiles. *Ma\_cty.shp* is a polygon shapefile showing Massachusetts county boundaries; *ma\_bus.shp* is a point shapefile showing the location of 85,000 businesses in Massachusetts, derived from InfoUSA data. Note: This data has been modified for this exercise, and should not be relied on for serious analysis.
4. Open ArcToolbox.
5. Create a working folder for yourself somewhere easy to find (like `c:\temp\exercise4`). You will save your output layers from your geoprocessing tasks to this folder.

#### Projecting your data:

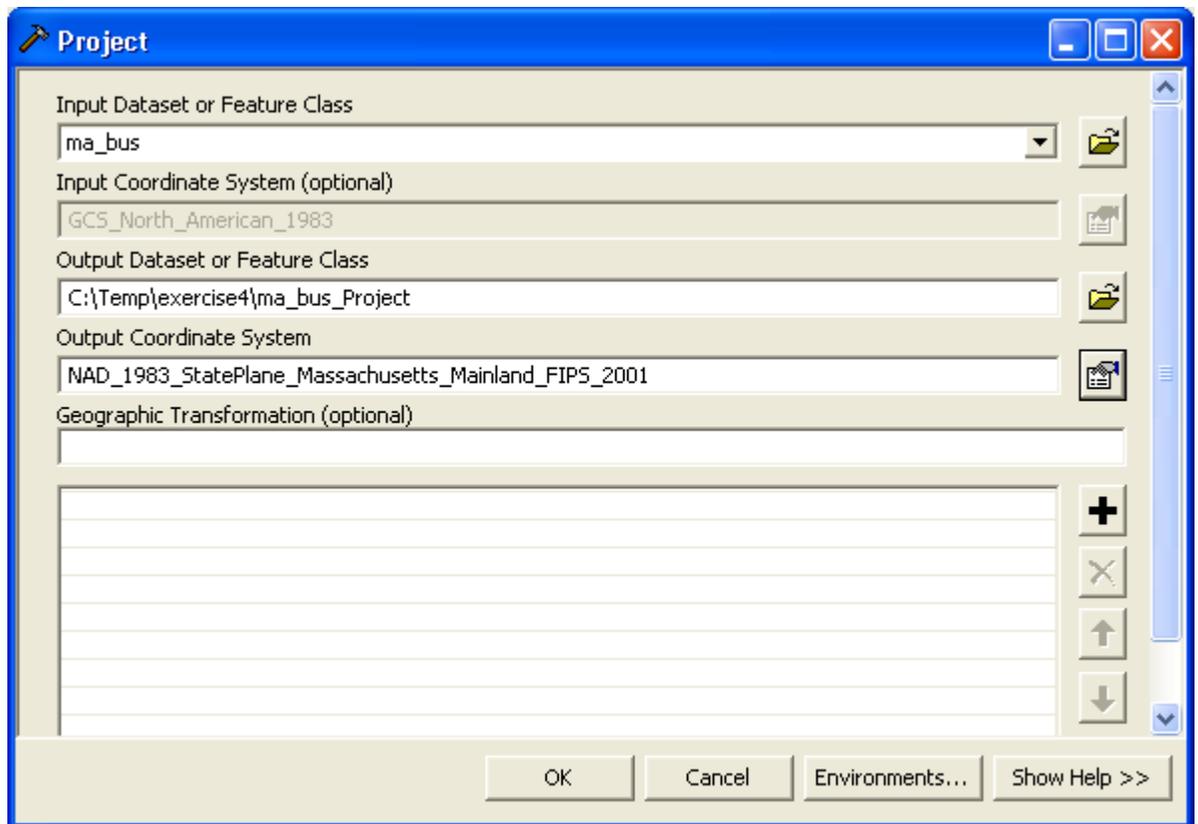
1. Right-click on each of the layers in the Table of Contents and choose Properties. Click on the Source tab. Notice that both layers are in geographic coordinates, using NAD 1983. We want to project this data using Massachusetts State Plane Mainland Zone, NAD 1983.
2. In ArcToolbox, open the Data Management toolbox. Within this toolbox, open the Projections and Transformations toolset, and within this toolset, open the Feature toolset.



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3. Double-click the Project tool. (Why are we using the Project tool, and not the Define Projection tool?) Choose *ma\_bus.shp* as your input layer. Set the output coordinate system (you'll need to browse through Projected Coordinate Systems > State Plane > NAD 1983 to find it). Make sure you set the output feature class to your newly created folder.



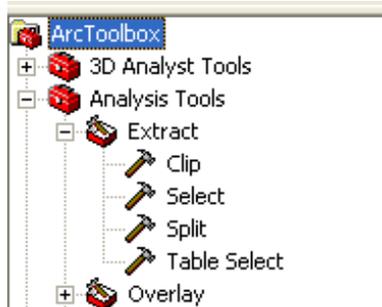
4. Click OK to run the tool. There's no need to add the output feature class to your map.
5. Repeat steps 3 and 4 for *the ma\_cty.shp* layer.
6. Start a new ArcMap document, and add your two new projected layers. Don't add the original *ma\_bus.shp* or *ma\_cty.shp* layers. (What's the effect of this step? Why not just add the new layers to the existing document?)

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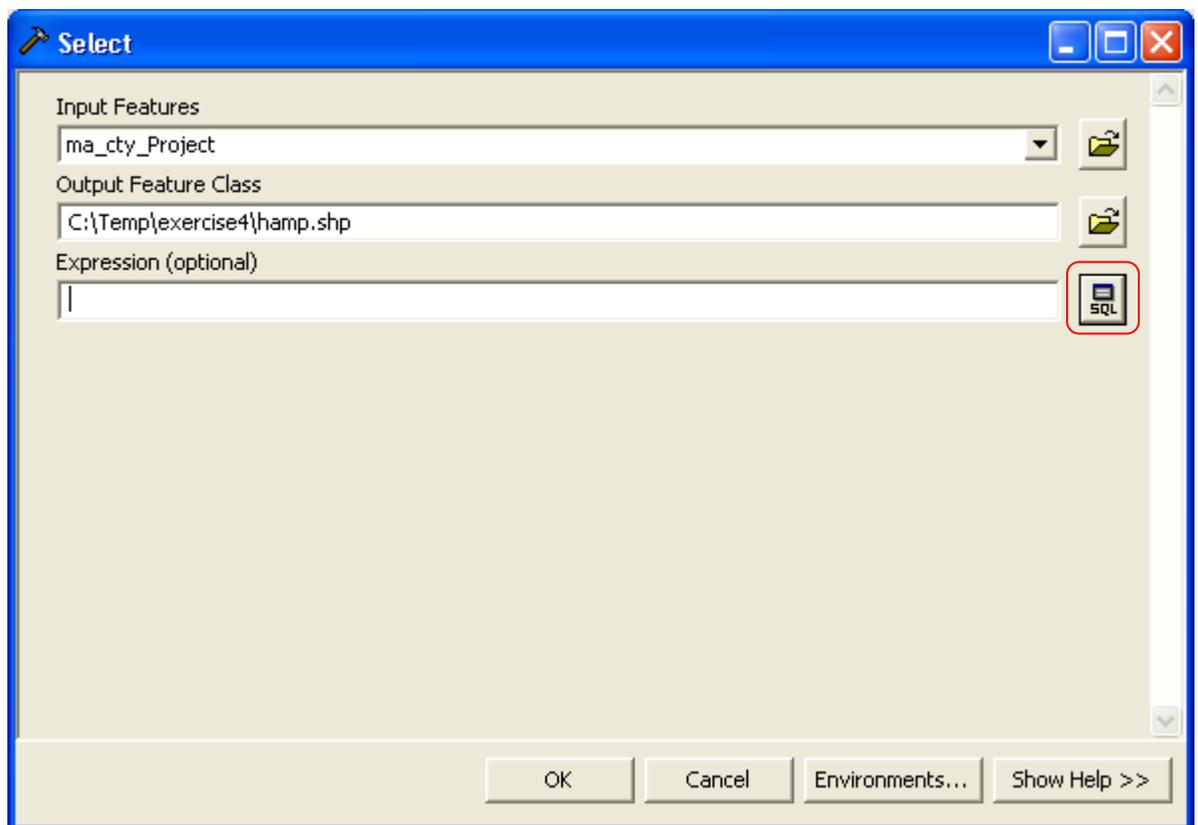
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#### Selecting features:

1. In ArcToolbox, open the Analysis toolbox. Within the toolbox, open the Extract toolset.



2. Our first step will be to select Hampshire County from the *ma\_cty\_Project.shp* shapefile. Double-click the Select tool. Choose the input feature class, set the output feature class, and then click the SQL button to the right of the Expression field.

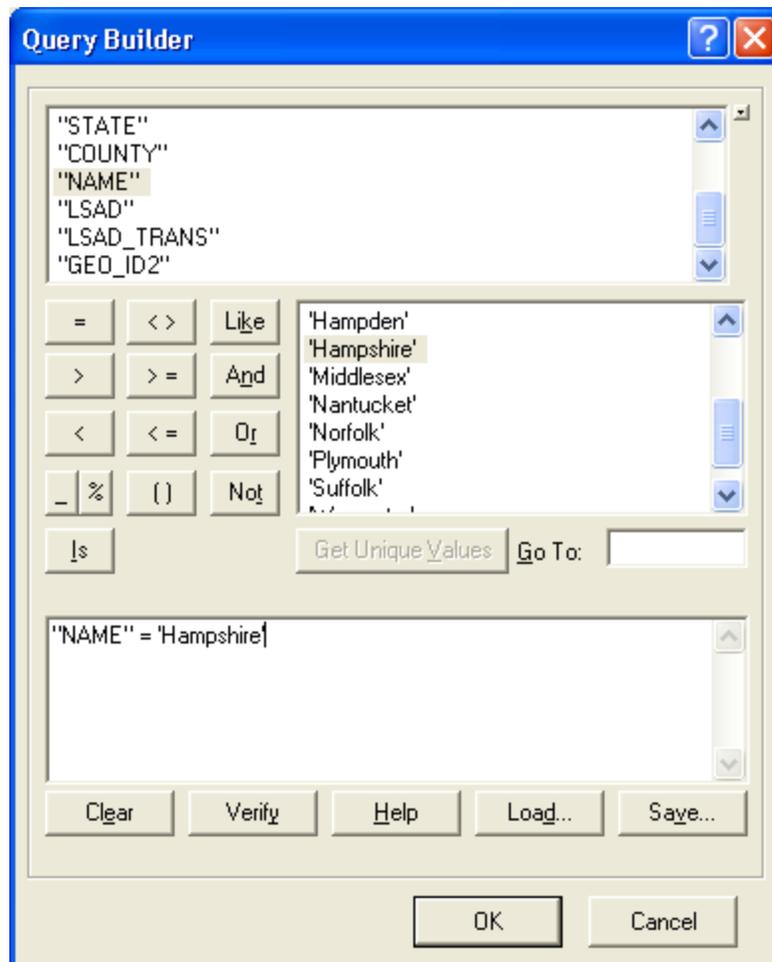


3. You can fill in the expression listed below either by typing it in or by clicking in the Query Builder window. Clicking may feel slow and inefficient, but it guarantees that your field names are quoted correctly and your elements are spaced correctly. If you choose to type the query in, be very careful about the difference between single and double quotes. To

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enter the query without typing, find the "NAME" field in the top pane of the window, and double-click it. Click the "=" button. Click the Get Unique Values button. From the list of county names, find 'Hampshire' and double-click it. Whether you've chosen to enter the query by clicking or by typing, it's always worth clicking the Verify button to make sure there are no typos in your query.



4. Click OK in the Query Builder, then OK in the Select tool window to run this selection.
5. Next, we're going to try to find all the pediatric practices in the state. Double-click the Select tool again, choose *ma\_bus\_Project.shp* as your input layer, set your output layer, and build another query.

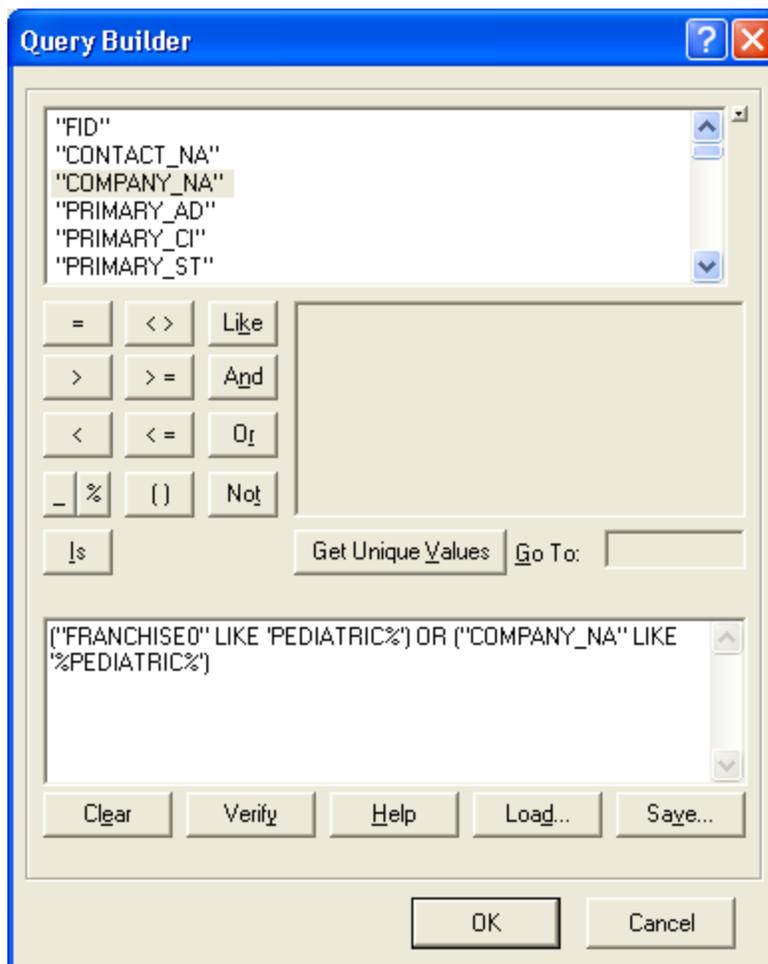
A few notes about the following query:

- The parentheses are not necessary in this case, but using them in any query with an "OR" or "AND" component is a good idea.
- The "LIKE" keyword matches based on a search pattern, while the "=" operator we used above requires an exact match.

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- The “%” acts as a wildcard here. The first part of this query, “FRANCHISE0” LIKE ‘PEDIATRIC%’, will match any record where the FRANCHISE0 field starts with PEDIATRIC. It will match PEDIATRICS, PEDIATRICIAN, and PEDIATRIC DENTISTRY. It will not match OBSTETRICS AND PEDIATRICS or PODIATRIST.
- The second part of this query, “COMPANY\_NA” LIKE “%PEDIATRIC%” will match any record where the COMPANY\_NA field contains the pattern PEDIATRIC anywhere. It will match PEDIATRIC ASSOCIATES OF NORTHAMPTON and PIONEER VALLEY PEDIATRICS. It will not match PODIATRIST.
- Note that this is probably not a good enough search strategy for serious analysis. For example, “AMHERST FAMILY MEDICINE” will not be captured by this query.



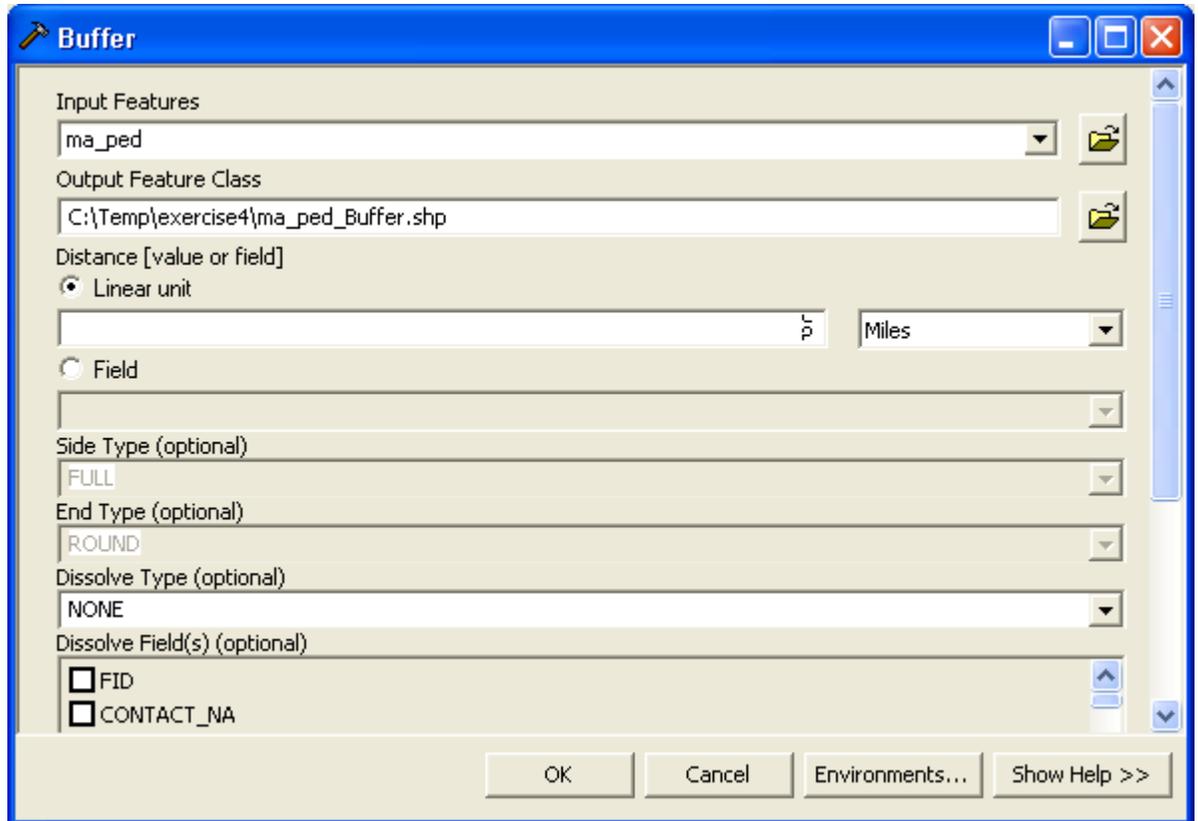
6. Click OK to finish the query, and OK to run the tool. Verify that your output layer has 447 features. If it doesn't, re-run the second query, double-checking every part of the query you enter.

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#### Buffering features:

1. In ArcToolbox, open the Analysis toolbox. Within the toolbox, open the Proximity toolset. Double-click on the Buffer tool. Choose your new pediatric practices layer as the input feature. Set the output feature class, and set the distance to 5 miles. (Make sure you don't choose 5 meters.)



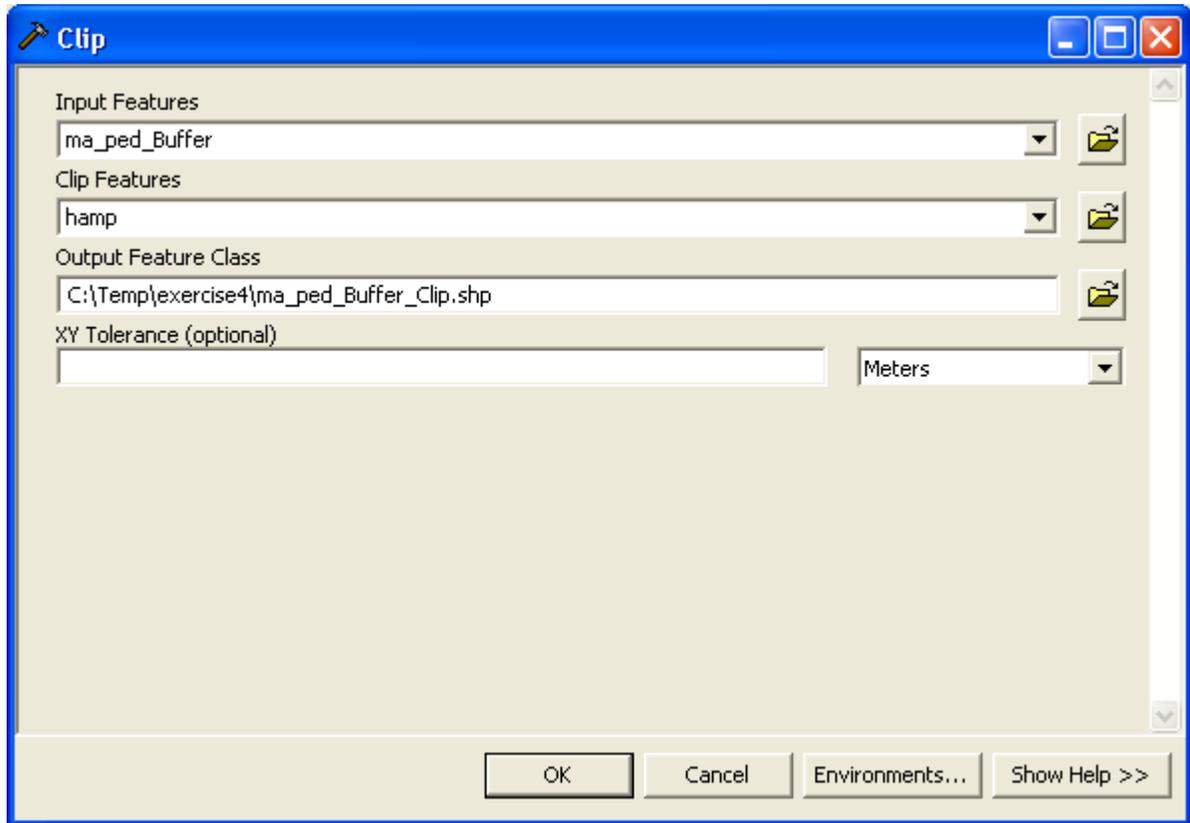
2. Click OK to run the tool.

#### Clipping features

1. In ArcToolbox, open the Analysis toolbox. Within the toolbox, open the Extract toolset. Double-click on the Clip tool. Choose your new buffered pediatric practices layer as the input, and your Hampshire county layer as the clip feature.

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2. Click OK to run the tool.

#### If you have time:

- Why did we run the clip tool after the buffer tool? What would be the effect if we clipped the pediatric practices layer to the Hampshire county boundary before we buffered it?
- Go back to the buffer step, and experiment with setting the Dissolve option in the buffer tool to All (we used the default of None). What effect does this have on the output features? How many output features are there? What attributes do they have?