

## Cookbook 2 October 2013 *GIS Analysis (Part 4)*

### Overview

1. Base Layers and Analysis Layers
2. Geoprocessing: Overview
3. Geoprocessing Tools: Select by Attributes
4. Geoprocessing Tools: Select by Location
5. Geoprocessing Tools: Merge
6. Geoprocessing Tools: Buffer
7. The Key Hole or Cookie Cutter Mask
8. Homework for Monday (7 October 2013)



[http://commons.wikimedia.org/wiki/File:Barack\\_Obama\\_looking\\_through\\_the\\_Oval\\_Office\\_door\\_peephole.jpg](http://commons.wikimedia.org/wiki/File:Barack_Obama_looking_through_the_Oval_Office_door_peephole.jpg)

## 1) Base Layers and Analysis Layers

A convenient way to organize your data layers is to think in terms of base layers and analysis layers.

### **Base Layers**

- Base layer from ArcGIS Online (optional, only if it adds to the visual appeal without distracting = function over form!).
- Road layer for Westfield – not used in the actual analysis, but helpful to orient the audience as to where these parcels are located and to visualize traffic and access to the parcels.

### **Base/Analysis Layer**

- City limits / town line (polygon) – used on final map as a base layer, but needed during the analysis and selection.

### **Analysis Layers**

- Parcel layer (polygon).
- Water body layer – streams, lakes, ponds, wetland, etc., line and polygons, buffered.
- Zoning layer – polygon – select industrial and commercial zoning.

## 2) Geoprocessing: Overview

<b>Hidden Criteria</b>	In Westfield	Select (by Attributes) Select Westfield town line, save as new feature class
<b>Criteria 1</b>	>10 acres	Sort attribute table of parcels layer by area Data Prep: Edit parcel layer, save as new feature class
<b>Criteria 2</b>	100 ft	Buffer Tool around hydrography Review in Help! (Dissolve = ALL) Data Prep: Merge hydrography layers Clip or Select by Location inside Westfield Save as a new feature class
<b>Criteria 3</b>	Zoning	Zoning Data Data Prep: Select by Attributes Industrial/Commercial Save as a new feature class

A logical combination and sequence of Select by Attribute, Select by Location, Merge, Buffer, and sorting of the attribute table will get you down to the parcels meeting the requirements.

**➔ Always check your outputs to make sure that they are indeed what you intended!**

### 3) Geoprocessing Tools: Select by Attributes

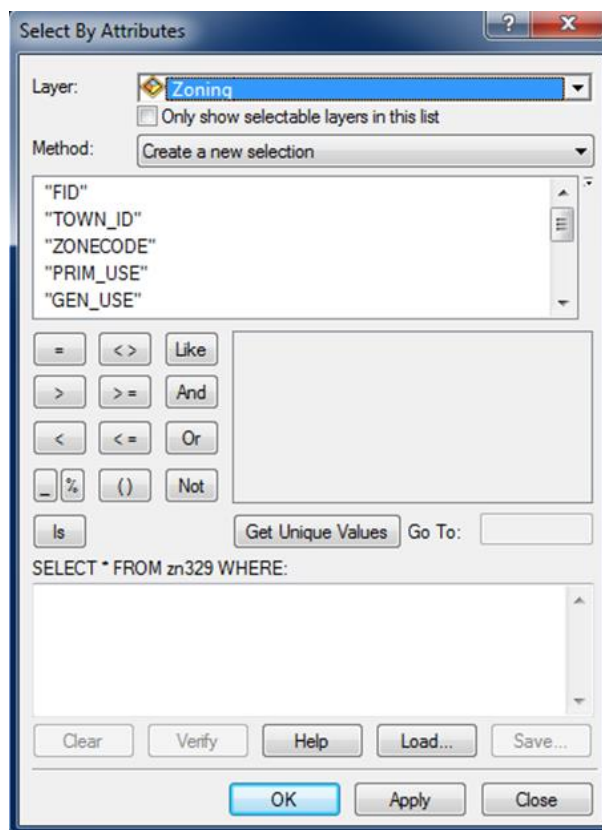
#### Example: Zoning Data Layer

<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/massgis-data-zoning.html>

You need to select the zoning polygons that are zoned industrial or commercial.

GEN\_USE = 2 or GEN\_USE = 3 using  
Select By Attributes

Save your selection as a new feature class.



#### Help and Information

- ArcMap Selection Types  
<http://gispathway.com/tag/select-by-attribute/>
- Tip Sheet for Select Query Tools in ArcGIS 9.2  
<http://ocw.tufts.edu/data/54/626829.pdf>
- Using Select By Attributes  
<http://resources.arcgis.com/en/help/main/10.1/index.html#//00s50000002100000>
- ArcGIS 10.1 - How to Select Attributes and Create Layer  
<http://youtu.be/QI4iW6U5WzI>

## **4) Geoprocessing Tools: Select by Location**

Example: You need to select all water features (streams, lakes, ponds, wetlands, etc.) that are located inside the Westfield City limits.

### **Example: DEP Wetlands (1:12,000)**

<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/depwetlands112000.html>

**Use only the arcs, not the polygons!**

There are a several ways to do this, including the Clip tool and the Select by Location tool. Whatever you choose...make sure you confirm *visually* that your clipping or selecting gave you the desired results.

Personally I find that using the least 'complex' tool as possible for any geoprocessing task is the best strategy. Here: Select By Location.

#### **1. Select by Location**

Selection method: select features from

Target Layer: your hydrography data layer(s)

Source Layer: Westfield town line polygon

Spatial Selection Method: Target layer(s) features are within the Source Layer feature

Apply a search distance of 200 feet (twice the 100 feet buffer you need later)

That works pretty well and you get a selection that covers most of the water features you need. However, the selection misses a series of water features that are somehow crossing the town line.

#### **2. Select by Location**

Selection method: add to the currently selected features in

Target Layer: your hydrography data layer(s)

Source Layer: Westfield town line polygon

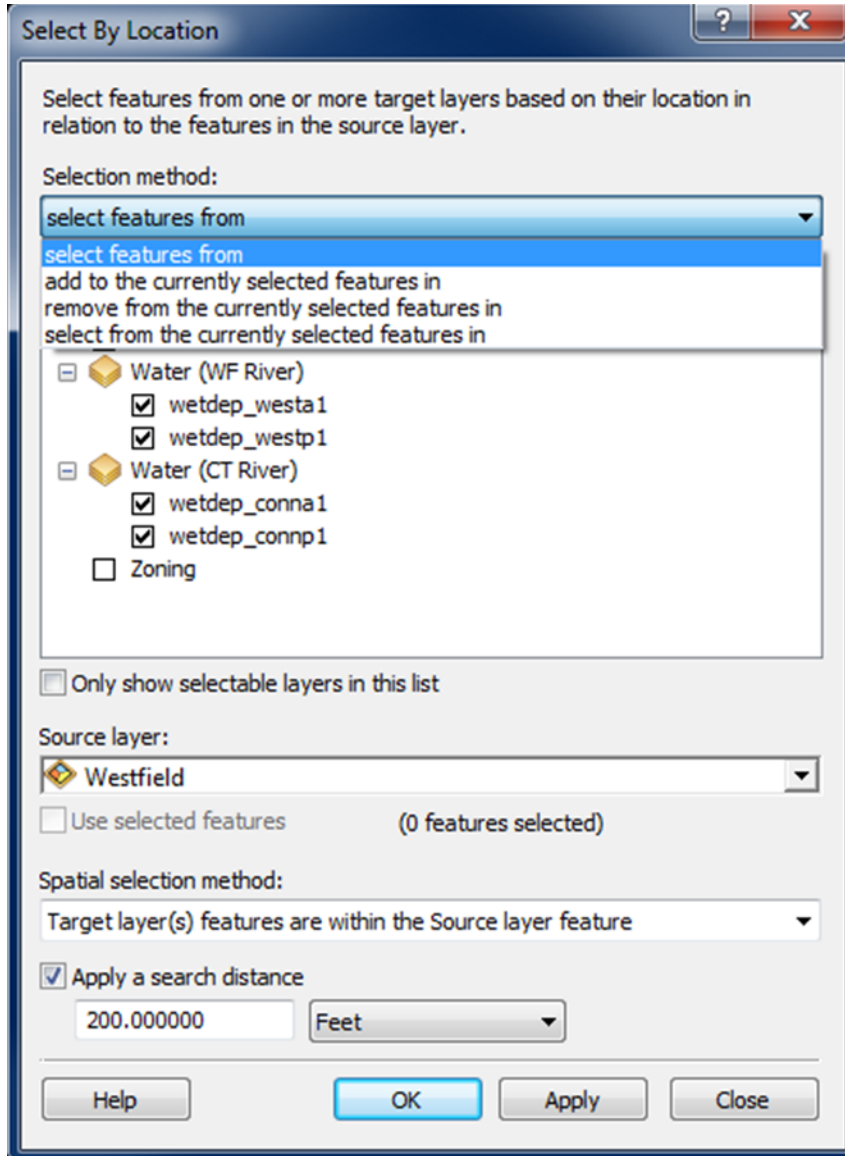
Spatial Selection Method: Target layer(s) features are crossed by the outline of the Source Layer feature

Here you are performing a 2-step selection procedure: the second step adds additional water features to the selection and the end result is a good selection of water features for our site selection project. Save your selection into a new feature class, repeat as needed, and merge your files into one data set

### **Help and Information**

- ArcMap Selection Types  
<http://gispathway.com/tag/select-by-location/>
- Working with Selections  
<http://tax.idaho.gov/i-1103.cfm?a=4&z=2>
- Select By Location Lecture  
<http://youtu.be/m3vmljZ5cRs>

- Using Select By Location  
<http://resources.arcgis.com/en/help/main/10.1/index.html#//00s50000002q000000>
- How to Select by Location  
[http://youtu.be/fVxbBAy\\_oFE](http://youtu.be/fVxbBAy_oFE)



## **5) Geoprocessing Tools: Merge**

The Merge tool combines multiple input datasets of the same data type into a single new dataset.

1. Use the Search window to search for Merge.
2. Add your Input Datasets.
3. Name your Output Dataset and hit OK – this has to be a feature class!

## **6) Geoprocessing Tools: Buffer**

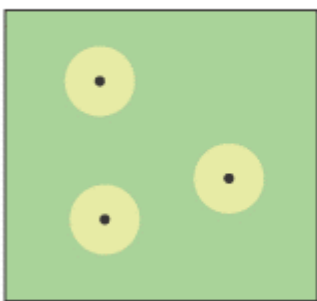
The Buffer tool creates buffer polygons around input features to a specified distance.

1. Use the Search window to search for Buffer.
2. Define your Input Features.
3. Name your Output Feature Class.
4. Define the Linear Unit (magnitude and unit).
5. Dissolve Type ALL (to create one large buffer polygon) and hit OK.

### **Help and Information**

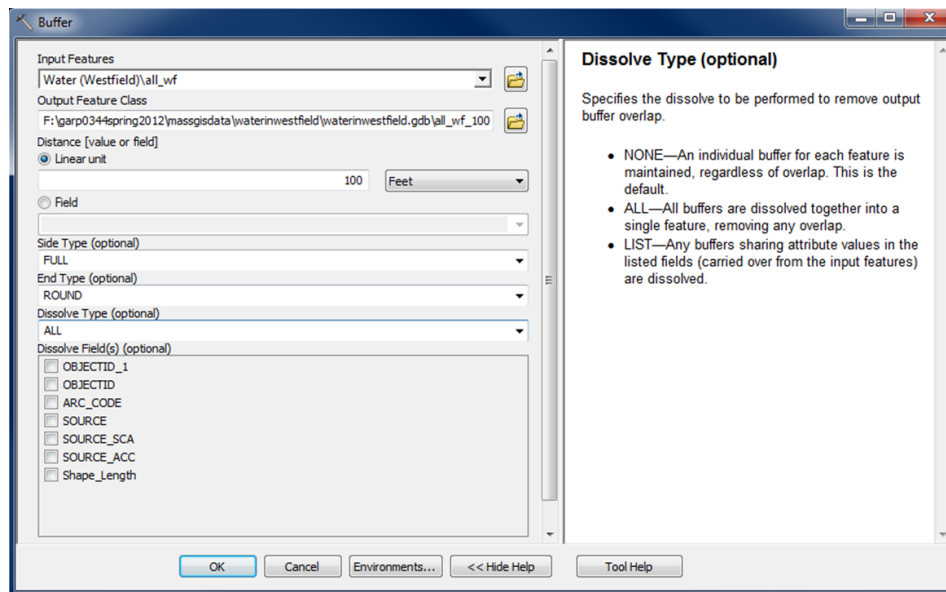
- Buffering Features in ArcGIS  
<http://gispathway.com/2009/03/23/buffering-features-in-arcgis/>
- Buffering Tool for ArcGIS  
<http://gislounge.com/buffering-tool-for-arcgis/>
- Buffer (Analysis)  
<http://resources.arcgis.com/en/help/main/10.1/index.html#//000800000019000000>
- How Buffer (Analysis) works  
<http://resources.arcgis.com/en/help/main/10.1/index.html#//00080000001s000000>

**POINT BUFFER**



**LINE BUFFER**





## **7) The Key Hole or Cookie Cutter Mask**

This is a useful trick if you need to ‘hide’ or mask features outside a given polygon feature, for example outside the Westfield city limits.

1. Add the TOWNS\_POLYM data layer to your map = 351 polygons for the 351 cities and towns in Massachusetts.
2. Select Westfield, then Switch selection. Now 350 cities and towns are selected, except for Westfield.
3. Save your selection as a new feature class and add to your map.

*Now you have a mask that leaves a ‘hole’ where Westfield is located!*

## **8) Homework for Monday (7 October 2013)**

You have team-worked on the Site Selection Project now for a week – time to show some results!

Prepare a short presentation of your progress that includes (at minimum):

1. Your analysis strategy as a flowchart.
2. Your draft map.
3. Your draft table listing the suitable parcels.

Each team will have about 10 minutes for their presentations.