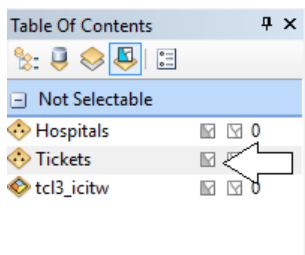# Chapter 7

Selecting by Attributes and Location in ArcGIS Desktop

Skills you will learn: This tutorial covers selecting features in ArcMap. If you are unfamiliar with the basics of the ArcMap user interface, please read the tutorial **A Quick Tour of ArcGIS Desktop**.
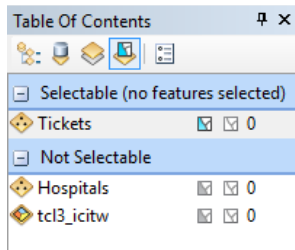
Getting Started

Selecting features on a map is similar in concept to selecting text in a word processing document, except that instead of highlighting words or sentences we highlight features in a map layer, so we can then do something with them, such as copy them, delete them, and so on.
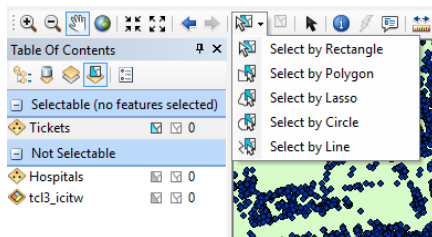
The first step in selecting features is to ensure that the layer you want to select features in is selectable. Select the List by Selection icon at the top of the table of contents, then click on the small selection toggle icon beside the layer in which you want to select features.

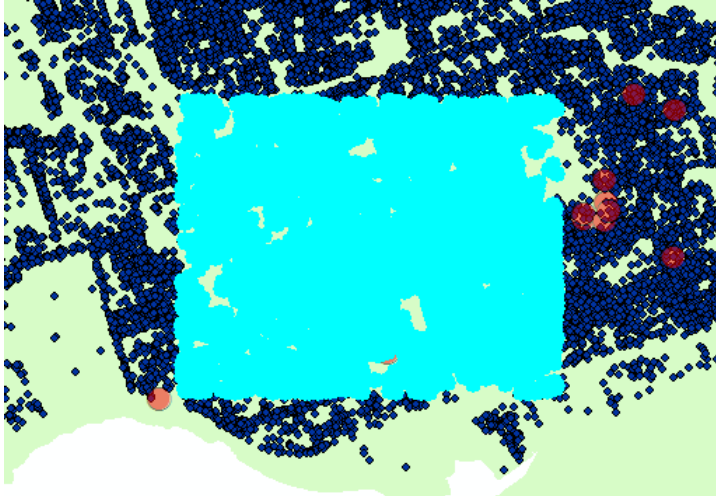This will move the chosen layer into the selectable area.

The simplest way to select features in ArcMap is to select them manually with the select tool on the Tools toolbar.

Choose the select tool you want to use, then define the area in the data frame from which you would like to select features. For example, with the Select by Rectangle tool, draw a rectangle on the map. When the defaults for how these tools behave are set, any feature that you touch or enclose with the rectangle will be selected. Here, you see a rectangle defined by the selection tool. The map layer shows parking tickets issued in the City of Toronto, Canada.

And this image shows the resulting selected features.
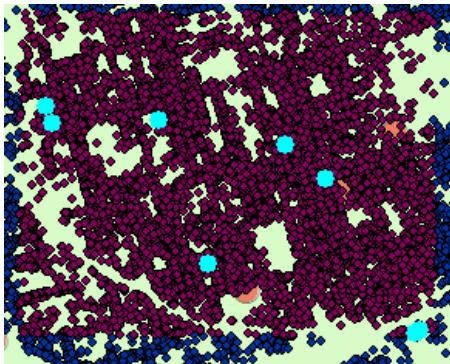
Selecting from the attribute table

You can also select data by opening the attribute table for a map layer, and manually selecting rows in the table.

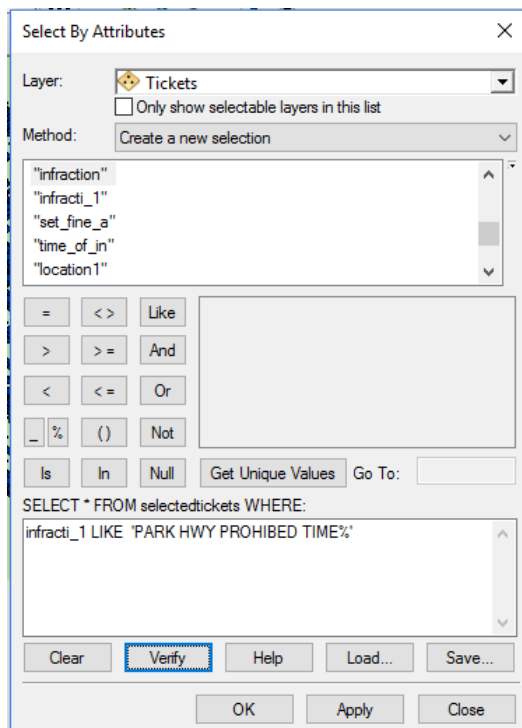The features will be selected on the map.

Selecting by Attributes

As discussed in chapter 7 of *The Data Journalist*, a GIS program is a specialized form of database program, one that happens to be able to work with geographic data. And just as you can use SQL queries in a relational database to select records, you can use SQL in ArcMap to select map features. This is called Selecting by Attributes.

This feature can be accessed either from the Selection menu, or from the Table Options menu when the attribute table is open.

Choosing Selection>Select By Attributes opens the select by attributes dialogue, in which you construct your SQL statement.

The first part of the SQL statement, up to the FROM clause, is created automatically. You can't select just some of the fields. The part you do fill in is the WHERE clause. In the above example, we are selecting all records for which the infraction description field, shorted to infracti_1 by ArcMap, contains the string PARK HWY PROHIBITED TIME followed by any additional characters. This is the same LIKE syntax you learned about in chapter 5.

All of the standard operators, including the Boolean operators AND, OR and NOT, are available for queries.

Once you click Apply, or OK, the query is run and the features on the map selected.

The selected features can be copied, put into a layer file, and exported to a new map layer, in the same way other selections can be.

Select by Location

Select by location selects features based on their relationship to features in another map layer in the data frame. Features are selected from what is called the **target** layer depending on their relationship to features in the **source** layer.

The map document used as an illustration for this tutorial with shows the locations of certain parking tickets in the City of Toronto, and the locations of hospitals.

Select By Location

Select features from one or more target layers based on their location in relation to the features in the source layer.

Selection method:

select features from

Target layer(s):

☐ Hospitals
☑ Tickets
☐ td3_icitw

☐ Only show selectable layers in this list
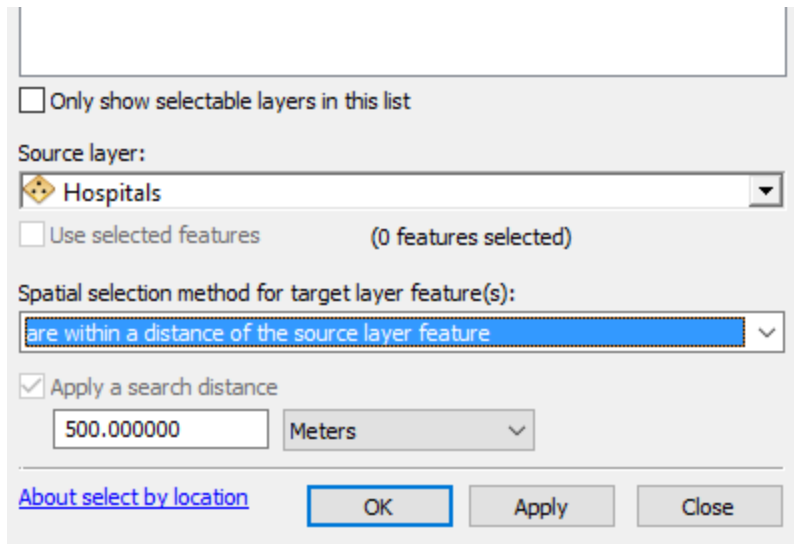
Source layer:

◇ Hospitals

☐ Use selected features   (0 features selected)

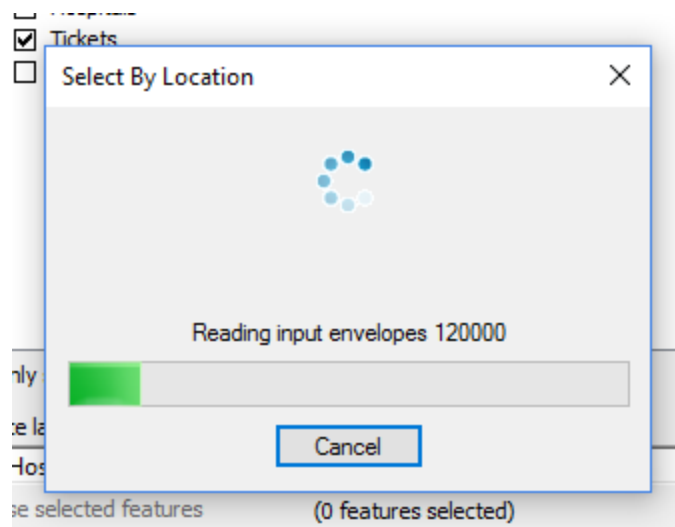Spatial selection method for target layer feature(s):

are within a distance of the source layer feature

intersect (3d) the source layer feature
are within a distance of the source layer feature
are within a distance of (3d) the source layer feature
contain the source layer feature
completely contain the source layer feature
contain (Clementini) the source layer feature
are within the source layer feature
are completely within the source layer feature
are within (Clementini) the source layer feature
are identical to the source layer feature
touch the boundary of the source layer feature
share a line segment with the source layer feature
are crossed by the outline of the source layer feature
have their centroid in the source layer feature

In the dropdown list for the spatial selection method, we have chosen "are within a distance of the source layer feature." As you can see, there are many options, all of which are relatively self explanatory.
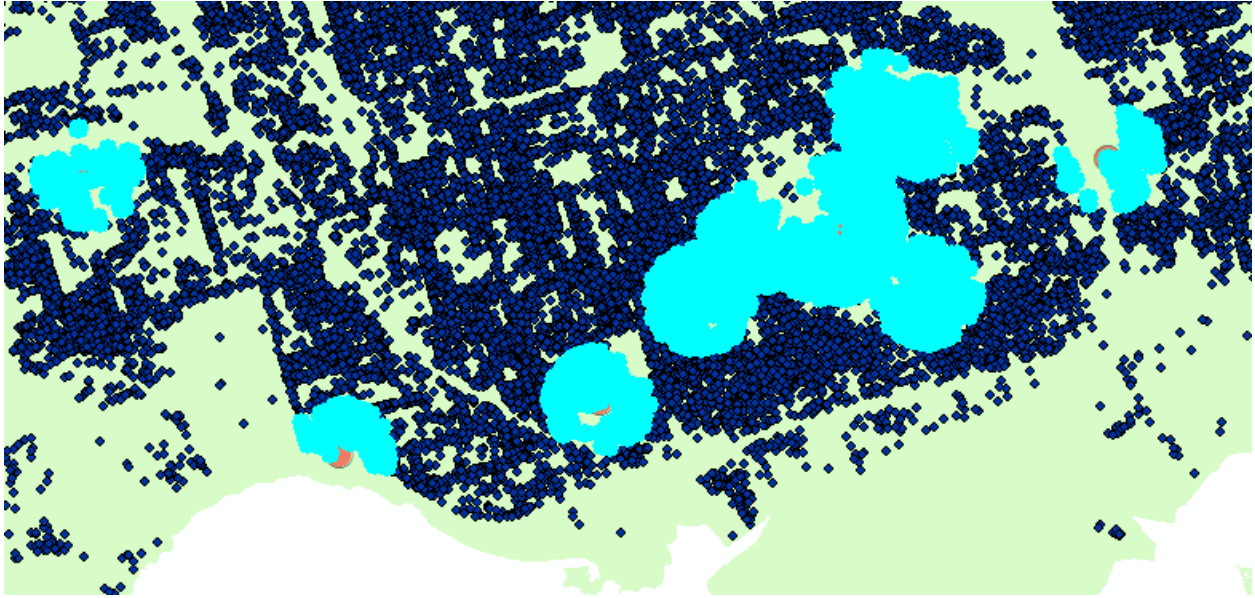
Obscured by the dropdown list, there is a small text box that is used to set the distance required. In this case, we have set it to 500 metres.

Clicking OK applies the selection criteria. Apply does the same, but leaves the window open to allow further selections. In either case, a progress meter appears.
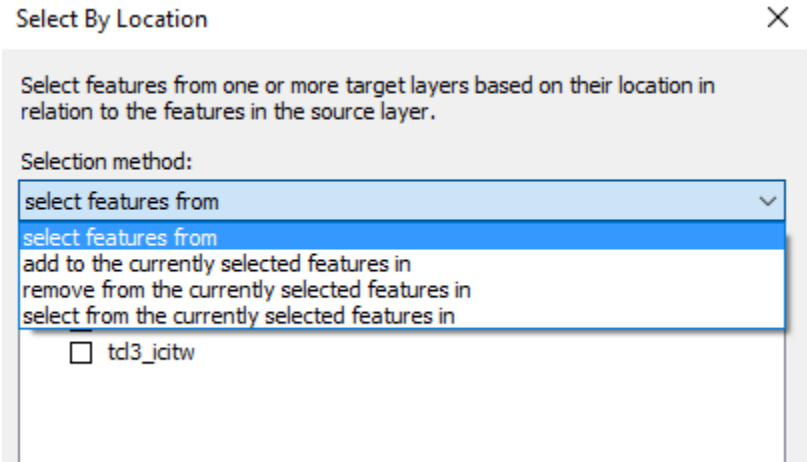

As you can see, the selected features appear on the map.

Select by location, like any tool that relies on area or distances, is affected by the coordinate system used on the map. Be sure to use one appropriate for the area being mapped.

If you do make further selections after clicking Apply, you have four choices for how the new selection will be made.
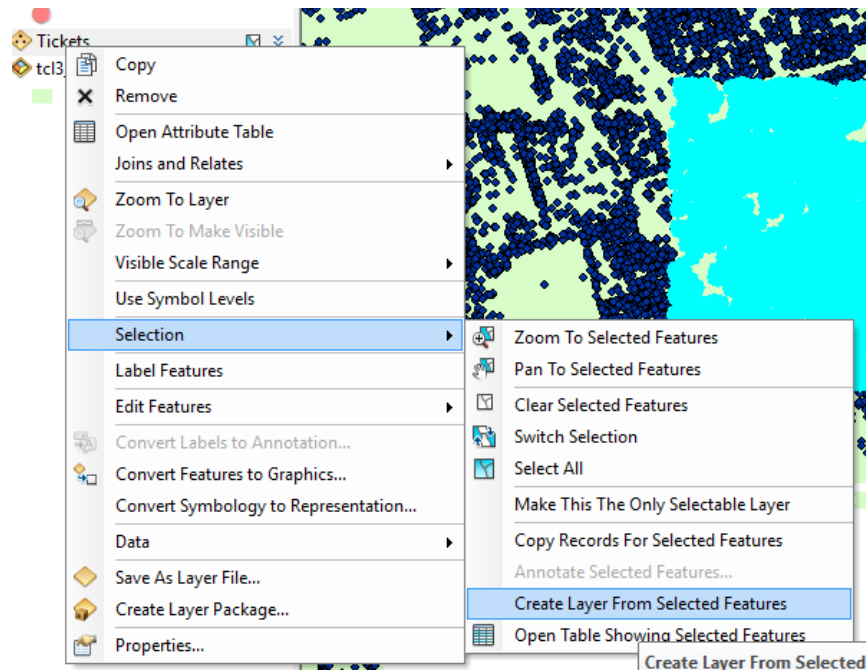

Working with Selected Features

Once you have selected features, you are not limited to just looking at them. Often, you will want to work with just the selected features, such as when you select part of a
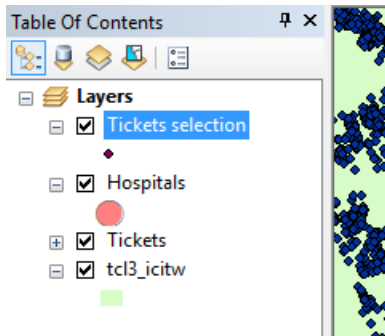
larger polygon layer, or when you have isolated a number of points within a distance of another feature, the exercise we just completed.

If you right click on the layer name in the table of contents, and choose Selection from the menu that appears. A submenu will be revealed, with a number of actions you can take on the selected features.

If you choose Switch Selection, selected features will be unselected and the features not selected with be selected. Copy Records for Selected Features will copy the data and attributes for the selected features to the clipboard. Perhaps most commonly, you will want to create a new map layer to work with separately. You can do this in two ways.

One way is to choose Create Layer From Selected Features. This will create a new layer file pointing to the selected features, which will be shown in the table of contents and in the data frame.

You can then create a new shapefile or feature class in a file geodatabase by right clicking on the new layer and choosing Data>Export Data.

You can also go directly to creating a new shapefile or feature class by choosing Data>Export Data for the entire map layer, then choosing the option to export only selected features.