

Calculating Impervious Cover in the City of Austin

Objective: Use GIS to calculate park impervious cover in Austin, TX.

Time Allotment: 55 minutes

Materials: Computers, ArcView GIS 3.2, Austin data (able to download for free – see <http://www.esi.utexas.edu/gk12/workshops/gis/gateways.php>)

Purpose: The purpose of today's lesson is to examine the issue of impervious cover in the City of Austin. First, it is important to consider that there are different types of impervious cover from hard, packed dirt to cement paving. Second, there is a limitation of data in several areas including the date the data layer was actually created and how the data layer is measured. Though we are examining the City of Austin, the transportation does not end at the city limits.

In order to create an approximation of the amount of impervious cover over the city, we will use two data sets including the building footprints of structures in the area *and* the curb lines/paving of the roads.

We will use the following **formula below to provide an estimate:**

*Building Footprints Square Footage + Transportation Shapefile Square Footage =
Approximate Impervious Cover in Square Footage over the Edwards Aquifer*

Procedures:

1. Click on ArcView GIS 3.2 symbol
2. You will get a "Welcome Window". Click on "Ok" to "Create a New Project with a New View"
3. A new window will pop up and ask "Would you like to add data to the view now?" Click on "Yes" to add data.
4. A new window labeled "Add Theme" will open. Go to the "Drives" drop down box and select the D: drive (this is the CD drive, make sure your CD is in the computer)
5. Click on GIS Data folder
6. Add the data for major/minor arterials "Cenart.shp"
7. Click on the new box in the view to activate the theme
8. Look for the "+" under Edit and "Add Theme"
9. Add the building footprints data "Build_p.shp" layer
10. Click on the new box in the view to activate the theme
11. Open the data table by clicking on the table icon in the tool bar
12. Select the "Area" Column by clicking on the word "Area", it should turn dark grey
13. Go to Statistics on the Tool Bar and wait patiently, this will open a new window called "Statistics for Area Field"
14. Open a new window in Netscape and go to <http://www.metric-conversions.org/area/square-feet-to-square-miles.htm>
15. Using the windows to toggle, go back to the "Statistics for Area Field"
16. Use the "CNTL +C" function to highlight and copy the "Sum" numbers and paste it (CNTL+ V) into the conversion table in the Netscape window.
Note: you should be converting *square feet* to *square miles*
17. Write this number down as part of the impervious cover formula on the worksheet
18. Add a new theme on the map, using the Transportation "Trans.shp" layer

19. Repeat Steps #10-17 for calculating and converting the Sum of impervious cover for the transportation file

Calculating the Percentage of Impervious Cover in Austin

In order to calculate the impervious cover, we need to refer to the formula

Building Footprints Square Footage+ Transportation Shapefile Square Footage= Approximate Impervious Cover in Square Footage over the Edwards Aquifer (convert to miles)

Then we need to compute the percentage of impervious cover by taking the area of square miles of impervious cover and dividing it by the approximate square miles of City of Austin, including the Extra-Territorial Jurisdiction¹, about 989 square miles².

Calculations for Impervious Cover:

1. Square Miles of Building Impervious Cover: _____
2. Square Miles of Transportation Impervious Cover: _____
3. Approximate percent of the City of Austin that is covered by impervious cover: _____

Finishing the Map Details...

20. You are almost ready to make your map, but first you need to change the names of your theme layers. Click on **Theme - Properties**. Change the Theme Name of the individual layers as appropriate (“build_p” should be changed to “Building Footprints”, “cenart” should be changed to “Major/Minor Streets”, and “trans.shp” to “Transportation Cover”).
21. Single click on **View –Layout – Landscape – OK**. Maximize this window.
22. Double click on View. Delete the words View 1 and write **Impervious Cover in the City of Austin**(hit enter then continue writing). You can resize the textbox by clicking on one of the corners and dragging it to the position you want. To move the textbox you can use the arrows on the keyboard or by clicking in the center of it and dragging it to the desired position.
23. Double click on the scale bar, change units to **miles**.
24. Double click on the **North Arrow** if you wish to change it.
25. Now you need to add the names of the cartographers, the date of publication, and the data source. Click on the “**T**” (Text) that is located on the toolbar. Write **Cartographers:** then your names, **Date of Publication** with today’s date and, **Data Sources: City of Austin**. Then, click ok. Position the textbox by using the arrows on the keyboard.
26. If you want to make any final touches on your map, click back on the arrow (Pointer) on the far left of the toolbar, then move or resize the components of the map.
27. To save the map, you will export it as a jpeg. Go to **File – Export**. At the bottom left of the export window where it says list file of type: scroll to the end and select **JPEG**. Follow the

¹ This is the area outside of the city limits that is still covered by city services, including transportation infrastructure

² Based on information “Quickfact Information” provided the U.S. Census Bureau, available online at www.census.gov

teacher's orders about where to save it (in your student folder). Then, where it says file name, write a name that includes your last name for identification. Click OK.