
Chapter 2

Drainage Areas

2.1	Objectives	1
2.2	Overview.....	1
2.3	Basic Layout	2
2.4	Set Project Preferences	Error! Bookmark not defined.
2.5	Define Landuses.....	4
2.6	Define Drainage Areas.....	5

2.1 Objectives

Introduce the designer to Drainage Areas and Land Uses in Geopak Drainage

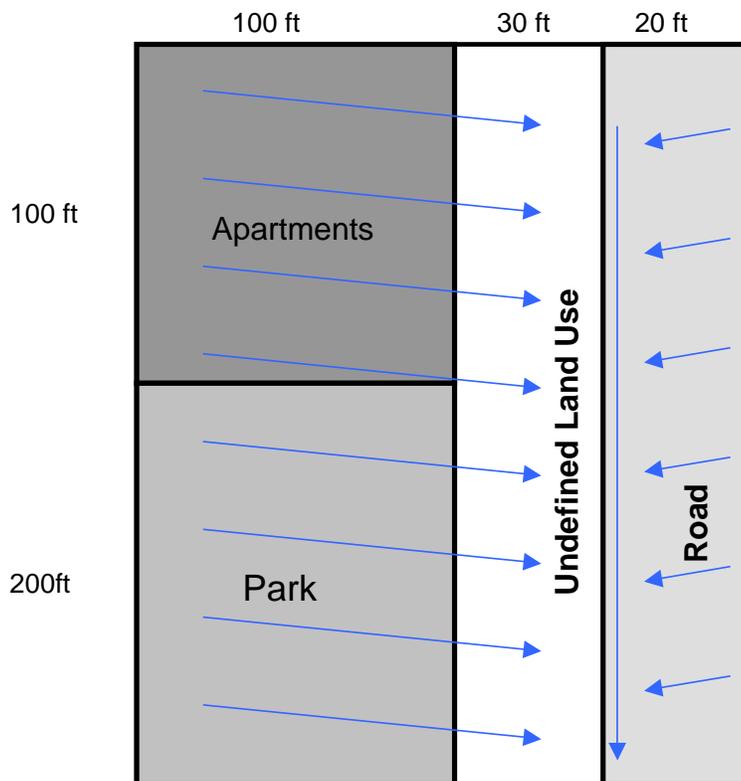
2.2 Overview

The term **drainage area** refers to a total extent of land that collects surface water and funnels that water to a low point that immediately impacts a roadway project. A drainage area can have just one land use type or might be made up of multiple land use types. A drainage area's land use types need to be defined in order to get the correct runoff value.

The **land use** types of a drainage area are determined by their surface type and functional use. These two factors are used to determine the amount of rain water that will be absorbed, how much will run off, and how quickly it will run off during a storm event.

For more information on drainage areas and land uses see Category 749

Establish land uses in the watershed which include an apartment complex, a park, and pavement as well as an area of undefined land use. All water drains to the gutter at the edge of the paved road and then to the downstream end of the watershed. The dimensions for the various land uses and the overall drainage area are given below. Assume a time of concentration of 10 minutes.



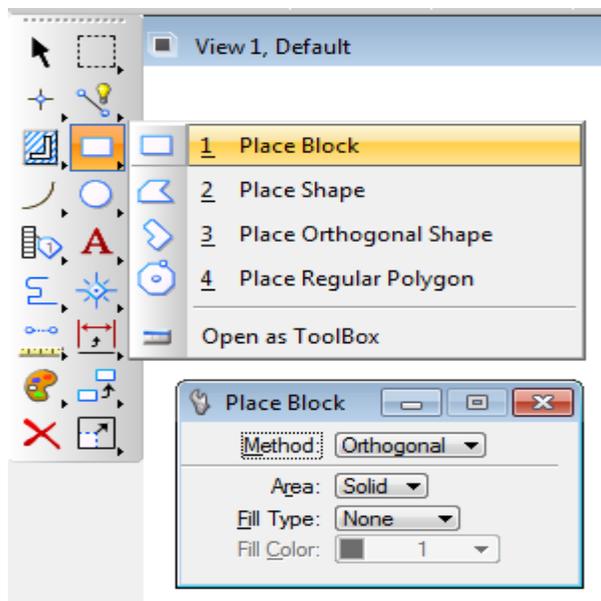
Chapter 2 Drainage Areas

2.3 Basic Layout

Using the steps given below, draw Microstation shapes representing the overall drainage area and the areas that represent the individual land use types shown in the diagram above.

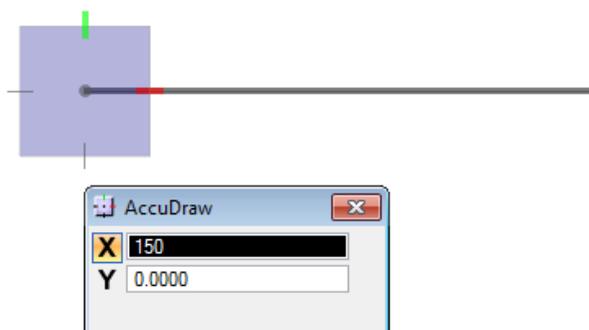
1. Make sure AccuDraw is activated

2. Select the Place Block tool

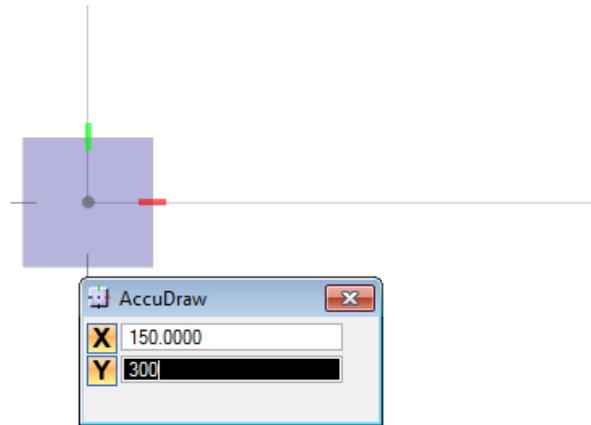


3. Data point at the location that will represent the bottom left corner of your drainage area

4. Move the mouse to the right (X direction) type in 150 to lock distance into AccuDraw



5. Now move the mouse up (Y direction) and type in 300 to lock in this distance, and hit Enter on the keyboard



You should now have the rectangle that forms the outside perimeter of the entire drainage area.

Now we can establish the land use areas that will provide runoff to our project.

6. Based on the supplied dimensions complete the areas that represent the apartments, park, undefined area, and road.

When finished, you should have drawn a total of 5 rectangles, 1 for the overall drainage area 4 more for each land use type inside the overall drainage area.

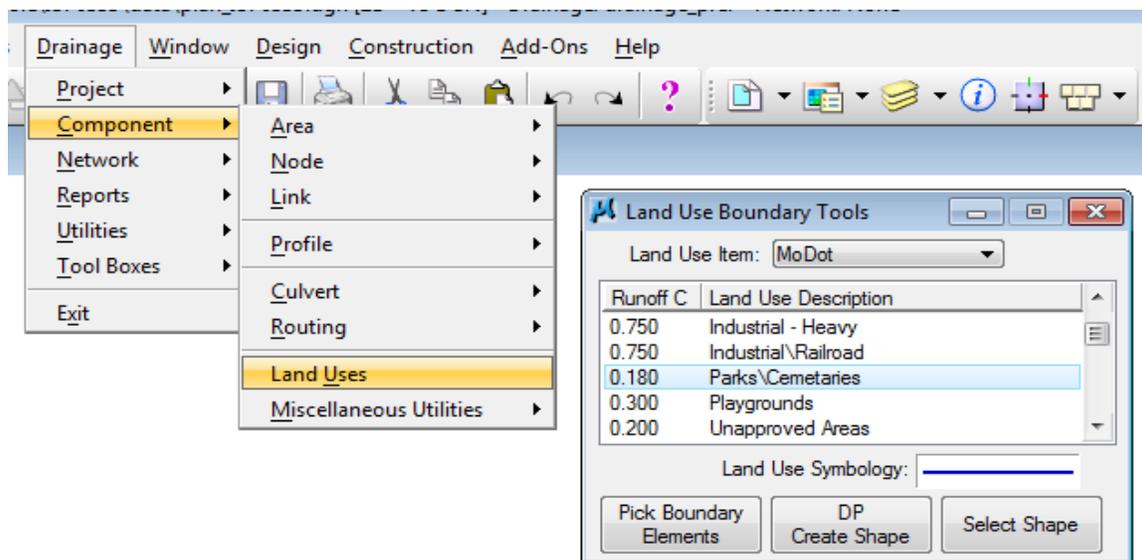
Chapter 2 Drainage Areas

2.4 Define Landuses

1. From the Geopak Drainage file menu go to Component >Landuses

2. For the lower left hand area select Parks\Cemeteries

- Click the **Select Shape** button
- Data point the edge of the lower left hand area to select the shape
- Data point a second time to accept the selection. The area should change to the assigned color in the drainage library (In this case dark blue)

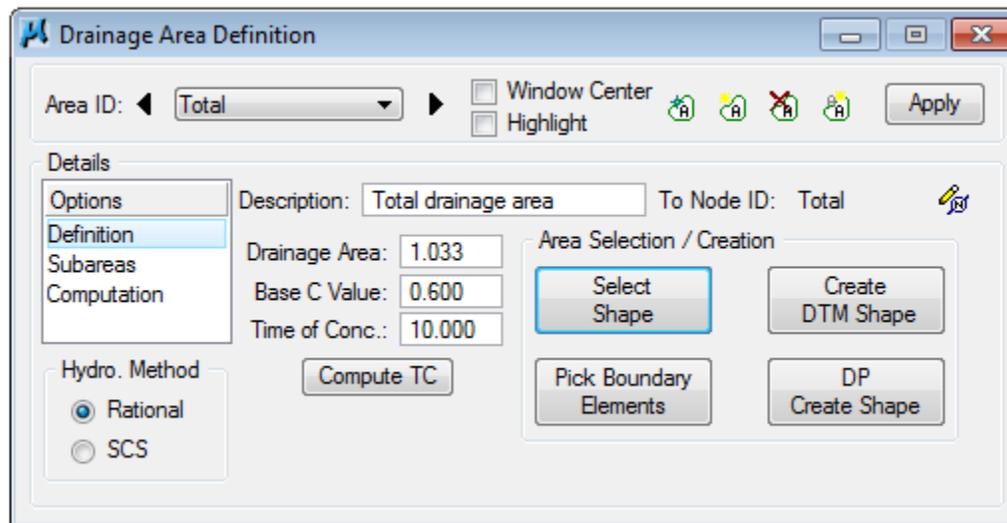
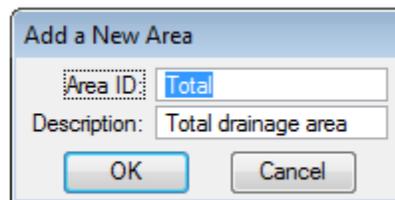


3. Based on the supplied descriptions assign the remaining land uses. When finished you should have 3 assigned land uses.

2.5 Define Drainage Areas

1. Go to Component >Area >Add

- Notice the Drainage Area ID defaults to CB – 1. For this example change the ID to Total
- In the Area Definition region click the Select Shape button
- Data point on the rectangle that represents the entire drainage area
- Data point a second time to accept the selection (The drainage area field should now contain the area in acres)



2. Enter in the time of concentration (Tc) as 10.000

If the time of concentration entered is below the minimum Tc set in the preferences, the program will default to the minimum to compute the peak discharge for the area.

3. Enter in the base C value as 0.6

Any areas that do not have a land use associated with them will be assigned the base C value. In this example the area between the (Apartments – Park) and (Road) will be assigned a C value based of 0.6.

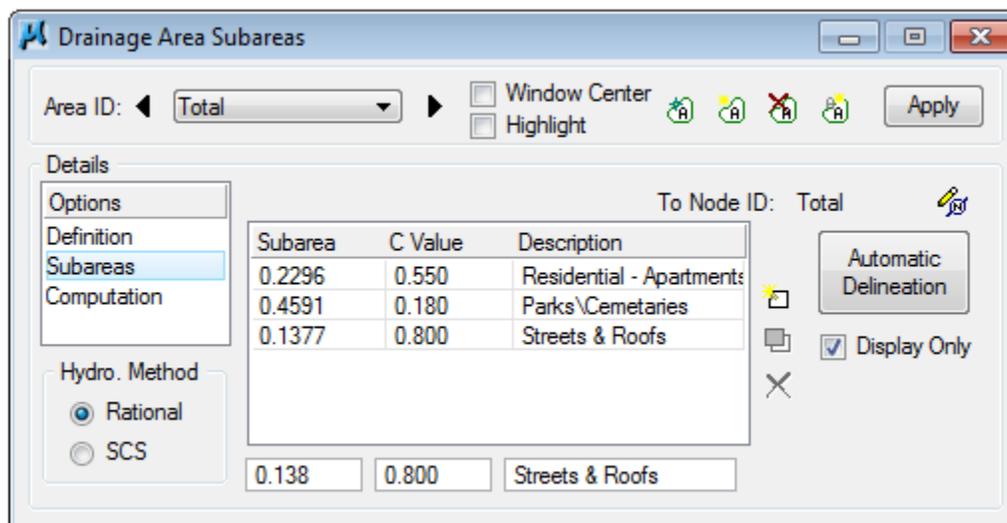
Chapter 2 Drainage Areas

4. Select the Subareas option on the left side

5. Select the Automation Delineation button.

This will compute the area for any shapes with an assigned land use. Notice how the subareas are temporarily filled in the with the assigned land use color. (You may need to go to >Settings >View Attributes in the Microstation menu and toggle on Fill)

Also note that you could override the default C value for any land use by highlighting the row and selecting the modify button to the right of the screen.

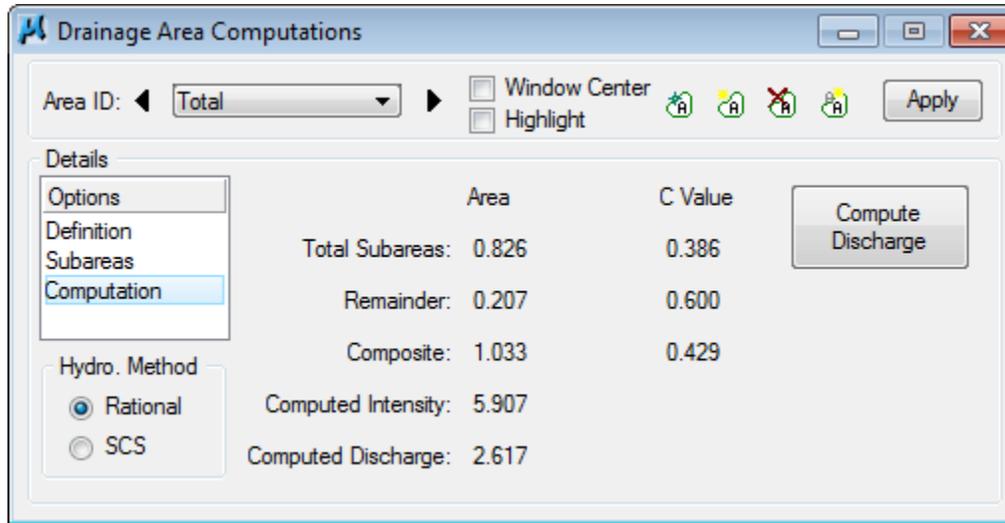


6. Select the **Computation** option

Notice that the remainder is the area of any regions that do not have an assigned land use.

7. Click the **Compute Discharge** button

Check the Composite C, Intensity, Total Area, and Discharge computed by Geopak.



8. Select the **Apply** button to add the Drainage Area ID to the drainage area