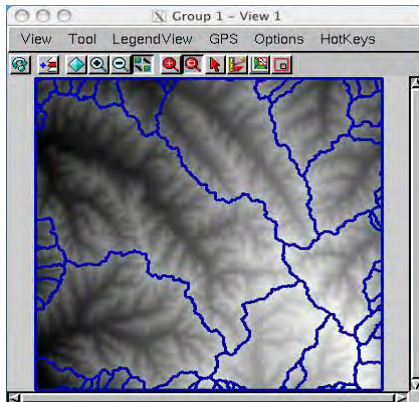
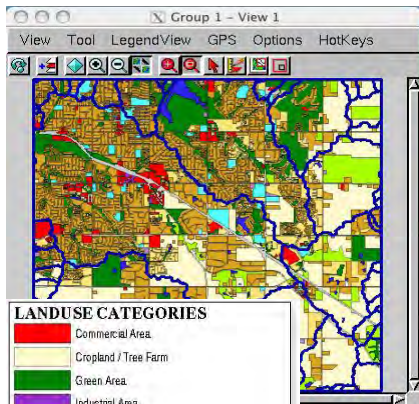


## Watershed Analysis

Watershed analysis is an important component of urban land use planning since land use decisions directly affect the quality of water resources. The Watershed process in TNTmips computes the local directions of flow, the stream network, the boundaries between watersheds, and the basins associated with particular branches of the stream network so you can make a detailed watershed analysis. A series of processes in TNTmips helps you to analyze the amount of land devoted to various urban uses within the watershed boundaries.



watershed boundaries displayed over the elevation raster



LANDUSE CATEGORIES	
<span style="color: red;">■</span>	Commercial Area
<span style="color: yellow;">■</span>	Cropland / Tree Farm
<span style="color: green;">■</span>	Green Area
<span style="color: purple;">■</span>	Industrial Area
<span style="color: blue;">■</span>	Lake / Water Body
<span style="color: lightgreen;">■</span>	Pasture / Grassland
<span style="color: orange;">■</span>	Residential Area
<span style="color: grey;">■</span>	Transportation
<span style="color: lightblue;">■</span>	Utility Facility
<span style="color: yellow;">■</span>	Vacant lots
<span style="color: cyan;">■</span>	Social Service Area (Education, Health, Religion)
<span style="color: blue;">■</span>	Watershed boundaries

watershed boundaries displayed over the land use vector object

- Create Watershed Boundaries.** The Watershed process (Process/Raster/Elevation/Watershed) computes standard watershed polygons, basins, and flowpaths using the input DEM. In this example, the input DEM was created using the contour lines of Grant township in Lancaster County, NE obtained from the City of Lincoln and Lancaster County Information Systems Map Shop website (<http://ims.ci.lincoln.ne.us/gisweb/>) as described in the color plate entitled *Urban Studies: Slope Analysis*. The watershed boundaries computed by the Watershed Analysis process are saved in a vector object. More information on Watershed Analysis can be found in the *Modeling Watershed Geomorphology* tutorial booklet.

- Compute Land Use properties for watersheds.** The land use data for Grant township was obtained in shapefile format and imported into TNTmips. The parcel vector polygons were dissolved into larger polygons for each land use category (Process/Vector/Compute/Filter/Dissolve Polygons) and the 36 land use categories available were reduced to 11 categories. The Polygon Properties process (Process/Vector/Attributes/Polygon Properties), which generates polygon statistics for a pair of vector objects (the source and destination objects) and attaches the statistical tables to the destination object, provides a powerful tool to compute the area and the percentages of each land use category in a watershed. In this example, the Percentage table was automatically created in the watershed polygon database using the Polygon Properties process.

Area	Percent	LabelLanduse
891.92	0.00	Residential Area
2675.32	0.00	Residential Area
4345791.11	0.34	Residential Area
461.10	0.00	Social Service Area
9502.89	0.00	Social Service Area
17029.97	0.00	Social Service Area
128083.09	0.01	Social Service Area
105742.36	0.01	Social Service Area
12729.44	0.00	Social Service Area

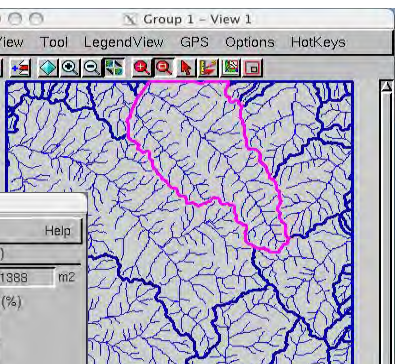
The selected watershed below contains 4345791.11 m<sup>2</sup> of residential area that accounts for 34% of the selected watershed area.

The Statistics and Substatistics features available on the database Table menu

help you visualize the total area and the percentage of the land use categories that occur in each watershed.

- Simplify Percentage table by computing new database fields.** The Percentage table contains all area and percentage records attached to each land use polygon in a particular watershed. Simplifying the percentage table requires that you generate a new database table that contains the land use categories, the area, and the area percentage that land use category occupies in a particular watershed. In this example, a computed field was created for each land use category in a new database table using a simple query.

Watershed ID:	Total Area:	
15	12781389	m2
Landuse	Area (m2)	Percent (%)
Residential:	4345791.11	34.00
Commercial:	243248.09	1.90
Industrial:	11462.51	0.09
Social Service:	540196.75	4.23
Water Body:	424912.51	3.32
Green Area:	2804602.72	21.94
Pasture:	4345791.11	34.00
Cropland:	560352.37	4.38
Utility:	64201.22	0.50
Transportation:	1888052.82	14.77
Vacant Lots:	1838229.18	14.39



```

Query Editor
File Edit Insert Syntax Help
#Compute total residential area occupied in each watershed
sum1 = 0.0
for i = 1 to num1 begin
  if (PERCENTAGE[i].LabelLanduse == "Residential Area") {
    sum1 = sum1 + PERCENTAGE[i].Area
  }
end
return sum1;
    
```

The new database table generated shows the areas and the percentages for each land use category for the selected watershed above.