

Exploring Runoff

Environmental Planner Skills

GIS Proficiency, Cartography, and Visualization



Part 1: Physical GIS Mapping & Land Area Calculation

Working in your group, use the transparent land-use sheets, gridded base map, and satellite map to complete the following:

1. Place each clear land-use sheet (urban, agriculture, conservation) over the gridded map. Count the total grid cells for each category and record them below:

LAND USE TYPE	NUMBER OF GRID CELLS	CALCULATION	AREA (ACRES)	CALCULATION	AREA RATIO OF WATERSHED
Urban		Multiply by 200 (acres)		Divide by 31,600 x 100	
Agricultural					
Conservation					
TOTAL	158	N/A	31,600	N/A	1.00

2. GIS Concept Reflection:

How does stacking your clear transparent sheets over the satellite map simulate how a Geographic Information System (GIS) works in real life?

Part 2: Water Flow, Stream Tracing & Receiving Waters

3. Place your clear land-use sheets over the hydrologic map. Trace the path of the stream as it passes through the different land uses.
 - Which land-use types does the stream flow through before reaching the end?

 - Identify the final receiving water body where the stream discharges (e.g., Ocean/Bay):

4. Modified Exploring Permeability Activity & Observations:

Step A (Assembly):

Attach your land-use materials onto your sponge to create a mock watershed model: stick duct tape for urban areas, glue/place sandpaper for agricultural areas, and place felt for conservation areas.

Step B (Simulation):

Elevate one end of the sponge slightly to simulate slope. Hold a spray bottle a few inches above the sponge and spray a steady "rainfall" across all three land-use patches.

- How did the water runoff differ across each material as you sprayed?
- What real-world runoff behaviors do these materials represent?

5. Based on your observations and stream tracing, list the specific types of pollutants likely to run off from each land-use type into the receiving water body:

- Urban (Duct Tape): _____
- Agricultural (Sandpaper): _____
- Conservation (Felt): _____

Part 3: Runoff Volume & Watershed Calculations

Calculate the volume of storm water runoff generated by each land-use type based on your calculated Percentage of Watershed in **Part 1** and a projected rainfall event of 3 inches (**NOTE:** The unit provided converts the acres to square feet to calculate cubic feet of runoff, then converts this volume to 42 gallon barrels).

Fill in the table below:

LAND USE TYPE	RUNOFF RATIO	AREA RATIO OF WATERSHED	CALCULATION	PROPORTION OF RAIN AS RUNOFF	CALCULATION	VOLUME OF RUNOFF (42 GALLON BARRELS)
Urban	0.90		Multiply the two columns to the left		Multiply by 61,288,484 (barrels of rain from a 3 inch rain event)	
Agricultural	0.30					
Conservation	0.10					
Total	n/a	1.00	N/A	N/A	N/A	

Bonus:

If development was conducted within the Waikele watershed, creating more green spaces within urban areas to mitigate storm water runoff and pollution, what information would you need to recalculate runoff?

How could you evaluate the effectiveness of the new development at decreasing storm water runoff volume?
