

# AS 12 - How much stormwater makes a flood?

## Science Stage 6 – Earth and Environmental Science

### Background – Impact of Urbanisation

Urbanisation in the upper Parramatta River catchment has greatly increased the area of impervious surfaces (such as roads and roofs). This causes rainfall that previously infiltrated into soil or flowed off the catchment at a slow rate, to flow off the catchment quickly and in greater volumes.

Throughout the catchment, many small creeks have been replaced with piped and lined drainage systems. This causes additional increases in the rate at which stormwater is carried, increased flooding and erosion problems. The concentration of pollutants such as oil, grease, sediment and organic matter running off urban surfaces causes deterioration in the water quality downstream.

### How much stormwater runs off your school site?

This activity involves:

1. Identifying the proportions of different kinds of ‘surfaces’ in your school grounds.
2. Designing an experimental model for these surfaces.
3. Measuring the % run-off of rain water from these models.
4. Calculating the volume of stormwater water running off from your school.
5. Developing strategies to reduce the run-off from the school grounds.

#### 1. Map school surfaces

- a. Walk through the school grounds and identify the different kinds of surfaces (for example: rooves, paths, garden, lawn and sporting fields etc).
- b. Devise a system of symbols to represent these surfaces.
- c. Use a school map and graph paper to draw a detailed map of the various surfaces.
- d. Mark on the map any systems that your school has installed to reduce the area of impervious surfaces within the school grounds.
- e. Estimate the area of each surface type in square metres and the proportion of each surface type in the school grounds.
- f. Record your results in a table.

#### 2. Design an experimental model

- a. Design ‘models’ to simulate the major types of surfaces found in your school grounds. For example large plastic trays from the school lab could be used as containers for the models. It could be filled with be filled with earth and covered with a small section of grass from the school yard to represent school sporting fields; trees and garden areas could be represented by small branches stuck into a mulched surface.
- b. Decide on how you can apply a measured volume of ‘rain’ to the surface and how you could measure the volume of ‘stormwater’ running off from the different model surfaces.

### 3. Measure % run off

- Conduct your experiment to determine the volume of water applied as rain and the volume of water running off from each surface type.
- Calculate the % runoff for each type of surface.  

$$\frac{\text{Volume of runoff}}{\text{Volume of rain applied}} \times 100 = \% \text{ runoff}$$
- Use tables and graphs to prepare a report of your findings.

### 4. Estimate school stormwater runoff volume

- Use this information to classify your school surfaces in high, medium and low runoff surfaces.
- Estimate the volume of stormwater that would leave the school site in a storm that dropped 25mm of rain.  
 (% runoff x surface area x rainfall volume = mm stormwater volume generated by each surface type)

### 5. Develop an action plan

How can your school reduce its stormwater impact?

- As a class, brainstorm strategies to reduce the schools environmental impact on the local creek and upper Parramatta River catchment.
- Conduct research into Water Sensitive Urban Design (WSUD) to assist the development of a school action plan.
- Prepare a report and action plan.
- Organise a meeting with your school principal and school executive to report on the results of your investigations and present the ideas developed in your action plan.
- With the agreement of your school executive, it may be possible to extend your action plan to become a “Sustainable Design” school implementation plan.

### Resources and Links

Water Sensitive Urban Design

- Upper Parramatta River Catchment Trust website [www.uprct.nsw.gov.au](http://www.uprct.nsw.gov.au) - click on “Sustainable Water”

UPRCT Catchment Education Kit

- Hydrology Information Sheet
- Flooding Information Sheet
- ESD Information Sheet