

311.02.01 Problem Categories

Planning for drainage and stormwater management facilities should include a consideration of the potential problems associated with stormwater quality and quantity. Several categories of data should be obtained and evaluated including:

- Runoff quality provisions
- Runoff quantity determination
- Flood plain delineation
- Inventory of problem and future developments
- Development of alternative plan concepts
- Consideration of multipurpose opportunities and constraints
- Hydrologic and hydraulic analysis of alternative concepts
- Benefits analysis and evaluation

These are further defined as follows:

A. Quality: Several broad categories of degradation have been developed to delineate or describe levels of stormwater impacts:

- **Aesthetic deterioration:** Undesirable general appearance features (dirty, turbid, or cloudy) and actual physical features (odors, floating debris, oil films, scum, or slime) are present.
- **Dissolved oxygen depletion:** When the oxygen demand of bacteria is stimulated by the organics, the subsequent reduction in oxygen levels can disturb the balance between lower forms and the food chain. Unoxidized nitrogen compounds (ammonia) can also cause problems. This is of concern when discharging into reservoirs, small, limited flush, tidewater areas, and freshwater streams.
- **Pathogen concentrations:** High concentrations of several pathogens can reduce the acceptable users of the receiving waters. A concern where discharge may be accessed for domestic use and discharge near public use areas (bathing beach).
- **Suspended solids:** The physical build-up of solids can cover productive bottoms, be

aesthetically objectionable, and disrupt flow and navigation.

- **Nutrients:** Accelerated eutrophication that stimulates growth of aquatic vegetation can cause a water body to become aesthetically objectionable, deplete dissolved oxygen, and decrease recreational value by creating odor and overgrowth. Advanced eutrophication can lead to sediment build-up, which reduces storage capabilities.
- **Toxicity:** The two types of toxics generally found in stormwater (metals and pesticides/persistent organics) may build up in sensitive areas over the long term. At high levels, they can have serious shock effects on aquatic life. Low levels can become significant by accumulation up the food chain.

Quantification of the levels of contaminants that are being washed off a roadway is complicated by the variable effects of and the periods between storm events. The contributory factors are rainfall intensity, street surface characteristics, and particle size. The varying interaction of these factors makes it difficult to precisely estimate the impact that discharge will have on water quality.

However, where it is suspected that periodic runoff may have a serious quality effect upon the receiving area, further investigation, analysis and methods for solving the problem should be presented for review and approval.

The quality control management procedure particularly applicable to this region would consist of diverting the first 8 to 10 millimeters of runoff into retention (often combined with detention for peak quantity control) basins where the more concentrated contaminants and sediments can be contained. The volume of stormwater is then allowed to dissipate slowly by seepage and evaporation, effectively trapping the contaminants in the basin for periodic cleanout and disposal in a sanitary land-fill as needed.

An exception is erosion and sediment control, which is often a significant component of stormwater quality. In general, erosion and sediment transport should be limited by