

## **OVERVIEW OF STORMWATER RUNOFF**

### **What is stormwater?**

Stormwater is a term used to describe water that originates during precipitation events. It may also be used to apply to water that originates with snowmelt or runoff water from overwatering that enters the stormwater system. Stormwater that does not soak into the ground becomes surface runoff, which either flows into surface waterways or is channeled into storm sewers.

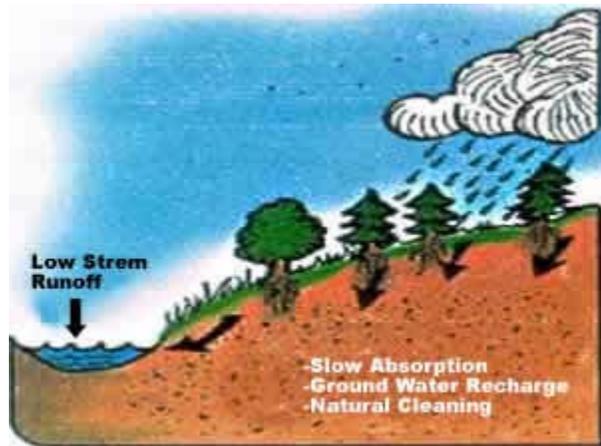
### **Why be concerned about stormwater?**

Stormwater runoff is of concern for two main issues: one related to the volume and timing of runoff water (flood control and water supplies) and the other related to potential contaminants that the water is carrying, i.e. water pollution.

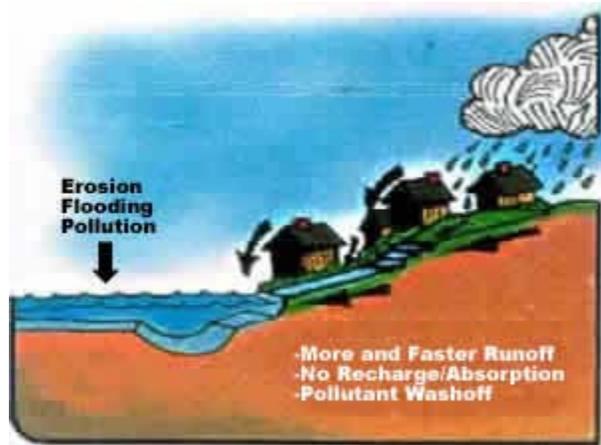
Stormwater runoff can have a number of impacts. As development and imperviousness increase in an area, the natural ability of the soil and vegetation to permeate and take up rainfall decreases, and more rainfall becomes stormwater runoff. This can produce negative impacts by causing erosion of land areas and stream banks, by causing or increasing flooding and also by carrying pollutants to surface waters. The following diagram demonstrates how continued development causes:

- Increased Imperviousness
- Increased Runoff
- Increased Pollutants
- Impact to Streambanks
- Erosion/Sedimentation





Natural Runoff



Built Up Development Runoff

### **Pollutants commonly found in stormwater runoff and their impacts**

The Table below summarizes common stormwater pollutants and also provides information on potential sources of these pollutants and types of impacts they may cause.

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|-----------|---|
| Sediment  | <ul style="list-style-type: none"> <li>• Sediment is often viewed as the largest pollutant load associated with stormwater runoff in an urban setting. The loadings have been shown to be exceptionally high in the case of construction activity.</li> <li>• Sediment is associated with numerous impacts in surface waters including increased turbidity, effects on aquatic and benthic habitat and reduction in capacity of impoundments.</li> <li>• A number of other pollutants often attach to, and are carried by, sediment particles.</li> </ul> |
| Nutrients | <ul style="list-style-type: none"> <li>• Most common nutrients in stormwater runoff are phosphorus and nitrogen.</li> <li>• In surface waters, nutrient loads can lead to algae growth, eutrophication (especially in impoundments) and low dissolved oxygen levels.</li> <li>• Nutrients enter the urban system in a variety of ways, including landscaping practices (commercial and home), leaks from sanitary sewers</li> </ul>   |

and septic systems, and animal wastes.

- |                  |   |
|------------------|---|
| Organic Matter   | <ul style="list-style-type: none"><li>• Various forms of organic matter may be carried by stormwater in urban areas. Decomposition of this material by organisms in surface waters results in depleted oxygen levels.</li><li>• Low levels of dissolved oxygen severely impact water quality and life within surface waters.</li><li>• Sources include leaking septic systems, garbage, yard waste, etc.</li></ul>  |
| Bacteria         | <ul style="list-style-type: none"><li>• High bacterial levels may be found in stormwater runoff as a result of leaking sanitary systems, garbage, pet waste, etc.</li><li>• The impacts of bacteria on surface waters may affect recreational uses and aquatic life as well as impose health risks.</li></ul>   |
| Oil and Grease   | <ul style="list-style-type: none"><li>• Numerous activities in urban areas produce oil, grease, and lubricating agents that are readily transported by stormwater.</li><li>• The intensity of activities, including vehicle traffic, maintenance and fueling activities, leaks and spills, and manufacturing processes within an urban setting contribute heavily to the level of these pollutants present in adjacent surface waters.</li></ul>                            |
| Toxic Substances | <ul style="list-style-type: none"><li>• Many toxic substances are potentially associated with urban stormwater including metals, pesticides, herbicides and hydrocarbons.</li><li>• Toxic compounds may affect biological systems, and accumulate in bottom sediments of surface waters.</li></ul>  |
| Heavy Metals     | <ul style="list-style-type: none"><li>• Heavy metals such as copper, lead, zinc, arsenic, chromium and cadmium may be typically found in urban stormwater runoff.</li><li>• Metals in stormwater may be toxic to some aquatic life and may accumulate in aquatic animals.</li><li>• Urban sources of metals in stormwater may include automobiles, paints, preservatives, motor oil and various urban activities.</li></ul>   |
| Temperature      | <ul style="list-style-type: none"><li>• Stormwater runoff increases in temperature as it flows over impervious surfaces. In addition, water stored in shallow, unshaded ponds and impoundments can increase in temperature.</li><li>• Removal of natural vegetation (such as tree canopy) opens up water bodies to direct solar radiation.</li><li>• Elevated water temperatures can impact a water body's ability to support certain fish and aquatic organisms.</li></ul> |



How big of a problem is this in Pennsylvania? Every two years, the Pennsylvania Department of Environmental Protection (PADEP) issues a report assessing the water quality in Pennsylvania. The report for 2008, entitled *2008 Pennsylvania Integrated Water Quality Monitoring and Assessment Report*, available at [http://www.depweb.state.pa.us/watersupply/lib/watersupply/2008\\_integratedlist/preface.pdf](http://www.depweb.state.pa.us/watersupply/lib/watersupply/2008_integratedlist/preface.pdf), reports that 15,929 assessed stream miles are impaired in that they do not support the aquatic life designated use for the stream, 1,965 of 2,555 assessed stream miles (76.91%) are impaired for fish consumption use, and 311 of 676 assessed stream miles (46.01%) were impaired for recreational use. The DEP identified runoff, land development, or construction as the cause of more than 26% of the aquatic life use impairment, and siltation as the primary form of impairment for 53.16%, of the impaired stream miles.

The focus of Get The Dirt Out – Chesapeake is on sediment because when sediment is properly handled at a construction site, many (though not necessarily all) of the polluting effects are reduced as well. We also believe that, by focusing regulatory attention on stormwater management via sediment, we will also focus attention on this entire list of adverse impacts and ultimately achieve stronger regulations and enforcement

