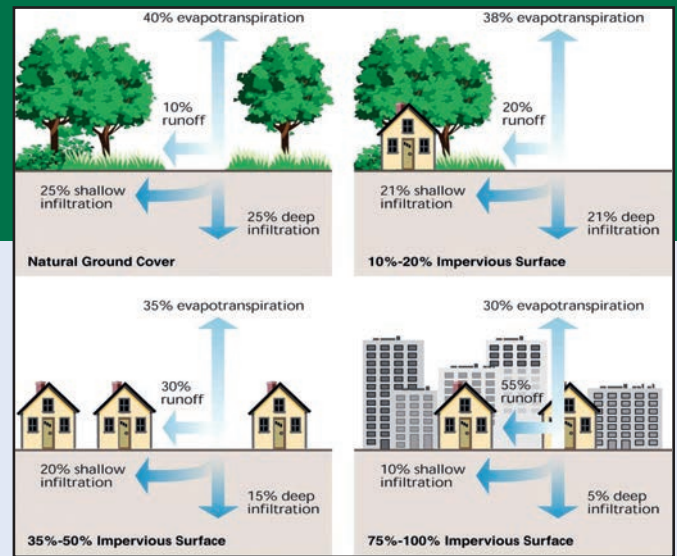


STORMWATER AND FLOODPLAINS

What is Stormwater?

Stormwater is defined as the flow of water that results from precipitation and which occurs immediately following rainfall or as a result of snowmelt. When a rainfall event occurs, several things can happen to the precipitation. Some of the precipitation infiltrates or soaks into the soil, some is taken up by plants for added growth, and some is evaporated into the atmosphere. Stormwater is the rest of the precipitation that runs off land surfaces and impervious (paved) areas.



The Water Balance Before & After Development



Wetland areas allow stormwater runoff to soak into the ground

Stormwater is typically generated by precipitation that runs off paved land areas; like buildings, rooftops, sidewalks, driveways and other hard surfaces. These hardened surfaces are called 'impervious surfaces' and they do not allow rainfall to infiltrate into the soil like natural vegetation, so more of the rainfall becomes stormwater runoff.

Stormwater runoff may be carried through natural or manmade drainage ways or conveyance systems. In some cases stormwater runoff leaves a site and then spreads out over a large dispersed area as "sheet flow." It may also be conveyed through ditches, swales, and natural drainage features. In most developed and urbanized areas, stormwater is conveyed through a system of catch basins, drainage basins, or storm drains.



Vegetated stormwater swale



Stormwater detention basin



Storm drains are the common stormwater conveyance system in urban areas

We often forget stormwater runoff collects everything on the surface of roadways, sidewalks, parking lots, constructions sites, business parks, rooftops, etc. and carries it to storm drains or ditches which often empty to our local rivers and streams. As it flows, stormwater runoff collects and transports soil, pet waste, road salt, pesticides, fertilizers, oil, debris, and other potential pollutants. The quality is affected by a variety of factors and depends on the season, local weather, geography, and activities throughout the watershed.



Stormwater runoff carrying sediment & other pollutants



Stormwater pipes discharging directly to a stream

What is a Floodplain?

A floodplain is an area next to a river, stream, or creek that may be covered with water following heavy rainstorms or snowmelt. The floodplain holds the excess water allowing it to be slowly released into the river system and seep into groundwater aquifers. Floodplains also allow time for sediment to settle out of floodwaters, thereby keeping it out of water bodies. Floodplains often support important wildlife habitat and are frequently used by humans as recreation areas.



Above: Example of floodplain area



Left: Same floodplain during a stormwater event

Did You Know...

It is estimated that more than $\frac{1}{2}$ of the pollution in our nation's waterways comes from stormwater runoff.

Flooding occurs when water bodies receive a greater volume of water than they can handle at one time. Floods are a natural part of the water cycle and can even be beneficial. By building on floodplains, draining wetlands, and diverting stormwater; we have increased the likelihood of flooding and the extent of damage done by floodwaters such as erosion, loss of property, loss of habitat, and loss of life.

In the past, we have developed on our floodplains. We then tried to control stormwater by keeping it out of the floodplains. This practice causes water to overflow riverbanks in other locations – often creating floods of a greater magnitude and danger. Building on floodplains increases the risk of property damage and life threatening situations. Diverting stormwater into channels forces water to flow faster. This greater velocity destroys habitats and causes greater erosion including the loss of valuable topsoil thus creating a need for increased fertilizer use.



Effects of building in a floodplain and the consequences this brings



Did You Know...

1 gallon of gasoline can contaminate approximately 750,000 gallons of water.



There are also other factors that increase flooding:

- The removal of stabilizing vegetation around stream banks and rivers.
- Erecting structures that deflect or inhibit the flow of floodwaters. This modifies flow paths and can spread flooding problems and increase erosion.
- Constructing bridges, culverts, buildings, and other structures that encroach on the floodplain. These developments reduce the storage area available for floodwaters and cause an increase in flood elevations.
- Building drainage systems that feed stormwater quickly into the receiving body.
- Straightening meandering watercourses to hasten drainage. This transfers flooding problems downstream and also alters habitat.
- Filling and dumping in floodplains. Floodwaters can transport this debris, which may interfere with the movement of the water causing increased flood elevations.



Example of removal of vegetation & stream straightening

Did You Know...

The number one pollutant in Lancaster County streams is sediment followed closely by nutrients (nitrogen and phosphorous in particular).



Example of floodplain development & potential safety issues

What can I do to Reduce Stormwater Runoff and Pollution from my daily activities?

- Maintain riparian buffer areas around streams to protect stream banks and to provide a natural system for pollutant removal. Trees slow stormwater runoff, reducing the volume of water that must be managed in urban areas. Trees provide their greatest benefit during light rains by increasing soil permeability, which increases groundwater recharge.
- Minimize paved impervious areas to reduce runoff. Direct your downspouts away from paved surfaces and into vegetated areas. This will reduce the amount of water that runoff and in the process increase groundwater recharge of our aquifer. Reducing impervious surfaces and increasing tree cover promotes the movement of water into the water table.
- Design all new construction to prevent or minimize runoff and stormwater pollution – a major component here is planning up front in the design process to consider and manage potential stormwater problems.



Low Flow



Storm Flow

- Use lawn care practices that protect water quality – minimize the use of fertilizers and pesticides, and when used, do so in a safe manner. When possible incorporate native plant species since they are best adapted to the local growing conditions and tend to be naturally pest resistant. Mulch grass clippings and leave on the lawn or compost your yard waste.
- Properly use and store household materials and be aware of and make use of local recycling and collection centers to handle household wastes.
- Remember that any materials that are poured or placed on the ground, streets, driveways, storm drains, etc. can be picked up and carried by stormwater runoff to our surface waters. Check your car for leaks and recycle motor oil.
- Have your septic tank pumped and system inspected at least every three years. This will ensure the system is operating correctly and not polluting groundwater supplies.
- Report any pollution, illegal dumping, or soil erosion that you see to the appropriate authorities.
- Get involved with local efforts for public education, water quality monitoring, stream cleanup, recycling, etc.

Another example of stormwater runoff utilizing a floodplain unimpeded by mans influence



For more information check out; www.lancasterwatersheds.org

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