

Cascade Charter Township

Storm Water 101

Storm Water Runoff

- Rainfall on a site can either soak into the ground or runoff the site. Runoff occurs when the rainwater leaves a site and runs downstream onto adjacent property.
- Some amount of runoff occurs with nearly every rain event and on nearly every piece of property.
- Runoff amount is affected by
 - type of ground surface (trees, grass, roof area, paving)
 - existing soil conditions (clay, sand)
 - slope of the land (steep, flat)
- Runoff predictions are based on two primary factors
 - Rainfall intensity (inches per hour of rain)
 - Ability of the site to absorb water (viewed as a percentage of water that will runoff)
- http://www.ecy.wa.gov/washington_waters/stormwater.html

Increases of Runoff

- Changes to a site from its natural conditions affects storm water runoff.
 - Changes that can increase runoff include:
 - Removal of trees or other changes in ground cover
 - The addition of a house and driveway.
 - Construction of a development (residential or commercial)
 - Changes to multiple sites in an area can collectively have a large impact on runoff.
 - Because paved/hard surfaces cannot absorb water, they allow more runoff volume and more frequent runoff than non-paved surfaces.

Example of Runoff Impact

- Let's take a very simplified example of a residential development being proposed in a once farmed field to illustrate the impact of runoff.
 - During a 10 year storm event (one that has a 10% chance of occurring each year), the runoff for a farmed field is approximately 30% of the rainfall amount
 - For a residential subdivision, the runoff is approximately 43% of the rainfall amount (due to roofs, driveways, & roads)
 - While the runoff percentage doesn't appear to increase much, the new development creates more than a 40% increase in the amount of runoff when compared to the previous land use.
 - In addition, hard surfaces generate more frequent runoff than natural areas. For example, a roof surface always generates runoff while a field area can absorb some water before generating runoff.

Ways to Reduce Runoff

- If the soil conditions of the site are sandy, it may be possible to promote infiltration into the ground. The storm water can be directed to a storage pond (infiltration basin) where it is held long enough to allow the water to soak into the soil.
- The rate at which runoff soaks into the soil varies by the soil type, groundwater elevation and other factors.
- Infiltration basins do not work in all areas.
- Infiltration basins require maintenance in order to work properly. Sediment must be removed to prevent clogging. If the system is not maintained, then it's capacity is diminished.
- The current Township Storm Water Ordinance requires infiltration in certain areas of the Township as soil conditions allow.

Controlling Runoff Rate

- If infiltration is not possible, then measures are put in place to control the rate that the runoff leaves a site.
- Controlling the runoff rate helps to minimize erosion damage and flooding to downstream properties.
- The runoff rate is usually controlled by installing a detention basin to hold the storm water and slowly releasing that water over a long period of time.
- The release rate is based on several factors including:
 - Pre-development conditions
 - Downstream waterway/storm sewer capacity

Common Questions

- Who controls the Township's waterways?
 - County drains fall under the jurisdiction of the Kent County Drain Commissioner
 - All other waterways are controlled by the Michigan Department of Environmental Quality
- Are all developments required to have storm water controls?
 - Those developments created before the Township had a storm water ordinance typically do not. However, since the creation of the first ordinance, all developments have been required to comply.

Common Questions

- How can I help to decrease the runoff from my property?
 - Decrease the amount of paved areas as much as possible.
 - In nature, most precipitation soaks into the ground where it falls. Plants absorb much of this through their roots, and some makes its way down to the water table, being purified as it gradually percolates through the soil. The "built environment," however, is characterized by impervious surfaces (surfaces that don't absorb water), so that a large portion of rainfall or snow melt becomes storm water runoff. Reducing the amount of impervious surface on your property therefore reduces the amount of runoff.

Common Questions

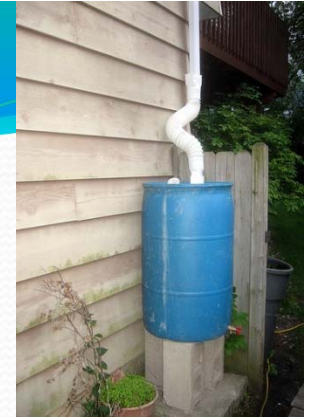


- How can I help to decrease the runoff from my property?
 - Install rain gardens to promote infiltration
 - <http://www.raingardens.org/Index.php>
 - A rain garden is a garden, planted in a slight depression in the ground, that collects water and allows it to gradually permeate into the soil. Rain gardens come in many sizes and are typically planted at the base of a slope or even at the outlet to a downspout--anywhere where water naturally flows or can be directed. Water-loving plants and a base of permeable soil enhanced with fertile loam and a topcoat of mulch allow the rain garden to quickly absorb even large amounts of water, usually in just a few hours.

Common Questions



- How can I help to decrease the runoff from my property?
 - Keep as much natural area as possible. Limit the area covered by lawn.
 - Lawns aren't particularly effective at absorbing and retaining water, especially during heavy rains. This is a problem not only because more natural precipitation runs off them, but also because they require a lot of irrigation, which in turn creates even more runoff. Native plants, such as shrubs and wildflowers, tend to develop more extensive root systems that take in and hold water much better than lawns. As an added bonus, they require less maintenance than a lawn does. If you do decide to keep your lawn, though, water it efficiently to conserve water and reduce runoff.



Common Questions

- How can I help to decrease the runoff from my property?
 - Install rain barrels at roof downspouts
 - A 1,000 square foot roof can produce more than 600 gallons of runoff for every 1" of rain that falls on it. If your downspouts are connected directly to a storm drain, disconnecting them is the single most important step you can take to reduce runoff. Instead of allowing water to go directly into the sewer or to run into the street, direct your downspouts toward a vegetated area, such as your garden or lawn. Use extensions to ensure the water comes out at least 5 feet away from your foundation. Alternatively, install rain barrels or cisterns to collect the water so you can reduce the risk of soggy yards or basement flooding and save some rain for a sunny day. If you don't have any way to make good use of the stored water, consider Dutch drains, gravel-filled barrels with holes at the bottom which slow the flow of water to allow the ground to absorb it all.
 - <http://www.uri.edu/ce/healthylandscapes/rainbsources.html>