Hamilton County SWCD
Urban Conservation

Drainage

When is standing water a problem?

Long durations of standing surface water or poor subsurface drainage can restrict land use and management goals including plant growth. Plant growth is essential for improving soil quality and increasing soil organic matter which improves the capacity of soil to hold water. Soaked, or saturated, soils increase the likelihood of plant diseases, significant losses of soil nitrogen (due to denitrification and leaching of nitrate-Nitrogen), and soil compaction with foot traffic or heavy equipment. Some plants can survive much longer durations of saturation. It is non-harmful to plants for water to take 24-48 hours to soak into the ground. Allowing water to infiltrate into the ground is important for replenishing our drinking water resource.

Causes of Standing Water:

- Back-to-back rains saturate soils limiting the ability to quickly soak in additional rain water
- Sediment built up in swale creating high and low spots or grade inconsistencies
- Landscaping within the drainage easement
- Installation of a fence, other construction, or filling of the swale
- Poor soil health and compaction
- High water table or very high clay content
- Sump pump discharge with no place to go
- Irrigation line leaks
- Downspout water with no place to go
- Broken or clogged subsurface drain line
- Poor initial site planning and grading

When is Standing Water a Resource Concern?

- Standing water remains for more than 48 hours
- No plant growth of any kind during growing season
- Caused by or is causing compaction of soil
- Erosion is occurring downstream
- Existing structures are negatively impacted
- Land may be available to set aside for wetland but currently is not a functional wetland.

Key Questions to Consider:

- Where is water coming from?
- Where is water going? Or where can it go?
- Who/what may be negatively impacted downstream by changes?

With these answers, you may be able to self diagnose the problem & identify a potential solution.

Other Considerations:

- Most drainage features around the home are hidden.
- Soaking water into the ground when possible[1] supplies water to our groundwater, drinking water aquifers, and may be beneficial to prevent flooding and other problems that arise from excess water.
- Drainage water must have a place to go that will not negatively impact other areas, such as sensitive plants, neighbors, or foot/vehicle traffic.
    - Determine if there is a natural place that water could go downhill with an outlet like a stream, storm drain, tile, pond, or swale. -Before draining get permission from the owner of the feature.
    - Consider the slope of any planned drainage path to avoid erosion.
    - Remove excess filling in existing drainage channels and roadside ditches. Filled in channels usually create wetness problems.
- Use erosion control measures (ask us) for any planned work and reseed areas as soon as possible to avoid erosion or more serious issues.
- Keep leaves and debris out of drains, cleanouts, downspouts and gutters
- Most drainage practices are costly and require on-going maintenance.

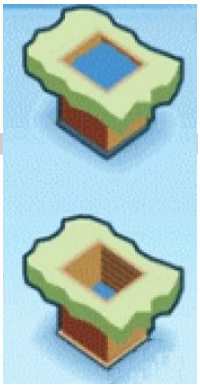
[1]**Percolation Test—**This is done to check for a high water table and to measure how well the water can percolate, or soak, into the ground. This test is necessary to design all the practices listed below. Dig a few coffee can sized holes 18 inches deep in the soil (below any compaction) pre-wet the area with a hose (or after a rain) and fill the hole with water. The next day, stick a ruler into the hole, pour in 16 inches of water, and measure how many inches of water soak in within 1 hour. Check hole after 12-24 hours for all water to be soaked in.

Benefits to Keeping Water On-site:

- Reduces or Prevents Erosion Downstream
- Decreases Flooding
- Improves our Rivers & Streams for Fish & Wildlife
- Protects our Drinking Water

Drainage Options:

The choice of drainage option is based on the site characteristics. You need to investigate all characteristics including: the slope of the area, what outlet is downhill, the soils (via web soil survey), the ability to soak in (via a percolation test), and a survey of trees and their root locations. All of these factors help determine the best drainage plan. Consider your tolerance to short-term standing water, is it realistic? It is important to consider the impact on others as you investigate drainage options.



Percolation Test—See the front of this fact sheet. Moving water into the soil can only happen when water tables are not near the surface. Conduct a percolation test to determine the suitability of the site for soak in drainage options below. If water will not percolate then storage, surface drainage, or native planting options will be your only choice for dealing with the drainage.

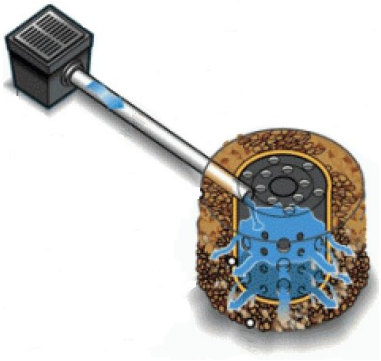
Compaction Test— Get a tile probe (can be purchased through our office) OR take a straightened wire coat hanger and push it into the ground. Soil should be moist but not saturated. Do not test when soil is excessively dry or subject to freezing temperatures. Apply slow and steady downward pressure to advance the wire. You will feel some resistance, but it should easily move into to the ground 36' or more (try a few places to miss individual rocks). If it is tight or stops at same depth in multiple locations, compaction remediation should be considered.

Soak-in Drainage Option:

- These practices depend on the ability of soils to take and move water underground. Good results from percolation test required.
- Soil Compaction mitigation can help improve the ability of the ground to soak in water everywhere that compaction is causing problems. Try aerating and spreading compost with rake to improve soil condition.

Soak-in Practices:

- Rain Gardens – Shallow Landscaped low area where water can pool and slowly seep into the ground filled with native plants that help soak up and filter water. See Rain Garden Fact Sheet
- Dry Well – a round plastic container with holes that is buried underground and surrounded by gravel and fabric that allow water



to seep into the ground. There may be a sump, or smaller chamber, located before the gravel pit or tank to collect leaves and other debris 10 feet from basement.

- Pervious Pavement – Water is stored and soaked in under patio, driveway or other hard surface
- Amended soils or gravel materials needed
- Native Plants best suited to thrive; no trees

Benefits to Soak-in Practices:

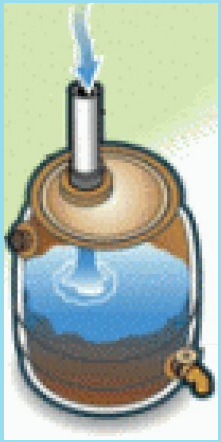
- Minimal drainage feature footprint
- Replenishes Groundwater/Drinking
- Prevents Flooding

Storage as Drainage Option:

- Rainwater storage collects water from rain and hard surfaces and stores it for later use.

Storage Practices:

- Rain Barrels or cisterns—collect roof water from downspout and store it for later use to water lawns and gardens. Underground cisterns store larger amount of water that can be reused in toilet flushing or irrigation.



- Trees — capture and store a portion of rainfall and release water to the atmosphere. The larger the tree canopy, the more water is captured. Trees also remove water from the ground and may help to lower water tables.

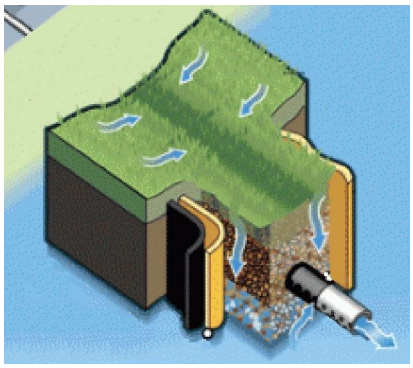
- Increase organic matter in the soil by adding mulch or compost—Organic matter increases the entry of water by protecting the soil aggregates from breaking down. Particles broken from aggregates can clog pores, seal the surface, and decrease infiltration during a rainfall event. For every 1% increase in organic matter can result in 20,000 gallons per acre of water storage in the soil along with improved structure to the soil improving vertical drainage.
- Diversity Above for Diversity Below—Increase diversity in plants in the area because different plants have different rooting depths which can create small channels in the soil to move water deeper into the ground. Diverse plants help feed worms and other soil biota which create small channels and break compaction layers.
- Green Roof—Growing plants on roofs can lessen the impact from rains and capture more water where it hits, keeping it from getting into yards and causing drainage problems.

Surface/Subsurface Drainage:

- These practices depend on the slope of the land and an having an outlet available.
- Often the most complex, costly and difficult. Must get other landowners permissions & involvement.

Drainage Practices:

- Bioswale – Shallow surface swale designed to temporarily hold and soak in rain water utilizing native plants to assist in storing and cleaning water. May or may not have subsurface tile drain to assist.
- Grass Swale– grass or native plant lined channel designed to carry water to drainage ditch or stormwater outlet. Slope < 5%



- French Drain– Underground pipe surrounded by gravel and landscape fabric that soaks water into ground until ground is full then carries water away in a pipe. Must be protected from aggressive tree roots.

Who to contact:

- Call *811 before you dig or probe anywhere
- County or City for easements, permits & stormwater considerations
- Health Department for mosquito concerns
- Hamilton County Soil & Water Conservation District

HAMILTON COUNTY Soil & Water CONSERVATION DISTRICT
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