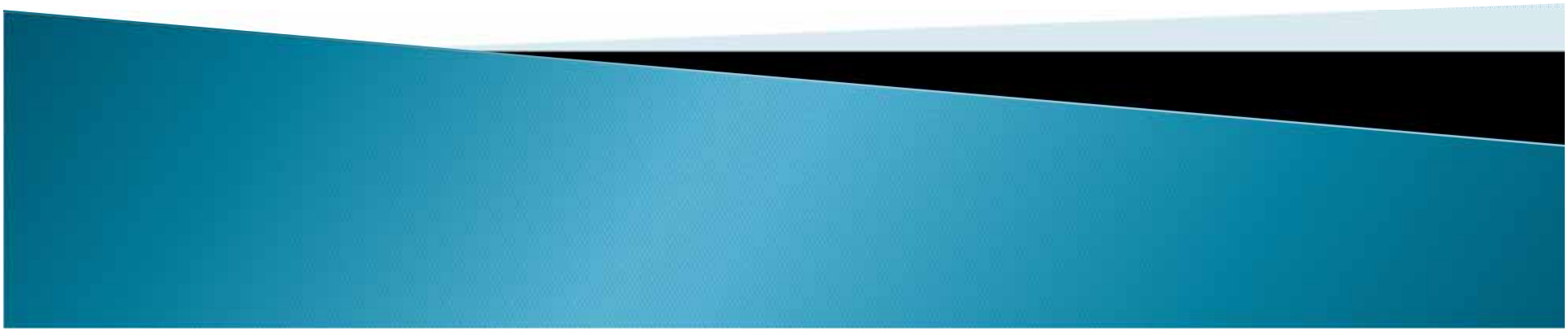
Site Specific Runoff Mngmnt



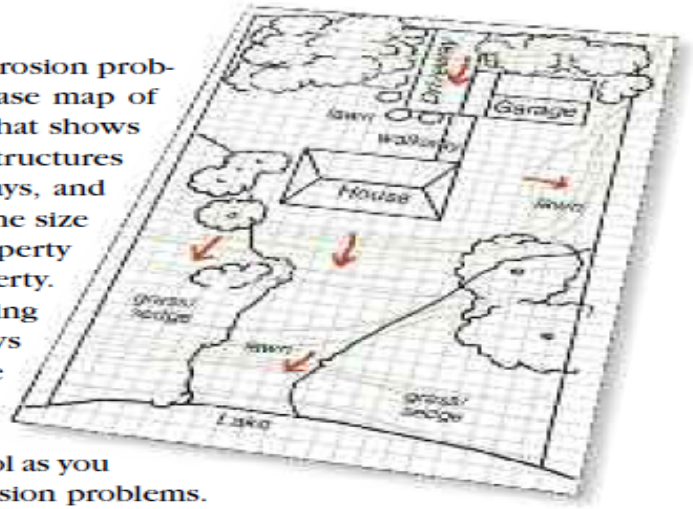
What to do on your lot

Assess the Problem

Look for areas where erosion is occurring. Runoff water is likely the cause of erosion. Right after a big rainstorm is the perfect time to look at erosion patterns. Can you see the pathway of water flow? Are leaves and pine needles or groundcover vegetation removed by flowing water? Follow the path of water uphill to its source. Is a channel created by runoff from a roof, driveway, road, or other hard surface? Don't ignore small channels and eroded areas. These spots frequently turn into bigger problems. Erosion that you identify may get worse if you increase the hard surfaces on your lot or if you experience a lot of rain in a short period of time.

Develop a Base Map

You can do a better job assessing your erosion problem and developing solutions with a base map of your property. Start by drawing a map that shows your entire property to scale. Include structures like your house, garage, sheds, pathways, and paved areas. Also measure or estimate the size of uphill areas that drain to your property from a road or your neighbor's property. Look at the direction of water flow during or after a large rain event and add arrows to illustrate the flow on the map. The eroded areas or gullies identified above also give you clues for placing flow arrows. The base map will be a useful tool as you begin to figure out solutions to your erosion problems.



Estimate Drainage Area

The size of the area that flows to a problem area is important information for coming up with runoff solutions. You might need some help with this step. Your local Land and Water Conservation Department or a landscaper might be able to provide assistance.

Too Much for Landscaping?

- Construction on slopes >20%
- More than 20,000 ft2 cleared
- Drainage area > 2 acres
- Deep gullies (> 1 foot deep)
- Can't come up with a solution

(even with a landscaper to guide you)

Site Evaluation Overview

- Mapping and Site Analysis
  - Review Runoff Patterns
  - Consider Site Conditions
  - Analyze Soils
- Measure Hard Surfaces
  - Calculate Runoff Volume
- Place Practices
- Divert Water

Analyze Site

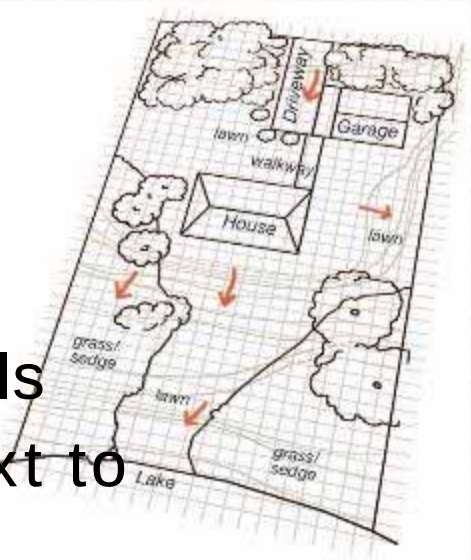
Use the Checklist

Look For

- Areas of bare soil
- Deposits of sand
- Channelized flow
- Get out during a rain storm!

Site Constraints

- Utilities – call Diggers Hotline for planning
  - Work around if possible
- Septic systems
  - Don't infiltrate above
- Wells
  - Set back 50 feet to shallow wells
- Structures – don't soak water next to basement
- Trees – back off to minimize disturbance to roots
- NOT where water ponds!



Assessing Your Soil Type

- Hints:
  - Sand feels coarse and gritty
  - Silty soil feels smooth and spongy
  - Clayey soil feels stiff and sticky
- Send soil in for analysis
- Use certified soil tester
- Perform a perc test

Importance of Soil Type

Infiltration rate will determine appropriate practice and size:

- Infiltration Rate of Sandy Soils: 2.5+ in/hr
- Infiltration Rate of Silty Soils: 0.5 in/hr
- Infiltration Rate of Clayey Soils: 0.3 in/hr

Some soils don't allow infiltration – best bet may be native planting!

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Calculating Runoff Volume

- Start with area of concern
- Consider direction of flow
  - Roof peaks and downspouts
- Measure area of hard surfaces above
- Calculate volume for a design storm – 1” or 2” rain
- Design practice to capture volume

Simple Tools:
Tape, wheel, laser

Hard surface area (ft) X Inches of rain/12 = cubic feet

1 cubic foot = 7.48 gallons

A Few Definitions

Divert means to re-direct runoff water.

Berms are small, mounded rows of earth about 6 to 12 inches high. Berms can also be constructed of concrete, asphalt, or gravel to direct water across a driveway to an infiltration practice.

Drain tile is perforated, smooth, high density polyethylene (HDPE) or corrugated plastic pipe. The perforations disperse water as it flows along the length of the pipe.

Channels are depressions or ditches created to carry water to a desired area.

Filter fabric is woven or nonwoven, geo-textile (plastic) with small pore spaces to allow water, but not sediment particles, to penetrate through the fabric.

Broad-based dips are depressions covered with gravel that divert water across the slope of a driveway.

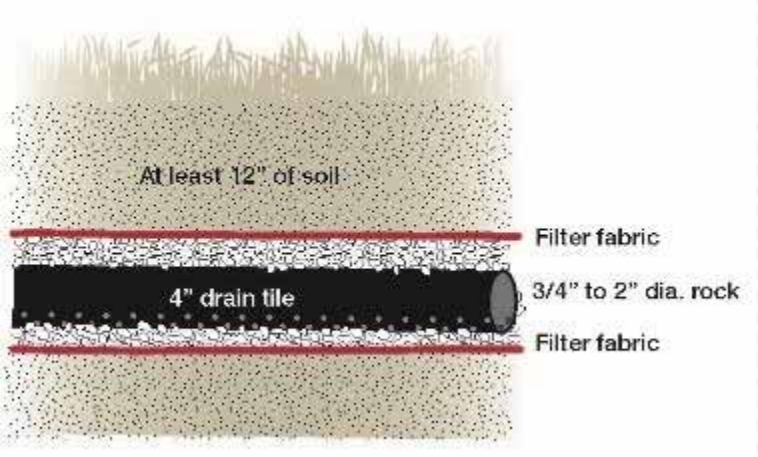
A **water bar** is a shallow trench with a mound (or berm) to intercept runoff water and provide cross drainage.

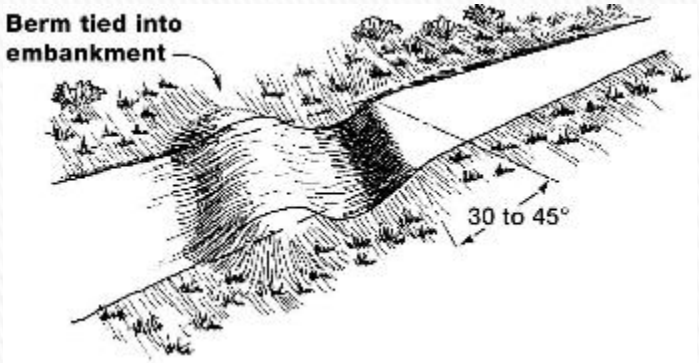
Do not transfer problems by diverting water to your neighbor's property! You may need to work together with several neighbors to solve a runoff problem.

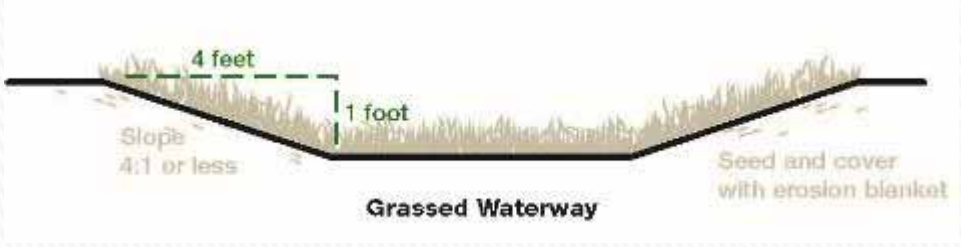
Shared Rain Garden

Diversions

- Pipes
- Drain Tile
- Grass Swales
- Vegetated Berms
- Gravel Berms

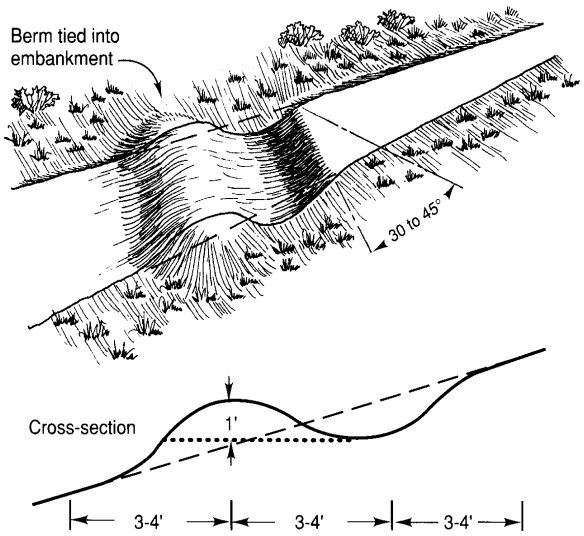






Pathway and Driveway Diversions

- Broad Dip
- Water Bars



Diversions

Sizing for rock trenches along roofs and parking areas.[1, 2]

Area of hard surface (sq. ft.)	Length (ft.) of 2 ft. wide trench	Length (ft.) of 3 ft. wide trench
200	17	11
400	33.5	22
600	50	33.5
800	67	45
1000	84	56
1500	126	84
2000	167	112
2500	209	140
3000	251	168

1 *Trenches are all two feet deep.*
2 *Trenches are sized to capture a one year, 24-hour storm event.*

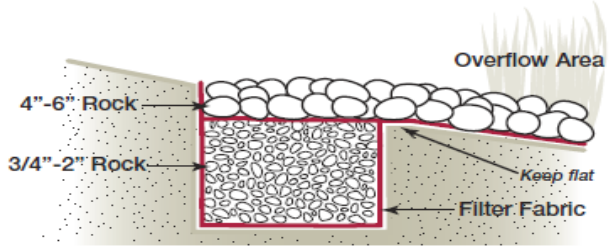
IMPORTANT NOTE:
Sizing in the table is for areas with sandy or sandy loam soils with drainage rate of at least 0.5 inches per hour.

Rock Infiltration Pits

An infiltration pit is constructed similarly to a trench, except that a pit is deeper, and a pit is designed to fit into available area. This deeper pit may reach sandy soils with higher infiltration rates when a shallower trench does not. With sandy soils, a 3-foot deep infiltration pit should be 5 to 10 percent of the size of the impervious surface that drains to it. A 4-foot deep infiltration pit should be from 4 to 8 percent of the size of the impervious surface that drains to it. See the table on page 24 for sizing in sandy loam soils.

If this much space isn't available, a smaller pit will still help reduce pollutants by capturing runoff from small rain events and the first flush from larger storms. Be sure to consider how water will flow from the pit when it overflows. The overflow area should be broad (2 to 4 feet) and absolutely flat across the overflow for even flow. Reinforce the overflow area with clean 4- to 6-inch rock underlain with filter fabric to prevent underlying soil from washing out. Do not construct a pit deeper than five feet because the soil beneath the pit will compact and drain more slowly.

Rock Infiltration Pit



Opportunities for Infiltration

Rain Gardens

Rock Trenches

Rock Trench to Rain Garden