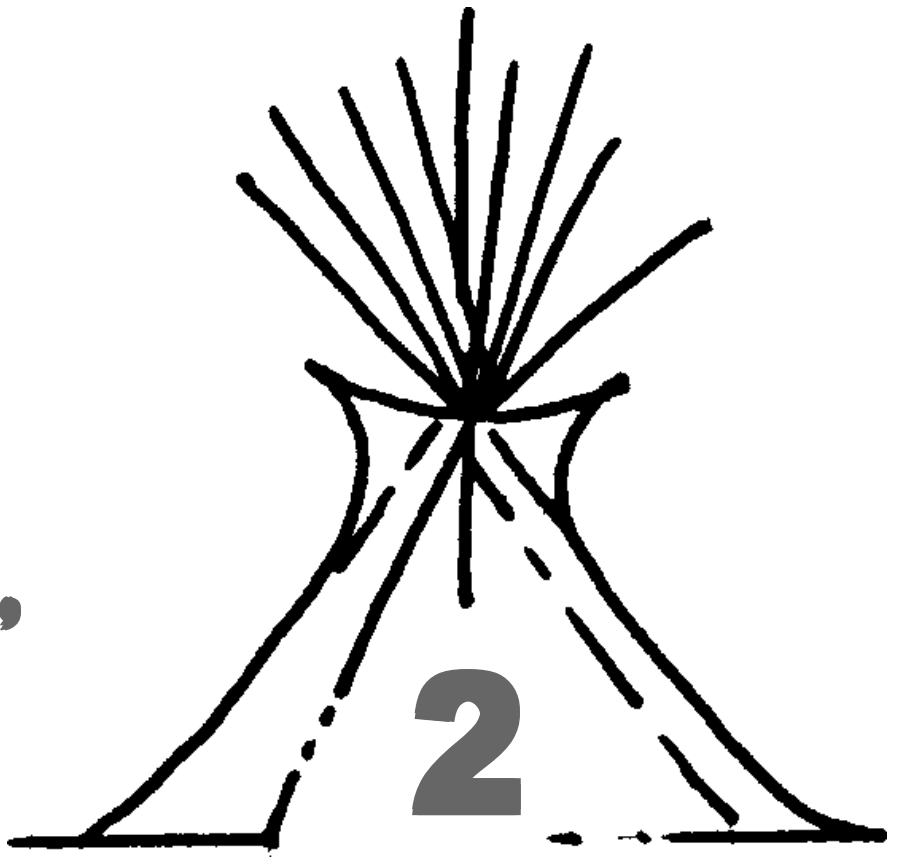
# PREVENTING POLLUTION FROM "STORMWATER" RUNOFF




## Stormwater runoff can pose health risks!

In this fact sheet, find out how stormwater affects the environmental health of your land (*and land downstream*) and learn how to reduce pollution risks!

***1. Reducing Pollutants in Runoff.*** *Pesticides, chemicals, automotive wastes, grass clippings, yard waste, pet and animal wastes and the road salt and deicers used in winter can all pollute water through runoff.*

***2. Landscaping and Home Care to Control Runoff.*** *You can help control runoff by preventing soil erosion, protecting your basement from flooding and making sure your roof drains properly. Certain kinds of landscaping and using fewer paved surfaces also limit runoff.*

## Connected to the Earth

**Listen to the voice of nature, for it tells no lies.**

**—Huron Proverb**

Across the country, public and tribal officials are focusing their pollution control efforts on **stormwater management**. Stormwater pollution can't be treated like water pollution from discharge pipes, because it comes from many sources (see table, right). It is carried by stormwater from every street, parking lot, sidewalk, driveway, yard, and garden, so the problem affects every tribal member and can be solved with everyone's help.

## Stormwater runoff can carry pollutants

Stormwater is water from rain or melting snow that doesn't soak into the ground. It flows from rooftops, over paved areas and bare soil, and through sloped lawns. As it flows, runoff collects and carries soil, pet waste, salt, pesticides, fertilizer, oil and grease, leaves, litter and other health hazards. You don't need a heavy rainstorm to send pollutants rushing toward streams, wetlands, lakes and oceans. A garden hose can supply enough water.

Even if your house is not close to any shore, storm drains and sewers quickly move runoff from your area to the nearest body of water. Many people assume that storm sewers carry stormwater to wastewater treatment plants, but *that is not true.* (figure 2.1, below)

Polluted stormwater affects the quality of our lakes, rivers, wetlands, and ocean bays. Soil clouds the water and endangers habitat for fish and water plants. Nutrients like phosphorus promote the growth of algae, which crowds out other aquatic life. Toxic chemicals like antifreeze and oil from leaking cars; pesticides from yard and garden; or zinc from galvanized metal gutters and downspouts threaten fish and other aquatic life. Bacteria and parasites from pet waste can make nearby lakes and bays unsafe for wading and swimming after storms.

Stormwater can be a problem closer to home. It can flow into basements and cause damage that is difficult and costly to clean up. It can also flow down a poorly sealed well shaft and contaminate drinking water. In areas with porous soil or rock, pollutants in runoff may reach groundwater, which can have widespread and lasting effects.

## Common Sources of Pollution from Stormwater

| Pollutant | Common sources |
|---|---|
| Silt, sand, and clay particles and other debris | Construction sites; bare spots in lawns and gardens; wastewater from washing cars and trucks on driveways or parking lots; unprotected streambanks |
| Nutrients | Overused or spilled fertilizers; pet waste; grass clippings and leaves left on streets and sidewalks; leaves burned in ditches |
| Disease organisms | Animal waste and garbage |
| Hydrocarbons | Car and truck exhaust; leaks and spills of oil and gas; burning leaves and garbage |
| Pesticides | Pesticides overapplied or applied before a rainstorm; spills and leaks |
| Metals | Cars and trucks (brake and tire wear, exhaust); galvanized metal gutters and downspouts |

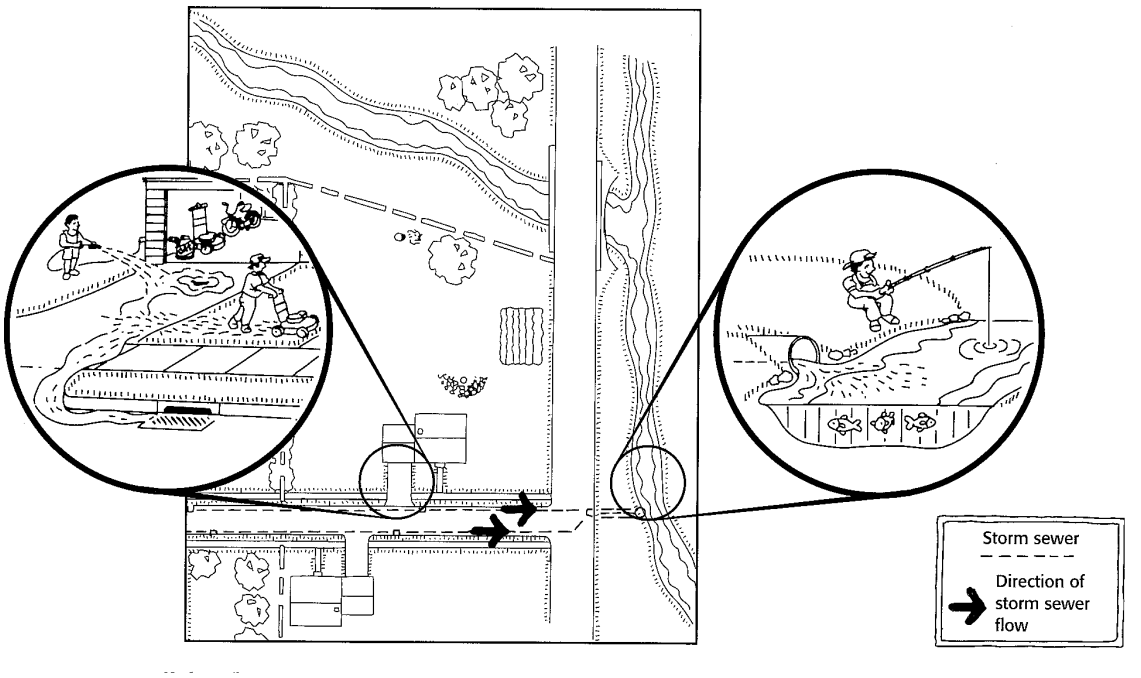



***Figure 2.1 Runoff that flows into storm sewers goes directly to streams and lakes without treatment***

# PART 1 • Reducing Pollutants in Runoff

Stormwater is unavoidable, but its effects can be reduced by keeping harmful chemicals and materials out of it. This part lists sources of contamination and offers ways to reduce them. At the end of this part, fill out the table to note stormwater risks on your property.

## Where does stormwater go?

The next time you are home during a rain shower, head outside and watch where the rainwater goes. On a sketch of your property, draw arrows showing the direction that stormwater flows off driveways, rooftops, sidewalks, and yards. A sample map is provided in figure 2.2.

Does water soak into the ground quickly, or does it puddle in places and flow off lawns and driveways? Your soil type affects how water soaks into the ground. Water soaks into sandy soil quickly but has a hard time seeping into fine-grained silt or clay soils.

During your walk, note how far it is to the nearest storm sewer, ditch, wetland, stream, or body of open water. Note whether runoff flows onto your land from nearby streets, lands, or stormwater systems. If you live near the bottom of a hill, you may have special problems. Go out during more than one rain shower to get a good understanding of runoff flow during small and large storms.

## Don't let stormwater carry away car and truck spills

Oil stains on your driveway and spills of antifreeze, brake fluid and other automotive fluids can be carried away by a rainstorm. An oily sheen on runoff from your driveway is a sure sign that you need to do something about it. Use a pan or carpet scrap to catch drips. Get your car checked out regularly to prevent and fix leaks. If you change your own oil, avoid spills and collect waste oil for recycling. *Ask your Extension agent or tribal official about local recycling programs.*

Store oily car parts and fluid containers out of the reach of rain and runoff. Never dump used oil, antifreeze or gasoline down a storm drain, in a ditch or on the ground. They will end up in a nearby lake or stream, or they may pollute your drinking water.

Washing your car in the driveway creates runoff without a rainstorm—your hose provides the water. The dirty, soapy runoff drains directly into storm sewers, picking up oil and other pollutants as it goes. Try washing your car on the lawn or, better yet, take it to a commercial car wash or spray booth that sends its dirty water to a wastewater system.

## Store household products out of the reach of stormwater

Nearly everyone stores some lawn and garden products like weed killers, insect killers, and fertilizers. If stormwater or floodwater reaches them, it can carry them into surface water and maybe even your well. Salt for water softeners, and other chemical products can also cause trouble if they are washed away. Keep these kinds of things in waterproof containers and store them up high and out of the path of runoff or floods. Try to avoid storage problems by buying just enough for each job and using it up.

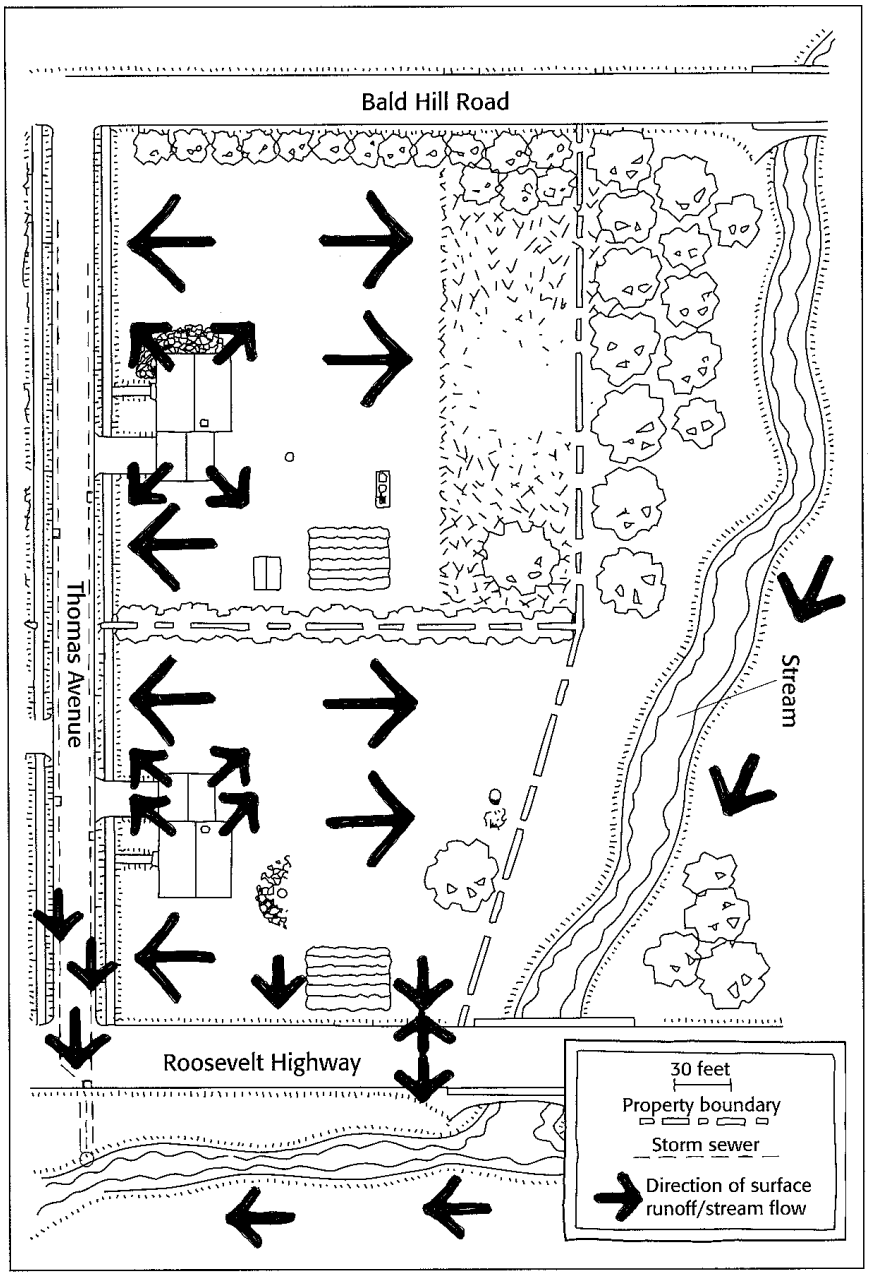



***Figure 2.2 Map showing direction of surface runoff and stream flow***

## Handle chemicals safely

Safe storage is just part of preventing contaminated runoff. When you mix chemicals, do it above a washtub or other large container so spills will be contained. If you spill chemicals, act quickly to clean up the spill and keep it from spreading, especially on paved surfaces. Don't use more pesticide or fertilizer than the label recommends. And **NEVER** apply pesticides and chemicals if rain is expected within 24 hours. See fact sheet 7, "Yard and Garden Care," for more information on yard and garden products.

## Road salt and deicers

Road salt and deicers eventually wash off paved surfaces and end up in the soil or water. From your driveway or sidewalk, salt can easily flow to storm drains and into streams and lakes. This can harm wildlife and plants. Use less of these chemicals to keep them out of natural systems. If you use too much, clean up the excess. Sand and kitty litter are less toxic alternatives. Chipping ice off pavements is an even better choice for the environment, but be careful not to damage the pavement surface.

## Clean up animal wastes

Droppings from dogs and cats and from other animals like birds, rabbits, goats and chickens can cause two kinds of trouble. First, the nutrients they contain can promote algae growth if they enter streams and lakes. Second, they are a source of disease.

Don't let manure or droppings pile up. Clean them from sidewalks, streets or driveways where runoff can carry them to storm sewers. If droppings are not mixed with litter or other materials, flush them down the toilet. If local laws allow it, you can bury animal wastes or wrap them and put in the garbage.

## Keep yard and garden wastes out of storm water

Grass clippings and other yard wastes will wash away with the next storm if they're left on sidewalks, driveways or roads (figure 2.1, page 2-2). Although leaves and other plant debris collect naturally in streams and lakes, homeowners can make too much plant matter at once, especially in areas with many homes. This can lead to water that is unattractive or green with algae and unsuitable for recreation.

Burning yard waste is not environmentally friendly, and in some areas it's illegal. Hydrocarbons and nutrients released by burning leaves pollute the air and water. Rain collects smoke particles from the air and runoff picks up ash from pavement and ditches. Avoiding the problem is easy. Sweep clippings back onto the grass, and compost leaves and garden wastes to recycle nutrients (figure 2.3).

*Information how to compost yard waste is available from many sources. Ask your tribal official or Extension agent if you need help finding information.*

## Do Table 1 - Reducing Pollution in Runoff

On the next page, rate your stormwater pollution risks. For each question, mark the risk level in the right-hand column that best fits your situation.

## Responding to risks

Try to lower your risks. Transfer any medium and high risks you marked in table 1 to the **action checklist** at the end of the fact sheet. Using the advice in part 1 and other resources, make plans to reduce your risks.

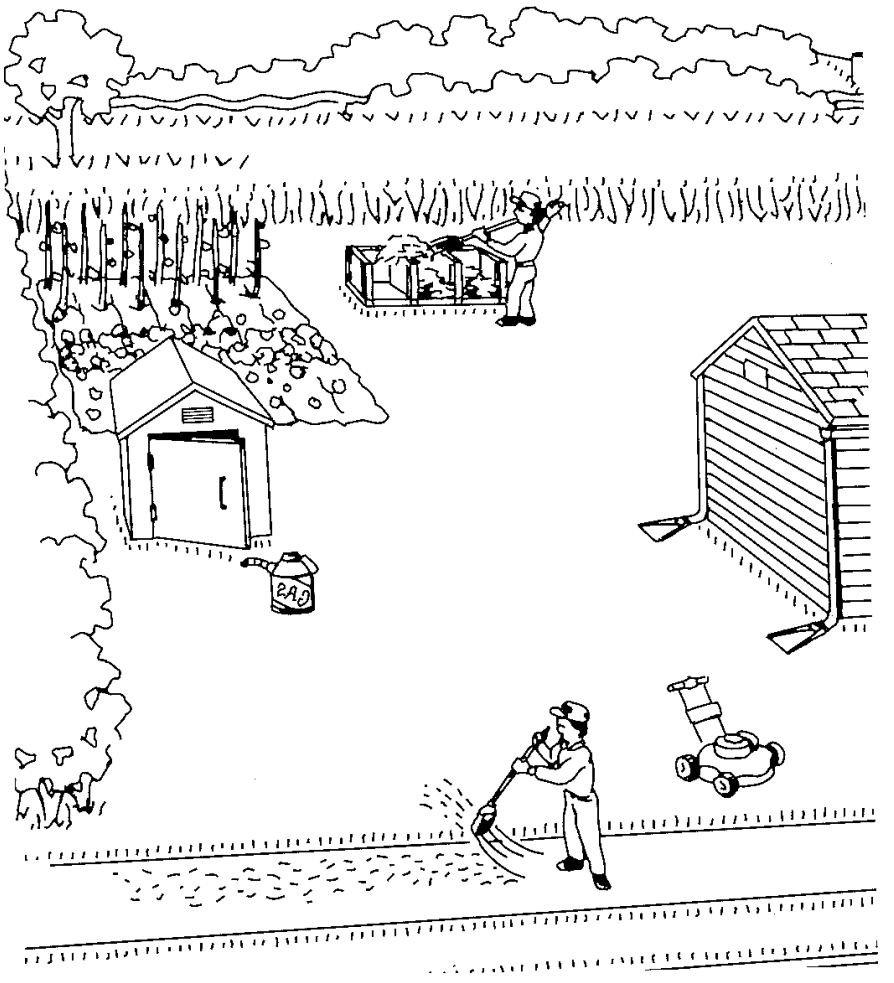


***Figure 2.3 Sweep grass clippings onto the lawn and start a compost pile to help keep yard waste out of storm sewers.***

# Table 1 - Reducing Pollution in Runoff

| | LOW RISK | MEDIUM RISK | HIGH RISK | YOUR RISK |
|---|---|---|---|---|
| **Automotive wastes** | Oil drips and fluid spills are cleaned up. Dirty car parts and other vehicle wastes are kept out of reach of stormwater runoff. | Drips and spills are not cleaned up. Car parts and other vehicle wastes are left on unpaved areas outside. | Used oil, antifreeze, and other wastes are dumped down the storm sewer, in a ditch,or on the ground. | ❒ Low<br>❒ Medium<br>❒ High |
| **Car washing** | Cars and trucks are taken to a commercial car wash or spray booth. | Cars, trucks or other items are washed on a lawn or gravel drive. | Cars, trucks or other items are washed on a driveway, street, or other paved area. | ❒ Low<br>❒ Medium<br>❒ High |
| **Storage of pesticides, fertilizers and other potentially harmful chemicals** | Chemicals are stored in waterproof containers in a garage, shed, or basement that is protected from stormwater. | Chemicals are stored in waterproof containers but within reach of stormwater. | Chemicals are stored in non-waterproof containers outdoors or within reach of stormwater. | ❒ Low<br>❒ Medium<br>❒ High |
| **Handling and use of pesticides, fertilizers and outdoor chemicals** | Spills are cleaned up immediately, particularly on paved surfaces. Minimum amounts of chemicals are applied according to label instructions. Applications are delayed to avoid rain. | Applications are not delayed to avoid rain. | Spills are not cleaned up. Products are used in higher amounts than what is recommended on the label. | ❒ Low<br>❒ Medium<br>❒ High |
| **Pet and animal wastes** | Animal and pet wastes are flushed down the toilet; buried away from gardens, wells, ditches, or areas where children play; or wrapped and placed in the garbage for disposal .* | Animal wastes are left to decompose on grass or soil. Wastes are scattered over a wide area. | Animal wastes are left on paved surfaces, concentrated in pen or yard areas, or dumped down a storm drain or in a ditch. | ❒ Low<br>❒ Medium<br>❒ High |
| **Grass clippings, leaves and other yard waste** | Grass clippings, leaves, and other yard wastes are swept off paved surfaces and onto lawns away from water flow routes. Leaves and other yard wastes are composted. | Leaves and other yard wastes are piled on the lawn next to the street for collection. | Grass clippings, leaves, and other yard wastes are left on driveways, streets, and other paved areas to be carried off by stormwater. Yard waste is burned on-site. | ❒ Low<br>❒ Medium<br>❒ High |

***Be sure to check local regulations regarding burying or landfilling pet and animal wastes.***

# PART 2 • Landscaping and Home Care to Control Runoff

Some stormwater risks can be controlled by making changes to buildings, paved surfaces, the landscape, and soil surfaces. This part reviews some easy-to-fix problems, as well as major landscape changes you might want to consider.

## Prevent runoff from areas of bare soil around your home

Usually areas of bare soil are in gardens, on newly seeded lawns and around construction projects. Even on gentle slopes, water from rain and snow can remove large amounts of soil and carry it to wetlands, rivers, and lakes.

The best way to stop erosion is to plant grass or other ground covers. Put straw or chip mulch over gardens or newly seeded areas to slow erosion. To slow runoff and trap sediment around construction sites, you can use straw bales, diversion ditches and commercially available silt fences. If you are working with a contractor, insist that runoff and erosion is controlled during construction.

## Remove paved surfaces or install alternatives

Concrete, asphalt, packed dirt roads, driveways and walkways prevent rainwater from soaking into the ground. When you have the choice, consider using other materials like gravel or wood chips for walkways. Avoid paving areas like patios. Where you need a more solid surface, interlocking cement blocks or rubber mats that allow spaces for rainwater to seep into the ground can be a good alternative to paving. If you must pour concrete, keep the paved area as short and narrow as possible.

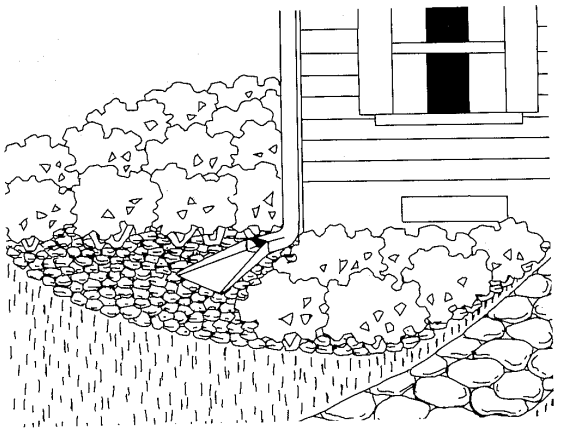


***Figure 2.4 Direct roof drainage toward the lawn or a flower bed and away from the foundation and paved surfaces.***

## Protect your basement from stormwater seepage or flooding

Stormwater in your basement can be a hazard in two ways. First, it may carry pollutants or diseases into your home. Second, it may pick up chemicals stored in your basement and carry them into the sewer or the ground. Basement windows or doors can let stormwater in. They should be sealed against leaks.

It is best if your window and door sills are at least a foot above ground level, but if not, you can protect them with clear plastic covers available in building supply stores. Window wells that extend above ground level can help divert stormwater. Ideally, your yard should slope away from the foundation to prevent water from pooling near the house and leaking into the basement.

## What to do with roof water

Your roof, like pavement, sheds water. If downspouts from roof gutters empty onto grassy areas, the water will have a chance to soak into the ground, and that's good. Aim downspouts away from foundations and paved surfaces that will encourage runoff.

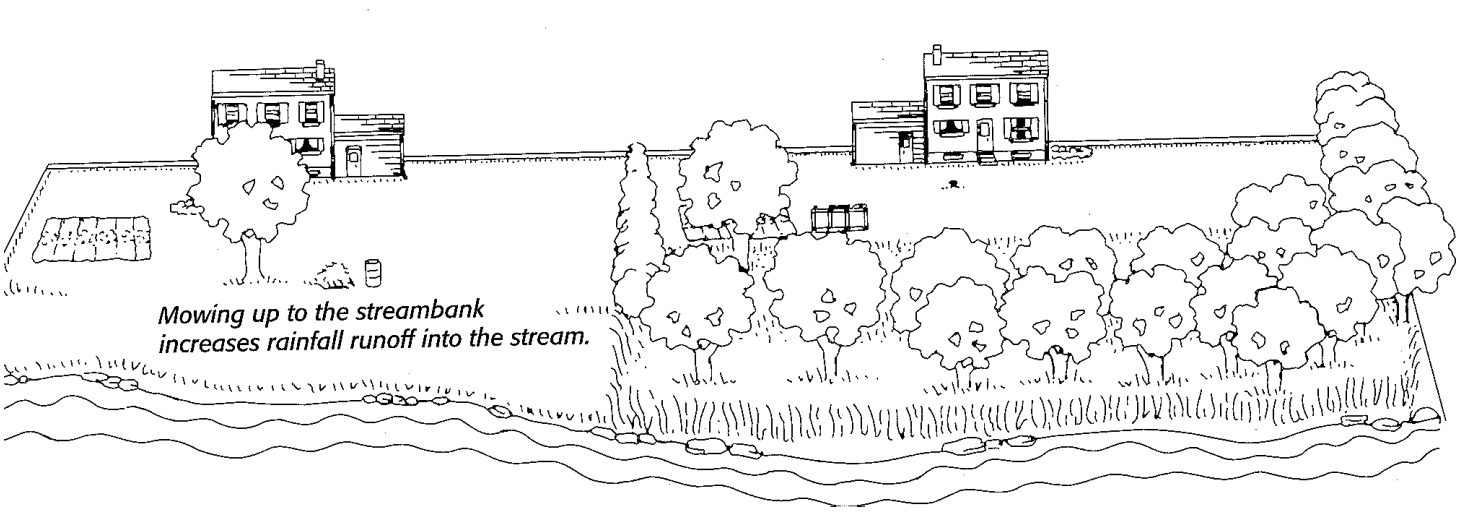



***Figure 2.5 To help prevent erosion, leave an unmowed buffer strip of thick vegetation along streambanks and lakeshores.***

(figure 2.4 on the previous page). For roofs without gutters, plant grass, spread mulch, or use gravel under the drip line to prevent soil erosion and increase the ground's capacity to absorb water. Using a cistern or rain barrel is a good way to catch rainwater for watering lawns and gardens in dry weather.

## Can you change your landscape to reduce runoff?

One of the most important goals in preventing pollution through stormwater runoff is to keep water from leaving your property, or at least slow its flow as much as possible. For years, home lawns have been sloped to encourage water to run off onto neighboring property or streets. It seemed like a good idea, but it actually contributes to water contamination through runoff.

Instead, you could provide low areas landscaped with shrubs and flowers to encourage water to soak into the ground. If your yard is hilly, you can terrace slopes to slow the flow of runoff and make mowing and gardening easier. If you have a large lot it makes sense to "naturalize" areas with prairie, woodland, or wetland plants. If your property is right on a lake or stream, one of the best ways to slow and filter runoff is to leave a buffer strip of

## Table 2 - Landscaping and Home Care to Control Runoff

| | LOW RISK | MEDIUM RISK | HIGH RISK | YOUR RISK |
|---|---|---|---|---|
| **Bare soil in lawns and gardens** | Bare spots in the lawn are promptly seeded and topped with a layer of straw or mulch. Bare soil in gardens is covered with mulch. | Grass or other ground cover is spotty, particularly on slopes. | Spots in the lawn or garden are left (exposed) without mulch or vegetation for long periods | ❒ Low<br>❒ Medium<br>❒ High |
| **Bare soil during construction** | Bare soil is seeded and mulched as soon as possible(before construction is completed). Sediment barriers are used until grass covers soil. | Soil is left bare until construction is completed. Sediment barriers are installed and maintained to detain muddy runoff until grass covers soil. | Soil is left bare and no sediment barriers are used. | ❒ Low<br>❒ Medium<br>❒ High |
| **Paved surfaces** | Paved surfaces are minimized. Alternatives such as wood chips or paving blocks are used for walkways, patios, and other areas. | Some small areas are paved for patios or basketball. | Paved surfaces are used extensively. | ❒ Low<br>❒ Medium<br>❒ High |
| **Basement protection** | Stormwater is diverted from basement windows by window well covers and other devices. Yard is sloped away from the foundation. Downspouts direct roof drainage away from the house. | No special water diversion methods are installed, but stormwater has never entered the basement. | No water diversion methods are attempted. Stormwater runoff has entered the basement or flows near the foundation. | ❒ Low<br>❒ Medium<br>❒ High |
| **Roof drainage** | Downspouts and drip lines direct roof drainage onto a lawn or garden where water soaks into the ground. | Some downspouts and drip lines discharge water onto paved surfaces or grassy areas where water runs off. | Most or all drip lines or downspouts discharge onto paved surfaces, or downspouts are connected directly to storm drains. | ❒ Low<br>❒ Medium<br>❒ High |
| **Landscaping and buffer strips** | Yard is landscaped to slow the flow of stormwater and provide areas where water soaks into the ground. Unmowed buffer strips of thick vegetation are left along streams or lakeshores. | No areas are landscaped to encourage water to soak in, but yard is relatively flat and little runoff occurs. Mowed grass or spotty vegetation exists adjacent to a stream or lake. | There is no landscaping to slow the flow of storm-water, especially on hilly, erodible properties. Stream banks or lakeshores are eroding. | ❒ Low<br>❒ Medium<br>❒ High |

thick vegetation along the waterfront (figure 2.5 on page 2-6). *For ideas, contact your tribal offices, Cooperative Extension, Natural Resources Conservation Service, or soil and water conservation district offices.*

## Do Table 2 - Landscaping and Home Care to Control Runoff

For each question in the table, write your risk level in the right-hand column. Pick the answer that best matches your situation. If you have any trouble completing the table, refer back to part 2.

## Responding to risks

Try to lower your risks. In the action checklist, record your medium- and high-risk practices. Use the advice in part 2 to help reduce your risks.

## TAKE ACTION

Go back over Tables 1 and 2 to be sure that all medium and high risks you found are recorded in the action checklist below. For each medium and high risk, write down the improvements you plan to make. Use ideas from this fact sheet and other resources to decide on actions you can realistically complete. Write a target date to help keep yourself on schedule. You don't have to do everything at once, but try to eliminate the most serious risks as soon as you can. You may find that it helps to tackle the inexpensive things first.

## For more information

Contact your local tribal offices, Cooperative Extension office, state department of natural/environmental resources, or specialists at your tribal college for information on landscaping, nonpoint source pollution, and stormwater management techniques.

## Acknowledgments

*This fact sheet has been revised from the original prepared by Carl DuPoldt, Natural Resources Conservation Service and Carolyn Johnson, University of Wisconsin-Cooperative Extension*

## ACTION CHECKLIST - Runoff from Storms

| Write all high and medium risks below. | What can you do to reduce the risk? | Set a target date for action. |
|---|---|---|
| Sample: Pet wastes left in areas where runoff occurs. | Bury wastes away from gardens, wells, ditches,or areas where children play. | One week from today: April 8 |
| | | |
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To obtain additional fact sheets in the *Connected to the Earth* series, contact your local Extension office or call Montana State University's Extension housing program at (406) 994-3451.