

SECTION 1

STORMWATER RUNOFF MANAGEMENT

This fact sheet addresses the impacts stormwater runoff has on water quality and how *you* can make a difference with **Best Management Practices (BMPs)**. BMPs are actions you can take to protect our natural resources. **The ultimate goal of this information is to minimize the negative impacts of stormwater runoff to lakes, rivers, and streams.**

1. Read the facts and information in the following pages.
2. Fill out the risk assessment worksheets (p. 1-9) in order to analyze your property's specific needs.
3. Fill out the action worksheet (p. 1-11), then **take action!**

Why is Stormwater Runoff a Problem?

Stormwater runoff is the flow of water from rain or melting snow that does not soak into the ground due to **impervious** surfaces. Under natural forested conditions, stormwater is absorbed into the ground, but as an area becomes developed or altered with structures, roads, and driveways, less water is absorbed into the soil. Not only does this disrupt the entire water cycle, it increases the amount of water that needs to be diverted (Figure 1-1).

Increased runoff is generally channeled into ditches, storm sewers, and road gullies, which often lead to lakes, rivers, and streams. Runoff picks up and carries **pollutants** such as fertilizers, pesticides, petroleum, **heavy metals**, and hazardous waste products. The movement of these materials into surface water creates a number of problems, including excess aquatic plant and **algae** growth; low **dissolved oxygen** (used up by decaying plants); negative impacts to fish, wildlife, and recreation; degraded spawning beds; and murky water. Runoff that is not diverted flows overland and unmanaged, creates problems such as drinking well contamination, flooding, and erosion (Figure 1-2).



Figure 1-1. Improperly placed sediment controls allow polluted stormwater runoff into storm drain which flows directly to surface water.

Our Responsibility

Our region is widely known for its world class fishing, immense beauty, and good water quality, which make it a popular destination for people worldwide. However, increased waterfront development raises concerns about how to maintain the good water quality we currently enjoy. If you live on the waterfront you have a special responsibility and opportunity to prevent water pollution. **One important action to take on your property is the control of stormwater runoff.** Homeowners are responsible for stormwater retention or discharge from their property. Your property alone is probably not a significant source of pollution, but the cumulative effect of numerous properties can have a substantial impact on water quality.



Figure 1-2. May 2008 photo taken by EPA of flood plume at mouth of Coeur d'Alene River. Flood events carry thousands of tons of sediment and polluted runoff into Coeur d'Alene Lake.

Minimizing Stormwater Runoff

Traditionally, the objective of stormwater management has been to transport runoff as quickly as possible through the drainage system to prevent flooding and protect lives and property. Years of research now shows how contaminated stormwater negatively affects public health and wildlife habitat. New practices encourage decreasing runoff rather than merely diverting it.

Reducing the amount of impervious surface on your property and directing runoff into an area where water can infiltrate are the best ways to minimize runoff. Ideally, stormwater should move slowly and absorb into the ground. Impervious surfaces are hardened surfaces that don't allow water to pass through. These surfaces include roofs, sidewalks, carports, roads, driveways, and patios (Figure 1-3). As you look around your property for stormwater problems, remember that you may not see the impacts created by stormwater coming off your property. Water from your land may quickly run off your driveway, along the curb, into a clogged culvert, and flood a road two miles down. In other words, everyone needs to do their part. If you reduce stormwater coming off your property, the entire drainage system will have less water to manage.

Consider stormwater and how it affects your property; walk your property during a heavy rainstorm, and watch where the water drains. Look for areas of **erosion**, potential flooding and water draining directly to surface water.

If you have an existing house and landscape, review the BMPs outlined in this section to address any stormwater runoff issues discovered while evaluating your property.

If you are in the development phase, a general step-by-step process is recommended for property located near waterbodies, on steep slopes or gradients, and on land with highly erodible soils. Begin with a quality site plan for pre-construction, construction, and post-construction. Use BMPs, and routinely practice pollution prevention. For more information on site planning and stormwater management, read Section 6, New Construction. Numerous online and community resources are available (see Resource Directory, p. 1-8).

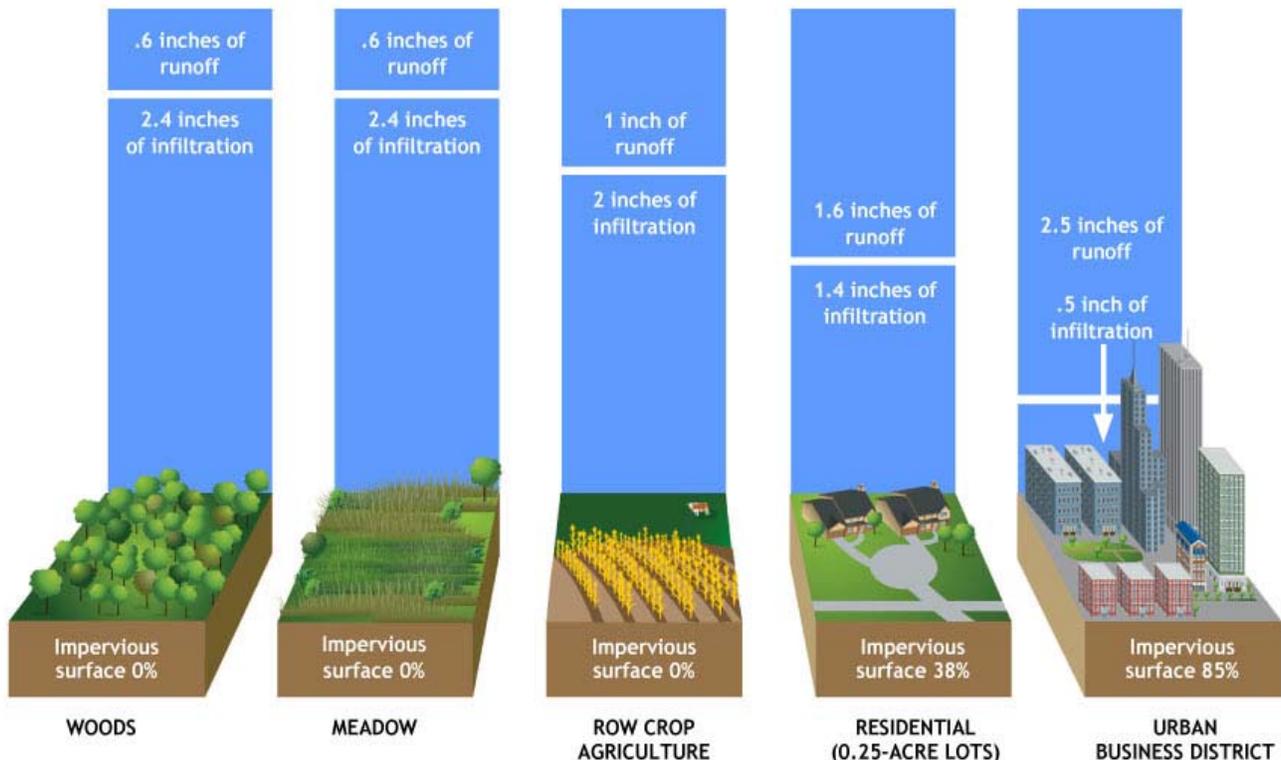


Figure 1-3. Percentage of impervious surface related to infiltration rates following a 3-inch rain storm.

Buildings and Landscapes

For buildings and landscapes, use the following BMPs:

- Limit paving, compacted dirt and covered areas.
- Use permeable pavers, flagstones, river rock or planted ground covers on patios, walkways and areas around buildings (Figure 1-4).
- Limit clearing and grading on slopes.
- Minimize cut and fill for roads, sidewalks, and footpaths to reduce erosion and still provide access.
- Preserve existing vegetation. Only disturb areas that are absolutely necessary for structures and access.
- Do not compact or pave wasted space such as corners near buildings that are not large enough for parking or driving.
- Use steps when a walkway must go directly up and down a slope, particularly near the shoreline.



Figure 1-4. Decorative permeable pavers.

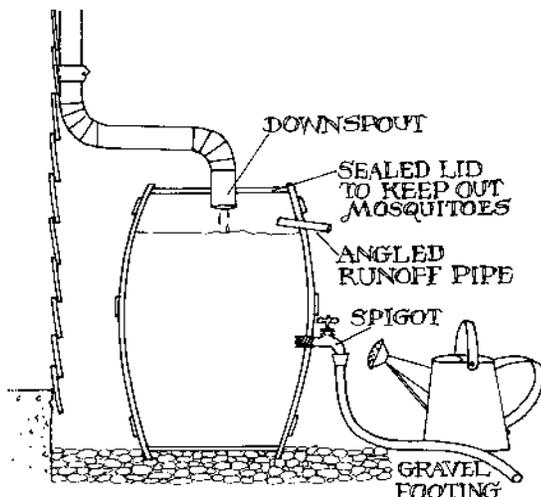


Figure 1-5. Rain barrel installed below rain spout.



- Install a rainwater catchment system to collect and reuse water for irrigation. In this region, a 2,000 square foot (ft²) roof could easily generate over 41,000 gallons of water a year (Figure 1-5).
- Install rain gutters and keep them free of debris. Place a rain garden below a downspout instead of concrete (Figure 1-6).
- Use native plants in your landscape, especially as a buffer around surface water. Native plants are very low maintenance.
- If you are building a new house or garage, consider positioning rooftops so they are perpendicular to the slope.
- To reduce erosion, avoid creating walking paths straight down slopes. Compacted soil on footpaths also promotes excessive runoff.



Figure 1-6. A rain garden installed below a downspout.

Roads, Driveways, and Ditches

- Keep culverts unplugged (Figure 1-7); keep drainage ditches deep and vegetated or rock-filled (Figure 1-8); and keep cut banks (above slope), and fill banks (below slope) from eroding by establishing vegetation.
- Minimize semi-impervious and impervious surfaces. Use permeable alternatives wherever possible (Figure 1-9).
- Incorporate a good gravel base into your private roads and driveways rather than compacted dirt.
- Locate driveways and all walkways away from slopes because steeper slopes have greater erosion potential; if you must cross a hillside, follow the contour of the slope.
- Minimize road crossings over waterways and cross at a right angle to the stream if possible.
- Sweep paved parking areas and walkways, instead of washing them down with a hose, to prevent sediment, salt, and petroleum products from washing off in runoff. Cover stockpiles of salt, sand, or soil with a tarp or store them in a building.
- Use roadside areas covered with grass for runoff and snow storage instead of impervious and semi-impervious surfaces.
- Install water bars, rolling dips, trench drains, or other diversion methods on sloping roads and driveways to slow and divert runoff (Figure 1-10). For diversion techniques, see Section 7, Access Roads and Driveway Runoff.
- Use existing natural drainage systems such as valleys or other low areas instead of digging new ditches.
- Design culverts and drainage structures to handle excessive amounts of runoff. Assistance is available from numerous public agencies (see Resource Directory, p. 1-8).



Figure 1-7. The result of an undersized/ clogged ditch.

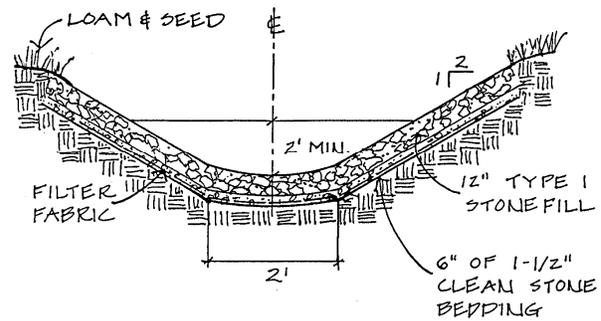


Figure 1-8. Recommended ditch design.



Figure 1-9. Permeable pavers on driveway allow stormwater to infiltrate.



Figure 1-10. Decorative trench drain in driveway directs runoff to vegetative landscaping for infiltration.

Reducing Pollutants in Runoff

Stormwater is unavoidable, but its impacts can be reduced by keeping harmful chemicals and unwanted materials out of runoff. Pollution prevention is the easiest way to keep the Coeur d'Alene Basin safe, clean, and inviting. Sources for concern are bare soils, roads, driveways, and yards. Stormwater and snowmelt collect and transport the following pollutants to surface and/or ground water:

Nutrients - Phosphorus and/or nitrogen from fertilizers, detergents, or animal wastes.

Bacteria and viruses - Human and animal wastes.

Litter - Glass, plastics, etc.

Organic chemicals - Pesticides and petroleum.

Heavy metals - Lead, copper, zinc, arsenic, and cadmium that are usually associated with sediments.

Sediment - Combination of silt/clay with chemically bound phosphorus, forest duff, stones, sand, gravel, seed, metals, and other fine residues.

Why is Phosphorus a Problem?

Phosphorus can negatively impact lake water quality because it is a *limiting nutrient* to plants. Additions of phosphorus above natural levels can accelerate algae and other aquatic plant growth (*eutrophication*), which depletes dissolved oxygen (Figure 1-11). When this plant material breaks down, it uses the dissolved oxygen in water. Overall phosphorus concentrations in Coeur d'Alene Lake are low, but in areas of dense residential development along the shoreline, phosphorus concentrations can be higher than in undeveloped areas.

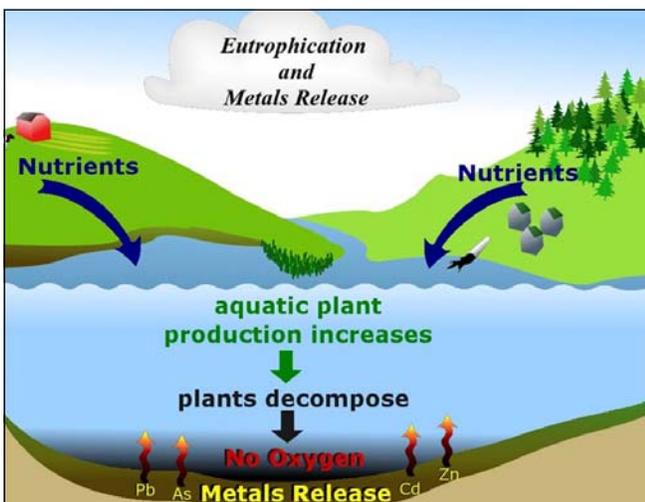


Figure 1-11. Eutrophication and metals release diagram.

Lawn and Garden Care

Lawns and gardens near the shore must be carefully planned and maintained to prevent possible contamination to stormwater runoff. Grass clippings, excess fertilizer, and other yard wastes will wash away during storm events. Excess fertilizer will add *nitrogen* and *phosphorus* to lakes, rivers, and streams promoting algae and aquatic weed growth (see Section 2, Lawn and Garden Management).

- Avoid applying fertilizers and pesticides at least 25 feet from lakes, rivers, and streams.
- Don't fertilize if you don't need to. Get a soil test kit to determine whether you need fertilizer. This could save you money.
- Choose a fertilizer with little to no phosphorus. Turf rarely needs additional phosphorus. Check phosphorus levels in your soil.
- Native vegetation is a quality alternative to cultured lawns and landscapes. Native plants do not need additional fertilizers or water; they take care of themselves.

Animal Wastes

Animal droppings can be troublesome in two ways. First, pet and livestock wastes contain nutrients that can promote the growth of algae in lakes, rivers, and streams. Second, wastes can be a source of disease. The risk of stormwater contamination increases if pet wastes are allowed to accumulate in animal pen areas or left on lawns, roads, or driveways where runoff can carry them to surface water. Reduce the risk of contamination by manure associated with dogs, cats, cattle, horses, or waterfowl by disposing of it upland.

- If animal manure is stacked, it should not be located within 150 feet of a water body. Always divert runoff from manure stacks toward a vegetated area for filtration. Covering manure piles is a great solution to prevent manure runoff.
- Apply stacked manure, once it is fully composted, to make effective use of fertilizers.
- Don't let dog waste accumulate in one central area. Either give pets lots of space away from water or routinely pick up waste and put it in the trash.
- Keep livestock fenced out of lakes, rivers, and streams.
- Waterfowl prefer to be able to walk in and out of the water but dislike plants higher than 18". Allowing plants to grow on the shore may reduce nuisance geese and ducks and their waste.

Protecting and Creating Vegetative Buffers

Riparian zones are heavily vegetated areas surrounding water bodies (Figure 1-12). The width of these areas can vary, but the natural function is to stabilize soil, filter pollutants, and provide fish and wildlife habitat. These areas provide homes to many plants and animals and are key components of lake, river, and stream environments. The thick vegetation reduces erosion and filters out pollutants. Overhanging branches provide shade and a source of insects and seeds. Riparian zones and **vegetative buffers** are quickly disappearing due to development along the shorelines (see Section 8, Riparian, Pasture, and Forest Management).



Figure 1-12. A vegetative buffer between water and upland land use protects water quality.

- For new home and lot construction, retain a high percentage of native shrubs and trees along the shoreline. As a guideline, remove no more than 20% of the native vegetation for a walkway, beach access, and home safety (Figure 1-12).
- For existing residential and business development, minimize disturbance in riparian zones along lakes, rivers, and streams. Leave native plants where possible and choose species that require little maintenance. Check your county's site disturbance ordinance for guidelines (see Resource Directory, p. 1-8).
- Contact local nurseries, University of Idaho Extension/Master Gardeners, or the Native Plant Society for recommendations on native plant design in vegetative buffers (see Resource Directory, p. 1-8).
- Keep cattle and horses out of riparian zones. Large animals trample riparian vegetation and stream banks causing erosion.

Use Caution with Hazardous Household Products



Use safe housekeeping practices when storing, handling, and disposing of potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, pharmaceuticals, fluorescent lights, and swimming pool and hot tub chemicals (see Section 5, Hazardous Materials).

- When possible use alternative products that are non-toxic and environmentally friendly.
- *Do not* dispose of household hazardous waste:
 - In the trash
 - Down storm drains
 - In creeks, streams, rivers, or lakes
 - Down sinks and toilets



- Unused household hazardous wastes can be disposed of properly at recycling/transfer stations in Kootenai County and Spokane County (see Resource Directory, p. 1-8).
- Change buying habits: purchase fewer products, and buy in appropriate quantities.
- Store products above flood levels of basements and storage sheds and off ground level.
- Read and follow instructions on product labels.
- Store products in their original containers, and keep them well labeled.

Vehicle Use and Engine Maintenance

Cars and boats are a major source of pollutants such as heavy metals, oil and grease, and other hydrocarbons through exhaust, leaks, spills, corrosion, and wear and tear of parts. These pollutants are deposited on roadways and carried into receiving waters by stormwater runoff (Figure 1-13; see also Section 5, Household Hazardous Wastes).



- Don't spill. Use drip pans and draining boards to capture oils and solvents, then dispose of properly.
- Use rags and dry absorbent materials like kitty litter and baking soda to clean up spills, leaks, and drips.
- Clean up oil stains and avoid outdoor spills of anti-freeze, brake fluid, and other engine fluids.
- Recycle unused fluids. Used oil, antifreeze, and cleaners can be taken to county recycling/transfer stations (see Resource Directory, p. 1-8).
- Never dump used oil, antifreeze, or gasoline down a storm drain, in a ditch, or on the ground. These wastes contain toxic compounds that can end up in the lake and in drinking water.
- Wash vehicles on the lawn or at a commercial car wash. Do not use cleaners that contain ammonia, chlorinated solvents, petroleum distillates, or lye.
- Buy and use only nontoxic, phosphate-free, biodegradable cleaners.
- Routine maintenance of your vehicle and boat helps prevent oil leaks and ensures efficient fuel consumption and clean exhaust.



Figure 1-13. Vehicle oil going down storm drain.

Erosion and Sedimentation Prevention

If you are building a new house or structure, landscaping, or putting in a new driveway or road, consider the effects of construction and other activities on nearby surface water. Bare soil is easily washed into nearby water. Excess soil in suspension, washes into nearby streams and buries coarse-sized channel sediment that is necessary for fish spawning. Sediment also carries excess phosphorus into surface water. For more erosion prevention methods, read Section 6, New Construction.

- Preserve existing vegetation whenever possible. Once vegetation is removed and soil is exposed, the rate of erosion is greatly increased.
- Cover bare soil immediately with layer of straw or other organic material (for hay or straw, use one 50 pound bale per 500 ft²). This covering will help keep soil in place (Figure 1-14).
- Replant disturbed areas as soon as possible.
- When landscaping or building, stage construction so that one area is stabilized before another area is disturbed.
- If you have rainspouts and gutters, direct the discharge to a grassy area, garden, or forest swale, where it can soak into the ground.
- Avoid damaging adjacent property.
- Design culverts and drainage structures to handle excessive amounts of runoff.
- Protect storm sewers from sedimentation so they can carry stormwater as intended.
- Inspect construction projects continually for potential erosion issues. Inspect area immediately after installing erosion control measures, following any severe rainstorm, before reseeding, and when nearing the completion of construction work.



Figure 1-14. Straw mulch covering bare soil to prevent erosion.

Resource Directory

Stormwater Runoff Management

Kootenai County

Community Development (Planning and Building)

451 Government Way
Coeur d'Alene, ID 83814
(208) 446-1000

Solid Waste and Hazardous Materials Transfer Stations

(208) 446-1430
www.kcgov.us/departments/solidwaste

Ramsey Transfer Station
3650 Ramsey Road
Coeur d'Alene, ID 83815

Post Falls Transfer Station
15580 W. Prairie Avenue
Post Falls, ID 83854

Kootenai-Shoshone

Soil and Water Conservation District

7830 Meadowlark Way, Suite C-1
Coeur d'Alene, ID 83815
(208) 762-4939 ext. 101

Benewah Soil and Water Conservation District

900 E Street
PO Box 488
Plummer, ID 83851
(208) 686-1699

City of Coeur d'Alene Stormwater Utility

710 E. Mullan Avenue
Coeur d'Alene, ID 83814-3958
(208) 769-2233

Lakes Highway District

11341 N. Ramsey Road
Hayden Lake, ID 83835
(208) 772-7527

Idaho Department of Environmental Quality

Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Coeur d'Alene Tribe -

Lake Management Department

Coeur d'Alene Office
424 Sherman Avenue, Suite 306
Coeur d'Alene, ID 83814
(208) 667-5772

Plummer Office
850 A Street
PO Box 408
Plummer, ID 83851
(208) 686-5302

University of Idaho Extension

Master Gardeners and Plant Clinic

Kootenai County Extension
1808 N. 3rd Street
Coeur d'Alene, ID 83814
(208) 446-1680

Benewah County Extension
701 College Avenue, Suite LL2
St. Maries, ID 83861
(208) 245-2422

Coeur d'Alene Reservation Extension
402 Anne Antelope
Plummer, ID 83851
(208) 686-1716

Other Resources

Center for Watershed Protection

www.cwp.org

Stormwater Manager's Resource Center

www.stormwatercenter.net

Kinnikinnick Native Plant Society, Inc.

www.nativeplantsociety.org

Stormwater Erosion Education Program (SEEP)

www.panhandleseep.org

Stormwater

Journal for Surface Water Professionals

www.stormwater.org

Risk Assessment Worksheets

Stormwater Management Runoff

Assessment Worksheet 1 - Reducing Pollutants in Runoff

Use this assessment worksheet to identify potential environmental risks. For each question, indicate your risk level in the right-hand column. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished, go to the Stormwater Runoff Management Action Worksheet on page 1-11 and record your medium and high-risk practices. The goal is to lower your risks. Use the BMP recommendations provided in this section to help you determine the best solution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Automotive wastes	I clean up all drips and spills, and recycle oil and fluids. I keep dirty car parts and other vehicle wastes out of runoff.	I don't clean up drips and spills. I leave car parts and other vehicle wastes on the ground.	I dump used oil, anti-freeze, and other wastes in a ditch or onto the ground.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Vehicle washing	I wash my vehicles on a lawn or gravel drive with phosphate-free soap. I make sure that runoff is diverted to vegetated areas.	I wash my vehicles at a commercial car wash, but I don't know if the operation uses BMPs.	I wash my vehicles on an impervious surface and my runoff runs directly into a lake or stream. I don't pay attention to what kind of soap I use.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Storing pesticides and other chemicals	I store my chemicals in waterproof containers in a garage, shed, or basement that is protected from stormwater.	My chemicals are stored in waterproof containers but within reach of stormwater.	My chemicals are stored in non-waterproof containers outdoors or within reach of stormwater.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Handling and using pesticides, fertilizers, and other chemicals	I immediately clean up any spills. I use alternatives to chemicals whenever I can, and apply the chemicals I do use according to the label instructions.	I use chemical applications according to label instructions, but I don't clean up spills.	I don't clean up spills, and I use products in higher amounts than what the label recommends.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Pet and animal wastes	I bury animal wastes away from gardens, wells, or ditches; or I put them in the garbage.	I leave animal wastes to decompose on grass or soil, but the wastes are scattered over a wide area.	I leave animal wastes on paved surfaces; or my pet wastes are concentrated in pen or yard areas; or I dump them in a ditch.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

Assessment Worksheet 2 - Minimizing Runoff

Use this assessment worksheet to identify potential environmental risks. For each question, indicate your risk level in the right-hand column. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished, go to the Stormwater Runoff Management Action Worksheet on page 1-11 and record your medium and high-risk practices. The goal is to lower your risks. Use the BMP recommendations provided in this section to help you determine the best solution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Bare soil, gardens, and construction projects	I seed any areas of bare soil and top them with a layer of mulch. I use sediment retention barriers (straw wattles and silt fences) until vegetation is established.	I leave soil bare during construction, but I use natural features and vegetation to slow most runoff.	My soil is left bare. No natural features or sediment retention barriers are used to slow runoff.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Impervious areas (rooftops, paved sidewalks, driveways, and roads)	My landscape plan minimizes paved surfaces; pavers are used instead. I use vegetated buffers to divert runoff from impervious surface areas to prevent drainage directly to surface water.	I have some small areas of my land paved for patios.	A lot of surfaces on my property are impervious to water. These areas also drain water directly into a lake, river, or stream.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Roof drainage	The downspouts on my home direct roof drainage onto my lawn, a rain garden, or a vegetated area.	Some of my home's downspouts discharge water onto paved surfaces.	Most or all of the downspouts on my home discharge onto paved or bare soil surfaces.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Landscaping and vegetative buffers	My yard is landscaped to slow the flow of stormwater and to provide areas where water soaks into the ground. I have left a thick vegetative buffer along the shoreline.	My yard is relatively flat with landscaping that allows water to soak in. I have some mowed grass or spotty vegetation adjacent to my shoreline.	I have no landscaping to slow the flow of stormwater. Steep slopes and shoreline on my property are eroding.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Septic system	I divert stormwater runoff away from my drainfield.	Some stormwater runoff flows over my septic drainfield but only a small amount.	Stormwater runoff runs toward my septic drainfield and saturates the ground.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

