

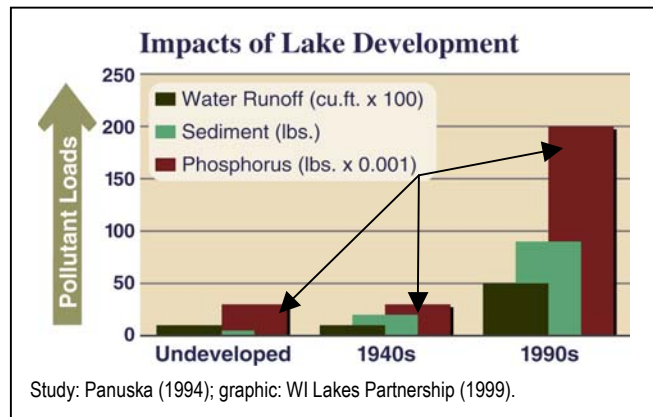
Controlling Runoff and Erosion

Runoff is water from precipitation, rain or melting snow, that flows across the surface of the land. It composes a fraction of the total volume of precipitation that lands on the ground; the remainder seeps into the ground through the soil or evaporates back into the atmosphere with the help of the sun and vegetation. Infiltration is the process by which water from precipitation percolates into the ground through the soil, eventually entering the groundwater aquifer and in some cases our lakes and streams. Runoff, often called stormwater runoff when used to refer to the unnaturally large volumes of runoff we create by paving roads and

driveways and building structures such as our homes and other buildings, can cause flooding, erosion, water pollution, and property damage, and it can ultimately cause the loss of fish and wildlife habitat and reduced water quality in our lakes and streams.

Erosion is caused when soil particles are dislodged by water falling on or running across bare soil or vegetated areas that are unable to handle the force of the flowing water. Erosion problems can be made worse by the increased volumes of stormwater runoff generated by the impervious (non-porous) surfaces we create, such as rooftops, decks, driveways, and paved walkways. In addition to the damage erosion can cause to property, eroded soil particles (sediments) can also cause problems when they run off into lakes and streams. For instance, these sediments can clog fish spawning beds, hurting reproduction, and they can bury mussels or wetland plants, eventually killing them. Additionally, eroded soil particles, whether they are from farm fields or our lawns, often contain nutrients from fertilizers, and they can contain toxic chemicals, such as pesticides we have applied to the land and oil and anti-freeze from our cars. Erosion can thus lead to property damage, loss of fish and wildlife habitat, and reduced water quality and clarity in our lakes and streams.

Waterfront properties, due to their close proximity and direct connection to surface water bodies, can play an especially important role both in the creation of harmful stormwater runoff and erosion and in the control and reduction of both.



What can waterfront property owners do?

Enjoying your waterfront property in an environmentally friendly way does not require you to leave it entirely undeveloped. Rather, by considering the best way to design the development on your property given the special characteristics of the site, by limiting as much as possible the area covered by impervious surfaces, by managing stormwater runoff to minimize its impacts, and by relying on Mother Nature's ability to mitigate some of the potential impacts of runoff and erosion naturally, you can develop your waterfront property in a way that won't harm the lake or stream that brought you there in the first place. All of these things can be considered both in the context of new development on a previously undeveloped waterfront lot and in cases where waterfront property has already been developed or even redeveloped.

4 key steps in minimizing runoff and erosion on your waterfront property:

- **Site design** – development that is appropriate for the landscape on the site
- **Limiting impervious surfaces** – stormwater runoff prevention at the source
- **Stormwater management** – treating stormwater runoff to minimize impacts
- **Vegetated buffers** – a little protection free of charge from Mother Nature

Controlling Runoff and Erosion - Assessing Your Property

Conduct a self-assessment of your property, focusing on the four key areas addressed above – site design, limiting impervious surfaces, stormwater management, and vegetated buffers.

Site Design – Mark the location of your (proposed or existing) driveway, house/cabin, and other structures on the site map as well as notable landscape features such as the lake or stream, steep slopes, forested areas, (isolated or riparian) wetlands, natural drainageways, etc.

Does the site naturally drain **toward** or **away from** (circle one) the lake or stream?
 Is the developed portion of the land flat, dry, and relatively far removed from the lake or stream? **Yes** _____ **No** _____

Do the designs and locations of the buildings and driveway conform to the topography of your site? **Yes** _____ **No** _____

Can the driveway, any of the structures, or any other impervious surfaces on the property be placed in locations where they would be less likely to result in runoff and/or erosion? An example might be to relocate a driveway, gazebo, storage shed, or other structure from atop a steep slope above the lake or stream to a more suitable location where runoff and erosion will be less of a problem.
Yes _____ **No** _____ If yes, which structures or surfaces can be moved? _____

Limiting Impervious Surfaces – Make sure all impervious surfaces are drawn on the site map and labeled. If possible, measure the area (in square feet) of each impervious surface as well as the area of your entire lot.

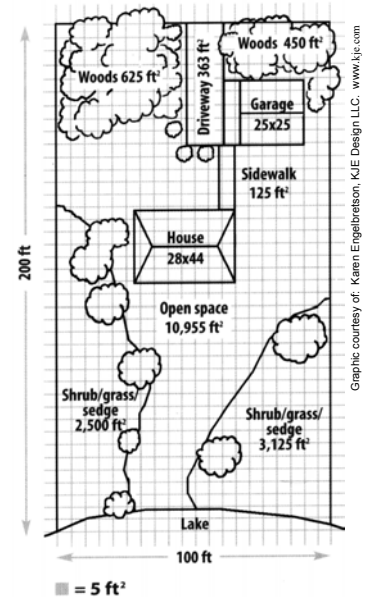
What percentage of your lot is covered by impervious surfaces?

- a. Total impervious surface area = _____ square feet
- b. Total lot area = _____ square feet
- c. Impervious surface area fraction = _____ = a / b
- d. Percent impervious surface area = _____ % = c x 100

Is each impervious surface on your property a necessity? **Yes** _____ **No** _____

If you can answer **Yes** for each surface, then you may move on. If you answered **No** for any impervious surface on your property, then think about how the purpose(s) for which that surface was built can be met with an alternative (more porous / permeable) design or by locating that impervious surface elsewhere. One example would be to use mulch, gravel, brick, or stone rather than concrete or asphalt for a walking path.

<u>Impervious Surface</u>	<u>Comments/thoughts: necessity and location</u>
_____	_____
_____	_____
_____	_____



Soils that have been compacted by heavy equipment before, during, or after construction are less permeable than natural, undisturbed soils. Can you minimize the area to be compacted by heavy equipment during construction on your property, or are there any areas on your property that were compacted by past activities where restoration maybe able to enhance infiltration? **Yes** _____ **No** _____ Description: _____

Did you know that even lawns are relatively impervious when compared with natural vegetation and soils that have not been compacted by construction, mowing, and other activities? Are you mowing more lawn on your property than your family needs (and wants to have to mow all the time!)? Are there any mowed areas (or areas proposed to become lawn) on your property that could be restored to (or left in) a natural state to reduce runoff and enhance infiltration? **Yes** _____ **No** _____
 If yes, describe those areas: _____

Assessing your Property, continued

Stormwater Management – *Mark any stormwater management practices (for the conveyance, storage, or treatment of stormwater) on the site map, and indicate any areas where stormwater runoff might be a potential problem in your mind.*

Are there any locations on your property where significant volumes of stormwater runoff are being generated?

Yes _____ **No** _____ *Please mark these on the site map if you haven't already.* If yes, begin thinking about how stormwater runoff might be addressed in these locations (by moving or removing what is causing the runoff or managing the runoff using diversion, infiltration, and/or storage practices) and jot down any ideas you may have here.

Are the soils on your site suitable for infiltration stormwater management practices? **Yes** _____ **No** _____

(Soil test kits and information on soil testing are available from your County Extension office. Infiltration practices work best where infiltration rates range from 0.5 – 3 inches per hour. In general, sandy and gravelly soils infiltrate water quite well, while soils with more than 30 percent clay or more than 40 percent silt and clay do not infiltrate very well. In soils high in clay and silt, infiltration practices may not be an option. Also, locations where bedrock or groundwater is very close to the soil surface are less suitable for infiltration practices. Consult with experts if needed on this.)

Is stormwater runoff on your property being **properly managed** (infiltrated to maintain groundwater recharge, diverted and stored to minimize flooding and erosion, and/or treated to minimize threats to water quality), or is it currently **unmanaged** (circle one)?

Are there places on your property where stormwater runoff might be able to be stored in a rain barrel or some other storage structure and/or diverted to a rain garden or some other infiltration practice for infiltration into the ground? **Yes** _____ **No** _____

Vegetated Buffers – *If vegetated buffer areas are present on your property along the lake or stream, any wetlands, and any natural drainageways, mark them on the site map. If there are any areas on the property where you think vegetated buffers ought to be created, indicate these on the map as well. (For additional detailed information on vegetated buffers, please refer to the Go 'Au Naturel' guide.)*

Does your property feature a vegetated buffer along any of the areas listed above? **Yes** _____ **No** _____ *Please indicate all of these on the site map if you haven't already.* _____

Are there any areas on the property that should have buffer zones to protect water quality? **Yes** _____ **No** _____ *Please indicate all of these on the site map if you haven't already and describe them here.* _____

Are any of your buffers compromised by runoff or erosion from your property or adjacent property? **Yes** _____ **No** _____

Controlling Runoff and Erosion - Finding Solutions

The following are suggestions for ways you can minimize stormwater erosion and runoff on your waterfront property. Having answered the questions on the previous pages and thought seriously about your property's potential to create runoff and erosion, you are now ready to consider potential solutions to those problems using the following techniques.

Site Design – Whether you are designing a new home on a formerly undeveloped lot or just designing a new gazebo or a walkway down to the water, there are many important things to think about in your project's planning and design stages.

- Position your driveway, home, and other structures on the site so they blend into their surroundings and conform to the existing topography to minimize both environmental and aesthetic impacts.
- Keep structures and other impervious surfaces away from steep slopes, wetlands, natural drainageways, and shorelines as much as possible to minimize potential impacts on surface waters from runoff and erosion.
- Think about ways in which you can reduce impervious surface areas in the design phase of your project.
- Think about the potential runoff and erosion issues your project may cause while you're in the design phase (many runoff and erosion problems occur during the construction phase; refer to the UW-Extension publication *Erosion Control for Home Builders* for more information), and think about how stormwater management techniques might be incorporated into the design at this early stage so they won't have to be retrofitted later.
- Think about the areas on your property that ought to be buffered from impacts from the developed portion of the site and make sure to retain significant naturally vegetated buffers around those areas.

Limiting Impervious Surfaces – Since almost all runoff originates on an impervious surface of one kind or another, minimizing the area covered by these surfaces is an important early step in minimizing runoff, erosion and the host of problems they can cause.

- Wherever possible, replace impervious surfaces with pervious designs aimed at achieving the same purposes.
- To maintain or enhance infiltration and prevent or reduce runoff, minimize the areas to be compacted by heavy equipment during construction on your property or restore with native vegetation any areas on your property that were compacted by past activities.
- Because of lawns' relatively poor ability to foster infiltration, minimize mowed areas of your property as much as possible and maintain or restore native vegetation in those areas (this is especially important in close proximity to a lake or stream shoreline, on steep slopes, or near wetlands and natural drainageways).

Stormwater Management - Having considered the important things listed above during the site design phase of your development and minimized proposed and existing impervious surfaces as much as possible, you must now consider how to go about managing the stormwater runoff that will (or already does) result from the development on your property.

- Attempt to infiltrate stormwater runoff as much as possible so that the groundwater continues to be recharged as it was prior to development. Rain gardens (refer to UW-Extension's *Rain Gardens* brochure for more information) and infiltration wells and trenches are effective infiltration techniques around the home. In some cases, one may need to construct diversionary structures to move runoff water from where it is created to where it can be managed.
- If infiltration is not feasible due to soil characteristics or other constraints, implement practices to store and treat stormwater and release it slowly over time (to reduce flooding, excessive runoff, and erosion problems while minimizing potential water quality impacts). Rain barrels and detention basins are two good techniques suited for these purposes.
- Direct rooftop and other runoff to more pervious areas such as yards, grass swales, or other vegetated areas and avoid routing rooftop runoff to the roadway and the storm sewer system (if your neighborhood has one).

Vegetated Buffers – Please refer to the *Go 'Au Naturel'* waterfront property guide (also included in your packet) for more in-depth coverage of the benefits of vegetated buffers. Buffers are included here due to the fact that, among their many other benefits, they can serve as a last line of defense to prevent runoff, sediments, and pollutants from reaching our water bodies and diminishing water quality and fish and wildlife habitat.

- Maintain or restore vegetated buffers along shoreline areas, wetlands, natural drainageways, and steep slopes on your property.
- Make sure that your buffers are not compromised by runoff or erosion from your property or adjacent properties. If necessary, take corrective actions to both stem existing problems and restore the benefits of your buffer.

Controlling Runoff and Erosion - Action Plan Checklist

Using your property assessment and list of potential solutions, this is your opportunity to propose specific actions that you can take to address any runoff and erosion concerns you may have on your property. Consider where you may have the most impact on protecting your property, adjacent properties, and water quality in your lake or stream. Enter the selected actions in the chart below and set a target date for when you hope to accomplish each of those actions.

Controlling Runoff & Erosion		Action Strategy	Target Date
Site Design	1.		
	2.		
	3.		
	4.		
	Notes:		
Impervious Surfaces	1.		
	2.		
	3.		
	4.		
	Notes:		
Stormwater Management	1.		
	2.		
	3.		
	4.		
	Notes:		
Vegetated Buffers	1.		
	2.		
	3.		
	4.		
	Notes:		

References:

Controlling Runoff and Erosion on your Waterfront Property (draft edition). Cheryl Bursik, Dragonfly Consulting. Polk County, Wisconsin Shoreland Property Owner Handbook. 2002. Published by Polk County, Wisconsin.

Controlling Runoff and Erosion guide prepared by:

Ezra Meyer, Wisconsin Association of Lakes Education Specialist and Susan Tesarik, Wisconsin Association of Lakes Education Director. August 2003.