DNR
GUIDANCE LETTERS
FOR LOCAL GOVERNMENTS

Administration, Compliance, and Enforcement

The effectiveness of the shoreland management program in protecting lakes and rivers for current and future generations depends heavily on the effectiveness of ordinance administration and enforcement efforts. Efficient ordinance administration and enforcement helps preserve the long-term land and water resource values that residents seek in owning shoreland properties and that the local government enjoys in the property values and tax base they generate.

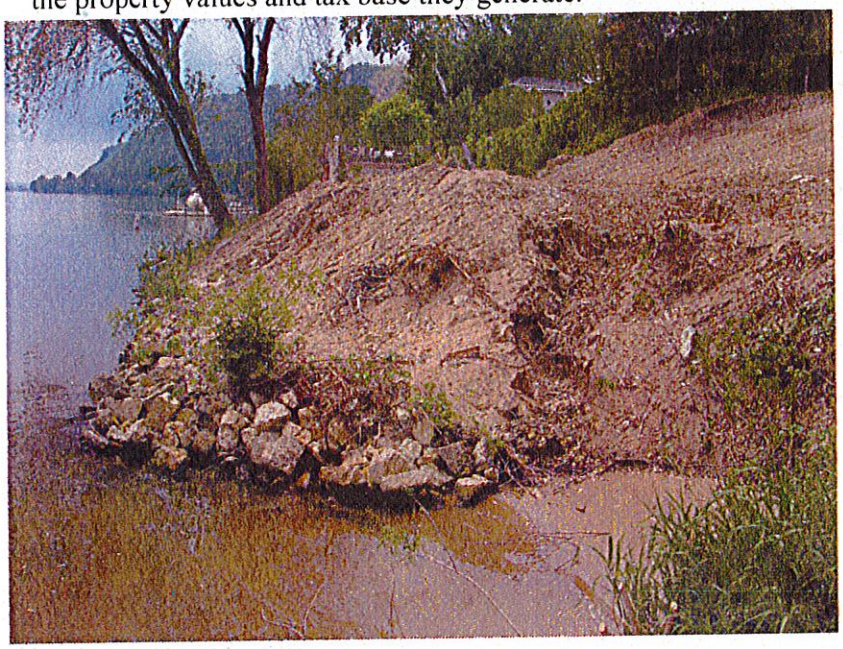


Figure 1. A landowner removed vegetation and changed a slope, which had impacts on the slope and the lake. Local government units must enforce violations of ordinances firmly and fairly.

Compliance and enforcement controls are designed to protect the long-term health of lakes and river systems. Local government units need to look at the water body as a whole when making individual decisions. The multiplied effect of many individual decisions can impair the whole water body for future generations. Effective protection of the natural resource values, which everyone generally desires, almost always competes with the individual landowner's desire to modify the property. A landowner's desire to modify the property contrary to community values and environmental health must be secondary to the best interests of the community who depends on public waters for enjoyment and recreation.

Equitable treatment and uniform application of the controls will minimize difficulties for planning and zoning staffs and governing boards. Residents will quickly recognize that ordinances are important and the local government unit is serious about protecting water resources based on how staffs and boards handle compliance and enforcement activities. Landowners who ignore ordinance requirements or the terms of their permits need to be dealt with equitably and effectively. Ineffective, inequitable, or inconsistent management of compliance issues will create difficulties for local government units and their staffs, which can unnecessarily consume resources and result in costly and unnecessary litigation.

The local government unit should establish, empower, and support a code enforcement officer who is able to ensure that residents are meeting their responsibilities. Use of existing employees, such as police department or sheriff's office personnel can assist in the enforcement of your shoreland management code. If the codes are fairly and effectively enforced with appropriate consequences, landowners will generally understand and respect the codes and follow the process for approvals. Many communities, however, are inconsistent on enforcement of ordinances. Residents may learn that asking forgiveness for violating an ordinance is easier than adhering to ordinance requirements. This can escalate into more serious problems if others learn that violators were successful in retaining improvements that would not have been allowed by the ordinance. A strong and consistent enforcement process will prevent this problem.

Recommendations

Carefully following the ordinances, following established procedures, inspecting properties and projects, documenting communications, and keeping good records will minimize risk of a lawsuit by landowners

dissatisfied with controls they perceive to limit the use of their property. The ordinance will always offer people reasonable use of their property, but it will impose reasonable restrictions to protect the health, safety, and welfare of the larger community and protect water resources.

Any local government unit that is threatened with a lawsuit for applying and enforcing its shoreland ordinance should contact the local DNR area hydrologist. The DNR will help the local government unit to defend its efforts to comply with state law and to protect residents and water resources.

The shoreland ordinance is designed to limit cumulative impacts on water resources from development on land adjacent to the water resource. Impairments will occur even with good enforcement and administration; failure to properly administer the ordinance today will greatly exacerbate resulting problems that will be extremely difficult and expensive to resolve in the future. The DNR passionately encourages communities to allow future generations to inherit water resources that remain valuable to them in the same way residents currently enjoy them. That will not be possible unless every community is diligent in administering ordinances now.

Grading and Filling within Shoreland Areas

Local shoreland management ordinances require permits for grading and filling activities in shoreland areas. Sediment carried by stormwater runoff is one of the most serious surface-water pollutants in Minnesota; therefore, the shoreland district is a critical area for protecting our lakes, wetlands, and streams from sedimentation. Sound erosion-control measures must be implemented in shoreland areas for any land alteration projects.

Figure 1. Alterations to vegetation and topography can adversely affect lakes and streams. Erosion-control measures must be implemented for a cut-and-fill road (above) or home site.

Controlling alterations to vegetation and topography is needed to avoid adverse impacts on the natural resources in shoreland areas.. These impacts can impair or destroy fish and wildlife habitat through sedimentation or through the intentional filling of low areas that previously held and filtered surface-water runoff before discharge to our waters. Removal of shoreland vegetation must also be carefully regulated because the vegetation provides erosion protection, habitat, and buffering from the impacts of shoreland development. On some shoreland properties, grading and filling can result in bank failure, which could also affect structures and have more serious impacts on the health of the water body.

Applicants must submit an erosion-control plan *prior* to permit approval. This plan should include the following details:

- total amount, extent, and schedule for work to be done and
- phasing of work to limit the extent of area disturbed at any one time.

A map should be submitted with the plan showing the following features:

- existing and proposed grades and drainage patterns;
- physical features, including trees greater than 4 inches in diameter and whether they will be disturbed, property boundaries, driveways, and both existing and proposed structures;
- locations of critical areas such as bluffs, wetlands, steep slopes, tile inlets, drainages, stormwater catch basins, ponds, lakes, streams, ditches, and swales; and
- location and design of both temporary and permanent erosion-control measures to be installed prior to or concurrent with construction activities, including silt fences, sediment ponds, sod, temporary mulch, inlet protection for catch basins and tile drains, rock check dams, diversions, and permanent vegetation.

Silt fences are not effective for controlling sediment where water is constantly flowing.

Wetland areas in shoreland districts need special protection. Tree and brush removal in wooded areas should be restricted to the minimum amount necessary in order to maintain the natural character of shore-

lands and to avoid increased runoff after development of the site. A healthy understory of native vegetation is also important in maintaining the site's ecology. Grading and filling in the shore impact zone should be limited to only those projects that adequately address existing erosion problems or shoreline stabilization. Prohibited activities include *grading and filling not associated with a permitted use for projects where intensive clearing of vegetation occurs in the bluff impact and shore impact zones.*

Recommendations
The Department of Natural Resources urges careful control and management of grading, filling, and associated vegetation removal in shoreland areas:

- Grading and filling in the shore impact zone should be limited to a total of 10 cubic yards.
- Grading and filling in shoreland areas should not be allowed to convert natural deep rooted vegetative buffers of trees, shrubs and native grasses into lawns or ornamental landscaping projects especially on slopes.
- Installation of rock riprap should follow DNR guidelines. If rock riprap is installed, it should protect the bank where erosion is likely from waves or ice pushes.
- Rock should not be placed several feet up the bank where water levels will never be a threat to bank stability.
- Rock, if it is used, should provide essential erosion control and not be used as a landscaping feature on a natural shore.

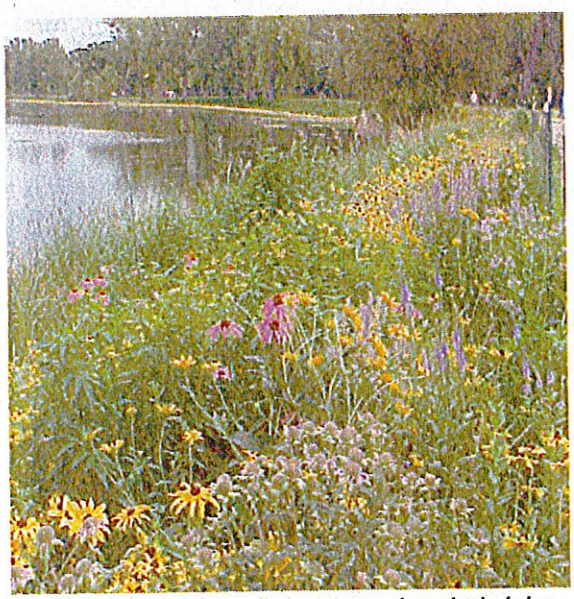
The long-term health of public waters depends on the wise management of their respective shoreland areas and of other contributing lands throughout their watersheds. Through careful management of grading and filling activities, erosion and runoff can be minimized to protect these water bodies for present and future generations. Maintaining natural buffers and limiting grading and filling activities to essential needs will positively influence the quality of our waters. Applicants should be referred to the county soil and water conservation district for guidance or potential assistance in preparing an erosion-control plan. The new Minnesota Stormwater Manual has been rated by the U.S. Environmental Protection Agency as one of the best in the nation. It is an excellent source of best management practices specific to Minnesota's conditions and can be accessed at the Minnesota Pollution Control Agency's web site http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html.

Natural Shorelines

Minnesota's shorelines are being urbanized at a record pace. Structures and turf grass lawns replace natural shorelines and have adverse impacts on water quality and the diverse life that depends on a natural shoreline. A natural shoreline is more than an aesthetic buffer for the water; it is a complex ecosystem that provides habitat for fish and wildlife and protects water quality for the entire water body.

Figure 1. (above) Shoreline of Lake Phalen in St. Paul at the start of a restoration project.

Figure 2. (below) The restoration of natural vegetation 2 years later at Lake Phalen.



Our lakes, wetlands, and streams need healthy shoreline buffers to reduce and filter rainwater runoff. The volume of rainwater runoff from manicured lawns can be five times to 10 times higher than natural shorelines, and can carry up to nine times more phosphorus and up to 18 times more sediment to the water body. Runoff from lawns occurs more frequently than previously thought with a high percentage of storms resulting in runoff. Water flowing over lawn surfaces picks up more dirt, pesticides, toxic chemicals, pet waste, and other pollutants than water flowing over a natural shoreline. Therefore, it is critical to maintain or restore natural shorelines.

Natural shorelines not only reduce runoff but also help stabilize water bodies and riverbanks, reducing erosion and sedimentation. The roots of trees and bushes hold soil better than turf grass does, and they provide pathways for water to soak into the soil. Trees and bushes can also reduce the impact of rain hitting the soil that can start the erosion process. A natural shoreline will also preserve the natural character and beauty of the shoreline for any others recreating on the water by screening the shoreland development.

Nobody develops a home site on a lake or river with the intent of ruining the water body, but we need to be more careful not to destroy homes for fish and wildlife as we make our home. Developing a home site may also diminish the water quality and scenic quality of our water bodies. A lawn down to the lake, stream, or wetland edge negatively affects the public value of Minnesota's lakes and streams. Residents living on the waterfront have a responsibility to leave as much natural shore or restore as much shoreline as possible.

A necessary part of managing the shoreland and shore impact zones in your community is to promote the restoration of areas that are degraded. Natural shorelines are gaining acceptance as people understand that shorelines play an important role in protecting their lakes and streams and that these buffers can bring health and natural beauty back to the yards and water.

Natural shorelines are protected through shoreland management programs based on community ordinances. The shore impact zone is defined as the land located between the ordinary high water level of a public water and a line parallel to it at a setback of 50 percent of the structure setback.

Recommendations

Any encroachment into the shore impact zone, including pathways, stairs, or other structures, should account for visual impacts. Pathways, stairs, homes, and sheds can be less conspicuous if trees, bushes, or even natural grasses screen them. Retaining walls should not be allowed in shore or bluff impact zones unless extraordinary erosion problems preclude the use of natural landscaping techniques. If existing lots have failing slopes or deteriorating retaining walls, landowners should limit the height of walls, restore a natural shore impact zone, and use vegetation to stabilize the soils and screen structures.

Some landowners need to protect the shore from wave action. Although rock riprap is a common solution to this problem and riprap can reduce erosion, it also reduces habitat for many species. Minnesota lakeshores and even some wetlands are being ringed with rock, often when it is not needed. Rock riprap protection should be limited to the amount necessary to protect eroding areas from wave action or flowing stream currents. Rock riprap should only be used where an erosion problem has been documented, and the riprap may require approval of the Minnesota Department of Natural Resources (DNR), depending on the scope of work. Even where rock is needed, plantings among the rocks can soften the "industrial" look, improve on habitat, and further reduce erosion from wave action. An environmentally friendlier alternative to rock riprap is to plant the shore with native vegetation that stabilizes the soil and dissipates the wave energy. The DNR can provide lists of native vegetation that will provide these benefits.

Not surprisingly, biologists have found that removing the native plants around lakes, wetlands, and streams changes both fish and wildlife species found along our shores. As native trees, shrubs, grasses, and forbs decline, species diversity also declines. Warblers, loons, and hummingbirds are replaced by common birds like house sparrows, blue jays, and grackles. Loons, ducks, and other birds will not likely nest on a groomed and manicured shore or beach. Even small areas of native grass can attract nesting ducks and other wildlife. As we "clean up" our shores, we are removing in-lake vegetation, logs, and other parts of the water body's ecosystem. We are removing the places where turtles and ducks sun and the habitat that fish and frogs spawn in. Cleaning up the shoreline is eliminating the turtles, ducks, frogs, and fish from our lakeshore.

The DNR has several resources to assist communities and property owners restore shoreland. These include the *Restore Your Shore* CD, an interactive guide to natural shoreland restoration with an extensive native plant guide; a list of shoreland management and restoration publications available on the internet at http://www.dnr.state.mn.us/waters/watermgmt_section/shoreland/references.html; and a comprehensive guide for buying and managing shoreland, also available on the internet at http://www.dnr.state.mn.us/shorelandmgmt/guide/index.html.

Plat Review Considerations for Shoreland Properties

Improper or inappropriate shoreland development can seriously impair Minnesota waters in a variety of ways. Therefore, proposed shoreland plats must be carefully evaluated based on several criteria to identify threats and reduce impacts on Minnesota waters. Every plat review should include an evaluation of lot sizes, setbacks, and suitability. Minnesota's shoreland standards contain minimum lot size and water frontage provisions, which vary depending on the sensitivity of the waterbody.

These standards have two objectives: 1) to ensure that a lot can be developed without damaging Minnesota waters and 2) to set an overall density of development around Minnesota waters. By providing for a large enough lot, these standards allow an owner to develop a site while meeting dimensional requirements (e.g., sewer system sizing and setback, impervious surface limits, and building setbacks) that protect Minnesota waters. Unfortunately, shoreland homes today are often much larger and their accessory structures more extensive than were the cabins prevalent when lot sizes were developed in the 1980s. Adequate room often is unavailable on existing lots to accommodate the needs of these larger homes. Given this constraint, developers and zoning departments should consider platting lots larger than the minimum. With a large enough lot, an owner can install effective sewer systems and other home infrastructure while avoiding impairment of the water resources.

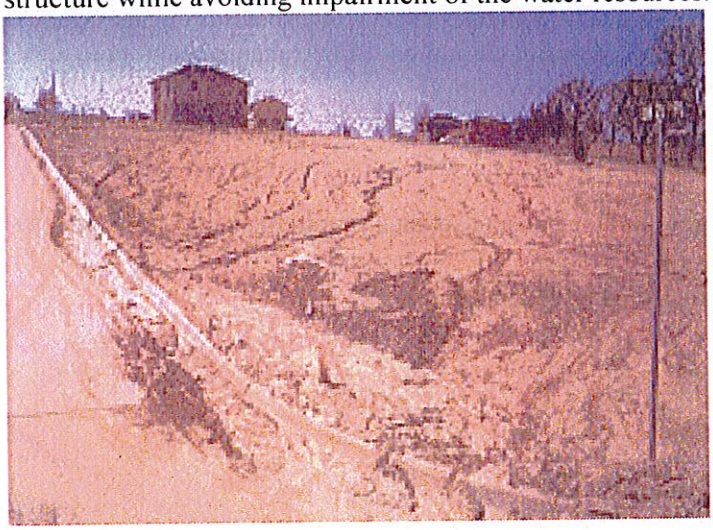


Figure 1. Developments change the hydrology of a property. Grading, buildings, and roads may increase runoff and result in erosion.

Beyond lot size increases, alternatives to standard lot/block platting can also buffer Minnesota waters from some of the consequences of development. Locating homes farther from the shore reduces impacts on water quality, habitat, and scenic values. Many developers include common space along lakes and wetlands, which expands access to the water while reducing negative impact from shoreland structures. Some plats create outlots along the shore while others incorporate cluster developments to increase open space for recreation and wildlife. Shoreland, wetlands, bluffs, and buffers can be protected by incorporating outlots along the water bodies by limiting their use with covenants or deed restrictions.

Recommendations

Decision makers should evaluate the suitability of the land for development. Some land is just not suitable for platting, or at least traditional platting. Avoiding impacts on mature trees, wetlands, and floodplains can easily be accomplished with clustering of building sites away from these features. Other questions of suitability are subtler. Shoreland plats should require minimal land alterations for construction or development; extensive alterations are a sign that the land is not suited to the platting under consideration.

Developments change the hydrology of a property. A proposed plat must include an effective stormwater management plan because improperly managed runoff is the greatest threat to the health of Minnesota waters. Grading, buildings, roads, and lawns will decrease infiltration and increase runoff and nonpoint-source pollution. An effective stormwater plan will depend on the soil types, topography, and the percentage of impervious surface. In general, the best approach is to allow water to infiltrate through vegetation. Traditional stormwater plans that collect and route water offsite are not recommended because of the high cost of construction, the transfer of water problems to other properties, and the water quality impacts on

public waters. Alternatives include rain garden installation, wetland creation or restoration, and temporary storage in small depressions (dry ponds). Stormwater should be treated to provide settling and infiltration before it enters natural wetlands. The Department of Natural Resources objects to stormwater plans that route runoff directly into public waters.

Practices that mimic natural hydrology of the site should be incorporated. A rule of thumb is to not collect stormwater if possible; keep it distributed. Maximize open space with native vegetation and use infiltration basins and vegetated swales rather than detention ponds when possible. Infiltration not only decreases water level fluctuations but also keeps the water cleaner and colder. Curb and gutter systems collect stormwater and dump it quickly, while rural road design allows for more storage, overland flow, and infiltration.

The plat should provide extra protection measures for any special or unique features on the property. Examples include wetlands, bluffs, wooded areas, floodplains, and shore impact areas. These measures may be incorporated into outlots, dedicated easements, covenants, and deed restrictions. The boundaries of these features should be marked with permanent monuments (e.g., signs, posts) to indicate clearly the boundary of the restricted area and to ensure that future landowners are aware of all restrictions.

Various agencies provide detailed guidance on stormwater practices. The Minnesota Stormwater Manual by the Minnesota Pollution Control Agency (MPCA) describes a number of best management practices (BMPs). The Metropolitan Council maintains a very useful website at www.metrocouncil.org/environment/Watershed/BMP/, where fact sheets for various stormwater BMPs can be accessed.

Lake classification criteria information and minimum lot size and setback requirements for lakes and rivers can be obtained at DNR Waters' website: http://www.dnr.state.mn.us/shorelandmgmt/guide/standards_tables.html.

The Role of the Variances in Shoreland Management Ordinances

Shoreland ordinances protect the ecological integrity of Minnesota waters, but even the best zoning ordinances can be undermined by *variances*. As a result, requests for variances must be carefully considered by local government units.

A variance provides flexibility in regulating unique situations faced by property owners. When properly used, a variance balances protection of the environment with protection of property owners from unduly onerous burdens. Both Minnesota Statute (MS) Chapters 394 and 462 address the issuance of variances. These laws state that variances shall be permitted *only* when they are in harmony with the general purposes and intent of the official control, where practical difficulties or a hardship would result from strict adherence to that official control, and when the terms of the variance are consistent with the community's comprehensive plan. MS 394.27 Subdivision (Subd) 7 *prohibits* the granting of a variance for a use not permitted in the district.

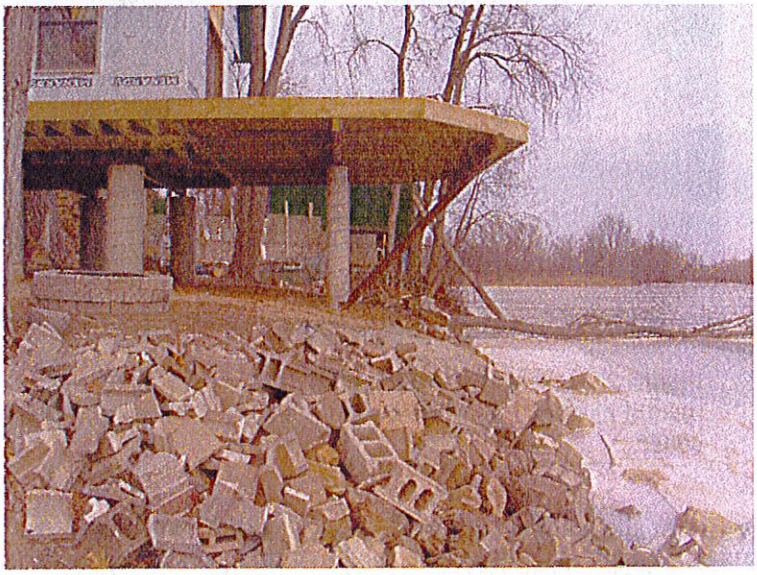


Figure 1. This home addition and deck were not needed because of a unique hardship for the owner. A variance should not be granted in a setting like this.

A variance is defined in MS Chapter 394.22 Subd. 10 as "any modification or variation of official controls where it is determined that, by reason of exceptional circumstances, the strict enforcement of the official controls would cause unnecessary hardship". It allows property to be used in a manner that does not comply with the literal requirements of the zoning ordinance in situations where it is impossible or impractical to comply.

Statutes set two criteria that must be met before a variance can be granted: *uniqueness* and *hardship*. These criteria require the applicant to meet a number of tests to address reasonable uses of the property:

- The property in question cannot be put to any reasonable use under the conditions allowed by the official controls.
- The plight of the landowner is due to circumstances unique to the property, not created by the landowner (the test of "uniqueness").
- The variance, if granted, will not alter the essential character of the locality.
- Economic considerations alone shall not constitute a hardship if a reasonable use for the property exists under the terms of the ordinance.
- No variance may be granted that would allow any use that is prohibited in the zoning district in which the subject property is located.

Recommendations

When the record demonstrates that the property owner would have a reasonable use of his or her property without the variance, the purpose of the statute takes precedence and the variance request should be denied.

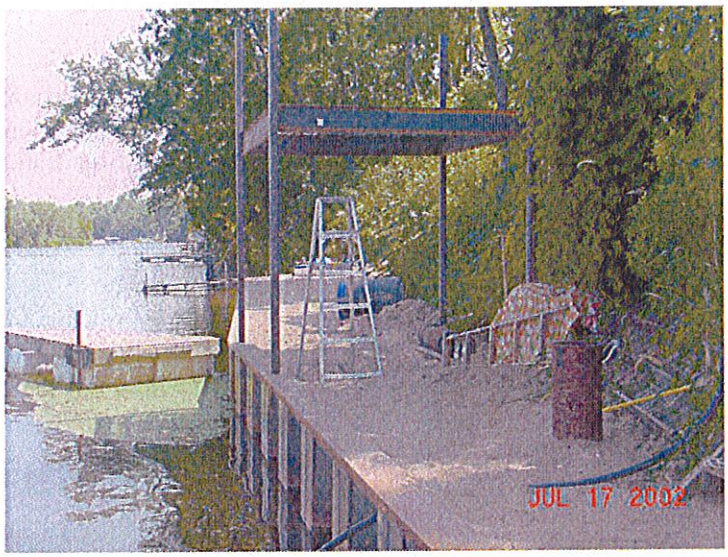


Figure 2. A property owner would need to demonstrate a unique hardship before erecting a platform so close to the water.

In evaluating variance requests from petitioners, the local government unit has the authority to grant variances and the responsibility to balance the petitioner's interests and the public's interests in the affected natural resources. If a variance is granted, the local government unit may impose conditions to ensure compliance, protect adjacent properties, and protect the public's interest. For example, a condition of approval may require that the applicant remove an inconsistent structure, restore riparian vegetation, or reduce the extent of impervious surface area on the affected property. The variance, if it is issued, should represent the *minimum* variance needed to alleviate hardships. In order to ensure that a variance decision can be sustained, the local government must make and record "findings" that address each of these parts of the definition of hardship.

Only on rare occasions should the local government unit grant a variance request. The granting of numerous variances should be a warning sign to a local government that its land use controls and its administration of these controls may be weak. Numerous variances may indicate that the ordinances need adjustment, or the variances may be undermining the intent of the ordinance.

Over the many years that the Shoreland Management Program has existed, the unfortunate trend is that local government units routinely grant variances without requiring a demonstration of hardship. The consequence of such actions has been to sacrifice the long-term protection of water resources in favor of the short-term desires of property owners. The primary purpose of the Shoreland Management Program is to protect these valuable waters for present and future generations. The rapid decline in the health of our waters is tied to population growth and the desire of many to expand the use of properties in ways unsuited to the environment. Unless local government units reverse their historic tendencies, the values provided by our water resources will be lost and not recovered except at great societal cost.

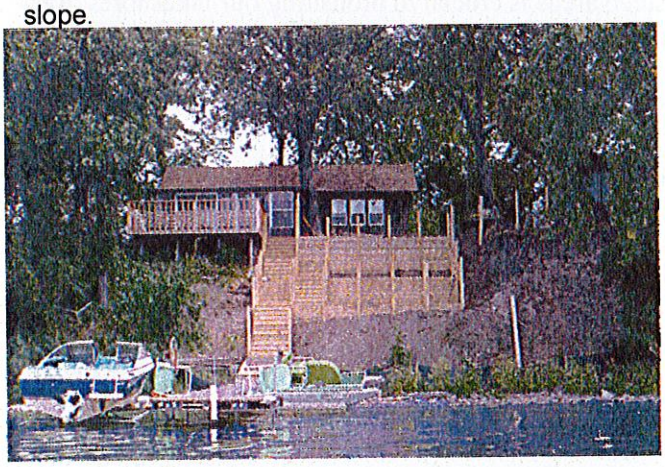
Bluffs and Steep Slopes

Bluffs and steep slopes are topographic features of special concern in shoreland areas due to their fragile and sensitive natures. With respect to regulation by the Shoreland Management Program, topographic features lying wholly or partly within the shoreland area and having the following characteristics are defined and regulated as **bluffs**:

- The slope rises at least 25 feet above the ordinary high-water level of the water body;
- The grade of the slope from the toe of the bluff to a point 25 feet or more above the ordinary high water level averages 30 percent or greater; and
- The slope must drain toward the water.

An area with an average slope of less than 18 percent over a distance of 50 feet or more is not considered part of the bluff.

Figures 1 and 2. The pictures above and below show the potential for sedimentation in surface water when vegetation has been removed from a slope.



Steep slopes are defined as land where agricultural activity or development is not recommended or considered poorly suited because of slope steepness and the site's soil characteristics. Where site-specific information is unavailable, steep slopes are defined as lands having average slopes of between 12 percent and 18 percent over a distance of 50 feet or more.

During the development of the 1989 shoreland standards, the Department of Natural Resources recognized that bluffs and steep slopes were sensitive areas and, therefore, developed performance standards to mitigate impacts that could result from activities on these areas.

Protection of Shoreland Areas

Managing bluffs and slopes effectively requires local government controls. These include zoning for compatible land uses, implementing appropriate bluff setbacks for structures, and requiring modern erosion control and stormwater management measures that are necessary to preserve the integrity of steep slopes and bluffs and provide for the public safety. These preventative measures also preserve property values; minimize the visual impact of artificial features; and preserve native vegetation that stabilizes slopes, protects water quality, and provides habitat for wildlife.

Importance of Protecting Bluffs and Steep Slopes

Erosion associated with bluffs and steep slopes is a natural process, but even the simplest activities can accelerate erosion and threaten slope stability. People walking on the hillside or even the family dog running up and down the slope can create a bare soil path that concentrates water running down the slope and initiates cutting. Gully erosion can cut deeply into steep slopes during a single rainfall. Tons of soil can

flow rapidly into a lake or river below a steep slope. Property values and water quality can drop quickly from such impacts. In siting a house location, many property owners target the edge of a bluff since it can provide a striking view of a lake or stream. In that location, the weight of the home and runoff from the roof and driveway put more pressure on the steep slopes. This can lead to sudden slope failure. Property owners should also think about the amount of useable yard space before the slope drops off to the water. Removing natural vegetation, reshaping the slope to create level areas, terracing with retaining walls, and many other activities can destabilize the delicate balance that undisturbed soil and native vegetation provide.

Bluff Impact Zone

The bluff impact zone is defined as the bluff and the land located within 20 feet of the top of the bluff and is considered to be the area most susceptible to degradation from activity. All structural development is excluded from this zone except for stairways, lifts, and landings. There should be little if any shoreland alteration needed or allowed. Native vegetation and undisturbed slopes help to avoid erosion and slumping.

Bluffs and steep slopes are sensitive resources that are susceptible to damage if not properly managed. Impacts can be measured in both physical and aesthetic terms. Physically, development can dramatically affect a previously stable slope with increased weight on the slope, increased runoff from impervious surfaces, and saturation from septic systems. Aesthetically, development on bluff tops can affect the natural character of this unique topographical feature. Setbacks from bluffs are needed in order to protect the bluff from adverse impacts of development, construction encroachment, and other activities. A bluff impact zone should be established for preservation and management of critical vegetation and soils. All structural development would be excluded from this zone except for essential stairways, lifts, and landings. Consequently, a well-managed bluff impact zone can minimize or prevent future erosion problems.

Stormwater Management Issues

The importance of managing site drainage and precipitation runoff from natural and impervious surfaces cannot be overstated. The landowner, developer, and the contractors must plan for and manage runoff where bluffs or steep slopes are nearby. Developing a lake lot generates great amounts of runoff from the increase in impervious surfaces. Directing excess water to a lake or river may be a big mistake because water that flows over bluffs or steep slopes will cause erosion problems. Designing the site so infiltration is promoted and runoff is directed away from the steep areas is crucial to protecting our lakeshores. Restoration of failed bluffs and steep slopes can be extremely expensive; often the repaired hillside is not as stable, so recurrent erosion becomes more likely.

Alterations to Vegetation and Topography

Local governments must control alterations to vegetation and topography since negligent decisions concerning soil and vegetation management will adversely affect natural resources, especially in bluff areas. Only where grading and filling are absolutely essential should local permits be issued. Many communities do not permit walkout home construction or "daylighting" structures in the shoreland setback zone or in the bluff impact zone.

Additionally, intensive vegetation clearing is not allowed in shore and bluff impact zones or in steep slope areas. Limited clearing of trees and shrubs or cutting, pruning, or trimming vegetation is allowed to accommodate the placement of stairways, picnic areas, access paths, beach and watercraft access areas, or water-oriented accessory structures. Pruning is also allowed to provide a view to the water from the home; in this circumstance, property owners should wait until their homes are built so they can look out their windows and see where views may be too obstructed.

Vegetation is important to bluff and steep slope stability in several ways:

- Vegetation directly removes water from the soil layers.
- Root systems, especially those of native vegetation, hold soil in place.
- Vegetation softens the impact of raindrops, which otherwise can jar loose soil particles.
- Vegetation slows runoff, filters suspended sediments, and encourages infiltration.
- Vegetation consumes nutrients in runoff water or in the soil profile, which would otherwise degrade the shoreland water quality.

Performance standards should be specified as a condition of permits allowing vegetation alterations in the bluff impact zone and on steep slopes.

Permits are not needed for the grading or filling of the topography in shore and bluff impact zones and on steep slopes that involve less than 10 cubic yards of material. Projects involving more than 10 cubic yards need permits.

Recommendations

The Department of Natural Resources strongly discourages any alteration of bluff and steep slope areas. This declaration is due to the sensitivity of these areas and the potential cumulative impacts on lakes, rivers, and streams from unnecessary or poorly planned and designed land alterations. Preserving natural, dense, and deep-rooted vegetation and preventing grading and site drainage activities that would destabilize these areas are important goals in properly protecting and managing these areas for the benefit of the property owner and our irreplaceable water resources. The purpose of a progressive shoreland management ordinance is to protect the beauty and value of the resources for all current and future residents. The desires of individuals to alter these highly sensitive areas need to be placed below the broader public need to protect the bluffs, steep slopes, and waters for present and future generations when requests will lead to direct or cumulative harm of the resource.

Limiting Impervious Surface Coverage and Mitigating the Effects

The primary goal of limiting impervious surfaces is to reduce the amount of untreated stormwater runoff directed into Minnesota waters. Runoff from impervious surfaces travels over the land and carries pollutants such as nutrients, sediment, bacteria, pesticides, heavy metals, and organic wastes. These pollutants are carried downstream to lakes, wetlands, and rivers. The U.S. Environmental Protection Agency considers this the chief cause of water quality degradation in the United States. In Minnesota, approximately 40 percent of surface water is impaired by pollutants. Studies have consistently shown a strong, direct connection between the percentage of impervious surface in a watershed and water quality degradation; in most models used to estimate pollutant loads, impervious surface area is the *key predictive variable*. As our shoreland areas are developed, the amount of impervious surface area also expands and the volume of runoff, phosphorus, and sediment entering the water increases significantly. This increase in nutrients and sediment is the main cause of nuisance algae blooms in our waters, and the poor water quality lowers property values, reduces public enjoyment, and harms aquatic plants and animals.

Impervious surfaces harm Minnesota waters in the following ways:

- changing the patterns of water flow in the watershed,
- being a major component of the intensive land uses that cause pollution,
- reducing natural pollution processing through reduced infiltration, and
- serving as a conduit for transporting pollutants into surface waters.

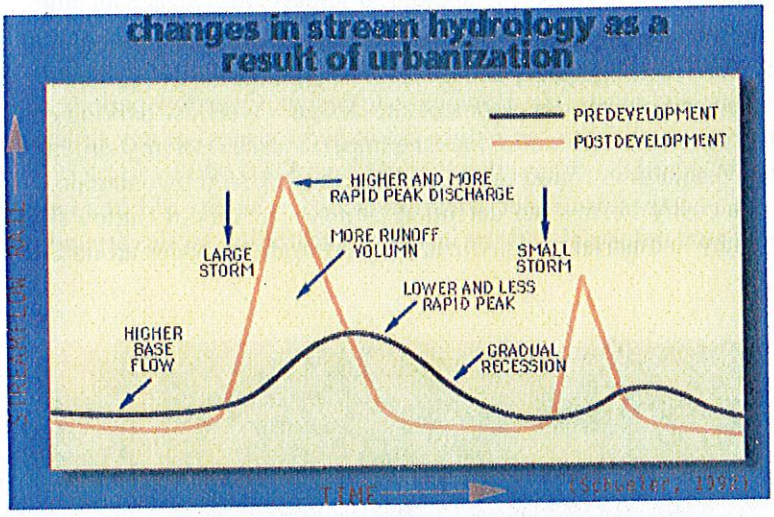


Figure 1. Urban development causes expansion of impervious surface area. After rain events, runoff causes higher peak flows in streams, which can cause flooding and streambank erosion and lower base flows between events.

Studies performed or reviewed by the Center for Watershed Protection have uniformly shown that water quality degradation occurs at relatively low levels of impervious surface cover (10 percent to 20 percent) and that an obvious decline in habitat quality occurs at about 10 percent to 15 percent of impervious surface cover. Wetlands consistently show impairment once the watershed exceeds 10 percent impervious surface cover. For streams, impervious cover can also significantly affect water levels. Reduced infiltration can lower water tables and affect the low flow in streams sometimes causing them to dry up. The reduction in infiltration coupled with the high runoff rate can increase flooding and streambank erosion. Silt and clay from eroded banks carry additional pollutants with them that are ultimately deposited in downstream water bodies. Since impervious surfaces absorb heat, runoff can also increase the temperature of a water body, which can harm trout habitat and heat-sensitive species.

Because of these impacts, limiting impervious surfaces has a direct payoff in preserving or improving the water quality of downstream waters. Fortunately, impervious surface coverage is one of the few variables that can be easily measured and managed at any stage of a development or home improvement.

Any land area or material that restricts water from soaking into the ground is considered an impervious surface. Examples of impervious surfaces include (concrete, gravel, or asphalt) roadways, driveways, sidewalks, and parking lots; roofs; decks and patios; and tightly compacted soils. Most of these can be divided into two groups: buildings and the transportation system. The area covered by impervious surfaces from transportation systems almost always exceeds the impervious surface area of buildings. For example, the city of Olympia, Washington, found that impervious surfaces from transportation systems were responsible for 63 percent to 70 percent of total impervious surfaces at the sites they measured. Also, these impervious surfaces contribute relatively more runoff since connected road surfaces, curbs and gutters, and storm sewers direct stormwater runoff away as quickly as possible. By contrast, most building runoff is first routed through a lawn or landscaping, where at least some of it infiltrates into the ground. This means that the most effective strategies to reducing runoff impacts emphasize the reduction of transportation-related surfaces and their effects.

Recommendations

Figure 2. Porous materials reduce runoff on parking lots.

To maintain or improve the water quality of our lakes and streams, the amount of impervious surface coverage in shoreland areas and the greater watershed should be minimized, and the amount of water that infiltrates into the ground should be maximized. The best approaches to achieve those goals for shoreland areas and the watershed incorporate biological filters and do not convey precipitation away from the area.

Approaches that decrease the amount of impervious surface include use of porous concrete, pervious pavers, and green roofs; reduction of street width, parking space, and driveways; elimination or reduction of sidewalks; and cluster development site design. Overflow parking can be on grass rather than concrete or asphalt. Porous concrete can reduce the imperviousness of any structure for which it is poured. The city of Olympia, Washington, found that it could save $100,000 by using porous concrete, which eliminated the need for a costly stormwater detention facility. The city of Little Falls, Minnesota, experienced similar savings on a new industrial park by installing infiltration swales around its perimeter instead of costly detention basins.

Conservation or cluster development is one of the most effective ways to promote impervious surface reduction. This approach decreases the amount of road, driveway, and sidewalk needed per residence; decreases lot size and lawn area; and increases the amount of open space available for infiltration and stormwater best management practices (BMPs). Depending on the lot size and road network, conservation development can reduce impervious surface area by more than 50 percent. The increased amount of open space also facilitates including stormwater BMPs such as rain gardens and swales that enhance infiltration and provide opportunities for improving the locations and efficiencies of septic systems. Redesign analyses of selected

Figure 3. A rain garden at a water collection point of a road without curbs allows stormwater runoff to infiltrate slowly into the ground.

residential developments show that open space designs resulted in a 10 percent to 65 percent reduction in impervious surfaces and a 10 percent to 66 percent reduction in stormwater runoff over conventional designs.

Approaches that increase the amount of water that infiltrates into the ground involve stormwater management. Stormwater BMPs reduce the impacts of impervious surfaces by restoring some of the hydrological and pollutant-filtering functions of a natural system. One effective BMP is the replacement of curbs and gutters, which focus runoff and drain it offsite as quickly as possible, with vegetated swales, which infiltrate the water and filter out sediment and pollutants. Other measures include rain gardens, cisterns, rain barrels, stormwater treatment wetlands, and vegetated buffer strips. Aggressive use of a combination of these techniques has reduced total phosphorus concentrations in the metropolitan Lake Harriet by 50 percent (from 50 micrograms per liter to about 24 micrograms per liter), a concentration fairly close to levels before Europeans settled the area. All of these BMPs emphasize a decentralized, at-source approach to runoff treatment rather than the old approach of directing runoff away from a site as quickly as possible and treating it (if at all) at a distant, central facility.

Reducing impervious surfaces also saves money. A study of 12 communities in Maryland compared the costs of conventional design with a design that minimized impervious surfaces and found that the alternative design saved 8.4 percent in construction costs and 6.9 percent in annual public service costs. Other studies have found dramatic construction savings of 40 percent to 66 percent for residential developments. Most of the savings are due to reduced need for roads and stormwater conveyances. Keeping the percentage of impervious surface within the limits of the local shoreland ordinance is not just a numbers game; scientifically and economically, it ensures the health and well being of the community and public waters.

Nonconforming Lots of Record in Shoreland Areas

Development of nonconforming lots of record often has serious impacts on shoreland areas. Before the advent of shoreland management in 1970, there were no clear standards to guide local governments on lot sizes for plats. Lots originally designed for seasonal cabins are not suitable for the large, year-round homes currently being built. While today's buyers may wish to build large, permanent residences with associated amenities on these same, small parcels, the result is often the almost total conversion of the lot's natural vegetation and water-holding areas into lawns and impervious surfaces. This drastic modification cannot be accommodated on such small parcels without serious water quality impacts on Minnesota waters.

Numerous studies have shown a direct correlation between the intensity of shoreland development and water quality impacts, as well as impacts on fish and wildlife species diversity and habitat. These effects result from deliberate and unintended physical land alterations, increases in stormwater runoff, chemical applications, the removal or disturbance of native vegetation, and the loss of habitat. The nonconforming lots generally lack sufficient useable area for primary and secondary sewage treatment system drainfields, and their development frequently requires variances from one or more of the shoreland standards.

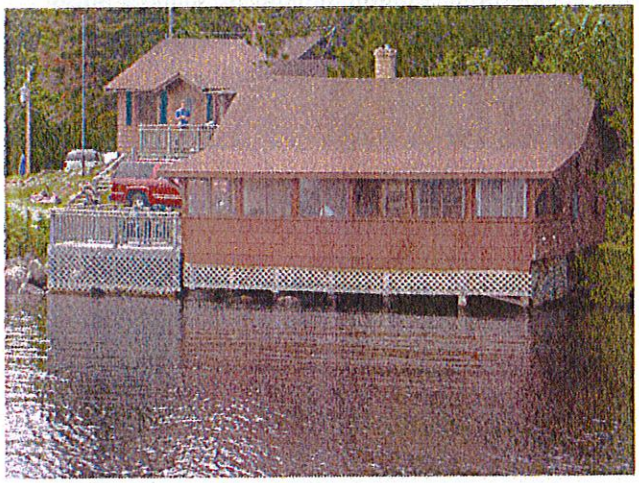


Figure 1. Overcrowding on nonconforming lots may harm the quality of the water body and reduce property values.

In addition to environmental concerns associated with the development of nonconforming lots, there are economic consequences. Overcrowding frequently results in declining property values for other nearby shoreland property. There are also aesthetic concerns resulting from excess development that influence recreational experiences and the perceived quality of life for those who live on or use these water bodies.

The 1989 statewide shoreland standards require that before adjacent, nonconforming lots can be sold or developed, two or more contiguous, nonconforming lots held by the same owner *must* be combined as much as possible in order to create lots meeting the required lot size. A variance should *not* be routinely granted that allows for the sale or split of substandard lots affected by this rule.

A person owning adjacent, nonconforming lots might seek to sell or subdivide their lots. The landowner will rarely meet the statutory burden of demonstrating that a particular hardship will occur from having to combine two or more of lots to create lots that comply with the rules. Numerous courts in Minnesota (most recently the Tenth Judicial District in a reversal of the Gilmore variance in Pine County) have ruled that a requirement to combine such substandard lots does *not* constitute a hardship on the owners since they still maintain a reasonable use of the property either by retaining or selling the lots together. In addition, the granting of such a variance is inconsistent with the stated goals of both shoreland ordinances and the comprehensive land use plans because this variance increases impacts on public waters and impairs the economic and environmental values of shorelands and waters.

Recommendations

The health of our lakes and rivers and the many values they bring to all Minnesotans depend on effective management of development impacts on our lakes, rivers, and wetlands. Modern homes and garages are much larger than the structures for which lots were created decades ago. Variance requests from multiple setbacks may signify that a request is unsuitable for a nonconforming lot. Granting such variances does not ensure orderly and consistent long-term planning because landowners will have future requests for garage additions, new wells, and septic systems. The size of structures and the amount of impervious surface allowed needs to be carefully regulated and not varied for these nonconforming lots of record. Allowing variances transfers problems from the landowner to other neighbors, increases impacts on the water resource from overdevelopment, or both.

Similar to the single nonconforming lot, allowing variances to split multiple, adjacent lots in common ownership limits the size for development and increases the impacts on our shorelands and waters. The requirement that nonconforming, contiguous lots of record should be combined helps to manage these impacts. As a result, the Department of Natural Resources opposes *any* request for a variance from the requirement to combine nonconforming shoreland lots that are mutually owned and contiguous, unless there is a true demonstration of hardship.

Structure Setback Requirements

Structure setbacks for our lakes, rivers, and wetlands are fundamental requirements for shoreland management. Good land use decisions have a positive impact on land values of shoreland properties. Failure to adhere to setback requirements, except in *extraordinary* circumstances where a *hardship* exists, can seriously undermine a community's efforts to protect its water resources and sustain the economic and quality of life values that lakes, streams, and wetlands provide to us.

A primary goal of structural setback requirements is to protect the quality of Minnesota's waters by providing an undeveloped buffer adjacent to the water. Vegetation buffers are areas of trees, shrubs, native flowers, and grasses growing along the shoreline that filter nutrients and sediment from runoff that flows to the water. Capturing nutrients and sediment before they reach the water maintains or improves water quality. Without setbacks and natural vegetation buffers, more nuisance algae blooms and a general decline will occur in the health of the lake or stream, including the fishery and natural habitats.

A secondary goal of setback requirements is to maintain the natural character of the shoreline. Buildings that are set back have decreased visibility when viewed from the water or the opposite shoreline, especially when a natural vegetation buffer is left along the shore. The area from the edge of the water to one-half the structure setback distance, called the shore impact zone, is particularly important in maintaining the ecological integrity of the water body. Shoreland ordinances need to restrict impacts on this area in order to retain natural buffers that provide critical functions for maintaining the ecology of our lakes, streams, and wetlands.

Figure 1. Homes and other structures too close to the shoreline may be damaged by an ice push.

Another goal of setback requirements is to provide some protection to any buildings on shoreland property from environmental damage. Maintaining setbacks helps protect shoreline owners from potential property damages associated with erosion, bank failure, flooding, or ice push.

Structure setback requirements are the foundation of local zoning ordinances. Individual landowners' activities can cause impacts on the water, and setback requirements are one of the primary tools to minimize these impacts. Private proposals should be weighed against the well being of public waters and the long-term economic base of the community.

Recommendations

The Minnesota Department of Natural Resources (DNR) opposes any structural setback variance unless there is a *demonstrated hardship*, as defined in Minnesota Statute 394.27 Subd. 7, unique to that property. The DNR recommends that in almost all cases *no* variance be granted for any encroachment into the shore impact zone. Because setbacks benefit water resources, many communities have increased setback requirements and lot sizes. Other communities have eliminated the "in-line" or "string test" that allowed construction without a variance if the structure was built at the average setback of the neighboring properties.