

## Administering & Strengthening Land Alteration Standards near Lakes & Rivers

### Purpose

The purpose of this document is to help local governments address problems shoreland property owners have with fluctuating water levels while protecting natural shorelines. Administering existing shoreland and floodplain ordinances is an important first step in this effort, but adopting higher standards may be critical for areas experiencing high water levels, including flooding and shoreline erosion.

### A Future with Greater Water Level Variability

Minnesota has experienced several very wet years. More frequent and extreme rain events are resulting in high water on some lakes, particularly on lakes with no natural outlets. In some areas, high water is inundating property and flooding, or threatening to flood, structures. Property owners are seeking ways to protect their property, ranging from placing a limited amount of fill to protect principal structures to filling extensively to keep their yards high and dry. These land alteration activities often include riprap and retaining walls to hold fill in place and protect shorelines from eroding. As Minnesota's climate changes, more precipitation is expected. A future with more water level variability is likely. Local governments can be proactive and develop standards to better manage problems resulting from this variability.



*By elevating and placing structures at the required elevations and setbacks, property owners can avoid situations like this.*

### Environmental Impacts from Filling, Riprap and Retaining Walls

Floodplain and shoreland ordinances regulate land alteration activities. However, ordinance provisions just meeting minimum state standards do not provide adequate direction for managing land alteration activities or for protecting shoreland resources from the impacts of fill, riprap and retaining walls, which include:

- Filling can alter runoff flow patterns, affecting neighboring properties, potentially causing neighbor conflicts and liability concerns.
- Filling on watercourses can redirect flows, causing increased bank erosion or flooding at new areas upstream or downstream.
- Filling wetlands along lakes and rivers removes water storage capacity, and increases flood elevations and flood damage potential to adjacent and downstream properties. Filling wetlands also eliminates their function of filtering nutrients and sediment.



*High water can overtop riprap and undermine it from behind.*

- Filling and land alteration kills existing deep-rooted natural vegetation and its ability to stabilize soil and buffer wave and ice action, leading to more erosion problems.
- Land disturbances create opportunities for the spread of invasive species.
- Riprap and retaining walls are often designed to create an aesthetic edge for the water, rather than to solve an erosion problem. These structures can actually create erosion problems when water levels rise over their top and undermine them from behind.
- Riprap and retaining walls displace natural vegetation and habitat above and below the shoreline, which is important for fish and wildlife and it blocks the movement of turtles, ducks and mammals to and from the water.
- Retaining walls cause wave action that scours lake and river beds creating a sterile aquatic environment.

## Determining Whether Floodplain or Shoreland Standards Apply

Land alteration and filling activities are regulated by floodplain and shoreland ordinances. Minimum floodplain regulations only pertain to floodplains mapped by the Federal Emergency Management Agency (FEMA). If there are no mapped floodplains in a shoreland district, then only the shoreland standards apply. If the shoreland district contains mapped floodplains, then both shoreland and floodplain standards apply.

## Shoreland Ordinance Requirements & Administration

Local shoreland ordinances regulate vegetation removal and filling and placement of riprap and retaining walls through shoreland alteration provisions consistent with state minimum standards in [Minnesota Rule, 6120.3300, subp. 4](#). These provisions contain few protection-specific standards, relying mainly on administrator-developed conditions of permit approval to ***“prevent erosion into public waters, fix nutrients, preserve shoreland aesthetics, preserve historic values, prevent bank slumping, and protect fish and wildlife habitat.”***

Developing effective conditions of approval requires relevant project information and a thorough evaluation of impacts. Following is a description of the shoreland alteration provisions and suggestions or “administrative tips” for developing conditions of approval that support the minimum state standards established by rule.

### Vegetation Removal

Shoreland ordinances prohibit intensive vegetation clearing in the shore impact zone (SIZ), bluff impact zone (BIZ) and on steep slopes. Placing fill on natural vegetation in these areas results in intensive vegetation clearing, and should be discouraged in most situations. While rare in the SIZ or BIZ, permitted construction of structures and sewage treatment systems are exempt from this vegetation clearing standard. Consistent with state laws protecting nonconformities, placing fill in the SIZ to elevate existing legal nonconforming structures is also considered an exempt activity. The intensive removal of natural vegetation in these areas for any other purpose should be prohibited.

***Administrative Tips:*** Require vegetation restoration as a condition of permit approval for any grading and filling project in the SIZ, BIZ, and on steep slopes.

### Grading and Filling

A grading and filling permit is required for the movement of more than 10 cubic yards of material - including fill, riprap, and retaining wall material - in the SIZ, BIZ, and on steep slopes, as well as movement of more than 50 cubic yards in other areas of the shoreland district. The following conditions of permit approval must be met for any activity meeting these numerical permitting thresholds, including building permits, sewage treatment systems, subdivisions, variances, and conditional use permits:

***Wetland Impacts.*** Assess the impacts to the functional qualities of wetlands under Minnesota Rules, Chapter 8420 (if applicable), including a determination of whether filling or any other proposed wetland alteration requires reviews, approvals or permits from other local, state or federal agencies.

**Administrative Tips:** Issue local permits after all required wetland reviews, approvals, and permits from other local, state and federal agencies (if applicable) have been completed. Use these reviews and approvals, along with locally-conducted reviews, to identify wetland impacts. Develop relevant and proportional conditions to mitigate the impacts. Become familiar with [Minnesota wetland regulations](#) and/or coordinate with a local resource agency who is qualified to review grading and filling applications to develop conditions of approval.

**Erosion and Sediment Control BMPs.** Review the proposed land alteration plan, including the proposed erosion and sediment control practices. Ensure the following practices are included and add or modify them if they are not adequate to address the potential impact:

- Alterations must minimize the area of and amount of time that bare ground is exposed.
- Mulches must be used to temporarily cover bare soil and permanent vegetation must be established as soon as possible.
- Methods must be used to minimize soil erosion and trap sediment before reaching surface waters.
- Altered areas must be stabilized to erosion control standards consistent with the field office technical guides of the local SWCD.
- Fill or excavated material must not be placed in a bluff impact zone, in a manner that creates an unstable slope, or a finished slope of 30 percent or more.

**Administrative Tips:** Require vegetation restoration as a condition of permit approval for any grading and filling project in the SIZ, BIZ, and on steep slopes. Require that the permanent vegetation used to stabilize soils upon project completion is deep-rooted natural vegetation, especially when natural vegetation was removed in near shore areas and on steep slopes and bluffs. Require the applicant to submit an erosion and sediment control plan if not currently an application requirement.

**Topographic Alterations.** Topographic alterations are only allowed if they are accessory to permitted or conditional uses and do not adversely affect adjacent or nearby properties. Most alterations below the OWHL are prohibited and those that are permitted are allowed only if DNR public waters permit requirements are met.

**Administrative Tips:** Evaluate grading plans to ensure that proposed alterations are only needed for uses accessory to permitted or conditional uses on the site and do not adversely affect other properties. Require that any natural vegetation removed or damaged by alterations be restored with natural vegetation suitable for the altered topography. Require grading changes to limit runoff to adjacent property to no more than that of existing conditions. Require the applicant to submit a stormwater runoff analysis if there are concerns about impacts to adjacent properties.

**Riprap.** The finished slope of riprap cannot exceed a 3:1 slope, the landward extent of the riprap can be no further than 10 feet from the Ordinary High Water Level (OHWL), and the height no more than three feet above the OWHL. Only natural rock riprap is allowed. State rules regulate placement of riprap below the OHWL, and permit it only when: 1) there is a demonstrated need to prevent erosion or to restore eroded shoreline, 2) it does not create new land above the OHWL, and 3) it is the minimal impact solution. These rules and design recommendations are summarized in the [Shoreline Alterations: Riprap](#) guidance document and in the DNR's [Best Management Practices for Riprap Shores](#).

New retaining walls at or below the OHWL are prohibited in most cases, and repair or replacement requires a DNR public waters work permit before work begins. Installation of riprap below the OWHL is only allowed "where there is a demonstrated need to prevent erosion or to restore eroded shoreline" (see MN Rules 6115.0215, subp. 4., E) and approved by the DNR.

**Administrative Tips:** Discourage riprap as an erosion control method when coir logs, willow wattles and other bioengineering techniques would work. Allow riprap when bioengineering methods won't work and then encourage bioengineering techniques in combination with riprap.

**Administrative Tips:** Plans for riprap and retaining walls near the water should show the location of the OHWL as a topographic line and elevation. Design drawings should also be submitted showing the current profile, evidence of previous profile (if applicable), and the proposed profile as meeting the slope, width and height standards.

**Administrative Tips:** Only issue a permit for riprap or retaining walls located near the OHWL and only after receiving verification that the DNR has approved or permitted the work.

## Floodplain Ordinance Requirements & Administration

Local floodplain ordinances focus on the impacts of land alterations to flood elevations, watercourse alterations, and the storage of floodwaters consistent with state and federal laws. These ordinance provisions vary based on whether land alterations are taking place in the floodway, flood fringe, or general floodplain district. Following is a description of floodplain alteration provisions for each district and suggestions or "administrative tips."

### All Floodplain Districts

The following provisions apply in all floodplain districts (floodway, flood fringe, and general):

- A permit is required for any development meeting the federal "Development" definition. Local floodplain ordinances must require a permit for any "development" in the floodplain to be compliant with federal minimum requirements.
- All development must be designed, constructed, and/or placed to minimize flood damages to any structure or property in a flood-prone area.
- Activities in the floodplain cannot affect the carrying capacity of any watercourse or drainage system, and must offer minimal obstructions to the flow of flood waters.

#### Permit Required for "Development"

(from 44 CFP 59.1)

Development means any man-made change to improved or unimproved real estate, including buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

**Administrative Tips:** A zoning administrator has some discretion to waive the local permit requirement for:

- ✓ Obviously insignificant activities, including examples given in FEMA guidance such as planting a garden, farming, or putting up a mailbox.
- ✓ Projects below the OHWL where a DNR public waters permit is obtained, or that meet the "no permit required" criteria in state rules for activities such as riprap, beaches, and access. **Note:** If such activities extend above the OHWL, a local permit would typically be required.

### Floodway Districts

Within floodways that have been modeled and designated by FEMA, land alteration activities may not obstruct flood flows or increase flood elevations or flood damages. This means that any land disturbances, installation of riprap and retaining walls, or stream stability projects in a floodway requires hydrologic and hydraulic analyses (often called a "no-rise" analysis) to determine that there won't be any (<0.00 feet) rise in flood levels during the 1% chance flood event.

### Flood Fringe Districts

Filling in the flood fringe area must meet those requirements listed in the "All Floodplain Districts" section above. A No Rise certification is not required in flood fringe districts. When modeling is done to determine the floodway, the model simulates the flood fringe areas being filled.



## General Floodplain Districts (A Zones and AE Zones with No Floodway Designated)

Since general floodplain districts do not have a floodway and flood fringe delineated by FEMA, they must be treated as floodway, unless the districts have been delineated by an engineer or through other appropriate engineering methods approved by the DNR. In all cases, the zoning administrator must:

1. Determine the base flood elevation. Use this elevation to identify the true boundaries of the floodplain.
2. Determine the floodway boundaries. Minor land alterations are allowable without a floodway determination as long as it can be verified that activities will not cumulatively increase flood stages more than one-half foot during a 100-year flood event. The development would be subject to lesser stage increases where any further rise would result in increased damages to other nearby buildings or infrastructure. If a building is proposed, a floodway determination is always required. In some cases, the DNR can assist zoning administrators with these floodway determinations.
3. If necessary, find alternatives or require applicant to hire an engineer. In some cases, where the DNR is unable to determine a base flood elevation or floodway, or if flood stages would increase to a point where increased flood damages may result from the project, engineering analysis would be required to process a permit.

*Note on Lakes Mapped as Floodplain.* Typically, the floodway and flood fringe are not delineated for lakes, wetlands, and other basins. As such, the entire area within the general floodplain district is treated as floodway as described above. However, the DNR has approved local floodplain ordinances that allow alternative methods for the delineation of an “administrative floodway” in areas unaffected by velocities (such as those not near inlets and outlets) - treating all areas between the OHWL and the limits of the floodplain as flood fringe - provided land alterations in near-shore areas are regulated/limited. The DNR recently updated the State [Floodplain Model Ordinance](#) to accommodate for “administrative floodways” with some restrictions on filling and land alteration in near-shore areas.

**Administrative Tips:** *Flood risk is always unpredictable. This is especially true in many General Floodplain Districts and other areas subject to fluctuating water levels. Zoning administrators are encouraged to advise property owners to proceed with caution. The best course of action is to treat the entire floodplain as floodway and encourage development outside of the floodplain or at an elevation that is determined by engineering analysis to be safe from flood risks.*

## Innovative Solutions

If the above administrative tips are not feasible or not sufficient to address local high water problems, local governments can improve protection of shoreline areas by codifying these administrative procedures and by adopting more specific land alteration standards as provided below. Many local governments have already taken steps to strengthen their land alterations standards. See examples in the [Land Alteration Innovative Standards](#).

## Design Considerations

In areas subject to fluctuating water levels, shoreland development or redevelopment must be designed for an uncertain future. Land alteration provisions must ensure that property investments balance safety, cost-effectiveness, and ecological resilience over the long term. Better land alteration provisions should require and/or encourage:

- Moving structures and facilities (e.g. sewer/septic, tanks, fuel lines, utilities) to higher ground where lot area, topography, and budget permit.
- Elevating structures and facilities in place on pilings/piers or filled stem walls instead of on a filled pad extending 15-feet out. Filling in the shore impact zone should be limited. (**Note:** Local floodplain ordinances require elevating on fill extended 15 feet from the structure. However, many allow these alternative elevation methods as a CUP as provided in the [State Floodplain Model Ordinance](#) in the flood fringe CUP section.)

- Wet flood proofing of smaller accessory structures rather than elevating on fill. Most local floodplain ordinances allow this option as provided in the State Floodplain Model Ordinance.
- Allowing areas subject to fluctuating water levels to become naturalized.
- Minimizing investment in structural solutions that impede the natural ebb and flow of water levels.
- Retaining or restoring natural shorelines for cleaner water and animal habitat.
- Reducing risks, costs and neighbor conflicts caused by drainage problems on adjacent properties.

## Higher Standard Ideas

*Structures in the SIZ.* There are many opportunities to limit near shore impacts when nonconforming structures are modified or rebuilt.

- Limit filling to only the minimum necessary to protect a principal structure, not for raising the entire yard or lot.
- Only allow elevation of structures through methods other than fill. Elevating on fill requires a fill pad that extends beyond the limits of the foundation and can disturb or destroy natural vegetation.
- Allow expansion of structures and/or movement of structures away from the water without a variance by:
  - Moving the structure as far away from the water as possible by providing flexibility from other setbacks.
  - Elevating the structure to be at least three feet above the OHWL or highest known water level.
  - Prohibiting the use of fill in the SIZ, and increasing the amount of fill allowed elsewhere on the lot commensurate with increasing distance from the water.
  - Requiring vegetation restoration of the original structure site and riparian areas.

*Grading and Filling.* These ideas address grading and filling in the SIZ, and vegetation restoration:

- Prohibit the use of fill in the SIZ.
- Limit filling in the SIZ to raise areas providing water access and for lawn areas of limited size. Size could be limited to defined percentage (e.g. 25%) of the SIZ area.
- Prohibit structure fill pads from extending into the SIZ.
- Reduce the cubic volume numerical threshold triggering grading and filling permits in the SIZ to allow for permitting review of smaller projects.
- Require a permit for the topographic alteration or grading (not necessarily filling) of more than 270 square feet in the SIZ instead of 10 cubic yards. It's easier for most people to measure and understand square feet compared to cubic yards. Note that 270 sq. ft. excavated to 6 inches and then filled with 6 inches is 10 cubic yards of material.
- Require vegetation restoration as a condition of permit approval. Establish a requirement to maintain a buffer of a given depth. Then, require restoration of the buffer if the buffer doesn't exist or the existing buffer is damaged due to the land alteration project.

*Riprap and Retaining Walls in the SIZ.* These ideas reduce negative impacts on natural shorelines by discouraging the use of riprap and retaining walls for aesthetic purposes:

- Prohibit riprap and retaining walls unless property owners demonstrate the erosion problem cannot be addressed with bioengineering methods.
- Require a local permit for **all** riprap or boulder projects in the SIZ regardless of size. Require that property owners obtain a DNR permit or approval before applying for a local permit for riprap located near the OHWL.
- Require all retaining walls to be located above the 1% flood elevation, or highest known water level.
- Require that natural vegetation be integrated into riprap.

*Flood Storage and Runoff.* These flood storage and runoff ideas can be implemented through either a shoreland or floodplain ordinance, whichever is most administratively easy to administer:

- Require no net loss of storage. Many communities and watershed districts have this requirement. Some require the compensatory storage on the same lot, and others require a 2:1 or other ratio of replacement that is greater than 1:1.

- Adopt a standard requiring that the first inch of runoff be retained on site with infiltration swales, rain gardens or other bioretention methods.

*Application Information.* Designing land alterations in areas with fluctuating water levels requires additional information and a higher level of design. Relevant and accurate design information is needed to evaluate projects and to develop effective conditions of approval. Following are ideas for application information.

Quantitative data and calculations:

- Data on historic water levels to ensure that structure placement, land alterations, riprap and retaining walls, and site designs are safe, cost effective and sustainable in the long term.
- Quantity of material to be “moved” along with verifiable calculations used to create the estimates. Clarify that the quantity of material moved includes riprap and wall products and all “cut and fill soil” or other material needed to place and anchor the riprap or wall.
- Area of existing and proposed impervious surfaces
- An analysis of the change in volume and rate of water movement onto neighboring properties.

Drawings showing:

- Location of the OHWL as a topographic line and elevation.
- Location of the floodway boundary, if available, and BFE or HKWL as a topographic line and elevation
- Location of bluff impact zone.
- Existing and proposed topography and drainage patterns for all land alterations in the SIZ, BIZ, and on steep slopes.
- Location of all proposed natural vegetation to be removed in the SIZ, BIZ, and on steep slopes including natural vegetation within all grading or topographic alteration limits.
- Existing and proposed impervious surfaces including retaining walls, paths, stairs, and patios.
- Existing and proposed structures including gazebos, saunas, and water-oriented accessory structures.

The statements in this document do not have the force and effect of law. This document is informational only and should not be interpreted as creating new criteria or requirements beyond what is already established in the relevant statutes and rules. Nothing in this document should be considered legal advice. Local governments should consult their attorney for specific advice.