

# When Your Home is at Imminent Risk from Bluff Failure



Ground Crack



Soil Slump



Severe Toe Erosion

If your house is located near the edge of an unstable bluff, bluff failure can present a serious risk to your home and personal safety. Bluff instability can be caused by a combination of a steep bluff slope angle, wave erosion, groundwater saturation and seepage, surface water runoff and frost heave. Humans can contribute to bluff instability by removing vegetation, changing drainage patterns, adding excess weight to the bluff edge. An unstable bluff can fail over time in small increments or rapidly in a large slump. The next wind storm or heavy rain may trigger a dangerous bluff failure.

## Is there an emergency? Determining whether your house is at imminent risk of bluff failure

The main factors to be considered are

1. the distance of the house to the edge of the bluff
2. the overall stability of the bluff
3. the rate at which the bluff is receding.

Visual signs of bluff instability include ground cracks on top of the bluff, soil slumps on the face of the bluff and severe erosion at the toe, or base, of the bluff. However, bluff failure can be a complex process and visual indicators may not always be apparent before a failure occurs. Therefore, *a professional evaluation by a qualified engineer or geologist is the only true way to determine the extent of your bluff's stability and whether your home is at a safe distance away from the bluff top edge.*

## Options for a home at imminent risk of bluff failure

An engineer, geologist or qualified contractor can assist with selecting an appropriate set of actions to protect a home located on an unstable bluff. *Actions are not listed in order of severity or cost.*

**Relocation.** Relocate the at-risk home to a safe distance landward of the eroding shoreline or bluff top edge. This can be the most cost-effective strategy if there is sufficient space.

**Slow toe erosion.** Construct a coastal protection structure, such as an engineered rip rap revetment, to reduce erosion at the toe of the bluff. *This can slow erosion, but an unstable bluff can continue to slump after toe protection is in place. Therefore, additional actions may need to be taken to address underlying instability issues.*

**Enhance bluff slope stability.** Strengthening the slope of the bluff can reduce the risk of failure. Typically, slope stability practices are used in combination with each other and include

removing excess stormwater and groundwater, re-establishing deep-rooted native vegetation, re-grading or terracing the slope and reinforcing the bluff face with geogrids or geocells. *If toe erosion is a root cause of the bluff instability, slope stability practices will not be effective in the long-term until toe erosion is mitigated.*

### **Avoid making bluff issues worse by managing water, vegetation and land use.**

To reduce the impact of stormwater on bluff instability, redirect water drainage away from the edge of the bluff top, including downspouts, runoff from pavement, septic drainage or other sources of water discharge. To maintain the strength of the bluff slope, preserve or enhance existing native vegetation, limit mowing close to the bluff edge, avoid adding excess weight near the bluff edge and do not dump yard waste or other materials onto the bluff slope.

## CONTACTS AND INFORMATION

### **University of Wisconsin Sea Grant Institute**

Wisconsin Sea Grant provides coastal engineering expertise to state and local government officials, contractors and lakeshore property owners in all Wisconsin coastal counties. Check the Coastal Processes and Engineering website for information, fact sheets and other publications to help understand coastal hazards and the options for addressing them.

EMAIL: [bechle@aquawisc.edu](mailto:bechle@aquawisc.edu)

PHONE: 608-263-5133

WEB: [seagrant.wisc.edu/our-work/focus-areas/coastal-processes-and-engineering](http://seagrant.wisc.edu/our-work/focus-areas/coastal-processes-and-engineering)

### **Municipal or county zoning office**

Contact your local zoning office before beginning any work on the coast to ensure that you are in compliance with local ordinances. Staff may also have experience with similar coastal issues in your area and may be able to provide additional information.

### **Wisconsin Department of Natural Resources (DNR)**

State law requires any material that is placed in the Great Lakes and along the shoreline to be authorized by the DNR through a permit for a permanent or temporary erosion-control structure. Some actions may be exempt from these requirements, depending on the specific activity

and its location. Contact the DNR to assist with your waterway permitting questions.

EMAIL: [DNRWMSPublicInquiry@wisconsin.gov](mailto:DNRWMSPublicInquiry@wisconsin.gov)

PHONE: 608-267-3125

WEB: [dnr.wi.gov/topic/Waterways/shoreline/GreatLakesErosionControl](http://dnr.wi.gov/topic/Waterways/shoreline/GreatLakesErosionControl)

### **United States Army Corps of Engineers – St. Paul District**

Federal permits are necessary for any work in the nation's navigable waters. In some cases, Wisconsin DNR permits operate as "joint permits" that are shared with the U.S. Army Corps to meet this requirement. U.S. Army Corps staff in your region can assist with federal permitting questions.

EMAIL: [usace\\_requests\\_wi@usace.army.mil](mailto:usace_requests_wi@usace.army.mil)

PHONE: 651-290-5731 (Brookfield)

920-448-2824 (Green Bay)

WEB: [mvp.usace.army.mil/Missions/Regulatory](http://mvp.usace.army.mil/Missions/Regulatory)

### **Building movers**

A professional building mover can help assess the feasibility of moving a home and the associated costs. The following professional associations maintain contact information for their members.

#### ***Wisconsin Building Movers Association***

[wisbma.org](http://wisbma.org)

#### ***International Association of Structural Movers***

[iasm.org/iasm-members/member-directory](http://iasm.org/iasm-members/member-directory)

### **Engineers, geologists and contractors**

Experienced coastal engineering professionals have the expertise necessary to perform a site evaluation, provide recommendations for a course of action and influence the success of a shoreline project, including the permitting process, neighboring impacts, construction and maintenance costs, and life of the project. An investment in the services of experienced professionals is the best way to ensure the long-term success of a coastal protection project and minimize costs during the period of ownership.

#### ***Working With Engineers and Contractors on Shore Protection Projects*** [go.wisc.edu/occ622](http://go.wisc.edu/occ622)

#### ***Partial list of Great Lakes coastal engineering firms and contractors*** [go.wisc.edu/lu905u](http://go.wisc.edu/lu905u)