Bank Stability for Structures Built Near Streams

Santa Clara Valley Water District

Handout 4 of 7

Slope-stability protection areas along watercourses are determined by the engineering and scientific analyses of geomorphic, hydraulic and hydrologic conditions. The potential for instability or erosion is influenced by the velocity, quantity and frequency of stream flow, the stream bank's physical characteristics, such as height and slope and soil type, and the weight or loading of the proposed structure.

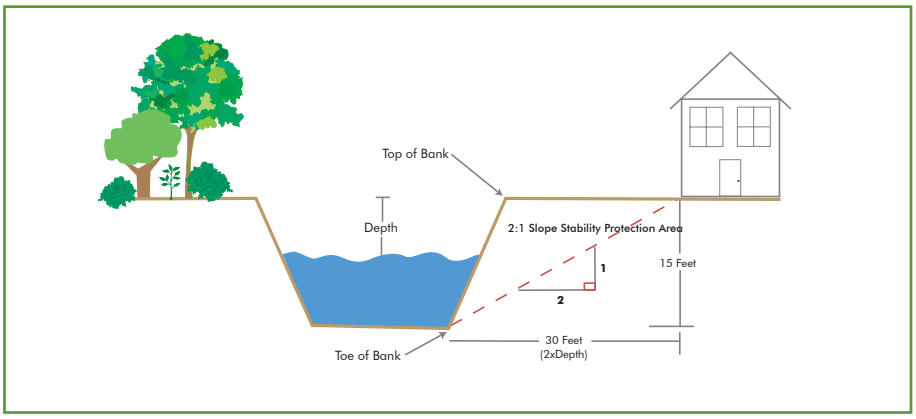

Figure 1.Protection or trigger area for a trapezoidal shaped channel.

Buildings and structures built too close to a stream bank can be affected by the natural forces of a stream. Structures built near streams can also negatively affect streams and streamside resources. Structures built to close to the stream can :

1. Have adverse effects on streamside slopes, and on existing flood protection or drainage facilities. Roof runoff, outfalls or overbank drainage can cause erosion to the bank. The weight or loading of a structure can impact adjacent drainage or flood protection structures.
2. Have adverse effects on riparian corridors and vegetation.
3. Have adverse effects on streams, including sedimentation, altered stream hydrology, erosion and water quality degradation.
4. Be undermined over time as the stream bank naturally erodes.

Slope stability protection trigger area

Projects that include construction of new roads, parking lots, pools and structures subject to the Uniform Building Code near a stream, must comply with local permit agency requirements for construction near a stream bank.

Requirements may relate to the location of a proposed structure to avoid impacts to the riparian corridor, and may consider the stability of the stream bank and impacts to the bank from the proposed construction. To guide the implementation of these requirements, a slope stability protection area, or trigger area has been established.

The slope stability protection or trigger area is measured from top of bank and is based upon stream characteristics. Implementation of a protection area is intended to help place structures on streamside properties in a location and manner that avoids or minimizes impacts to streams, streamside natural resources, flood protection and local drainage infrastructure and the proposed structure.

Slope Stability Protection Area for New Development

For all new development and major redevelopment, the slope stability trigger area is the greater of:

1. A 2 to 1 slope stability protection or trigger area measured using a hypothetical 2 horizontal to 1 vertical line projected from the toe of bank to a point where it intersects the adjacent ground. A diagram showing this concept is shown in this handout. The protection area should allow for construction access and access around the structure. For banks of large streams, or for streams that are deeply incised or have highly erodable banks, the local permitting agency may increase the protection area in order to protect water quality, the riparian corridor, and other resources.

2. Twenty (20) feet from top of bank or property line. Buildings and improvements should be located outside the areas defined by the slope stability protection area or a geotechnical analysis as described below will be required.

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Slope stability protection area for single family units

Every municipality and the county each have varying requirements and regulations for the placement of homes and accessory buildings which may not follow those described for new development. The slope stability protection area should be used as a guide for the placement of any structures, including pools and accessory buildings next to stream banks, for the safety of property owners and protection of their investment.

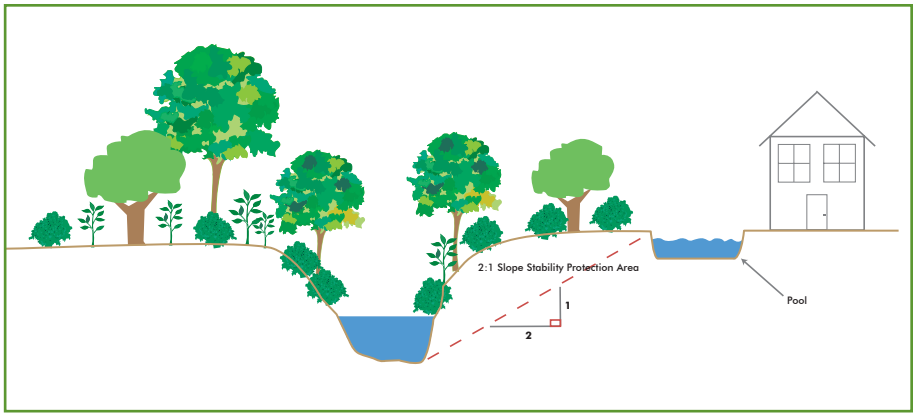

Figure 2. Protection or trigger area for a natural stream.

Slope stability protection area triggers geotechnical study

If a structure is proposed closer to the stream bank than defined by the slope stability protection or trigger area, the applicant is required to conduct a study of on-site geotechnical and slope stability conditions.

The purpose of the study is to determine:

1. Whether the location of a proposed structure may threaten bank stability, and
2. Whether the bank is in an unstable or potentially unstable condition that may threaten structures and/or potentially cause a health andsafety hazard.

The study needs to include a geotechnical analysis of soil conditions, a slope stability analysis

that considers static conditions and the action of the stream on the bank. The study must :

1) Demonstrate that development would not require introduction of hardscape in order to maintain a stable slope and

2. Show how maintenance or repair of the stream could be provided should it become necessary.

For banks of larger streams, or for streams that are deeply incised or have highly erodable banks, a permitting agency may require on-site geotechnical analyses even if the structure is outside the slope stability protection or trigger area.

Flood protection for structures built near streams

Structures must meet Federal Emergency Management Agency (FEMA) and local flood hazard ordinance requirements if within a special flood hazard area. The Santa Clara Valley Water District recommends in many cases that higher standards than those required by FEMA be followed. An example of one of these requirements relates to the elevation of the lowest floor elevation of habitable building. FEMA requires that the lowest floor of habitable buildings be constructed above the base flood elevation. The water district recommends that the lowest floor be placed at least one foot and, preferably, two feet above the base flood elevation.

Refer to the district's Watershed Stewardship Plans and verify the status of any planned or anticipated flood protection projects. The district may request dedication of land rights for flood protection or maintenance access in conjunction with new or redevelopment projects.

For streams protected by levees, the water district recommends including an 18 to 25 foot building setback from the toe of levee to allow for potential emergency operations.

For more information, contact your local planning department, or SCVWD staff in the Community Projects Review Unit (**408) 265-2607** ext **2650**