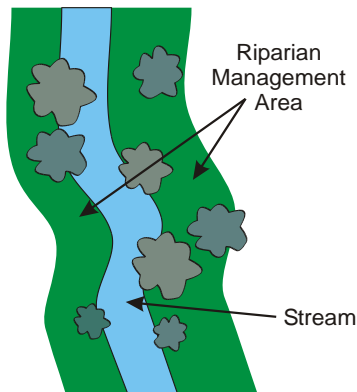


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Figure C-1: Riparian Management Area



Riparian Area

A riparian area links aquatic to terrestrial ecosystems and includes both the area dominated by high moisture content and the adjacent upland vegetation that exerts an influence on it.

A riparian area contributes directly to fish life processes and fish habitat by providing the necessary features, functions and conditions (see Appendix A--Definitions).

Riparian Management Area

The stream Riparian Management Area (RMA) is a specified riparian protection and enhancement area that is to remain in a largely undisturbed state. The width of these areas is determined by existing and potential attributes of the stream's aquatic and adjacent terrestrial ecosystems.

For the Purposes of the Development Permit process, this area is generally comprised of the Riparian Reserve Zone, the Riparian Management Zone, or both. See Appendix B, Table 7-1 for detailed information on RMA setback widths.

Planning Principles

The Riparian Management Area permits management for multiple uses (e.g., protection and recreation).

- ✓ Where recreational use is proposed (private or public), a hierarchy of trails, footpaths, and structures should be planned. These must consider site sensitivities, and should only support compatible uses.
- ✓ Nearby residents should be buffered from trail users.
- ✓ Interpretive opportunities and stream stewardship should be encouraged.
- ✓ Signage, kiosks or bulletin boards should be installed at strategic locations (e.g., road crossings, viewpoints, trail heads, etc.) to provide information on environmental values, stewardship initiatives or to post trail rules.
- ✓ Penetration into the RMA (e.g., trails, footpaths, livestock crossings, etc.) Should be kept to a minimum.
- ✓ RMAs should be clearly delineated and protected from any disturbance prior to and during construction.
- ✓ Barriers should be used as necessary (e.g., fences, vegetative barriers, turnstiles).

Fencing Separates an RMA from a Heavily Used Trail

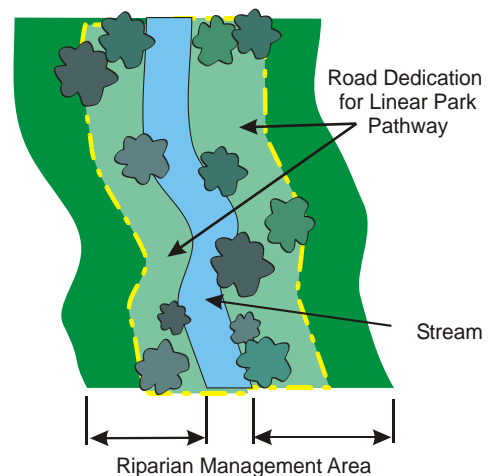


Figure C-2: Riparian Management Area - Road Dedication for Public Access

Note: Drawings are for illustrative purposes only, are not to scale, and are not representative of any actual stream or development situation.

Handbook for Environmental & Hazardous Condition Development Permit Areas **APPENDIX C - DEVELOPMENT SCENARIOS**



Limited Access Trail

Road Dedication

Where public access is required the City may seek a dedication at time of development. The dedication may be intended to service a planned roadway, utility crossing, or public access.

Riparian Reserve Zone

Stream Riparian Reserve Zones (RRZ) are specified setbacks on both sides of a stream comprised of the protected natural feature and its riparian (buffer) area that are to remain largely in an undisturbed state (90-100% retention of native vegetation).

Typically, the RRZ is the inner portion of a Riparian Management Area situated adjacent to a stream and is established to conserve and maintain the productivity of aquatic and riparian ecosystems.

Riparian Management Zone

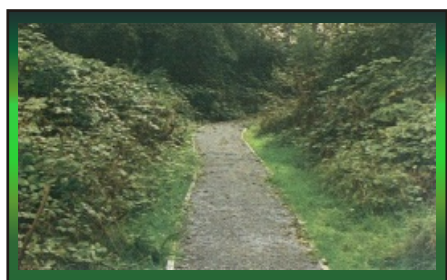
Stream Riparian Management Zones (RMZ) are specified areas of the RMA, generally located to the outside edge of the RRZ, or if there is no RRZ, it is that area adjacent to a stream (minimum 50% retention of vegetation within the RMZ).

Linear Park Pathway

A continuous pathway for public access may be constructed to City standards within the Riparian Management Area.

As a general rule, a pedestrian pathway will be constructed of pervious material, such as, hard-packed gravel. Cycle paths are generally impervious or semi-pervious surfaces, such as, asphalt or paving brick. Pathway widths may vary depending on traffic demand and other factors; typically, ped-paths would be approx. 2-m wide, and cycle-paths up to 5-m wide.

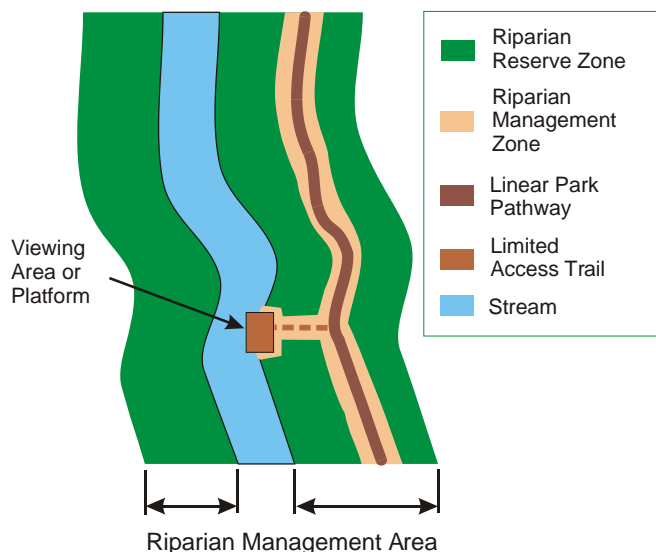
The pathway may occasionally approach the water's



**Path Surface -
Crushed Aggregate**



**Combination Fence with
Vegetative Barrier**

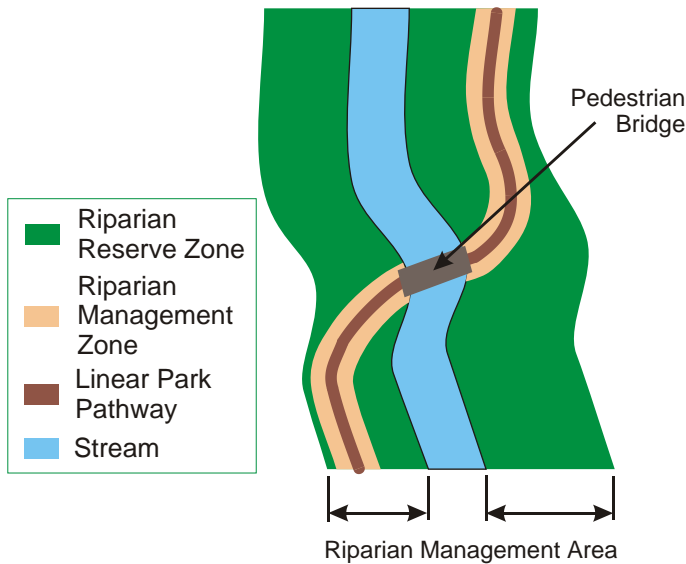


**Figure C-3: Linear Park Example -
Trail Alignment**

Note: Drawings are for illustrative purposes only, are not to scale, and are not representative of any actual stream or development situation.

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**Figure C-4: Linear Park Example -
Trail Alignment with Pedestrian Bridge**



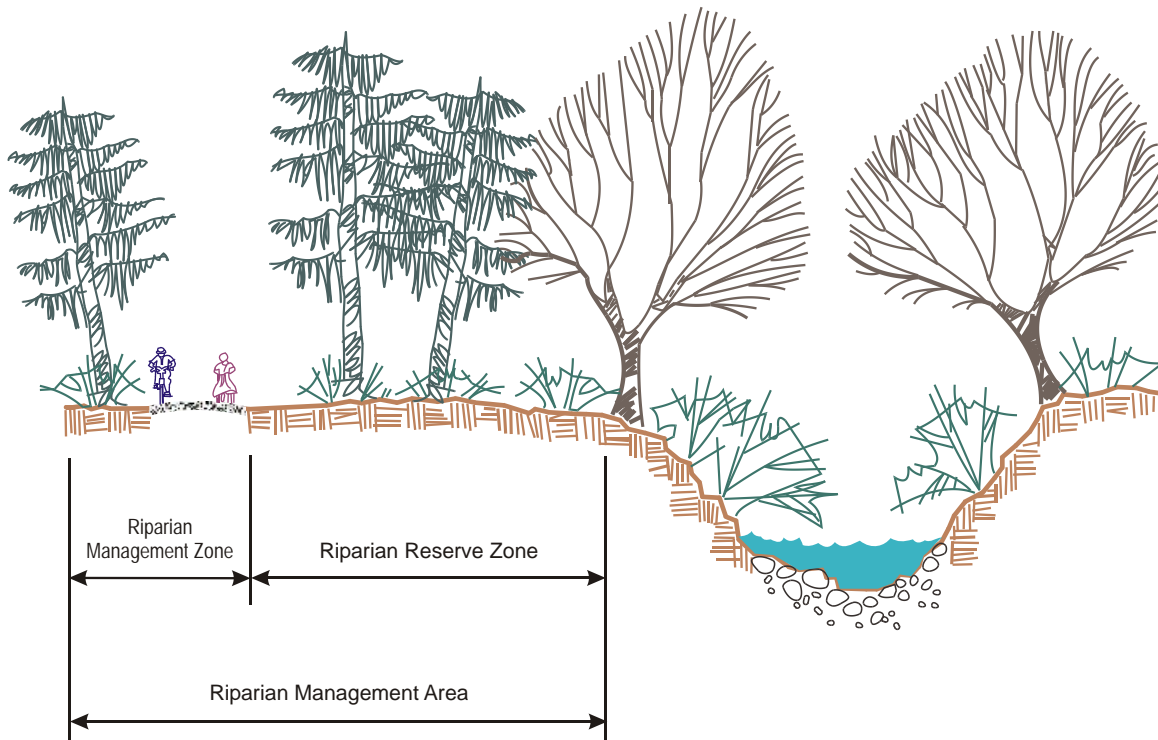
Linear Park Plans

The City of Kelowna has recognized that local streams can be a beneficial recreational opportunity. Careful planning and design can provide a linear open space amenity for citizens while protecting and enhancing the natural environment. Linear park plans must address the needs of a variety of users while accommodating the variation in stream characteristics and adjacent land uses.

Riparian habitat restoration or enhancement may be required within the RMZ. Encroachment into the RRZ will require riparian habitat restoration or enhancement.

See the Parks Chapter of the OCP for policy and objectives and contact the Parks Department at 862-5580 for detailed information on linear park cross-sections and development standards.

**Figure C-5: Stream Riparian Management Area -
Typical Cross-section**



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APPENDIX C - DEVELOPMENT SCENARIOS

Stream Crossing--Roadway or Underground Utility

A stream crossing for the purpose of establishing a right-of-way (ROW) for a road crossing or public utility shall be located within a Riparian Management Zone. The width of the RMZ may vary depending upon the functional needs of the ROW. For example, the minimum ROW for an underground water or sewer main is 4.5-m, a roadway 20-m, and a gas main is 6-m in width.

To maintain the minimum 50% vegetation retention requirement, the RMZ may extend beyond the ROW. Functional issues, such as, maintaining sight-lines, placing bridge abutments & wing walls, or assuring long-term pipe integrity will affect the final restoration or vegetation plan.

Foreshore Development

For single or two-unit residential, a Riparian Reserve Zone (measured from the natural boundary) is required in which no buildings, construction, or alteration can take place without first obtaining a DP.

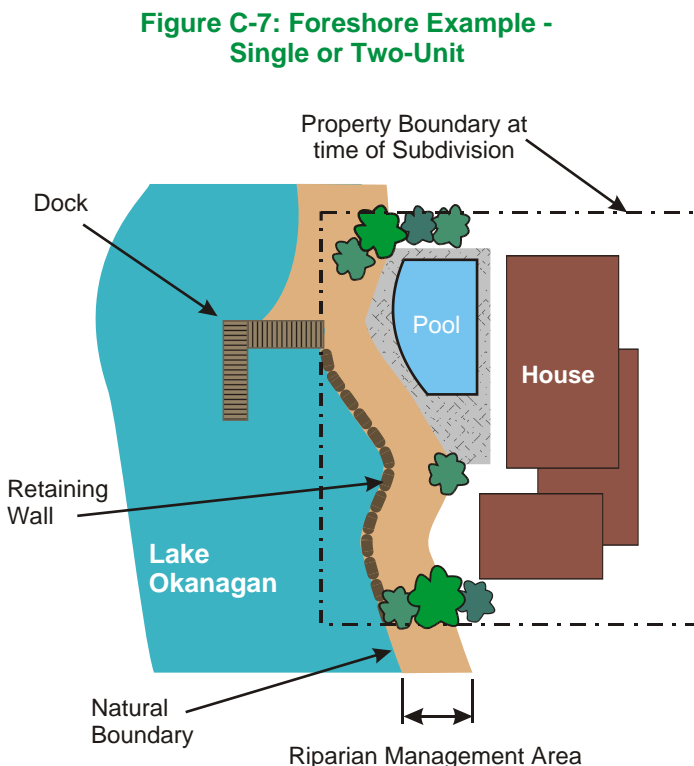
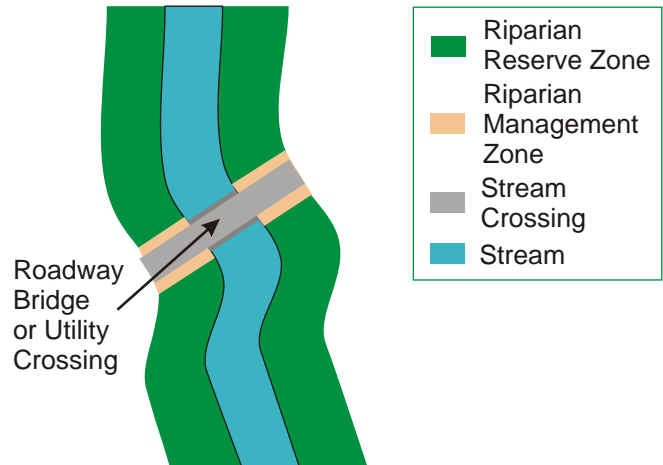


Figure C-7: Foreshore Example - Single or Two-Unit

Note: Drawings are for illustrative purposes only, are not to scale, and are not representative of any actual stream or development situation.
City of Kelowna

Figure C-6: Stream Crossing Example - Roadway Bridge or U/G Utility



In the case of multiple-unit, industrial, commercial and institutional land uses, the City will seek a public route of access by way of a road right-of-way or dedication. Owners of land along the foreshore of Lake Okanagan may not close, fence, or otherwise obstruct public access along Crown foreshore (below the natural boundary).

Accretion, access to moorage, and installation of retaining walls to prevent erosion are recognized property rights; however, a DP and Provincial approval is required to ensure City and Provincial standards are satisfied when proposing to alter the land along the foreshore.

Wetlands

Environmental DP guidelines also apply to Protected Wetlands. At time of development, a Riparian Management Area will be established in accord with Table 7-1. As with streams, the RMA will be comprised of the protected wetland feature and its buffer zone.

In all development scenarios, work within the RMA shall respect the natural biophysical function of the wetland feature and shall restore disturbed areas to a condition compatible with the normal function of the wetland and its natural surroundings.

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Building Additions

Additions may not require a DP if the proposed addition causes no further disturbance to the Riparian Management Area. However, a DP may be needed for other reasons and a Building Permit is required.

Existing or Proposed Structures

Occupants or owners of existing buildings, structures, or landscaped features that now encroach into the Riparian Management Area are not restricted in continuing to use them. However, they would be required to obtain a DP when seeking to build new structures or additions to existing structures.

Figure C-8: Proposed Additions

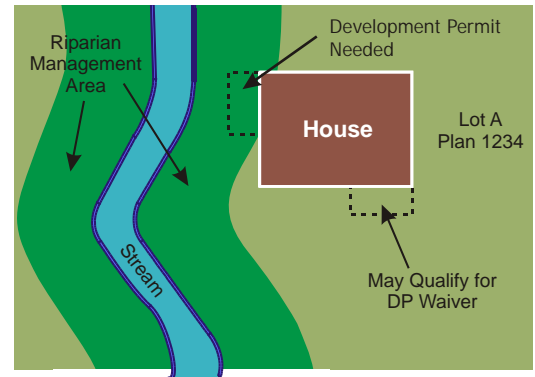
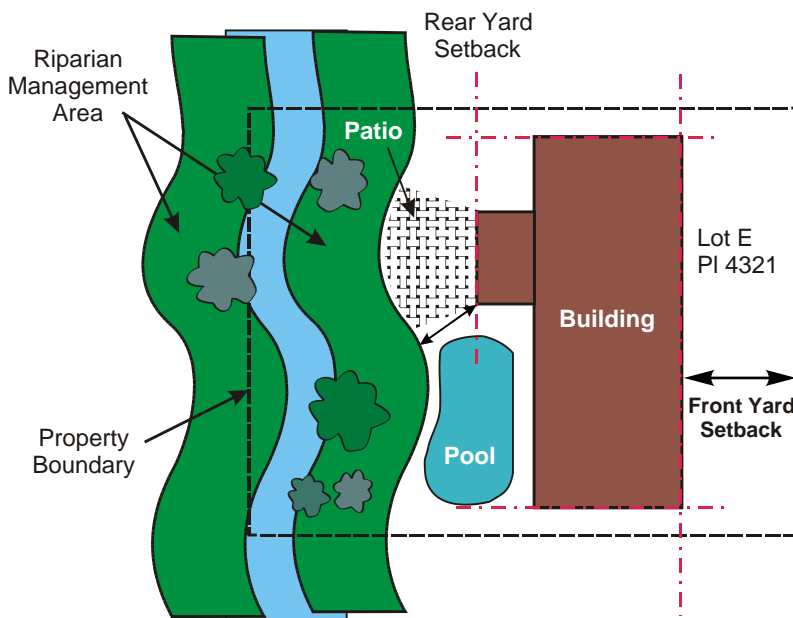


Figure C-9: Secondary Structures



an alternative building site is available outside the RMA, the structure is required to be relocated outside the RMA.

Note: House insurance covers the cost of replacing the structure, but may not cover any extra costs of relocating to meet new regulations (e.g., New foundation). You may want to look into "bylaw insurance" which covers some or all of the costs needed to meet new requirements that did not exist when your house was originally built.

Safety and Risk Assessment

Natural areas, including riparian areas, are not necessarily any more dangerous than other landscapes, such as parks, commercial, or residential sites; however, there may be a perception of heightened risk.

The health and wind firmness of trees, and risks to trail users associated with falling trees need to be assessed. Adequately sized buffers between protected and developed areas not only provided a corridor for trail alignment but they also enhance natural successional forest processes. These increase the integrity of the buffer edge and have the added benefit of protecting adjacent property owners' buildings and structures. Dead trees that do not pose a direct hazard should be retained as habitat for wildlife.

Replacing Burned or Damaged Structures

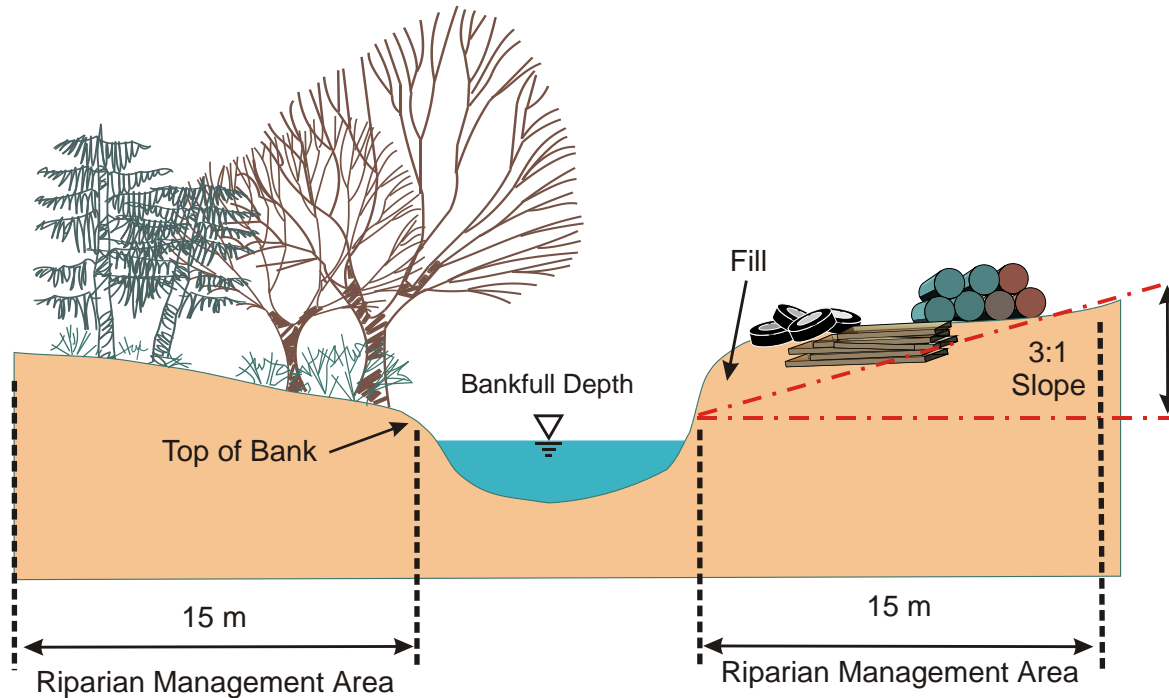
If there is an alternative building site outside the RMA, construction could occur without a DP. If not, you will have to apply for a DP in order to rebuild in the RMA, and you will likely have to meet some mitigation requirements.

If the estimated cost of replacing the structure exceeds 75% of the assessed value of the original structure, and

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Figure C-10: Stream Restoration



**Remove debris, pull back fill material to 3:1 slope, and
replant vegetation within the Riparian Management Area**

Restoration

Within the stream Riparian Management Area, environmental restoration may be a requirement of the Development Permit process. Within the Riparian Reserve Zone, environmental restoration will be a requirement of the Development Permit process.

Applicants proposing to do work or carry out development within a stream channel must comply with the requirements under Section 9 regulation of the Provincial Water Act. Written authorization of the proposed works must be obtained from the BC Ministry of Water, Land & Air Protection prior to submission of a DP or DP waiver application. For more information, call the Penticton office at 1-250-490-8200.

All applicants for development permits will require compliance with the Kelowna Tree Protection Bylaw number 8041. A DP holder will not be required to pay for separate approval under the Tree Protection Bylaw. Where no development, other than the removal of a protected tree is proposed, the applicant will be required to comply with the Tree Protection Bylaw only.

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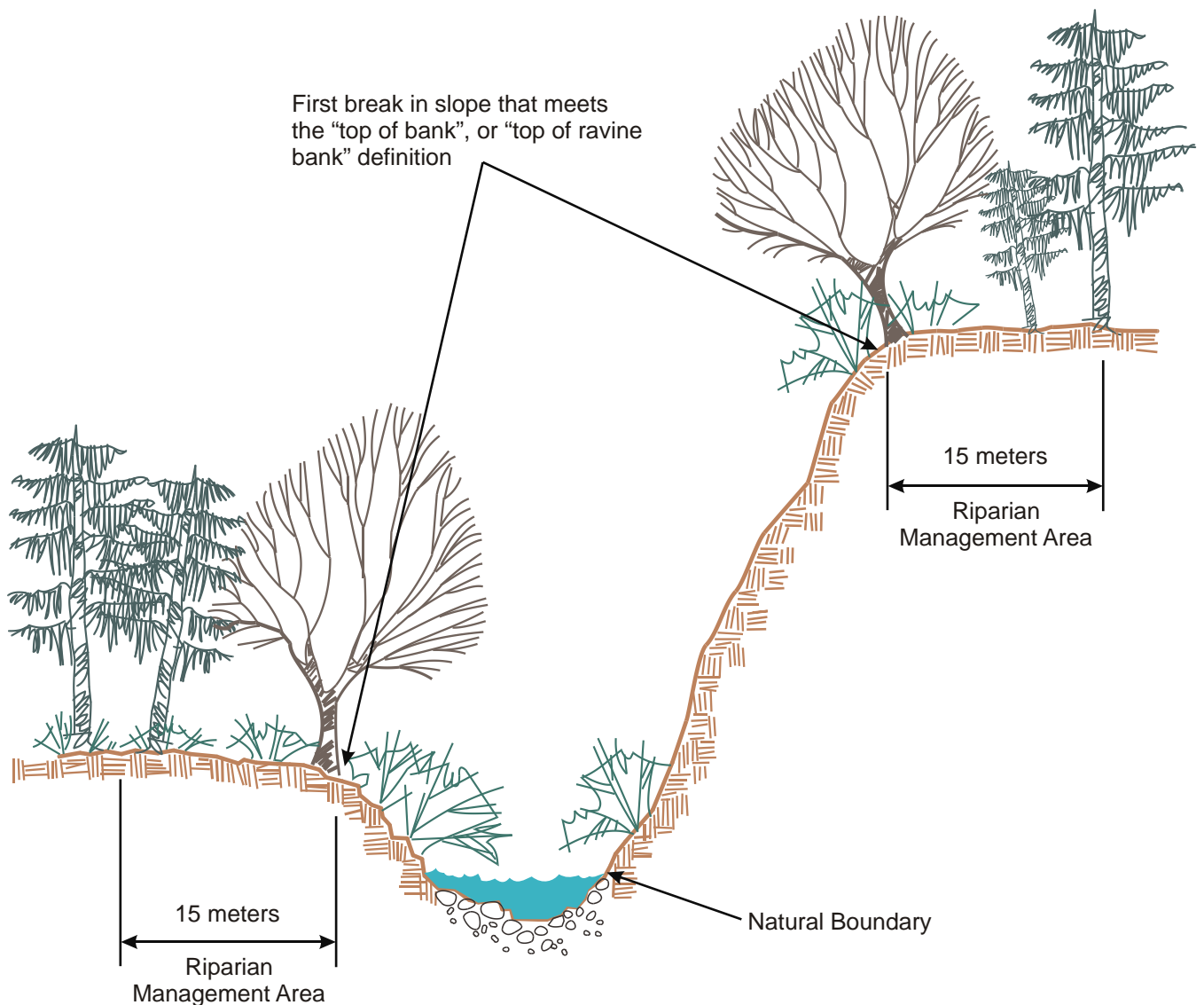
Finding Top of Bank

"Top of Bank" means

- A) for an area [other than an active flood plain area], the point closest to the natural boundary of the stream where a break in the slope of the land occurs such that the grade beyond the break is flatter than 3:1 at any point for a minimum distance of 15 meters measured perpendicularly from the break, and
- B) for a flood plain area, the edge of the active flood plain.

"Top of Ravine Bank" means the first break in a ravine slope where the break occurs such that the grade beyond the break is flatter than 3:1 for a minimum distance of 15 meters measured perpendicularly from the break.

Figure C-11: How to Determine Setbacks



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