

DEVELOPMENT GUIDELINES:

Encroachment into the *Riparian Management Area* by any development activity will not exceed that approved in the DP process. All development activities will avoid or minimize disturbance in the *Riparian Management Area* beyond the building footprint. This may mean adjusting conventional practices with respect to locating machinery and stockpiles relative to excavations, use of hand labour as opposed to machinery, etc.

Prior to any development activity, boundaries of the *Riparian Management Area*, and the extent of encroachment allowed by the development permit, should be clearly marked with bright orange (or other highly visible) temporary fence. Fencing must be a minimum height of 1.2-m (4.0-ft) and be supported by poles—maximum pole spacing distance of 3.0-m (10 ft). This fence should remain in place throughout clearing, site preparation, construction, or any other form of disturbance.

When necessary to ensure public safety, protection of the natural environment and water quality, or to prevent access by livestock, a permanent fence may be required.

STORMWATER MANAGEMENT:

All development adjacent to any stream is required to be in accordance with the City's *Sanitary Sewer/Storm Drain Regulation Bylaw* and the *Subdivision, Development and Servicing Manual*.

To reduce the amount of contaminants entering the storm drain system from construction activities, the following policies should be practiced:

Site Layout and Clearing

- Phase the clearing and excavation activities so that they occur no sooner than is necessary for subsequent construction activities
- Remove as little of the existing vegetation cover as possible. Vegetation holds the soil in place and reduces the velocity of runoff on the site. Apply temporary cover—seeding or erosion control blankets—to bare areas that will remain dormant for extended periods.
- Store excavated soils away from surface waters and storm drains so that runoff will be filtered by existing vegetation or collected in perimeter ditches
- Prevent vehicles and equipment from tracking mud offsite by installing a stabilised construction entrance (crushed gravel on the driveway area), and restrict traffic to this area where practical.

EROSION CONTROL:

Issuance of a DP may be conditional on the applicant providing a construction plan that specifies sediment containment and erosion control measures that reflect measures prescribed in the City's "*Erosion & Sediment Control Guidelines*" (1998), or other standards or guidelines adopted or approved by the City. These plans could form part of the development permit. The plans may contain one or more of the measures suggested in Table E-1.

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Sediment containment and erosion control measures should be installed prior to development activity.

Soil Erosion Control

- Cover temporary soil stockpiles with plastic or tarps held down with tires, when rain is expected. Plastic covers will also protect against windblown dust during dry periods.
- Backfill the basement walls as soon as possible and rough grade the lot
- Remove excess soil from the site immediately after backfilling to eliminate sediment loss from surplus fill
- Replant or landscape the site as soon as practically possible
- Limit machine access and operations to prepared access areas only

Drainage and Sediment Control

- Prevent runoff from entering the construction site and divert runoff away from cleared areas using berms or swales
- Use silt fences around soil stockpiles and sloped areas
- Collect runoff into site sediment traps prior to discharge off site. A sediment trap should be equivalent to approximately 1% of the drainage area.

Temporary and permanent erosion and sediment control practices must be maintained and repaired as needed to assure continued performance of their intended function.

TABLE E-1: Erosion control measures* (summary)

Sediment Source Control Measures	Sediment Outfall Control Measures
<ul style="list-style-type: none"> • Seeding of disturbed areas during growing season. • Diversion swales on slopes greater than 30 m in length. • Silt fences around--and/or tarps over—stockpiles or unvegetated fill areas. • Silt trap at catch basins. • On sloping terrain of 10-40% (6-22⁰): interceptor swale spacing no more than 30 m; hydro-seed slope plus mulch, and/or rip-rap swale and outlet. • On sloping terrain greater than 40% (22⁰+): above plus seeding supplemented by an erosion control blanket or other bioengineered protection method. 	<ul style="list-style-type: none"> • Sediment control pond of ample size and number to allow all runoff from disturbed area to settle sediments sufficiently to meet City or Provincial requirements. • Permanent detention pond may be required; may be constructed wetland with sediment detention forebay. • Structurally lined aprons or other acceptable energy dissipating devices placed at outlets or pipes or paved channel sections. • Continued maintenance of source control and all interceptor measures until completion of project.

- Please refer to City of Kelowna’s “*Guidelines for Best Management Practices for Erosion & Sediment Control*” for detailed erosion control measures and design criteria.

EXCAVATION AND DRILLING:

In the case of wetlands, some water is retained by deposits of clay and silt that form an impermeable layer in a depression and are responsible for the retention of water. Disturbance of the impermeable layer, however slight, may create a puncture in the impermeable layer resulting in water and habitat loss.

Development within a wetland will require the recommendations of a hydrogeologist or a professional qualified to practice hydrogeology prior to undertaking excavation or drilling.

VEGETATION MANAGEMENT:

Existing trees and vegetation within the *Riparian Management Area* will not be disturbed except where allowed under an approved Development Permit, or Tree Removal Permit as required by the Tree Protection Bylaw No. 8041.

Provide sufficient clearance between roads, services, and vegetation root zones to ensure viability of the vegetation. The alignment and profiles of roads and utilities should avoid disruption of significant trees and vegetation and, where possible, not parallel the *Riparian Reserve Zone*.

Restore disturbed areas of the site that are not part of a roadway or formal yard landscaping, as soon as possible after disturbance. Employ restoration practices tailored to address the type and degree of disturbance and the specific conditions of the site, such that normal ecological functions can be sustained.



To ensure their long-term health, all existing trees that are retained will be clearly marked prior to development, and temporary fencing (as described in item 2) installed at the drip line to protect them during clearing, grading, and other development activities.

Where existing trees and vegetation are retained, the following are allowed:

- Pruning or removing of hazardous trees (as determined by the City Parks Manager or certified arborist), but leaving wildlife trees and snags (dead, upright trees or stumps), if safe.
- Pruning of undergrowth within 1 meter of existing or proposed public trails to avoid injury to users, but no disturbance of vegetation along trails that are within 3 meters of the natural boundary of the stream.

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The use of fertilizers and pesticides within an Environmental Management Area can have deleterious impacts on the health and biodiversity of the natural area. The application of fertilizers and pesticides is prohibited without first obtaining a Development Permit. DP provisions may include, but is not limited to, the following:

- Manual or cultural control of weeds and pests
- Temporary and controlled use of species-specific pest traps or biological agents for chronic or extreme pest outbreaks.

All vegetation will be protected from intrusion by motor vehicles with a curb or other suitable protective barrier if roads, driveways, or parking areas abut the *Riparian Management Area*.



HABITAT RESTORATION:

Riparian Management Areas

To replace portions of the *Riparian Management Area* that are encroached upon by development of the parcel, remaining portions of the *Riparian Management Area* may be enhanced. Enhancement can be accomplished by supplementing existing vegetation, planting in bare or thin areas, or by adding to (widening) the *Riparian Management Area*, with equivalent portions, at other locations on the site not affected by the development.

(Primarily for larger developments) Establishing a *Riparian Management Area*, or providing habitat enhancement, in another portion of the same stream that is in need of restoration may be considered as compensation for habitat that is permanently displaced on a given site. This option could be applied but only as a last resort when all other options to avoid, mitigate, restore, or enhance on-site habitats are exhausted.

Planting Guidelines

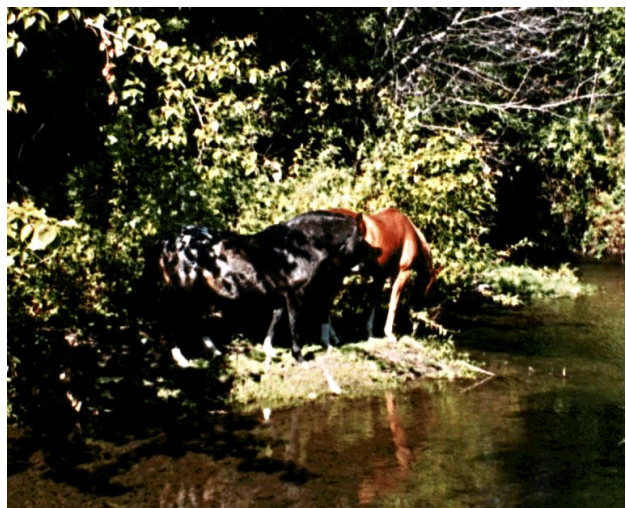
It is recommended that replanting of disturbed areas or supplementing existing vegetation with planted stock in thin or bare areas of a *Riparian Management Area* will enhance habitat potential through implementation of the following:

- Replanting will use trees, shrubs and ground cover indigenous to the area and selected to suit soil, light and groundwater conditions, and to promote habitat or erosion control functions as necessary (refer to native and recommended species list--*Appendix G*).
- Individual trees will be replaced within one growing season at a replacement ratio of two replacement trees for each tree removed, and shall be planted and maintained in the riparian management area on the same parcel of land as the tree(s) removed.

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- Install temporary or permanent irrigation, as necessary, to ensure the survival of the planted stock.
- At least one of the replacement trees must be of the same type (i.e., either a coniferous or deciduous tree) as the tree type being removed. The minimum size of replacement trees shall be 3.0m in height for conifers and 80mm diameter at breast height (DBH) for deciduous species.
- Species native to the area shall be used, preferably species that have value as food for wildlife. Where needed, trees should be placed to enhance bank stability and to provide cover to the stream.
- In vegetated areas, clearing should not exceed 10% of the Riparian Reserve Zone or 50% of the Riparian Management Zone. Clearing should be confined to the outer portions of the *Riparian Management Area* opposite the sensitive feature, and must not be on slopes greater than 30% (17 degrees).
- A shrub layer will be provided for a minimum of 33% of the restoration area; shrubs will be planted at an average site density of 1.0 meter spacing and a minimum (2 gallon) pot size at time of planting. Space shrubs in clusters or groupings that appear natural in character. Avoid planting in evenly spaced straight lines.
- Groundcover may be substituted for shrubs; if used, groundcover will consist of brush layers or planted groundcover species at a maximum average spacing of 0.5 meters with plants of minimum 10 cm pot size at time of planting.
- Areas not covered by trees, shrubs or groundcover will be seeded with a mix of indigenous herbaceous plants, grasses, or legumes that is suitable to site use and conditions (ex: Ducks Unlimited Seed).
- All planted stock will be maintained for a minimum of one year; within that time, any unsuccessful stock will be replaced at the owner's expense.



HORSES AND OTHER LIVESTOCK CAN CAUSE DAMAGE TO RIPARIAN AREAS

Riparian Management Area boundaries will be indicated on the property and information can be provided to purchasers of the property on:

- the importance of *Riparian Management Areas*, and
- activities that are not permitted within a *Riparian Management Area* without a Development Permit.

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Escarments and Steep Slopes:

Development should be avoided on slopes greater than 30% (approximately 17°) due to the increased risk of erosion or slope slippage.

The existing vegetation of hillsides is important to the ecological and aesthetic values of the site as well to the management of wildfire hazard and maintenance of slope stability, drainage, & erosion prevention.

- Identify and protect old growth and significant stands of trees & vegetation.
- When preparing a land clearing and tree retention or removal plan, apply the criteria in Table E-2 to determine existing vegetation to be retained.

Table E-2: Tree Retention Criteria

Retention Criteria	Removal Criteria
• To retain special features and the character of the site	• To accommodate site development or site improvements
• To retain slope stability	• To ensure public safety
• To prevent erosion	• To control forest pests
• To keep special or rare trees, plants and plant communities	
• To protect habitat values	
• To selectively screen development or act as buffers	
• To maintain vegetated open spaces	

- Where possible, use cluster housing development to help retain significant stands of trees and vegetation.
- On forested slopes, retain trees and tree stands that represent a range of ages, to provide for natural succession and the long-term continuation of a forested character.
- The alignment and profiles of roads and utilities should avoid disruption of significant trees and vegetation. Provide sufficient clearance between roads, services, and vegetation root zones to ensure viability of the vegetation.
- As much as possible, clearing should be phased to minimize the amount of area that is exposed to soil loss and erosion at any one time. Phasing may be service related (e.g., clear initially only enough to install roads and main service lines), or spatially (i.e., clearing only one portion of the parcel at a time; completing development and revegetation to control erosion before starting the next portion).

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- On individual large lots, limit clearing to what is required for services and the building footprint. Any additional clearing must be revegetated immediately.
- Replacement trees should be placed in such a manner that helps to restore the natural character of the hillside. Plant trees to screen undesirable views and to buffer incompatible uses.
- Rather than in lines or formal arrangements, plant trees and vegetation in groupings or clusters characteristic of the natural landscape. Planting in natural groupings encourages biodiversity by enhancing colonization by wildlife species.
- On forested slopes, replacement trees may be placed to establish a transition between hard edge urban forms and remaining forest trees. This action can serve to eventually restore a tree line characteristic that emulates and blends with the natural forest condition.
- See the above *Planting Guidelines* section regarding appropriate plant material and other recommendations.

At the time of subdivision or building permit for all areas determined by the Fire Department to be at risk of wildland fire (see OCP Map 7.2 for general indication of areas affected):

- Require the registration of a Section 219 Restrictive Covenant under the Land Title Act by the Applicant against the title of the subject property.
- The City will require that, where fire hazard mitigation measures are necessary, such measures be undertaken on the subject property.
- The Restrictive Covenant should incorporate the recommendations of a professional proficient in wildland fire management assessment and save harmless the City of Kelowna in the event of damage to individual homes as a result of the spread of wildfire.

A “Hazardous Condition” Development Permit may not be required, if the Hazardous Condition of concern is solely wildland fire, and if a Section 219 Restrictive Covenant has been registered under the Land Title Act by the applicant against the title of the subject property, at the time of subdivision or building permit. The covenant should incorporate the recommendations of a professional in wildland fire management assessment and save harmless the City of Kelowna in the event of damage to individual homes as a result of the spread of wildfire.