

Hillside Development Design Guidelines



Photo Credit: David Ward

April 2020

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Introduction

Pemberton's hillside neighbourhoods are characterized by prominent rocky knolls and dramatic valley views afforded from stepped terraces. While hillside development may offer opportunities for residential development with stunning, panoramic views and unrivalled access to nature, it also presents unique design challenges for the creation of safe, aesthetically pleasing and environmentally sensitive neighbourhoods. Hillside developments are significantly more complex than those occurring on the valley floor. The following Hillside Development Design Guidelines aim to sensitively integrate the built form in a manner that protects the integrity of the surrounding landscape.

Vision

Hillside developments will be environmentally sensitive, functionally appropriate, aesthetically pleasing and economically feasible.

Goals

Development applications within hillside areas should work to achieve the vision for hillside development by focusing on achieving the following goals:

- **Complement the scenic hillside character of Pemberton;**
- **Screen visual impact and minimize unsightly cut and fill;**
- **Integrate unique natural features such as landforms, rock outcroppings, viable existing stands of trees and vegetation, ravines, water features, hilltops and ridgelines into new neighbourhoods;**
- **Avoid development on unstable or hazardous sites and prevent potential rockfall hazards;**
- **Preserve and enhance access to trails and outdoor recreation;**
- **Protect wildlife habitat, wildlife corridors and other environmental values; and**
- **Manage storm run-off and limit erosion hydrology.**

Applicability

Within the Village of Pemberton, hillside areas are defined as all lands with slopes of 10% or greater for a minimum horizontal distance of 10 metres. The following Hillside Development Design Guidelines shall be considered with development applications in hillside areas to the extent determined at the pre-application meeting – not all guidelines apply in every instance. The Guidelines are intended for use by developers, designers, builders, landowners and Staff to define the intent and purpose of hillside development in Pemberton and are not intended to be regulatory. Hillside Development Design Guidelines have been structured to encourage

innovation and flexibility; designers are encouraged to prepare the most appropriate design given the characteristics of the site.

Development Approval Application Requirements

The Hillside Development Design Guidelines compliment but do not replace existing Village policies. This document will work with information required by other Village bylaws including but not limited to: The Village's **Official Community Plan** (including Development Permit Guidelines), **Zoning Bylaw No. 832, 2018** as amended and **Subdivision and Development Control Bylaw No. 677, 2011** as amended. It is the applicants' responsibility to ensure they have met and obtained all necessary requirements and permits related to their associated subdivision and development applications.

Wildfire Mitigation

Wildfires are an inherent natural hazard of hillside development in Pemberton. In 2017, the Village updated the Community Wildfire Protection Plan which recommends several measures to reduce the community's interface fire risk. Wildland Fire Interface Hazard Areas are designated in 'Map L' of the Official Community Plan. Hillside Developments should strive to find a balance to incorporate the following design objectives and achieve wildfire protection measures.

Objectives and Design Guidelines

How To Read This Document

The following Hillside Development Design Guidelines are divided into four sections:

1. Site and Subdivision Design;
2. Landscaping;
3. Trail Preservation; and
4. Works and Services.

Objectives identified in each section shall be considered as goals to work towards. Each Objective requires careful consideration and must be addressed with each submission. Design Guidelines offer suggestions how to achieve these Objectives. It is recognized that not all Objectives may be equally or simultaneously attained.

1. Site and Subdivision Design

Subdivision and site design on steep slopes are expected to respond and integrate into the unique characteristics of each site, avoiding significant disruption of the natural terrain as much as possible and reducing visual impacts.

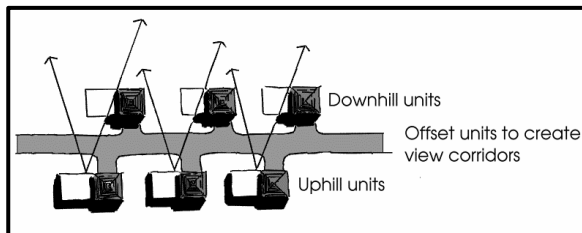


Low profile houses follow the natural ridgeline, mature trees are retained.

1.1 Visual Objectives

The impact of development on views should be mitigated to ensure:

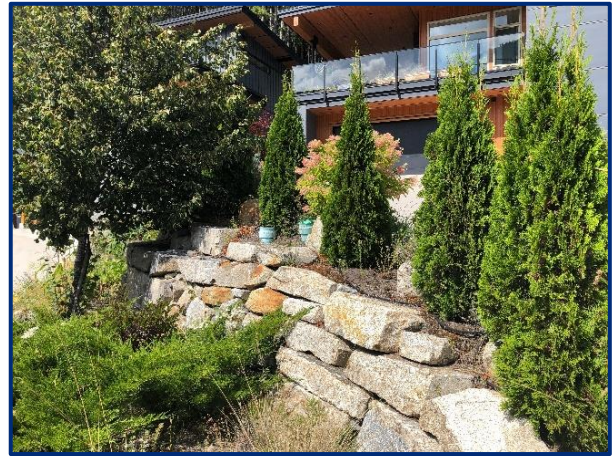
- Pemberton's scenic beauty and hillside character are not compromised, and trees are retained, where possible;
- Structures and building faces do not dominate the landscape;
- Structures are screened through effective use of landscape materials;
- Significant natural features and landforms, including ridgelines, are retained or enhanced;
- Street and building lighting is not overpowering to protect nighttime views; and
- View corridors from within the development are maintained.



Examples of how siting can maximize view corridors.

1.1.1 Visual Design Guidelines

- Consider using local, site-specific natural building and retaining materials, where practical.
- Scenic natural features should be incorporated into the subdivision design as natural open space.
- Unavoidable interruptions along ridgelines should be re-vegetated with natural landscaping.
- Warm coloured street lighting and limited ambient light is encouraged.
- Landscaping is capable of hiding views of imposing building facades, reflective glass, retaining walls, roadways and utility corridors, while protecting views from the site.
- Timely landscape restoration can mitigate impacts; consider using mature vegetation.
- View potential can be optimized through strategic placement of roads, parks and open spaces, staggered lot configuration, sensitive lot grading, transparent fencing, etc.
- View corridors can be created by designing lower rooflines, stepped rooflines and staggered lots.
- Views from the street should not be blocked with solid fences.
- Building ground floor elevations and heights should consider up-slope views.



Small well-landscaped retaining walls used to maintain the natural topography and reduce grading.



Natural feature within lot is left intact.



Retaining wall is made with natural building materials and visual impact is minimized with natural landscaping.



Blasted rock wall leaves stark and negative mark on the landscape.



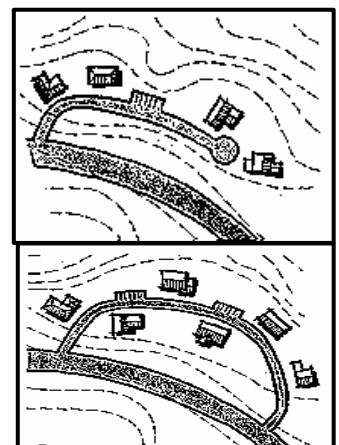
Unattractive visually dominant retaining wall.

1.2 Housing Diversity, Design, Massing and Setback Objectives

- A variety of housing types are considered.
- Visual dominance of development on the hillside is reduced.
- Colours blend into the natural landscape for all structures, including retaining walls and fences; reflective roof materials are discouraged.
- Flexibility for the size and layout of single family lots is encouraged.
- Density is influenced by visual impacts, slope, natural features and vegetation.
- Building design increases the conservation of energy and reduces greenhouse gas emissions in accordance with **Building Bylaw No. 867, 2019**, as amended and the BC Energy Step Code.

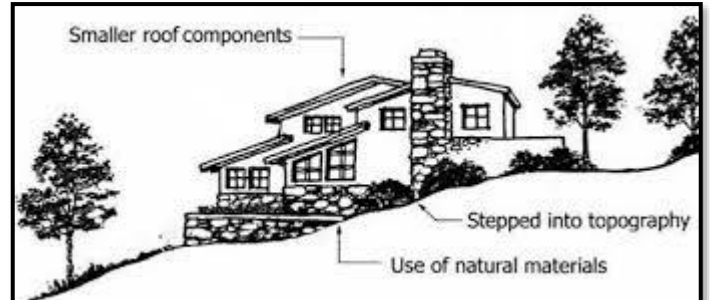
1.2.1 Housing Diversity, Design, Massing and Setback Guidelines

- Multiple-unit housing becomes an acceptable housing type on hillsides.
- Cluster development is encouraged for the purpose of maintaining natural open space and protecting steep slopes and ridgelines, otherwise larger lot sizes should be considered.
- Consider multiple lots with shared access/driveways where appropriate.
- Orient buildings to run parallel to the natural slope.
- Respond to the natural slope of the hillside by using a stepped foundation and setting the building into the hillside to help integrate it with the natural landform.
- Avoid large, unbroken expanses of wall and long building masses. Rather, design buildings with smaller or less massive building components which reflect the sloped character of the site.



Examples of shared driveways.

- Avoid over height buildings and minimize the visual impact of new buildings on steep slopes.
- Terrace back yards to reduce grading/retaining.
- Allow greater flexibility in locating a building on a steep slope lot, consider reduced setbacks to minimize the extent of grading.
- Articulate buildings to reduce mass, vary rooflines.
- Building ground floor elevations and heights should be sensitive to up-slope views.
- Buildings, retaining walls and fences should be appropriately set back from the edge of a natural feature, such as a cliff, rock knoll or outcrop.



Example of house stepped into topography with smaller roof components.



Flat roof and low-profile house designs integrated into the natural topography minimize visual impacts and optimize views.

1.3 Streetscape Objectives

- Pedestrians and cyclists feel safe using roadways.
- Low-impact design standards are utilized to manage stormwater.
- Road aesthetics are valued as a significant contributor to the character and quality of neighbourhood.
- Developments are accessible to emergency vehicles.

1.3.1 Streetscape Design Guidelines

- Consider 3-D computer modeling to create an attractive streetscape design, one which favours pedestrian and neighbourhood activities and creates amenity space capable of accommodating all users, including children.
- Consider adopting a 20-30 km/h design speed for selected local streets, where appropriate.
- Where appropriate use xeriscape boulevard landscaping and pervious parking bays.
- Reduce impervious surfaces to the greatest extent possible, consider alternate surface treatments and incorporate bio-swales where appropriate.
- Consider mature native street trees and heavily landscaped boulevards on all roads, including local streets.
- Reduce right-of-way requirements and conflicts with outside utility providers by sharing utility corridors while maintaining adequate ditch lines.
- Include eco-passages to allow for safe movement under road ways for reptiles and amphibians where there are no conflicts with stormwater management.



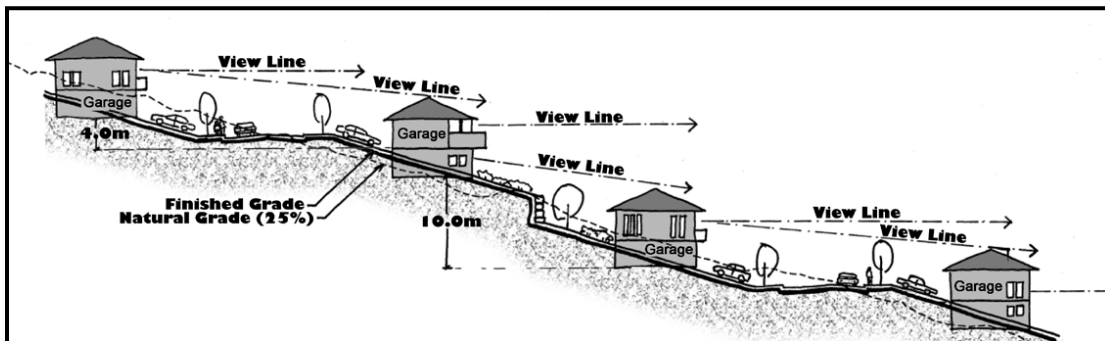
Streets are pedestrian oriented.



Street parking is integrated into narrow road.

1.4 Grading and Retaining Objectives

- Manufactured grades mimic natural slopes.
- Significant natural scenic features, such as gullies, rock outcrops and knolls are at a minimum retained and preferably enhanced.
- Site and lot grading do not compromise visual objectives.
- Retaining structures integrate well with the onsite architectural character and natural environment.
- Visual dominance as a result of development is reduced by sensitive grading.



Increasing grade differential on opposite sides of the street improves view potential and mitigates grading impacts.

1.4.1 Grading and Retaining Design Guidelines

- Consider grade difference on opposite sides of the street; opposing slab elevations should be set at a higher grade than the natural slope.
- Manufactured slopes can be placed behind buildings.
- Retaining walls can be used to reduce slope disturbance, rather than modify natural terrain – lot sizes should increase as the natural slope increases.
- Use single loaded streets or split lanes and narrow roads to avoid removing scenic features, such as knolls, and reduce grading.
- Avoid side-casting fill/excess material along road frontages and attempt to balance earthworks where impacts to hillside objectives are not compromised.
- Boulevards and driveways can be graded from the curb to match existing terrain.
- Extreme grades may necessitate detached garages.
- Site grading and retaining walls respect existing terrain; that is, large cuts/fills are not used to create ‘buildable lots’ or flat yards.
- Driveway grades follow the natural terrain, large single level building platforms are avoided, final lot grades mimic the natural slope.
- Lot grading/disturbance should occur at the stage of development where it best accommodates existing terrain and vegetation around the perimeter of the building envelope.



Sloped driveway reduces grading.

1.5 Geotechnical and Hydro-geological Objectives

- Risks are appropriately identified and quantified prior to site disturbance.
- Changes to natural slopes are structurally sound and avoid or mitigate hydro-geologically sensitive areas.
- Mitigation strategies/recommendations are implemented during subdivision development and building construction.
- Where appropriate, geotechnical recommendations are filed at the Land Title Office.
- Mitigation strategies are prepared to reduce impacts to surface run-off for both minor and major storm events, while retaining natural features, vegetation and trees, where possible.
- Impervious surfaces are minimized and irrigation needs are addressed.

1.5.1 Geotechnical and Hydro-geological Design Guidelines

- Geotechnical/hydro-geological issues, including down-slope potential impacts, shall be considered prior to subdivision design in order to avoid development in unsuitable areas and to protect down-stream habitats.
- A geotechnical study with detailed site grading confirming both the lot and the building site are stable and suitable for building should be submitted at both subdivision and building permit stages of the development.
- Quality assurance systems must be employed by professional consultants.
- Sign-off from the geotechnical engineer(s) must be provided at appropriate stages of construction, such as pre-clearing, pre-site grading, post-site grading, upon substantial completion, before foundation pour and prior to occupancy.
- Covenants may be registered upon subdivision approval.
- Plans for all development on hillsides must indicate current drainage routing for minor and major storm events and indicate how development proposes to alter these patterns.

2. Landscaping

This section of the guidelines addresses how to use landscaping to minimize the impact of development on the natural environment of the site and how to make residential development more compatible with the hillside environment.

2.1 Landscape Vegetation Objectives

- Development takes advantage of natural environmental features; natural vegetation and landforms are retained to the extent practical.
- Landscape is a key determinant of where development should and should not go.
- Identify and protect significant stands of trees and vegetative communities.
- Plant native vegetation that helps mitigate the impacts of development, enhances visual quality and addresses the needs of residents.
- Wildland fire risk is mitigated in a way sensitive to the ecosystem.

2.1.1 Landscape Vegetation Design Guidelines

- Use open space development, and varied lot size and configuration, to retain tree stands and other vegetation communities to preserve environmental value (e.g., habitat, biodiversity, heritage trees, etc.), maintain soil stability, provide a buffer between development cells and define neighbourhood character.
- Make strategic use of existing native vegetation to retain the site's natural character and to break up views of building facades, roadways (e.g., cut and fill slopes), and other site works.
- The alignments and profiles of roadways and utilities should avoid disruption of significant and unique stands of vegetation and critical environmentally sensitive areas. Provide

sufficient clearance between roads, services and vegetation root zones to ensure viability of the vegetation.

- On forested slopes, retain trees and tree stands that represent a range of ages to provide for natural succession and the long-term sustainability of the forest ecosystem.
- Phase land clearing to minimize the area 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 related (i.e., clearing only one portion of the parcel at a time, completing development and revegetation to control erosion before starting the next portion).
- On individual larger lots, limit clearing to what is required for services and the building footprint. Any additional clearing should be immediately revegetated with suitable native species.
- For areas of the site where vegetation must be removed but no construction will occur, leave soil intact (i.e., avoid compaction, excavation, filling, etc.) to allow for more successful replanting in these areas. If unavoidable to leave soil intact, stockpile top soil to be used in restoration.
- Restore disturbed areas of the site that are not part of a roadway or a formal landscaping plan, to a natural condition as soon as possible after disturbance. If required, use assistance from a landscape professional or other appropriate professional.
- Employ restoration practices specifically tailored to address the type and degree of disturbance and the specific conditions of the site.
- Replace trees in a manner that helps to restore the natural character of the hillside site. Specifically, plant trees to screen undesirable views and to buffer incompatible uses. Arrange trees in natural groupings or clusters rather than in lines or formal arrangements.
- Plant shrubs and trees in masses and patterns characteristic of a natural setting and with the intent of encouraging biodiversity.
- When choosing plant species, native plant species must be prioritized and the **Village of Pemberton Landscape Plant List** should be consulted. Invasive species are not permitted.
- Utilize plant material for site restoration and residential landscaping that is native to the region as much as possible.
- Where the use of native plant material is not desirable given site or view constraints, select plant material that is similar in appearance, growth habit, colour and texture to native plants, and that is not unfavourable to the natural environment (i.e., it will not out-compete native plants, provide habitat for undesirable wildlife, or act as a host for insect pests).
- Employ water-conserving principles and practices in the choice of plant material (“xeriscaping”), and in the irrigation design and watering of residential and public landscapes on hillside sites.

- Conduct wildfire hazard reduction through accepted practices, such as thinning and removal of fuel sources, which are also designed to improve forest health.
- Tree removal shall be in accordance with **Site Alteration Bylaw No. 822, 2017**, as amended. When preparing a land clearing and tree preservation plan, the following criteria can be applied to existing vegetation to determine whether it is to be retained or removed:

Tree Retention Criteria
To retain special features and the character of the site
To retain slope stability
To prevent erosion
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
Tree Removal Criteria
To accommodate site development
To ensure public safety
To reduce fire hazard

3. Trail Preservation

This section of the guidelines addresses the preservation of trails to preserve and enhance access to nature and outdoor recreation.

3.1 Trail Preservation Objectives

- Preserve existing forested trails and improve access to new green corridors or nature trails to facilitate outdoor recreation activities including hiking, cycling, walking, dog-walking and running.
- Ensure no net trail loss as per the Official Community Plan - Trails Map and the draft Pemberton Valley Recreational Trails Master Plan, as amended or replaced.
- Public engagement is utilized and a key component to trail development.



Photo: Bjorn Naylor

3.1.1 Trail Preservation Guidelines

- Hiking and/or mountain biking trails that cannot be preserved are to be replaced with in-kind trails of equal quality and level of difficulty in accordance with the **Village of Pemberton Trail Standard Guidelines**, as amended or replaced.
- Developers are encouraged to collaborate with trail users, including the Pemberton Valley Trails Association (PVTA) and the Pemberton Off-Road Cycling Association (PORCA), through early and ongoing engagement on trail replacement and construction.
- Use easements and rights of way to create nature trails, off-road cycling trails and green walking paths to provide direct landscaped connections between subdivisions and streets.
- Where feasible, bike lanes should be incorporated into hillside road design to provide access to nearby trail heads.

4. Works and Services

This section of the guidelines addresses various means of designing and siting roads and utilities to lessen impacts on steep slopes while maintaining public and private safety, individual lot access, municipal and emergency access and other operational needs.

4.1 Municipal Services and Utilities Objectives

- Provide municipal services and utilities on steep slope developments that have the least environmental and visual impact, meets service requirements, and minimizes redundancy, capital costs and ongoing maintenance costs.
- Install all services and utilities underground.
- Design roads and road rights-of-way to allow flexible offsets for utility trenches and other facilities such as transformers.
- Road design must consider winter safety stopping and sliding concerns and maintenance issues including snow clearing.
- Major infrastructure requirements such as new transmission lines, telephone switching facilities, primary gas mains or pumping stations should be identified and located early.

4.1.1 Municipal Services Design Guidelines

Development on steep slopes requires additional infrastructure for water systems, including booster pump stations, reservoirs, pressure reducing valves (PRVs), individual pressure regulators and pipe anchors. Sanitary sewer systems require additional infrastructure such as lift stations and forcemains. If these systems are not comprehensively designed and phased, costly redundancy or insufficient capacities can result. Comprehensive design of water and sewer systems could be accomplished as part of, or in response to, neighbourhood concept plans. This approach eliminates ad hoc expansions, which can result in expensive future upgrades as services

are extended. Comprehensive planning ensures appropriately sized services and logical phasing and expansion of the systems in a cost-effective manner.

- Where practical, install more than one service in a common trench to reduce the number of trench excavations and therefore the impacts on the terrain. Where the design profile permits, increase the pipe separation to obtain more than one service in a trench. The works must be constructed in accordance with Village and Provincial standards regarding separation of water and sewer lines.
- Design water service valve and meter boxes with flexible offsets to property lines to maintain ease of access and maintenance. Locate boxes where future grading or landscaping of boulevards will not make access difficult.
- Design water system pressure zone boundaries with sufficient range to ensure fire fighting pressures on the highest side of parcels.
- Address snow maintenance and include snow dumping areas in road design layout.
- Roads must be designed with reference to the National Fire Protection Association Standards and International Fire Code regulations.

4.1.2 Utilities Design Guidelines

- Where practical, install power, telephone and cablevision in a common trench in accordance with the **Subdivision and Development Control Bylaw No. 677, 2011**, as amended. Installation of these services under sidewalks is encouraged where this can reduce the effective right-of-way required on a steep slope.
- Alternatively, if no sidewalks are installed on the upper side of a road right-of-way, utilities could be installed deeper than standard, allowing the slope to grade upward from the back of the curb within the road right-of-way. Utility service and transformer boxes, which need to be at road grade, would require suitable grading and retaining structures. However, the net effect can significantly decrease earthwork volumes and grading required to install a road into a steep slope.
- Locate access to utility boxes, fire hydrants and other services that require periodic inspection in areas where slopes do not exceed 15% and where they are clearly visible from the road.



Visible utilities have a negative visual impact.

Acknowledgments

City of Kelowna Hillside Development Guidelines, October 2009

City of Kelowna Hillside Development Audit, UMA, 2006

City of Nanaimo, Slope Development Permit Area Guidelines, 2005

City of Vernon Hillside Guidelines, 2008



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