POLICY DIRECTIVE NO. G-24

SUBJECT: HILLSIDE DEVELOPMENT STANDARDS

APPROVAL DATE: June 18, 2013 LAST REVIEW DATE:

REFERENCE: HILLSIDE DEVELOPMENTS STANDARDS POLICY

A. INTRODUCTION

Within the City of Chilliwack, hillside areas are defined as all lands with slopes of 20 percent or more. When planning development in these areas, there are several unique challenges not experienced in valley floor areas, including: visual, functional, environmental, geotechnical and financial challenges. This policy, attached as Schedule "A", has been developed in response to these challenges.

B. GENERAL:

This Policy Directive outlines the objectives and performance targets regarding comprehensive hillside planning and protection of natural hillside features and the natural environment, in keeping with the Official Community Plan.

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Chief Administrative Officer

CHILLIWACK HILLSIDE

DEVELOPMENT STANDARDS POLICY

April 2013

Prepared by Urban Systems Ltd.
for the City of Chilliwack
April, 2013

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1.0
INTRODUCTION

Within the City of Chilliwack, hillside areas are defined as all lands with slopes of 20 percent or more. When planning development in these areas, there are several unique challenges not experienced in valley floor areas. These challenges include the following:

- Visual Challenges - Chilliwack's hillsides are highly visible from the valley floor. They function as landmarks in the community, and they provide a green backdrop to development in the valley-bottom. When planning development, a significant amount of effort is required to ensure that the aesthetic and scenic qualities of the City's hillsides are preserved.

- Functional Challenges – Hillside areas contain unique topography and natural features. In order to preserve the character of the hillside, site-specific responses are often necessary when designing lot layouts, roads and infrastructure.

- Environmental Challenges – The City's hillsides contain many unique environmental attributes such as watercourses, tree stands, rock outcrops, environmentally sensitive areas, and wildlife corridors. Care must be taken to ensure these unique features are identified and integrated into the development concept.

- Geotechnical Challenges – When development occurs on hillsides, there is a need to ensure slope stability and safety. A site specific approach is required to appropriately address any geotechnical or hydro-geological issues.

- Financial Challenges – Hillside development is more costly to service, operate, and maintain than development in the valley-bottom. Discretion is required to ensure that the long term financial implications to the City are considered when evaluating the appropriateness of a development concept.

The Hillside Development Standards Policy has been developed in response to these challenges. The City wishes to encourage flexibility and innovation in terms of how developers address the challenges associated with hillside development. Nevertheless, there are a number of guiding principles, or standards, that should be achieved with all hillside developments. Within Chilliwack, the City will utilize the hillside Development Standards Policy and implementation tools, such as the Hillside Development Permit Area requirements, to ensure that new hillside development:

- positively contributes to Chilliwack's hillside character;
- integrates seamlessly with its hillside context through context-sensitive design approaches;
- preserves the aesthetic values of Chilliwack's scenic "green backdrop";
- respects views both to and from the hillside;
- provides safe access and services that fit the hillside context;
- maintains many of the unique natural features of the hillside, such as rock outcrops, watercourses, ravines, mature trees and vegetation, and ridgelines;
- protects wildlife habitat and environmentally sensitive areas;
- avoids unstable or hazardous portions of the hillside and provides protection against slope instability and erosion; and,
- uses economic and efficient approaches to construction and maintenance.

How to Use The Hillside Development Standards

The Hillside Development Standards Policy has been adopted by Council to assist the City and the development community in achieving hillside developments that integrate well with their unique natural context. There are two main components to the policy:

A. Development Approval Information; and
B. Hillside Development Standards.

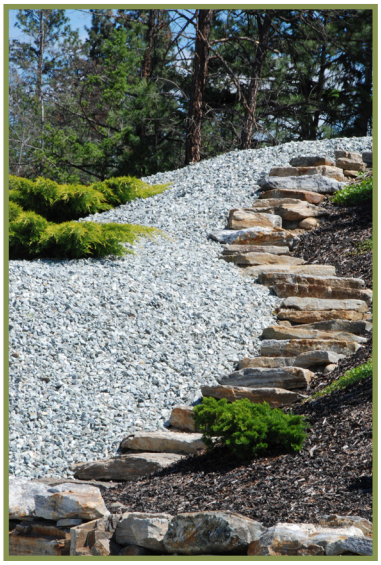
A. Development Approval Information: Further to the City of Chilliwack Development Approval Information Bylaw, the Hillside Development Standards Policy outlines the development application submission information that is required for hillside projects at each stage of the development process. In particular, there are specific submission requirements related to Zoning Bylaw Amendment applications, Development Permit applications, and Subdivision Applications for developments on all lands with slopes of 20 percent or more.

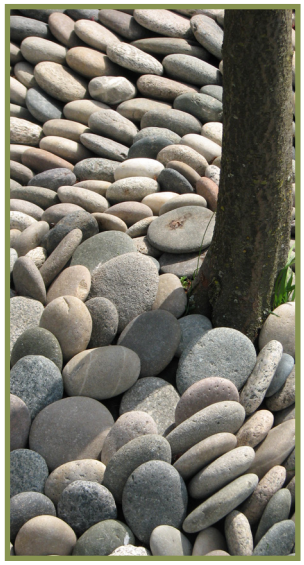
B. Hillside Development Standards: The Hillside Development Standards articulate the City's design principles and performance targets for developments on all lands with slopes of 20 percent or more. Design principles are organized around four main categories:

- Natural Environment;
- Site Planning;
- Works and Services; and,
- Building Form.

Within each of these categories, performance targets outline the results that the City wishes to achieve with regard to a variety of topics related to hillside development.

For convenience, the City's Hillside Development Permit requirements are also listed within each section. The City's intent is to encourage flexibility and innovation through the development process, and to utilize a discretionary approach. Therefore, in the review of Hillside Development Permit applications, the City's main objective is to ensure that its performance targets are met. Hillside Development Permits are required for all projects on lands that include natural slopes of 20 percent or more. For projects that involve development on slopes of 30 percent or more, or alteration of slopes of 30 percent or more, a third party review of the application will automatically be triggered per the Development Approval Information Bylaw.





2.0
DEVELOPMENT APPROVAL INFORMATION

To illustrate conformance with the Hillside Development Standards Policy, the City requires additional development approval information for all projects on sites that have natural slopes of 20 percent or more. Additional development approval information is required for Zoning Bylaw Amendment applications, Development Permit applications, and Subdivision applications. On a site-specific basis, the Approving Officer, applicable Director, or Designate may vary submission requirements in accordance with the provisions of the City of Chilliwack Development Approval Information Bylaw.

2.1 Zoning Bylaw Amendment Applications

In a hillside context, Zoning Bylaw Amendment applications must be supported by the following information:

1. The **Site Features Inventory** should identify the following minimum information:
   a. Property lines, easements, and rights-of-way.
   b. Natural pre-development site contours (1 metre interval) and spot elevations.
   c. Slope analysis showing slope intervals of 0% to <10%, 10% to <20%, 20% to <30%, 30% to <40%, and 40% or more. This information should also be shown 50m beyond all property lines.
   d. Existing human-made features such as roads, curbs, sidewalks, utilities, trails, buildings, structures, fences, and retaining walls.
   e. Natural physical features including knolls, ridgelines, rock outcrops, watercourses, ravines, and cliffs.
   f. Prominent views from within the site.
   g. Significant environmental attributes.
   h. Potential hazards and hazard areas.
   i. Archaeological and historic resources.

2. **Preliminary Geotechnical Assessment**, identifying the following minimum information:
   a. Indication of any areas that may not be suitable for development, consistent with the APEGBC Guidelines for Legislated Landslide Assessments and any other relevant guidelines or standards.
   b. Confirmation that there are no geotechnical hazards and that the land is safe for the intended use; and,
   c. Identification of measures that may be required to mitigate any potential geotechnical risks.

3. **Preliminary Environmental Report**, identifying the following minimum information:
   a. Valued ecosystem components, including an inventory of plant and animal species on the site and any environmentally sensitive areas or species at risk.

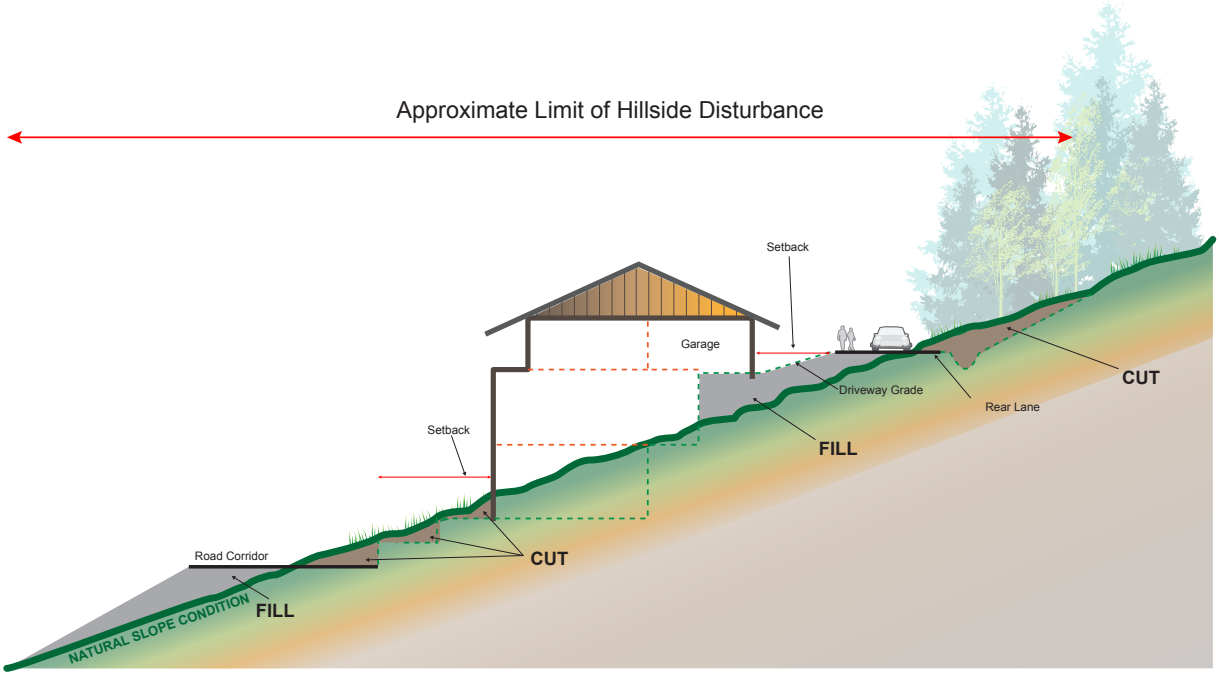
4. **Preliminary Concept Plan**, identifying the following minimum information:
   a. Areas to be developed.
   b. Natural areas to be preserved.
   c. Road layout.
   d. Proposed land uses.
   e. Preliminary site servicing.
   f. Tree cutting limits.

5. **Visual Impact Analysis**, identifying the following minimum information:
   a. 3D digital terrain model illustrating pre and post-development conditions. The post-development model must illustrate proposed road alignments, extent of cuts and fills, site features to be preserved or removed, and building placements.
   b. Viewshed analysis from a select number of valley bottom locations outside of the development site to illustrate pre and post-development views to the site. Locations are to be determined in a pre-application meeting with City of Chilliwack staff. post-development views must include views immediately after development, prior to re-vegetation of the site.

6. **Grading Concept Plan**, identifying the following minimum information:
   a. Area of proposed disturbance.
   b. Height, locations, and type/materials of significant retaining features.

7. **Site Development Cross-Sections** (pre and post development).

SAMPLE SITE DEVELOPMENT SECTION



2.2 Environmental and Geotechnical Development Permit (DP Area #2) Applications

In a hillside context, Environmental and Geotechnical Development Permit (DP Area #2) applications must be accompanied by the following information:

1. **Geotechnical Hazard Assessment**, if necessary;
2. **Detailed Environmental Report**, if necessary;
3. **Construction Management, Erosion and Sediment Control Plan**.
4. All other applicable DP Area #2 requirements.

2.3 Hillside Development Permit (DP Area #13) Applications

Hillside Development Permit (DP Area #13) applications must be supported by the following information:

1. **Site Features Inventory**, if necessary (see requirements under Zoning Bylaw Amendment applications).

2. **Detailed Development Concept Plan**, identifying the following minimum information:
   a. Location, size and grade of roads, any shared driveways and lanes.
   b. Land uses.
   c. Lot layout.
   d. Building envelopes and orientation.
   e. Typical building elevations to illustrate building form (mass, height, articulation).
   f. Parks, open spaces, natural areas, and trail connections.
   g. Tree clearing limits.
   h. Major utility features (e.g. mains, pump stations, reservoirs, detention ponds).

3. **Visual Impact Analysis**, if necessary (see requirements under Zoning Bylaw Amendment applications).

4. **Detailed Grading Plan**, if necessary, identifying the following minimum information:
   a. Cuts and fills.
   b. Post development contours in 1 to 2m intervals.
   c. Detailed design of retaining features.
   d. Building envelopes.

5. **Site Development Cross-Sections** (pre and post development), if necessary.

6. **Tree Management Plan**.

7. **Re-vegetation/Landscape Plan**.

2.4 Subdivision Applications

In a hillside context, Subdivision Applications must be accompanied by the following information (in addition to any other subdivision requirements):

1. **Detailed Grading Plan**, identifying the following minimum information:
   a. Cuts and fills.
   b. Post development contours in 1 to 2m intervals.
   c. Detailed design of retaining features.
   d. Building envelopes.
   e. Pre and post-development cross sections.

2. **Road Standards and Cross-Sections**.

3. **Design of Works and Services**.

4. All other applicable requirements of the Subdivision and Land Development Bylaw.

5. Any additional items not addressed at time of Development Permit.

3.0
HILLSIDE DEVELOPMENT STANDARDS

3.1 Natural Environment

Design Principle: To ensure that the City's hillsides continue to provide a beautiful, striking, green backdrop to the valley bottom, hillside development should sensitively integrate with its natural surroundings and the environmental integrity of hillside areas should be preserved. The natural characteristics of sites should be used to enhance the quality of development and their preservation should contribute to Chilliwack's visual, environmental, historical, and cultural character.

3.1.1. Unique Natural Characteristics

Preservation of unique natural features builds a sense of identity and place.

Performance Target: Preserve unique natural characteristics such as rock outcrops, watercourses, wetlands, ravines, mature stands of trees, and significant wildlife habitat.

Development Permit Requirements:

a) In the Development Concept Plan, identify and integrate natural site characteristics such as rock outcrops, watercourses, wetlands, ravines, mature stands of trees, and significant wildlife habitat.

The site plan must demonstrate how it incorporates existing natural characteristics into the development concept.

A wetland and significant tree stands were preserved by splitting a road.

A historically significant building is retained and utilized as an amenity within the neighbourhood.

By adjusting road and sidewalk alignments, trees and a rock outcrop were preserved, adding to the natural quality of the development.

3.1.2. Ridgelines

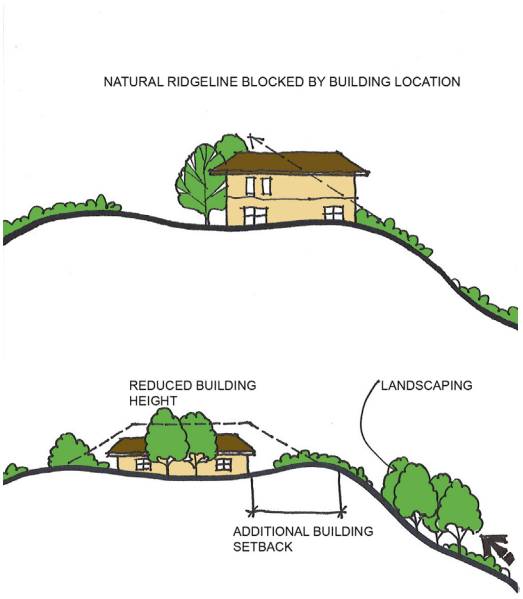
Ridgelines provide excellent views of the valley, yet they also present a design challenge as development on ridgelines is highly visible from the valley bottom.

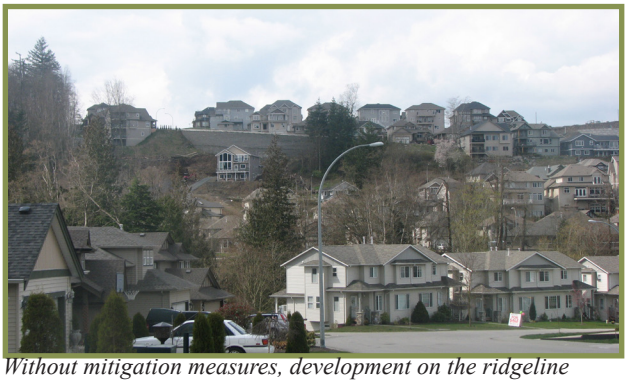
Performance Target: Maintain the natural character and integrity of Chilliwack's ridgelines as viewed from the valley bottom.

Development Permit Requirements:

a) Preserve the natural qualities of ridgelines for the benefit of the community-at-large. To minimize view impacts to the ridgeline, development should:
   - provide additional setbacks from the top of ridgeline; and/or
   - preserve or plant trees and vegetation to screen development; and/or
   - reduce building height to ensure that new development has a low profile on the ridgeline.

Development on the ridgeline can dominate views from below. Additional setbacks, landscaping and reduced building height may be used to mitigate view impacts towards ridgelines.





Without mitigation measures, development on the ridgeline detracts from many of the natural characteristics of the hillside environment.

Development at the ridgeline (to the upper left) is highly visible whereas development that is set back from the ridgeline (to the upper right) blends with the hillside and preserves the character of the ridgeline.

3.1.3. Trees and Vegetation

Existing trees and vegetation have important ecological and aesthetic value in hillside locations. For example, they prevent erosion, stabilize slopes, contribute to neighbourhood character, and break up views of building facades, roadways, and other site works.

Performance Target: Retain existing trees and vegetation of important ecological and aesthetic value, as identified in the Development Concept Plan.

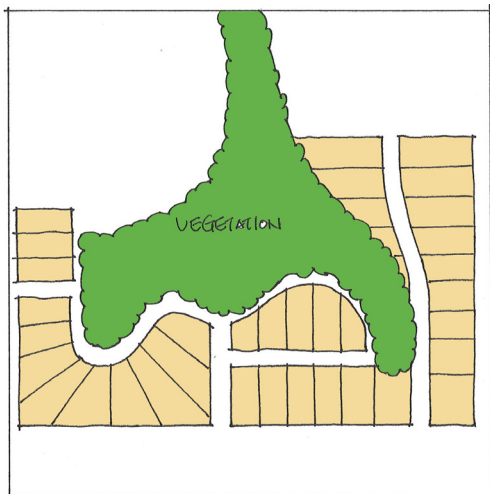
Development Permit Requirements:

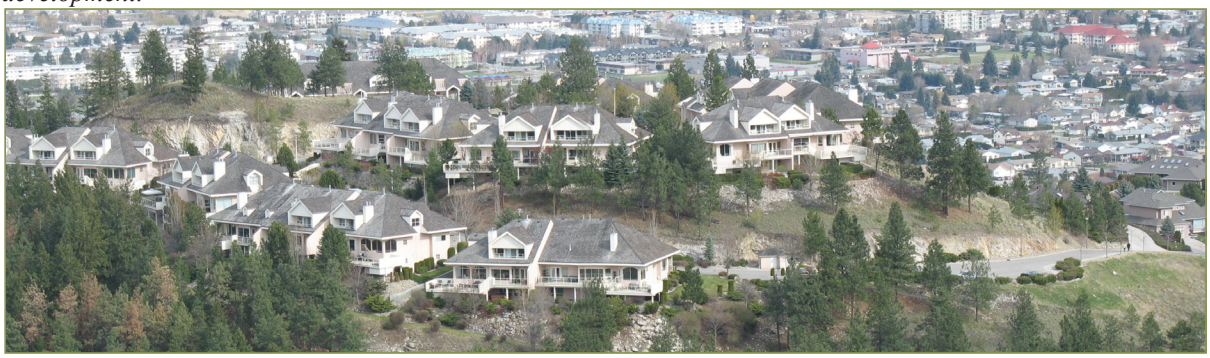
a) Clearly identify tree clearing limits in the Development Concept Plan.
b) Identify and preserve stands of trees and vegetation.
c) Complete a Tree Management Plan and plant new trees in accordance with the provisions of the City's Tree Management (Land Development) Bylaw.

Total clearing of development sites should be avoided.

Tree retention provides hillside neighbourhoods with a mature feel immediately after development.

Tree retention reinforces the natural character of hillside neighbourhoods.





Natural slope conditions are maintained in yard areas, facilitating the preservation of numerous trees throughout the site.

3.1.4. Restoration of Disturbed Areas

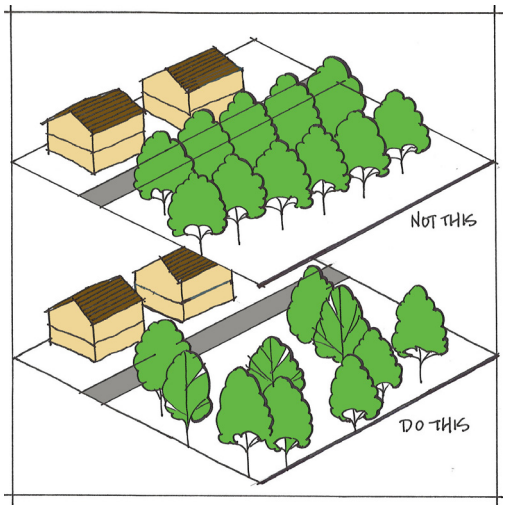
Through re-vegetation and landscaping, the restoration of disturbed sites helps to enhance the visual quality of development and mitigate the site disturbances associated with development (e.g. clearing, grading, dumping, erosion, compaction, etc.).

Performance Target: Re-vegetate and landscape sites prior to occupancy.

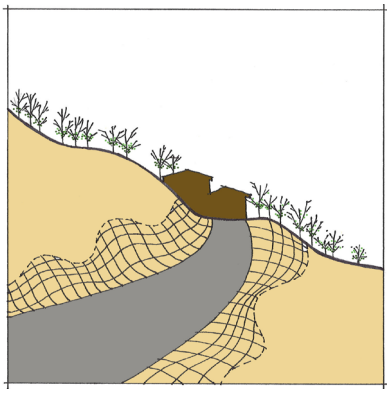
Development Permit Requirements:

a) Restore disturbed areas as soon as possible and prior to occupancy in accordance with a re-vegetation plan that is prepared by a registered landscape architect (BCSLA) and designed specifically to promote plant health, mitigate erosion, and offset any visual impacts of hillside development.
b) Intensly landscape each lot, with particular attention to areas adjacent to street frontages and areas adjacent to retaining features.
c) Use native plant materials to the greatest extent possible.
d) Limit the use of irrigation. Where irrigation is essential, water conserving principals should be employed in the design of the irrigation system. In addition automatic shut-off valves should be provided for all irrigation systems to prevent risk of accidental erosion due to system failures.
e) Replace trees and vegetation in a manner that replicates the characteristics and performance of the natural setting, including the provision of a sufficient density of trees (as specified in the City's Tree Management Bylaw), sufficient ground cover, and intensity of vegetation. Trees should be planted in organic clusters rather than in lines or formal arrangements.
f) Replace trees and vegetation in such a way that they reach maturity in a 10 year time frame.
g) Manufactured slopes should not appear engineered but should blend with existing slope conditions.
h) Re-vegetation should consider viewscapes from the hillside.
i) When restoring disturbed areas, adequate depth of growing medium should be provided in accordance with the specifications of the BC Landscape Standard.

Trees should be re-planted to replicate the characteristics of the natural setting.



Manufactured slopes should blend well with existing slope conditions.



New landscaping and manufacturing of the slope (at left) blends well with existing slope conditions.

3.2 Site Planning

Design Principle: In hillside locations, special care is required in site planning to ensure that development responds to existing site conditions and opportunities, and integrates seamlessly with its natural context. Hillside locations pose unique challenges to development as they contain natural hazards, they provide topographical constraints in design, and they have a number of natural features and aesthetic values that may need protection. In this context, a sensitive, flexible approach to site planning is necessary to ensure that the City's hillsides remain an attractive and safe place to live. Overall, development should fit the hillside rather than making the hillside fit development.

3.2.1. Lot Size and Configuration

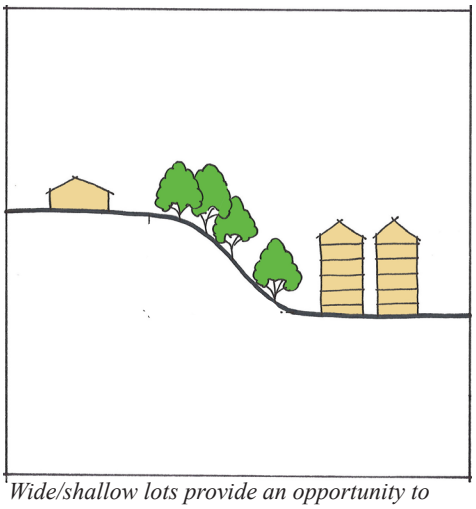
In hillside areas, traditional "flat-land" approaches to neighbourhood design can result in significant disruption to the natural terrain. An alternative approach involves the clustering of development on a portion of a site, and the retention of remaining land as permanent open space. This approach serves to protect the natural integrity of hillside areas, while also providing a greater variety of building forms.

Using the clustering approach, there is typically more flexibility in terms of housing forms and tenure options, with consideration for multi-family dwellings (e.g. townhouses), small lot single- detached development, and single-detached strata development. The overall intent is to permit similar development yields as may occur in a conventional subdivision, but to "cluster" these yields and utilize different built forms. Open space could be dedicated to the City, protected by covenant, or transferred to a land conservancy - the specific approach is reviewed on a case-by-case basis.

Performance Target: Configure development such that disruptions to the natural terrain are minimized and unique features are preserved.

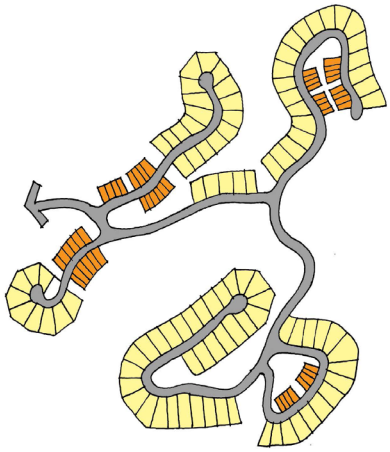
Development Permit Requirements:

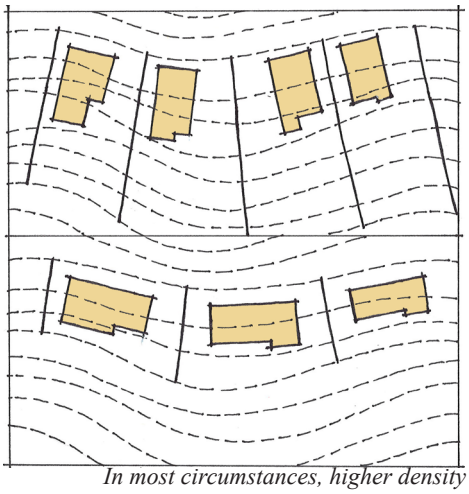
a) Cluster development as a means of minimizing site disturbance, protecting open space in steeper areas, and protecting the natural environment.
b) Where possible, direct higher density development (e.g. small lot single-detached residential, townhouses) towards areas with less steep slopes that are most easily developable.
c) In general, locate the majority of hillside development in areas with natural slopes of less than 30%, and preserve open space in areas with natural slopes of 30% or more, where there are greater inherent risks associated with development.
d) Utilize alternative lot configurations (e.g. wide/shallow lots) to reflect unique site conditions.



Wide/shallow lots provide an opportunity to minimize slope disruption.

Clustering directs development to useable portions of the site while retaining remaining areas as open space.





In most circumstances, higher density development is best concentrated in less steep areas, with steeper areas preserved in a natural state.

3.2.2. Parks, Open Space and Trails

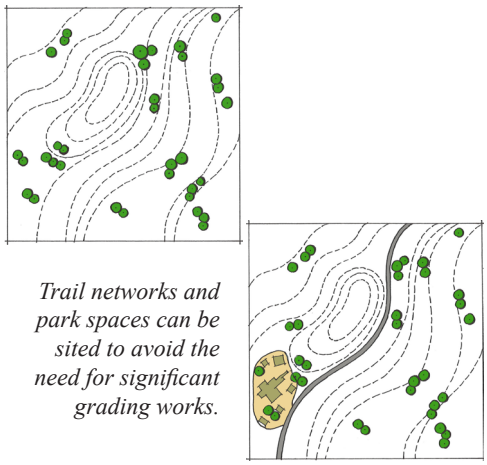
Hillside areas provide unique opportunities for an integrated network of parks, open spaces and trails that take advantage of the hillside context.

Performance Target: Ensure that natural site conditions are taken advantage of to provide unique parks, open spaces and trails within the hillside context.

Development Permit Requirements:

a) Retain natural hillside features as a means of creating unique park spaces.
b) Avoid extensive grading when creating parks, trails and open spaces.
c) Preserve contiguous open space networks to provide habitat linkages within the site and to neighbouring areas. Where practical these networks should be integrated into existing riparian corridors.
d) Utilize trails to connect parks and schools as well as parts of the community that cannot be linked by roads due to topographic constraints.
e) Locate key park spaces to capitalize on scenic views from the hillside.

In this project, a significant rock outcrop was identified as an asset and turned into a park space. A stairway and separate trail connection provide access to the top, where there is a playground, seating areas and views.



Trail networks and park spaces can be sited to avoid the need for significant grading works.

A trail provides a recreational amenity and it provides a connection to other portions of the neighbourhood.

A field and riparian area was preserved to provide park and amenity space for local residents.

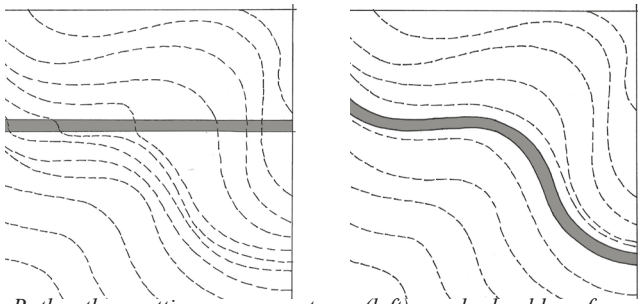
3.2.3. Roads

Roads are the building blocks of site design as they provide access for vehicles, cyclists, pedestrians, emergency, and maintenance vehicles. They also establish a pattern for development and they contain many other necessary services, such as water, sewer and other utilities. However, the cuts and fills associated with roads can often have a dramatic effect on the quality of the hillside environment. In steep slope areas, a flexible approach can help to ensure that visual and other impacts are mitigated. In this regard, where warranted, Development Permit requirements may vary or supplement the requirements of the City's Subdivision and Land Development Bylaw.

Performance Target: Provide a road and transportation network that is safe, accessible, and sensitive to the terrain.

Development Permit Requirements:

a) Align roads to follow natural site contours, conforming to topographic conditions rather than cutting across contours.
b) Provide for reduced design speeds (minimum 40 km/hour on collectors and arterials and minimum 30 km/hour on local roads) and increased road grades (maximum 15%) where it can be demonstrated that design measures will be employed to help ensure that travelled speeds remain close to the posted speed limits through reduced straight sight distances and road geometric design.
c) Utilize connectivity in the road network over long cul-de-sacs and "dead-end" situations where topographic conditions permit.
d) Utilize alternative approaches to turnarounds (e.g. hammerhead configurations) to reduce the amount of required grading works.
e) Allow cul-de-sac length to be increased where connectivity in the road network is not possible due to topographic conditions, provided that appropriate emergency access is constructed. Emergency vehicle access lanes shall generally have a minimum hard packed surface width of 4 metres and a cleared width of 6 metres.
f) Utilize split roads and/or one-way roads to preserve significant natural features, to reduce the amount of slope disturbance, or to improve accessibility to individual parcels.
g) Require one-way roads to have a minimum pavement width of 6 metres and a minimum right-of-way of 10 metres.
h) Utilize reduced pavement widths and right-of-way widths (e.g. local road with minimum pavement width of 6 metres plus parking bays and minimum right-of-way of 12 metres) where service levels can be maintained, emergency vehicle access can be maintained, the reduced widths provide demonstrably less slope disturbance and the reduced widths contribute to the overall neighbourhood character.
i) Allow for meandering sidewalks adjacent to the road as a means of eliminating long, sustained grades, preserving natural features, or reducing grading requirements within the right-of-way. Varied offsets between the road and sidewalk will be considered for these purposes.



Rather than cutting across contours (left), roads should conform to topographic conditions (right).

A one-way road system can reduce the amount of slope disturbance and provide additional opportunities to protect the natural environment.

A split road was used to preserve a wetland and significant tree stand.

The meandering pathway adjacent to the road reduces road grading requirements and provides an opportunity to preserve natural features between the roadway and the pathway.

A hammerhead configuration can reduce the amount of grading works required to accommodate an adequate turn-around.

3.2.4. Driveways and Lanes

Driveway access within hillside development can significantly impact the ability to allow the housing to conform to the natural grading of the hillside. Creativity in driveway access should be employed to allow for good property access while maintaining the intent of the Hillside Development Standards. Where warranted, Development Permit requirements may vary or supplement the requirements of the City's Subdivision and Land Development Bylaw.

Lanes are owned and maintained by the City, and intended to provide access for emergency and maintenance vehicles. Shared driveways are privately held and maintained.

Performance Target: Provide driveway and rear lane configurations that best allow development to conform to the natural grading of the hillside.

Development Permit Requirements:

a) Individual driveway grades up to 20% may be permitted where site conditions warrant and where it can be demonstrated that grade transitions will ensure good vehicular access.

b) Ensure the first 3.5 m on a downslope driveway has a grade no greater than 7%.

c) Lanes and shared driveways may be permitted where significant site grading can be reduced with the following provisions:

- Grades should not exceed 14%.
- Single in and out lanes, and shared driveways should be limited to servicing 6 lots and they should include turn around provisions.
- Through lanes and shared driveways may service up to 15 lots.
- Minimum paved travel lane width shall be 4.0m with widening where necessary to permit safe vehicle movements.
- Lane design must allow for access by emergency, garbage collection vehicles, and moving vehicles at a design speed of 20 km/hour.
- One on-site guest parking spot must be provided per lot serviced.
- Where house frontage is not visible from the street, civic addresses must be placed on a sign that is visible from the street.
- For shared driveways, an appropriately sized and located area will be required for common garbage and recycling pick-up from the road. Space must be provided to allow for a vehicle to pull off the road to access this area.

Narrow rear lanes provide at-grade driveway access to homes on the top storey.

d) Rear lanes are encouraged particularly on the high side of lots, in order to allow for stepping of buildings, eliminate the need for steep driveways, and to allow for retaining features and/or reduced grading requirements in front yards.

e) Driveway widths should not exceed 3.5m at the curb face, in order to minimize grading requirements.

Shared driveways provide access to multiple properties.

3.2.5. Building Siting and Orientation

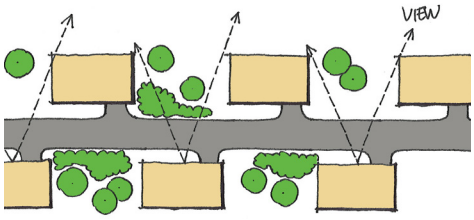
In hillside context, building orientation can have a significant impact on both views and the need for terrain alteration.

Performance Target: Orient building to minimize view impacts and grading requirements.

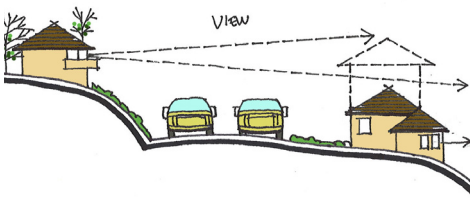
Development Permit Requirements:

a) Orient buildings so they run parallel with the natural site contours to reduce the need for site grading works and to avoid high wall facades on the downhill elevation.
b) Site buildings to minimize interference with the views from nearby (uphill) buildings.

This lot configuration facilitates building orientation that runs parallel with the site contours. Combined with a reduced front yard setback, this configuration minimized grading requirements and preserved the site's hillside character while still providing usable outdoor space.



Staggering of buildings is one method that can be used to preserve views.



Views can also be preserved by reducing building height in the downhill buildings.

3.2.6. Earthworks and Grading

In hillside areas, earthworks and grading should primarily be used to ensure the feasibility of roads and building envelopes without requiring massive manipulation of the land.

Performance Target: Maintain the hillside charater and use grading to fit development to the land, as opposed to making the land fit the development.

Development Permit Requirements:

a) Maintain yard areas in a natural slope condition. Large cuts and fills to achieve flat yards will not be permitted.
b) Ensure cuts and fills blend in with the natural topography, providing smooth transitions and mimicking the pre-development site contours. This can be accomplished by providing berms, grading the site to reflect original topographic conditions, and providing landscaping that mimics the site topography.
c) Re-vegetate manufactured slopes to reflect natural conditions.
d) Rock cuts are an acceptable alternative to retaining and they will be permitted where necessary (i.e. for roads) but with consideration for the visual impact of the exposed rock faces.
e) Lot grading should be provided on a consistent, comprehensive basis throughout the whole of the development. Grading should not be undertaken on a parcel by parcel basis. In other words, all grading and retaining should be completed by the master developer, and at an individual parcel level, there should not be a requirement for builders to manipulate land.

Significant earthworks can compromise natural slope conditions and neighbourhood character.

This development provides a positive example of yard areas that are maintained in a natural slope condition.

3.2.7. Retaining

The use of retaining structures is an outcome of site design decisions, and alternatives to retaining structures should be considered prior to their use. Retaining features should not be used as a means of providing flat development sites.

Performance Target: Utilize retaining features to reduce on-site grading requirements, and ensure that any retaining features are aesthetically appealing, subtly fit with the landscape, and reinforce the hillside character.

Development Permit Requirement:

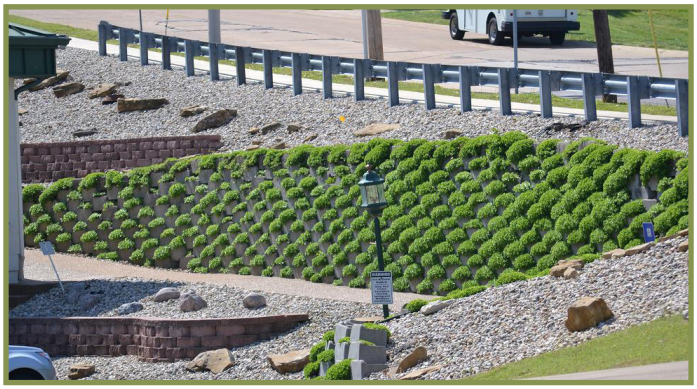
a) Retaining materials should evoke a sense of permanence and reflect natural qualities in appearance through the use of context-sensitive materials (i.e. stone, masonry, brick, etc.), colours, and textures. Large concrete lock block is not considered to be a context-sensitive retaining material, and if used, it must be masked or screened (e.g. through the use of landscaping).
b) Retaining walls should generally be curvilinear and follow the natural contours of the land.
c) Utilize terracing of retaining walls to break up apparent mass and to provide planting space for landscaping features.
d) Use systems of smaller, terraced retaining walls where significant retaining is necessary, rather than providing a single, large, uniform wall. The height and depth of terraced walls shall be consistent with the natural terrain and the general pre-development slope conditions above and below the walls.
e) Provide landscaping to screen or supplement all retaining features.
f) Minimize the height of retaining walls. In site-specific circumstances, high walls may be permitted where warranted. Retaining walls over 1.2m in height should either be terraced with landscaped tiers, be screened by landscaping, have a unique surfaced texture/pattern, or use innovative design techniques (e.g. green retaining wall systems primarily on southern exposures) to mitigate visual impacts. Note that for proposed walls in excess of 1.2m the developer will be required to show that the wall is essential (i.e. to accomodate road geometry).

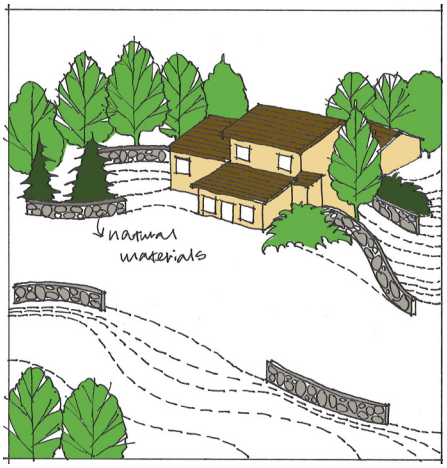
Concrete lock block is not considered to be a context-sensitive retaining material.

Large retaining walls appear out of place and detract from the quality of the hillside environment.

Terraced retaining systems provide tremendous opportunities for landscaping that enhances the quality of the hillside development.

Green wall systems provide an innovative technique to mitigate the visual impacts of high retaining walls.





This drawing illustrates appropriate uses for retaining walls that are low in profile, use natural materials, and are broken up into sections to reflect the natural terrain.

Design retaining walls to be curvilinear and follow natural contours.

The visual impact of retaining walls is subdued by using context-sensitive natural materials in combination with landscaping.

3.3 Building Form

Design Principle: Buildings on the hillside should be designed and constructed in such a way as to complement the natural surroundings and to blend buildings with the hillside in ways that benefit both the landowners and the community. In hillside locations, context-sensitive design will require some customization to ensure that buildings fit with the surrounding landscape.

3.3.1. Building Mass and Height

Building mass and height have a significant impact on the apparent prominence of a building in relation to its surroundings. While building height and mass are regulated through zoning, in a hillside context, special care must be taken to integrate development into its natural context to minimize the visual impacts of buildings.

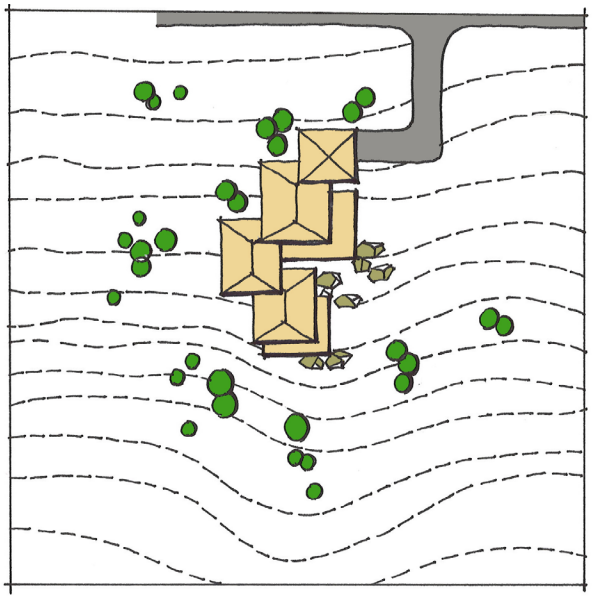
Performance Target: Reduce apparent building mass, reduce apparent building height, integrate development into its natural context, and minimize the visual impact of buildings in the hillside context.

Development Permit Requirements:

a) Utilize a range of design tools to reduce apparent building height and mass. Options include:
   - Stepping the building foundation to reduce site grading and retaining requirements (i.e. buildings should be set into the hillside and integrated with the natural slope conditions);
   - Avoiding single vertical planes in excess of two storeys;
   - Varying rooflines;
   - Articulating buildings;
   - Avoiding unbroken expanses of wall;
   - Designing buildings in smaller components that appear to fit with the natural topography of the site;
   - Designing roof pitches to reflect the slope of the natural terrain (i.e. angling roof pitches at slopes that are similar to those of the natural terrain).

By stepping the foundation, articulating the building, and varying heights and rooflines, these homes could better reinforce the natural topography and hillside landscape.

Apparent height and building mass could be reduced by stepping building foundations and eliminating single vertical planes in excess of two storeys.



To reduce site grading and retaining requirements on steeper sites, step the building foundation.

This example illustrates how stepping can occur with garage access at the bottom. The architecture also provides an excellent example of how to avoid single vertical planes in excess of two storeys, vary rooflines, and articulate the building to reduce apparent mass.

With garage access at the top, this house is stepped and set comfortably into the hillside context.

3.4 Works and Services

Design Principle: In hillside locations, there is need to integrate site planning with planning for municipal services and utilities. The goal is to respect and protect the natural environment while meeting servicing requirements and minimizing ongoing operating and maintenance costs. Overall, site servicing should be designed to suit the hillside context rather than modifying the hillside to suit the servicing requirements. In this regard, where warranted, Development permit requirements may vary or supplement the requirements of the City's Subdivision and Land Development Bylaw.

3.4.1. Stormwater Management

Stormwater is a resource to hillside developments. It provides essential recharge to groundwater and surface water systems and provides much needed nourishment to the natural species.

Performance Target: Implement integrated stormwater management systems that sustain the characteristics of a healthy watershed and protect life and property.

Subdivision Requirements:

a) Require all development plans to indicate how stormwater runoff will be impacted and mitigated in accordance with City policy (i.e. The Policy and Design Criteria Manual for Storm Water Management). Integrated storm water management plans, at a watershed level, and functional stormwater plans, at a catchment level, should be completed in advance of development permit application and each development permit application will be required to demonstrate how the elements of these plans have been incorporated.
b) Require runoff on hillsides to be infiltrated (where practical) and attenuated at a lot level through the use of best management practices. The construction of large detention tanks or ponds is only to be considered once onsite measures have been maximized.
c) Locate and design large detention basins and tanks with consideration for seismic design events, access for routine operations and maintenance as well as eventual tank repair.
d) Ensure that the Development Concept Plan respects the natural drainage pattern.

In hillside environments the construction of large detention tanks or ponds should only be considered as a last resort.

This wetland provides a valuable stormwater management function while also providing amenity space for surrounding residents.

3.4.2. Water and Sanitary Sewer Servicing

Hillside development typically requires more extensive infrastructure to provide water and sanitary sewer service. Careful planning of pressure zone boundaries and sanitary sewer pump station catchment areas is critical to avoid excessive redundancy. As well, design of water and sewer infrastructure can have an impact on road width requirements, which in turn impact site grading requirements and visual impacts of hillside development.

Performance Target: Avoid excessive system redundancy and ensure that servicing designs support the use of alternative road standards where necessary to reduce grading requirements and visual impacts.

Subdivision Requirements:

a) Develop water pressure zones and sanitary pump station catchment areas on a watershed by watershed basis (typically outlined in the Comprehensive Development Plan). Require the developer to illustrate how the development servicing has remained true to these plans.
b) Ensure that the design of the development is consistent with available fire flow.
c) Services may be located outside of a road right-of-way provided a 3.0m driving surface is provided within a 6.0m right-of-way over the entire length of the main.
d) The use of a common trench for storm and sanitary sewers is permitted where practical.

3.4.3. Other Utilities

Development of servicing strategies for other utilities (i.e. gas, hydro, cable, telephone) should be initiated early in the design process.

Performance Target: Optimize the layout and configuration of other utilities (i.e. gas, hydro, cable, telephone) so that the visual character of hillside development is protected.

Subdivision Requirements:

a) Design roads and lane rights-of-way to allow flexibility in offsets for utility trenches, vaults and transformers. Consideration should be given for narrowing offsets along trench areas and then locally widening at major infrastructure (i.e. vaults and transformers). This will provide greater ability to avoid excessive flattening of the rights-of-way.
b) Hydro, telephone and cable ducting may be located under sidewalks. Gas mains should be located outside of areas where excessive disturbance will result when the service connections are put in.
c) Bury utilities to preserve the visual character of hillsides.