Information Brochure for the Preparation of Landslide Hazard Assessments

A Landslide Hazard Assessment is required prior to approval of your application (Building Permit or Subdivision) with the District of Mission.

A Landslide Hazard Assessment (the "Report") must confirm that the land may be used safely for the use intended (i.e. for building permit or subdivision) without an undue risk of hazards. The Report shall be prepared at the cost of the applicant by a professional engineer or geoscientist ("Qualified Professional") with experience or training in landslide hazards.

Where Landslide Hazard Assessments are required the Association of Professional Engineers and Geoscientists of British Columbia (APEG) requires that the Qualified Professional:

- Be knowledgeable about application and approval processes; procedures of subdivision approval, development permit, building permit and floodplain bylaw variance and exemption; and applicable legislation.
- Confirm that he/she has appropriate training and experience to carry out a landslide assessment associated with the complexity of associated terrain and geology and if no, involve require specialists.
- If they exist, obtain a copy of the approving jurisdiction's guidelines for carrying out landslide assessments and/or for preparing landslide assessment reports, and
- If one exists obtain the adopted level of landslide safety or other landslide assessment approval criteria, for the proposed residential development in the approving jurisdiction.

If the Report makes recommendations (i.e. setbacks, protective works or identifies a specific building envelope) you may also require a:

- Hazardous Lands Development Permit and/or
- Covenant and/or
- Reference Plan prepared by a BC Land Surveyor.

The specific requirements will be determined based on the findings of the Report.

Please provide your Qualified Professional with the attached handouts:

- **Handout #1**: Assistance to Developers and Building Permit Applicants undertaking Landslide Hazard Assessments
- **Handout # 2**: Hazard Acceptability Thresholds for Development Approvals by Local Government **(Cave Report)**
- **Handout # 3:** Landslide Assessment Assurance Statement-Appendix D from APEG Guidelines.

**See Section 56 of the Community Charter, (1) SBC Chapter 26, and Section 879 and 920 of the Local Government Act, RSBC 1996, Chapter 323, Land Title Act Section 86(d).*

HANDOUT 1

ASSISTANCE TO DEVELOPERS AND BUILDING PERMIT APPLICANTS UNDERTAKING LANDSLIDE HAZARD ASSESSMENTS

Landslide Hazard Assessments are requested by the District of Mission in order to satisfy the requirements of the *Community Charter*, the *Local Government Act* or *Land Title Act**. The purpose is to ensure that development occurs only on sites which are safe for the use intended.

Landslide Hazards Assessments may only be undertaken by a professional engineer or professional geoscientist (qualified professional) with appropriate educating, training and experience to carry out various forms of landslide analyses.

However, there is a certain minimum content which a landslide Hazard Assessment must have in order for it to be acceptable to the District of Mission.

1. A topographic and geomorphological description of the site and a statement as to which type of natural hazards may affect it. (See list in Community Charter.)
2. A review of previous geotechnical studies affecting the site and/or of engineering work in the vicinity or on scientifically relevant sites elsewhere.
3. An assessment of the nature, extent, frequency (probability) and potential effect of the hazard including a description of the scientific methodology use to define these parameters. The qualified professional must reference the document "Hazard Acceptability Thresholds for Development Approvals by Local Governments" (Cave report). The methodology should be described in sufficient detail to facilitate a professional review of the study by the District of Mission when necessary. The qualified professional must be able to state the development is 'safe for the use intended' prior to approvals by the District of Mission.
4. Proposed mitigative works (if any, including construction and maintenance programs for such works) and/or actions designed to prevent hazardous occurences. Certificates of approval are required on all constructed works for which the qualified professional is responsible.
5. An assessment of the effect of the mitigative works in terms of its ability to reduce the potential impact of the hazard.
6. Any other recommendations which the qualified professional believes appropriate. Note that items 4, 5 & 6 should be in sufficient detail and clarity to permit their inclusion in a Section 219 Covenant as required by Statute.
7. Sesmic stability of soil slopes and liquefaction of soils must be addressed when undertaking landslide assessments.
8. An external independent peer review of a geotechnical report, the cost of which is the responsibility of the client, may be required by the District.
9. Where applicable Engineers reports must meet the Guidelines for Legislated Landslide Assessments for Proposed Residential Development in BC.
10. The signature and seal of a B.C. registered qualified professional in the specialized field appropriate to the study.

The District of Mission requires that clients instruct their qualified professional to contact the District prior to commencement of their work so that they can receive relevant information and more specific guidelines that may be applicable to the development.

**See Section 56 of he Community Charter,(1) SBC Chapter 26, and Section 879 and 920 of the Local Government Act, RSBC 1996, Chapter 323, land Title Act Section 86(d).*

HAZARD ACCEPTABILITY THRESHOLDS FOR DEVELOPMENT APPROVALS BY LCOAL GOVERNMENTS

(Revised November 1993)

A Paper by

Dr. Peter W. Cave
Director of Planning
Regional District of Fraser Cheam

Hazard –Related Responses to Development Approval Applications

1. Approvals without conditions relating to hazards.

2. Approval, without siting conditions or protective works conditions, but with a covenant including “save harmless” conditions.

3. Approval, but with siting requirements to avoid hazards, or with requirements for protective works to mitigate the hazard.

4. Approval as (3) above, but with a covenant including “save harmless” conditions as well as siting conditions, protective works or both.

5. Not Approvable.

Mountain Stream Erosion or Avulsion					
	1:10	1:10-1:100	1:100-1:200	1:200-1:500	<1:500
Minor Repair (<25%)r	5	2	1	1	1
Major Repair (>25%)	5	4	2	1	1
Reconstruction	5	5	2	2	1
Extension	5	5	2	2	1
New Building	5	5	4	2	1
Subdivision (infill/extend)	5	5	5	4	1
Rezoning (for new Community)	5	5	5	5	1

Debris Flow/Debris Torrent					
	1:50	1:50-1:200	1:200-1:500	1:500-110,000	<1:10,000
Minor Repair (<25%)r	5	2	2	1	1
Major Repair (>25%)	5	4	2	1	1
Reconstruction	5	5	4	3	1
Extension	5	5	4	2	1
New Building	5	5	4	3	1
Subdivision (infill/extend)	5	5	5	4	1
Rezoning (for new Community)	5	5	5	5	1

Small-Scale Localized Landslip					
	1:50	1:50-1:200	1:200-1:500	1:500-1:10,000	<1:10000
Minor Repair (<25%)r	5	2	2	1	1
Major Repair (>25%)	5	4	4	1	1
Reconstruction	5	4	4	3	1
Extension	5	4	4	3	1
New Building	5	4	4	3	1
Subdivision (infill/extend)	5	5	5	4	1
Rezoning (for new Community)	5	5	5	5	1

Snow Avalanche					
	1:30	1:30-1:100	1:100-1:500	1:500-1:10000	<1:10000
Minor Repair (<25%)r	5	4	4	4	1
Major Repair (>25%)	5	4	4	4	1
Reconstruction	5	4	4	4	1
Extension	5	4	4	4	1
New Building	5	4	4	4	1
Subdivision (infill/extend)	5	5	5	4	1
Rezoning (for new Community)	5	5	5	5	1

Rockfall Small Scale Detachment					
	1:100	1:100-1:500	1:500-1:1000	1:1,000-1:10,000	<1:10,000
Minor Repair (<25%)r	5	2	1	1	1
Major Repair (>25%)	5	4	2	1	1
Reconstruction	5	4	2	1	1
Extension	5	5	4	1	1
New Building	5	5	4	1	1
Subdivision (infill/extend)	5	5	5	4	1
Rezoning (for new Community)	5	5	5	5	1

Major Catastrophic Landslide					
	1:200	1:200-1:500	1:500-1:1,000	1:1,000-1:10,000	<1:10,000
Minor Repair (<25%)r	5	2	1	1	1
Major Repair (>25%)	5	5	2	1	1
Reconstruction	5	5	5	1	1
Extension	5	5	5	1	1
New Building	5	5	5	1	1
Subdivision (infill/extend)	5	5	5	5	1
Rezoning (for new Community)	5	5	5	5	5

Debris Flood				
	1:50	1:50-1:200	1:200-1:500	1:500-1:10,000
Minor Repair (<25%)	2		2	1
Major Repair (>25%)	4	4	1	1
Reconstruction	4	4	3	1
Extension	4	4	3	1
New Building	4	4	3	1
Subdivision (infill/extend)	5	5	4	2
Rezoning (for new Community)	5	5	5	3

Inundation[1] by Flood Waters from Fraser River & Tributaries			
	1:40	1:40-1:200	< 1:200
Minor Repair (<25%)	2		2
Major Repair (>25%)	4	4	1
Reconstruction	4	4	3
Extension	4	4	3
New Building	4	4	3
Subdivision (infill/extend)	5	5	4
Rezoning (for new Community)	5	5	5

1 Flooding Hazard involves both inundation and erosion/avulsion. Hazard acceptability thresholds must therefore involve assessment of both types of hazards at a given site.

APPENDIX D: *LANDSLIDE ASSESSMENT ASSURANCE STATEMENT*

Note: This Statement is to be read and completed in conjunction with the "*APEGBC Guidelines for Legislated Landslide Assessments for Proposed Residential Development in British Columbia*", March 2006/Revised September 2008 ("*APEGBC* Guidelines"*)* and the "2006 BC Building Code (BCBC 2006)" and is to be provided for *landslide assessments* (not floods or flood controls) for the purposes of the Land Title Act, Community Charter or the Local Government Act. Italicized words are defined in the *APEGBC* Guidelines*.*

To: The *Approving Authority* Date: _____

_____

_____

Jurisdiction and address

With reference to (check one):

- ☐ Land Title Act (Section 86) – Subdivision Approval
- ☐ Local Government Act (Sections 919.1 and 920) – Development Permit
- ☐ Community Charter (Section 56) – Building Permit
- ☐ Local Government Act (Section 910) – Flood Plain Bylaw Variance
- ☐ Local Government Act (Section 910) – Flood Plain Bylaw Exemption
- ☐ British Columbia Building Code 2006 sentences 4.1.8.16 (8) and 9.4 4.4.(2) (Refer to BC Building and Safety Policy Branch Information Bulletin B10-01 issued January 18, 2010)

For the Property:

_____

Legal description and civic address of the Property

The undersigned hereby gives assurance that he/she is a *Qualified Professional* and is a *Professional Engineer* or *Professional Geoscientist.*

I have signed, sealed and dated, and thereby certified, the attached *landslide assessment* report on the Property in accordance with the *APEGBC Guidelines*. That report must be read in conjunction with this Statement. In preparing that report I have:

Check to the left of applicable items

___1. Collected and reviewed appropriate background information

___2. Reviewed the proposed *residential development* on the Property

___3. Conducted field work on and, if required, beyond the Property

___4. Reported on the results of the field work on and, if required, beyond the Property

___5. Considered any changed conditions on and, if required, beyond the Property

6. For a *landslide hazard analysis* or *landslide risk analysis* I have:

___6.1 reviewed and characterized, if appropriate, any *landslide* that may affect the Property

___6.2 estimated the *landslide hazard*

___6.3 identified existing and anticipated future *elements at risk* on and, if required, beyond the Property

___6.4 estimated the potential *consequences* to those *elements at risk*

7. Where the *Approving Authority* has adopted a *level of landslide safety* I have:

___7.1 compared the *level of landslide safety* adopted by the *Approving Authority* with the findings of my investigation

___7.2 made a finding on the *level of landslide safety* on the Property based on the comparison

___7.3 made recommendations to reduce *landslide hazards* and/or *landslide risks*

8. Where the *Approving Authority* has **not** adopted a *level of landslide safety* I have:

___8.1 described the method of *landslide hazard analysis* or *landslide risk analysis* used

___8.2 referred to an appropriate and identified provincial, national or international guideline for *level of landslide safety*

___8.3 compared this guideline with the findings of my investigation

___8.4 made a finding on the *level of landslide safety* on the Property based on the comparison

___8.5 made recommendations to reduce *landslide hazards* and/or *landslide risks*

___9. Reported on the requirements for future inspections of the Property and recommended who should conduct those inspections.

Based on my comparison between

Check one

☐ the findings from the investigation and the adopted *level of landslide safety* (item 7.2 above)

☐ the appropriate and identified provincial, national or international guideline for *level of landslide safety* (item 8.4 above)

I hereby give my assurance that, based on the conditions[1] contained in the attached *landslide assessment* report,

Check one

☐ for subdivision approval, as required by the Land Title Act (Section 86), "that the land may be used safely for the use intended"

Check one

☐ with one or more recommended registered covenants.

☐ without any registered covenant.

☐ for a development permit, as required by the Local Government Act (Sections 919.1 and 920), my report will "assist the local government in determining what conditions or requirements under [Section 920] subsection (7.1) it will impose in the permit".

☐ for a building permit, as required by the Community Charter (Section 56), "the land may be used safely for the use intended"

Check one

☐ with one or more recommended registered covenants.

☐ without any registered covenant.

☐ for flood plain bylaw variance, as required by the "Flood Hazard Area Land Use Management Guidelines" associated with the Local Government Act (Section 910), "the development may occur safely".

☐ for flood plain bylaw exemption, as required by the Local Government Act (Section 910), "the land may be used safely for the use intended".

_____ _____

Name (print) Date

_____

Signature

[1] When seismic slope stability assessments are involved, *level of landslide safety* is considered to be a "life safety" criteria as described in the National Building Code of Canada (NBCC 2005*),* Commentary on Design for Seismic Effects in the User's Guide, Structural Commentaries, Part 4 of Division B. This states:

"The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse nor will its attachments break off and fall on people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial strength and stiffness, it retains some margin of resistance against collapse".