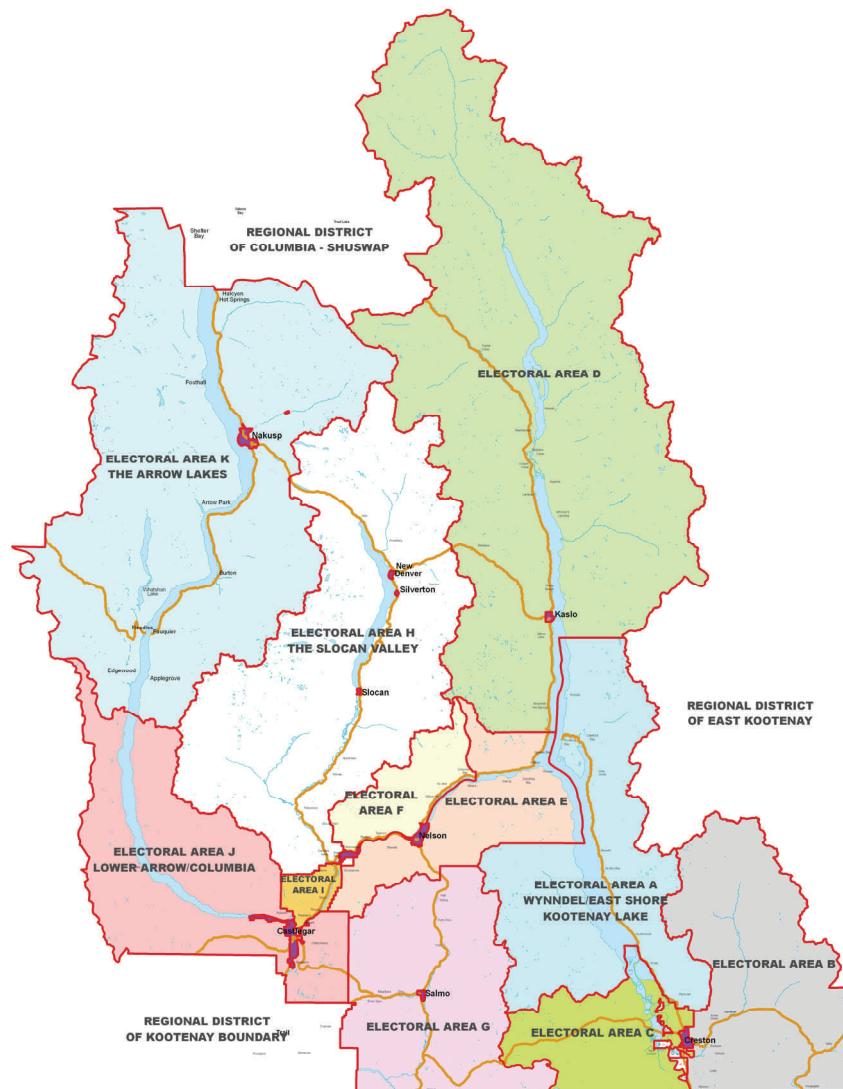




# FLOODPLAINS, ALLUVIAL FANS and GEOTECHNICAL HAZARDS



This brochure is intended to assist the general public by explaining the requirements for construction within a floodplain, alluvial fan or other geotechnical hazard.

## A Guide to Geotechnical Hazards

In British Columbia, property damage resulting from floodwaters or mudslides is not uncommon. The costs to clean up and repair damages from such geotechnical hazards can be considerable.

Reducing the damage to private property and disruption of residents due to geotechnical hazards is an important concern. There is a need to ensure that all new development occurs either on sites which are safe from geotechnical hazards or in such a manner as to insure safety from these hazards.

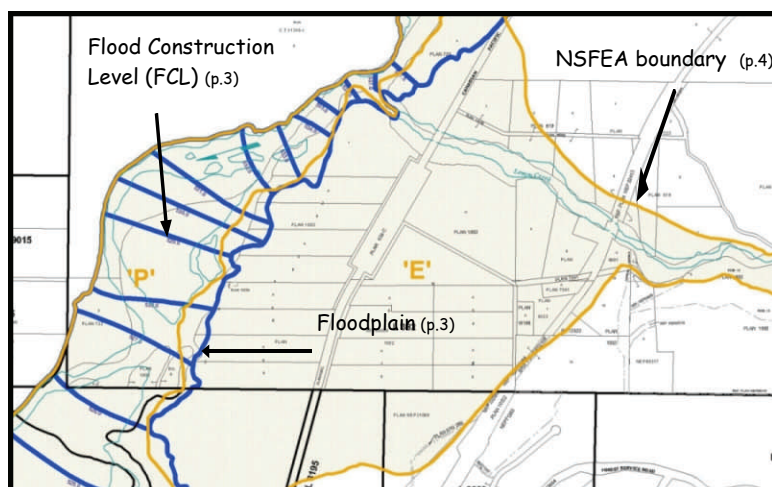


SINCE 1985, PROVINCIAL LAW HAS REQUIRED that new development in areas where building inspection is available be planned and constructed in such a way as to minimize the impact of such hazards. Specifically, the *Local Government Act* requires that all new development must be located on land that is "safe for the use intended". From a regulatory standpoint, this can involve:

- ◆ designation of geotechnical hazard areas and flood-prone areas on mapping;
- ◆ zoning and designating hazardous lands for parks, recreation use and other uses not sensitive to hazard events where practical;
- ◆ requiring geotechnical reports when lands affected by hazards are proposed for building or subdivision; and
- ◆ requiring that conditions be met to insure safety and inspections be undertaken by qualified engineers during construction of new development in potentially hazardous areas.

WHEN IT IS TIME TO BUILD, the cost of protecting a new home is generally very affordable. It is certainly much less than the cost of modifying or moving an existing building since protection measures can often be addressed at the start of construction. Recently approved lots usually have these protection measures taken into account during the subdivision process.

VACANT LOTS WHICH PREDATE this approval process can require more involved protection work, and should be approached with caution. In these cases, it may be necessary to consult with a geotechnical engineer to determine the cost and most appropriate way of protecting your property.



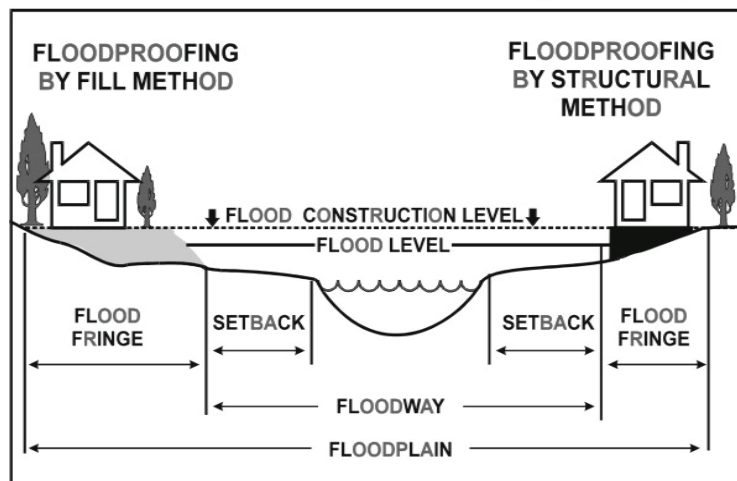
A typical hazard map showing properties and land area affected by Floodplain and Non-Standard Flooding and Erosion Areas (NSFEA)

## Some Key Words:

If you are planning to purchase property or build a new home in a rural area of the Regional District and wish to apply for a building permit, you may encounter some unfamiliar terms:

- ◆ **ALLUVIAL FAN** means a landform which develops down slope from the point where steep mountain streams emerge on wider valley bottoms.
- ◆ **FLOOD CONSTRUCTION LEVEL (FCL)** refers to elevating living spaces above ground level to protect against inundation of flood waters.
- ◆ **FLOOD FRINGE** means the portion of the floodplain not in the floodway to which flood proofing requirements apply.
- ◆ **FLOODPLAIN** means a lowland area which is susceptible to flooding from an adjoining watercourse, lake, or other body of water.
- ◆ **FLOOD PROOFING** means the alteration of land or other precautions to reduce flood damages. This may include adding fill to raise the elevation of a building site, structural measures such as foundation walls or columns to raise a building, or combinations of fill and structural measures.

*Cross Section of a Typical Floodplain*



- ◆ **FLOODWAY** means the channel of the watercourse plus those portions of the floodway which are reasonably required to convey the flood.
- ◆ **NATURAL BOUNDARY** means the visible high water mark of any lake, river, stream, or other body of water where the presence of water action is so common and usual and so long continued in all ordinary years as to distinctly mark upon the soil and vegetation of the bed of the lake, river, stream or other body of water.
- ◆ **SETBACK** means the required minimum distance from the Natural Boundary of a watercourse, lake or other body of water to any structural support or landfill required to elevate a floor system or pad above the flood level so as to maintain a floodway and allow for potential land erosion.
- ◆ **WATERCOURSE** means any natural or man made depression with well-defined banks and a bed 0.6 metres or more below the surrounding land serving to give direction to a current of water at least six (6) months of the year or having a drainage area of two (2) square kilometres or more upstream of the point of consideration.

# NON-STANDARD FLOODING AND EROSION RATINGS (NSFER)

## NON-STANDARD FLOODING AND EROSION AREAS (NSFEA):

Areas where standard flood proofing conditions are not adequate to provide the necessary level of protection against flooding, erosion and/or debris flow. NSFEA includes: alluvial fans, debris flow fans and floodway areas subject to flooding and erosion hazards which require special flooding and erosion precautions.

## NON-STANDARD FLOODING AND EROSION RATING (NSFER):

The NSFER is a rating assigned by the Ministry of Environment (MoE) for the purpose of establishing reasonable subdivision and floodplain bylaw requirements. The rating is based upon field experiences and all information available to MoE's Floodplain Engineering Staff at the time it was assigned (includes all known independent studies).

NSFEA Rating	Physical Description	CC Section 56 Professional Engineer/Geoscientist Report Requirements	Minimum Elevation above Natural Ground surface (m)	Minimum Elevation above Obstruction that could cause ponding (m)	Comments
<b>S</b>	Superficial flooding and inundation by low velocity flow possible; typical of the low gradient alluvial/debris flow fans of very small streams or the flattest most distant edges of larger alluvia/debris flow fans.	N/A	0.3	0.3	Scour/Erosion Protection as per Sec. 9.4 and 9.5
<b>1</b>	Shallow flooding by low velocity flow possible; typical of the alluvial/debris flow fans of small streams with moderate slopes or the run-out areas of larger alluvial/debris flow fans.	N/A	0.6	0.3	Scour/Erosion Protection as per Sec. 9.4 and 9.5
<b>2</b>	Flooding by moderate velocity flows possible; typical of the alluvial/debris flow fans of moderate size streams, small streams with steeper slopes, or the transition zone of larger alluvial/debris flow fans.	N/A	1.0	0.6	Scour/Erosion Protection as per Sec. 9.4 and 9.5
<b>F</b>	Flooding by moderate velocity flows possible; typical of the alluvial and debris fans of moderate size streams, small streams with steeper slopes, or the transition zone of larger alluvial and debris flow fans.	Full Engineer/Geoscientist Report required including a complete hazard assessment, siting of proposed buildings and site specific recommendations. Report registered on the title of the property.	N/A	N/A	
<b>E</b>	Flooding and erosion from: high velocity flows, avulsions, debris flows or bank stability problems possible. Typical of areas on alluvial/debris flow fans of larger streams, moderate sized streams with steeper slopes or erodible banks in the floodway of large rivers.	Full Engineer/Geoscientist Report required including a complete hazard assessment, siting of proposed buildings and site specific recommendations. Report registered on the title of the property.	N/A	N/A	
<b>G</b>	<b>Temporary NSFE Rating:</b> This is a geological feature. As such any portion of it should be assumed to be <b>potentially</b> active. The geological fan boundaries have been solely delineated by interpretation of aerial photography.	Professional Engineer/Geoscientist reconnaissance level report recommended to first determine what portion of the lot, if any, is on an active alluvial/debris torrent fan.	N/A	N/A	Geological fans identified using air photographs; field verification of hazard level required.
<b>P</b>	<b>Temporary NSFE Rating:</b> Flooding and erosion from high velocity flows; avulsions, debris flows or bank stability problems. Typical of the apex areas of larger streams or moderated sized streams with steeper slopes.	Full Engineer/Geoscientist Report required including a complete hazard assessment, siting of proposed buildings and site specific recommendations. Report registered on the title of the property	N/A	N/A	Essentially, an 'E' rated fan that needs its boundaries clarified

## WHEN DO I NEED A GEOTECHNICAL REPORT?

When land proposed for development is identified as being potentially subject to a geotechnical hazard, the Building Official may request the owner to provide a Geotechnical Report prepared by a professional engineer. The report, required by Provincial legislation, must demonstrate that the land may be utilized safely for the use intended. As part of the building permit process, it protects the land owner's interests as well as those of the community at large and assists in ensuring the construction of safe and sound structures.

THE LOCAL GOVERNMENT ACT REQUIRES that a landowner undertaking:

1. construction of new buildings or structures,
2. structural alterations to an existing building or structure, or
3. an addition to an existing building or structure.

ON LAND THAT IS "SUBJECT TO, OR LIKELY TO BE SUBJECT TO, GEOTECHNICAL HAZARDS" be required to provide a geotechnical report certified by a professional engineer with experience in geotechnical engineering which certifies that the land may be used safely for the use intended.



Because it is the responsibility of the landowner to undertake this work it is important to determine at the earliest stage possible whether a geotechnical report and/or work will be a requirement in any proposed development.

In most cases the geotechnical report may require special siting, structural design, landscaping, landfill, or other conditions to be met in the course of the project. It is important to note, however, that if a geotechnical report determines that the land may not be used safely for the use intended, the Building Official is required to refuse to issue a building permit.

## NEED MORE INFORMATION?



The Regional District of Central Kootenay has information on file which may assist in assessing whether a property will require a geotechnical review when new development is proposed. Mapping from various sources, overview geotechnical reports, and background information on the local area all assist in making this determination. If you are purchasing a property with the intention of undertaking new construction or alterations which require a building permit it is essential that, before you complete the property purchase, you consider whether geotechnical work will be required. If you own property and plan to undertake new construction near streams, drainage areas, land with uncertain foundation conditions, or steep slopes, you should contact the Planning or Building Department for information on geotechnical hazards in your area.

Information regarding NSFEEAs is available at the Regional District of Central Kootenay website at: [www.rdck.bc.ca](http://www.rdck.bc.ca). Not all mapping is currently available on the web. Please contact the RDCK for complete mapping information or if you have any questions.

## Questions?

If you have questions regarding information presented in this brochure, please telephone or visit the Regional District of Central Kootenay Planning Department.



Telephone Number: (250) 352-8165 or  
1-800-268-7325 (BC only)



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