

**12.7 DPA 6 – HAZARD LANDS**

**Category**            **Protection of development from hazardous conditions**

**Justification**        Natural hazards, such as floods and steep slopes can pose a risk to life and property.

**Steep Slope Areas**

Steep slopes are identified as land with 30 degrees incline or more, lands within 30 m of undeveloped slopes with gradients exceeding 50% and all land within 30 m of developed slopes with gradients exceeding 30%. These areas are identified generally in Map 3. This mapping is developed from map contours and site specific measurements prior to development may be required. Developing on steep slopes can create erosion problems, excessive storm water drainage, groundwater management concerns, and other environmental and visual impacts, particularly if tree cover is substantially altered. Protecting these slopes in the course of development is important to the environment. Conventional detached residential developments located on steep slopes are typically very disruptive on steep slopes given the densities that need to be achieved. It is also very difficult to retain vegetation on the slopes. For this reason, the City supports the use of housing forms that concentrate development in less sensitive parts of steeply sloped areas, leaving a significant portion of the land in a relatively undisturbed state.

**Flood Areas**

Flooding is a potential hazard, in particular along the Cowichan River. Flood areas may be unsuitable for development without putting life and property at risk. The measure of risk is calculated by the Provincial Government and is based on a 200-year flood event. These flood zone areas are indicated on Map 3. Lands not shown on this schedule but adjacent to watercourses, may also be subject to flooding. Reference to the BC Ministry of Environment flood plain mapping and/or site-specific elevations may be required to determine if there is a risk of flooding prior to development approval.

The hazard area designations should not be interpreted as prohibitions on all development activity, but as an identification of areas where professional geotechnical assessment and specific development standards are required.

**Guidelines****General**

Development Permits will be required in these areas for activity including construction, subdivision, land clearing, land grubbing, soil removal, soil deposit and tree removal. The hazard area designations should not be interpreted as prohibitions on all development activity, but as an identification of areas where professional geotechnical assessment and specific development standards are required.

- Prior to any development or alteration of land, a geotechnical engineering report must be prepared by a qualified professional engineer with experience in geotechnical engineering and, preferably also with experience in hydraulic engineering. The geotechnical engineering report should include:
  - A topographic and geomorphic description of the site and a statement as to which type of natural hazards may affect it.
  - A review of previous geotechnical studies affecting the site and/or engineering work in the vicinity.
  - An assessment of the nature, extent, frequency (probability) and potential

effect of the hazard including a description of the scientific methodology used to define these parameters. The methodology should be described in sufficient detail to facilitate a professional review of the study of necessary.

- Proposed mitigative works (if any, including construction and maintenance programs for such works) and/or actions designed to prevent hazardous occurrences. Certificates of approval are required on all constructed works for which the engineer is responsible.
  - An assessment of the effect of the mitigative work in terms of its ability to reduce the potential impact of the hazard.
  - Any other recommendations which the qualified professional engineer believes appropriate.
- No development or alteration of land will occur where the report by the qualified professional indicates that a hazardous condition would result.
  - Planning for the retention of significant stands of trees is strongly encouraged.
  - In the absence of a geotechnical engineering report, no development or alteration of land will be permitted on the escarpment or within 30 m of the top of the ridge or the base of the slope.

#### **Steep Slope Areas**

- No unnecessary disturbance to the steep slope shall be permitted.
- Existing vegetation should be maintained to control erosion and protect banks. Any access improvements on the steep slope such as footpaths and stairways should be constructed so as not to disturb the slope or other natural slope drainage.
- No significant excavation or filling should be undertaken, nor any building or permanent structure of any kind whatsoever should be erected, constructed or placed in those areas subject to bank instability or damage from bank instability.
- Lot configurations and building designs should incorporate the topography rather than relying on creating large, flat lots.
- Buildings and structures should be sited in accordance with building setbacks and other requirements, as determined by a professional engineer, to avoid those areas subject to unstable slopes.
- Building heights and roof forms should conform to topography and minimize visual impact.
- Special natural features such as rock outcroppings, significant trees, watercourses and ridgelines should be protected.
- Provision should be made and works undertaken to provide for the disposal of surface run-off and storm water currently flowing over the crest of the slope and which may stem from further development. Such works shall be required to divert drainage away from those areas subject to sloughing.
- Controls on erosion during the construction phase, and measures to mitigate erosion on the finished development should be encouraged.
- The desire for views should be balanced with the need to maintain vegetation.

**Flood Areas**

- New residential development will be discouraged within designated flood plains. Where no alternative exists and/or where residential development is currently allowed within the flood plain, structures should be flood proofed to standards specified by the BC Ministry of Environment.
- Lands subject to flooding should, where possible, be left in a natural state, or used for parks and open space recreation.
- The City will discourage filling within designated flood plains due to the cumulative impact that such works may have. Where filling cannot be avoided, it will only be permitted when it is shown that the drainage of other lands is not affected.
- On-site storm water management systems will be encouraged throughout the City to reduce potential flood impacts.
- Where a flood plain setback from a designated watercourse renders a property totally undevelopable, the setback may be reduced provided that: a geotechnical report from a professional engineer certifies that the land may be used safely for the intended use; environmental factors such as building siting, placement of fill, soil disturbance, planting and maintenance of vegetation have been considered; a Safe Harmless Covenant is registered in favour of the City.
- A flood control program was initiated in the 1980's for the lower reaches of the Cowichan River. Various reports and studies have been undertaken to assess and design the appropriate measures (i.e. dicing). Flood hazard mitigation measures, including land uses restrictions, within the Cowichan Estuary shall be undertaken in accordance with the Cowichan Estuary Environmental Management Plan, 1992.