

Mapping the Natural Hazards within the City of Owen Sound: A Summary

The Natural Hazards Technical Guidance for the Provincial Policy Statement was used in the mapping of the hazard zone boundary for the City of Owen Sound's Draft Zoning By-Law. In an effort to make this more readable to local citizen's the Grey Sauble Conservation Authority has prepared a succinct overview of how these mapping guidelines have been applied to the unique landscape of Owen Sound.

The natural hazard areas within the City of Owen Sound encompass steep slopes, watercourses and the Great Lakes shoreline. How the natural hazard lands associated with these features are mapped within the City is briefly described below.

1.0 Unstable or Over-Steepened Slopes

Steep slopes are generally considered unstable in areas where the slope angle exceeds 18.5 degrees. The grade of these slopes is therefore steeper than three horizontal units for every one vertical unit, or 3:1. For the purposes of defining the extent of the slope hazard, we have broken the slope feature into "slope toe" and "slope crest", with the slope feature itself constituting hazard land.

1.1 Slope Toe

Within the City of Owen Sound the natural hazard area associated with this portion of the slope has been mapped in one of two ways:

- i) The toe of the physical 3:1 slope feature plus a six metre hazard allowance. The purpose for this hazard allowance is three-fold:
 - a) To mitigate against development that may undermine the slope feature;
 - b) To allow a setback at the toe should a slope failure occur; and,
 - c) To allow access to the base of the slope feature should remediation be required in the future.
- ii) Where a site specific geotechnical investigation has established the hazard land boundary at the toe of the slope, this boundary is used for the by-law.

1.2 Slope Crest

The primary concern with development at or near the crest of a slope is the potential for slope failure which may impact the subject property and/or adjacent properties. As with all natural hazard areas, this may lead to property damage and/or loss of life. Due to the unique nature of the City of Owen Sound, many geotechnical studies have been undertaken over the last 25 years to review and/or address this issue. In 1988, Trow Engineering undertook the "Owen Sound Slope Study" which reviewed the re-entrant valley slope system through the entire City and prescribed a stable slope line. This stable slope line is the point at which the stable slope angle intersects the ground above the crest of the slope. The stable slope angle is the angle at which the slope feature will naturally resist failure.

The extent of the natural hazard area mapping at the crest of the slope has been established in one of the following ways:

- i) The stable slope line developed by Trow Engineering plus a six metre hazard allowance to keep development from encroaching on the stable slope line; OR,
- ii) The stable slope line developed by Trow Engineering plus a 15 metre hazard allowance where the potential for toe erosion exists due to the presence of a water feature; OR
- iii) The stable slope line for development based on site specific geotechnical review; OR,

- iv) The 3:1 slope angle, plus a six metre or 15 metre hazard allowance depending on toe erosion potential; OR,
- v) A 15 metre setback from crest of rock escarpment slope (West Rocks area).

2.0 Watercourses

In a general sense, a watercourse is defined as an identifiable depression in the ground in which a flow of water regularly or continuously occurs. Natural hazard concerns associated with watercourse features are related to the potential for flooding and/or erosion. These hazards are mapped as follows:

- i) Where a watercourse is within 15 metres of the toe of a slope feature, the hazard area is mapped as a 15 metre allowance from the watercourse for toe erosion, plus a 3:1 stable slope allowance.
- ii) Where engineered flood lines exist based on an accepted engineering study, the hazard area is mapped as a combination of the greater of the engineered flood line for the regional flood event or a 15 metre setback from the top of bank for erosion potential. An example of this is on portions of the Kenny Drain where the flood elevation does not exceed the height of the banks; OR,
- iii) Where there is no engineered flood lines mapping, the flood line has been estimated based on existing data and a review of 1:2000 contour mapping. An example of this is the Sydenham River upstream of the Mill Dam; OR,
- iv) A 15 metre setback from the bankfull width of smaller watercourse systems where no specific information exists.

3.0 The Georgian Bay – Owen Sound Shoreline

As noted in the Ministry of Natural Resources publication, “Understanding Natural Hazards”, the hazardous lands associated with this shoreline is defined by delineating the farthest combined landward extent of the three key shoreline natural hazards: flooding hazards, erosion hazards and dynamic beach hazards.

The hazard area for the City’s shoreline is delineated as the 100-year flood lake level of 177.9m GSC plus a 15 metre flood allowance for wave uprush and other water related hazards. In certain areas the 15 metre allowance for wave uprush and other water related hazards has been removed due to obvious obstructions to such processes. An example of this is in portions of the marina that are protected by breakwalls.

Due to the unique nature of each individual piece of land, the mapping of natural hazards may require that more than one of the above situations apply at the same time (ie: floodplain mapping exists and an erosion hazard must be accounted for). In these instances, the greater of the two areas is mapped.

The hazard area throughout the City is generally mapped to skirt around existing houses, except where the houses are within an area defined as hazard through an engineering study, such as the Trow Slope Study (1988).

For greater detail on any of these hazard areas, please refer to the Ontario Ministry of Natural Resources publication “Understanding Natural Hazards”.