

City of Bainbridge Island - Geologically Hazardous Areas

Summary of Impacts of Best Available Science - Geologically Hazardous Areas: Task 2.3

New and existing Best Available Science (BAS) information relevant to geologic hazards on Bainbridge Island (COBI) are anticipated to require updates to the geologically hazardous critical areas (CA) maps and will have some impacts on the City's Critical Areas Ordinances (CAO). A summary of the new information is presented in the Task 2.2 memorandum. The new BAS information generally falls within two groups. These groups are:

1. Surficial geology and detailed topography

Significant surficial geologic information sources include the 1:24,000-scale geologic map by Deeter (1979) and the 1:100,000-scale map by Yount, Minard, and Glen, (1993). A surface land form (geomorphic) map by Haugerud, (2001) at the 1:15,000 scale presents surface landform and geomorphic type information on a topographic shaded relief base. A revised geologic map of Bainbridge Island (in progress by Ralph Haugerud) will become available in several years. Digital data used to generate the LIDAR topographic map base used by Haugerud, and Kitsap County's shaded relief map of Bainbridge Island, are available as raw DEM data.

2. Seismicity

Ongoing research into seismicity of the Puget Sound region has resulted in significant new information on earthquake related hazards. These developments present several new categories of seismic hazards for COBI. Ground shaking is covered by the Uniform Building Code (UBC). The International Building Code (IBC) will present more stringent seismic design criteria. Seismic impacts that warrant new or revised mapped designations include liquefaction areas, potential fault rupture zones, known fault rupture zones, and tsunami hazard areas.

Integration of New BAS Data

New topographic data and surface unit and surface process information will be digitized where not already done so, and compiled with GIS. Compilation of these data will provide a more detailed and definitive basis for delineation of areas of high landslide risk. Agricultural soil type data from the Soil Survey of Kitsap County (Murphy, 1980) will be used in conjunction with geologic units and topography to predict erosion potential of the top 4 to 5 feet of soil and delineation of potential high erosion hazards. The amount of areas designated as having potential for high erosion will likely increase when the Kitsap

County soil survey data is used in conjunction with geologic mapping and geomorphic mapping.

Seismic data is generally still preliminary. Maximum credible earthquake information and estimates of frequency of reoccurrence on specific structures are still being developed. Although the available data are preliminary, identification of seismic hazards has proceeded to the point where the preliminary data should be included in geologic hazard planning.

Impacts on CAO of Implementation of New BAS Data

The implementation of data in category 1 above would result in an improvement in island wide delineation of surficial geology and topography. Potential landslide hazard zones and erosion hazard zones will be refined by these data. Inclusion of the LIDAR topographic data and the geologic mapping will result in increased precision in the designation of the critical combination of unfavorable slope and unfavorable geologic condition. It will be possible to identify and map smaller areas of land that fall within the critical area designation. A determination will be required to specify the minimum mapped area that should be considered a critical area. Use of GIS for compilation should accommodate incremental updating when new data become available.

Inclusion of new seismic hazards (category 2) data would principally impact the southern third of the island, in the vicinity of the inferred traces of the Seattle fault and the Toe Jam strand of the Seattle fault (generally from Eagle Harbor to the south end of the island). Some areas around Eagle Harbor and in the vicinity of other suspected tectonic lineaments throughout the remaining portion of the Island would be flagged as “provide information” on the potential of surficial fault rupture. No data on potential activity or recurrence of movement are available at this time. Low-lying wet areas throughout the island, the uplifted sandy benches south of Eagle Harbor, and some near sea level sand spits and bars north of Eagle Harbor may fall within potential liquefaction hazard zones. Most of the shoreline around the southern half of the island would fall within the tsunami hazard area.

Adoption of the IBC may result in increased no-build buffers around sensitive slopes. Many marginally stable areas under static and UBC design accelerations may be shown to be unstable under the increased seismic accelerations presented by the IBC. The increased setbacks could affect most bluff shoreline areas of the island and some steep ravines.

Overall, a more accurate inclusion of hazard areas would be developed by adoption of the new BAS-derived information. New hazard categories would include potential surficial fault rupture, liquefaction, and tsunami hazard areas. These geologic hazards are not included on the existing CA maps and may not have been previously considered significant risks. Inclusion of the new hazard categories in the CAO will require new reporting requirements by the applicants and new evaluation criteria by the City.

Implementation of the above BAS-derived information would include analysis and development of a GIS layer for each type of potential hazard being revised or added.

Minor changes in the structure of the code will be necessary to provide a clearer definition of the minimum required submittals for critical area for each type of geologically hazardous area, along with clearer definition of required development standards. Evaluation procedures would need to accommodate updating or changing of the hazard layers after new data have been accumulated. A clearer definition of the process for providing exemptions due to errors in mapping the CA boundaries, and other CA designation errors needs to be provided.

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