



AMENDMENT
(DRAFT – MAY 7, 2013)

Section 3.5 and 3.6 – Flood Hazard Area Land Use Management Guidelines

3.5 The Sea

3.5.1 Background and Reference Documents

The content for this Amendment is drawn primarily from, "Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Guidelines for Management of Coastal Flood Hazard Land Use", Ausenco Sandwell, report to BC Ministry of Environment, January 27, 2011 and the companion reports, "Sea Dike Guidelines" and "Draft Policy Discussion Paper", also dated January 27, 2011.

These 2011 reports, including terminology, definitions and explanatory figures, supplement this Amendment to the "Flood Hazard Area Land Use Management Guidelines". Where there is any inconsistency between the Ausenco Sandwell (2011) reports and this Amendment document, the Amendment document shall govern. These reports are referenced in this Amendment as:

"Draft Policy Discussion Paper" - AS(2011a)
 "Guidelines for Management of Coastal Flood Hazard Land Use" - AS (2011b)
 "Sea Dike Guidelines" - AS (2011c)

These reports are available on the ministry web page:

http://www.env.gov.bc.ca/wsd/public_safety/flood/fhm-2012/draw_report.html

3.5.2 Design and Planning Time Frame

Requirements for buildings, subdivision, and zoning should allow for sea level rise (SLR) to the year 2100.

Land use adaptation strategies should allow for sea level rise to the year 2200.

3.5.3 Recommended Sea Level Rise Scenario for BC

Allow for 0.5 m by 2050, 1.0 m by 2100 and 2.0 m Global Sea Level Rise by 2200 relative to the year 2000 as per Figure 1.

Adjust for regional uplift and subsidence using the most recent and best information available. Where no information is available, assume neutral conditions (i.e. no uplift or subsidence).

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The scenario in Figure 1 is intended to be reviewed in 2015, or sooner if there is significant new scientific information.

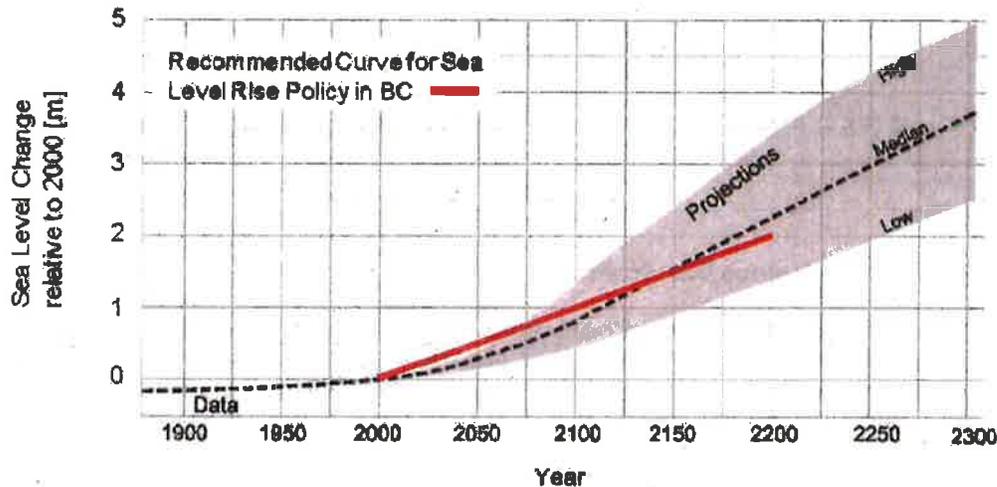


Figure 1. Recommended Global Sea Level Rise Curve for Planning and Design in BC

3.5.4 Sea Level Rise Planning Areas

Local Governments should consider defining SLR Planning Areas and developing land use planning strategies integrating both flood protection (sea dikes) and flood hazard management tools. These areas should include inland floodplains adjacent to tidally influenced rivers where potential flood levels will be increased by sea level rise.

3.5.5 Strait of Georgia

3.5.5.1 Standard FCLs and Setbacks

The Year 2100 FCL should be established for specific coastal areas during the SLR Planning Area process by a suitably qualified professional. The Year 2100 FCL should be the minimum elevation for the underside of a wooden floor system or top of concrete slab for habitable buildings, and should be determined as the sum of:

- The 1:200 Annual Exceedence Probability (AEP) water level as determined by joint probability analyses of high tides and storm surge;
- Allowance for future SLR to the year 2100;
- Allowance for regional uplift, or subsidence to the year 2100;
- Estimated wave effects associated with the Designated Storm; and
- Freeboard.

Note: Alternatively, the Year 2100 FCL can be determined by a simplified but more conservative method as described in the Ausenco Sandwell (2011) reports. Example calculations of FCLs for specific areas in coastal BC are provided in Table 3-2 AS(2011b) where the FCL is determined as the sum of:

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- Allowance for future SLR to the year 2100;
- Allowance for regional uplift, or subsidence to the year 2100;
- Higher high water large tide (HHWLT);
- Estimated storm surge for the Designated Storm;
- Estimated wave effects associated with the Designated Storm; and
- Freeboard.

The building setback should be at least the greater of 15 m from the future estimated Natural Boundary of the sea at Year 2100, or landward of the location where the natural ground elevation contour is equivalent to the Year 2100 FCL (refer to Figure 2-2 in AS (2011b) for a definition sketch).

The setback may be increased on a site-specific basis such as for exposed erodible beaches and/or in areas of known erosion hazard.

3.5.5.2 Subdivision

All lots created through subdivision should have viable building sites on natural ground that comply with the Year 2100 FCL and setback guidelines noted above.

To regulate redevelopment at the end of the building lifespan, the development approving officer should require a restrictive covenant stipulating that any future reconstruction must meet the FCL and setbacks requirements in force at the time of redevelopment, and including a liability disclaimer if reconstruction does not take place at or before the planned lifespan of the building.

3.5.5.3 Development on Existing Lots

On existing lots, if meeting the setback guidelines noted above would sterilize the lot (i.e., not allow even one of the land uses or structures permitted under the current zoning), the development approving official may agree to modify setback requirements as recommended by a suitably qualified professional, provided that this is augmented through a restrictive covenant stipulating the hazard, building requirements, and liability disclaimer.

The Year 2100 FCL requirements would still apply to new habitable building construction.

3.5.5.4 Lots with Coastal Bluffs

For lots containing coastal bluffs that are steeper than 3(H):1(V) and susceptible to erosion from the sea, setbacks should be determined as follows:

1. If the future estimated Natural Boundary is located at least 15 m seaward of the toe of the bluff, then no action is required and the setback should conform with other guidelines that adequately address terrestrial cliff and slope stability hazards.
2. If the future estimated Natural Boundary is located 15m or less seaward of the toe of the bluff, then the setback from the future estimated Natural Boundary should be located at a horizontal distance of at least 3 times the height of the bluff, measured from 15 m landwards from the location of the future estimated Natural Boundary.

In some conditions, setbacks may require site-specific interpretation and could result in the use of a minimum distance measured back from the crest of the bluff. The setback may be modified provided the modification is supported by a report, giving consideration

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to the coastal erosion that may occur over the life of the project, prepared by a suitably qualified professional.

3.5.6 Outside the Strait of Georgia Area - Areas Subject to Significant Tsunami Hazard

For coastal lands subject to tsunami hazards, the tsunami setback and elevation as determined below will typically exceed the "standard" setbacks and elevations determined for the Year 2100 as described in 3.5.5.1. Where the tsunami hazard is low, the greater FCLs and setbacks shall apply.

A subdivision application in tsunami prone areas must include a report by a suitably qualified professional who must formulate safe building conditions for each proposed lot based on a review of recent Tsunami hazard literature plus the historical report, "Evaluation of Tsunami Levels Along the British Columbia Coast", by Seaconsult Marine Research Ltd., dated March 1988.

At a minimum, building conditions should protect improvements from damage from a tsunami of equal magnitude to the March 28, 1964 tsunami that resulted from the Prince William Sound, Alaska earthquake.

Setback –

Setback requirements should be established on a site-specific basis and take into account tsunami hazards.

The setback must be sufficient to protect buildings and must be at least 30 metres from the Year 2100 estimated natural boundary.

FCL –

FCL requirements should be established on a site-specific basis and take into account tsunami hazards.

Reductions to these requirements should only be considered where the building can be built to the Tsunami FCL on bedrock.

3.6 Areas Protected by Standard Dikes

Residential, commercial and institutional developments in areas protected by standard dikes are required to comply with full flood proofing requirements for their respective categories, with a possible exception for development within Sea Level Rise Planning Areas as noted below.

Setback –

Buildings should be located a minimum of 7.5 metres away from any structure for flood protection or seepage control or any dike right-of-way used for protection works. In addition, fill for floodproofing should not be placed within 7.5 metres of the inboard toe of any structure for flood protection or seepage control or the inboard side of any dike right-of-way used for protection works.

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Additional dike right of way and building set back requirements should be defined for Sea Level Rise Planning Areas to accommodate upgrading of dikes for sea level rise

Any change to these conditions requires the approval of the Inspector of Dikes.

FCL –

Buildings and manufactured homes in areas protected by standard dikes should meet minimum FCLs prescribed for the primary stream, lake or sea adjacent to the dike and the FCL requirements for any internal drainage (minimum ponding elevations).

Relaxation of FCL requirements for new development in coastal areas protected by standard dikes may be appropriate for Sea Level Rise Planning Areas where the long term flood protection strategy and dike upgrading program has been approved by the Inspector of Dikes. This relaxation should be augmented through a restrictive covenant stipulating the hazard and protection strategy, building requirements, and liability disclaimer.

3.6.1 Secondary sources of flooding

Where there are secondary sources of flooding within diked areas, the appropriate requirements as set out in Clauses 3.1 through 3.5 should be applied. These should include consideration of minimum ponding elevations behind the dike to protect against internal drainage.

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