



Technical Memorandum

DATE: June 28, 2024

TO: Matt Gunn, MRM (Planning), RPP
District of Squamish

FROM: David Roche, MAsC, PEng

RE: BILL 44 REQUIREMENTS FOR INCREASED DENSITY IN FLOOD HAZARD AREAS
Review of Bill 44 Implications for Risk Mitigation Policy in District of Squamish
Our File 0463.384-300

1. Introduction

In November 2023, the Government of British Columbia passed the *Housing Statutes (Residential Development) Amendment Act, 2023*¹, more commonly referred to as Bill 44. The intent of this bill is to promote accommodation of Small-Scale Multiple-Unit Housing (SSMUH) in local government policy. It does so by imposing minimum requirements for the number of dwellings that must be permitted on lots where existing zoning prioritizes single family and duplex dwellings. Updates to local zoning bylaws must be received by the Province of BC by June 30, 2024.

The relevant documents (the *Act*, the *Local Government Zoning Bylaw Regulation*², and its and corresponding Policy Manual and Site Standards) also outline circumstances that would allow a local government to specify areas that are exempt from Bill 44 requirements. Exemptions due to natural hazards (including flood hazards) are permissible if based on a Qualified Professional's report.

The District of Squamish (District) has retained Kerr Wood Leidal Associates Ltd. (KWL) to provide an opinion on whether exemptions due to natural hazards should be pursued for Squamish, and if so, which areas should be considered for such exemption. This memorandum provides the requested recommendations on Bill 44 exemptions for flood hazard areas in the District.

2. District Flood Risk Mitigation Policy

In 2017, the District completed its Integrated Flood Hazard Management Plan³ (IFHMP). The IFHMP was followed in 2019 by a Quantitative Risk Assessment⁴ for the dike-protected portions of the

¹ *Housing Statutes (Residential Development) Amendment Act, 2023*, amending the *Local Government Act, R.S.B.C. 2015*. Electronic version accessed 27 June 2024 at <https://www.bclaws.gov.bc.ca/civix/document/id/bills/billsprevious/4th42nd:gov44-1>.

² *Local Government Zoning Bylaw Regulation*. Order-in-Council no. 673, ordered 7 December 2023. Accessed 27 June 2024 at [https://www.bclaws.gov.bc.ca/civix/document/id/oic/oic_cur/0673_2023/search/CIVIX_DOCUMENT_ROOT_STEM:\(small-scale%20multi-unit\)?1#hit1](https://www.bclaws.gov.bc.ca/civix/document/id/oic/oic_cur/0673_2023/search/CIVIX_DOCUMENT_ROOT_STEM:(small-scale%20multi-unit)?1#hit1). 3pp.

³ KWL, 2017. Squamish Integrated Flood Hazard Management Plan – Final Report. KWL file 0463.278-300. Accessed 27 June 2024 at https://squamish.ca/assets/IFHMP/1117/5dbb51bad9/20171031-FINAL_IFHMP_FinalReport-compressed.pdf. 251pp.

⁴ KWL, 2019. Quantitative Risk Assessment for Squamish River Floodplain. KWL file 0463.323-300. 224pp.



Squamish River floodplain. The risk assessment found that the risk to life posed by dike breach flooding was “unacceptable” based on the criteria of Figure 11-2 in the District’s Official Community Plan⁵ (OCP).

As part of a multi-faceted flood risk management strategy, the District’s OCP adopted IFHMP recommendations to upgrade its dike system and manage densification in the areas with the greatest flood hazard. The District decided to retain development rights based on existing zoning, but to constrain rezoning in three types of controlled densification areas:

- Rezoning to a higher density will be considered for **Conditional Densification** areas provided the developer demonstrated compliance with objectives outlined in the OCP.
- Rezoning to a higher density will be considered for **Limited Densification** areas based on satisfying the same list of requirements but also subject to a maximum density of 29 units per hectare (equivalent to duplex density).
- Rezoning to a higher density will not be permitted for **Restricted Densification** areas, comprising the highest hazard lands.

In addition to the above controlled densification areas, the OCP designates all areas identified as “Secondary Floodway” in the IFHMP as Development Permit Areas. Guidelines for the DPAs are generally intended to allow development to proceed while preserving conveyance through the defined secondary floodways during a dike breach event. Preserving conveyance is important to avoid increasing water levels (and flood risk) for upstream development. A detailed description of the relevant DPA guidelines can be found in s.35 of the OCP.

Through these policies, the District is able to balance its desire for continued development and new housing opportunities with its risk management responsibilities.

3. Bill 44 Implications for Flood Risk in Squamish

In terms of impact to flood risk, Bill 44 has several key considerations:

- the potential for additional dwelling units to increase the population at risk in flood hazard areas;
- the potential for additional dwelling units to increase the value of at-risk assets and infrastructure in flood hazard areas;
- increased challenges for implementing a safe, successful, and timely evacuation of the (larger) Population at Risk in the event of an imminent dike breach condition; and
- the potential for additional dwelling units and reduced property line setbacks to decrease conveyance through flood hazard areas and thereby exacerbate upstream flood levels.

Section 3(1) of the Regulations for the *Act* provides that land may be exempted from the requirements of s.481.3(3), (4), and (5) if the land meets the following conditions:

1. The land is subject to a hazardous condition.
2. Development of the land to a density of use required to be permitted under the applicable provision of the *Act* would significantly increase the threat or risk from the hazardous condition.

⁵ District of Squamish Official Community Plan Bylaw 2500, 2017.



3. The threat or risk from the hazardous condition cannot practically be mitigated.
4. The local government has obtained a report in which a qualified professional, as described in paragraphs (c) to (f) of section 55 (1) of the Community Charter⁶, certifies to the local government the matters set out in paragraphs (a) and (b).

The authors of this technical memorandum meet the requirements of s.55(1) of the Community Charter. Based on discussions with District staff, most if not all single-family and duplex-zoned properties in Squamish will be required by Bill 44 to allow for up to four (4) dwelling units.

Reduced setbacks recommended in the Policy Manual are not strict requirements but must be considered by local governments. The District's housing priorities are generally aligned with Bill 44 and staff wish to reduce setbacks to promote density where such can be achieved without significantly increasing risk.

Clause 3.1(b) of the Regulations specifies that the additional density required by Bill 44 would have to "significantly increase" risk as a prerequisite for exemption. Unfortunately, Bill 44 does not provide an explanation of "significantly increase", which is a subjective expression.

The application of Bill 44 requirements would have an incremental effect for flood risk in Squamish. For example, it is highly unlikely that a floodway encroachment would turn a categorically "safe" condition into a categorically "unsafe" condition. It can, however, make a safe situation less safe, or an unsafe situation more unsafe. Quantifying the potential impacts would require a detailed study.

The approach recommended herein is that the District implement Bill 44 requirements in a way that aligns with existing risk management measures contained in the OCP, Floodplain Management Bylaw⁷, and IFHMP. These existing policies already regulate densification and collectively define a level of "acceptable risk" for the District. This approach maximizes clarity and consistency for development proponents while streamlining the District's internal review and approvals process.

The IFHMP recognizes several distinct neighbourhoods or types of areas that are potentially exposed to flood hazard. Generally, from south to north, these include Valleycliffe, Unconnected Coastal Flood Hazard Areas, Squamish River lower floodplain (south of Mamquam River), Squamish River upper floodplain (north of Mamquam River), Cheekeye Fan, and Paradise Valley. Bill 44 is not applicable to Squamish Nation reserve lands within these areas. Hazards considered in this document primarily focus on river, coastal, and dike breach flooding, with some consideration for debris flows on the Cheekeye Fan. Groundwater (seepage) flooding due to high river levels is expected to be less severe than dike breach flooding and need not be considered separately. Creek flooding (e.g., stormwater runoff and smaller creeks), landslide, rockfall, avalanche, and wildfire hazards have not been evaluated.

Considerations for each of the above areas is discussed below.

4. Valleycliffe

The majority of the District's Valleycliffe area is classified as overland flow hazard area in IFHMP Figure 3-6. The area is protected from the Stawamus River by the Stawamus River dike, which meets provincial criteria for a standard dike. The primary flood hazard considered for Valleycliffe is overflow or

⁶ *Community Charter, SBC 2003 Chapter 26*. Electronic version accessed 27 June 2024 at https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/03026_03#section55.

⁷ Floodplain Management Bylaw 2751, 2021. As amended Bylaw 2880. Accessed 27 June 2024 at <https://squamish.civicweb.net/filepro/documents/11774/?preview=208966>. 31pp.



avulsion of the Stawamus River during a debris flood event, most likely at or upstream of the Forest Service Road bridge crossing that forms the upstream terminus of the dike. A secondary floodway network subject to Development Permit Area requirements is shown generally along the road network in OCP Schedule L. Some properties adjacent to the dike, river, and Little Stawamus Creek are fully within the secondary floodway. There are no controlled densification areas in Valleycliffe.

As an overland flow hazard area protected by a standard dike and with proximity to high ground, additional density can be accommodated without significantly increasing flood risk provided all OCP flood mitigation measures (including Flood Construction Levels) are applied. Bill 44 density requirements can therefore be applied in Valleycliffe.

In Valleycliffe, most of the designated secondary floodways follow the road network and are intended to promote flow along roads rather than through properties. Lot line setbacks along the road network's secondary floodways can be reduced without significantly increasing flood risk. However, setbacks from watercourses, dikes, and flood protection statutory right-of-ways specified in the Floodplain Management Bylaw should not be reduced.

Secondary floodways in Valleycliffe are considered potential conveyance areas. Increasing the allowable lot coverage (i.e., potential footprint of structures) has the potential to reduce conveyance and increase risk. **Parcels located adjacent to a primary floodway or dike and having a substantial portion of their area within a secondary floodway should be exempted from any increase in lot coverages arising from rezoning to meet Bill 44 density requirements.**

5. Unconnected Coastal Flood Hazard Areas

Unconnected coastal flood hazard areas include all parcels outside the District's planned sea dike that are subject to flood hazard from the sea. The IFHMP defines minimum flood risk mitigation requirements for these parcels, which are not expected to depend on each other for mutual protection (e.g., through protection from a common dike). Flood risk mitigation measures include planning allowances for 1 m of sea level rise. Most importantly, proposals for development in unconnected coastal flood hazard areas must be supported by a flood assessment report prepared by a Qualified Professional confirming the hazards (e.g., site-specific wave effects) and identifying mitigation measures required to make the site "safe for the intended use".

Unconnected coastal flood hazard areas are not subject to any controlled densification areas, and do not have designated secondary floodways.

There is already extensive high-density development occurring in unconnected coastal flood hazard areas. Additional density can therefore be accommodated in these areas without significantly increasing flood risk provided all development meets the requirements established in the Qualified Professional's flood assessment report pursuant to applicable District policies and guidelines. Bill 44 density requirements and recommended setbacks can therefore be applied to unconnected coastal flood hazard areas. Setbacks from watercourses, dikes, and flood protection statutory right-of-ways specified in the Floodplain Management Bylaw should not be reduced.

6. Squamish River Lower Floodplain

The Squamish River lower floodplain area extends from the Mamquam River south to the 3rd Ave tide gates and from the Squamish River and Crescent Slough west to high ground. Flood hazards arise from the Mamquam River, Squamish River, and the sea. These areas are collectively protected from river flood hazards by the Mamquam River south (left bank) dike and the Lower Squamish River dike. They



are also protected from coastal flood hazards by the District's existing sea dike, which does not meet minimum provincial design guidelines for present-day or future coastal flood hazards and may not be considered an "adequate" dike under Engineers and Geoscientists BC (EGBC) Professional Practice Guidelines for Legislated Flood Assessments in a Changing Climate in BC⁸. Conceptual plans for extensive upgrades to the sea dike were adopted through the IFHMP, but only short sections have been completed to date.

Flood hazards within the Squamish River lower floodplain include areas potentially exposed to conveyance, ponding, and overland flood hazards. There are several controlled densification areas, particularly along the dikes and through the Wilson Slough and Britannia Slough environmental and floodway corridors. These areas were identified as the highest hazard areas by the IFHMP, which recognized that increasing density could significantly increase flood risk. **Parcels with a substantial portion of their area falling within a controlled densification should be exempted from Bill 44 requirements.** Some densification in limited and conditional densification areas may still be possible through the process established in the OCP.

A significant network of secondary floodways is designated with the majority of (but not all) secondary floodways following the road network. **To preserve conveyance, setbacks on lot lines within secondary floodways should generally not be reduced as a result of Bill 44 rezoning.** However, setback reductions could be applied in Downtown Squamish south of Pemberton Avenue and Winnipeg Street, recognizing that the grid of streets (and secondary floodways) in Downtown Squamish is relatively dense, that ultimate velocities are low, and FCLs are high due to ponding. Setbacks from dikes and watercourses should remain at the levels specified in the District's Floodplain Management Bylaw.

7. Squamish River Upper Floodplain

The Squamish River upper floodplain area extends from Squamish Nation Waiwakum I.R. No. 14 in the north to the Mamquam River in the south, and from the Squamish River in the west to high ground in the east. Flood hazards arise from the Squamish River and Mamquam River. The area may also be subject to flood hazards from the afterflow of a Cheekeye River debris flow event as well as the unlikely scenario of a full avulsion of the river following a major debris flow.

The Squamish River upper floodplain is protected from river flood hazards by the Upper Squamish River dike and the Mamquam River north (right bank) dike. The dikes are considered standard or "adequate" dikes under Engineers and Geoscientists BC (EGBC) Professional Practice Guidelines for Legislated Flood Assessments in a Changing Climate in BC. The District is progressively upgrading the dikes in accordance with IFHMP recommendations and is in discussions with Squamish Nation about upgrading dikes that cross the Squamish Nation reserves.

Flood hazards within the Squamish River upper floodplain include areas exposed to conveyance, ponding, and overland flood hazards. In particular, the IFHMP identified the potential for substantial conveyance through the dike-protected Squamish River upper floodplain in the event of a breach toward the upstream end of the dike. Creating additional density in these areas has the potential to significantly increase flood risk. Recognizing this, the IFHMP designated large areas of the Squamish River upper floodplain as controlled densification areas. **All parcels with a substantial portion of their area falling within a controlled densification should therefore be exempted from Bill 44**

⁸ EGBC, 2018. Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC. V2.1. Accessed 27 June 2024 at <https://www.egbc.ca/getmedia/f5c2d7e9-26ad-4cb3-b528-940b3aaa9069/Legislated-Flood-Assessments-in-BC.pdf.aspx>. 192pp.



requirements. Some densification in limited and conditional densification areas may still be possible through the process established in the OCP.

The OCP also designates large parts of Squamish River upper floodplain as secondary floodway areas; however, the secondary floodways fully overlap with controlled densification areas and will already be exempted from Bill 44 requirements if the above recommended to exempt controlled densification areas is implemented. It is expected that all setbacks and lot coverages will remain at pre-Bill 44 values.

8. Cheekeye Fan

The Cheekeye Fan area is generally bounded by the Cheekeye River, Cheakamus River, Squamish River, and the flood hazard areas of the Squamish River upper floodplain. The primary hazards in this area are debris flows, debris floods, river avulsion, and overland flow. The IFHMP designates the Cheekeye Fan as an overland flow hazard area (though it is unclear whether this designation was formally adopted in the OCP).

The District has obtained a Quantitative Risk Assessment for the Cheekeye Fan that indicates risk to life from debris flow hazards is “intolerable”. As a result, any additional densification would create a significant increase in risk. **To avoid this, Cheekeye Fan debris flow hazard zones C1, C2, C3, and C4 should be exempted from Bill 44 requirements.**

Bill 44 requirements may be applied to debris flow hazard zone C5, except in areas that overlap with controlled densification areas in the Squamish River upper floodplain (which are already recommended for exemption). The two exemption areas (Cheekeye Fan zones C1 to C4 and Squamish River upper floodplain controlled densification areas) should remain contiguous along their shared boundary (i.e., no small gaps between exemption zones).

The District is in the process of negotiations toward an area-wide hazard mitigation strategy for the Cheekeye Fan. The area-wide strategy includes a large debris barrier to arrest and retain debris flows above Highway 99. Once a formal area-wide mitigation strategy is approved, the District should re-evaluate risk and may consider removing the Bill 44 exemption for some or all of the debris flow hazard zones.

9. Paradise Valley

The Paradise Valley area is defined as the area along both sides of the Cheakamus River from the Cheekeye Fan to the northern District boundary near Culliton Creek, excluding Squamish Nation Cheakamus I.R. No. 11. It is subject to conveyance flood and potentially debris flood hazards from the Cheakamus River. A large proportion of the flood hazard area is designated as Primary Floodway.

Based on conversation with District staff, Bill 44 requirements will not apply to Paradise Valley, which is generally rural and not connected to the municipal sanitary sewer system. It is understood that Paradise Valley will be exempted from Bill 44 requirements based on these factors. Flood risk may be considered an additional contributing factor for the exemption.

10. Summary

The Province of BC’s Bill 44 requires that municipalities permit up to four dwelling units on lots within the District of Squamish currently zoned as single-family or duplex residential. Exceptions are permitted where the application of Bill 44 would result in a “significant increase” in flood risk. The term “significant increase” is not specifically defined in Bill 44 or its Regulations.



District staff have expressed support for the affordable housing objectives that motivated the provincial government to pass Bill 44 but wish to seek exemptions for areas where necessary to avoid a “significant increase” in flood risk. This technical memorandum has reviewed flood hazards and mitigation measures for various parts of Squamish as defined by the District’s IFHMP and adopted through its OCP and Floodplain Management Bylaw. Through that lens, recommendations are made for exemptions from Bill 44 in each sub-area.

In general, the technical memorandum recognizes that the IFHMP, OCP, and bylaw already define a pathway to densification for different flood hazard areas. By aligning with existing policies and processes for managing flood risk, the District creates consistency in the interpretation of how much risk it is prepared to accept and what steps are required to safely increase density.

At a summary level, this technical memorandum recommends the following:

- All parcels with a substantial portion of their area falling within one or more controlled densification areas (restricted, limited, and conditional) should be exempted from Bill 44. These areas have been previously identified as the highest flood hazard areas, and may still be allowed to densify through the OCP process.
- All lots where a substantial portion of the lot area falls within a designated secondary floodway should retain their existing (i.e., pre-Bill 44) maximum allowable lot coverage.
- All lot lines falling within secondary floodways should retain their pre-Bill 44 setbacks.
- Notwithstanding the above, reduction of setbacks along lot lines falling within secondary floodways are permissible in Downtown Squamish south of Pemberton Avenue and Winnipeg Street.
- Cheekeye Fan debris flow hazard zones C1, C2, C3, and C4 should be exempted from Bill 44 requirements recognizing the current “Intolerable” risk to life posed by debris flow hazards. This exemption can be revisited after an area-wide debris flow mitigation strategy is formally adopted.
- No reductions should be considered for setbacks specified in the Floodplain Management Bylaw (i.e., from watercourses, dikes, and dike SRWs).
- Paradise Valley will be exempted from Bill 44 requirements. Flood risk is a contributing reason for this but is not the controlling reason.
- Bill 44 density requirements and setback reductions can be applied without a significant increase in risk for any areas not specifically listed above, noting that FCLs and other applicable mitigation measures specified by the OCP and Floodplain Management Bylaw continue to apply to all residential buildings.

The result of applying the above is three exemption areas for the District of Squamish, summarized graphically in the attached Figure 1:

- “Full exemption” areas should retain all characteristics of their existing zoning.
- “Lot coverage and setback exemption” areas should retain their existing lot coverage and lot line setbacks, but can be rezoned to permit additional density.
- “Setback exemption” areas can also be rezoned to permit additional density, but should retain their existing setbacks along lot lines that fall within or abut a secondary floodway.

Implementing these recommendations will allow the District to comply with Bill 44 without incurring a significant increase in flood risk.



Closure

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Encl: Figure 1 – Bill 44 Flood Hazard Exemption Areas for Squamish.

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Revision History

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