

To: Electoral Area Services Committee

Date: 2018-09-05

From: Graham Daneluz, Deputy Director of Planning & Development

File No: 9600-25-2018-01

Subject: Site-Specific Floodplain Exemption Application 2018-01 for the construction of a 260 m² garage at 9650 Deroche Landing Road, Area "G"

RECOMMENDATION

THAT the Fraser Valley Regional District Board issue Site Specific Floodplain Exemption 2018-01 to permit the construction of a 260 m² garage below the flood construction level at 8650 Deroche Landing Road, Area "G" subject to 'wet floodproofing' of the garage to the satisfaction of the Director of Planning & Development;

AND THAT the Fraser Valley Regional District Board authorize its signatories to execute all documents relating to Site-Specific Floodplain Exemption Application 2018-01.

STRATEGIC AREA(S) OF FOCUS

Support Healthy & Sustainable Community
Provide Responsive & Effective Public Services
Support Healthy & Sustainable Community
Provide Responsive & Effective Public Services

PRIORITIES

Priority #3 Flood Protection & Management

SUMMARY

FVRD Floodplain Management Bylaw No. 0681 limits the area of a garage that can be built in the floodplain below the flood construction level (FCL) to 1,185 s.f. The applicant has an existing 1,130 s.f. garage built in 2012. He proposes to build a new 2,800 s.f. garage to store collectable cars and has applied for a Site-Specific Exemption to build below the FCL.

The bylaw provision to limit garage space below the FCL is intended to reduce property damage and economic impact of the next major Fraser River flood. It is good policy to minimize predictable losses, especially where dikes do not provide full flood protection. On the other hand, elevating garages to the flood construction level poses practical challenges and non-habitable accessory buildings may not require the same treatment as habitable buildings.

This application provides an opportunity to try out a new approach for mitigating flood damage to accessory buildings like garages. 'Wet floodproofing' – a well-established practice in the US – may be

suitable for non-habitable accessory buildings in the floodplain without flood construction elevations or size limits.

BACKGROUND

Proposal Details

Mr. Thomas Dufour proposes to construct a 260 m² (2,800 s.f.) detached garage on his property at 8650 Deroche Landing Road, Area "G". The property is within the floodplain of the Fraser River. It is subject to *FVRD Floodplain Management Bylaw No. 0681, 2006* which establishes flood construction levels (FCLs) to protect development from Fraser River floods.

The FCL in the area of the subject property is 10.5 m GSC (an elevation above sea level). The ground elevation is 8.9 meters.

Bylaw No. 0681 allows for the construction of a garage below the FCL, but it limits the area of the garage to 110 m² (1,184 s.f.). Depending on the configuration of the garage, this is enough space for six regulation size parking spaces.¹ The property currently includes a 105 m² (1,130 s.f.) attached garage that was completed in 2012.

The applicant has applied for a Site-Specific Floodplain Exemption to permit the construction of a new detached garage greater than 110m² at or near natural ground elevation below FCL.

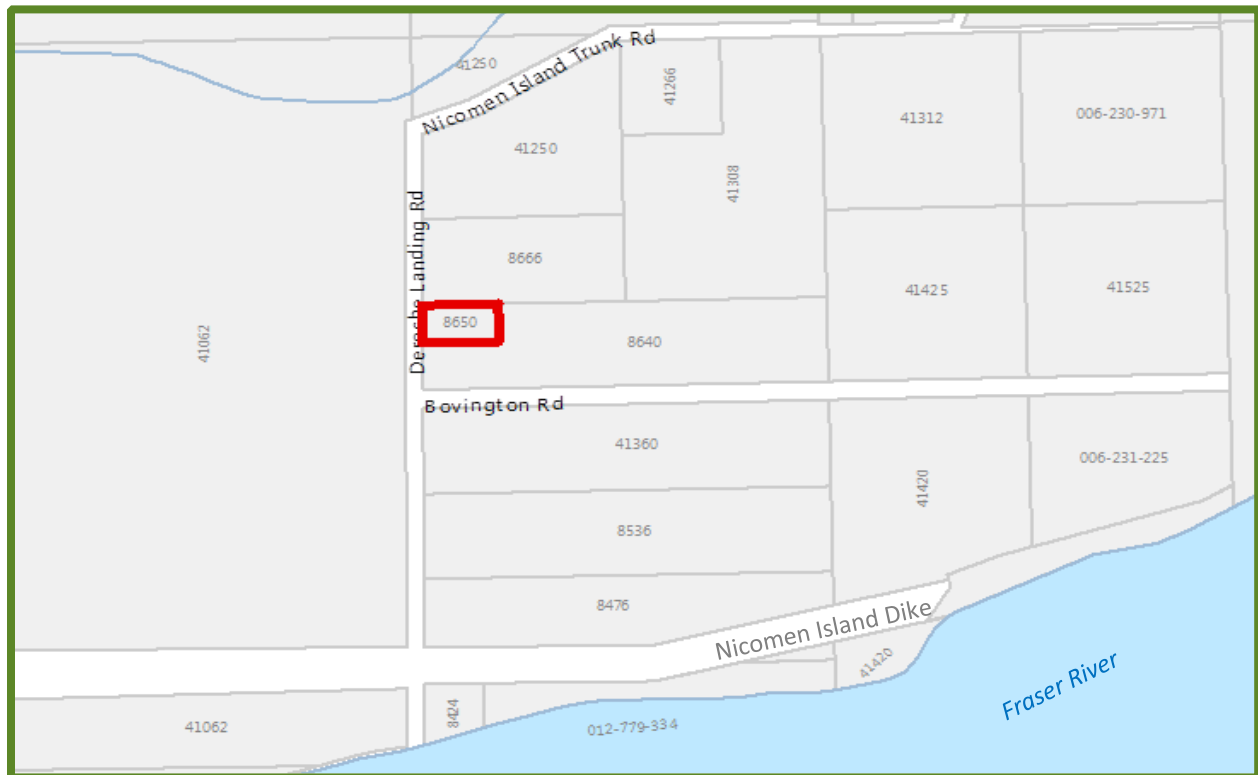
Property Details

PROPERTY DETAILS			
Electoral Area	G		
Address	8650 Deroche Landing Road		
PID	006-286-381		
Folio	775-03511-200		
Lot Size	0.79 acres		
Owner	Thomas Dufour	Agent	N/A
Current Zoning	A-2	Proposed Zoning	N/A
Current OCP	AG	Proposed OCP	N/A
Current Use	Residential	Proposed Use	N/A
Development Permit Areas	2-G		
Agricultural Land Reserve	Yes		

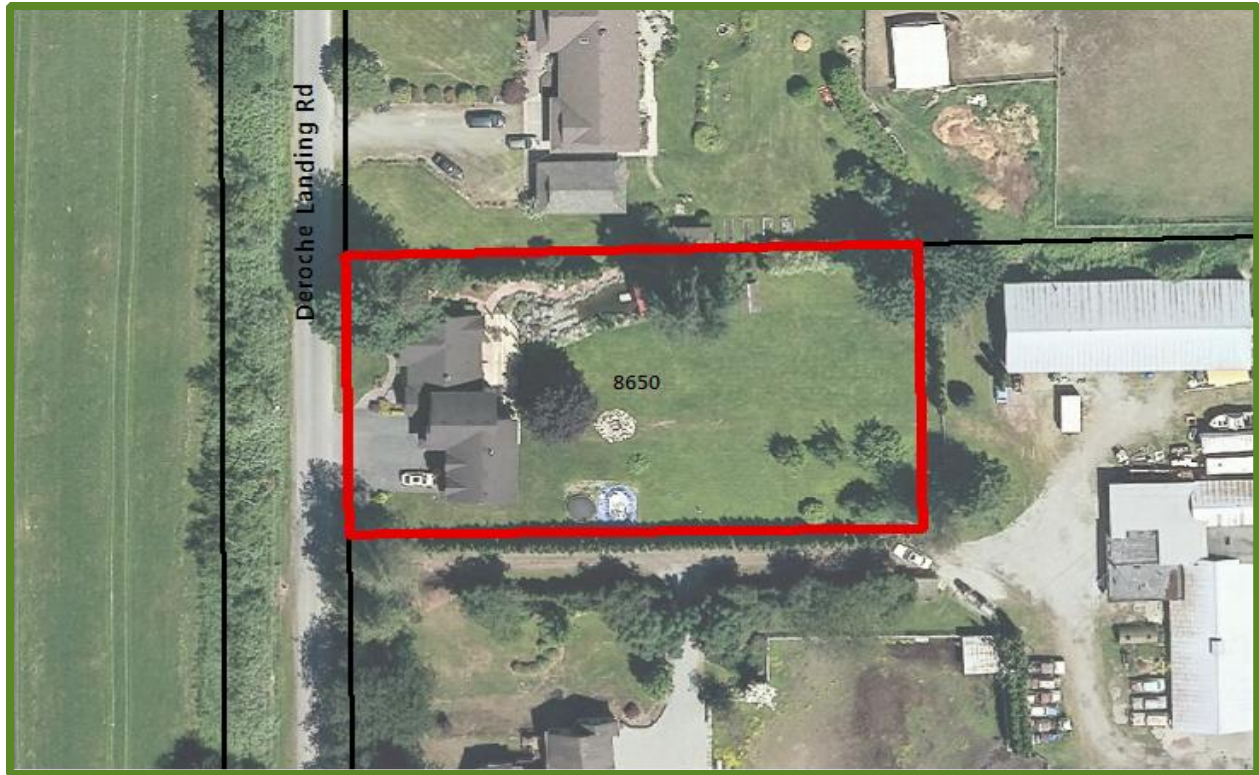
ADJACENT ZONING & LAND USES		
North	^	Floodplain Agriculture A-2, Single Family Home
East	>	Floodplain Agriculture A-2, Single Family Home
West	<	Floodplain Agriculture A-2, Dairy Farm
South	v	Floodplain Agriculture A-2, Single Family Home

¹ *Bylaw No. 559* requires parking spaces to be 6.0 m by 2.8 m. This equals an area of 16.8 m². Six parking spaces could fit in a garage of 110 m², depending on the configuration of the garage.

NEIGHBOURHOOD MAP



PROPERTY MAP



Land Use

The subject property is 0.79 acres. It is within the Agricultural Land Reserve and it is zoned Floodplain Agriculture (A-2) under *DARD Land Use and Subdivision Regulation Bylaw No. 559*. The property is used for rural residential purposes. Surrounding lots contain rural residential and agricultural uses.

Fraser River Floodplain

Nicomen Island Dike System

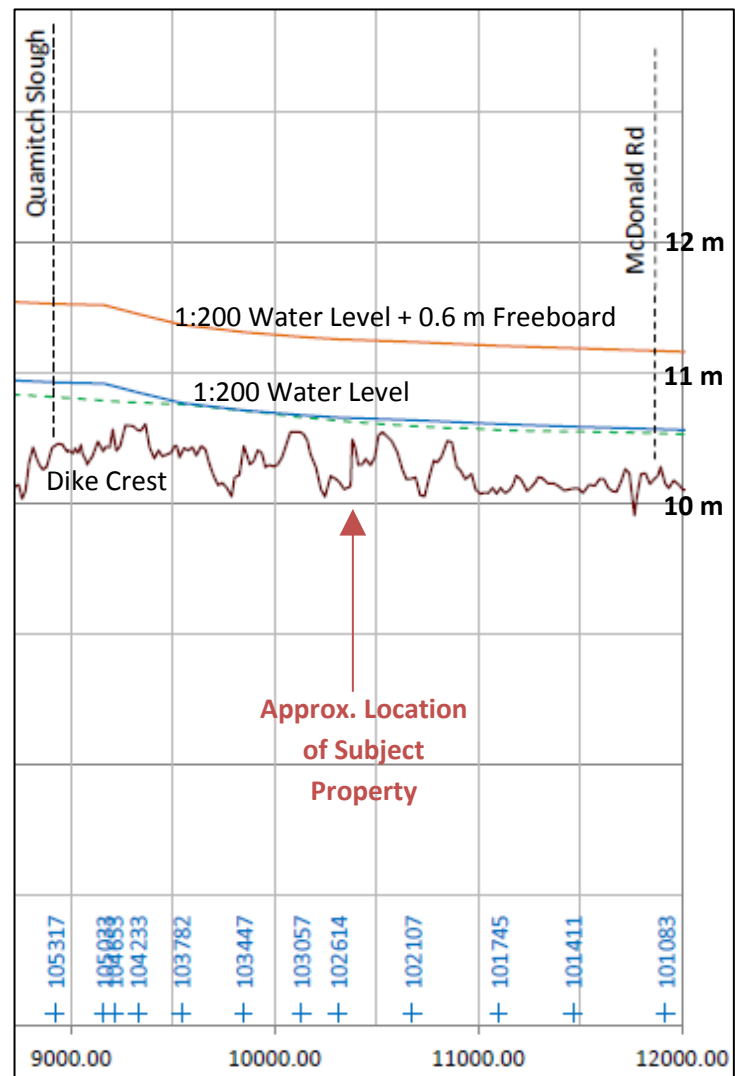
Risk of flooding from the Fraser River is greatly reduced by the Nicomen Island dike system. The 35 km long dike provides a below-standard level of protection to Nicomen and Skumpalasph Islands from flooding of Fraser River on the south side and Nicomen Slough on the north. Bell Dam prevents the Fraser from entering the upstream end of Nicomen Slough (near Bell Road). Internal drainage within the diked area is managed with twelve floodboxes and five pump stations. The dike and associated infrastructure is administered by the Nicomen Island Improvement District. The Nicomen Island dike is considered "non-standard" because it: 1) was not built to provincial engineering standards for dike design; and 2) it would be overtopped during a 1:200 year flood.

2014 Fraser River Design Flood Level Update

From 2006 to 2014, Northwest Hydraulic Consultants (NHC) and the Ministry of Forests Lands and Natural Resource Operations (FLNRO) completed a program of hydraulic modelling to update the 1:200 year flood profile of the lower Fraser River.

The 1:200 flood is the “design” flood that serves as the basis for provincial floodplain management strategies. The flood profiles developed by NHC and FLNRO have been adopted as the provincial standard. They replaced the previous estimate of the 1:200 flood profile created in 1969, prior to modern computer modelling methods.

The 2014 flood profile maps indicate that the elevation of the water during a 1:200 year flood in the area of the subject property would be about 10.66 metres GSC at Deroche Landing Road. The flood construction level, which includes 0.6 m ‘freeboard’, would be 11.26 m (freeboard accounts for wave action). The dike crest elevation in this location is about 10.2 metres GSC (0.4 m below the 1:200 year flood level).



The ground elevation at the proposed building site is 8 to 9 metres GSC. Accordingly, a 1:200 year Fraser River flood would result in floodwaters about 1.66-2.66 metres deep at the subject property.

The 2014 flood profile is not reflected in flood construction levels established in the *FVRD Floodplain Management Bylaw No. 0681* which utilized the previous 1969 flood profile data.

FVRD Floodplain Management Bylaw

FVRD Floodplain Management Bylaw No. 0681 establishes a flood construction level of 10.5 m GSC for the subject property. It is this elevation that the applicant has applied through the site specific exemption process to reduce by 1.5 m down to 9.0 m GSC to support the construction of a 260 m² detached garage at grade.

Bylaw 0681 allows the FVRD Board to grant site-specific exemptions if the Board considers it advisable and provided that:

- the exemption is consistent with the Provincial Guidelines or a report prepared by a Professional Engineering certifying that the land may be used safely for the use intended is provided; and,
- the owner enters into a Restrictive Covenant.

FVRD Policies

Flood protection and management is a current priority of the FVRD Board and the Board has adopted a body of policy around it.

Official Community Plan

Fraser River flood protection is addressed in the *Official Community Plan for Electoral Area G Bylaw No. 0866, 2008*. The policies of the Plan aim to:

- minimize exposure to flood risk and consequences of Fraser River flood events will be central concerns in land use planning decisions (11.2.1);
- utilize floodplain management and zoning bylaws, official community plan policies and covenants to limit development within the floodplain and minimize exposure to risk (11.2.2);
- reinforce the 1:200 year design flood as the basis for flood proofing measures (11.2.3);
- continue reliance on dikes combined with on-site flood-proofing measures including the implementation of flood construction levels, siting, and floodplain setbacks to minimize exposure to flood hazards (11.2.4);
- consider the Ministry of Environment Flood Hazard Area Land Use Management Guidelines when amending the floodplain bylaw bylaws and generally when developing land use policy and regulation for the Fraser River floodplain within the Plan area (11.2.5); and,
- support an update to the Floodplain Management Bylaw to reflect the most current Fraser River flood profile modelling (11.2.6).

FVRD Hazard Acceptability Thresholds Policy

FVRD's Hazard Acceptability Thresholds Policy identifies acceptable levels of risk based on the type of hazard and the form of development proposed. The likelihood that the subject property will be flooded by the Fraser River is greater than 1:200. As shown below, the policy supports the construction of new buildings where the flood risk is between 1:40-1:200 as long as there are protective works to mitigate the hazard.

The Dewdney Dike mitigates much of the flood risk, but (as described above) it does not protect against a 1:200 year flood because the dike is about half a meter lower than the 1:200 flood level. Normally, elevating the building to meet the flood construction elevation deals with this the residual risk. In this case, the property owner doesn't want to elevate the building and so an alternative solution is needed to mitigate the flood hazard.



Inundation¹ by Flood Waters

Flood inundation involves the submersion of land or property by flood waters. This includes areas located on the flood-plain of the Fraser River and its tributaries, which may be susceptible to inundation by flood waters, particularly during spring thaw or periods of heavy rainfall.

Table 1

	1:40	1:40 - 1:200	< 1:200
Minor Repair (< 25%)	2	1	1
Major Repair (> 25%)	4	3	1
Reconstruction	4	3	1
Extension	4	3	1
New Building	4	3	1
Subdivision (infill/extend)	5	4	1
Rezoning (for new community)	5	5	1

¹ Flooding Hazard involves both inundation and erosion/revision. Hazard acceptability thresholds must therefore involve assessment of both types of hazards at a given site.

Figure 2. Hazard-Related Responses to Development Approval Applications

- 1 Approval without conditions relating to hazards.
- 2 Approval, without siting conditions or protective works conditions, but with a covenant including "save harmless" conditions.
- 3 Approval, but with siting requirements to avoid the hazard, or with requirements for protective works to mitigate the hazard.
- 4 Approval as (3) above, but with a covenant including "save harmless" conditions as well as siting conditions, protective works or both.
- 5 Not approvable.

Provincial Policy

Provincial policy regarding the management of development within floodplains is set out in the *Flood Hazard Area Land Use Management Guidelines* document. "The goals of the provincial guidelines are to reduce or prevent injury, human trauma and loss of life, and to minimize property damage during flooding events."

Under these guidelines, requirements for flood construction elevations may be waived for: a) the portion of a building or structure that is to be used as a carport or garage; and b) minor buildings such as storage buildings. There are no size limits on garages in the provincial policy. Accordingly, it would be consistent with the Guidelines to vary the flood construction elevation for a garage particularly if there are other measures in place to minimize property damage during flooding events.

Previous Site Specific Exemptions on Nicomen Island

Address	Year	Description	FCL reduction
8963 Rowan Rd	2017	The Regional Board approved a site specific exemption to allow the construction of a farm building, varying the floodplain setback from 7.5 m to 4 m from the toe of the dike.	n/a
41590 Nicomen Isl. Trunk Rd	2015	The Regional Board approved a site specific exemption to allow the placement of a mobile home for farm help, varying the FCL from 10.7 to 8.4 m GSC.	2.3 m
8713 Howell Rd	2014	The Regional Board approved a site specific exemption to allow the placement of a mobile home, varying the required FCL from 10.3 m GSC to 9.3 m GSC	1.0 m
37894 Loughheed Hwy	2012	The Regional Board approved a site specific exemption to allow an agricultural storage building, varying the required FCL from 9.8 m GSC to 7.4 m GSC	2.4 m
9610 Johnson Rd	2006	The Regional Board approved a site specific exemption to allow the placement of a mobile home for farm help at 2.5 m above grade.	n/a

DISCUSSION

Option 1. Approve with 'Wet Floodproofing' (Staff Recommendation)

In the United States, 'wet floodproofing' is an accepted approach for minimizing flood damage to accessory structures in floodplain environments. 'Wet floodproofing' involves:

1. the use of non-fibrous building materials resistant to flood damage;
2. allowing flood water to enter and exit the structure (to balance water pressure inside and outside the structure to avoid damage from pressure on exterior walls); and,
3. locating electrical equipment and outlets above the flood level.

The portion of the building below the flood construction level would be made with materials that can be soaked by flood water and dry out without lasting damage or excessive mold growth. There are a number of ways the applicant could achieve this with common construction techniques and materials. One way would be to construct a metal building insulated to the flood level with either rigid polystyrene or high density closed-cell spray foam (or, preferably, not insulated). Interior walls could be finished with treated plywood, cement board or a range of other products.

This approach would meet BC Building Code requirements, satisfy provincial floodplain guidelines and address all FVRD policies. It would involve moderate additional expense over conventional wood frame

construction. However, the owner was already considering a metal building and he felt this would be an acceptable option.

This would be a new approach to floodproofing in the FVRD. It could serve as a test case for the potential broader use of 'wet floodproofing' methods for accessory structures in FVRD's floodplain areas, especially behind non-standard dikes. Since this would be a new approach, staff would work with the applicant to identify suitable methods and materials. Upon completion, staff would assess the potential for broader use of 'wet floodproofing' for outbuildings.

Option 2. Approve with No On-Site Flood Mitigation

The FVRD Board may wish to approve the application with no on-site flood mitigation. Option 2 is not recommended by staff because it is not consistent with Official Community Plan policies, the FVRD Hazard Acceptability Thresholds policy and it does nothing to minimize damage when a flood occurs.

Option 3. Refuse

The Board may wish to refuse the site specific floodplain application and require the garage to be built at the flood construction level.

Options 1 and 2 require a covenant to address the flood hazard.

COST

The Site Specific Exemption application fee of \$400.00 has been paid by the applicant.

SUMMARY OF OPTIONS

Option 1 – Approve with 'Wet Floodproofing' (Staff Recommendation)

THAT the Fraser Valley Regional District Board issue Site Specific Floodplain Exemption 2018-01 to permit the construction of a 260 m² garage below the flood construction level at 8650 Deroche Landing Road, Area "G" subject to 'wet floodproofing' of the garage to the satisfaction of the Director of Planning & Development;

AND THAT the Fraser Valley Regional District Board authorize its signatories to execute all documents relating to Site-Specific Floodplain Exemption Application 2018-01.

Option 2 – Approve with No On-Site Flood Mitigation

THAT the Fraser Valley Regional District Board issue Site Specific Floodplain Exemption 2018-01 to permit the construction of a 260 m² garage below the flood construction level at 8650 Deroche Landing Road, Area "G".

AND THAT the Fraser Valley Regional District Board authorize its signatories to execute all documents relating to Site-Specific Floodplain Exemption Application 2018-01.

Option 3 – Refuse the Application

THAT the Fraser Valley Regional District Board refuse Site Specific Floodplain Exemption Application 2018-01

COMMENTS

Margaret Thornton, Director of Planning & Development	Reviewed and supported.
Mike Veenbaas, Director of Financial Services	No further financial comments.
Paul Gipps, Chief Administrative Officer	Reviewed and supported