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northwest hydraulic consultants

NHC Ref. No. 3005215

5 March 2020

British Columbia Ferry Services Inc.
Suite 500 - 1321 Blanshard Street
Victoria, BC
V8W 0B7

Attention: **Halyna Tataryn, P.Eng.**
Project Coordinator, Terminal Construction

Copy to: **Stephen Mayall**

Via email: Halyna.Tataryn@bcferries.com, Stephen.Mayall@bcferries.com

Re: **Gabriola Ferry Terminal Redevelopment**
Relevance of Provincial Guidelines for Flood Construction Levels

Dear Halyna,

BC Ferries Services (BCFS) contacted Northwest Hydraulic Consultants Ltd (NHC) to evaluate the need for an assessment of the flood construction levels consistent with Provincial guidelines for redevelopment of a ferry terminal for the Gabriola Ferry Terminal. It is our understanding that this request is to comply with obtaining development permits from the Gabriola Islands Local Trust (GILT). The specific request to BCFS from GILT as provided to NHC was:

> *"An assessment report and recommendations prepared by a qualified professional coastal engineer, that details flood construction levels consistent with Provincial Guidelines for redevelopment of the ferry terminal."*

With respect to this request from GILT to BCFS it is important to first note that Provincial Guidelines for flood construction levels (FCL's) are specific to habitable buildings and ferry terminal infrastructure does not fall within the description of these guidelines per se. Separate to a study of the FCL, it is first worth considering the relevance of an FCL analysis to a ferry terminal.

This letter will provide a brief summary of the relevant Provincial guidelines followed by a description of ferry terminal infrastructure and operations. The letter will conclude with the rational for why the redevelopment of a ferry terminal need not adopt the habitable building FCL guidelines.

Provincial Guidelines

Provincial Guidelines provide guidance on the methodology for the determination of FCL for habitable buildings and also for flood hazard assessments of properties. These documents have recently been

updated, including an update in 2018 of the professional practice guidelines for legislated flood assessments (EGBC, 2018). There are also existing bylaws for Gabriola Island land use which provide specific attention to general setbacks, water commercial usage for marine transportation, and for ferry parking. It should be noted that the setbacks and elevations given in the local bylaws do not conform to the Provincial Guidelines.

A summary of the relevant documents are as follows:

Gabriola Island Land Use Bylaw (Bylaw No. 177, 1999, Consolidated Version, Nov 4, 2018).

BC Ministry of Water, Land, and Air Protection, *Flood Hazard Area Land Use Management Guidelines,* Amended by Ministry of Forests, Lands, Natural Resource Operations and Rural Development, January 1, 2018

Engineers and Geoscientists British Columbia (EGBC), *Professional Practice Guidelines for Legislated Flood Assessments in a changing climate in BC,* Version 2.1, August 28, 2018

Further references to Provincial Guidelines

BC Ministry of Environment, Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use, *Draft Policy Discussion Paper,* Prepared by Ausenco Sandwell, January 2011

BC Ministry of Environment, Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use, *Guidelines for Management of Coastal Flood Hazard Land Use,* Prepared by Ausenco Sandwell, January 2011

BC Ministry of Environment, Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use, *Sea Dike Guidelines,* Prepared by Ausenco Sandwell, January 2011

The BC FLNRORD Flood Hazard Area Land Use Management Guidelines goals are stated as to "*reduce or prevent injury, human trauma and loss of life, and to minimize property damage during flood events. Experience has shown that regulating land development to keep people out of harm's way is the most practical and cost-effective way of achieving these goals*." For most cases of property development, the preceding avoidance strategy is appropriate. However, in the case of a ferry terminal which must operate at the shoreline avoidance is not a viable option. The guidelines recognize that these situations will exist and that requests for modifications of bylaws and exemptions are appropriate in such cases. In such situations the municipality may consider granting a covenant for the development of lands that could be prone to coastal flooding that includes a waiver of liability in favour of the local government and/or the provincial government in the event of any damage caused by flooding or erosion (reference: EGBC, 2018).

As per Provincial Guidelines the FCL is used to establish the elevation of the underside of a wooden floor system or top of concrete slab for habitable buildings. The rational in the guidelines is that the combination of ensuring habitable space above the FCL and including appropriate setbacks will reduce

the risk of harm during flood events. However, the FCL should not be a target elevation for land for which temporary flooding can be reasonably tolerated, or a minimum elevation for structures that are not habitable buildings.

The existing bylaws (Gabriola Island Land Use Bylaw) identify setbacks and elevations as required for shoreline properties (Section B.2.1). However, we note that this bylaw does not conform to recent Provincial Guidelines for which wave effects are calculated in addition to the year 2100 design water level. The bylaws also designate Marine Transportation (Water Commercial 3, Section D.5.4) and Ferry Parking (Section D.3.7) zoning areas although these sections of the bylaw do not mention FCL or setbacks.

BCFS Terminal Land Use and Operations

Gabriola Ferry Terminal is the home port and point of assembly for the vessel staff on the Gabriola-Nanaimo Harbour Route. There is limited on-land infrastructure as the terminal comprises only a parking lot, washrooms, and a small waiting room structure. There are no ticket kiosks and waiting vehicles park on the side of a public road outside of the terminal area.

It is important to note that a high shoreline is an operational challenge as vehicle and passenger loading ramps must be able to accommodate vessels during a full range of tidal conditions. Thus, an overly high shoreline can lead to excessively steep ramps that make loading and unloading vehicles (especially trucks and buses) problematic at normal low tide condition. The design of the ferry terminal must consider the full range of expected operational water levels.

In the event of high winds or extreme storms we are informed that BCFS suspends the ferry service between Nanaimo and Gabriola Island. The vessel will be secured at the berth in Gabriola and the terminal closed. Notice of closure will be communicated through signage posted at the terminal and through other electronic notices.

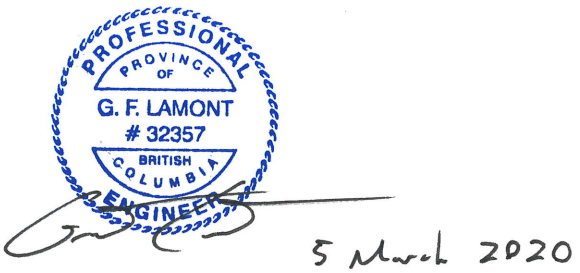
Rational for ferry terminal redevelopment to not adhere to FCL requirements

The Provincial Guidelines do not in general account for the operational requirements of a ferry terminal, and NHC does not believe that a ferry terminal need necessarily adhere to the Provincial FCL guidelines. The design of land-side infrastructure such as ramp abutments, access roads to the vehicle ramps, and related ferry terminal infrastructure should be designed to meet BCFS operational needs and should adhere to the relevant design standards for such structures (such as the CSA Ferry Boarding Facilities Standards and the Canadian Highway Bridge Design Code). It is important to note that ferry operations will be suspended during design storm conditions and thus it is reasonable for BCFS (as the terminal operator) to adopt a risk based design approach and site management protocols in which short term and temporary exposure to flooding on some areas of their terminal property is acceptable.

If you have any questions related to the information provided within this letter, please do not hesitate to contact us.

Sincerely,

Northwest Hydraulic Consultants Ltd.



Grant Lamont, P.Eng.
Principal, Senior Coastal Engineer