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In response to your request for a review of the validity of conclusions in the July 21, 2025 NHC memo titled, "*Henriette Dam Breach Impacts Assessment*" this document provides my comments.

In general, the material released in this memo and in previous memos on the same subject do not meet the standards of detail typically required for assessing life safety related hazards or for decision making based on these assessments.

The memo presents interpolations made from model estimates of wave heights based on unstated assumptions but provides no detailed methodology to allow other professionals to confirm the validity of the wave predictions or interpolations made. There is no discussion of the validities of the methodologies, limitations of the methods used or expected precision or range of error in the predictions.

In particular, there is no information about how wave propagation and wave attenuation with distance was modelled within HEC-RAS, nor is there any discussion about how momentum (non-wave equation impulse propagation) or directional effects on resulting impact waves were considered. All of these factors would be significant to correctly estimate impulse wave heights in the waters between the creek and the floatel.

The memo also states that there was no actual modelling done at the location of Floatel #2 and that results were simply interpolated. However, the interpolation was based on results from propagation directions that are inappropriate for assessing wave heights at the closest point of Floatel #2 to the creek which is in the direction of maximum wave propagation. There is no information presented in the memo as to how this "interpolation" was done.

The memo and the Northwest Hydraulics Consultants (NHC) report thus appear to underestimate the potential for ocean wave generation by a dam breach flood at the closest point of Floatel #2 to Woodfibre Creek.

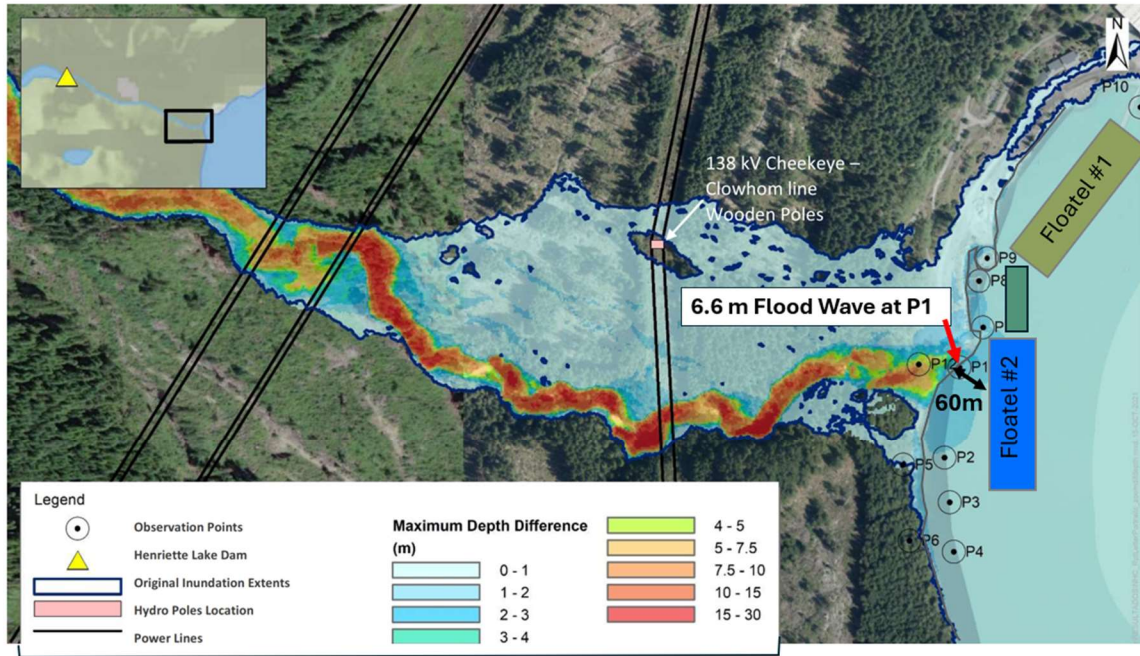
It seems unlikely that a flood impact wave of over 6 m in height arriving at the foreshore at over 12 m/s would only generate an impact wave of 0.5 at the Floatel #2 location directly offshore of 60 m from Woodfibre Creek. The reason for the low wave heights predicted in Table 3.1 of the memo is rather obvious upon looking at the locations of the modelled points as seen in Figures A and B.

Figure A) Approximate floatel locations added to NHC Figure 22

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October 2022



After: Figure 22 NHC Report: Maximum Incremental Flow Depths along Downstream End of Woodfibre Creek



Source: Overlay atop base figure from NHC, 2022

Figure B) Wave Propagation Directions and “Interpolation Points” added to NHC Figure 2.1

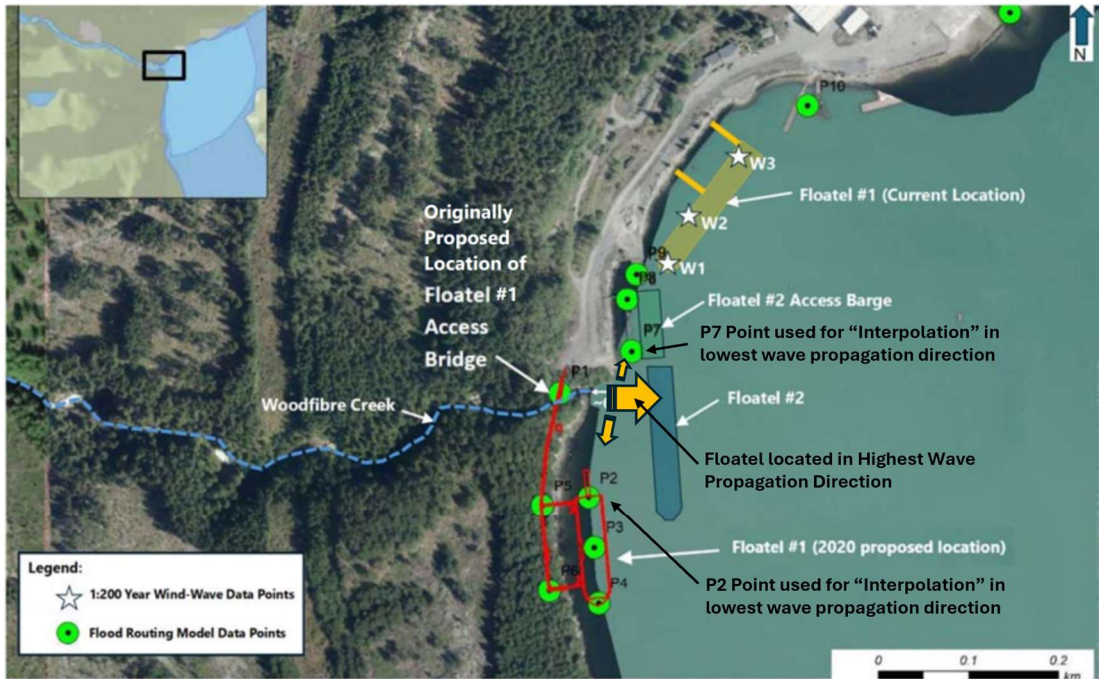


Figure 2.1 Available flood routing and wind-wave modeling observation points in the vicinity of the floatel #2.

Source: Overlay atop base from NHC, July 21, 2025

Table 3.1 Summary of Maximum Depth Variations and Maximum Velocities in Woodfibre Creek and Howe Sound Resulting from Sunny-Day Breach of Henriette Lake Dam.

Observation Points ¹	Initial Depth ^{2,3} (m)	Maximum Depth Increase Resulting from Dam Breach ³ (m)	Maximum Velocity resulting from Dam Breach (m/s)
P1	0.4	6.6	12.3
P2	7.5	0.9	1.3
P3	6.1	0.7	0.9
P7	7.4	1.2	1.8
P8	4.0	0.9	2.1

Point directly opposite Floatel #2

Points used for "interpolation"

1. See Figure 2.1 for locations of observation points.
2. Initial depth refers to depth prior to flood wave arrival from a breach of Henriette Lake Dam.
3. Modelled initial depths based on a Higher High Water Mean Tide (HHWMT) level of El. 1.97 m which was conservatively adopted for the 2022 dam breach Inundation model.

Source: Overlay on table from NHC, July 21, 2025

The quoted wave height value of 0.9 m in NHC's Table 3.1 is for point P2 located in the ocean near the shoreline, about 100 m south of Woodfibre Creek. A key point is that this location is perpendicular to the flood wave momentum direction. As a result, very little if any wave propagation is expected in this direction compared to the direct 60 m path to Floatel #2 - at which location impact wave height was not modelled.

Similarly, point P7 although closer to Woodfibre Creek is in the perpendicular direction to the north of the creek and is also behind the curve of the shoreline. So again, the modelled wave height of 1.2 m at P7 would be expected to be significantly lower than the actual wave heights at the directly exposed Floatel #2 location. So, two points of reduced wave height were selected for interpolation.

Due to the above factors the predicted (actually "interpolated" using a questionable methodology) 0.5 m high impact wave height at 75 m downstream of P1 (the Floatel #2 centreline location) does not seem at all realistic. Especially considering that the Floatel #2 location is directly in front of the mouth of Woodfibre Creek which at P1 will experience a fast moving 6 m high wall of water in the event of a dam breach. It is not clear how "interpolating" in a direction perpendicular to the wave propagation has any physical significance for estimating wave height. The modelling did not actually include attenuation of wave heights to the closest location of the Floatel #2, instead the comment about "rapid attenuation" is an interpretation based on questionable assumptions.

As a result of the unstated assumptions and methodologies that appear to be the basis for the unsupported wave height estimates at the Floatel #2 location as presented in the memo, the stated maximum impact wave height at Floatel #2 appears to be significantly understated.

To substantiate an assessment of impact wave hazards at Floatel #2 will require actual modelling at the Floatel #2 location directly opposite Woodfibre Creek. This modelling would need to be done with both full wave equation modelling at sufficiently discrete time steps to resolve free surface wave effects and would need to incorporate directional impulse/momentum considerations.

The hazard assessment memo also does not consider potential effects of a debris flow which could mobilize large woody debris (telephone pole or larger size logs) at high speeds towards any infrastructure associated with the Floatel#2 installation. Floatel #2 would be directly inline with Woodfibre Creek. A debris flow could occur either concurrent with a dam break or simply as the result of heavy rainfall.

Regards,



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