

REPORT

Engineering Services

To: Mayor Cote and Members of Council **Date:** February 28, 2022

From: Lisa Leblanc
Director of Engineering Services **File:** 09.1750.01
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Item #: 2022-119

Subject: 2022 Spring Freshet and Snow Pack Level

RECOMMENDATION

THAT Council receive this report for information.

PURPOSE

This report is to inform Council of the current snowpack conditions as of February 1, 2022 in the Fraser River Basin and related preparation for the annual freshet for 2022.

SUMMARY

Snow basin indices in the British Columbia (B.C) for February 1, 2022 range from a low of 88% of normal in the Boundary Basin to a high of 143% in the Liard Basin. Generally, the province has above normal snow pack for February 1, 2022, with the average of all snow measurements across the province at 109%. The overall snow basin index for the entire Fraser River basin (e.g., upstream of the Lower Mainland) is 108% which is near average for this time of the year. By early February, 66% of the annual B.C snowpack has typically accumulated. With a few months left for snow accumulation, it is still early in the season as the snow pack as well as the flood risk can change significantly. Staff will continue to monitor the river basin conditions, assess the developing risk, and initiate minor preparations and inventory review.

BACKGROUND

The waterfront portions of the New Westminster mainland as well as all of Queensborough are located within the floodplain of the Fraser River. Only Queensborough has an existing permanent dyke system for protection against flooding

from the Fraser River. The Engineering Department has a High Water Response Plan which is invoked annually to ensure that risk of flooding in vulnerable areas in the floodplain is managed by a series of temporary mitigation measures in the event of a significant freshet.

EXISTING POLICY AND PRACTICE

The City has a Freshet Preparation Work Plan that is regularly updated. Key components in the preparation stage include:

1. Review historical information and update the Freshet Preparation Work Plan and High Water Response Plan. *Status: The City has an up to date High Water Response plan and Freshet Preparation Workplan;*
2. Monitor snowpack information to assess risk. *Status: The City's Engineering Department is actively in contact with the Emergency Management Office and closely monitoring the developing risk;*
3. Complete a dike inspection and crest survey to identify potential areas where either permanent or temporary works may be necessary. *Status: Scheduled for March, 2022;*
4. Start the process to update contact lists of local suppliers and contractors and potential emergency measures. *Status: The City has over 40,000 burlap sandbags with another 12,000 on standby order. The City will also be placing orders for various sizes of sandbags based on the River Forecast Centre modelling forecasts;*
5. Coordinate with adjacent municipalities to develop joint work plans where inter-boundary concerns exist *Status: Ongoing;*
6. Evaluate new flood protection techniques developed since 2020 that could be used for permanent or temporary mitigation measures. *Status: Completed;*
7. Inspect condition of existing City fast-deployment water dams (Aqua-dams) and have supplier complete a refresher training for staff. *Status: Completed on April 27th, 2021.*

The City's freshet monitoring and associated tasks have historically been referenced to the water level at the Mission gauge which is not influenced by tidal effects. Certain tasks of the 2022 Freshet Preparation Plan are activated when the gauge readings reach the levels indicated in the following table:

Tasks / Historical References	Mission Gauge Water Level
CNW Starts Weekly Dyke Patrols	6.0 m
CNW Starts Daily Dyke Patrols	6.5 m
CNW Starts 24hr Continuous Patrol and installs temporary protection measures in certain locations	7.0 m

1948 Flood levels (June 8th)	7.56 m
1894 Flood Levels	7.92 m
Top of Dykes at Mission Gauge	8.53 m

The Work Plan includes additional tasks to be completed later in the spring. In light of the present COVID-19 pandemic, staff will be closely assessing the Work Plan to ensure that sufficient staff and resources are available to adequately plan for and respond to the annual freshet. Regular updates will be provided to Council as circumstances develop.

ANALYSIS

The Climate Prediction Center (CPC) shows that El Niño Southern Oscillation (ENSO) demonstrated La Niña conditions during the fall of 2021. This is the second La Niña in a row, with La Niña present during the fall-winter of 2020-21. La Niña occurs when oceanic temperature anomalies along the equatorial Pacific Ocean region are below normal for an extended period. Historically, La Niña conditions create cooler temperatures for British Columbia and wetter weather in the South Coast and Vancouver Island during the winter months. Conditions this year have so far followed this typical La Niña scenario.

Seasonal weather forecasts from late January by Environment and Climate Change Canada indicate an increased likelihood of colder than normal temperatures from February through April for the entire province. There is an increased likelihood of greater than normal precipitation in the Northeast, Peace and Upper Fraser East for February to April, whereas there is a greater probability of below normal precipitation for Vancouver Island and the South Coast.

The Fraser River Snow Basin Index for February 1, 2022 is slightly above normal at 108%. By early February, nearly two-thirds of the annual B.C. snow pack has typically accumulated. Snow pack throughout the province ranges from 88 to 142% of normal. The provincial average for all snow measurements across the province is 109% of normal and indicates a slightly higher risk for snowmelt related flooding during the spring months (freshet). With a few months left for snow accumulation, seasonal snow packs can still change significantly. The critical weather factors that result in increased risk of flooding are extended periods of hot weather, or a significant frontal rainstorm near the peak time of snowmelt. In general, snowpack factor produces about 20-40% of the flood risk, while weather factors produce about 60-80%. For context:

- 5-6 days of hot weather (greater than 25 degrees Celsius) during the snowmelt peak period (mid-June) will produce very high flows (but not flood flows), whereas greater than 8 days of hot weather during the snowmelt peak period may produce flows that approach those of the 1948 flood;
- Rainfall of 70+ mm over 48 hours occurring widespread near the time of snowmelt peak can produce very high flows in the Fraser River.

The River Forecast Centre will continue to monitor snow pack conditions and will provide an updated seasonal flood risk forecast in the March 1, 2022 bulletin, which is scheduled for release on March 9, 2022. Subsequently, the City will provide the next update on snow pack conditions to Council in mid to late March.

SUSTAINABILITY IMPLICATIONS

Staff is in consultation with the provincial River Forecast Centre in order to understand the impacts of Climate Change such as the recent atmospheric river and heatwave in 2021, and how this translates to the seasonal freshet flood risk now and in the future. Engineering staff is also in the process of updating the City's Floodplain Management Strategy, which will recommend future dike protection measures to adapt to sea level rise and climate change.

FINANCIAL IMPLICATIONS

There is no expenditure at this time except the allocation of regular staff time to monitor the river basin conditions, assess the developing risk, initiate minor preparations and inventory review, and to complete the annual dike inspection. There is sufficient budget allocated at this time to respond to the current level of risk. Additional financial resources may be required to implement flood mitigation measures depending on the further development of freshet conditions.

INTERDEPARTMENTAL LIAISON

Interdepartmental liaison to date has been limited to coordination within Engineering, between Operations and Infrastructure Planning. More interaction with other departments such as Police, Emergency Management Office, Electrical and Finance will be incorporated if the City & the Province activate their respective Emergency Operations Centers.

OPTIONS

The following options are presented for Council's consideration:

1. That Council receive this report for information; or
2. That Council provide alternative direction to staff.

Staff recommends Option 1.

CONCLUSION

The Fraser River Snow Basin Index for February 1, 2022 is slightly above normal at 108%. By early February, nearly two-thirds of the annual B.C. snow pack has typically accumulated. Snow pack throughout the province ranges from 88 to 142% of normal. The

provincial average for all snow measurements across the province is 109% of normal which indicates a slightly higher risk for snowmelt related flooding during the spring months (freshet). With a few months left for snow accumulation, seasonal snow packs and the flood risk can still change significantly. The Engineering Department annually executes its High Water Response Plan to ensure that vulnerable areas in the floodplain will be protected by a series of temporary mitigation measures in the event of a significant freshet. Staff will continue to monitor the river basin conditions, assess the developing risk, and initiate minor preparations and inventory review.

ATTACHMENTS

Attachment 1 - Snow Survey & Water Supply Bulletin – February 1, 2022

APPROVALS

This report was prepared by:

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