



April 26, 2018

Files: 35050-20/Mailout &
35050-20/IOD Dike Files

To: British Columbia Diking Authorities

Re: Annual Dike Inspection Reporting, 2018 Snowpack & Spring Freshet, Flood Preparedness Planning, and *Dike Maintenance Act* Approvals

To help reduce the risk of dike failure and impacts of flooding in British Columbia, **every diking authority is required to submit an annual dike inspection report** to the Office of the Inspector of Dikes. The contents and attachments of this letter provide the information on:

- A. Dike Inspection Reporting
- B. 2018 Snowpack and Freshet Flood Potential
- C. Requirements for Flood Preparedness Planning
- D. *Dike Maintenance Act* Approvals for Changes to Dikes

A. DIKE INSPECTION REPORTING

In 2017/2018 (fall/winter) the Province's Flood Safety Section put on a series of dike inspection workshops for diking authorities in various regions across the province. This program will continue this year focusing on the northern regions of the province.

In previous years, the submission of the Dike Inspection Checklist as a stand-alone report was considered an inadequate submission by the Inspector of Dikes. Many diking authorities expressed concern over the lack of resources to provide more substantial reporting. The Inspector of Dikes has modified the minimum inspection report quality, to achieve adequate information on the state of the dikes while promoting increased reporting compliance.

Non-submission or reporting below the new minimum report quality standard may result in the further reporting requirements or auditing by the Office of the Inspector of Dikes per the *Dike Maintenance Act*. Please review the **report quality** section below.

If your dike protects against freshet flooding, please ensure that any outstanding dike inspections, maintenance, emergency planning, and reporting be completed prior to the freshet period.



Report Quality

The minimum standard for the annual dike inspection report submission below is not a substitute for a comprehensive dike inspection program. It is recommended that diking authorities review their dikes often (during high and low flows) and collect as much information as is required to effectively maintain their dikes. Your regional Deputy Inspectors of Dikes (see attached contact list) are also available for information and advice on inspections and dike safety.

By **October 31, 2018**, email a colour PDF file of the inspection report to floodsafety@gov.bc.ca or mail a colour hardcopy (please include a flash drive with a PDF version) to the address below.

The minimum requirements for the inspection report are:

- a. Fill in the attached Dike Inspection Checklist (**mobile app output no longer accepted**);
- b. Use the official dike names and GPS Numbers – to obtain this information please visit the Flood Protection Works Database at:
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/integrated-flood-hazard-management/dike-management/flood-protection-structures>
- c. Include detailed descriptions, sketches, etc., of maintenance issues, deficiencies and proposed remedial measures;
- d. Include a photo record of observed issues/deficiencies referenced to the detailed descriptions in the checklist;
- e. Provide a summary of maintenance work completed in the past 12 months;
- f. Provide a summary of maintenance work proposed for the next 12 months;
- g. Provide a pdf copy of consultant reports completed in the past year (if available).

Diking authorities are reminded that the [Flood Protection Works Inspection Guide 2000](#) is available online to assist with completing the dike inspection report.

Mobile Application

Please note that the mobile applications previously made available for dike inspections are no longer supported or available, and the outputs from this app are not accepted.

B. APRIL 2018 SNOWPACK AND FRESHET FLOOD POTENTIAL

BC River Forecast Centre – Published April 9, 2018

The April 1, 2018 snow survey is now complete. Data from 132 snow courses and 74 automated snow weather stations around the province (collected by the Ministry of Environment Snow Survey Program, BC Hydro and partners), and climate data from Environment and Climate Change Canada forms the basis of the following report^[1].

Full details on the snow bulletin, including the snow basin index map and snow survey data can be found at: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/river-forecast-centre/snow-survey-water-supply-bulletin>.

^[1] Every effort is made to ensure that data reported on these pages are accurate. However, in order to update the graphs and indices as quickly as possible, some data may have been estimated. Please note that data provided on these pages are preliminary and subject to revision upon review.

Weather

The weather in March was relatively cool and remained dry for most of the month until several storm systems moved through the province at the end of the month. Temperatures across British Columbia were near normal to slightly below normal (-2 to 0°C relative to normal). Precipitation was well above normal for most locations in the Interior, and significantly below normal for Vancouver Island and the South Coast.

Snowpack

Snow basin indices for April 1, 2018 range from a low of 65% of normal in the Stikine to a high of 152% in the Similkameen and Okanagan regions (Table 1). Overall, the province has an above normal snow pack for April 1st. The average of all snow measurements across the province is 127% of normal, increasing significantly from 119% of normal on March 1st.

Well-above normal snow packs (>130%) are present in the Upper Fraser West, Okanagan, Similkameen, Boundary, and Skagit. The April 1st snow index for the Okanagan is 152% of normal, which is tied with April 1999 for the highest snow pack dating back to 1980. Above normal snow packs (110-130%) are present in the Middle Fraser, Upper Fraser East, Lower Fraser, Upper Columbia, West Kootenay, East Kootenay, South Coast, and Central Coast. Although the Middle Fraser snow index is 110%, there are areas within the Middle Fraser that are much higher. For example, the Nicola basin has an index of 132%, and snow surveys within the Chilcotin plateau are significantly above normal (>150%). Near normal snow packs (80-110%) have accumulated in the Liard, Peace, Skeena-Nass, Nechako, Vancouver Island, the North Thompson, and the South Thompson. Although the Nechako snow index is considered near normal, two snow surveys within the Nechako basin (1A23 Bird Creek & 1B05 Skins Lake) currently measure all-time record highs. It is thus likely that the Nechako snow index (103%) under-represents certain areas within the entire basin. A well-below normal snow pack is present in the Stikine (65%) and Northwest (72%). Finally, the Fraser River snow index as an entire watershed is 108% of normal.

Table 1 - BC Snow Basin Indices – April 1, 2018

Basin	% of Normal	Basin	% of Normal
Upper Fraser West	145	Boundary	149
Upper Fraser East	114	Similkameen	152
Nechako	103	South Coast	120
Middle Fraser	110	Vancouver Island	106
Lower Fraser	113	Central Coast	116
North Thompson	109	Skagit	150
South Thompson	109	Peace	95
Upper Columbia	111	Skeena-Nass	89
West Kootenay	127	Stikine	65
East Kootenay	119	Liard	83
Okanagan	152	Northwest	72

Outlook

The easing trend in La Niña conditions in the equatorial Pacific Ocean, which began in February, is continuing. The Climate Prediction Centre (CPC) at the U.S. National Weather Service/NOAA is forecasting the high likelihood that conditions will continue to transition to ENSO-neutral through the spring, with neutral conditions to develop into the summer. While La Niña is waning, it is not uncommon for the effects of La Niña to persist several months beyond the period of the defined La Niña event. For example, snow packs in previous La Niña events in British Columbia tended to grow more rapidly than normal through April. Province-wide snow basin indices during La Niña years tend to increase by 2-5% over the April 1st to May 1st period. While there is still uncertainty over how weather patterns will play out over the next few months, continued increases in snow basin indices into May are likely to occur, given this year's La Niña context.

Seasonal forecasts (April to June) from Environment and Climate Change Canada indicate an increased likelihood of below normal temperatures for the eastern border of British Columbia and above normal temperatures for the Northwest. Short to medium-term forecasts suggest continued light to moderate precipitation for Vancouver Island and the South Coast for the following week. Precipitation from these events is expected to spill over the Coast Mountains and into the southern interior, likely increasing the mountain snowpack. Temperatures are forecast to be near normal over this period.

By April 1st, nearly 95% of the annual BC snow pack has typically accumulated. For most areas, the transition from snow accumulation to snow melt generally occurs in the middle of April, and therefore the April 1st snow survey is considered to be the key survey of the year for assessing the impact of snow pack on seasonal water supply and flood risk.

Very high snow packs (>145%) in the South Interior (including the Skagit, Similkameen, Okanagan, Boundary and Upper Fraser West), and high snow packs in the Kootenay (>120%) indicate an increased seasonal risk of flooding. Given this year's La Niña conditions, it is unlikely that the risk will ease much prior to the melt season. While the snow pack in the overall Fraser River basin is only slightly above normal (108%), under specific weather conditions it is possible for snow to melt rapidly throughout the entire basin. Increased seasonal runoff in spring can contribute to higher local inflows to the lower reaches of the Fraser River, where there is still a flood risk for the Lillooet River and tributaries depending upon weather conditions. Given the potential for increasing snow packs in the coming weeks, there is the possibility of increasing seasonal flood risk in other areas of the province.

Seasonal volume runoff forecasts are near-normal (100-110%) for the Upper Fraser, Middle Fraser, Thompson and Skeena/Bulkley basins, and well above-normal (>130%) for areas of the South Interior, including the Okanagan, Similkameen and Nicola. The snowmelt component of seasonal runoff on Vancouver Island, South Coast, Lower Fraser and Skagit is expected to be near to slightly above normal given the snow pack in those regions. Below normal snow packs in the Northwest and Stikine are an early indication of the potential for below normal seasonal runoff.

Hydrological Effects of BC Wildfires in 2017

Forest fires burned the largest area in BC's history during the summer of 2017. These fires affected many watersheds, including large areas in the Cariboo Chilcotin, Thompson Okanagan, West Coast, and Kootenay Boundary regions. Disturbances such as fire affect the hydrologic response of streams, rivers and lakes relevant to potential flooding. Specifically, flows from snowmelt dominated watersheds impacted by fires tend to be greater and peak earlier as compared to undisturbed areas, even under normal weather conditions. Many of the regions affected by burns last summer have above normal snow packs this year.

Areas that will be more susceptible to earlier and higher flows due to potential fire impacts and a high snowpack include: Bonaparte River (Cache), Baezaeko River, Nazko River, Chilcotin River, Deadman River, and West Road River; including minor tributaries/creeks.

Upcoming Freshet

Snow pack is one element of seasonal flood risk during BC's freshet season. Weather patterns during the snow melt season play a critical role in whether or not flooding occurs. Intense or prolonged rainfall and extreme temperatures are important factors that can lead to flooding, even for areas with a near normal snow pack.

The River Forecast Centre will continue to monitor snow pack conditions and will provide an updated seasonal flood risk forecast in the May 1st 2018 bulletin, which is scheduled for release on May 7th.

C. REQUIREMENTS FOR FLOOD PREPAREDNESS PLANNING

Local governments are responsible under the *Emergency Program Act* for emergency preparedness as well as initial and continuing response.

All diking authorities (even if they are not a local government) **are required to prepare an emergency preparedness plan for the diked area** in cooperation with their respective local government(s) and/or the Provincial Emergency Program. Such plans must include, amongst other things, provisions for flood patrols, flood-fighting personnel and equipment, materials, communications, and evacuation planning.

More specifically, preparedness activities should include:

- Completing inspections, maintenance and repairs,
- Ensuring access to dikes for flood fighting equipment,
- Ensuring dike patrols and flood fighting personnel are familiar with the diking system,
- Installing flood level monitoring gauges,
- Stockpiling riprap and other materials that may be needed.

D. DIKE MAINTENANCE ACT APPROVALS FOR CHANGES TO DIKES

Routine maintenance of a dike by a diking authority does not require an Approval under the *Dike Maintenance Act* (DMA), but major repairs or changes as listed below do require an Approval per Section 2(4) of DMA.

- Changes or alterations to the cross section or crest elevation of a dike;
- Installation of culverts, pipes, flood-boxes, utility lines, pump stations, or any structure through, on or over a dike;
- Construction of any works on or over a dike or dike right of way, including structures, excavations and placement of fill or other materials;
- Alteration of the foreshore or stream channel where the work could impact the integrity of a dike such as dredging, construction of erosion protection and other in-stream works; and
- Construction of a new dike.

DMA Approval application forms, approval requirements, design guidelines, and general information are available at: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/integrated-flood-hazard-management/dike-management/approvals>

Additional permits and/or Approvals under other legislation/regulation may be required in addition to a DMA Approval.

If you have any questions or comments relating to flood preparedness, dike safety or the DMA approval process, please contact your regional Deputy Inspector of Dikes.

Sincerely,



Mitchell Hahn, P.Eng.
Inspector of Dikes

List of Attachments

1. 2018 Dike Inspection Checklist
2. 2018 Dike Safety Program Contact List

pc: Deputy Inspectors of Dikes, Water Management Branch, FLNR
Valerie Cameron, P.Geo., Water Stewardship Manager, Water Management Branch, FLNR
Chris Duffy, Executive Director, Emergency Coordination, Emergency Management BC
Jesal Shah, P.Eng., Director, Disaster Mitigation Program, Emergency Management BC