



To:	Public Works and Transportation Committee	Date:	June 24, 2026
From:	Roeland Zwaag General Manager, Engineering and Public Works	File:	10-6060-01/2025-Vol-01
Re:	Fraser River Freshet and Flood Protection Update 2026		

Staff Recommendation

That the report titled “Fraser River Freshet and Flood Protection Update 2026”, dated June 24, 2026, from the General Manager, Engineering and Public Works, be received for information.

Executive Summary

The 2026 Fraser River freshet was below average, with peak flows of 7,003 m³/s recorded at Hope on June 3, 2026, which is between a 1-year and 2-year return period event. No flooding occurred in Richmond during the 2026 freshet. In 2025, annual rainfall was 1,092 mm, which is 14% below the 10-year average, and although six significant rainfall events were recorded, none exceeded a two-year return period.

The City’s drainage and flood protection systems continue to perform well, supported by Council-endorsed capital projects, preventative maintenance programs, and emergency response planning. Infrastructure improvements to the dike system, pump station upgrades, and culvert rehabilitation continue to support system performance and emergency readiness. The Flood Protection Management Strategy continues to guide the City’s proactive approach to forecasting, planning, and improving the flood protection system to meet long-term requirements related to climate change, infrastructure age, and growth.

Staff Report

Origin

This report provides a summary of the 2026 Fraser River freshet, along with an update on 2025 rainfall statistics and ongoing works regarding the City's flood protection program.

As detailed in the City's Flood Protection Management Strategy, Richmond is situated approximately one metre above sea level, making flood protection integral to protecting the health, safety and economic viability of the City. Richmond is protected from flooding by infrastructure that includes 49 kilometres of dikes, 599 kilometres of drainage pipes, 61 kilometres of culverts, 151 kilometres of watercourses and 39 drainage pump stations with an estimated replacement value of \$3.7 billion.

This report supports Council's Strategic Plan 2022-2026 Focus Area #3 A Safe and Prepared Community:

Community safety and preparedness through effective planning, strategic partnerships and proactive programs.

Analysis

2026 Fraser River Freshet

In recent years, milder winters have occurred throughout the province, which has contributed to reduced snow depth levels in southern BC. Although climate patterns indicate the continuation of milder winters, the frequency and intensity of rainfall events is expected to continue to rise. For 2026, the province advised that Fraser River basin snowpack levels were 57% of normal as of June 1, 2026. This has led to a reduced spring freshet with the peak Fraser River flows measured at Hope to be 7,003 m³/s on June 3, 2026, which is between a 1-year and a 2-year return period event. Historical data over the past five years have been summarized in Table 1 below.

Table 1: Peak Fraser River Flow Measured at Hope, BC Over the Past Five Years

Year	Peak Fraser River flow measured at Hope, BC (m ³ /s)
2022	10,400
2023	9,130
2024	5,120
2025	7,060
2026	7,003

No flooding occurred in Richmond during the 2026 freshet. The City continues to be a leader in flood protection planning and mitigation through Council-endorsed capital projects and maintenance programs.

Predicted climate change impacts, including more extreme wet and dry weather events, may result in an increased variability in freshet flows in the future. This reinforces the need for the City's continued flood protection upgrade program.

2025 Rainfall

Significant Rainfall Events

The City of Richmond currently has 5 rain gauges located at City Hall, Fire Hall No. 2, Fire Hall No. 7, Richmond Ice Centre, and Hamilton Community Centre. The rain gauges measure and record rainfall, assisting the City in preparing for and responding to extreme weather events.

Rainfall highlights for 2025 include the following:

- The City received 1,092 mm of rainfall in 2025, which was 14% lower than the average annual rainfall over the last 10 years;
- December was the month with the most rainfall in 2025, with 203 mm of rainfall measured at the City Hall rain gauge, which accounted for 19% of the total rainfall measured at City Hall;
- Six significant rainfall events were recorded in 2025; however, none exceeded a two-year return period. The most intense rainfall event occurred on August 6, 2025, when the Richmond Ice Centre rain gauge recorded a rainfall intensity of 8.5 mm/hr for a 1-hour period; however, this intensity was not sustained as the total rainfall recorded for that day was approximately 25mm; and
- The City received 248 drainage service requests in 2025, which is the lowest annual total in the last 10 years (shown in Attachment 1). This indicates a well performing drainage system as a result of ongoing capital improvements, proactive maintenance programs, and preparedness actions for anticipated significant rainfall events.

The City's drainage system is designed to withstand a 10-year return period rainfall event. The drainage system performed well during rainfall events. The total annual rainfall over the last 10 years is included in Attachment 2.

In advance of anticipated weather events, an Operations Response Plan is initiated, and a number of actions are taken by staff to reduce localized flooding and respond to the anticipated weather event. Examples of actions taken to prepare the drainage system are increasing capacity by lowering water levels in the canals, adjusting settings at pump stations, clearing heavy leaf routes, inspecting and servicing identified hot spots, pre-planning the best deployment of resources, and preparing sandbags for both staff and public use.

After a weather event, staff review data from rain gauges, level sensors, SCADA, service requests, and staff observations to implement action items. Additionally, the City's *Getting Ready for Rain* campaign helps residents prepare for severe weather and provides steps to help reduce the risk of flooding. These efforts ensure the continued improvement and readiness of the City's drainage system.

Atmospheric River Initiatives

Using lessons learned from the November 2021 and October 2024 Atmospheric River events, a number of initiatives to assess and improve the City's drainage system have been undertaken.

Ongoing initiatives include coordinating with the Ministry of Transportation and Transit (MoTT) to identify drainage infrastructure upgrades and facilitate maintenance to address localized flooding issues, monitoring results of maintenance activities in drainage catchment areas, and acquiring a mobile fuel tanker to support emergency response preparedness for extreme weather events.

Completed initiatives include large-scale maintenance activities for drainage infrastructure in the Horseshoe Slough catchment; increased coordination with cranberry farms and City staff; investigation and review of existing drainage system locations to determine long-term upgrades; development of a sandbag staging and distribution program to help protect private properties during extreme weather events; construction of site drainage improvements and relocation of electrical equipment for the Edgemere Sanitary Pump Station; and upgrades to fuel supply infrastructure at the Works Yard.

Staff will continue to implement flood protection infrastructure upgrades and emergency response protocols to enhance the City's flood resilience during extreme weather events.

2025/2026 Winter Storm Events

During January 3 to 5, 2026, a provincial storm surge warning was issued. Staff prepared for the possibility of tides peaking up to 70 cm above expected water levels; however, Richmond saw tides peak 40 cm above expected water levels on January 4, 2026. Water pooling was observed along the south dike near London Wharf Park and Britannia Shipyards National Historic Site, along the north dike near the Moray Channel Bridge, and at the lower portion of the West Dyke Trail. All observed pooling remained outside of the dike crest or flood walls.

City crews completed the install of river gauges on Mitchell Island, as well as camera systems to monitor the tides on the island remotely. The Britannia flood wall was also erected during periods of high-water events. The events did not result in any flooding.

Overall, seasonal high tides and king tides were not significant over the winter, and the City's diking system performed well. There were no reports of dike overtopping, breaching, or other flood related concerns during this period. Erosion and debris run up continue to be addressed as part of the dike maintenance program.

Infrastructure Improvements

The City's flood protection system (drainage infrastructure and dike system) has a replacement value of approximately \$3.7 billion. The City is actively implementing the Council-endorsed accelerated flood response program and upgrading flood protection infrastructure to address the impacts of growth, infrastructure age and climate change.

Key planning and assessment work to support long-term flood protection improvements completed or underway in 2025 include:

- Hydrodynamic flood modelling to assess flood risks on Lulu Island;
- Dikes Emergency Reconstruction Strategy to support emergency response planning;
- Nature-Based Flood Protection Solutions Assessment for Lulu Island to identify opportunities to integrate nature-based approaches with flood protection infrastructure, where feasible; and
- East Richmond Agricultural Water Supply Study to identify potential upgrades to the drainage and irrigation system to improve water supply for agriculture.

These planning initiatives support the City's ongoing capital program, including continued dike upgrades to address sea level rise, land subsidence, growth and climate change.

Capital Dike Upgrades

Current climate change science estimates that sea levels will rise approximately 1.0 metre by the year 2100 and 0.2 metres of land subsidence will occur over the same time period. The City's Flood Protection Management Strategy is the guiding framework for continual upgrades and improvements to the City's flood protection system. A key action identified in the City's Flood Protection Management Strategy is to continue raising the City's perimeter dike to 4.7 metres in advance of climate change induced sea level rise.

The following dike improvement projects have been approved through the capital budget and are progressing through the various design phases or getting underway:

- North dike upgrades between Lynas Lane and No. 2 Road;
- South dike upgrades between No. 4 Road and No. 5 Road;
- South dike upgrades between 6080 Dyke Road to Gilbert Road;
- North dike upgrades between Knight Street and the CN Rail Trestle Bridge; and
- North dike upgrades between Terra Nova and Lynas Lane.

Funding to construct dike upgrades will continue to be requested through future capital projects for Council's consideration as part of the annual budget process. The City will also continue to seek senior government grant funding opportunities to support dike raising projects.

Dike Rehabilitation

Staff have developed a Dikes Emergency Reconstruction Strategy to help the City better prepare for any potential flooding emergencies in the future.

This strategy supports planning a better, faster, more robust and well-prepared response in the event of a future emergency. Notable dike inspection, maintenance and construction work in 2025 included the following:

- Responded to 10 High Water Events totaling 57 days of patrols;
- Completed 2 land side dike slope restoration projects totaling 200m and repaired 38 beaver burrows in the dike slope;
- Completed 3 waterside rip rap restoration projects totaling 1,905m;
- Completed 49km of brush cutting and inspections along the entire dike perimeter;
- Conducted the Annual Dike Inspection;
- Conducted an in-river water-side dike inspection;
- Purchased a new drone with LiDAR technology that will allow more in-depth analysis of the dike and other City assets;
- Repaired an emergency hydrant washout at the Horseshoe Slough Pump Station; and
- Removed invasive species from the north and west dike.

Pump Station Upgrades

Significant progress has been made in upgrading the City's drainage pump stations to accommodate growth and climate change. The total capacity of the City's drainage pump stations has increased by 30% since 2005. Over the last 20 years, as part of the City's asset management program, 19 of 39 drainage pump stations have been rebuilt or upgraded.

In 2025, the UBCM grant-funded Drainage Pump Station Climate Adaptation and Resilience Upgrade project was completed which involved the installation of new onsite generators at 6 drainage pump stations, permitting uninterrupted operation of the pump stations by providing backup power capabilities. The project was funded through a \$2,000,000 grant from the UBCM Community Emergency Preparedness Fund. In addition, through the Drainage Pump Station Rehabilitation and Generator Upgrade Program, the No. 6 Road North Drainage Pump Station was upgraded to increase the pumping capacity.

The City is currently undertaking a condition assessment of all 39 drainage pump stations. Upcoming drainage pump station upgrade projects include the No. 3 Road South and No. 9 Road-Westminster Highway Pump Stations.

During extreme events, a number of older pump stations operate near full capacity. These stations have been identified for upgrades. Projects to upgrade or replace these stations are either included in current capital budgets or will be brought forward for Council's consideration as part of future capital budgets.

Box Culvert Repair and Preventative Maintenance

The City has approximately 61 kilometres of culverts, the majority of which are 50 to 60 years in age. Although the box culverts have a design life of 100 years, premature failure of some joints has been observed in recent years.

The City has implemented a preventative box culvert maintenance program to inspect the condition of box culverts on a 7-year cycle and identify sections that require repair or replacement. Staff are proactively managing the condition of box culverts by identifying and repairing deteriorating joints before they cause significant damage. Repair of significant defects identified through the program will continue to be presented to Council for consideration as part of the annual capital budget.

Staff inspected 12.6 kilometres of box culverts within 13 drainage catchments in 2025. Results of each inspection are documented in reports with supporting images and video recordings. This allows staff to monitor changes to the condition of box culverts, thereby better informing long-term infrastructure improvement planning. In 2025, no significant defects were encountered and all minor defects that were identified have been repaired.

Rehabilitation of the No. 4 Road box culvert from Westminster Highway to Granville Avenue was completed in 2025. The rehabilitation included cleaning inside of the box culvert, detailed inspection of all the joints, injection grouting at joints and cracks to prevent infiltration into the box culvert and fill potential voids on the outside of the box culvert. The box culvert rehabilitation projects mitigate the deterioration of the box culvert joints and extend the service life of the culverts. The box culverts in the No. 2 Road South, No. 3 Road South, McCallan Road North, and No. 1 Road North drainage catchment areas are scheduled for inspection in 2026.

Canal Stabilization Works

The City undertakes canal stabilization works to upgrade canal banks and drainage and irrigation infrastructure. Canal stabilization upgrades help improve the capacity of the City's flood protection system by removing blockages along the canal and increasing the storage volume of the canal. In 2025, canal stabilization projects were completed along Sidaway Road between Westminster Highway and Blundell Road and along No. 7 Road between Highway 91 and Cambie Road.

Development

The City has successfully partnered with developers to secure dike upgrades through development. In particular, the City is actively pursuing opportunities to construct superdikes, where land supporting development behind the dike is filled to the same elevation as the dike crest. This eliminates visual impacts of a raised dike structure on waterfront views, while providing an enhanced flood protection structure for the City.

Superdikes, constructed through development to date, include sections of the north dike near the Richmond Olympic Oval and No. 4 Road, as well as sections along the south dike at Riverport Way, Williams Road, and in Steveston.

Budgetary Implications

There are no budgetary implications associated with the report.

Conclusion

The City observed the below average annual rainfall over the last 10 years in 2025, however, the intensity of rainfall events has continued to increase. Below average freshet flows were also observed in the spring of 2026. The drainage and flood protection system performed well, with negligible freshet flood risk and a below average number of drainage-related service requests.

Demands on the drainage and flood protection system will continue to increase due to climate change and growth. The Flood Protection Management Strategy guides the City to proactively forecast, plan and improve the City's flood protection system to meet long-term requirements. Through capital improvements, investment in preventative maintenance programs, and sound incident planning and response efforts, the City is able to manage flooding risks and maintain a high level of service to Richmond residents.

Significant progress continues to be made in advancing the City's dike planning efforts and implementing infrastructure improvements to the City's flood protection system.

Respectfully submitted,

Milton Chan, Director, Engineering

Report Contributors

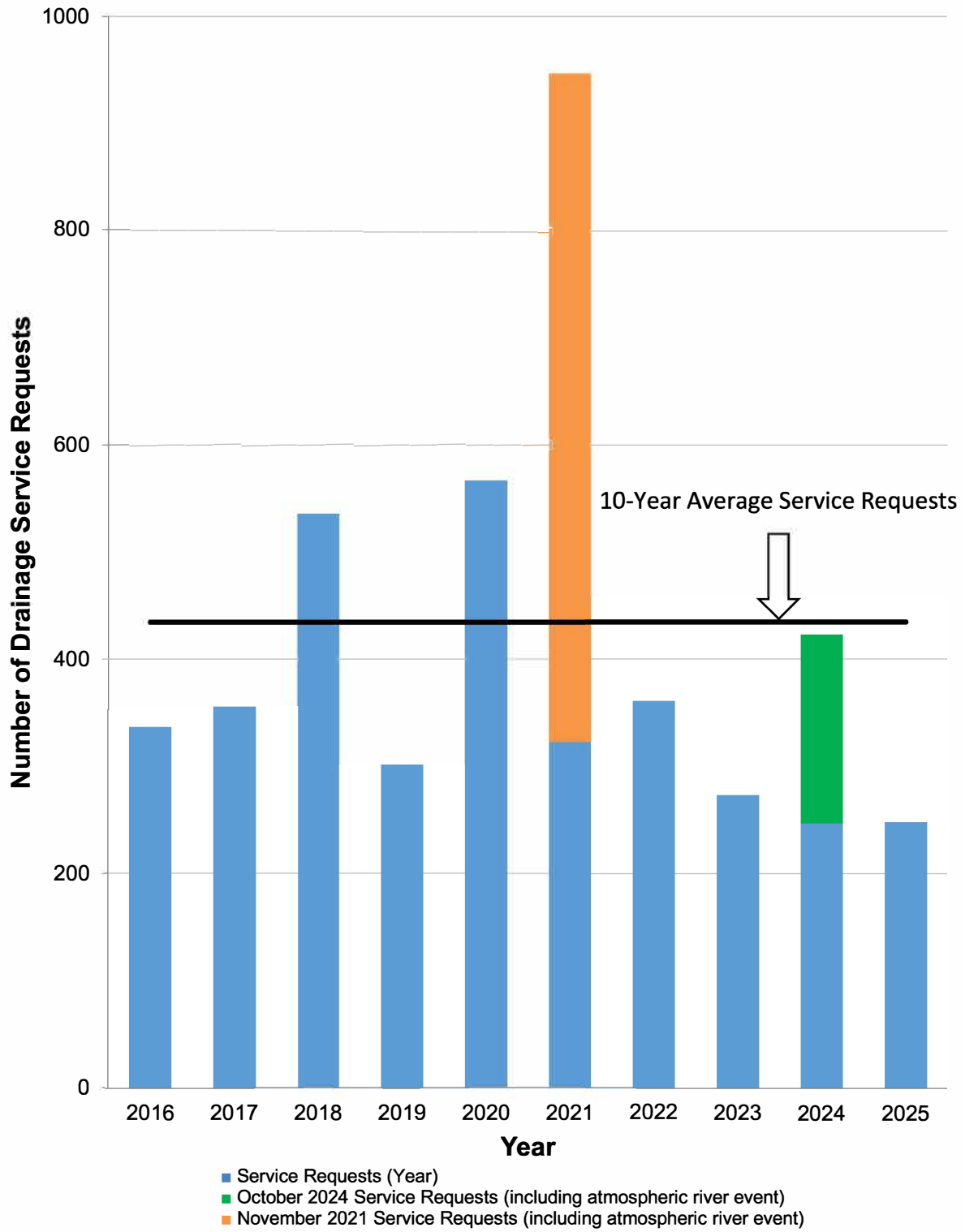
This report was prepared by Jason Ho, Manager, Engineering Planning and reviewed by Public Works.

Endorsed by Serena Lusk, CAO

Att. 1: Annual Drainage Service Requests 2016 – 2025

2: Annual Rainfall Data 2016 – 2025

Annual Drainage Service Requests 2016-2025



**Annual Rainfall Data
2016-2025**

