

# City of Richmond

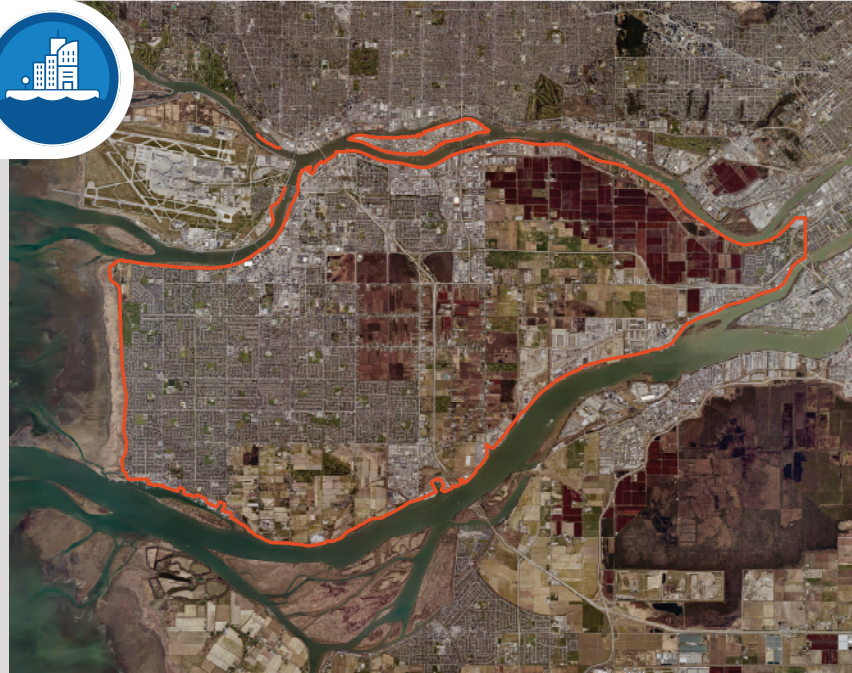
# FLOOD PROTECTION



## An Island City



The City of Richmond is made up of islands within the floodplain of the Fraser River, where it flows into the Salish Sea. Surrounded by both river and sea and sitting at an average of 1 metre (3 feet) above sea level, Richmond is subject to flood hazards from coastal storm surges, snowmelt flooding, and extreme weather events like the atmospheric river rainfall experienced in the fall of 2021.



*Richmond is surrounded by 49 kilometres of dikes that hold back the waters of the Salish Sea and Fraser River*

## Climate Change and Flooding

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Along with a changing climate, the flood hazards in Richmond are also changing. Sea level is rising with global warming and the frequency and intensity of extreme weather events is increasing. Individually and together, these climate events are increasing Richmond's exposure to coastal, river, and rainfall flood hazards.

### Sea Level Rise

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With climate change, warmer temperatures melt glaciers and ice caps, and increase the temperature of the ocean, which causes the water to expand. As a result, global sea levels are rising. Sea level rise increases flood risks posed by king tides and coastal storm surges.

The Province of British Columbia advises municipalities to plan for 1 metre of sea level rise by 2100. During this same period, land in Richmond is expected to subside by 0.2 metre.

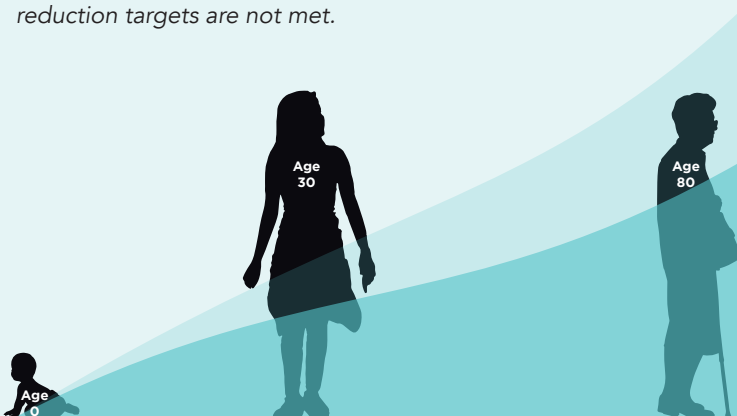
### Increased Rainfall

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Over the past 20 years, the average intensity of rainfall events in Richmond has increased by approximately 15 per cent. With the changing climate, this trend is expected to continue. Powerful rainfall events intensify coastal storm surges and river flood hazards due to the increased river flow.

The atmospheric river events that hit the Lower Mainland in November 2021 are examples of extreme rainfall events that can lead to flooding. While Richmond did not experience the same level of rainfall or flooding as some areas of the Fraser Valley, it did receive over 130 millimetres of rain during a three-day period, which is the biggest storm Richmond has faced in half a century.

**A LIFETIME OF SEA LEVEL RISE:** A child born today can expect 50 centimetres of sea level rise by the time they're 30 years old and 1 metre by the time they're 80. The lighter shaded area shows a higher range of sea level rise that could occur if global emissions reduction targets are not met.



#### STORM SURGES

High water levels caused by storm winds and waves combined with high tides 'pushing' additional water onshore.

*PHOTO: Storm surge event looking west at No. 3 Road Pier*



#### KING TIDES

The highest tides of the year, which occur regularly in winter, can increase risk of flooding.

*PHOTO: November 2020 king tide event, looking south at Steveston Island near No. 2 Road Pier*



#### FRESHET

High water levels from melting ice, snow, and rain that typically occur in the spring.

*PHOTO: Freshet flows looking north east at the south dike near No. 3 Road Pier*

# What's Keeping Richmond Safe?

The City of Richmond has one of the most comprehensive flood protection systems in BC. Current flood protection infrastructure includes:

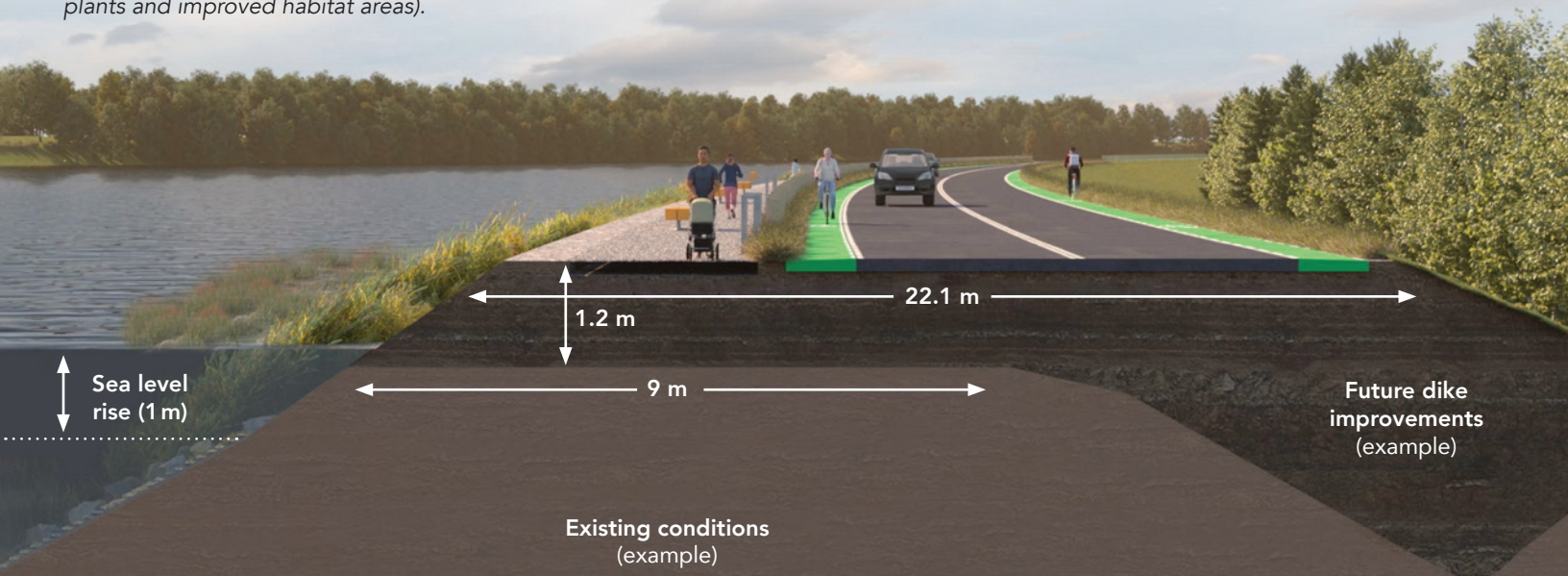
- **Dikes:** 49 kilometres of dikes for holding back the waters of the sea and river
- **Drainage Pipes:** 585 kilometres of drainage pipes that transport water out of the city
- **Culverts:** 61 kilometres of culverts and tunnels that carry streams and act as rainwater storage
- **Channelized Watercourses:** 165 kilometres of man-made channels that move water through and out of the city
- **Pumps:** 39 drainage pump stations that pump rain and groundwater into the Fraser River
- **Sensors:** Numerous flood protection sensors spread throughout Richmond that provide real-time data on river levels, rainfall, and stormwater drainage.

The flood protection system can withstand high water events such as spring freshet and king tides. It can also handle a 1:500 flooding event, a major flood that has a 0.2% chance of happening in any given year.

The November 2021 atmospheric river events put Richmond's flood protection system to the test. At the peak of the storms, each of Richmond's pump stations were moving water at or near full capacity.

## IMPROVING RICHMOND'S DIKES:

The illustration shows an example of how dikes will be raised to protect against sea level rise and other climate change driven flooding risks while improving recreational amenities and environmental performance of dikes (new dikes will feature native plants and improved habitat areas).



# Planning for Change

The City of Richmond recognizes that even with climate change mitigation efforts to reduce greenhouse gas emissions, there are environmental changes that are predicted to occur even if global emissions are dramatically reduced. This includes at least 1 metre of sea level rise and increased rainfall for all coastal communities. To ensure Richmond remains safe, the City is continuously upgrading flood protection measures.

Since the early 2000s, Richmond has rebuilt and upgraded 19 drainage pump stations, increasing the total pumping capacity by 29% since 2005. They are now capable of discharging 1.4 million US gallons of water per minute – the equivalent of over two Olympic swimming pools every 60 seconds.

The current focus is now shifting towards dike raising. Richmond's Flood Protection Management Strategy plans to upgrade dikes from the current 3.5 metres in elevation to 4.7 metres in elevation, to stay ahead of sea level rise. Richmond City Council recently endorsed accelerating the implementation timeline to 50 years to improve diking infrastructure in advance of current anticipated climate change impacts.



## MORE INFORMATION?

Visit [richmond.ca/floodprotection](https://richmond.ca/floodprotection) to:



- learn about what Richmond is doing for flood protection and growing climate change risks
- share your thoughts and feedback

