City of Richmond

FLOOD PROTECTION Q+A

Richmond's Flood Protection System

What is protecting Richmond from floods?

The City of Richmond sits an average of 1 metre above sea level. Our flood protection system protects us from ocean storm surges, river flooding, extreme rainfall, and sea level rise. The system is made up of:

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

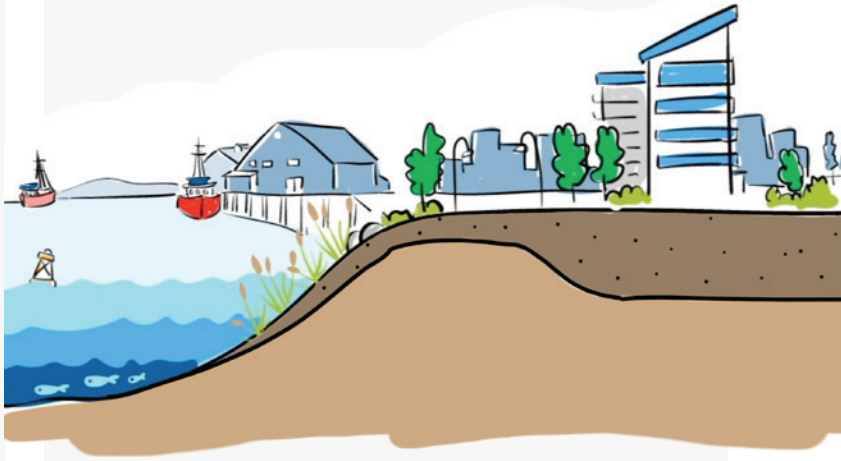
Channelized watercourses: 165 kilometres of man-made channels that move water through and out of the city

Pumps: 39 drainage pump stations that pump rainwater into the Fraser River

Sensors: Numerous flood protection sensors spread throughout Richmond that provide real-time data on river levels, rainfall, and stormwater drainage.

What is a "Superdike"?

As Richmond raises its dikes to decrease the impacts of future water levels, there is also the opportunity to make wider dikes by raising the land area behind the dike to the same height. These kinds of large dikes are wide enough that buildings and streets can be built on top of them. Engineers call these wide dikes, superdikes.

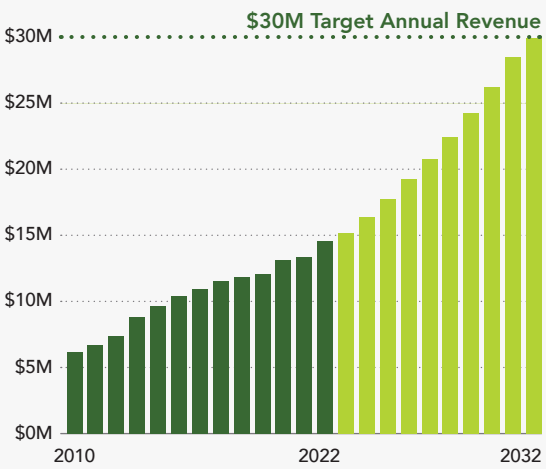


Dike Construction, Inspection, and Maintenance

Q *How is the flood protection system funded?*

Richmond's Drainage and Diking Utility was established by Council in 2000 and is funded by an annual flood protection utility fee paid by property owners. This fee currently generates over $14 million annually to maintain and upgrade flood protection infrastructure. Grants from the Provincial and Federal governments also support a wide range of flood protection improvements and planning. New residential and commercial developments along the water are also required to help fund improvements to adjacent dikes.

Annual Drainage and Diking Utility Revenue Projections



Q *How does Richmond monitor the flood protection system?*

There are numerous flood protection sensors spread throughout Richmond that provide real-time data on river levels, rainfall, and stormwater drainage. This information is monitored by the City, and staff are available to respond to drainage related emergencies on a 24/7 basis. The City also monitors weather and river flow forecasts to identify any storms or river flows that could pose a risk to the flood protection system and prepare for these forecasted events in advance.

Q *How does Richmond maintain the flood protection system?*

All flood protection components are inspected regularly. Dikes are inspected multiple times a year to monitor performance through the seasons. Dike heights are also surveyed regularly across Richmond to monitor ground subsidence. City staff inspect underground drainage systems on a regular basis with both CCTV camera inspections and visual assessments by City operations staff.

Will dikes fail during an earthquake?

Computer soil models predict that dikes will sustain some damage during an earthquake; however, the dikes will remain an intact barrier to flooding. City staff have emergency equipment readily available to repair critical damage after an earthquake or other significant event.

Richmond's Flood Protection Program

What is the Richmond Flood Protection Program?

The Flood Protection Management Strategy and supporting Dike Master Plan are Richmond's guiding frameworks to upgrade and improve flood protection across the city. A key objective of the Flood Protection Management Strategy is to raise and strengthen the dike that surrounds Richmond. The Dike Master Plan identifies how this will be achieved and provides guidance on funding it through Richmond capital programs.

Why is Richmond's flood protection program being expedited?

Richmond is accelerating the dike upgrade and raising program over the next 50 years to provide additional flood resilience in advance of current sea level rise projections and increasing flood events expected along the Fraser River due to climate change.

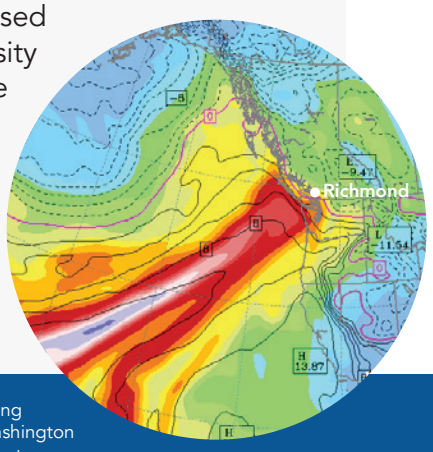
How will Richmond's flood protection program be expedited?

Richmond is gradually increasing the flood protection utility fee paid by property owners to fund the expedited improvement program. Under the updated fee structure, property owners with higher value assets and a greater demand on the drainage system will be contributing more towards flood protection. This structure accounts for the fact that all residents benefit from flood protection – including the protection of shared community assets and infrastructure – while recognizing the large variations in parcel size and assessed value that occur across the city.

Climate Change and Flood Protection

What are the main flood hazards in Richmond?

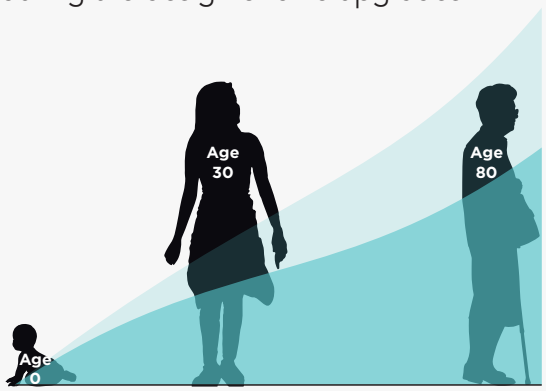
Richmond is at risk of flooding from the river, the ocean, and heavy rainfall events. Climate change is escalating these flood hazards through increased water levels due to snowmelt, sea level rise, and increased frequency and intensity of rainfall events, like the Lower Mainland experienced during the atmospheric river events in November 2021.



Weather Research and Forecasting Model from the University of Washington Atmospheric Sciences Department

Q *How much sea level rise is expected?*

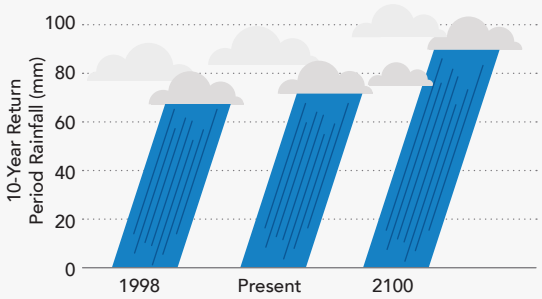
According to the Government of British Columbia, sea levels are expected to rise approximately 50 centimetres over the next 30 years and 1 metre in 80 years. Many factors contribute to sea level rise, so it is difficult to predict when these changes will happen. To provide an additional level of protection, Richmond is considering expected long-term additional sea level rise (i.e., 2 m+) during the design of dike upgrades.



Q *What about increased rainfall?*

On average over the past 20 years, rainfall events have been approximately 15% more intense. This is consistent with predicted climate change impacts on local weather patterns and supports the need for continued flood protection upgrades. The interior drainage system and pump stations protect the city against flooding from heavy rainfall. In the past 20 years, Richmond has rebuilt or upgraded 19 drainage pump stations. In recent years, additional emphasis has been placed on repair of large box culverts, which are critical for carrying rainwater from all parts of the city to the pump stations.

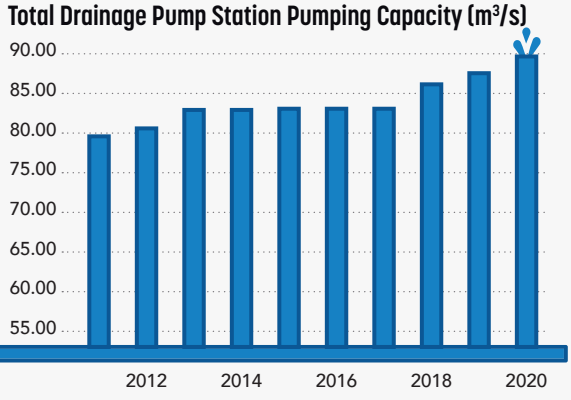
Historical and Projected Rainfall in Richmond

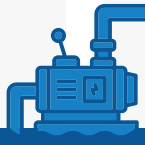


Q *What about climate change?*

Richmond is working hard to prepare for the increased flood risks that climate change is driving through dike upgrades, pump station upgrades, storm sewer maintenance and upgrades, laneway drainage, agricultural drainage and irrigation, and implementation of stormwater retention infrastructure. For example, Richmond's drainage pump stations can move 29% more water than they could in 2005.

Total Drainage Pump Station Pumping Capacity (m^3/s)





Visit **richmond.ca/floodprotection** to learn about what Richmond is doing for flood protection and growing climate change risks, and to share your thoughts and feedback.