



# City of Richmond

## Report to Committee

**To:** General Purposes Committee

**Date:** February 26, 2021

**From:** Milton Chan, P.Eng.  
Director, Engineering

**File:** 10-6060-04-01/2021-  
Vol 01

**Re:** **Accelerated Flood Protection Program Concept and Flood Protection Rate Structure Review**

### Staff Recommendation

1. That a target annual revenue level of \$30 million by 2031, for the Drainage and Diking Utility, be endorsed for use in future utility budget planning in order to support Option 1 – 50 Year Implementation Period for an accelerated flood protection program; and
2. That new rate classes be introduced for the Drainage and Diking Utility as presented in Table 2 of the report titled “Accelerated Flood Protection Program Concept and Flood Protection Rate Structure Review” dated February 26, 2021 from the Director, Engineering and be incorporated in the preparation of the 2022 utility budget and rates.

Milton Chan, P.Eng.  
Director, Engineering  
(604-276-4377)

REPORT CONCURRENCE		
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>
Finance Department	<input checked="" type="checkbox"/>	
Law	<input checked="" type="checkbox"/>	
Real Estate Services	<input checked="" type="checkbox"/>	
Roads & Construction	<input checked="" type="checkbox"/>	
Sustainability	<input checked="" type="checkbox"/>	
<b>SENIOR STAFF REPORT REVIEW</b>	<b>INITIALS:</b> 	<b>APPROVED BY CAO</b> 

## Staff Report

### Origin

At the November 12, 2019 Regular Council Meeting, the following referral motion was made:

*That staff examine the timing, concepts and plans for the potential acceleration of improvements to the City's diking system and report back.*

At the November 4, 2019 Finance Committee Meeting, the following referral motion was made:

*That staff examine the property rate classes for the Drainage and Diking rates and report back.*

This report responds to the above referrals, outlining the current strategy for addressing climate change induced sea level rise and presents a strategy to accelerate implementation of the flood protection program. This report also presents recommendations for new property rate classes for the drainage and diking rates to improve user equity.

This report supports the following strategies within Council's Strategic Plan 2018-2022:

Strategy #1 A Safe and Resilient City:

*Enhance and protect the safety and well-being of Richmond.*

*1.2 Future-proof and maintain city infrastructure to keep the community safe.*

*1.3 Ensure Richmond is prepared for emergencies, both human-made and natural disasters.*

Strategy #5 Sound Financial Management:

*Accountable, transparent, and responsible financial management that supports the needs of the community into the future.*

*5.1 Maintain a strong and robust financial position.*

## Analysis

### Flood Protection Management Strategy and Dike Master Plan

Richmond is recognized as a leading dike authority in British Columbia. Key components of the City's successful flood protection program are the Flood Protection Management Strategy and Dike Master Plan, which provide long-term guidance on flood risk mitigation. These guiding documents are informed by current science that align with provincial guidelines and conservative predictions from the Intergovernmental Panel on Climate Change.

The current strategy identifies raising the dikes in advance of year 2100 to a minimum dike crest elevation of 4.7 m, which would protect the City against the conservative projections for 1 m of sea level rise during the same time (Figure 1). With the understanding that climate change is an evolving science, the City's strategies and plans are reviewed regularly and updated to accommodate changes to sea level rise projections.

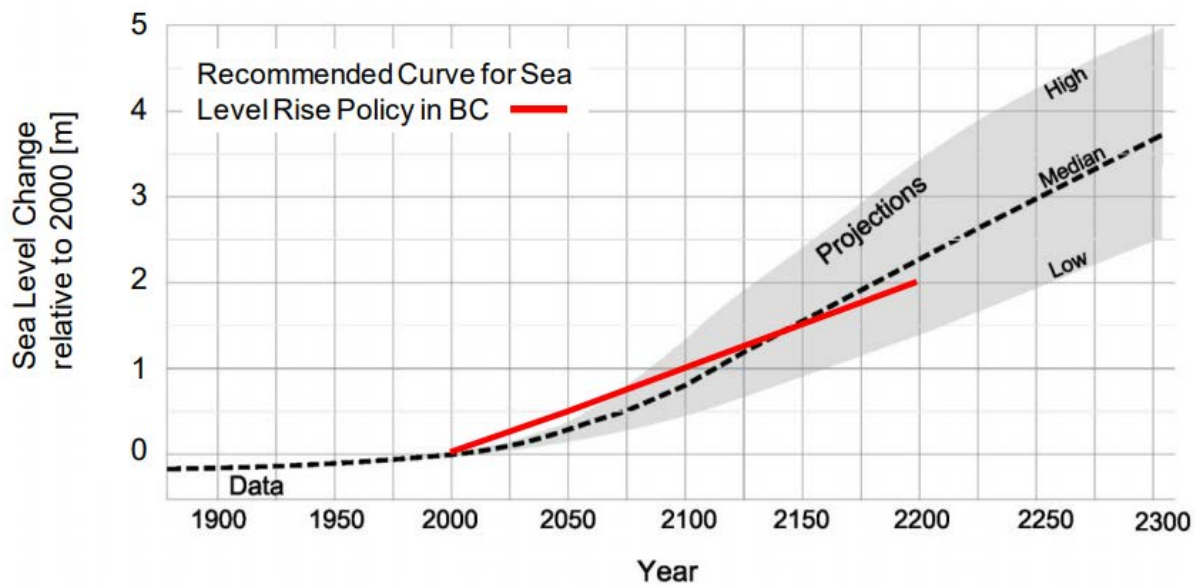


Figure 1: Provincial Guidelines for Sea Level Rise Projections

Flood protection upgrades are being implemented on an on-going basis. Over the past 10 years, the City has dedicated over \$130 million, through the Drainage and Diking Utility and senior government grant funding, to complete flood protection projects. These projects include pump station upgrades and dike raising works, with the focus shifting towards perimeter dike improvements, in accordance with the City's Flood Protection Management Strategy Implementation Program.

Flood Protection System fees collected by the City contribute to the Drainage and Diking Utility, and are used to replace ageing infrastructure and upgrade the City's flood protection system. Since being established in 2003, annual revenue for the Drainage and Diking Utility has increased steadily to its current level of \$13.4 million (Figure 2) and has allowed the City to advance the flood protection program considerably. To further accelerate the program, annual revenues would need to be increased at a higher pace.

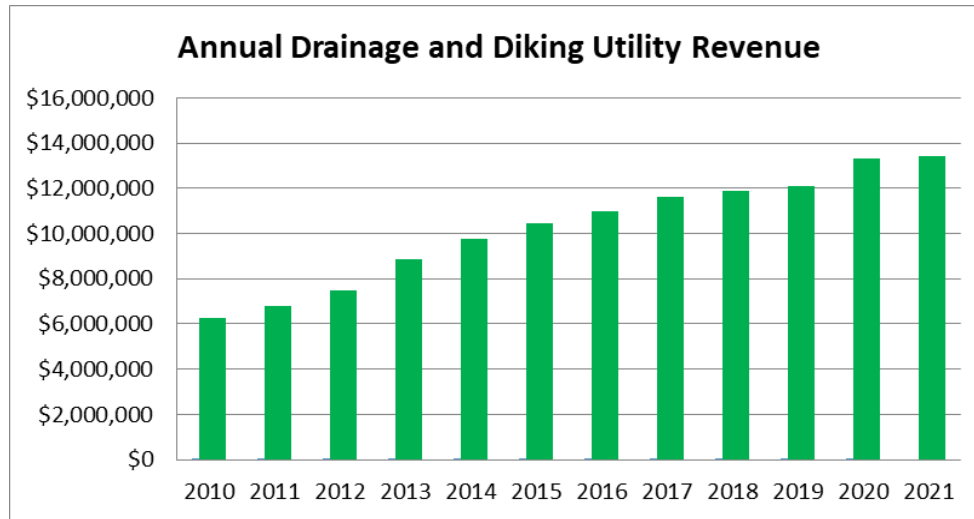


Figure 2: Annual Drainage and Diking Utility Revenue

### Accelerated Flood Protection Program

Accelerating the dike upgrade program would provide additional flood resilience for the City by raising the dikes well in advance of the current sea level rise projections. The total cost to complete the dike upgrades is currently estimated at \$1 billion, which includes costs associated with land acquisition, design and construction, and restoration along the perimeter dike; but not habitat compensation. This estimated value should be used as an order of magnitude reference, considering highly variable factors such as real estate costs, superdikes and land raising applications, and regulatory requirements. Staff will be able to further refine these cost estimates as the program develops and more projects are completed.

The required annual revenue for the Drainage and Diking Utility will vary based on the implementation period of the dike upgrades. Staff have prepared three options to compare the high-level costs associated with accelerating dike upgrades in the City. Staff recommend Option 1 – 50-Year Implementation Period to best position the City financially, while improving the City’s diking infrastructure well in advance of the current anticipated climate change impacts.

Table 1: Options for an Accelerated Flood Protection Program

Implementation Period	75 Years (current)	Option 1 50 Years (recommended)	Option 2 40 Years	Option 3 30 Years
Target Annual Revenue Required	\$23 million	\$30 million	\$37 million	\$49 million

In order to achieve Option 1 – 50 Year Implementation Period, the total annual revenue for the Drainage and Diking Utility would need to increase from \$13.4 million in 2021 to a minimum of \$30 million by 2031.

Additional funding beyond these targets will be required for habitat compensation costs. This has not been included in the target annual funding calculations at this point due to the site-specific requirements and on-going staff investigation into habitat compensation opportunities. As the scope of habitat compensation becomes better defined, the target funding will be adjusted accordingly as part of the Ageing Utility and Road Infrastructure planning process. Actual increases for each year will be assessed as part of the annual utility budget and rates process, including adjustments for inflation and cost escalation.

\$30 million in annual revenue by 2031 for the Drainage and Diking Utility would be considerably less than the water and sanitary utility revenues anticipated for the same period, which are estimated to be \$56 million and \$55 million respectively, based on historical Metro Vancouver rate increases and the City's operational requirements.

Staff recommend that \$30 million be endorsed as an annual revenue objective for the Drainage and Diking Utility in order to achieve the accelerated 50-year implementation timeline. The Flood Protection System fee would be increased through the annual budget and rates process until the revenue objective is met in 2031. Staff would continue to monitor the rate of sea level rise and report back to Council with any recommended adjustments to further accelerate the flood protection program as required.

#### Drainage and Diking Utility - Flood Protection Rate Structure

In 2003, Council adopted an initial flat rate of \$10 per property for flood protection. This fee has increased by \$10 per year from 2004 to 2015. Since 2016, new rate classes have progressively been introduced to provide greater equity between ratepayers and reflect the different levels of demand that properties place on the City's drainage and diking systems.

Staff have analyzed options to further progress with increasing equity in the Flood Protection System fee for future years, and recommend that the rate structure be expanded to include additional rate classes. The proposed structure accounts for the fact that all residents benefit from flood protection, including the protection of shared community assets and infrastructure, while recognizing that the large variation in parcel size and assessed value also needs to be considered. The updated fee structure normalizes the fees between rate classes, is consistent with drainage system demands, and better aligns rates with assessed property values. Groups with higher value assets will be contributing more towards flood protection.

Creating additional rate classes based on parcel size will improve equity between ratepayers, particularly in the Industrial, Commercial, and Institutional (ICI) categories. Staff propose that ICI properties with larger parcel areas pay higher rates than single-family, multi-family, and agricultural properties. The proposed rate structure update provides better alignment with assessed property values when compared with fees based solely on parcel area. Properties like shopping malls or industrial sites contribute a larger demand on the City's drainage system and receive greater benefits due to their higher property values. The additional granularity between the ICI rate classes results in higher fees for large operations while small ICI properties will see smaller increases.

Agricultural properties are currently included in the single-family residential rate class. Due to the complex mix of agricultural parcel sizes and land use, further refinement of this rate class is not proposed at this time, but may be considered in the future.

Table 2 shows a conceptual breakdown of the proposed fee structure and rate classes. The Average Annual Rate Increase column shows the approximate average increases for each rate class over 10 years to achieve the required funding level. Target rates and average increases presented are conceptual and are

shown for comparison only. Options for rate increases will be developed and presented for Council's consideration each year as part of the budget and rates process.

Table 2: Recommended Parcel Area Rate Structure and Rate Classes

Proposed Rate Classes <sup>1</sup>	Current Rates (2021)	Option 1 – 50 Year (Recommended)		Option 2 – 40 Year		Option 3 – 30 Year	
		Average Annual Rate Increase	Rates at Target Funding (2031)	Average Annual Rate Increase	Rates at Target Funding (2031)	Average Annual Rate Increase	Rates at Target Funding (2031)
Multi-family Residential	\$145.31	6.0%	\$260	8.0%	\$314	11.0%	\$413
Single-family Residential and Agricultural	\$154.55	12.0%	\$480	14.0%	\$573	17.0%	\$743
Small or Stratified ICI (less than 800m2)	\$154.55	12.0%	\$480	14.0%	\$573	17.0%	\$743
<b>ICI (between 800m2 and 2000m2)</b>	\$488.60	2.0%	\$596	2.5%	\$625	6.0%	\$875
<b>ICI (between 2000m2 and 10,000m2)</b>	\$488.60	12.0%	\$1,518	15.0%	\$1,977	17.0%	\$2,349
<b>ICI (between 10,000m2 and 20,000m2)</b>	\$977.18	12.0%	\$3,035	15.0%	\$3,953	17.0%	\$4,697
<b>ICI (between 20,000m2 and 50,000m2)</b>	\$977.18	15.0%	\$3,953	20.0%	\$6,050	22.5%	\$7,436
<b>ICI (between 50,000m2 and 100,000m2)</b>	\$977.18	20.0%	\$6,050	22.5%	\$7,436	25.0%	\$9,101
<b>ICI (between 100,000m2 and 500,000m2)</b>	\$977.18	22.5%	\$7,436	25.0%	\$9,101	30.0%	\$13,471
<b>ICI (greater than 500,000m2)</b>	\$977.18	25.0%	\$9,101	30.0%	\$13,471	35.0%	\$19,648

<sup>1</sup>Bolded rate classes are proposed to add greater definition and equity between ratepayers

## Next Steps

### *2022 Utility Budget and Rates Planning*

Should Council endorse Option 1 – 50 Year Implementation Period for dike upgrades, staff will prepare the 2022 utility budget and rates accordingly, including the budgeted expenditures for additional staffing, maintenance of the flood protection works, and operational resources for Council's consideration as part of the annual budget process.

In addition to using external contractors and consultants, an estimated five additional regular full-time staff from Engineering, Sustainability, Real Estate Services, and Law would be required to efficiently manage the design, environmental permitting/compensation/monitoring, regulatory permitting, property/legal negotiations and project management for the accelerated program. The proposed positions include two Project Managers for Engineering, an Environmental Coordinator for Sustainability, a Real Estate Negotiator for Real Estate Services, and a Staff Solicitor for Law. Five temporary full-time construction staff members would also be required to enable City forces to complete a portion of the dike upgrades and provide stability against external construction cost escalation. These positions would be fully funded from the Drainage and Diking Utility and are captured within the \$30 million target annual revenue.

### *Continuing Implementation of the Flood Protection Program*

Staff will continue dike upgrades in priority areas according to the City's Dike Master Plan and bring forward accelerated projects as a part of the annual Capital Program for Council consideration. Provincial and international studies on climate change will continue to be monitored and reviewed, and any significant changes will be assessed and incorporated into future iterations of the City's Flood Protection Management Strategy and Dike Master Plan.

Completion of the perimeter dike upgrades will require substantial amounts of material for dike fill. Staff will continue to explore strategies to source materials within Richmond to the greatest extent possible, as this would be efficient and effective for the City from both the cost and sustainability perspective.

### *Senior Government Funding*

Staff will continue to pursue senior government funding opportunities. Additionally, the City would be in a better position to accelerate the flood protection works with a dedicated funding program from senior governments. At the January 27, 2020 Regular Council Meeting, Council endorsed the City's position on regional flood protection management, as outlined in the staff report titled "Regional Flood Protection Management and Governance," dated December 13, 2019, from the Acting Director, Engineering. The City's position includes a request that dedicated flood protection funding be established at the Provincial and Federal level, to be used by Diking Authorities, which include local governments, for flood management projects. Staff have engaged senior government officials with a formal letter requesting dedicated funding for flood protection and will continue to pursue this objective.

### *Environmental Considerations*

Raising the dike also expands the dike footprint. In certain areas of the City, implementing the Flood Protection Management Strategy and the associated dike infrastructure upgrades will have significant impacts to Richmond's aquatic and terrestrial habitats. In many areas, there is limited opportunity to mitigate these impacts on-site due to various factors, such as proximity to private property. Staff are exploring potential options to develop a Richmond-specific approach for mitigating and offsetting those

impacts that best responds to the City's needs and unique context. These options will also maximize the co-benefits to Richmond's broader biodiversity conservation and land management goals, consistent with existing strategies such as the Ecological Management Network Strategy. As the full scope of the environmental mitigation works has yet to be determined, the estimated costs noted in this report for accelerating the diking program do not include the full costs for environmental compensation. Staff will bring forward a separate report that includes a habitat offsetting strategy for mitigating the environmental impacts of diking improvements.

### **Financial Impact**

None at this time. Should Council endorse the recommended accelerated flood protection program and drainage and diking utility rate structure, staff will incorporate these recommendations into future utility budgets and capital plans. Options for implementation will be presented as part of the 2022 Utility Budget and Rates report.

### **Conclusion**

Staff are continuously monitoring regional and global climate change science to inform the City's flood protection program. Acceleration of the City's dike upgrade program would provide additional flood resilience for the City, should the rate of sea level rise increase from current projections. Staff have presented an accelerated flood protection program with a target funding level of \$30 million by 2031 and an updated rate structure to improve equity for ratepayers. Should Council endorse the recommendations, reflective rate options will be presented annually for Council consideration through the utility budgets and rates process.



Jason Ho, P.Eng.  
Manager, Engineering Planning  
(604-244-1281)



Christopher Chan, EIT, PMP  
Project Manager, Engineering Planning  
(604-204-8516)

JH:cc

Att. 1: Examples of ratepayers that fall within each proposed rate class.



<b>Proposed Rate Classes<sup>1</sup></b>	<b>Approximate Number of Accounts</b>	<b>Examples of Property Types</b>
Multi-family Residential	53,200	Apartments and Townhouses
Single-family Residential and Agricultural	28,100 (Single-family) 1,100 (Agricultural)	Single-family and Agricultural properties
Small or Stratified ICI (less than 800m2)	2,100	Small restaurants and retail stores without dedicated parking
<b>ICI (between 800m2 and 2000m2)</b>	140	Restaurants with parking, small grocery stores, and auto repair shops
<b>ICI (between 2000m2 and 10,000m2)</b>	510	Large retail stores, warehouses, and recreation centres
<b>ICI (between 10,000m2 and 20,000m2)</b>	90	Large grocery chains, small shopping centres, and car dealerships
<b>ICI (between 20,000m2 and 50,000m2)</b>	150	Malls, industrial sites, and wholesalers
<b>ICI (between 50,000m2 and 100,000m2)</b>	20	Movie theatres, large industrial sites, and large shopping centres
<b>ICI (between 100,000m2 and 500,000m2)</b>	20	Large commercial and industrial sites
<b>ICI (greater than 500,000m2)</b>	2	Large commercial and industrial sites

<sup>1</sup>Bolded rate classes are proposed to add greater definition and equity between ratepayers