



City of Richmond

Report to Committee

To: Public Works and Transportation Committee **Date:** April 11, 2007
From: Robert Gonzalez, P.Eng. **File:** 10-6060-04-01/2007-Vol
Director, Engineering 01
Re: **Richmond 2006-2031 Flood Protection Management Strategy - Update**

Staff Recommendation

It is recommended that the status update of the Richmond 2006-2031 Flood Protection Management Strategy be received for information.

Robert Gonzalez, P.Eng.
Director, Engineering
(4150)

Att. 1

FOR ORIGINATING DEPARTMENT USE ONLY					
ROUTED TO:	CONCURRENCE		CONCURRENCE OF GENERAL MANAGER		
Emergency Programs	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>	
REVIEWED BY TAG	YES	NO	REVIEWED BY CAO	YES	NO
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Staff Report

Origin

In June 2006, the “Richmond 2006-2031 Flood Protection Management Strategy” report was received by Council. Several significant studies have been concluded since that time.

This report is a status update on the progress of the implementation of the strategies outlined in the June 2006 Report to Committee.

Analysis

The Richmond 2006-2031 Flood Protection Management Strategy report recommended several short, medium, and long term objectives that the City should perform. The tasks were also organized into three (3) categories: Planning, Bylaw Related Actions, and Dikes.

Several of the initiatives identified in the report have been initiated or completed to date. Discussed below are some of the highlights:

- Staff met with the Ministry of Transportation (MoT) in February 2007 to discuss the construction of the mid-island barriers. The MoT confirmed their acceptance in principle to construct the mid-island dike along the Highway 99/Knight Street corridor. This topic is the subject of a separate report.
- The January 2007 Fraser Basin Council (FBC) Study provided updated flood levels along the Fraser River. The flood levels in Richmond are estimated to range from 2.9 m at the West to 3.5 m at the East municipal boundaries. On January 24, 2006, the Ministry of Environment adopted the updated flood profiles, outlined in the FBC report, as the provincial standard for the Fraser River dikes. The report reviewed existing literature on sea level rise; however, the flood profiles and assessments did not include any provision for future sea level rise. The Ministry of Environment, however, is currently completing a study on sea level rise which will help formulate sea dike design standards.
- Flood covenant, including indemnity clauses, requirements for all discretionary development applications have been implemented.
- Initially, staff was proposing to develop an interim flood plain bylaw consistent with FBC Study which was scheduled to be completed in fall 2006. However, the FBC study was not made available until January 2007. Therefore, staff proceeded with preparing a permanent flood plain bylaw to prevent redundancy. Staff will be bringing forward the Flood Plain Designation and Protection Bylaw 8204 for Council adoption in May 2007 which will replace the existing Policy 7000 including the raised dike elevation resulting from the FBC study.

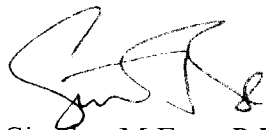
Attached is the table summarizing all the status of the identified tasks in the Flood Protection Management Strategy report.

Financial Impact

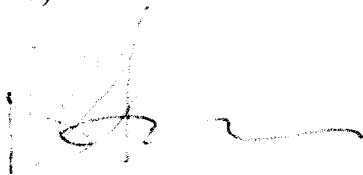
There is no direct financial impact to the City at this time.

Conclusion

The City has implemented several of the objectives outlined in the 2006-2031 Flood Protection Management Strategy. As more information is made available through on-going studies and research, staff will review that the Flood Protection Management Strategy every five (5) years to ensure that the strategy is consistent with the latest data available.



Siu Tse, M.Eng., P.Eng.
Manager, Engineering Planning
(4075)



Helen Chan, P.Eng.
Project Engineer, Engineering Planning
(4656)

ST:hc

Short Term (2006)		Medium Term (2007)		On-going and Longer Term (now – 2021)	
Task	Status	Task	Status	Task	Status
<p>1. Refer the Flood Protection Management Strategy (FPMS) to the Ministry of Environment (MoE) Water Stewardship Division for review and comment (PLANNING)</p> <p>2. Discuss with Ministry of Transportation (MoT) the mid-island barrier along Highway 99/Knight Street corridor (PLANNING; TRANSPORTATION; ENGINEERING)</p>	<p>Complete - MOE response received and is now being reviewed by staff along with comments from other agencies.</p> <p>Complete - The Provincial MOE has confirmed this infrastructure to be critical towards flood protection. A meeting with the MOT was held in February 2007 at which time they confirmed their acceptance in principle to construct a Mid-Island Dike along the subject alignment.</p>	<p>1. Work with the MoT on a plan for the development of the Highway 99/Knight Street mid-island barrier (may require a Multiple Account Evaluation of interior barrier options - study cost estimate - \$100,000) (ENGINEERING)</p> <p>2. Improve the City's ability to get data and undertake direct measurements (e.g., monitoring local sea level changes through City operated gauging stations) (ENGINEERING; PUBLIC WORKS)</p>	<p>A meeting has been held with MOT and a written response has been received which endorses the City's pursuit of this option</p> <p>Complete - Staff have met and measurements are ongoing.</p>	<p>1. Prepare a plan to support increased density adjacent to dikes but require grade increases and contributions to dike improvements. Retain dike rights of ways and access (PLANNING)</p> <p>2. Remove and relocate or replace toe ditches adjacent to dikes (ENGINEERING)</p>	<p>Ongoing</p> <p>Opportunities as they present themselves through development, maintenance, capital, etc., are considered on an ongoing basis, i.e., Edgewater Estates West Dike ditch infill possibility as an example. There is no active capital ditch infilling program.</p>
<p>3. Consultation with Provincial and Federal Governments to determine direction for increased perimeter dike standards (ENGINEERING)</p>	<p>Complete - Inspector of Dikes (MoE) has adopted the study results as the provincial standard for the Fraser River dikes as per letter issued January 24, 2006.</p>	<p>3. Direct staff to prepare an updated Flood Response Plan as part of the overall Emergency Response Plan (updated on basis of new modeling and technical information) (ENGINEERING; EMERGENCY PROGRAMS)</p>	<p>Emergency Response Plan adopted by Council.</p>	<p>3. Co-ordinate between emergency facilities and development planning (e.g., ensure refuge areas are located in areas not subject to flooding) (ENGINEERING; EMERGENCY PROGRAMS; PLANNING)</p>	<p>Discussions underway</p>
<p>4. Review the upcoming Fraser Basin Council study to determine the implications for setting a new perimeter dike standard (ENGINEERING; PUBLIC WORKS)</p>	<p>Complete</p>	<p>4. Establish a protocol for obtaining dike rights of way for Mitchell Island (ENGINEERING)</p>	<p>Underway - City to establish the protocol.</p>	<p>4. Review plans and implement for refuge areas, emergency routes, and create public awareness (ENGINEERING; EMERGENCY PROGRAMS)</p>	<p>Ongoing</p>
<p>5. Examine and pursue senior government cost sharing to implement the FPMS (ENGINEERING; PUBLIC WORKS; FINANCE)</p>	<p>Complete - dialogue and funding request is regularly done.</p>	<p>5. Work with VIAA to clarify jurisdiction, maintenance standards and improvement programs for the Sea Island dikes (ENGINEERING)</p>	<p>Verbal discussions with provincial staff</p>	<p>5. Direct staff to review the FPMS approximately every 5 years (to ensure new information is reflected) (ALL)</p>	<p>Engineering will review the FCL's every 5 years.</p>
<p>6. Review the City's Development Cost Charge Bylaw and Drainage & Dike Utility to determine municipal funding sources for the mid-island barrier and perimeter dike upgrading (ENGINEERING; PUBLIC WORKS; FINANCE)</p>	<p>Ongoing</p>	<p>6. Encourage the City of New Westminster to harmonize their flood protection levels with Richmond's strategy (ENGINEERING)</p>	<p>Discussions underway</p>	<p>6. Consult at timely intervals with experts (MoE, Canadian Hydrographic Service, etc.) and monitor the latest long-range ocean/climate change forecasts for their implications (ENGINEERING)</p>	<p>Ongoing</p>

	Short Term (2006)	Medium Term (2007)	On-going and Longer Term (now - 2021)	Status
	<p>Task</p> <p>7. Collaborate between Engineering and Planning to develop a phased plan for overall land grade increases (ENGINEERING; PLANNING)</p> <p>8. Pursue and plan for appropriate grade changes in local area plans (e.g. City Centre Area Plan update) (PLANNING)</p>	<p>Task</p> <p>7. Work with Department of Fisheries and Oceans on a plan for widening the perimeter dikes – inside and outside existing dikes, addressing related mitigation and compensation requirements (ENGINEERING)</p> <p>8. Work with external agencies (such as the Agricultural Land Commission) to develop a protocol that will allow for these changes in use through rezoning, development permits, etc. (PLANNING)</p>	<p>Task</p> <p>7. Based on better understanding of flood problem and threats (risks) develop on-going public evacuation and communication programs (ENGINEERING; EMERGENCY PROGRAMS)</p>	<p>Status</p> <p>Discussions underway - Strategy to be developed</p> <p>Discussions underway</p>
<p>2. Bylaw Related Actions</p>	<p>1. Prepare an interim floodplain bylaw (Estimated cost - \$10,000 for legal input) (PLANNING; ENGINEERING; LAW)</p> <p>Some of the items the Interim Floodplain Bylaw would consider are:</p> <ul style="list-style-type: none"> - Flood Construction Levels (FCL's) for the urban exempt area; - FCL's for all habitable residential space; - Require developments over 1 ha to raise grades to new FCLs (e.g., 2.6 m in urban exempt area), with provision for lower grades where lower edge conditions; - Incrementally raise the grade of smaller developments to over the crown of the road or the existing grade – whichever is greater; - Wet proofing for development below the FCL's; - Exemptions for commercial development but still seek modest grade increases over the crown of the road or the existing grade – whichever is greater <p>2. Public consultation regarding Interim Flood Plain Bylaw (PLANNING)</p> <p>3. Rescind Floodplain Management Implementation Strategy Policy 7000 (PLANNING)</p>	<p>1. Carry out additional computer modeling upon the selection of an interior barrier to gain an understanding of resultant flood levels with the proposed interior barrier in place, as this will influence the selection of the FCLs (Modeling cost estimate - \$60,000, using 4 breach scenarios) (ENGINEERING; PLANNING).</p> <p>Funds to be used for legal input on developing a full Flood Plain Bylaw.</p>	<p>1. Ensure issues of flood protection, grade levels, as well as refuge areas are considered in the development of local area plans (PLANNING; ENGINEERING; EMERGENCY PROGRAMS)</p>	<p>To be addressed as part of project scope identified in mid-island dyke RTC.</p> <p>N/A - flood levels established using Fraser Basin Council (FBC) study completed in December 2006.</p> <p>Near completion. Flood Plain Bylaw 8204 forthcoming.</p>
		<p>2. Undertake floodplain mapping to establish flood levels, and agree upon reasonable FCL's (Flood mapping cost estimate - \$100,000) (ENGINEERING; PLANNING)</p> <p>3. Prepare a floodplain bylaw including the new FCLs and the requirement for covenants/ indemnity (Estimated cost - \$7,500 for legal input) (ENGINEERING; PLANNING; LAW)</p>		



Flood Protection Management Implementation Program

		Short Term (2006)	Medium Term (2007)	On-going and Longer Term (now - 2021)	Status
	Task	Task	Task	Task	Status
3. Dikes	1. Establish protocol for obtaining dike rights of way for Mitchell Island (ENGINEERING, LAW).	1. Seek direction from Province on new acceptable probability criteria that will address sea level rise and climate related extremes for the next 100 years (Current city standard is 1:200 for sea level event, and the 1894 discharge of the Fraser River plus freeboard as per provincial standards, versus 1:1250 recommended by UMA) (Potential additional sea level subsidence study cost estimate - \$5,000) (ENGINEERING);	FBC study recommended re-assessing the simulations to include climate change and basin forest cover. MoE is currently completing a preliminary study on impacts of climate change on sea level; however, sea dike standards will not be available for 2-3 years.	1. Review dike maintenance programs at ongoing 3 to 5 year intervals (ENGINEERING; PUBLIC WORKS)	This is completed on an ongoing basis.
		2. Prepare and implement a comprehensive perimeter dike improvement program (researching, strengthening and widening dikes to reduce the level of risk) (ENGINEERING)	The perimeter dike improvement program is ongoing with specific 2007 designs being between No. 4 and No. 5 Roads, the SE corner (an approximate 2 km length) and a 2 km length on the North Dyke between approximately Hollybridge and Cambie.	2. Support sustainable funding for a river dredging program to maintain river profile (ENGINEERING)	Dredging of the Fraser River downstream of the Alex Fraser Bridge has very little impact on flood prevention according to the FBC report finalized in December 2006. Staff will not pursue this program from a flood prevention viewpoint.
		3. Establish a program for phasing/prioritizing perimeter dike improvement (e.g., seismically weak areas first, the mid island barrier, overall perimeter dike improvements) (ENGINEERING)	Complete - A program is in place for perimeter dykes based upon assessment of survey results, operational observations and seismic assessment documents.	3. Establish in City budget annual amount for land for access rights to waterfront and dike areas (ALL)	Discussions underway
				4. Establish and maintain inventory of rights of way and access agreements to diking system (ENGINEERING)	Tracking commenced-ongoing
				5. Establish a protocol for dike restoration (e.g., procedural response plan by the City) (ENGINEERING, EMERGENCY PROGRAMS)	The first meeting to document the existing protocol was held between Emergency Programs and Engineering on March 20, 2007
				6. Update existing procedural policy of comprehensive dike maintenance (ENGINEERING ; PUBLIC WORKS)	Review of procedure underway.

Short Term (2006)		Medium Term (2007)		On-going and Longer Term (now - 2021)	
Task	Status	Task	Status	Task	Status
				7. Pursue development of the Highway 99/ Knight Street corridor as an internal barrier and as a secondary flood defence mechanism (Construction cost estimate - \$16 million) (ENGINEERING)	The Provincial MOE has confirmed this infrastructure to be critical towards flood protection. A meeting with the MOT was held in February 2007 at which time they confirmed their acceptance in principle to construct a Mid-Island Dike along the subject alignment.

Notes:

1. Changes to perimeter dike standards are to await other flood studies.
2. Other Strategy Implementation Program elements proceed now.
3. Departmental responsibilities and time reflect suggestions made by City of Richmond staff.
4. Detailed Implementation will be determined annually.