SURREY
CITY OF PARKS

Corporate Report

NO: R005

COUNCIL DATE: January 19, 2009

REGULAR COUNCIL

TO:	**Mayor & Council**	DATE:	**January 15, 2009**
FROM:	**General Manager, Engineering**	FILE:	**5650-20 (Flood Control)** **5225-60** **5225-40(MBDD)** **5225-40(CDD)**

SUBJECT: **City Flood Protection/Dyke Initiatives and Related Funding Needs**

RECOMMENDATIONS

The Engineering Department recommends that Council:

1. Receive this report as information;

2. Request that the Mayor forward a letter to the Minister of Public Safety and Solicitor General that includes a copy of this report and the related Council resolution and which requests that the Flood Protection Program provide funding assistance in the amount of $7.75 million in each of the next 5 years to assist the City of Surrey to construct dyke and flood protection initiatives in various areas of the City.

INTENT

The purpose of this report is to provide information on the status of dyke-related initiatives along the Fraser River, Mud Bay, Crescent Beach, the Serpentine River and the Nicomekl River and to seek Council approval for a course of action to encourage the Province to assist with funding important dyke upgrades in Surrey.

BACKGROUND

In 2005, the Fraser Basin Council generated an up-to-date design flood profile for the lower Fraser River based on the following two scenarios:

- The 1894 Fraser River Freshet flood combined with spring high tide conditions (Fraser Freshet Profile); and

- The 1-in-200-year winter storm surge flood with winter high tide conditions combined with a Fraser River winter flow (the Winter Storm Surge profile).

From this modeling exercise, it became evident that the City's dyke protection along the Fraser River did not meet new Provincial standards. In response to this modeling exercise and the 2007 freshet forecast, the City raised existing dykes where possible and constructed temporary dykes. The Provincial Flood Protection Assistance Fund contributed approximately $1.0 million towards the upgrading of a portion of the permanent dykes along the Fraser River.

In 1997, the City embarked on an ambitious program to address lowland flooding in the Serpentine and Nicomekl floodplains. These floodplain areas are not impacted by Fraser River levels but influenced by precipitation and tides. The City has been actively planning, designing and constructing dykes, pump stations, and conveyance improvements within the agricultural lowlands of the Serpentine and Nicomekl Rivers. The full program is scheduled for completion by the end of 2011.

The dykes along Mud Bay are impacted by high tide storm surge events, wind, and wave action within Mud Bay and have had minor upgrades over the past five years. A full review of the Mud Bay dykes was completed in the last year.

Similarly, the Crescent Beach dykes are designed for winter storm surge events caused by high tides and significant wind and wave action. These dykes were upgraded in 2000 and 2001 after significant storm damage had occurred. Only minor dyke maintenance works have occurred since these upgrades.

DISCUSSION

Federal and Provincial Funding

In 2007, the Province announced a $100 million Flood Protection Program (FPP) to improve flood protection throughout B.C. and requested the Federal Government to match this funding. In 2008, the Federal Government, through the Build Canada fund, committed $60 million to the existing Provincial Flood Protection Program (FPP). Since its inception, $30 million has been allocated throughout the Province, of which Surrey has received nothing. The remaining $130 million will be allocated on a 2/3 FPP and 1/3 Local Government cost share basis over the next 8 years.

Fraser River

Over the past ten years, the City has invested over $8.4 million in dyke and flood protection works along the Fraser River, of which the City received a total of $1.3 million from the Province in 2003 and in early 2007 (before the FPP).

In 2007, with assistance from the Province's Flood Protection Assistance Fund, several sections of the existing earth dykes were upgraded. The City also installed temporary dykes in areas where permanent structures were deficient and there was insufficient time prior to the 2007 freshet to rebuild the permanent dyke higher. The City has just

completed a comprehensive dyke and pump station upgrade servicing plan for the Bridgeview and South Westminster areas that recommends construction of two new pump stations, reconstruction or new construction of 6.3 km of earth dykes and new construction of 1.6 km of concrete floodwalls along the Fraser River. It is estimated that these works will cost $34.3 million to complete. The implementation of this plan will assist in securing the Bridgeview and South Westminster areas from flood damage due to Fraser River flows. However, due to the magnitude of the costs, the City will not be able to complete the works for many years and, as such, is seeking funding assistance from the Provincial and Federal Governments through the joint FPP.

Serpentine & Nicomekl Rivers

Dyke construction along the Serpentine River is nearing completion as part of the City's Strategic Plan for Lowlands Flood Control. Minor dyke improvements along the Lower Serpentine River remain to be completed. Along the Central Serpentine River, the raising of the dykes will be substantially completed in 2009, with only minor works required in 2010. The dykes upstream of the Fraser Highway are complete. The existing Fraser Highway Bridge due to its low elevation is a system constraint but this bridge is currently being replaced and will be completed to the full dyke elevation during 2009.

Dyke construction along the Nicomekl River, as part of the Strategic Plan for Lowlands Flood Control, commenced in 2005. Since that time, most of the dyke improvements along the Lower Nicomekl River have been completed. The City initiated dyke construction along the Central Nicomekl in 2008 and is targeting completion of all dyke improvements along the Nicomekl River by the end of 2011.

The City has not received any Provincial or Federal funding for the flood control works on either of the Serpentine or Nicomekl Rivers. The City has invested $27 million to date in implementing the Serpentine / Nicomekl Lowlands Flood Control Plan and will need to invest another $10.7 million to complete the full Plan.

Crescent Beach

In 2000, the City received $500,000 from the Provincial Government towards the upgrading of the Crescent Beach sea dykes. In addition to the Provincial funding, the City invested over $1.7 million in dyking and shore protection works at Crescent Beach and in the Nico Wynd area over the past ten years.

The Crescent Beach dykes were upgraded in 2000 following comprehensive assessments of storm surge events that occurred in Boundary Bay. The dyke upgrades and subsequent modifications to additional areas of the shoreline have served to protect the community of Crescent Beach from storm surges. More recently, community concerns have been raised regarding groundwater and flooding issues that have occurred during high tide events.

Staff are conducting a comprehensive drainage assessment for the area and investigating the effects of land subsidence, sea level rise, groundwater conditions and rainfall events on the existing lots within the floodplain area of Crescent Beach. Early findings show significant correlation between groundwater levels in the area and tide cycles. It will be

challenging to develop measures to prevent flooding of the properties in Crescent Beach related to the tidal effects on the groundwater table. The full assessment is expected to be completed in the next few months after which staff will provide a further report to Council on the matter.

Mud Bay (Mud Bay and Colebrook Dyking Districts)

The Mud Bay and Colebrook Dyking Districts are responsible for maintaining the majority of dykes downstream of the Nicomekl River and Serpentine River sea dams. In cooperation with these Districts, the City has completed several improvement projects through the Provincial Flood Protection Assistance Fund over the last few years.

The Mud Bay Dyking District and the Colebrook Dyking District have also received approximately $300,000 through the Provincial Flood Protection Assistance Fund for works in their areas over the past five years.

Given recent concerns relating to climate change, and land subsidence, the City is completing a review and upgrading plan for these dykes that will identify any necessary improvements over the short, medium, and long term. The preliminary results indicate that works are required immediately along the Nicomekl River within the Mud Bay Dyking District. In the medium to long term, the elevation of the dykes within both Districts will need to be increased to meet current standards and to address global factors such as increases in the sea level resulting from climate change.

Dyke Protection Expenditures and Funding

The costs incurred by the City to date, and the cost to complete the ultimate dyke protection works, excluding the Crescent Beach works (for which there is no estimate at this time), are estimated as follows:

Dyke Location	Cost to date	Estimate to completion	Total investment required
Fraser River	$ 7,100,000	$34,286,000	$41,386,000
Serpentine & Nicomekl River	$27,700,000	$10,700,000	$38,400,000
Mud Bay – Mud Bay Dyking District Short Term (1-5 years) Medium Term (5-10 years)	$ 300,000	 $ 1,342,285 $ 7,031,640	 $ 1,642,285 $ 7,031,640
Mud Bay – Colebrook Dyking District Medium Term	$ 100,000	$ 4,287,360	$ 4,387,360
TOTAL	**$35,200,000**	**$57,647,285**	**$92,847,285**

Provincial Funding

The Federal-Provincial Flood Protection Program granted $16.2 million for flood protection in 2008 to other municipalities and dyking districts. The City, in conjunction with Mud Bay Dyking District and the Colebrook Dyking District, submitted funding requests as follows:

2008 APPLICATIONS FOR FUNDING		
City of Surrey – Fraser River Dyke Works	$34,286,000	(over 4 years)
Mud Bay Dyking District – Short Term Works	$ 1,342,285	
Mud Bay Dyking District – Medium Term Works	$ 7,031,640	(over 4 years)
Colebrook Dyking District – Medium Term Works	$ 4,287,360	(over 4 years)
TOTAL	**$46,947,285**	

Unfortunately, neither the City, the Mud Bay Dyking District nor the Colebrook Dyking District were successful in the funding requests. The City of Pitt Meadows was the only local government in Metro Vancouver that received funding ($1,027,200). Within the Fraser Valley Regional District, the City of Chilliwack ($230,000), the District of Mission ($633,100), and the District of Kent ($870,000) were the only local governments to receive funding. The majority of the funding was allocated to communities in Central British Columbia and the Interior along the Fraser River, Thompson River, Skeena River, and Nechako River. This could have been a reaction to the floods experienced last year in those areas of the Province. Staff holds the view that the distribution of grants has not been fully balanced and that funding should be allocated on a cost/benefit ratio or population served basis since the Province is responsible for disaster relief and flooding can cause major losses.

Schedule to Complete Upgrades

Without significant funding assistance, the City is will not be in a position in the next 5 years to proceed with significant implementation of any dyke projects except for the remaining works associated completing the Serpentine/Nicomekl Strategic Lowland Flood Control Plan, which are included in the 2009-2013 5-year Financial Plan. Council endorsed this Plan in 1999.

Fraser River

Components of dyke reconstruction along the Fraser River are going to be incorporated into the next 10-Year Servicing Plan; however, the City will be unable to fund a majority of the recommended works over the next ten years from existing revenue sources. At the present time, only one-third of the necessary funding is available in the City's 10 Year Servicing Plan. This amount would be sufficient to complete the works if they were to be funded on a "1/3 City – 2/3 Federal/Provincial Flood Protection Program" basis. It is noted that the proposed dyke works along the Fraser River will protect regionally, provincially and nationally significant infrastructure, such as Port Metro Vancouver in Surrey, Highways, CN Rail, etc., and as such cost sharing the improvements between the three levels of government would be rational.

Mud Bay and Colebrook Dyking Districts

Staff is working with the Mud Bay and Colebrook Dyking Districts to finalize their short, medium, and long term needs. Once the work program is developed, staff will be work with each Dyking District to develop a cost sharing agreement in relation to implementing the works. As a cost sharing agreement has not been developed, such works have not been included in the draft of the updated 10-Year Servicing Plan; however, once a cost sharing agreement has been established, the City will seek to incorporate these works into the 10 Year Servicing Plan. Although the exact extent of the City's financial contribution has yet to be determined, it is estimated that at current funding allocations, the City would need 15 to 20-years to complete all of the required works in the Mud Bay and Colebrook areas. It is clearly important that funding assistance be obtained from the Provincial and Federal governments to expedite the completion of the needed works.

Crescent Beach

The draft of the new 10 Year Servicing Plan allocates only a part of the funding that is required to provide flood protection to the Crescent Beach community. The dykes around Crescent Beach do not require adjustment but works are required in the area to address groundwater flooding issues and potential flooding from significant rainfall events, both of which are being exacerbated due to local climate change effects.

When combined with other drainage and dyke needs in Surrey, the overall projects could take more than 20 years to complete. The strategy for this area includes raising the land over time, as redevelopment occurs to improve flood protection and better manage local area groundwater conditions. Staff is currently working on various servicing scenarios with for review with local residents. A further report on this matter will be forwarded to Council in the next few months.

Overall Comments on Funding:

Current scenarios are based on construction being completed with funding being provided by the Drainage Utility and grants from other levels of government. The infrastructure in the City's floodplains has regional, provincial and national significance including railways, transportation corridors and ports, which would be seriously affected if major flooding was to occur. Given the significance of the infrastructure and the Provincial exposure related to funding disaster relief, it would be reasonable for the Province and the Federal government to partner in the upgrading programs described in this report in a timely manner. The total amount necessary to complete the flood protection works described in this report in 2009 dollars is $57 million. It would be reasonable to plan to complete the works over the next 5 years. To accomplish this, the City would need a grant from the Flood Protection Program or other funding source in the amount of $7.6 million per year for a total of $38 million over the 5-year period. The City will be able to provide or raise the remaining $19 million.

Comments on Recent Flooding Associated with Heavy Rainfall and Snowmelt in January

From the beginning of December 2008 to January 3, 2009, the City received approximately 110 cm (42 inches) of snow. In early January, a warming trend occurred, which brought with it a significant amount of rainfall. Between January 4 and 11, 2009 a total 170mm of rain was recorded at City Hall. The combination of snowmelt and rainfall runoff caused significant flooding throughout the lower mainland and Fraser Valley including Surrey. Flooding occurred within each of the Serpentine River and Nicomekl River floodplains.

The high water levels in the Serpentine River resulted in the controlled spilling of floodwaters through temporary spillways to the Fry's Corner and Fleetwood areas, which resulted in the closure of 80 Avenue between 176 Street and Harvie Road, and the closure of Harvie Road between 80 Avenue and the Fraser Highway.

The high water levels in the Nicomekl River resulted in minor overtopping of a dyke on the north side of the River immediately east of Highway No. 15 (176 Street). In response to this overtopping, the Surrey Dyking District completed a temporary repair, which was reinforced by City crews. The section of dyke where the overtopping occurred is scheduled to be raised over the next two years as part of the City's Flood Control Plan for the Nicomekl River floodplain.

The floodwaters have since receded in both lowland areas with minimal damage or loss.

CONCLUSION

Based on the discussion in this report, to complete all of the identified dyke and flood control projects in a reasonable time frame, the City will need assistance from the Flood Protection Program or other sources. It is recommended that Council request that the Mayor forward a letter to the Minister of Public Safety and Solicitor General that includes a copy of this report and the related Council resolution and which requests that the Flood Protection Program provide funding assistance in the amount of $7.75 million in each of the next 5 years to assist the City of Surrey to construct dyke and flood protection initiatives in various areas of the City as identified in this report. Subject to Council adoption of that recommendation, staff intends to arrange appropriate meetings with the Ministry of Public Safety & Solicitor General, to discuss Surrey's flood management plans and need for funding assistance.

Vincent Lalonde, P.Eng.
General Manager, Engineering

VL/KDZ/CAB/JA:brb:kd

g:\wp-docs\2009\administration\cr\01121056cab.doc
AMR 7/14/10 11:17 AM