

NO: R168

COUNCIL DATE: July 23, 2018

REGULAR COUNCIL

TO: Mayor & Council **DATE: July 19, 2018**

FROM: General Manager, Engineering **FILE: 1855-03**
General Manager Parks, Recreation & Culture **XC: 4816-706**

SUBJECT: Expression of Interest and Application to Infrastructure
Canada's Disaster Mitigation and Adaptation Fund

RECOMMENDATION

The Engineering Department and the Parks, Recreation & Culture Department recommend that Council:

1. Approve the core projects proposed for the City's expression of interest and application to Infrastructure Canada's Disaster Mitigation and Adaptation Fund; and
2. Direct staff to develop sustainable procurement guidelines that align with the Federal Community Employment Benefits requirements and bring these forward for Council's consideration in 2019.

INTENT

The purpose of this report is to obtain Council's support for the projects proposed for inclusion in the City's expression of interest to Infrastructure Canada's Disaster Mitigation and Adaptation Fund ("DMAF") and to authorize staff to develop a draft sustainable procurement guidelines for Council's consideration at a later date.

BACKGROUND

Infrastructure Canada, in May 2018, launched the \$2 billion DMAF in an effort to support natural hazard mitigation and climate change adaptation across the country. The funding program seeks to reduce disaster risk that is deemed of national significance with a minimum application value of \$20M. Federal funding in the amount of 25% to 100% of eligible costs is possible depending on the ownership of the assets included in the application. Successful applications must address one or more of the following:

- Reduce impacts on critical infrastructure including interruptions in essential services;
- Reduce the amount of critical infrastructure that is at risk;
- Reduce impacts on health and safety of Canadians;
- Reduce significant disruptions in economic activity;
- Reduce costs of recovery and replacement; and
- Reduce impact on Canada's vulnerable regions (Indigenous, northern, coastal, and remote communities).

To qualify for this program, interested communities must submit an expression of interest by July 31, 2018. Infrastructure Canada will then evaluate each submission and invite selected communities to submit a more detailed application in the fall of 2018. The more detailed application will be merit based and evaluated using the following criteria:

- Assessment of the hazard risk;
- Extent to which the project strengthens resilience;
- Return on investment;
- Project rationale;
- Promote the use of innovation;
- Project risk transfer management measures;
- Alignment with relevant plans, strategies and frameworks;
- Public and Indigenous engagement;
- Risks associated with project management and implementation; and
- Project benefits.

In addition to the above criteria, two new federal funding requirements are also being implemented as part of the DMAF program these requirements will also apply to other Federal funding opportunities. These requirements include completing a Climate Lens Assessment and developing a Community Employment Benefits plan.

The Climate Lens Assessment has two aspects - the proposed projects must consider both climate mitigation and climate resilience.

The Federal Community Employment Benefits requirement sets out seven segments of the community in which the federal government is seeking to increase employment benefits. Measures are to be taken by the applicant to ensure that at least three of the segments will receive increased employment benefits, including:

- Apprentices;
- Indigenous peoples;
- Women;
- Persons with disabilities;
- Veterans;
- Youth;
- Recent immigrants; and
- Small-sized, medium-sized and social enterprises.

DISCUSSION

The Surrey Coastal Flood Adaptation Strategy (“CFAS”) is well underway and its objectives and approaches align well with the goals and requirements set out in the DMAF program. As such, CFAS has been used as a starting point for identifying projects for inclusion in the City’s DMAF expression of interest.

Based on work completed as part of CFAS to date, input received from DMAF staff and discussions with potential partners, a suite of seven projects has been identified as the core for inclusion in the City’s DMAF expression of interest. The proposed suite of core projects is a comprehensive and spatially related program that will help to reduce key impacts or risks eligible under the DMAF program in Crescent Beach and Mud Bay.

The proposed suite of core projects is as follows:

No.	Project Name	Value
1	Colebrook Dyke Upgrades	\$20M
2	Colebrook Drainage Pump Station Replacement	\$5M
3	Serpentine Sea Dam Replacement	\$18M
4	152 Street Improvements from 36 Avenue to 5000 Block	\$22M
5	Nicomekl Riverfront Park	\$10M
6	Nicomekl River Bridge and Sea Dam replacement	\$30M
7	Crescent Beach Coastal Drainage Improvements	\$11M
Total		\$116M

The proposed suite of core projects are also illustrated on the map attached to this report as Appendix “I”. One page project information sheets for each project are attached to this report as Appendix “II”.

Of the total \$116 Million value of the core projects, approximately \$44M, or 40%, is anticipated to be eligible for DMAF funding.

The proposed projects will replace or renew a number of key infrastructure assets that are near the end of their service life and will provide scope to incorporate additional natural hazard and climate resilience elements to increase their service life. Most of the projects listed are included either in the Parks, Recreation & Culture Strategic Plan (2018–2027) or planned to be included in the next edition of the Engineering Department’s 10-Year Servicing Plan. If the City’s DMAF application is successful, the Federal funding contribution will replace existing financial commitments and enable the City to allocate funding to support other projects.

To further enhance the City’s DMAF expression of interest, staff are also actively engaging with potential partners to include additional projects in the City’s overall application. Some potential partners are able to provide a financial contribution for a portion of the application, while other partners are able to provide a letter of support and in-kind contributions. Where financial partnerships are developed, the City will establish an agreement with each partner organization upon the City receiving a DMAF funding agreement. Discussions are currently ongoing with the following potential partners:

- BC Ministry of Forests Lands and Natural Resource Operations and Rural Development;
- BC Ministry of Transportation and Infrastructure;
- City of Delta;
- City of White Rock;
- Metro Vancouver;
- Port of Vancouver;
- Semiahmoo First Nation;
- South Coast Conservation Land Management Program;
- Southern Railway of British Columbia; and
- Tsawwassen First Nation.

Based on these discussions, a number of additional smaller projects that support the proposed projects and improve coastal flood resilience are being considered for inclusion in the expression of interest. The exact value of the additional projects is under development and is dependent on external partners financial support.

Climate Lens Assessment and Community Employment Benefits Plan

As the proposed projects were developed to adapt to climate change and advance existing City policies, such as the City's Community Climate Action Strategy, it is anticipated that the Climate Lens Assessment will positively impact the City's application. The City will seek to complete this Climate Lens Assessment internally, and in this way, build capacity to apply the analysis to other Federal funding initiatives, such as the Smart Cities Challenge. This work will be supported by the City's Sustainability Office.

While there is strong alignment between the Community Employment Benefits and the Surrey Sustainability Charter 2.0's Desired Outcomes and Strategic Directions related to Inclusion, and Economic Prosperity and Livelihoods, the City does not currently have procurement guidelines or policies that would enhance community employment benefits. As such, it is recommended that sustainable procurement guidelines be developed for Council's consideration in 2019 to provide clarity in the procurement of services that align with Federal government requirements for federally funded projects. These guidelines will build on the sustainability principles in the City's Purchase and Payment Process Manual, and draw from ongoing research on social procurement which is being completed in 2018 and includes consideration of employment opportunities for disadvantaged communities.

SUSTAINABILITY CONSIDERATIONS

Securing funding for implementation elements of the CFAS through the DMAF will strengthen a number of Sustainability Charter 2.0 themes for Infrastructure, Built Environment and Neighbourhoods, Ecosystems, and Public Safety. Specifically, funding commitments will support the following Desired Outcomes ("DO") and Strategic Directions ("SD"):

- Infrastructure DO6: The City anticipates changing weather patterns and sea level rise as a result of climate change, and implements appropriate infrastructure, land use planning and emergency response solutions that will be resilient over the long term;
- Ecosystems DO12: Surrey protects ecosystem services and manages natural assets in order to create resiliency to adapt and thrive in a changing climate; and
- Public Safety DO8: The community's critical infrastructure and systems are designed to withstand climate change impacts and natural events and disasters, and include emergency response and reconstruction plans.
- Inclusion SD7: Increase access to education, training and inclusive employment opportunities for people who face barriers within the community.
- Economic Prosperity and Livelihoods DO1: Diverse and meaningful employment and business opportunities are available close to where people live, and provide incomes that can support a high quality of life.
- Economic Prosperity and Livelihoods SD2: Understand the needs of specific demographics such as newcomers, youth, seniors and people with disabilities, and encourage actions to support their integration into the workforce

CONCLUSION

The DMAF provides a unique opportunity to improve coastal flood resilience over the next 10 years with significant Federal funding. Based on the foregoing discussion the Engineering Department and the Parks, Recreation & Culture Department recommend that Council:

1. Approve the core projects proposed for the City's expression of interest and application to Infrastructure Canada's Disaster Mitigation and Adaptation Fund; and
2. Direct staff to develop sustainable procurement guidelines that align with the Federal Community Employment Benefits requirements and bring these forward for Council's consideration in 2019.

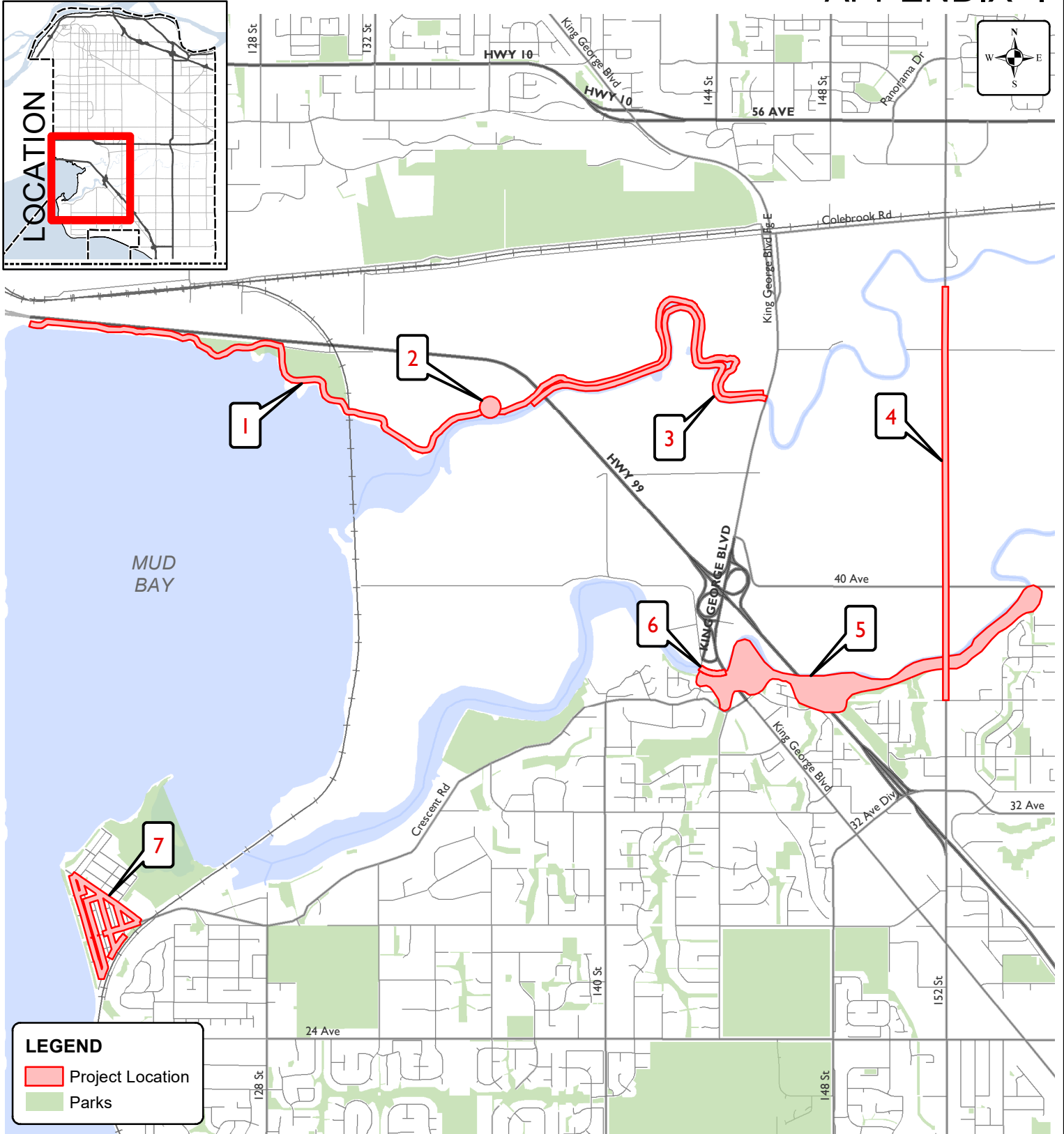
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Appendix "I": Map of Surrey Core Projects for the DMAF

Appendix "II": One Page Project Sheets for Surrey Core Projects for the DMAF



Produced by GIS Section: 11-Jul-2018, P205934

Scale: 1:37,500 0 310 M



Map of Surrey Core Projects for the DMAF

ENGINEERING DEPARTMENT

APPENDIX “II”

One Page Project Sheets for Surrey Core Projects for the DMAF

No. 1

City of Surrey – Colebrook Dyke Upgrades

One third of City of Surrey is within a floodplain and is bordered by the Fraser River to the north and the Salish Sea to the southwest. While regional work in BC is developing a strategy focusing on the Fraser River, Surrey has completed two years of stakeholder engagement in a process to develop the Surrey Coastal Flood Adaptation Strategy (CFAS), part of the Municipalities for Climate Innovation Program. It addresses 20% of the City's land and critical infrastructure of national, regional and local significance that is at risk from sea level rise within Surrey.

Impacts cover the areas depicted as: Colebrook, Mud Bay, Serpentine & Nicomekl, Crescent Beach and Campbell River including Semiahmoo First Nation.

The first phase of Dyke upgrades for the most vulnerable section of Surrey's coast will be shovel ready to commence in 2019. The total value of the proposed Colebrook Dyke upgrades is \$20M.

Challenging soil conditions require construction to be phased over five years, to gradually build a wider dyke up to four metres above the surrounding grade, allowing the foundation to adjust to the additional weight.

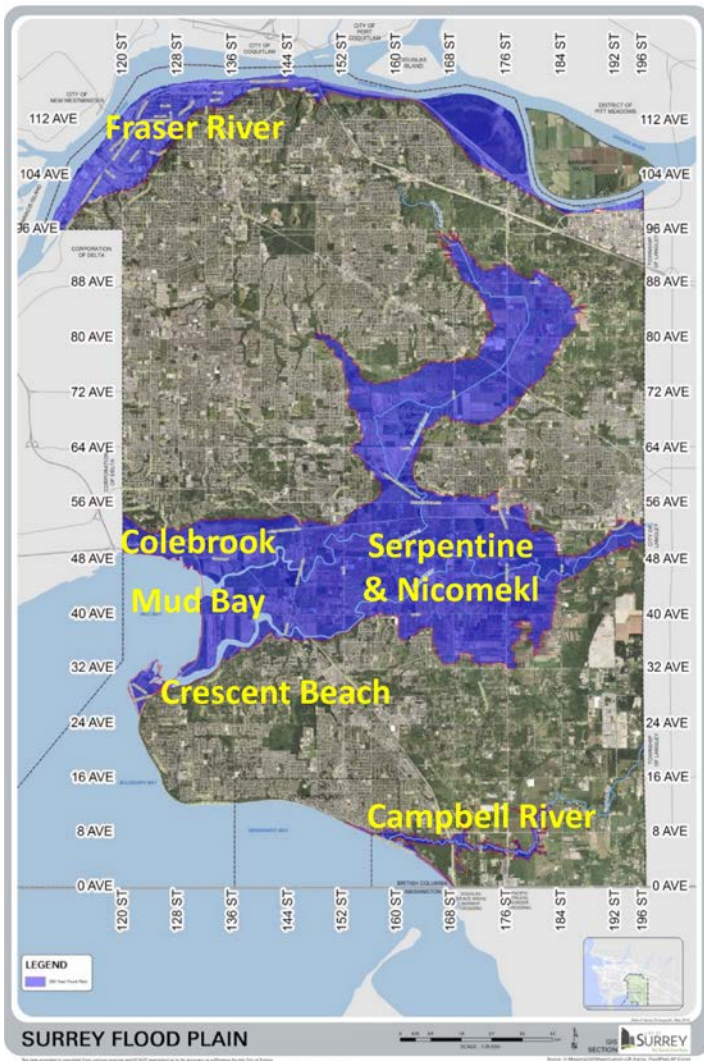
Colebrook Dyke Existing Crest



The Colebrook Dyke protects critical infrastructure of:

- Hwy 99 regional link to Peace Arch Border
- BC Hydro's primary transmission line to U.S.A.
- Regional sewer and watermains

Colebrook Dyke showing Provincial Guidelines for current (lower black line) and future year 2100 elevation (upper black line) targets



No. 2 City of Surrey – Colebrook Drainage Pump Station

The Colebrook Pump Station is located on the north bank of the Serpentine River, west of Highway 99, adjacent to Mud Bay. Its purpose is to mitigate coastal flooding by draining the water from Peacock Brook and connecting ditches into the tidally-influenced Serpentine River during high water levels. The existing station was built in 1990 and has now approached the end of its service life and is in pressing need of replacement.

The existing station is well below current flood construction levels and is vulnerable to flood damage in a significant coastal flood. The new pump station design incorporates aspects of climate change and sea level rise adaptation.

Existing Colebrook Drainage Pump Station



Only two out of three pumps are operational and replacement parts are no longer available. The new station will reinstate full pumping capacity and provide for future climate resilience by leaving room for additional future capacity. The overall design of the pump station accommodates observed and projected changes in the environment such as:

- Regional ground subsidence has resulted in an elevation differential between the agricultural fields and base flow water levels controlled by the pump station. The

new pump station accommodates the existing elevation differential, as well as to provide flexibility to gradually lower the pump settings to accommodate observed ground subsidence over the life of the pump station;

- The current dyke crest elevation at the pump station of 3.2m will not be sufficient to meet the increasing overtopping requirements imposed by future sea level rise. The updated pump station will be compatible with future dyke upgrades (estimated at 4.84 to 5.13m by 2100).

The project budget is \$5 million and is shovel ready. The construction will be phased to commence after the Colebrook Dyke construction is completed. The updated pump station will provide the following community benefits:

- Improved flood protection and drainage and reduced soil salination of agricultural land in Surrey lowlands;
- Proactive climate change adaptation to allow for increased sea levels and precipitation;
- Increased protection of nationally critical infrastructure such as Hwy 99 and Bulk Power Transmission Lines.

Mouth of the Serpentine River with Colebrook Drainage Pump Station (view from south)



No. 3

City of Surrey –Serpentine Sea Dam

Over one hundred years ago, early settlers constructed two dams to reclaim fertile land for agriculture, provide a source of irrigation and provide transportation crossings for the Semiahmoo Trail.

Throughout the hundred year service life of the dams, Surrey's population has increased by 500,000 and significant regional infrastructure has been built behind the dams in low-lying areas.

The Serpentine Sea Dam will be over topped as a result of projected sea level rise from Climate Change and is a significant coastal flood vulnerability. The dam also poses the largest seismic vulnerability to the City's Drainage System. The complexity of rebuilding the dam after an earthquake would take many years and would be devastating for the community. It would damage the local and regional transportation network, impacting over 200,000 daily trips and billions of dollars of goods movement.

Serpentine Sea Dam at high tide with gates closed



Preliminary design of the dam is complete and incorporates climate and seismic resilience with a higher crest elevation, adjustable flood gates to adapt to rising water levels and a robust foundation and dyke tie-in to resist an extreme earthquake. Community consultation on long-term coastal climate change has identified the preferred

locations of the dams. The Class D budget required to replace the dams is \$15M. Discussion is underway with Ministry of Transportation and Infrastructure to integrate with Provincial plans.

Today, the dams support a number of important services to the community including:

- *Flood Control:* Keeps out storm surges and high tides from backing up the rivers and flooding 2,000 Ha upstream lands;
- *Irrigation:* Prevents brackish water from mixing with fresh water, supporting 38 authorized water licenses to extract up to 129.6 million cubic metres per year;
- *Transportation:* Provides water crossing for the King George Greenway and protects upstream bridges;
- *Utility and Energy:* Protects upstream utilities.

Additional community benefits of replacement structures will be:

- Better fish passage to upstream habitat;
- Improved drought management;
- Movement for cyclists and pedestrians.

Serpentine Sea Dam at low tide with gates open





No. 4 City of Surrey – 152 Street Road Improvements

152 Street is a key transportation corridor in the City of Surrey. It is one of only six routes linking the communities in North Surrey with South Surrey/White Rock (114,000 pop). 152 Street supports approximately 21,800 vehicles per day. 152 Street is also part of TransLink's Major Road Network, acting as a key corridor for goods movement, emergency response, and public transit. 5,150 people per day use public transit on 152 Street – over 1.5million people per year. 152 Street also provides direct connections to the corridors for the Canada/U.S. border crossings.

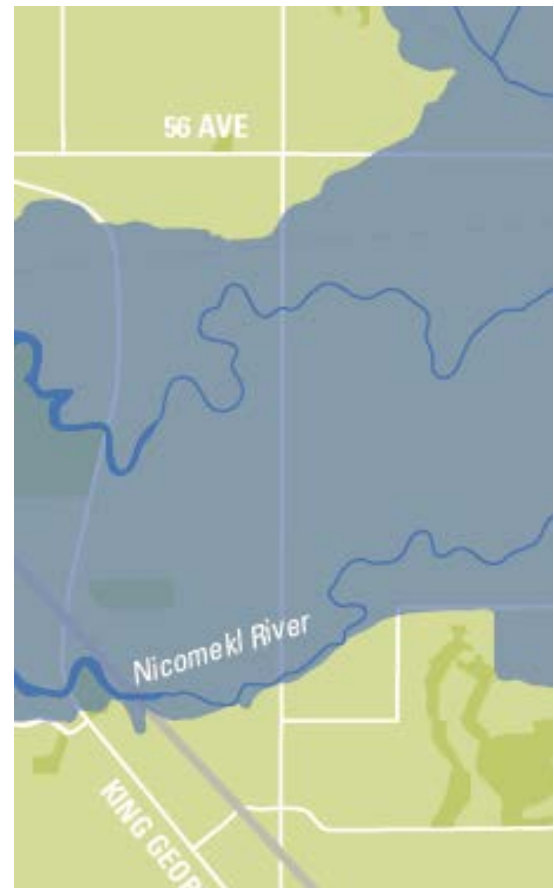
152nd Street is a key corridor for the movement of goods and people



-  Major Road Network
-  Provincial Road

From 40 Avenue and 50 Avenue, 152 Street is 2-lanes, and built at grade in the floodplain of the Nicomekl River, with no facilities for walking or cycling. Studies have demonstrated this section of 152 Street is a high risk for flood hazards.

Excerpt from the Surrey Coastal Flood Adaptation Strategy (CFAS) April 2018 <https://www.surrey.ca/city-services/19888.aspx>



A significant flood along this road alignment would have major economic impacts, restrict the region's ability to respond to emergencies and impact the flow of vehicles and people.

The City has plans to widen and raise 152 Street to meet new standards for flood resilience. 152 Street would be widened to 4-lanes including cycling facilities and turning lanes for farm access. Benefits include:

- 152 Street raised to protect against flood risk
- Addition of multi-modal facilities for cyclists
- Improved road capacity for cars, public transit and goods movement

No. 5

City of Surrey – Nicomekl Riverfront Park

The Nicomekl River is one of three significant river systems in Surrey that are impacted by sea level rise. For the majority of its length, it is bounded on both sides by the Agricultural Land Reserve. Downstream of the crossing at 40th Avenue, the river is bounded on its southern bank primarily by parkland to Mud Bay.



Photo: Coastal portion of Nicomekl River looking upstream

The City has acquired land and the final pieces are currently being secured to provide a continuous 3 km section of parkland along the south side of the River. Parks, Recreation and Culture (PRC) staff have commenced a planning and consultation process to develop the Nicomekl Riverfront Plan which will include concept plans for two larger park sites on either side of King George Boulevard. The approximate park site stretches from the Sea dam at Elgin Road east to 40 Ave. This aligns with the PRC Strategic Plan, which states “parks will play an increasing role in the mitigation of the impacts of climate change”.

In close proximity to coastal waters, the Nicomekl Riverfront Park is an ideal place to employ innovative climate adaptation and mitigation measures and a test site for design related to sea level rise due to climate change.

Possible adaptation and mitigation measures and their community benefits are:

- *Mitigate flooding* by accepting/conveying flood waters through the park using soft drainage features such as ponds, bioswales, riparian buffers, rain gardens and wetlands;
- *Adapting ecosystem* to be flood tolerant through the addition of wetlands;
- *Improve air and water quality* through implementation of unique ecosystems (wetland, bog, meadow and forest) and biological drainage measures (filtration strips and ponds); and
- *Protect and enhance existing habitat and ecosystems* with restoration plantings, habitat islands, and by limiting public access to natural areas.

Climate adaptation and mitigation measures will be multifunctional, layered with social and recreational spaces, environmental connectivity, and public art and heritage elements to offset impacts from sea level rise and coastal flooding. Additionally, the park may serve as a satellite location of the Surrey Nature Centre by delivering educational programs about climate awareness to improve community resilience. The Park will be a place for daily activity (picnics, walking loops) and a refuge from the urban realm, with access to and onto the river. The total project value is \$10 million over ten years.



Photo: Nicomekl Riverfront Park project area outlined in red

No. 6 City of Surrey – Nicomekl King George Bridge & Sea Dam

The King George Boulevard Nicomekl River Bridge comprises two separate structures south of the King George Boulevard and Highway 99 Interchange in Surrey, BC. The first structure carries two lanes of traffic (one southbound and one northbound) over the Nicomekl River. A bailey bridge is located immediately east (upstream) of the bridge and carries a second northbound lane of the King George Highway over the Nicomekl River. Built in 1939, the bridge is 56m long and comprises 11 timber trestle spans.

The Nicomekl Bridges provide a key link in the transportation network in Surrey and Metro Vancouver. King George Boulevard is one of only six north south connections between South Surrey and White Rock (total 114,000 pop.) and the rest of the Surrey (450,000 pop). It is a truck route for goods movement, emergency response corridor and forms part of TransLink's frequent transit network and Major Road Network.

The bridges are maintained by the Ministry of Transportation and Infrastructure (MoTI). MoTI have indicated that the life spans of the bridges are around 70 years old and that they are reaching the end of their serviceable life. The City has been working with MoTI to develop a plan to replace the existing bridges with a new modernized six lane structure that includes transit vehicle lanes and multi-use path in each direction for pedestrians and cyclists.

Due to the ages of the bridges they are susceptible to multiple natural hazards. The existing bridges are projected to be overtopped due to sea level rise and challenging soil conditions making the bridges vulnerable in an earthquake. An adjacent sea dam that mitigates coastal flooding is also increasingly becoming vulnerable to overtopping. Rebuilding the bridges and sea dam after an earthquake would take years and interrupt an essential north-south connection in Surrey and White Rock.

An innovative cost-saving solution that adapts multiple assets for a changing climate is proposed. A new resilient structure is proposed that combines the function of the sea dam structure and needs for a King George Boulevard bridge with a robust foundation that will be fully functional after an extreme earthquake.

The combined replacement sea dam and bridges structure support a number of important services to the community including:

- *Flood Control:* Keeps out storm surges and high tides from backing up the rivers and flooding 2,000 Ha upstream lands;
- *Irrigation:* Prevents brackish water from mixing with fresh water, supporting 52 authorized water licenses to extract up to 4.6 million cubic metres per year; and
- *Essential Transportation:* Provides the King George and Elgin Road water crossings over the Nicomekl and Serpentine with an estimated traffic volume of 26,000 vehicles per day.

Additional community benefits of replacement structures will be:

- Enhanced wildlife and pedestrian access across transportation corridors. Supports connection to a planned 6 km continuous water path to offset reduced beach access from sea level rise and coastal flooding;
- Better fish passage to over 100 km of habitat;
- Improved drought management; and
- Accessible design for cyclists and pedestrians.



Existing Nicomekl Bridge

No. 7 City of Surrey – Crescent Beach Coastal Drainage Improvements

Situated in South Surrey, Crescent Beach is a dynamic environment that has seen many changes over time. It formed over centuries through the deposit of sediment from coastal bluff erosion. First Nations inhabited the area for thousands of years prior to colonization. In the early 20th century, Crescent Beach began to establish itself as a summer seaside cottage resort. In recent decades, the historic cottages have been gradually converting to permanent and more formal residences.

Today, a combination of sandy porous ground, recent redevelopments and sea level rise is impacting the performance of the outdated groundwater drainage system in the community and impact the safety of approximately 1,400 residents as a result of increasing winter surface ponding impacting the road network.

In 2009, a Crescent Beach Climate Change Adaptation Study was completed to develop the optimal drainage servicing strategy for the area. It was developed with extensive community consultation and provides direction on drainage servicing needs in a changing climate.

Surface ponding following a rainfall event in May 2008



Through the Study, a perforated storm sewer system was chosen as the preferred drainage improvement strategy for Crescent Beach, in conjunction with raising the ground and road. The intent of a perforated storm sewer system is to provide an efficient conveyance system that can

manage both stormwater runoff and rising groundwater levels. In the summer (when the groundwater table is typically low), stormwater runoff that enters the sewer system will have an opportunity to exfiltrate out of the pipe through the perforations and recharge the groundwater table. On the other hand, in the winter (when the groundwater table is typically high), groundwater is able to enter the perforated storm sewer system and is conveyed to the Dunsmuir Channel. During winter, the system maintains a relatively constant groundwater table elevation and manages water efficiently to mitigate coastal flooding. Maple Drainage Pump Station was upgraded to accommodate the additional water collected by the drainage system in 2012.

Proposed perforated Storm Sewer System, 2008



The adaptation work is being implemented in phases. Total remaining phases for years 2019-2028 is valued at \$11M, including road upgrades to provide more resilient transportation and builds on \$9M of adaptation work to-date towards implementing the 2009 Study.