City of Richmond

Agenda

Public Works and Transportation Committee

Anderson Room, City Hall
6911 No. 3 Road

Thursday, February 21, 2019
4:00 p.m.

Pg. # ITEM

MINUTES

PWT-5 ***Motion to adopt the minutes of the meeting of the Public Works and Transportation Committee held on January 23, 2019.***

NEXT COMMITTEE MEETING DATE

March 20, 2019, (tentative date) at 4:00 p.m. in the Anderson Room

DELEGATIONS

PWT-24 Norman Van Eeden Petersman, Richmond resident, to speak on parking minimums and materials produced by Strong Towns.

PLANNING AND DEVELOPMENT DIVISION

1. **TRAFFIC SAFETY ADVISORY COMMITTEE - PROPOSED 2019 INITIATIVES**
(File Ref. No. 01-0100-30-TSAD1-01) (REDMS No. 6051615 v. 2)

PWT-27 See Page **PWT-27** for full report

Designated Speaker: Donna Chan

STAFF RECOMMENDATION

(1) That the proposed 2019 initiatives for the Traffic Safety Advisory Committee, as outlined in the staff report titled "Traffic Safety Advisory Committee - Proposed 2019 Initiatives" dated January 18, 2019 from the Director, Transportation, be endorsed; and

(2) That a copy of the above staff report be forwarded to the Richmond Council-School Board Liaison Committee for information.

2. **POTENTIAL ACCOMMODATION OF TOUR BUSES ON DYKE ROAD**
(File Ref. No. 10-6360-01) (REDMS No. 5896306 v. 6)

PWT-32 See Page **PWT-32** for full report

Designated Speaker: Sonali Hingorani

STAFF RECOMMENDATION

That the report titled "Potential Accommodation of Tour Buses on Dyke Road" dated January 29, 2019 from the Director, Transportation, be received for information.

ENGINEERING AND PUBLIC WORKS DIVISION

3. **2018 ZERO WASTE CONFERENCE UPDATE**
(File Ref. No. 10-6370-01) (REDMS No. 6049391 v. 5)

PWT-39 See Page **PWT-39** for full report

Designated Speaker: Suzanne Bycraft

STAFF RECOMMENDATION

(1) That the report regarding "2018 Zero Waste Conference Update" dated February 1, 2019, from the Director, Public Works Operations be received for information;

(2) That letters be sent to the Board Chair of Metro Vancouver and the Minister, Environment and Climate Change, requesting their leadership in advancing the circular economy agenda under a broad-based approach; and

(3) That staff participate in regional and provincial forums relating to the circular economy agenda and report back at appropriate intervals.

4. **2019 LIQUID WASTE MANAGEMENT PLAN BIENNIAL REPORT**
(File Ref. No. 10-6060-01) (REDMS No. 6074892 v. 7)

PWT-48 See Page **PWT-48** for full report

Designated Speaker: Eric Sparolin

STAFF RECOMMENDATION

That the staff report titled "2019 Liquid Waste Management Plan Biennial Report," dated January 25, 2019, from the Director, Engineering, be submitted to Metro Vancouver.

5. **BURKEVILLE DRAINAGE UPDATE**
(File Ref. No. 10-6060-01) (REDMS No. 6066590 v. 8)

PWT-88 See Page **PWT-88** for full report

Designated Speaker: Eric Sparolin

STAFF RECOMMENDATION

That the staff report titled "Burkeville Drainage Update", dated January 11, 2019 from the Director, Engineering, be received for information.

6. **2018 WINTER STORM AND 2019 FLOOD PROTECTION UPDATE**
(File Ref. No. 10-6060-01) (REDMS No. 6108057 v. 5)

PWT-92 See Page **PWT-92** for full report

Designated Speaker: Eric Sparolin

STAFF RECOMMENDATION

That the staff report titled "2018 Winter Storm and 2019 Flood Protection Update", dated January 25, 2019 from the Director, Engineering, be received for information.

7. **MANAGER'S REPORT**

ADJOURNMENT

City of Richmond

Minutes

Public Works and Transportation Committee

Date:	Wednesday, January 23, 2019
Place:	Anderson Room Richmond City Hall
Present:	Councillor Chak Au, Chair Councillor Linda McPhail Councillor Kelly Greene Councillor Alexa Loo Councillor Michael Wolfe
Also Present:	Councillor Carol Day Councillor Harold Steves
Call to Order:	The Chair called the meeting to order at 4:00 p.m.

MINUTES

It was moved and seconded
That the minutes of the meeting of the Public Works and Transportation Committee held on December 19, 2018, be adopted as circulated.

CARRIED

NEXT COMMITTEE MEETING DATE

February 21, 2019, (tentative date) at 4:00 p.m. in the Anderson Room

PLANNING AND DEVELOPMENT DIVISION

1. **2019/2020 BIKEBC PROGRAM SUBMISSION**
(File Ref. No. 01-0150-20-THIG1) (REDMS No. 6054370 v. 2)

It was moved and seconded
(1) That the submission for cost-sharing to the Province of BC 2019/2020 BikeBC Program for the Westminster Highway multi-use pathway, as described in the report, titled "2019/2020 BikeBC Program Submission" dated December 14, 2018, from the Director, Transportation, be endorsed;

(2) That, should the above application be successful, the Chief Administrative Officer and the General Manager, Planning and Development, be authorized to execute the funding agreement; and

(3) That the Consolidated 5 Year Financial Plan (2019-2023) be updated accordingly.

CARRIED

2. **GEORGE MASSEY CROSSING – FINDINGS OF INDEPENDENT TECHNICAL REVIEW**
(File Ref. No. 01-0150-20-THIG1) (REDMS No. 5920748 v. 7)

Discussion took place on (i) the potential impact to salmon habitats from any pier installation in the Fraser River, (ii) the potential for Port operations to expand to 24 hours per day and truck traffic through the Tunnel during peak hours be banned, (iii) alternative materials for the surface of the Tunnel's interior walls, such as ceramic tiles, and (iv) the future of light rail transit in the area and potential increase to bus service for routes along Highway 99.

Newspaper articles regarding transit improvements in the lower mainland were distributed on table (attached to and forming part of these minutes as Schedule 1.)

In response to queries from Committee, Lloyd Bie, Director, Transportation, and Donna Chan, Manager, Transportation Planning, provided the following information:

- staff have reported on the findings of the independent review and an opportunity to provide comments to the Ministry will be made available to Council;
- stakeholder and municipal consultation was launched in January and will continue until April 2019;
- the George Massey Tunnel replacement project name is in reference to the previous provincial government's work and the assumption that the Tunnel was being replaced; therefore, staff understand that moving forward, it is to be referenced the George Massey Tunnel enhancement project; and
- the Vancouver Fraser Port Authority has indicated that it can be challenging to increase Port operations to 24 hours for all operations; however, this does not preclude Council from requesting that the Ministry implement traffic restrictions.

Joe Erceg, General Manager, Planning and Development, advised that staff can compile a chronological background of information regarding the George Massey crossing. Mr. Erceg remarked that, in staff's review, many findings in the Independent Technical Review are consistent with Council's previous direction and comments.

Discussion further ensued on requesting increased bus service from TransLink and proposing limitations on Port truck traffic through the Tunnel during peak periods of traffic.

As a result of the discussion, the following **motion** was introduced:

It was moved and seconded
That a letter requesting the Ministry of Transportation and Infrastructure:

(1) pursue short-term strategic improvements to the Steveston Highway interchange and expedite the completion of a business case for Highway 99 crossing improvements, as detailed in the staff report titled "George Massey Crossing – Findings of Independent Technical Review" dated December 21, 2018 from the Director, Transportation;

(2) work with the Vancouver Fraser Port Authority to limit port traffic from using the George Massey Tunnel Crossing during peak hours; and

(3) request that TransLink review increasing bus capacity for routes along the George Massey Tunnel Crossing;

be endorsed.

CARRIED
Opposed: Cllr. Loo

Jim Wright, Richmond resident, referenced his speaking notes (attached to and forming part of these minutes as Schedule 2) and spoke on the George Massey crossing.

Discussion then took place on (i) the delegation's comments, (ii) the Independent Technical Review of the George Massey Crossing, (iii) the Province's upcoming public consultation, and the likelihood of a forum for public input.

3. **RICHMOND ACTIVE TRANSPORTATION COMMITTEE – PROPOSED 2019 INITIATIVES**
(File Ref. No. 01-0100-20-RCYC1) (REDMS No. 6042766 v. 3)

In response to questions from Committee, staff advised that (i) information regarding the cost per school for the Bike to School education program can be provided to Council, (ii) physical barriers are provided wherever possible for cyclists, (iii) the proposed No. 6 Road multi-use pathway and Steveston Highway projects will be partially funded by TransLink, and (iv) temporary barriers to separate cyclists from motorists can be examined prior to implementation of the proposed safety enhancements.

Discussion took place on potential expansion of the bike education program, particularly on potential cost sharing opportunities with the Richmond School District, and the No. 6 Road multi-use pathway and Steveston Highway pathway.

Councillor Greene left the meeting (5:03 p.m.).

It was moved and seconded

(1) That the proposed 2019 initiatives of the Richmond Active Transportation Committee, as outlined in the staff report titled "Richmond Active Transportation Committee - Proposed 2019 Initiatives" dated December 13, 2018 from the Director, Transportation, be endorsed; and

(2) That a copy of the report titled "Richmond Active Transportation Committee – Proposed 2019 Initiatives" be forwarded to the Richmond Council-School Board Liaison Committee for information.

CARRIED

ENGINEERING AND PUBLIC WORKS DIVISION

4. **RECYCLING DEPOT - POTENTIAL ECO CENTRE UPGRADE OPTIONS**
(File Ref. No. 10-6370-04-01) (REDMS No. 5968841 v. 8)

Suzanne Bycraft, Manager, Fleet and Environmental Programs, advised that the estimated capital improvement costs listed in Table 3 of the staff report should be $1,226,000. She then highlighted that the Recycling Depot has experienced a higher than usual volume of users as a result of the newly expanded scope of materials accepted.

Councillor Greene returned to the meeting (5:05 p.m.).

In response to questions from Committee, Robert Gonzalez, General Manager, Engineering and Public Works, advised that there is an outstanding referral regarding the replacement of the Works Yard; he remarked that it would be premature to consider significant capital upgrades to the Recycling Depot as the facility will be considered in conjunction with a forthcoming staff report on the Works Yard.

In reply to further queries from Committee, staff provided the following information:

- the Recycling Depot may only accept materials permitted by Recycling BC;
- the Recycling Depot could be open 7 days a week, however this would have an impact to the Operating budget;
- future procurement processes for upholstered furniture recycling will seek a reuse component;
- as noted in Option 3, a Reuse Centre would allow for items to be accepted and donated to charities as appropriate; a storefront may not be viable due to liability concerns; and
- any revenues generated as a result of recycling materials such as metal are applied to offset operating costs.

Discussion took place on the tent-style structures noted under Option 2, and Mr. Gonzalez remarked that these structures are semi-permanent in that they are to replace deteriorating trailers; a more permanent solution for the Recycling Depot and its accessory structures will be examined as part of the broader review of the Works Yard replacement.

It was moved and seconded

(1) That Option 2 of the staff reported entitled, "Recycling Depot – Potential Eco Centre Upgrade Options" from the Director, Public Works Operations dated January 16, 2019, be endorsed; and

(2) That the City's Consolidated 5 Year Financial Plan (2019-2023) be amended to include $1,226,000 for the Recycling Depot – potential eco centre upgrade as presented under Option 2 of the staff report entitled "Recycling Depot – Potential Eco Centre Upgrade Options", funded from the Sanitation and Recycling provision.

CARRIED

5. **FUEL PURCHASES AGREEMENT - SUNCOR ENERGY PRODUCTS PARTNERSHIP**
(File Ref. No. 02-0665-03-01) (REDMS No. 6073610)

It was moved and seconded

(1) That the City enter into an agreement, as outlined in the staff report titled "Fuel Purchases Agreement – Suncor Energy Products Partnership" dated January 3, 2019 from the Director, Public Works Operations;

(2) That the Chief Administrative Officer and General Manager, Engineering & Public Works, be authorized to negotiate and execute a fuel supply and delivery contract with Suncor Energy Products Partnership on the contemplated terms and conditions of the fuel consortium contract as outlined in City of Vancouver Request for Proposals No. PS20180305 Supply and Delivery of Fuels; and

(3) That the current fuel purchase contract with Parkland Fuel Corporation under BCPPBG Contract No. PS11122 be extended until such time as the fuel supply and delivery contract with Suncor Energy Products Partnerships is executed and fuel delivery commences under the agreement with Suncor Energy Products Partnerships.

CARRIED

6. **MANAGER'S REPORT**

2018 Zero Waste Conference Summary

Ms. Bycraft spoke to a staff memorandum previously distributed to Council dated January 22, 2019 (copy on file, City Clerk's Office) regarding the 2018 Zero Waste Conference.

ADJOURNMENT

It was moved and seconded
That the meeting adjourn (5:23 p.m.).

CARRIED

Certified a true and correct copy of the Minutes of the meeting of the Public Works and Transportation Committee of the Council of the City of Richmond held on Wednesday, January 23, 2019.

Councillor Chak Au
Chair

Amanda Welby
Legislative Services Coordinator

VOL. 58 NO. 60 THE RICHMOND REVIEW, WEDNESDAY, AUGUST 2, 1989

Premier promises

By DIANE STRANDBERG

Richmond will have a new $500 million rapid transit system in place by 1995, Premier Bill Vander Zalm promised Monday.

But what kind of system it will be and where it will go is still up for grabs.

B.C. Transit will begin detailed planning immediately on a rapid transit system to Richmond, with a possible spur to the International Airport here. The announcement was made Monday at the B.C. Institution of Technology training facility on Sea Island. It was part of a $1 billion transit package that will see Skytrain and Seabus routes extended and a fleet of new articulated buses purchased for use throughout the Greater Vancouver region.

Transit choices include a rail system, using existing rail lines from Vancouver to Richmond, along the Arbutus corridor, an elevated system similar to Skytrain, and express buses on special bus lanes. Mayor Gil Blair said he wouldn't speculate what type of system the planning committee will recommend. But he praised the Premier's transit proposal, particularly his commitment to 100 per cent funding for the project, which relieves local taxpayers of the burden of fully paying for the system.

"It's a very significant announcement. The capital cost of Skytrain was an impossible burden for the (Vancouver Regional) Transit Commission to fund," Blair said.

While Blair wouldn't comment what kind of rapid transit system Richmond needs, his Vancouver counterpart, Mayor Gordon Campbell, has admitted a preference for buses.

In an interview Tuesday, Mayor Campbell said he wouldn't prejudge the transit commission's study of alternative systems. But he expressed his concern that an elevated Skytrain system would create "visual pollution" and a rail system would cause traffic problems and noise.

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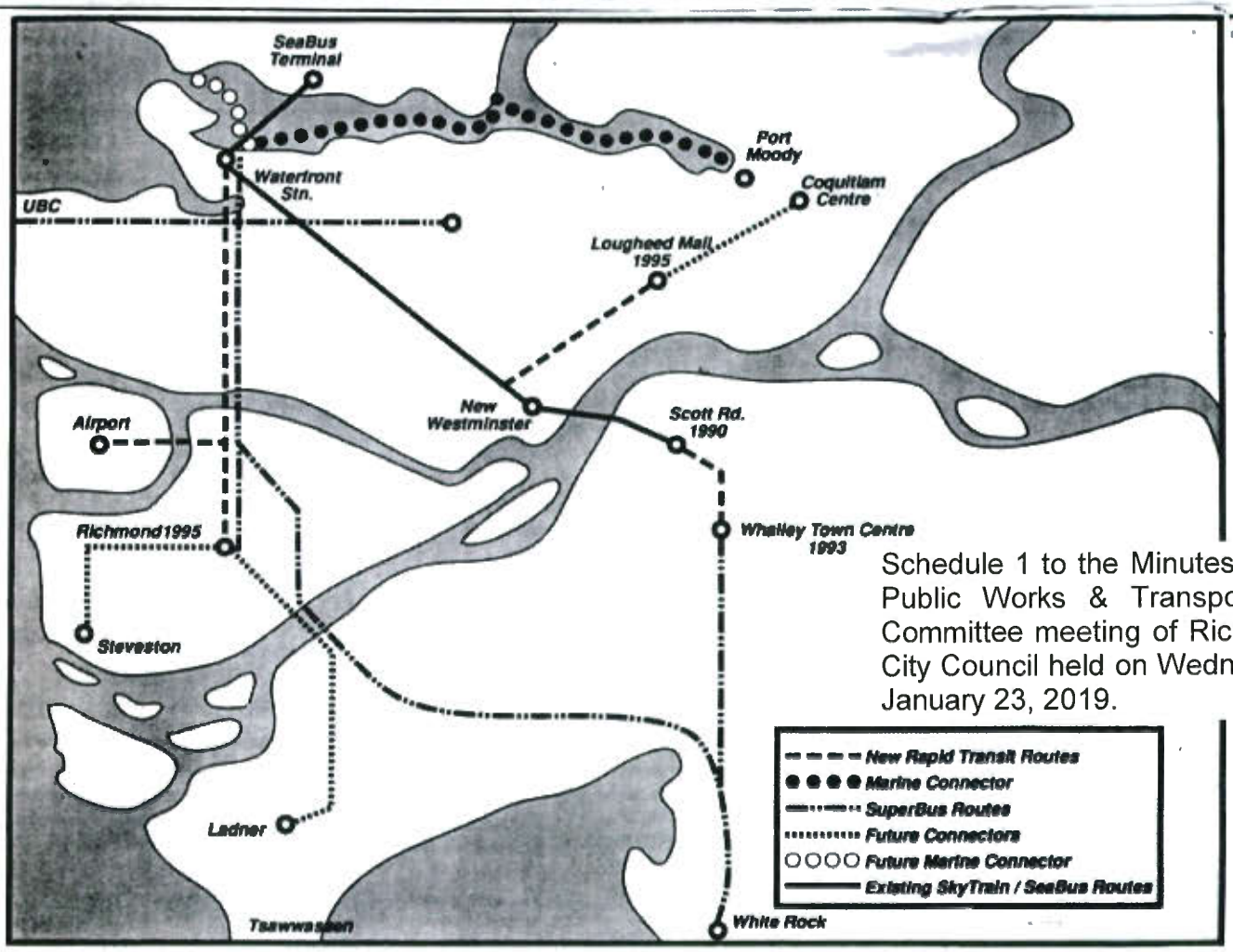


Schedule 1 to the Minutes of the Public Works & Transportation Committee meeting of Richmond City Council held on Wednesday, January 23, 2019.

PWT - 12

Transit improvements announced

Columbian 23 Dec 72 p 3

Affairs Minister taking a look at Fraser Valley transit plan

Municipal Affairs Minister Jim Lorimer has promised to examine a new public transportation proposal calling for a bus-on-railway-tracks-network.

The scheme, proposed by Richmond Ald. Harold Steeves and Dr. Ray Rodgers of White Rock, was presented to the minister at a meeting Thursday.

Ald. Steeves said Mr. Lorimer will add the suggestion to his study on public transportation now being made by his department.

According to Ald. Steeves, the bus-on-tracks-transit-network would follow existing rail lines, making a loop through New Westminster, Surrey, Richmond and back to Vancouver.

The proposal calls for a light, rapid-transit system using silent operating equipment.

Mr. Steeves suggested the route could follow a path through the Arbutus corridor, cross Richmond, reach past Delta as far as White Rock with a return through Surrey and New Westminster to Burnaby-Kingsway and downtown.

In addition, Dr. Rodgers has proposed a spur line that would extend the service through Crescent Beach to White Rock. The line would end just short of the beaches near Duprez St.

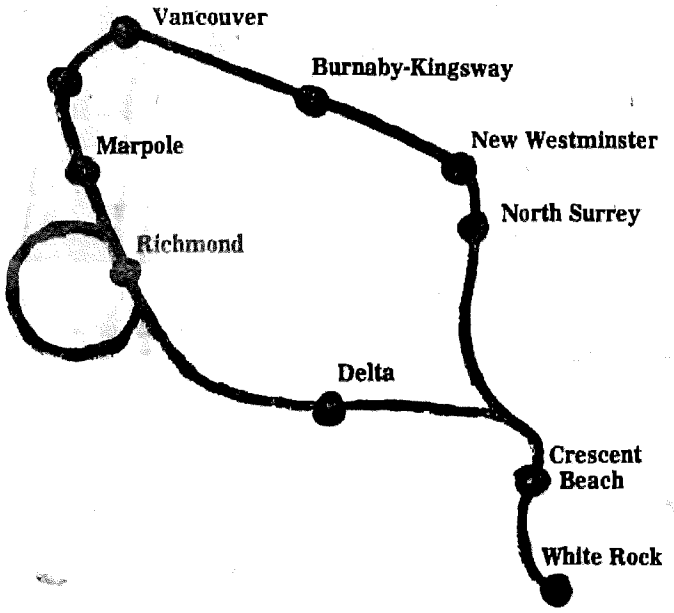
Mr. Steeves also suggested that if the CPR and CN rail lines could be connected in Richmond a secondary loop could be constructed to service the entire municipality.

"In effect you could serve every home in Richmond within a half mile of the line," he said.

Mr. Steeves said the scheme requires the co-operation of the CPR, CN, Burlington Northern and B.C. Hydro lines. He said one stumbling block could be the crossing of the Fraser River near the Deas Tunnel.

But he noted, previous rapid transit proposals have been of a radial type, with downtown Vancouver at the centre of the spokes, and with a further assumption of heavy equipment in most cases. The Steeves-Rodgers emphasis is for a loop with light equipment.

Mr. Rodgers said a White Rock spur using existing Burlington Northern Railway lines would provide commuter service for the South Surrey region and make it possible for weekend beach trippers to come from all parts of the region.



White Rock-Vancouver rail loop to get study

PWT - 13

Jim Wright on Massey Crossing, Public Works & Transportation, Jan 23, 2019

Thank you, Councillor Au.
Councillors:

I'm speaking as Acting Chair of the Fraser Voices Association and also for the Garden City Conservation Society—for President Sharon MacGougan, who can't be here.

First, let me share an epiphany. I reviewed Richmond staff's excellent July 2017 Massey Crossing report from Victor Wei (today), and I found it was really by *Joan Caravan*—who is still here. So the excellence can go on!

I should also mention that I'm connected to this issue back to mid-1955. This [showing the four volumes] is the very first and most independent Massey Crossing report, and my father was a partner in the authors, Crippen Wright Engineering Ltd. Also, I've been studying the issue for six years, with many blog articles, along with a number of columns in three newspapers.

I'm involved in the City of Richmond aspect because Victor Wei invited me in July 2017, with this letter [showing the letter]. I provided set of inputs [showing the 8-page report], and this is a November 2018 update. I'll include it with my speaking notes for the minutes. It addresses five factors, with insights you won't see elsewhere. If the province's old Massey Replacement team had dared to think this way, they might have been banished as heretics.

Back at Joan Caravan's 2017 report, it suggested two options, each including an upgrade to the existing tunnel:

Option 1: Add 4 lanes in the form of
(a) a lane each way for bus/HOV and
(b) a lane each way for traffic between the Steveston and 17A interchanges.

Option 2: Upgrade existing tunnel and add a lane of bus/HOV each way.

The 2017 report options both include provisions such as a means for walking and cycling. I see that as a short outer lane each way, perhaps from Rice Mill Rd to Delta's River Rd. The report also includes "Complementary Measures." In essence, it was all well done, and that is now more evident, since the Cowdell Report confirms we were right all along. So, I hope the City will build on both reports and provide staff like Joan Caravan with time and support.

Let me add five quick insights that fit with the Cowdell and Caravan reports.

One. Rule out the bridge options. If the tunnel is removed, the Vancouver Fraser Port Authority will dredge the ship channel two metres deeper after the Roberts Bank Terminal 2 issue is resolved. The effects will be ecological disaster plus harm to our dikes, irrigation water, safety and quality of life.

Two. R**ule out counterflow.** Cowdell says *addressing reliability in the off-peak direction is the primary need for adding capacity to the Crossing.* Addressing that will *not* increase congestion, but adding a counterflow in the *peak* direction ***would***.

Three. Add a new tube on each side of the existing tunnel. That's one tube each way, enabling the pedestrian/cyclist lanes and possible Steveston-to-17A lanes to be done right. *Most important, it is crucial for safety, especially for seismic safety equal to bridge seismic safety.* The Cowdell report agrees with my input to Victor Wei on that—an insight I've never seen anywhere else.

Four: Read the Cowdell Report. Skim and slow down for key parts for a couple of revealing hours. As an example, you'll find (on pages 103–106, among others) that, in comparison to a new bridge, a new tunnel would cause less construction congestion delays, have minimal impact on agricultural lands and less environmental impact, and be better for pedestrians and cyclists.

Fifth, so any bridge die-hards can move on in peace: Notice in the Recommendations (Pages 118–130), that bridge components would probably have to be fabricated outside Canada, whereas the tunnel segments would be fabricated locally. So the tunnel is better for the economy too.

If it's okay with council and staff, I suggest that staff and council continue to work with me on the Massey Crossing Project, in my roles with local societies. The City and community can build on each other's insights and credibility for results. For benefits, one plus one may then equal *three* — or even *infinity* because it will make the difference between non-success and success.

A point that came up: Stan Cowdell has used the appropriate "George Massey Crossing" name, so that is the current name. Coun. Carol Day's "George Massey Tunnel Enhancement" or "George Massey Tunnel Renewal" would be a good name for Richmond to use to frame the project from a Richmond perspective. It is crucial for Richmond to take action now to establish the best crossing and naming.

FRASER VOICES

Speak out for the Estuary!

Fraser Voices Association, Fraser Estuary, BC

November 2018

Dear People Who Care,

Massey Crossing decisions are near. Together with professional advice, informed community input adds relevant perspectives, preludes to success. We're happy to help. Please do our appetizer self-test or just skip to the insights.

With best wishes,

Jim Wright

Jim Wright
Acting Chair, Fraser Voices, FraserVoicesAssoc@gmail.com

Appetizer self-test

If you qualify, please turn to the next page.

As Fraser Voices idealists, we remain grounded in reality*, and great success *is* possible. Please read our "Five Factors . . . Massey" if you agree with some or all of this:

1. People very much want a good experience on trips that include the Massey Crossing.
2. That means comfortable, efficient and safe/secure trips at reliable and convenient times—and not necessarily by driving.
3. It also entails co-existent commercial use that respects their daily aspirations for their family/work lives and natural world.
4. It involves government/transit planning to meet volume needs while empowering each person to get happily between start and end points across the Crossing.
5. A Massey Crossing project with an empathic quality would be unlike the mega-bridge ex-project, with its vision of an immense trophy bestriding the Crossing.
6. In essence, not necessarily in working title or name, people who care look forward to a Massey Crossing Renewal Project and, all going well, a Massey Thruway Project.
7. In contrast to the mega-bridge ex-project, it is an ideal project for federal funding.

* We have been immersed in the Massey Crossing for six years but involved for six decades. My dad, Harry Wright, showed me the tunnel as it neared completion, of interest because of his role as a partner in Crippen Wright Engineering Ltd., the initial engineering consultants, and I still have their beautifully bound multi-volume 1955 report, *Fraser River Highway Crossing at Deas Island.* Dedicated Fraser Voices member Douglas Massey goes back even further, thanks to *his* dad, MLA George Massey.

Five factors to respect in the Massey Crossing Renewal

Fraser Voices to the Governments of British Columbia and Estuary Municipalities, November 2018.

Immersed in Massey Crossing Renewal, we* offer community insights—here & in "Inputs," next pages.

The factor	The details
A. Since the role of Supplementary Tube(s) in **enabling Legacy Tube renewal** is practically essential, getting them into service ASAP is more vital than the populace realizes. See Input 1.	Fast-tracking a new tube to take Legacy Tube traffic (a pair of lanes at a time) would make the seismic upgrade and Legacy Tube refurbishing fast and safe, giving tunnel users what they deserve.
B. The most needed paradigm shift is *away from* increases in highway capacity (bringing more vehicles quickly to congestion points) *toward* increased **thruway capacity** (bringing more people from place to place in reliable, comfortable, convenient, safe/secure ways).	See Input 2. Although the Amtrak *Thruway* with a rail core is different from the Massey *Thruway* with a tunnel core, the commitment to enabling personal translocation with mass translocation effect is a thruway aspect they would share. With vision, it could start here in early ways soon.
C. If one puts preconceptions about cost on hold, it may be optimal to add a Supplementary Tube ***on each side*** of the Legacy Tube. The new tubes could be spaced as shown in Input 3 *or* close to the Legacy Tube with the kind of cutoff walls between tubes shown by the Massey ex-Project).	The cancelled ex-Project also showed an approach of using two tubes to equal one larger one, and the benefits stated in Input 3 could outweigh an increase in dredging cost. Supplementary Tubes would each have one or two lanes and a multi-use path (cycling, walking, wheelchair, responder, etc.).
D. *A caution:* Although having a set of four tunnel lanes in each direction has significant *safety benefits* (see Input 4), that eight-lane option is also a concern unless there is reliable resolve to **avoid the "counterflow"** temptation that would lead to five lanes in one direction.	The concern: An added counterflow lane would enable single-occupancy-vehicle (SOV) use to increase, working against the paradigm shift. The Massey Renewal must help all users, but the trick is to empower more-deprived kinds of users in preference to pampering SOV drivers.
E. It is crucial that the Massey Crossing Renewal be designed to protect the Fraser River Estuary from the much **deeper ship channel dredging** —still blocked by the tunnel—that the Vancouver Fraser Port Authority (VFPA) has long sought to enable much port expansion east of the tunnel.	After the current CEAA environmental assessment of the proposed Roberts Bank Terminal 2, it will become opportune for the VFPA to again pursue its dream of deeper dredging, which threatens the estuary ecosystem—if tunnel removal permits. It is essential to preempt deeper dredging.

On the next pages, we've filled out this table with "Inputs" for decision makers. The aim is to better the life of the Fraser Estuary and the lives of everyone affected. Let's succeed together!

* *We* are the Fraser Voices Association, led on this issue by Jim Wright, Acting Chair, who has written numerous newspaper columns and blog articles on the issue since 2012. Jim even has a personal interest, as his father was a partner in Crippen Wright Engineering Ltd., which did the extensive initial study, *Fraser River Highway Crossing at Deas Island*, 1955, and he often refers to it, along with Fraser Voices research, among other sources.

This report builds on an earlier report by Jim Wright on behalf of the Garden City Conservation Society in 2017.

Input 1. Massey Crossing rationale

Aim: The Massey Crossing will enable reliable, efficient, comfortable, convenient, safe/secure transportation of people and goods between its served areas while conserving in a range of ways.

What's known: The bridge options were, in effect, self-eliminated by their proponents' failure to make a credible case in years of trying. Also, from a conservation standpoint, leaders of all three of the broad conservation groups in Delta/Richmond determined that the tunnel options were better.

Basic best: From the GMTR Project's five scenarios (Phase 2 Guide, 2013), the simple tunnel option in Scenario 4 (p. 12) could meet the needs with:

1) completion of the seismic upgrades for the tunnel and its approaches,
2) refurbishing of the tunnel systems—ventilation, lighting, safety, etc.,
3) new ***2+ lane tube*** for transit* + multi-use path, in Massey Corridor,
4) retrofit/replacement of related Hwy 99 bridges/interchanges, and
5) further Hwy 99 corridor improvements—Bridgeport to USA border.

Our graphic at right shows the traditionally best spacing of new tube ("Green Tube" = ecologically best) from current tunnel ("Legacy Tube").

*While the Green Tube would ***enable*** two transit lanes, it might do so ***indirectly*** (e.g., if *Legacy* lanes are better positioned for Rapid Bus use).

Quality: Since this saves a hefty chunk of $12 billion, doing things well should be feasible. Examples:

1) State-of-the-art seismic upgrade for the Legacy Tube and approaches. Methods have improved in the decade of delay, and there must also be new site-specific knowledge from the bridge studies.
2) Lining of the tunnel walls/ceiling with reflective, easy-to-clean ceramic tile (early intended, never done).
3) Green Tube: Improved ceiling height and lane width. Designed to easily adapt for (possible) rail.
4) At the new Steveston Interchange, faster and safer entry and exit, as planned a quarter century ago.
5) Facilities for additional efficient Hwy 99 bus entry/exit ramps, sheltered pullouts, easy transfers, etc.

Buses and trucks: Steps to enable (a) early congestion relief, beginning ASAP, and (b) lessons for the future:

- The early need is for the long-overdue influx of energy-efficient Rapid Buses that are reliable (on time, with passenger space), convenient (with Rapid Bus routes or feeder routes reaching people's start/end points) and comfortable (user-friendly throughout trips). High expectations must be set and exceeded.
- Truck traffic to and from the Delta port terminals will need to be spread over far more hours a day, with large trucks banned from the tunnel during the times when they would cause congestion (e.g., rush hour).

Steps: Ideally, the current government's experts will quickly determine how to implement the scenario in seismically sound and practical ways. Action will depend on their advice. For example, re the Green Tube:

- With its current technology to disrupt destructive seismic waves before they reach it, the Green Tube might protect the Legacy Tube. If that applies, it might be placed on the west side of the Massey Corridor.
- The Green Tube, shown above and in Scenario 4, could alternatively be separated from the tunnel by a cutoff wall. Also alternatively, it could be a new tunnel further east, presumably connecting the South Fraser Perimeter Rd (with roughly a 76 St route) to Westminster Hwy and Hwy 91, via Nelson Rd.
- In any case, fast-tracking the Green Tube will allow it to take traffic from the Legacy Tube (usually a pair of lanes of traffic at a time) to enable efficient seismic upgrading and refurbishing of the Legacy Tube.

Note: The scenario in this input is not intended to preclude a second Green Tube (Supplementary Tube).

Input 2. "Massey Thruway Renewal Project"

This page of input builds on "1. Massey Crossing Rationale."

With the power of naming, the name for a replacement project could remove an impediment to success, the term "Tunnel Replacement Project" that dismissed retention and renewal. One obvious option for a working title is "Massey Crossing Renewal Project." We'll start by explicating it.

"Massey": It could honour George Massey without the "George," and "Massey" could also include son Douglas Massey, 85, a tireless campaigner for an ecologically sound crossing (not the bridge).

"Thruway": The renewal would ideally feature a transportation ***thruway***, like a river (Hwy 99) with its tributaries (and distributaries). With enhanced transit (starting soon), the thruway will get people, etc., all the way from Point A to Point B (such as home to workplace) on both sides of the South Arm of the Fraser in reliable, convenient, efficient comfortable, safe/secure ways. (But "Crossing" is a good word too.)

Conceptually, it is fairly like an Amtrak Thruway in intent (despite many differences). That proven thruway features coach buses, and the choice of bus options for the Massey Freeway will be critical, but an early step would be a healthy dose of any kind of **Rapid Buses** to alleviate congestion.

"Renewal": An updated project name such as "Massey Thruway Renewal Project" would assert the *renewal aspect that* Richmond has long supported, in harmony with Metro Vancouver and—except in recent years—the BC government. We suggest this be done soon. The help and goodwill will matter.

Determinant of wellbeing: The Massey Thruway can and should be a social determinant of wellbeing as an enabler of access to employment, food, health care, education and social support, with tributaries/distributarues into/from Hwy 99. Quality of life matters!

Congestion: Richmond has had to deal with a campaign by another local government that (despite no ill intent toward Richmond) would flush traffic congestion north into Richmond, which does not welcome it and aims to ***not*** dump it on neighbouring cities. Now, we hope that Richmond will share (and even promote!) its big-picture vision, which is driven by higher values.

Value per dollar: An independent analysis will likely find that the Massey Thruway Renewal will provide more value at less cost than the current project plan. Some of the most valuable benefits have been downplayed, so we suggest bringing those values to attention. For instance, the *Renewal* can:

- End the immense ecological threat to the Fraser Estuary—and the whole Fraser *River* and Salish Sea—from deeper dredging of the ship channel. (It is a bad time for it, but the intent will persist if it can.)
- Minimize the biggest threat to safety. The incidence of LNG carrier explosion may seem low, but it would leave a swath of devastation—probably worse than the Halifax Explosion of 1917. (For instance, it might only take only one terrorist throwing a well-suited bomb from the bridge.)
- Be a model for the world, with values for the BC economy and the future of life on Earth.

Richmond's two options: Richmond's Transportation Department refined two renewal options that embody the tunnel expansion intent, which goes back to the initial engineering consultants' thorough report, *Fraser River Highway Crossing at Deas Island*, 1955. We commend them. Our third set of input in this series will share suggestions for making the options like those even better.

Input 3. Why use *two 2-lane* tubes to add four lanes?

We have suggested that the Massey Thruway Renewal Project consider adding a 2-lane tube on each side of the Legacy Tube *if it the project opts to add four lanes*. This fills out the values of that approach:

1. Having tubes just over half as wide as 4-lane ones would make each segment much smaller, making construction in a shipyard or purpose-built drydock more feasible. (The purpose-built drydock where the Legacy Tube was fabricated is now the BC Ferries cove in the top-left corner of the graphic—not available.)
2. Each of the two 2-lane tubes could have its path for walking, cycling and rolling (and emergency use) on the outer side of the expanded tunnel, with *user movement in the same direction as traffic movement*. That is ideal for path users, who would have their first entry to the path beyond the last vehicle entrance and their last exit before the first vehicle exit. Southbound, for example, the path entry could be beyond (south of) Rice Mill Road, and the path exits could be before (north of) the vehicle exit for Delta's River Road. This approach says a lot: *it treats vehicle-less users as important*.
3. If there is thought of encouraging buses and/or large trucks to use the four added lanes—with their more generous width and height, that can only be done for both directions if there is a new tube on each side of the expanded tunnel.
4. Having two new lanes on each side of the expanded tunnel enables easy continuity with the existing highway lanes leading into/from the tunnel. (Simple is good, and there is no loss to Deas Island Regional Park or the somewhat natural area on the Richmond side.)
5. All these values add to the basic value of improved safety of the Legacy Tube in an earthquake (subject to an expert study confirming that theory). Furthermore, along with the boost to safety, any damage would be more likely to be repairable, saving money and enabling reliable service.

With all those values, a large financial cost might be reasonable, but it might not even occur. After all, when the existing tunnel was built, the meticulously quoted amount for a tunnel with *two 2-lane tubes* seems to have been far lower than its eventual cost as *a single 4-lane tube* with far less included.* For instance, the originally planned ceramic tile (reflective and easily cleaned) and raised walkway beside each pair of lanes were included and would, in effect, have added significant safety benefits.)

- According to "British Columbia's Massey Tunnel was a cutting-edge endeavour" in the *Journal of Commerce* (Sep 7, 2009), the 4-lane tube cost $29 million. So much more that as listed in the very thorough 1955 report *Fraser River Highway Crossing at Deas Island,* by Crippen Wright Engineering Ltd.) was not included in the eventual George Massey tunnel that it is hard to be precise about the cost difference, but the eventual tunnel seems to have increased the cost by about a third.
- The Crippen Wright report is available on short-term loan from the Fraser Voices Association.

Input 4. Safety benefits of the renewed tunnel

Naturally, the principal structure in the Massey Thruway Renewal Project is the South Arm crossing structure—either the upgraded and expanded tunnel or the bridge that the previous BC government preferred. One point of agreement: everyone wants to use it with due confidence it is safe.

Best for safety: From that safety perspective, we suggest it is optimal to add four lanes (Richmond's Option 1) as a pair of 2-lane tunnel tubes—a new tube on each side of the Legacy Tube. (That should also be cost-friendly, user-friendly, timeline-friendly, etc., but the focus here is on assurance of safety.)

Basically, there would be four lanes heading in each direction (two in a new tube, two in the Legacy Tube).

As shown, each new tube is about 50 metres from the Legacy Tube, essentially within the Hwy 99 tunnel corridor. On the northwest side, access is between the Canfisco dock/plant to the east and the BC Ferries maintenance dock/facility. On the southeast side, access is via Deas Island Regional Park.

The BC Ferries cove (shown here with one ferry docked) was the low-lying site of the single-use dry dock where the six segments of the tunnel were fabricated in the late 1950s. It was then flooded so they could be floated (sealed at the ends) into position.

Traffic safety: We are impressed with the Richmond concept of an additional outer lane through the tunnel in each direction—between the closest interchanges. At last, it would enable safe merging/diverging where it is has been *unsafe*. For instance, where traffic from Steveston Hwy merges into the tunnel-bound traffic, statistical evidence indicates many crashes there, year after year. As well, anecdotal evidence indicates that the related fear prompts people to avoid driving through the tunnel.

The effect of this approach is roughly a one-third boost in tunnel-exiting capacity, so the earthquake warning system will more certainly get everyone out. As well, perhaps, a lower speed limit could be applied to those user-empathic segments of outer lane, among the ways to tailor the feature for a calmly safe experience.

The simplicity of the tunnel is in contrast to the complexity of the proposed bridge. For instance, the tunnel project would include a simple two-level Steveston Interchange, not the proposed bridge's famous faux Los Angeles interchange, with its many ways for drivers to err and crash.

Seismic safety: With this design, two tubes out of the three would theoretically sustain no damage at all in the worst earthquake in 475 years and only repairable damage in the worst quake in 2,450 years.

Furthermore, bringing the new tubes into use before doing the external seismic upgrade of the Legacy Tube would make that upgrade safer, especially since the current level of Legacy Tube traffic could be diverted entirely to the new tubes. (The temporary closure of the Legacy Tube would also enable the extensive *internal* renewal work to take place efficiently in the Legacy Tube.)

Along with the obvious benefits for seismic safety stated so far, there is an intriguing possibility that the new tubes could make the Legacy Tube seismically safer than ever thought possible.

This builds on the fact that studies like the 2002 Seismic Retrofits by Rensselaer Polytechnic simulation show that lateral movement of the tunnel, which the external upgrade must address well, is an effect of seismic waves in the *upper 10 metres* of adjacent soil. Remediation* to that depth can be very effective.

The new tunnel tubes, with nearby state-of-the-art remediation, would normally not be damaged by even a fairly high-magnitude earthquake.

With new tubes to dissipate seismic waves and arrest ground movement, one would expect the Legacy Tube—between them and no more than about 50 metres from them—to be further protected as a result. *Is there an independent expert who could confirm this?*

Extreme-weather safety: The tunnel is well suited to the increasing incidence of extreme weather. Unlike a bridge, the tunnel would not typically be dangerous in storm winds, ice, blizzards, torrential rain or thick fog. It would therefore be one of the most reliable lifeline corridors—for emergency response in calamities when a bridge might sometimes even make the situation worse.

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* Note: A 2016 report for the previous government included concerning comments that make the remediation seem risky, but the report made suspect use of sources. For example, when it referred to a 2007 seismic densification value engineering study's examination of ways to limit the *risk of cost overruns* in the external seismic upgrade, the 2016 report treated the financial risks as *safety* risks. Also, provincial records have revealed that the parent company of the report writers, which makes large donations to the BC Liberals, received a $24,250,000 contract in 2013 to be the "George Massey Bridge Project Owner's Engineer" (the government's *bridge* engineer). That makes them less credible when critiquing the *competing tunnel* option. There are real seismic safety concerns, but the appearance of skewing by consultants with possible conflict of interest means that independent analysis is needed.

Safety from LNG explosions: When the Tilbury LNG plant (with much increased capacity) exports LNG, the carriers will pass through the Massey Crossing. A bridge there might enable a terrorist to drop a bomb on one. That seems as likely as a major earthquake. To add to the following background from the Fraser Voices' *Let the Fraser Live*, read Kevin Washbrook's thorough *Sailing Into Unknown Waters*.

The BC Wilderness Committee has created a colour-coded risk map of the area on the basis of a US Coast Guard document that outlines "zones of concern" in the event of an LNG tanker accident:

Zone 1 is where an LNG spill could pose severe public safety and property hazard.	Zone 2 would be "less severe" in a wider hazard zone—up to 1.6 kilometres away.	Zone 3 would spread further into Ladner and Richmond. It is considered the maximum distance a cloud of escaped LNG vapour could drift without dispersing. If ignited, the cloud could burn back to the tanker and result in a "pool fire."

LNG Hazard Zones—"Zones of Concern"

Zone 1: 500 metres **Zone 2: 1.6 kilometres** **Zone 3: 3.5 kilometres**

First responding: In either of the new tubes, responders could reach crashes via a pathway (perhaps primarily provided for cyclists in one and for pedestrians and mobility-aid users such as wheelchair users in the other or perhaps multi-use in each direction). However, since the whole renewed tunnel will take every opportunity to provide and encourage safety, the need for first responders will be significantly reduced in the best possible way.

Written Submission to the Public Works and Transportation Committee of the City of Richmond

Thank you for the privilege of appearing before your committee. I look forward to sharing with you a brief overview of two overlapping matters:

1. The negative effects parking minimums can have in our city
2. The true cost of on-street parking and ways we can improve our city through the introduction of Parking Benefit Districts

I have included one article from the Strong Towns journal (strongtowns.org) below and have two more resources I would encourage you to read when you have a few minutes:

1. "Parking Policy is Hot, Thanks to Donald Shoup" *CityLab* (https://www.citylab.com/transportation/2018/05/parking-is-sexy-now-thank-donald-shoup/560876/)
2. Donald Shoup, *The High Cost of Free Parking* (https://www.amazon.com/High-Cost-Free-Parking-Updated/dp/193236496X/ref=sr_1_1?ie=UTF8&qid=1550187072&sr=8-1&keywords=high+cost+of+free+parking) – unfortunately this title is inexplicably high priced on Amazon but certainly worthwhile reading on this subject

With much appreciation for your time,

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One Line of Your Zoning Code Can Make a World of Difference

- January 31st, 2019
https://www.strongtowns.org/journal/2019/1/30/one-line-of-your-zoning-code-can-make-a-world-of-difference
- By *Aaron Qualls, the Planning and Community Development Director for the City of Sandpoint, Idaho.*

Arguably, no city ordinance is more underestimated for its long term impacts than off-street parking requirements. Many cities are now starting to recognize the negative effects parking minimums can

have on housing affordability, historic preservation, the environment, small businesses, walkability and municipal budgets. In Sandpoint, some of these effects were not hypothetical but happening right before our eyes. The 2009 approval of a 60,000 square foot, 3-story bank headquarters in the heart of downtown ended up requiring 218 parking spaces. Because only 110 were provided (which was plenty), the bank was subjected to in-lieu parking fees totaling over $700,000. Well, being bankers, they soon realized the cheaper alternative was to buy up adjacent properties and demolish the buildings for surface lots. Consequently, small businesses were evicted and the much-beloved downtown historic development pattern was diminished.

This experience caused city leaders to pause, reflect, and take action to ensure this would not happen again. Now we are realizing the dividends paid over time. That single line of code abolishing off-street parking minimums downtown has enabled four distinct projects that would have been otherwise impractical. Each of these projects has enriched Sandpoint by contributing vibrancy, economic productivity and an increase in tax base.

Four Success Stories Made Possible by Parking Reform

The first was an expansion of a popular taqueria. A modest increase of seating area prior to the code change would have required 7 additional parking spaces, or $70,000 in fees. That's just too many tacos. For a small local restaurant (one which began as a food truck), this would have ended the project before it began. Instead, the venture ushered in other business expansions and downtown improvements.

The local winery soon after not only expanded but the owners were able to transform "...a defunct former furniture store into a vibrant mixed-use showcase blend of old and new materials and design ... bringing renewed prominence and economic energy to this corner of Sandpoint's downtown," according to *Idaho Smart Growth*, which bestowed a *Grow Smart Award* for the renovation in 2015. Had there been off-street parking requirements in place, it never could have happened.
The same is true for Sandpoint's premier music venue downtown which now brings in world renowned musicians consistently and is attended by music lovers regularly—some of whom travel considerable distances from Washington, Montana and even Canada.

More recently, a small local tech startup started to feel extreme growing pains once their platform became recognized for its innovation. Rather than relocating, they renovated an old, dilapidated steel frame building downtown that was originally constructed to house lumber supplies. It is now a modern tech campus, which houses close to 100 full time employees. Despite having a sizable surface parking lot, the owners would have needed to roughly double the amount of parking (or pay exorbitant fees). This last example alone, compared to tax assessor data from the year before, resulted in an assessed value increase of over $2 million. Beyond an increase in property tax, the centrally located tech jobs have had many other positive rippling effects through Sandpoint's economy.

One. Line. Of. Code.

At this point you're probably wondering about the fears of those who opposed the rule change. "So, is there now a parking problem?" If you believe that in a downtown area you should not have to walk a

couple of blocks at certain times, then yes, there is a problem. But is that really a problem or an indicator of success?

A vibrant downtown is where people go to see and be seen by others. If Downtown Sandpoint were vacant and subsequently full of empty parking spaces, why would anyone go there at all? In this sense, the only thing worse than having a parking problem is not ever having a parking problem.

Now, this is not to say the city should ignore the issue of parking altogether. It should also be pointed out that not every new development elects not to provide parking. There are other solutions beyond mandated parking minimums, however, which won't sack a downtown or diminish economic productivity.

A Positive Precedent

Towards the close of 2018, Sandpoint expanded the de-regulated area and completely overhauled off-street parking requirements throughout the rest of the city—substantially reducing minimum requirements. It was much easier this time around. The reason? The City was able to see the millions invested downtown as a result of that bold action taken in 2009. Since that time (even during the recession), Downtown Sandpoint has seen the local winery building expand, a new music venue open, a beloved restaurant expand, and a local high tech startup enjoy relocation and growth to nearly 100 employees right in the middle of it all. Not one of these investments would have been possible under the old paradigm of mandated parking minimums. Was it easy? No. Is there more work to be done? Likely, yes. Has it been worth it so far? Absolutely.

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	January 18, 2019
From:	Lloyd Bie, P.Eng. Director, Transportation	**File:**	01-0100-30-TSAD1-01/2019-Vol 01
Re:	**Traffic Safety Advisory Committee - Proposed 2019 Initiatives**		

Staff Recommendation

1. That the proposed 2019 initiatives for the Traffic Safety Advisory Committee, as outlined in the staff report titled "Traffic Safety Advisory Committee - Proposed 2019 Initiatives" dated January 18, 2019 from the Director, Transportation, be endorsed.

2. That a copy of the above staff report be forwarded to the Richmond Council-School Board Liaison Committee for information.

Lloyd Bie, P.Eng.
Director, Transportation
(604-276-4131)

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Community Bylaws	☑	
Fire Rescue	☑	
RCMP	☑	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	**INITIALS:**	**APPROVED BY CAO**

Staff Report

Origin

Council endorsed the establishment of the Traffic Safety Advisory Committee (TSAC) in 1997, in order to create a co-operative partnership between City staff, community groups and other agencies that seek to enhance traffic and pedestrian safety in Richmond. The Committee provides input and feedback on a wide range of traffic safety issues such as school zone concerns, neighbourhood traffic calming requests and traffic-related education initiatives. TSAC has representation from the following groups: Insurance Corporation of BC (ICBC), Richmond School District, Richmond RCMP, Richmond Fire-Rescue, Richmond District Parents Association, and the City's Transportation and Community Bylaws Departments. This report summarizes the Committee's activities in 2018 and identifies proposed initiatives for 2019.

Analysis

The Committee's major activities and accomplishments in 2018 are summarized below.

Road and School Zone Safety Initiatives in 2018

The Committee provided input on and/or participated in the following measures aimed at improving the safety of Richmond roads for all users, particularly in school zones.

- *Pedestrian Zone Markers in School Zones*: Given the past success of in-street mounted signage in school zones and other locations in Richmond, two signs were installed on Railway Avenue adjacent to Homma Elementary School to advise approaching motorists of the crosswalk (Figure 1).

Figure 1: In-Street Pedestrian Zone Markers on Railway Avenue

- *School Zone Traffic Safety*: The Committee reviewed and responded to a number of traffic safety concerns at various schools across the city. These concerns were typically related to motorist speeding and illegal parking/stopping in school zones, driver behaviour within school sites (e.g., prohibited turns when exiting parking lots) and pedestrian crossing facilities near schools. The issues were addressed by a variety of measures, each tailored to

the specific site conditions at the school. These measures included increased enforcement in school zones by Community Bylaws and Richmond RCMP, deployment of Speed Watch volunteers, clearing of vegetation to improve sightlines at crosswalks, and the installation of a new crosswalk and connecting sidewalk (on Finlayson Drive to serve Tait Elementary School).

- *River Road (No. 6 Road-Westminster Highway)*: Identification of and feedback on road safety improvement measures on River Road to address on-going concerns related to motorist speeding and conflicts with cyclists.

- *Commercial Vehicle Enforcement*: Community Bylaws continued to provide enforcement of commercial vehicles including overweight vehicles travelling on weight restricted roads, failure to display a valid BC Commercial Vehicle Licence Decal, and on-street parking during restricted hours.

Traffic and Pedestrian Safety Campaigns in 2018

Committee members participated in the following ICBC- and Richmond RCMP-led road and pedestrian safety campaigns.

- *Pedestrian Safety*: In October-November 2018, Richmond RCMP in partnership with ICBC and Richmond Fire-Rescue conducted three pedestrian safety education and enforcement campaigns that involved the distribution of 5,000 reflectors and proactive engagement with pedestrians. Locations focused on No. 3 Road around the Richmond-Brighouse and Lansdowne Canada Line stations and the Bridgeport Canada Line station.

- "*Project Swoop*": During this annual event held in May, Speed Watch volunteers set up a speed reader board at a high incident crash location that displays the motorist's speed. Those drivers who continue to speed even after being clocked by the Speed Watch volunteers receive a speeding ticket from an RCMP officer a few blocks down the road. Nine officers and 29 volunteers were deployed at a total of 11 locations and checked nearly 7,000 motorists. Locations included the No. 5 Road-McNeely Drive, Garden City Road-Saunders Road, Westminster Highway-Kartner Road, and Cook Road at Cook Elementary School. A total of 62 violation tickets were issued.

- *Distracted Driving*: As part of this campaign that is conducted year-round, RCMP officers and community police volunteers conducted two "Cell Watch" blitz days in March and one in September that included a total of 15 deployments (comprising 25 RCMP officers and 50 volunteers) who collectively checked over 28,000 motorists. Targeted locations in March included Alderbridge Way at Garden City Road and No. 3 Road, and Westminster Highway-Garden City Road. Locations in September featured No. 3 Road in the City Centre and the Alderbridge Way corridor. A total of 58 violation tickets were issued.

- *Auto Crime Awareness*: As part of this annual campaign, RCMP officers and community police volunteers conducted four "Lock Out Auto Crime" blitz days throughout the year and issued nearly 2,000 notices. Almost 43,000 notices were issued in total for 2018. At the same time, nearly 3,500 licence plates were checked as part of the Stolen Auto Recovery program. If a plate number comes up as a match, the volunteers notify police. Locations

focused on parking lots for shopping malls, hotels and other destinations. Over 208,000 vehicle plates were checked in total for 2018, but none were identified as stolen vehicles.

Proposed Traffic Safety Activities for 2019

In addition to developing and providing input on corrective measures to address identified traffic safety concerns, the Committee will undertake a number of proactive initiatives to enhance traffic safety in 2019.

- *School Zone Traffic Safety*: On-going review and improvement of traffic and pedestrian safety in school zones through improving vehicle parking and circulation layout at schools, supporting the enforcement of school zone traffic violations, and introducing new walkways and crosswalks as well as upgraded crosswalks to improve pedestrian safety.

- *Pedestrian and Traffic Safety Projects and Campaigns*: Continue to support and participate in on-going multi-agency efforts to increase the level of pedestrian and traffic safety, such as the annual campaigns held by ICBC and Richmond RCMP in various locations.

- *Discouraging Vehicle Speeding*: The member agencies of the Committee will continue to jointly work on initiatives to curb vehicle speeding in the community, such as the deployment of Speed Watch volunteers in various school zones when requested by principals and the targeted enforcement program of Richmond RCMP.

- *Traffic Calming*: The assessment, implementation and monitoring of road safety and traffic calming measures where warranted in local neighbourhoods, together with consultation with Richmond RCMP and Richmond Fire-Rescue prior to the implementation of any traffic calming measures.

- *Special Events*: Provide comment and input from a traffic safety perspective on the development and implementation of traffic management plans to support special events (e.g., World Festival, Farm Fest).

Costs associated with the installation of traffic control devices, walkway construction and other road and traffic safety improvements are normally accommodated in the City's annual capital budget and considered as part of the annual budget review process. Some of these projects are eligible for financial contribution from external agencies (e.g., ICBC and TransLink). If successful, staff will report back on the amount of financial contribution obtained from these external agencies through the annual staff reports on ICBC and TransLink cost-sharing programs respectively.

Financial Impact

None.

Conclusion

The Traffic Safety Advisory Committee is one of the few multi-agency forums in the region dedicated to enhancing pedestrian and traffic safety within its home municipality. Since its

inception in 1997, the Committee has provided input on and support of various traffic safety improvements and programs and initiated a range of successful measures encompassing engineering, education and enforcement activities. Staff recommend that the proposed 2019 initiatives of the Committee be endorsed and this staff report forwarded to the Richmond Council-School Board Liaison Committee for information.

C. ROBERTSON (ACTING).

Bill Dhaliwal
Supervisor, Traffic Operations
(604-276-4210)

J Caravan

Joan Caravan
Transportation Planner
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JC:jc

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	January 29, 2019
From:	Lloyd Bie, P. Eng. Director, Transportation	**File:**	10-6360-01/2019-Vol 01
Re:	**Potential Accommodation of Tour Buses on Dyke Road**		

Staff Recommendation

That the report titled "Potential Accommodation of Tour Buses on Dyke Road" dated January 29, 2019 from the Director, Transportation, be received for information.

Lloyd Bie, P. Eng.
Director, Transportation
(604-276-4131)

Att. 2

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Arts, Culture & Heritage Parks Services Engineering	☑ ☑ ☑	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	**INITIALS:** CJ	**APPROVED BY CAO**

Staff Report

Origin

At the February 28, 2017 meeting of the Parks, Recreation & Cultural Services Committee, discussion occurred regarding the development of tour bus access to Britannia Heritage Shipyard along Dyke Road. Staff were subsequently directed to consider:

(1) repaving a portion of Dyke Road from Trites Road around Paramount Pond to London Landing; and
(2) remove speed bumps.

The same topic was also discussed at the March 22, 2017 Public Works and Transportation Committee. The Committee provided the following direction:

That staff investigate upgrading Dyke Road to industrial/park standards, from Trites Road around Paramount Pond to the foot of No. 2 Road, sufficient to accommodate tour buses and industrial traffic and report back.

This report responds to both referrals.

Analysis

Existing Conditions

Figure 1 illustrates the existing alignment of Dyke Road east of Trites Road to No. 2 Road. Currently, this section of Dyke Road is built on the dike and follows the perimeter of Paramount Pond. There are no road or weight limit restrictions that would prohibit use of the road by larger vehicles.

Although this connection is circuitous, the road is adequate for the very low traffic volume that it serves as the majority of vehicles are destined for the Steveston Harbour Authority (SHA) properties to the south. Accordingly, the road is built to a rural standard of a 4.5 m pavement width with gravel shoulder on either side. There are three speed bumps located along the north-south portion of Dyke Road that serve as traffic calming devices along the straight portion of the road.

From a transportation capacity perspective, the current operation of this section of Dyke Road does not warrant any geometric alterations at this time. As with any other local road, larger vehicles are not precluded from using the road today but may encroach into the opposing lane, particularly when turning.

Figure 1: Current Dyke Road Alignment

Road Widening Concept

While Dyke Road is functional today, the road would need to be widened to allow for separated two-way travel if traffic volumes including larger vehicles/tour buses were to increase. Staff developed a conceptual road plan for the widening of Dyke Road around Paramount Pond with the objectives of:

- determining the amount of road widening required to accommodate larger vehicles including tour buses such that the vehicles would not need to cross the centerline when turning; and
- identifying the potential impacts and costs associated with the construction works.

Attachment 1 illustrates the road widening required to accommodate large vehicles. There are several impacts that would need to be addressed to better accommodate larger vehicles along this section of Dyke Road.

- *Potential Private Property Impacts*: Based on the conceptual plan, it appears that the road widening could be accommodated within the existing road right-of-way. Further, more detailed design would be required to confirm the extent of any private property impacts.

- *Parking Impacts*: The road widening would necessitate the loss of existing shoulder parking comprising approximately 15 spaces.

- *Environmental Impacts*: The entire foreshore around Paramount Pond is within a shoreline Environmentally Sensitive Area (ESA) designated by the Official Community Plan as shown in Attachment 2. Portions of the ESA habitat are contiguous with the riparian and park lands within Great West Cannery Park to the north. The ESA is measured 30 metres from the High Water Mark inland and 30 metres from High Water Mark into the foreshore. As such, the existing Dyke Road alignment falls within the inland portion of the shoreline ESA, although at present, it does not reflect any sensitive ecological features. The existing Dyke Road alignment around the northern perimeter of Paramount Pond is not an ideal site for compensation due to the existing disturbance related to riprap construction within the foreshore zone. Further analysis would be required to determine the extent and feasibility of any compensation requirements arising from road widening.

- *Dike Impacts*: The dike in this area will need to be raised in the future to address climate change induced sea level rise. Any proposed road widening will be reviewed in conjunction with the recommended dike improvements identified in the Dike Master Plan.

- *No. 2 Road South Drainage Pump Station*: Construction of a new drainage pump station at London Landing Park at the south end of No. 2 Road is scheduled to commence later in 2019. Once the construction is complete, the above ground structures at the existing pump station location can be removed. The existing canal and underground gravity outfall structure will remain in place. As part of the decommissioning of this station, the existing concrete slabs will be assessed and reinforced as required to accommodate full roadway loading.

The cost to widen Dyke Road between Trites Road and No. 2 Road is estimated at $3.0 million. This estimate does not include any allowance for infilling of the existing ditch that may be necessary, property acquisition or dike raising.

Speed Bumps

A speed survey was conducted in March 2018 to assess the effectiveness of the speed bumps on the north-south section of Dyke Road. The results indicate that the speed bumps are functioning to maintain an operational speed on Dyke Road at 30 km/h, which is appropriate to manage travel speeds ahead of the sharp curves at the north and south ends of the road. As the speed bumps were installed many years ago, the design of the bumps is outdated and does not conform to the current, more gradual speed hump design that has been deployed elsewhere in the city to calm traffic. Notwithstanding, the City has not received any concerns from the public regarding the presence of the speed bumps.

If the speed bumps that exist today are removed and traffic calming measures are not reinstated, there is an increased potential for speeding on this roadway that has low vehicle volumes but can have high pedestrian and cyclist volumes, particularly on weekends. The potential for speeding would be exacerbated if parking adjacent to the road is removed to allow for road widening.

Consultation with City Heritage Sites

Museum and Heritage Services staff advise that no concerns have been raised with the current roadway access to Britannia Shipyards or London Farm by tour buses or school buses. Visitors to Britannia Shipyards, including bus operators, generally access Westwater Drive via Trites

Road or Railway Avenue. Visitors to London Farm generally use Dyke Road via Gilbert Road or No. 2 Road. Staff are not aware of any tour bus companies regularly using the section of Dyke Road around Paramount Pond.

As Steveston continues to evolve as a tourism destination, Museum and Heritage Services staff will continue to maintain an open dialogue with bus operators and work with Transportation to address any emerging issues.

Summary of Findings

The widening of Dyke Road between Trites Road and No. 2 Road to accommodate tour buses is technically feasible. However, staff do not recommend widening the road at this time due to the following:

- there is no evidence that tour bus companies desire to use this section of Dyke Road to access Britannia Shipyards;
- tour buses currently use the existing access to Britannia Shipyards via Trites Road with no reported concerns;
- the current Dyke Road width and alignment is fully functional for the existing low traffic volume and meets the needs of the general public today; and
- the removal of the existing speed bumps has the potential to increase motorist speeding and generate road safety concerns between motorists, cyclists and pedestrians.

Financial Impact

None.

Conclusion

Tour bus traffic and any parking issues arising from increased visitation to Britannia Shipyards and London Farm will be monitored. If required, transportation plans including road improvements will be developed to address any issues. Any future road improvements would be subject to Council approval via the annual capital budget process and include public and stakeholder consultation. Updating the existing speed bumps to the City's standard speed hump design to continue to slow traffic but limit the amount of vertical deflection to a more comfortable level would also be included as part of future road improvements.

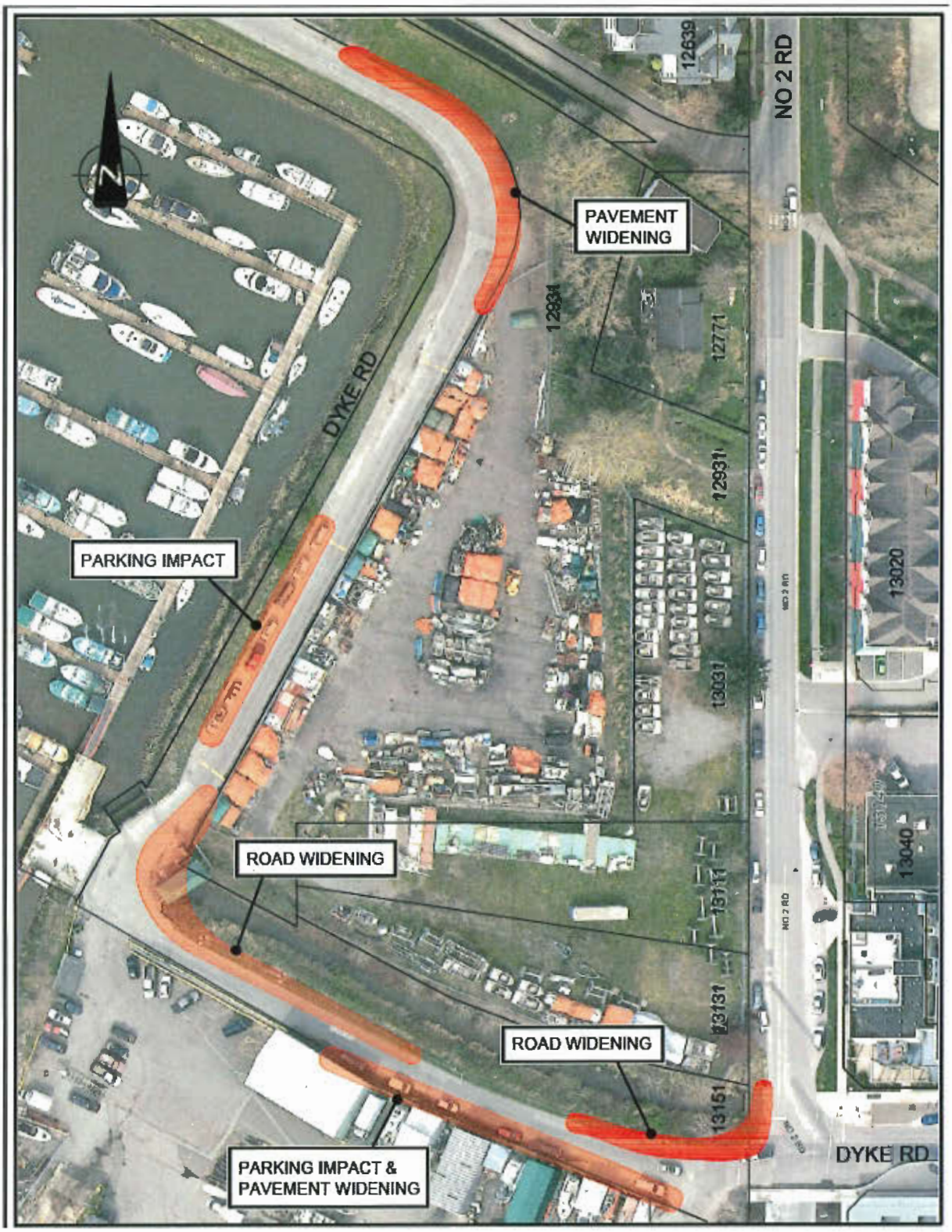
For: Sonali Hingorani, P.Eng.
Transportation Engineer
(604-276-4049)

Joan Caravan
Transportation Planner
(604-276-4035)

JC:jc

Att. 1: Conceptual Road Widening of Dyke Road to Accommodate Large Vehicles
Att. 2: Shoreline Environmentally Sensitive Area at Paramount Pond

Conceptual Road Widening of Dyke Road to Accommodate Large Vehicles



Shoreline Environmentally Sensitive Area at Paramount Pond

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	February 1, 2019
From:	Tom Stewart, AScT. Director, Public Works Operations	**File:**	10-6370-01/2018-Vol 01
Re:	**2018 Zero Waste Conference Update**		

Staff Recommendation

1. That the report regarding "2018 Zero Waste Conference Update" dated February 1, 2019, from the Director, Public Works Operations be received for information.

2. That letters be sent to the Board Chair of Metro Vancouver and the Minister, Environment and Climate Change, requesting their leadership in advancing the circular economy agenda under a broad-based approach.

3. That staff participate in regional and provincial forums relating to the circular economy agenda and report back at appropriate intervals.

Tom Stewart, AScT.
Director, Public Works Operations
(604-233-3301)

Att. 2

REPORT CONCURRENCE	
CONCURRENCE OF GENERAL MANAGER	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: CJ
APPROVED BY CAO	

Staff Report

Origin

At their November 21, 2018 meeting, Public Works and Transportation Committee passed the following referral motion:

"That staff prepare a report reviewing the 2018 Zero Waste Conference and report back with recommendations."

This report responds to this referral and proposes next steps for advocating development of a circular economy agenda under a broader approach, specifically at the regional and provincial government levels.

Analysis

National Zero Waste Council Zero Waste Conference 2018 Overview

Metro Vancouver and the National Zero Waste Council presented their "2018 Zero Waste Conference: A Future Without Waste: The Journey to a Circular Economy" on November 8-9, 2018. The conference, which was held at the Vancouver Convention Centre, was attended by over 500 registered individuals, comprised of academia, local government, other government, first nations, individuals, non-profits and the private sector.

The annual Zero Waste conference has been held for the last 10 years and is designed to highlight emerging trends, opportunities and insights designed to stimulate innovation and creative ideas to disrupt typical approaches to managing waste. This annual conference includes leading edge ideas from academia, business and governments from around the world with a focus on new approaches toward waste elimination.

This year's theme focused on the circular economy. A circular economy is one where the typical approach to draw on natural resources under a 'take-make-dispose' approach for economic and societal purposes is transitioned into approaches where materials and resources are 'repurposed, renewed and regenerated'. Doing so eliminates or significantly reduces the need to draw on natural resources and the resulting negative impacts when items are introduced back into the environment as waste. Items disposed in landfills or incinerators cause impacts which can be avoided by reintroducing materials back into the economic cycle through deconstructing and re-engineering them into new products. A circular economy focuses on positive society-wide benefits by decoupling economic activity from the consumption of finite resources (the 'linear economy'), and designing waste out of the system (the 'circular economy').
The circular economy approach includes changes in not only mindsets but also the entire approach to the development of products, from design to construction to renewed uses at end of life. To facilitate this change, new business models, approaches and attitudes will be needed and driven through the adoption of government policies, at all levels, and through business innovation. To help facilitate and advance the concept, the 2018 Zero Waste Conference included a variety of topics and speakers including presentations relating to:

- New thinking needed to move toward circular economies and capture the potential benefits of technology;
- A technology innovation panel;
- Materials and design innovation;
- Transformational leadership;
- A design portfolio competition;
- Sustainable innovation and change management;
- Business model transformation;
- A zero waste cooking demonstration;
- Food waste reduction;
- Systems mapping;
- Plastics innovation forum;
- A showcase relating to resource-efficient, lifecycle management of plastics; and
- A panel of members from the Circular Economy Leadership Coalition, a national alliance of institutional and corporate leaders committed to advancing a circular economy in Canada.

A more detailed overview of the presentations and presenters is included in Attachment 1.

Conference Overview – Staff Summary:
Staff's overall summary view is that the conference highlighted:

- emerging issues relating to the harmful effects of increasing quantities of waste in our environment;
- the missed opportunities in reducing waste and/or capturing this waste for regeneration;
- the need to 'retool' current practises and business models to trend away from the continued use of finite resources; and
- the need for widespread engagement and actions, both at the individual community, national and international levels, in order to effect meaningful change.

Without change, the current overdraft approach to the world's finite natural resource bank will mean a lack of ability to support future population growth in a sustainable manner. Current practices relating to the use of fossil fuels are also contributing to complications from climate change. The public is looking to its political leaders to address these issues using holistic, well-planned and considered approaches rather than sole-purpose reactions to topical issues. This is evidenced by the number of commitments at various government levels relating to zero waste, effective resource management, ocean plastics and other issues. A summary of Related Circular Economy Commitments and Initiatives is included in Attachment 2.
Advancing the circular economy requires taking the discussion beyond those programs directly controlled by the City. While the City has advanced a number of impactful and leading sustainability based programs and initiatives (discussed below), a broader approach will be required to build the needed momentum among businesses, industry, academia, institutions, the general community, and other levels of government. Leadership at the provincial and regional levels of government is an important starting point to help drive the wave of change needed to develop and advance a circular economy strategy.

Summary of Richmond's Current Actions as it Relates to the Circular Economy Approach

The City undertakes a number of services, programs and initiatives which directly align with the circular economy agenda. In fact, the City has been recognized as a leader in many areas that support the path toward a circular economy. A sample of some City programs and outcomes include:

- **Diversion:** The City's current solid waste and recycling programs are arguably among those leading the region, with 78% waste diversion achieved for single-family residential waste. Residents in multi-family developments also receive comprehensive recycling programs from the City, including Blue Cart and Green Cart/organic recycling services. In the commercial sector, the City began a pilot program starting in 2015, which provides optional services for organics, recycling and garbage collection on a request basis. Currently, service is provided to 35 businesses.
- **Recycling Depot:** The City continues to introduce new services and programs as part of our goal to achieve 80% waste diversion by 2020, such as the most recent expansion of materials accepted at the City's Recycling Depot, which commenced in January, 2019.
- **Building Demolition:** The City has established a demolition recycling bylaw that requires 70% recycling of waste from single-family home demolitions.
- **House Moving and Salvage Program:** The City promotes house moves by providing an inventory listing to promote re-use connections/opportunities.
- **Waste Heat Recovery:** The City currently operates sewer heat recovery equipment at the Gateway Theatre and aims to expand this approach through the Lulu Island Energy Company's Oval Village District Energy Utility. The new Minoru Centre for Active Living recovers heat from the pool facilities for heating community use space within the building.
- **Resource Recovery:** The City worked with Metro Vancouver to complete an Integrated Resource Recovery Strategy for the Lulu Island Wastewater Treatment Plant to assess available resources, such as heat and nutrients that can be economically recovered.
- **Gravel and Asphalt Recycling**: Richmond is leading, in partnership with the National Zero Waste Council, a pilot certification program for asphalt and concrete pavement products as a tool to build confidence in product quality.

Approach to a Developing a Circular Economy Strategy

Background – the Economic Case for a Circular Economy:

Global demand for limited finite natural resources (e.g. biomass, fossil energy and many metals) is expected to reach as much as 130 billion tons by 2050, up from 50 billion tons in 2014. This is equal to more than 400 percent overuse of Earth's total capacity, known as 'overshoot', a feat that is physically impossible. The goal of a circular economy, which aims to de-couple growth from the consumption of natural resources, is to shape the next industrial revolution where an

economic shift equal to $4.5 trillion globally by 2030 is predicted by Accenture, a leading economic research firm commissioned by the National Zero Waste Council's Circular Economy Working Group. The Circular Economy presents a vision for change to address not just mounting waste problems, but resource supply and price volatility, growth in global population and the generational challenge of climate change. A circular economy approach will require participation at all levels of government.

Developing a Circular Economy Strategy:

The City is a recognized leader in many sustainability-focused arenas ranging from a robust waste management program, to leading district energy initiatives, and greenhouse gas emissions reduction programs designed to achieve carbon neutral operations. The move toward a circular economy is broader than municipal service and will require a robust, planned and consultative approach to maximize both corporate and community opportunities and would be far reaching across the City and the Metro Vancouver Region.

Considered the global lead in helping and supporting governments' transition toward a circular economy, the Ellen MacArthur Foundation (EMF) was launched in 2010. The EMF Ellen Circular Economy 100 (CE100) is an innovation program designed to help governments and others realize their circular economy ambitions faster and in a unique multi-stakeholder platform. There are a number of opportunities that can be explored with the support of the EMF to help develop a circular economy strategy. There are various membership models available to engage with the EMF and Metro Vancouver began a three year membership in 2019. Staff expect this membership will foster growing opportunities at the regional level to advance a circular economy strategy. Ongoing participation in regional committees where these discussions are held is just one way that Richmond can remain connected, advocate and learn more about advancing the circular economy.

Further impetus at the provincial government level will also be needed and should be pursued to create the necessary momentum to foster a groundswell approach to widespread adoption of the circular economy. As noted, the City of Richmond is going in the right direction with many of its programs and initiatives that nicely dovetail with the circular economy. However, to independently pursue the circular economy more fully at this time would be premature given the level of financial commitment required and the low impact this would have compared to a broader-based approach.

Recommended Approach:

The greater the scale and scope of a circular economy, the greater benefit it will deliver. In addition, many of the players in a circular economy, such as senior governments and multi-national corporations, operate across local jurisdictional boundaries. In Canada, the provincial scale would be a scale of a circular economy that could be resourced and regulated to maximum benefit. At the regional level, there are many opportunities to influence plans and policies, particularly in the waste management arena (e.g. solid and liquid waste management plans). Therefore, advocating leadership at the provincial and regional levels is recommended. Richmond staff can continue to participate and advocate the circular economy agenda through participation in regional committees and provincial forums, in addition to continuing

Richmond's already progressive approach to bringing forward leading edge programs and services that support the circular economy.

Financial Impact

None.

Conclusion

The 2018 Zero Waste Conference highlighted the importance of moving from a linear to a circular economy to preserve finite resources and sustainably steward those resources for a growing population.

The approach outlined in this report recommends urging leadership at the regional and provincial government levels to facilitate broader and more impactful change to foster the circular economy agenda.

Suzanne Bycraft
Manager, Fleet and Environmental Programs
(604-233-3338)

Peter Russell
Senior Manager, Sustainability and District Energy
(604-276-4130)

SJB:

Att. 1: Summary of "2018 Zero Waste Conference: A Future without Waste: The Journey to a Circular Economy"
Att. 2: Related Circular Economy Commitments and Initiatives

Attachment 1

Summary of 2018 Zero Waste Conference
A Future without Waste: The Journey to a Circular Economy
Presented by: Metro Vancouver and the National Zero Waste Council (NZWC)
Date: November 8-9, 2018

Key Highlights:

- A total of 501 registered attendees (Academia 6%, Individuals 7%, Local Government 18%, Other Government & First Nations 8%, Not for Profit/NGOs 20%, Private Sector 41%)

- Hosted by Malcolm Brodie (Chair, NZWC and Metro Vancouver Zero Waste Committee), Emceed by Vanessa Timmer (Executive Director, One Earth), with a video welcome from Prime Minister Justin Trudeau, and over 40 other speakers, panelists and moderators including:

    - A keynote presentation from Swiss Futurist and Humanist Gerd Leonhard on how new thinking by individuals and moving to more circular economies is needed to capture the potential benefits of technology.
    - A Technology Innovation panel with representatives from OPTEL, Accenture Strategy & IBM, moderated by Smarter Sorting.
    - A Materials and Design Innovation presentation from Arthur Huang, founder of Miniwiz, which upcycles consumer and industrial waste into low carbon footprint products, and a panel discussion with IDEO & Closed Loop Partners, moderated by Cascades Recovery.
    - A panel on transformational leadership in the circular economy focusing on the role of government, featuring representatives from international leaders: Sitra (the Finnish Innovation Fund), Zero Waste Scotland, and the Netherlands
    - Announcement of the entrants into the NZWC's Design Portfolio – an online celebration of Canadian products and packaging in market that demonstrate the application of design principles and systems thinking to minimize waste.
    - A keynote presentation from Professor Wayne Visser of the Antwerp Management School on Sustainability Innovation & Change Management.
    - A panel on Business Model Transformation associated with moving to a circular economy with representatives from Eileen Fisher Renew, IKEA Canada, three local entrepreneurs from FoodMesh (B2B food marketplace), ChopValue Manufacturing (furnishings and materials from recycled chopsticks), Nada (zero waste supermarket), a policy entrepreneur and moderated by Fairware (sustainable promotional merchandise).
    - A zero waste cooking demonstration with Bob Blumer, host of Food Network's The Surreal Gourmet using food scraps to create a pizza.

Attachment 1 (cont'd)

- A panel on Canadian leaders in reducing food waste, with Agriculture and Agri-Food Canada, Walmart Canada, Second Harvest, Provision Coalition, and the NZWC.
- A keynote from designer and educator Dr. Leyla Acaroglu (Unschool) on Disrupting the Status Quo through design and collaborative action based on systems mapping.
- A second day video welcome from George Heyman, BC Minister of Environment & Climate Change Strategy and a keynote from Dr. Stephen Lucas, Deputy Minister, Environment and Climate Change Canada.
- A Plastics Innovation Forum with Cheslea Rochman from the University of Toronto and a panel including representatives from Ellen MacArthur Foundation, Circle Cities Programme, and Think Beyond Plastic™ moderated by the Recycling Council of Alberta.
- A Canadian Innovation Showcase featuring initiatives consistent with resource-efficient, lifecycle management of plastics in the economy per the G7 Ocean Plastics Charter.
- A panel including members of the Circular Economy Leadership Coalition, a national alliance of institutional and corporate leaders committed to advancing a circular economy in Canada. Speakers included those from the NZWC, IKEA Canada, The Natural Step Canada, Smart Prosperity Institute, Loblaws, and NEI Investments.

Attachment 2

Related Circular Economy Commitments and Initiatives

There are a number of calls to action at international, national and local levels which target responsible resource use and waste diversion. These commitments serve to highlight the growing and widespread harmful impacts of waste, and in particular plastic waste, on the natural environment. Recent commitments include:

- **Group of Seven:** On September 20, 2018, the Group of Seven (G7) meeting, which groups Canada, France, the United States, the United Kingdom, Germany, Japan, Italy and the European Union, endorsed an Ocean Plastics Charter launched by Canada as part of its 2018 G7 presidency.

- **Canadian Council of Ministers of Environment:** On November 23, 2018 the Canadian Council of Ministers of Environment (CCME) agreed to work collectively toward a common goal of zero waste. The CCME endorsed a Canada-wide waste reduction goal to encourage and highlight waste reduction progress in Canada. In 2014, each Canadian generated an average of 706 kg of all types of waste (as per Statistics Canada). The Canada-wide target is to reduce this number to 490 kg per person (a 30% reduction) by 2030, and to 350 kg per person (a 50% reduction) by 2040. The agreement further added: *"In moving to a circular economy for plastics with this collaborative approach, Canada will be positioning itself as a leader in forward-looking and innovative waste prevention and management solutions."*

- **The Circular Economy Leadership Coalition:** The National Zero Waste Council helped to found the Circular Economy Leadership Coalition (CCLC). The CCLC is a national alliance of Canadian leaders working together to eliminate waste and accelerate the reduction of carbon emissions from the Canadian economy through the advancement of a circular economy. The CELC identified that *"An opportunity for governments to increase companies' competitiveness with better policy and regulatory tools: Canadian businesses understand the need for innovation to stay competitive in the global economy. Building a Circular Economy requires policies at every level of government to encourage and reward firms that invest in new technologies and processes, protect and remediate our natural resource wealth, use those resources efficiently and eliminate waste."*

- **Metro Vancouver:** Metro Vancouver's Zero Waste Challenge states that *"The challenge for Metro Vancouver, which manages the region's waste, is to increase awareness that reducing and reusing waste are a priority to managing waste sustainably. This requires advocating policies and regulations to reduce waste, opening discussions on the approach to consumer goods to include more durable, repairable and recyclable goods, and encouraging citizens to act."* Metro Vancouver aims to work with other governments, Federation of Canadian Municipalities, and businesses to advocate increased reduce and reuse initiatives and provide tools such as an online recycling database, promote best practices for business, and strengthen the market for recyclable materials.

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	January 25, 2019
From:	John Irving, P.Eng. MPA Director, Engineering	**File:**	10-6060-01/2019-Vol 01
Re:	**2019 Liquid Waste Management Plan Biennial Report**		

Staff Recommendation

That the staff report titled "2019 Liquid Waste Management Plan Biennial Report," dated January 25, 2019, from the Director, Engineering, be submitted to Metro Vancouver.

John Irving, P.Eng. MPA
Director, Engineering
(604-276-4140)

Att. 1

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Sewerage & Drainage	☑	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	**INITIALS:**	**APPROVED BY CAO**

Staff Report

Origin

The Greater Vancouver Sewerage and Drainage District (GVS&DD) Board adopted the Integrated Liquid Waste and Resource Management Plan (the "Liquid Waste Plan") in May 2010. Subsequently, at the September 27, 2010 City of Richmond Regular Council Meeting, Council adopted the following motion:

> *"That the municipal commitments in the Metro Vancouver 2010 Integrated Liquid Waste and Resource Management Plan be endorsed."*

The Minister of Environment approved the Liquid Waste Plan, subject to conditions identified in his letter, dated May 30, 2011.

The Liquid Waste Plan requires member municipalities to report progress on 27 municipal commitments on a biennial basis. The Liquid Waste Plan Biennial Report will be compiled by Metro Vancouver and submitted to the Minister of Environment once it is approved by the GVS&DD Board.

This staff report summarizes the City's progress on the Liquid Waste Plan municipal actions and presents the 2019 Liquid Waste Management Plan Biennial Report (the "2019 Biennial Report") (Attachment 1) for Council's endorsement for submission to Metro Vancouver for incorporation into the Liquid Waste Plan Biennial Report.

Analysis

The Liquid Waste Plan includes a municipal commitment to report progress on a biennial basis. The 2019 Biennial Report covers the 2017 to 2018 reporting period. Richmond has previously submitted seven biennial reports over the last 16 years based on reporting requirements in the current and previous Liquid Waste Management Plans.

The 2019 Biennial Report includes 27 narratives, several tables and graphics attachments that report on the 27 municipal commitments included in the Liquid Waste Plan. The following are highlights of Richmond's 2019 Biennial Report:

Inflow and Infiltration

Inflow and infiltration of stormwater into the sanitary sewer system are typically caused by cross-connections or defects in the infrastructure and place additional demands on the sanitary system. Liquid Waste Plan action 1.1.18 requires municipalities to develop and implement inflow and infiltration management plans that ensure inflow and infiltration levels are within Metro Vancouver allowances. Richmond does not have combined sewers and does not permit unregulated groundwater discharge into the sanitary sewer system. The City continues to manage inflow and infiltration through managing defects through its sanitary sewer assessment and rehabilitation program.

Metro Vancouver targets to inspect regional sanitary sewers on a twenty year cycle. Richmond began CCTV inspections of its gravity sanitary sewers in 2002 and was completed by 2015, seven years ahead of Metro Vancouver's target. Rehabilitation of damaged mains identified through inspection are brought forward through the annual capital program.

Staff continue to monitor inflow and infiltration levels at the City's sanitary pump stations, identifying any catchments that may have higher inflow and infiltration rates for subsequent study and remediation if required. Richmond is currently a leader within the region in managing and reducing inflow and infiltration in its sanitary sewer system.

Asset Management Plan

Liquid Waste Plan action 3.1.8 requires municipalities to develop and implement asset management plans and to provide copies of those plans to Metro Vancouver by 2014. Richmond maintains both an Ageing Infrastructure Management Plan and a Growth Related Infrastructure Management Plan that are reviewed and updated regularly. Both of these have been in place for a number of years and were submitted ahead of Metro Vancouver's target date.

Sanitary Sewer Overflows

Liquid Waste Plan action 3.3.7 requires municipalities to report on the frequency and location of sewerage overflows from municipal sanitary sewers. The City does not have sanitary sewer overflow issues and there were zero overflows for the reporting period. This is largely due to Richmond's successful capital and maintenance programs and separated sewer systems.

Stormwater Management Plan

Liquid Waste Plan action 3.4.7 requires municipalities to develop and implement stormwater management plans that integrate with land use. Richmond has developed an Integrated Rainwater Resource Management Strategy (IRRMS), a strategic approach to manage stormwater within the City's floodplain ecosystem. It identifies strategies to detain stormwater, improve water quality, control sediments, harvest and re-use rainwater, and protect and enhance green infrastructure. Richmond's Ecological Network Management Strategy (ENMS) contains extensive actions and initiatives on the integration of rainwater management Best Management Practices tailored to various land uses within the City.

Key programs aligned with the IRRMS include:

- Stormwater detention pond constructed in the Garden City Lands, and other planned water storage bodies for future phases;
- Updated and new Bulletins with specific information for development adjacent to RMA's for single-family and multifamily residential, commercial and industrial development;
- City's Rain Barrel Program to encourage residents to collect and store water for outdoor re-use; and
- Implementation of stormwater sampling and monitoring program.

Water Metering

Ministerial Condition 2 for approval of the Liquid Waste Plan strongly encourages municipalities to business case and/or implement residential water metering programs and to consider municipal rebate programs for water efficient fixtures and appliances to reduce water use.

The City is a regional leader in water metering and has a comprehensive water meter program for both residential and commercial properties. All single-family, industrial, commercial, institutional and farm properties in Richmond are metered. Multi-family complexes can volunteer for water meters through a subsidized program comprised of a meter installation subsidy complemented by a five-year guarantee that allows residents to adjust water use habits without financial risk. By the end of 2018, 46% of multi-family properties are metered in Richmond and approximately 94% of those customers saved money compared to the flat rate.

Water metering provides customers increased rate equity compared to the flat rate and a tool to manage their costs while consumption monitoring allows staff to identify system inefficiencies. Since 2003, the City has managed to reduce total water consumption despite an 18% population increase. By reducing water consumption, the City achieved a cost reduction of over $9 million in Metro Vancouver water purchase costs in 2017 alone. This is a strong indication that water metering efforts to date are having a positive impact on water conservation and minimizing the need for costly infrastructure upgrades by managing increases in demands.

Universal deployment of the fixed base water meter reading network throughout the City was previously endorsed by Council and will be completed in 2019. The fixed base network will facilitate automated data collection to reduce costs associated with reading water meters, allow staff to gather real-time consumption data, assist in helping customers identify causes of leaks and water consumption habits, and enhance revenue forecasting which will inform the utility budget process.

To further promote reduced water use, the City provides metered customers with water conservation kits, which include low flow showerheads, faucet aerators, toilet fill cycle diverters, toilet leak detection tablets, and educational water conservation tools. In addition, the City has successful programs for toilet rebates, rain barrels, and clothes washer rebates. To the end of 2018, 7372 toilet rebates, 1727 rain barrels, and 914 clothes washer rebates have been issued to Richmond residents.

Odour Control

Following the odour issues related to Harvest Power, the City took a lead role in coordinating residents, businesses, Metro Vancouver and the Province in addressing the matter. One of the outcomes resulted in the City writing to the Province and Metro Vancouver to request that measurable odour limits be included in the Provincial Environmental Management Act and Organic Matter Recycling Regulation and in the Metro Vancouver Air Quality Management Bylaw in order to manage these issues in the future. Metro Vancouver and the Province have not added odour measurement to their regulations. In 2019 the City will pursue this matter further with Metro Vancouver and the Province so that odours can be measured and regulated.

Regional Asset Management

Through this initiative staff will be requesting that Metro Vancouver address the potential impacts of climate change to the regional liquid waste system. There are significant investments in new regional liquid waste infrastructure funded through municipal sewer utility rates. It is not clear through this process how the regional liquid waste system is being adapted given the latest science on climate change.

Financial Impact

None.

Conclusion

The 2010 Liquid Waste Plan includes a municipal commitment to report progress on Liquid Waste Plan actions on a biennial basis. The attached 2019 Biennial Report summarizes Richmond's progress on municipal actions for the 2017 to 2018 reporting period. Staff will continue to work on municipal actions identified in the Liquid Waste Plan to ensure the City of Richmond is meeting all of the requirements.

Eric Sparolin, P.Eng.
Acting Manager, Engineering Planning
(604-247-4915)

ES:al

Att. 1: City of Richmond 2019 Liquid Waste Management Plan Biennial Report

2019 Liquid Waste Management Plan Biennial Report

Reporting Period: 2017 – 2018

Municipal Submission Section

To be completed by: March 15, 2019

Municipal Contact Information			
Name	**Email**	**Phone**	**Responsible For ILWMP Action #'s**
Eric Sparolin	ESparolin@Richmond.ca	(604) 247-4915	
Peter Russell	PRussell2@Richmond.ca	(604) 276-4130	1.1.16, 1.1.17, 1.3.15, 3.4.7, Ministerial Conditions (7,9)

List of Content

Submission Checklist

Narratives:

☐ Narrative 1: *Summarize ongoing permitting & inspection programs*

☒ Narrative 2: *Summarize approach to regulating pesticides and lawn care products*

☒ Narrative 3: *Summarize updates to outreach plans for supporting liquid waste source control programs (e.g. stormwater, sewer use, sewer maintenance, I&I management, cross connections etc.) during the reporting period*

☒ Narrative 4: *Summarize I&I management plans & list key actions resulting from plans*

☒ Narrative 5: *Summarize enforcement enhancements and process efforts during reporting period*

☒ Narrative 6: *Highlight and summarize bylaw changes relating to stormwater management*

☒ Narrative 7: *Highlight and summarize changes to utility design standards and neighbourhood design guidelines in relation to on-site rainwater management*

☒ Narrative 8: *Summarize development of municipal sanitary overflow management plans. Highlight specific examples.*

☒ Narrative 9: *Highlight & summarize progress on the prevention of CSOs and the separation of combined sewers*

☒ Narrative 10: *List approaches and strategies that address risks (ie: regular maintenance, SCADA, monitoring, protocols, identified redundancies/contingencies)*

☒ Narrative 11: *Describe regulations and status of applications*

☒ Narrative 12: *Summarize existing municipal odour control programs and the implementation of new programs for targeted municipal sewer facilities*

☒ Narrative 13: *Summarize air emissions management programs for standby power generators at municipal sewer pump stations*

☒ Narrative 14: *Summarize air emissions management programs for standby power generators at municipal sewer pump stations.*

☒ Narrative 15: *Summarize key progress on the assessment and condition of municipal sewerage system*

☒ Narrative 16: *Summarize key progress or accomplishments on the development of asset management plans for municipal sewerage infrastructure*

☒ Narrative 17: *Summarize key findings from the tri-annual internal audit (first due in 2015)*

☒ Narrative 18: *Summarize the estimate of greenhouse gas emissions and odours associated with the operation of municipal and regional liquid waste management systems*

☒Narrative 19: *Summarize and highlight any important details and action plans relating to wet weather SSOs & probably causes of CSOs*

☒ Narrative 20: *Summarize and highlight any changes to the existing municipal sewer flow & sewer level monitoring network*

☒ Narrative 21: *Summarize progress on the development of emergency management strategies and response plans for municipal & regional wastewater collection and treatment systems*

☒ Narrative 22: *Summarize key initiatives that support the adaptation of infrastructure & operations to address risks and long term needs*

☒ Narrative 23: *Summarize and highlight key initiatives relating to the development and implementation of the integrated management plans*

☒Narrative 24: *Discuss water metering & rebate programs relating to water fixtures and appliances*

☒Narrative 25: *Summarize whether any new municipal water metering policies or programs were introduced in 2015-2016 that address this action. If no changes, then indicate, "Same as the 2013-2014 reporting period: no changes".*

☒ Narrative 26: *Quote relevant OCP sections addressing stormwater, stream health and their consideration of ISMPs*

Tables:

Graphics & GIS Data:

☒ Attachment 1:

- I&I Mapping showing I&I rates for neighbourhoods where studies have been completed with before and after I&I (L/ha·d). Objectives to Illustrates catchment areas covered by I&I studies.
- Transmit an electronic copy of GIS shape files for study catchment boundaries to Metro Vancouver

☐ Attachment 2:

- Mapping showing where sewer separation work occurred in 2017-2018
- GIS shape files of the locations where sewer separation occurred in 2017-2018 for composite mapping
- GIS shape files of catchments of remaining combined sewer catchments as of December 31, 2016 (if separated catchments discharge to combined sewers, code the separated catchments as "separated").

☐ Attachment 3:

- Map and GIS data showing location of emergency municipal overflows (this information should have already been provided through a separate request through the REAC LWSC as well as the 2015-2016 reporting). If already provided, please indicated so.

☒ Attachment 4:

- 2017-2018 map showing odour control facilities & locations of complaints (different than facility)
- GIS shape files for the odour facility and complaint mapping to allow for development of composite mapping

☒ Attachment 5:

- A map showing sewerage system CCTV inspection for 2017-2018 and the other areas of CCTV inspection work in a different colour over the previous 18 years (1996-2014).
- A map showing any sewer replacement /rehabilitation work for 2017-2018 as part of either asset management or capacity upgrades. Indicate whether the work is for upgrades or maintenance.

☒ Attachment 6:

- Titles of any completed asset [replacement] management plans (author, date, title, and publisher) for 2017-2018.
- Completed annual PSAP 3150 reporting on asset values for 2017-2018.
- Colour coded map showing age of the sewerage system (i.e.: <1900, 1901-1925, 1926-1950, 1951-1975, 1976-2000, >2001) updated to show any changes made in 2013-2014. If no changes, please indicate so and the mapping prepared for the 2010-2013 reporting period will be used.

☐ Attachment 7:

- Provide (if not already provided) GIS shape files which have the locations of the CSO outfalls for purposes of summary mapping (should already be reported under WSER).
- Provide GIS shape files or coordinates for the locations of wet & dry weather SSOs for each year (indicate which is dry/wet and year). Include SSO dates and estimated volume

☒ Attachment 8:

- Map and GIS coordinates showing locations of active municipal sewer flow/level monitors for the reporting period 2017-2018 (indicate whether permanent or temporary)

☒ Attachment 9:

- If not already provided, provide updated GIS shape files of the municipal sanitary sewer network, including manholes, pump stations, pipe diameters for the municipal sewer system as of the end of 2016. Please indicate what changes have been made for 2017-2018.

☒ Attachment 10:

- GIS shape files showing the ISMP boundaries and their status: Development Phase= Yellow; Implementation Phase = Light Green; Completed Phase = Dark Green. Add ISMPs still to start development as outlined only).

☐ Attachment 11:

- If initiated, results per watershed (as per ISMP Adaptive Management Framework)
- If undertaken, a map plus GIS shape files/coordinates showing location of monitoring.

☐ Attachment 12:

- Map showing any 2017-2018 changes to protected riparian areas & possible stream classifications. If no changes, then this figure is not required.

City of Richmond

Action 1.1.14 – Review and enhance sewer use bylaws to reduce liquid waste at source, including contaminants identified by the *Canadian Environmental Protection Act (2012).*

Table 1 Core Sewer Use Bylaws

Sewer Use Bylaws*	2017-2018 Changes**
Drainage, Dyke and Sanitary Sewer System Bylaw No. 7551	While it has always been standard practice for the City to restrict the discharge of groundwater in to the City's drainage system, in 2017, the bylaw was amended to explicitly prohibit the discharge of groundwater into the City's drainage system.
Public Health Protection Bylaw No. 6989	No changes with respect to liquid waste
Pollution Prevention and Clean-Up Bylaw No. 8475	Amended to include a new non-stormwater discharge permitting process that includes: • Update dewatering discharge standards; • Requirement for a Qualified Environmental Professional to certify the quality of discharge into the City's storm system; • Include a new permit fee to enable cost recovery for the City for processing such applications.

**Re-list existing core sewer use bylaws and list all new bylaws*
***Summarize any changes (if no changes, enter "No changes")*

Table 2 Summarize Status of Bylaws Related to Controlling Sediment Transport & Erosion

Name of Bylaw* (related to controlling sediment release from land clearing and construction phase of development)
Drainage, Dyke and Sanitary Sewer System Bylaw No. 7551 – requires that connections to the City's drainage system are disconnected and capped prior to demolition of buildings to prevent sediment entering the drainage system. ***Pollution Prevention and Clean-Up Bylaw No. 8475*** – prohibits the release of polluting substances into the receiving environment, and restricts non-stormwater discharges in the City's drainage system or watercourse without a Permit. Permit applications require a Qualified Environmental Professional to provide a Water Quality Monitoring Response Plan and a signed and sealed declaration confirming the discharge water will meet minimum standards listed in the Bylaw. ***Boulevard and Roadway Protection and Regulation Bylaw No. 6366*** – requires that anyone using a boulevard for construction to ensure that the roadway is cleared of sediment producing material during the activity. ***Boulevard Maintenance Bylaw No. 7174*** – Requires that a property owner not discard any materials fronting their property. ***Watercourse Protection and Crossing Bylaw No. 8441*** – limits the obstruction of flow, and requires that watercourse crossing design, construction and maintenance are approved by the City so as to protect water quality and the functioning of the City's drainage system or any City land. ***City of Richmond Engineering Design Specifications*** – requires that catch basins and inspection chambers be

installed on all drainage service pipes to prevent sediment discharging into the City's drainage system. It also requires that a Sediment Control Plan be submitted to the City to identify the type and location of sediment control best management practices that will be used during construction.	
Bylaw Details	**2017-2018 Changes***
Summarize monitoring requirements	No changes
How data is assessed under the bylaw?	No changes
How is assessment used to initiate corrective actions?	No changes
Summarize approaches used to maintain compliance with the bylaw (e.g. annual resources dedicated to maintaining compliance).	Bylaw 8475 was amended to include a non-stormwater discharge permit fee. Funds generated are allocated to field monitoring and verification of discharge compliance. Additionally, the bylaw was strengthened to allow greater ability to recover remediation costs in the event of a pollution event.
Discuss effectiveness of bylaw/bylaws and current approach to prevent inputs of sediment to the storm system and receiving environment.	Sediment meets the definition of a "polluting substance" under Bylaw No. 8475 and is banned from being introduced to the environment. The bylaw is used to recover remediation costs caused by sediment inputs, and additionally serves to promote owner –lead preventative measures to avoid these costs.

**For bylaws unchanged since 2015-2016, summarize any changes 2017-2018 (if no changes, enter "No changes"). Otherwise, describe the new bylaw.*

Action 1.1.15* – Continue existing programs of permitting and inspection to support and enforce sewer use bylaws (*Ongoing, *City of Vancouver Only).*

Narrative 1: Summarize ongoing permitting & inspection programs

Insert Narrative Text Here

Table 3 Types and Number of Liquid Waste Related Permits Issued 2017-2018

Permit Type/Name*	Number of Permits*	Referenced Bylaw*

**City of Vancouver Only*

Action 1.1.16 – Identify and regulate pesticides and lawn care products which negatively affect rainwater runoff quality and urban stream health *(2014).*

Narrative 2: Summarize approach to regulating pesticides & lawn care products for 2017-2018.

Adopted in 2009, Richmond's Enhanced Pesticide Management Program (EPMP) reduces the exposure of Richmond residents to unnecessary pesticide use. The program includes a regulation restricting the use of pesticides for cosmetic purpose, as well as resources to empower community members to make the switch to pesticide-free practices. In December of 2015, the City adopted the Invasive Species Action Plan (ISAP), intended to build upon the

accomplishments of the EPMP. ISAP includes strategies to reduce the economic and environmental risks of invasive species management by implementing monitoring and control procedures and increasing awareness of invasive species within the community. ISAP delivers the City's early detection and rapid response program for public and private lands in order to ensure that pesticides and lawn-care products are deployed minimally and in a highly controlled fashion.

The City's Pesticide Use Control Bylaw No. 8514 restricts the cosmetic use of pesticides on residential and municipally-owned lands, allowing only low-toxicity products listed under the BC Integrated Pest Management (IPM) Regulation Schedule 2 and Schedule 5. In addition to bylaw enforcement, the City provides an expanded Education and Community

Partnerships Program to inform the community about pesticide restrictions and to promote natural gardening and pest solutions. This includes a series of natural gardening workshops, a phone line to help residents learn proper plant care and sustainable pest solutions, and information sheets available through the City's website. In 2016, the list of permitted pesticides that serve as safer alternatives to conventional pesticides were reviewed and updated within Bylaw No. 8514.

Table 4 Products Regulated to Protect Stormwater Runoff Quality

Regulated Products	**Type of Regulation** *(Sales Ban, Use Ban, Permit, Limited Users, etc.)*	**Additional Information** *(Referenced Bylaw & Policy Numbers)*
Pesticide	Limited users	Pesticide Use Control Bylaw No. 8514 – Amendment Bylaw 9574.

Action 1.1.17 – Continue outreach plans to support liquid waste source control programs *(Ongoing).*

Narrative 3: Summarize 2017-2018 updates to outreach plans for supporting liquid waste source control programs (e.g. stormwater, sewer use, sewer maintenance, I&I management, cross connections etc.).

Green Cart Program

Richmond residents have access to food scraps recycling services with the Green Cart Program since 2013. The Green Cart Program reduces the amount of waste that would otherwise be discharged to the sanitary sewer through garburators. Through the Green Cart program, 20,500 tonnes of food scraps and yard trimmings were collected in 2018. To facilitate grease reduction in the sanitary system, Richmond conducts the following activities:

- Provide Green Cart Program literature, which includes information on the impact of grease on the sewer system as well as proper grease disposal techniques, noting that small amounts of grease and oil that can be absorbed by newspaper or paper towel should be recycled in the Green Cart.
- Cooking oil and animal fat continue to be accepted at the City's Recycling Depot.
- Promote proper disposal of cooking oil and grease through the annual collection calendar/recycling guide, Green Cart brochure, annual report and community outreach which includes recycling workshops , booths at community events and recycling information sessions in multi-family buildings.
- Discourage the use of garburators as part of the Green Cart Program.

- Carry out the Green Cart and Recycling Depot programs, which allow residents to recycle food scraps and solid grease. Signage at the depot for oil and grease recycling simplifies the drop off process for residents.

Metro Vancouver Waste Water Discharge Permit Process

The City continues to participate in the Metro Vancouver sanitary sewer source control program by supporting the Metro Vancouver Waste Water Discharge Permit process.

Fat, Oil and Grease Reduction Programs

The City maintains a Grease Management Program which includes grease source control, sanitary sewer system monitoring and inspection, an on-going maintenance work. Bylaw enforcement staff continued to work with representatives from Metro Vancouver, stakeholder groups, industry associations, pumping operators and grease trap vendors to mitigate the impact of fats, oils and grease on the region's sanitary sewer system. In 2017, the City expanded its grease management enforcement program to include a full time grease inspector. The following additional services have been introduced through this expanded program:

- Improved Education and Assistance: The bylaw officer's services have been expanded to include assisting food establishment owners by providing the necessary tools and information to enable them to meet the requirements of the City's Bylaw No. 7551. This has resulted in a decrease in grease-related violations to the bylaw.

- Increased Inspection Efforts: In 2017 and 2018, assertive enforcement efforts involved 2181 Grease Inspections and 71 violations.

- Integrated Inspection and Outreach Program: The grease inspection program has been enhanced to become integrated with the sanitary sewer maintenance program to collaboratively trace the source of significant grease discharge within the City. The integrated approach to target problem areas has increased the effectiveness of sanitary maintenance and inspection efforts. Previous efforts have been largely focused on food sector establishments. The stronger coordination with Public Works has facilitated identification of grease issues in residential areas.

Rainwater Best Management Practices

Richmond's Official Community Plan Bylaw No. 9000 – Schedule 1, Section 14.2.10, Development Permit Guidelines – Green Buildings and Sustainable Infrastructure, provides general direction in regards to the voluntary undertaking, where feasible, of green building and sustainable infrastructure to support City of Richmond sustainability objectives and help reduce the demand for energy and resources. Developers are encouraged to incorporate green roofs, bio-swales, infiltration and other best management practices throughout the building site to store rainwater, mitigate urban heat island effect, reduce heating and cooling loads and reduce the impact on City drainage systems.

Richmond's Integrated Rainwater Resource Management Strategy contains initiatives to strategically implement stormwater detention and rainwater re-use measures and encourage stormwater detention on private properties in order to reduce stormwater runoff. In addition, the strategy works to strengthen erosion and sediment control and encourage water quality improvements.

Richmond's Ecological Network Management Strategy (ENMS) was adopted in 2014 and provides the ecological blueprint for the City to protect, connect and enhance the natural and green spaces throughout Richmond and beyond.

It is an opportunistic approach for managing and guiding decisions regarding the city-wide system of natural areas and the ecosystem services they provide. It is designed to complement existing development processes and regulations in order to integrate ecological connectivity and health into all neighbourhoods and land-uses. The ENMS contains extensive actions and initiatives on the integration of rainwater management Best Management Practices tailored to various land uses within the city. These include green infrastructure (e.g. rain gardens, swales, harvesting) development in parks and through planning processes, riparian corridor enhancements, and the review and update of bylaws.

In November 2018, the City hosted a Mitchell Island Environmental Management Collaboration Meeting. The purpose of the meeting was to define strategies to deal with the prevention of pollution on Mitchell Island. Storm water health was a primary topic of the meeting and provincial, regional, and city regulators were present.

Rain Barrel Program

The City offers rain barrels to Richmond residents at subsidized prices.

Low-Flow Toilet Rebate Program

The City offers a $100 rebate to residents for replacing old toilets with new low-flush toilets to reduce waste volume through water conservation.

High-Efficiency Clothes Washer Rebate Program

The City partnered with BC Hydro to offer a maximum $100 rebate to residents for replacing old clothes washers with new energy- and water- efficient models, in order to reduce GHGs through energy conservation as well as waste volume through water conservation.

Water Meter Programs

The City maintains an advanced water metering program to encourage water conservation. All commercial and industrial water use is metered. The Universal Water Metering program for all single-family properties was completed by the end of 2017. The City continues to maintain a volunteer water metering program for multi-family properties that includes mandatory metering of new multi-family complexes, subsidizing installation costs for existing multi-family complexes (up to the greater of $1,200 per unit or $100,000 per complex for the actual installation cost), and a five-year guarantee that allows residents to adjust water use habits without financial risk. Currently 46% of the multi-family units in Richmond have been metered for water and approximately 94% of metered multi-family complexes saved money compared to the flat rate.

Water metering provides customers increased rate equity compared to the flat rate and a tool to manage their costs while consumption monitoring allows staff to identify leaks and system inefficiencies to minimize wastage. Since 2003, the City has managed to reduce total water consumption despite an 18% population increase. By reducing water consumption, the City achieved a cost reduction of over $9M in Metro Vancouver water purchase costs in 2017 alone. This is a strong indication that water conservation efforts to date are have been effective in reducing water use and sewerage discharge correspondingly to minimize capital replacement needs.

The City continues to leverage its water meter infrastructure to further enhance customer service and water conservation strategies by deploying a fixed based network. This advanced metering infrastructure will provide staff with real-time consumption data that can help customers identify leaks, inform water consumption habits, and enhance revenue forecasting.

Action 1.1.18 – Develop and implement inflow and infiltration management plans, using the Metro Vancouver template as a guide, to ensure wet weather inflow and infiltration volumes are within Metro Vancouver's allowances as measured at Metro Vancouver's flow metering stations *(2012).*

Narrative 4: Summarize I&I management plans & list key actions resulting from plans in 2017-2018. If no work was initiated or undertaken for 2017-2018, then indicate "Same as the 2015-2016 reporting period: no changes".

Richmond monitors I&I at the catchment level through pump runtimes at sanitary pump stations. Detailed pump runtimes are captured in data loggers that are manually downloaded to spreadsheets and subsequently converted to sanitary flow rates.

Richmond has installed pressure sensors at sanitary pump stations in order to improve the accuracy of pump runtime analysis. Utilizing pressure information and pump curves will improve the accuracy of the flow information generated by the City's monitoring program. In addition, the City continues to install magnetic flow meters at new sanitary pump stations. Automated pump runtime data collection has also been set up through the SCADA network, and the City is moving towards utilizing FlowWorks to further analyze the data collected.

Catchment level data is being utilized to identify catchments with excessive I&I for further study. This study will include a review of sanitary system response to rainfall events in order to determine the relative levels of I&I. This information will be subsequently utilized to identify appropriate inspection techniques for further catchment review.

Richmond began CCTV inspections of its gravity sanitary sewers in 2002. By 2015, CCTV inspections have been completed for 100% of Richmond's gravity sewers. A dynamic GIS layer was introduced in 2018 linking CCTV inspection videos to the asset management system enhancing access and documentation of inspection results and asset condition assessments.

Attachment 1:

a) I&I Mapping showing I&I rates for neighbourhoods where studies have been completed with before and after I&I (L/ha·d). Objectives to Illustrates catchment areas covered by I&I studies.

b) Transmit an electronic copy of GIS shape files for study catchment boundaries to Metro Vancouver.

Action 1.1.19 – Enhance enforcement of sewer use bylaw prohibition against the unauthorized discharge of rainwater and groundwater to sanitary sewers *(2010).*

Narrative 5: Summarize enforcement enhancements and process effort changes during 2017-2018. If no changes, then enter "Same as the 2015-2016 reporting period: no changes".

Same as the 2015-2016 reporting period: no changes.

Table 5 Bylaws Regulating Discharges of Groundwater and Rainwater to Sanitary Sewers

Regulation or Bylaw No.	Date	Summary of Any Changes 2017-2018*
Drainage, Dyke and Sanitary Sewer System Bylaw No. 7551	Effective Date –	In 2017, the bylaw was amended to explicitly prohibit the discharge of groundwater into the City's drainage system.

	January 1, 2003	
Pollution Prevention and Clean-Up Bylaw No. 8475	Effective Date- October 13, 2009	Amended to update the discharge criteria and include a permit fee. Funds generated are allocated to field monitoring and verification of discharge compliance. The bylaw was further strengthened to allow greater ability for the City to recover remediation costs in the event of a pollution event.

**if no changes, enter "no changes" in table.*

Action 1.1.20 – Update municipal bylaws to require on-site rainwater management sufficient to meet criteria established in municipal integrated stormwater plans or baseline region-wide criteria *(2014).*

Narrative 6: Highlight and summarize any bylaw changes or development effort relating to stormwater management for 2017-2018. If no changes, indicate "Same as the 2015-2016 reporting period: no changes".

The region wide baseline has been approved by the Board for use by Municipalities and ISMP's should be in implementation phase. Please list below the bylaws requiring on-site stormwater management per this action.

Bylaw provisions have been strengthened to allow greater ability to recover remediation costs in the event of a pollution event.

Table 6 Bylaws Related to On-site Stormwater Management

Related Stormwater Bylaws	**Changes to On-Site Stormwater Management Target/Objectives** (2017-2018)*
Green Roofs & Other Options Involving Industrial & Office Buildings Outside the City Centre Bylaw No. 8385	No changes
Official Community Plan Bylaw No. 9000	No changes regarding on-site stormwater management
Pollution Prevention and Clean-Up Bylaw No. 8475	Amended to include a non-stormwater discharge permit fee. Funds generated are allocated to field monitoring and verification of discharge compliance. Additionally, the bylaw was strengthened to allow greater ability to recover remediation costs in the event of a pollution event.

**if no changes, enter "no changes" in table.*

Action 1.1.21 – Update municipal utility design standards and neighbourhood design guidelines to enable and encourage on-site rainwater management *(2014).*

Narrative 7: Highlight and summarize changes for 2017-2018 to utility design standards and neighbourhood design guidelines in relation to on-site rainwater management. If no changes were made or processes initiated, then indicate "Same as the 2015-2016 reporting period: no changes".

In 2018 Council endorsed the Integrated Rainwater Resource Management Strategy (IRRMS). Key programs aligned with the IRRMS include:

- In 2017 at the Garden City Lands a pond was constructed to serve both as irrigation storage for farm fields within the lands and stormwater detention. Several other water storage bodies are planned for future phases. Additionally, the Bog located on the eastern half of the site serves both as a site for restoration of sensitive ecological habitat as well as a large stormwater detention measure.

- The City has updated Bulletin Information-23 to include specific information for development adjacent to RMA's for multifamily residential, commercial and industrial development. A new standalone Bulletin Information-44 has been developed to inform single family residential development adjacent to the RMA.

- Since 2005 the City's Rain Barrel Program invites Richmond residents to purchase rain barrels at a subsidized rate. Rain barrels are used by residents to collect and store water for outdoor usage such as watering gardens and washing vehicles.

- The IRRMS sampling program for water quality parameters was implemented in 2018. Nine pump stations sample locations were selected to be representative of the majority of Richmond storm water discharge flow volume. To date five samples were collected within 30 days in both the wet and dry seasons and analyzed for general water quality parameters, bacteria (fecal coliform and E.coli) nutrients (nitrate) and select metals. Analytical results are expected by early 2019.

The City's drainage system is designed to accommodate a 10-year return period rainfall event. In recent years, there has been an increase in the occurrences and intensities of significant storms, with multiple storms exceeding a 10-year return period intensity in a given year. Staff analysis of recent storms events and recent trends has led to an update of the Intensity Duration Frequency design standards for drainage systems within Richmond. These updated standards will provide Richmond with more robust infrastructure to meet future needs.

Table 7 Municipal Standards, Guidelines and Policy Changes Related to On-site Stormwater Management

Name of Standard, Guideline or Policy	Changes for 2017-2018
City of Richmond Engineering Design Specifications	No changes with respect to rainwater management.
City of Richmond Integrated Rainwater Resource Management Strategy	Endorsed by Council for implementation (2018).
City of Richmond Ecological Network Management Strategy	No changes with respect to rainwater management.

**If identified unchanged since 2015-2017, briefly summarize any changes 2015-2017 (if no changes, enter "No changes"). Otherwise, briefly summarize if a new bylaw.*

Action 1.2.5 –	Work with Metro Vancouver to develop and implement municipal-regional sanitary overflow management plans as set out in 1.2.4 *(2013)*.

Narrative 8: Summarize development of any municipal sanitary overflow management plans for 2017-2018. Highlight any specific examples. If no new plans developed, then indicate "Same as the 2015-2016 reporting period: no changes".

Same as the 2015-2016 reporting period: no changes.

Action 1.2.6 – Burnaby, New Westminster and Vancouver will work with Metro Vancouver to give effect to 1.2.2 and, specifically, implement plans to prevent combined sewer overflows by 2050 for the Vancouver Sewerage Area and 2075 for the Fraser Sewerage Area and separate combined sewers at an average rate of 1% and 1.5% of the system per year in the Vancouver Sewerage Area and Fraser Sewerage Area respectively *(Ongoing).*

Narrative 9: Highlight and summarize progress on the prevention of CSOs and the separation of combined sewers for 2017-2018.

Not applicable as there are no combined sewers in Richmond.

Attachment 2:

a) Mapping showing where sewer separation work occurred in 2017-2018

b) GIS shape files of the locations where sewer separation occurred in 2017-2018 for composite mapping

c) GIS shape files of catchments of remaining combined sewer catchments as of December 31, 2015 (if separated catchments discharge to combined sewers, code the separated catchments as "separated").

N/A

Action 1.3.11 – Develop and implement operational plans for municipal sewerage facilities to ensure infrastructure reliability and optimal performance *(Ongoing).*

Narrative 10: Discuss approaches and strategies applied in 2017-2018 that address risks (i.e. regular maintenance, SCADA, monitoring, protocols, identified redundancies/contingencies). If these are the same as the previous reporting period 2015-2016, then indicate "Same as the 2015-2016 reporting period: no changes", or if only minor changes, enter appropriate text similar to "Same as the 2015-2016 reporting period except for..."

Same as the 2015-2016 reporting period except the City has initiated pilot projects for grease management within the sanitary system that facilitates the removal or breakdown of grease buildup in pump station wet wells. The projects are currently underway and results are expected in 2019 for review.

Action 1.3.12 – Work with Metro Vancouver to develop and implement emergency sanitary sewer overflow plans including contingency plans to minimize impacts of unavoidable sanitary sewer overflows resulting from extreme weather, system failures or unusual events *(Ongoing).*

Narrative 8: Identify any emergency procedures & protocols developed for 2017-2018. If these are the same as the previous reporting period 2015-2016, then indicate "Same as the 2015-2016 reporting period: no changes", or if only minor changes, enter appropriate text similar to "Same as the 2015-2016 reporting period except for..."

Richmond's municipal sanitary system did not experience any sanitary sewer overflows during the reporting period. Richmond does not have any combined sewer systems. Richmond does not have chronic sanitary sewer overflow issues due to weather or rainfall. There have been no changes to the emergency management plan, procedures, and protocols outlined for the 2017-2018 reporting period.

Attachment 3:

Map and GIS data showing location of emergency municipal overflows (this information should have already been provided through a separate request through the REAC LWSC as well as the 2015-2016 reporting). If already provided, please indicated so.

Action 1.3.13 – Work with private marina operators, Ministry of Environment and Environment Canada to develop and implement regulations to ensure all new marinas and marinas where planned renovations exceed 50% of the assessed existing improvements value have pleasure craft pump-out facilities *(Ongoing).*

Table 8 Bylaws and Regulations Requiring Pleasure Craft Pump-out Facilities at Marinas

Regulation Process or Bylaw*	Date*
Public Health Protection Bylaw No. 6989, Subdivision Two – Marina Health and Safety Regulation	Effective Date – March 13, 2000

** This may be repeated from the 2015-2016 reporting period*

Action 1.3.14 – Require all pleasure craft pump-out facilities to connect to a municipal sanitary sewerage system or a provincially permitted on-site treatment and disposal system or have established enforceable protocols for transporting liquid waste for disposal at a permitted liquid waste management facility *(Ongoing).*

Narrative 11: Describe any additional regulations and the number of on-site treatment systems required/installed during the reporting period 2016-2017. If these are the same as the previous reporting period 2015-2016, then indicate "Same as the 2015-2016 reporting period: no changes".

Same as the 2017-2018 reporting period: no changes.

Action 1.3.15 – Continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities *(Ongoing, see Action 3.3.4).*

Narrative 12: Summarize existing municipal odour control programs and the implementation of new programs for targeted municipal sewer facilities for the reporting period 2017-2018. If these are the same as the previous reporting period 2015-2016 then indicate "Same as the 2015-2016 reporting period: no changes", or if only minor changes, enter appropriate text similar to "Same as the 2015-2016 reporting period except for..."

Same as the 2015-2016 reporting period: no changes – odour complaints have been investigated by City operation crews to confirm that sources of odour are not attributed to malfunctioning sewer systems. Odour complaints have been identified to be largely caused by agriculture, soils and rotting vegetation near dikes and tidal areas and are typically unrelated to the sanitary system.

Following the odour issues related to Harvest Power, the City took a lead role in coordinating residents, businesses, Metro Vancouver and the Province in addressing the matter. One of the outcomes resulted in the City writing to the Province and Metro Vancouver to request that measurable odour limits be included in the Provincial Environmental Management Act and Organic Matter Recycling Regulation and in the Metro Vancouver Air Quality Management Bylaw in order to manage these issues in the future. Metro Vancouver and the Province have not added odour measurement to their regulations. In 2019 the City will pursue this matter further with Metro Vancouver and the Province so that odours can be measured and regulated.

Attachment 4:

a) *2017-2018 map showing odour control facilities & locations of complaints (different than facility)*

b) *GIS shape files for the odour facility and complaint mapping to allow for development of composite mapping*

Action 1.3.16 – Develop and implement air emissions management programs for standby power generators at municipal sewer pump stations *(2016).*

Narrative 13: Summarize air emissions management programs for standby power generators at municipal sewer pump stations. If these are the same as the previous reporting period 2015-2016, then indicate "Same as the 2015-2016 reporting period: no changes", or if only minor changes, enter appropriate text similar to "Same as the 2015-2016 reporting period except for..." This action should be complete by now.

***Notes:** Metro Vancouver has developed "Specifications for New Diesel Powered Vehicles & Equipment" as part of its green procurement process (details were shared with the REAC-LWS at an earlier meeting and are available from MV).*

Same as the 2015-2016 reporting period except for all new generators procured by the City must meet tier 4 emission standards per Metro Vancouver specifications.

Action 1.3.17 – Develop and implement programs to reduce greenhouse gas emissions from municipal liquid waste management systems to help achieve federal, provincial and municipal greenhouse gas targets *(Ongoing, see Action 3.1.5)*.

Narrative 14: Summarize air emissions management programs for standby power generators at municipal sewer pump stations. If these are the same as the previous reporting period 2015-2016, then indicate "Same as the 2015-2016 reporting period: no changes", or if only minor changes, enter appropriate text similar to "Same as the 2015-2016 reporting period except for..."

Richmond's 2041 OCP includes targets to reduce the community's energy use by 10 per cent by 2020, and to reduce community greenhouse gas (GHG) emissions by 33 per cent by 2020 and 80 per cent by 2050. In January 2014, City Council approved Richmond's Community Energy and Emissions Plan (CEEP). The CEEP includes:

- Strategy 9: Continue Advancement of Neighbourhood District Energy Systems;
- Strategy 10: Utilize Local Energy Sources; and
- Strategy 11: Maximize Use of Waste, including liquid waste.

Richmond is continuing to work with Metro Vancouver to implement a sewer heat recovery system on the Gilbert Trunk Sewer as part of the Oval Village District Energy Utility (formerly the River Green District Energy Utility). During the reporting period, Lulu Island Energy Company Inc. (LIEC), a City-owned corporation that manages district energy initiatives, in partnership with Corix Utilities Inc. continue to provide thermal energy services to developments with the Oval Village service area. To date, 1,892,024 ft^2 (175,775 m^2) of residential floor space is connected to the system, with an estimated 6,391,517 ft^2 (593,792 m^2) at full build out. The implementation of the sewer heat recovery energy source for this project is targeted for 2024. At full build-out, this project will result in an estimated annual reduction of 8,900 tonnes of CO2e GHG emissions.

The City has also completed a project to identify potential locations within the municipality's own sanitary sewer system for the cost-effective implementation of smaller-scale energy recovery facilities. Such "micro" sewer heat recovery plants could provide heating and/or cooling for a smaller-scale stand-alone developments, or act as an ancillary heating input to the City's large District Energy networks.

Richmond continues to secure commitments from new developments in the City Centre Area to be "District Energy Ready" as part of rezoning and development permitting, while also completing the planning and due diligence process for the development of a City Centre district energy system. As part of the due diligence process, several scenarios which utilize liquid waste as an energy source are being analyzed. These initiatives are all part of a medium- to long-term strategy to develop district energy utilities in the City Centre.

Action 3.1.6 – Assess the performance and condition of municipal sewerage systems by: (a) inspecting municipal sanitary sewers on a twenty year cycle, (b) maintaining current maps of sewerage inspection, condition and repairs, and (c) using the Metro Vancouver "Sewer Condition Report, November 2002" as a guide to ensure a consistent approach to sewer system evaluation and reporting *(Ongoing)*.

Narrative 15: Summarize key progress on the assessment and condition of municipal sewerage system for 2017-2018. If these are no changes since the previous reporting period 2015-2016, then indicate "Same as the 2015-2016 reporting period: no changes".

Same as the 2015-2016 reporting period: no changes.

Attachment 5:

a) *A map showing sewerage system CCTV inspection for 2016-2017 and the other areas of CCTV inspection work in a different colour over the previous 18 years (1994-2012).*

b) *A map showing any sewer replacement /rehabilitation work for 2017-2018 as part of either asset management or capacity upgrades. Indicate whether the work is for upgrades or maintenance.*

Action 3.1.8 –	Develop and implement asset management plans targeting a 100 year replacement of rehabilitation cycle for municipal sewerage infrastructure and provide copies of such plans to Metro Vancouver *(2014).*

Narrative 16: Summarize key progress or accomplishments on the development of asset management plans for municipal sewerage infrastructure for 2017-2018.

Richmond has an ongoing Ageing Infrastructure Replacement Program with dedicated funding from the Sanitary Sewer Utility that maintains the sanitary system in an appropriate operating condition. Staff report to City Council bi-annually on the status of the program, including current infrastructure status, long-term funding requirements and funding gaps if they exist. The 2017 program update identified a long-term, sustainable capital requirement of $6.8M and a current annual budget of $5.3M. City Council and staff have made significant progress in closing the funding gap and will continue to close the gap in subsequent utility rate setting cycles. The sanitary system is relatively young and the bulk of replacement funding is predicted to be required between 2041 and 2061. As such, the incremental approach to closing the funding gap is appropriate for the City of Richmond.

Attachment 6:

a) *Titles of any completed asset [replacement] management plans (author, date, title, and publisher) for 2017-2018.*

John Irving, P.Eng. MPA, June 23, 2017, Ageing Utilities Infrastructure Planning – 2017 Update, CoR (REDMS 5333959)

Corrine Haer, P.Eng., 5-Year Capital Program – Sanitary Capital Program, CoR (REDMS 5843820)

Eric Sparolin, P.Eng., Jan Engineering & Public Works – Monthly Construction Update to Mayor and Council, CoR (REDMS 5283388)

b) *Completed annual PSAP 3150 reporting on asset values for 2017-2018.*

2017 Annual Report: https://www.richmond.ca/cityhall/finance/reporting/reports.htm
More information on Richmond's non-financial assets is available at:
https://www2.gov.bc.ca/gov/content/governments/local-governments/facts-framework/statistics/statistics

c) *Colour coded map showing age of the sewerage system (i.e.: <1900, 1901-1925, 1926-1950, 1951-1975, 1976-2000, >2001) updated to show any changes made in 2017-2018. If no changes, please indicate so and the mapping prepared for the 2015-2017 reporting period will be used.*

Action 3.2.4 –	Undertake a tri-annual internal audit of best practices of one municipal liquid waste management sub-program in each municipality to identify opportunities for innovation and improvements *(Triennially).*

Narrative 17: Summarize key findings from the tri-annual internal audit (first due for 2013, the next in 2016).

Ageing Infrastructure Planning Program

In 2017, Richmond conducted an update of the Ageing Infrastructure Planning Program, which included reconciling current inventory, reviewing the evolving theory on infrastructure service life, and updating infrastructure replacement pricing.

This audit identified the following key findings:

- Infrastructure replacement costs continue to increase due to inflation, environmental requirements and sanitary pump station complexity.
- Development facilitates significant infrastructure replacement, having a positive impact on the City's overall ageing infrastructure picture. However, development is subject to external factors, such as the economy, and does not always coincide with infrastructure that is beyond its useful life. Therefore, development is not considered a sustainable resource for ageing infrastructure replacement.
- The long-term, sustainable capital requirement is $6.8M for the sanitary utility. The current budget is $5.3M. Closing the funding gap is achievable within the next decade or sooner through the annual budgeting process.

Action 3.3.6 –	In collaboration with Metro Vancouver, estimate and document the greenhouse gas emissions and odours associated with the operation of the municipal and regional liquid waste management systems *(2014).*

Narrative 18: Summarize the estimate of greenhouse gas emissions associated with the operation of municipal and regional liquid waste management systems. Odour control and mapping are being reported under Action 1.3.15.

The estimated total emission in 2017 due to electricity use at sanitary pump stations and sanitary fleet fuel use for operational tasks is 157.1 tCO2e.

Action 3.3.7 –	Estimate and report on the frequency, location and volume of sewerage overflows from municipal combined and sanitary sewers, and where feasible identify and address the probable causes *(Ongoing).*

Narrative 19: Summarize and highlight any important details and/or action plans relating to managing wet weather SSOs, CSOs and dry & wet weather SSOs during the period 2017-2018. If no changes since 2015-2016, then indicate "Same as the 2015-2016 reporting period: no changes".

For each CSO location, in a table indicated estimated volumes & number of occurrences (this will have been prepared for EC WSER reporting but is also required by the LWMP).

Same as the 2015-2016 reporting period: no changes.

Attachment 7:

a) *Provide (if not already provided) GIS shape files which have the locations of the CSO outfalls for purposes of summary mapping (should already be reported under WSER).*

b) *Provide GIS shape files or coordinates for the locations of wet & dry weather SSOs for each year (indicate which is dry/wet and year). Include SSO dates and estimated volume.*

Action 3.3.8 – Maintain and, if necessary, expand the existing municipal sewer flow and sewer level monitoring network *(Ongoing).*

Narrative 20: Summarize and highlight any changes to the existing municipal sewer flow & sewer level monitoring network for 2017-2018 (if no changes, then indicate "Same as the 2015-2016 reporting period: no changes").

Same as the 2015-2016 reporting period: no changes.

Attachment 8:

a) *Map and GIS coordinates showing locations of active municipal sewer flow/level monitors for the reporting period 2017-2018 (indicate whether permanent or temporary)*

Action 3.4.4 – In collaboration with Metro Vancouver and the Integrated Partnership for Regional Emergency Management (IPREM), develop emergency management strategies and response plans for municipal and regional wastewater collection and treatment systems *(2015).*

Narrative 21: Summarize any progress on the development of emergency management strategies and response plans for municipal & regional wastewater collection and treatment systems.

***Note:** This action is being addressed through direction by REAC to REAC LWSC and REAC WSC to undertake in 2015.*

The City maintains an inventory of portable diesel standby power generators on trailers. These generators are intended to provide back-up power for sanitary and drainage pump stations in the event of emergency power failures and is the primary response plan for stations that do not have built-in generators. Built-in backup generators are incorporated into new or upgraded stations constructed within City Centre where possible.

In 2017, the City began investigating resilience systems for sanitary pump stations focused on long duration energy availability comprised of onsite energy generation and storage reducing reliance on diesel generators for back-up power. This project is ongoing and currently in its planning stages.

Action 3.4.5 – Adapt infrastructure and operations to address risks and long-term needs *(Ongoing).*

Narrative 22: Summarize any key initiatives that support the adaptation of infrastructure & operations to address risks and long term needs (e.g. climate change, sea level rise, seismic risk, demographic growth, etc...). If no change from 2015-2016, then indicate, "Same as the 2015-2016 reporting period: no changes".

Richmond's Flood Protection Management Strategy identifies climate change issues and provides high level guidance on the City's flood mitigation improvements. A key component of the Flood Protection Management Strategy is the Dike Master Plan, which guides the City's dike raising efforts. The plan is being completed in multiple phases, each identifying dike upgrade options and recommendations for different areas throughout the City. These recommendations address long term risks such as climate change-induced sea level rise, higher intensity storms, and spring snow melt. These risks are mitigated by the City's proactive and extensive flood protection efforts.

Action 3.4.6 – Ensure liquid waste infrastructure and services are provided in accordance with the Regional Growth Strategy and coordinated with municipal Official Community Plans *(Ongoing).*

Attachment 9:

a) If not already provided, provide updated GIS shape files of the municipal sanitary sewer network, including manholes, pump stations, pipe diameters for the municipal sewer system as of the end of 2016. Please indicate what changes have been made for 2017-2018.

***NOTE:** This information is part of the routine information provided to Metro Vancouver every two years in response to municipal obligations under the GVS&DD Act. This information will be used to update Metro Vancouver's GIS data base and to create a composite map showing alignment and discrepancies with the RGS.*

Action 3.4.7 – Develop and implement integrated stormwater management plans at the watershed scale that integrate with land use to manage rainwater runoff *(2014).*

Narrative 23: Summarize and highlight key initiatives relating to the development and implementation of the integrated stormwater management plans ***for each watershed/ISMP area.***

***NOTE:** Format and content should be similar to the reporting provided in February 2018 for the Interim Report: for the Integrated Liquid Waste and Resource Management Plan. See: http://www.metrovancouver.org/services/liquid-waste/LiquidWastePublications/IntegratedLiquidWasteResourceManagementPlanInterimReport2017.pdf*

The City of Richmond is comprised of a series of islands in the delta of the Fraser River, with the majority of the land mass located on Lulu Island. Lulu Island this characterized by a relatively flat topography with an average elevation of one meter above mean sea level. The island forms a single watershed with carefully engineered drainage catchments that include channelized watercourses, sloughs and ditches that serve drainage, irrigation and habitat functions. In 2018, Richmond's ISMP, the Integrated Rainwater Resource Management Strategy, was endorsed by Council for implementation. Sampling was completed in wet and dry seasons.

a) *GIS shape files showing the ISMP boundaries and their status: Development Phase= Yellow; Implementation Phase = Light Green; Completed Phase = Dark Green. Add ISMPs still to start development as outlined only).*

NOTE: *The ISMPs will be summarized and mapped similar to the February 2018 Interim Report: http://www.metrovancouver.org/services/liquid-waste/LiquidWastePublications/IntegratedLiquidWasteResourceManagementPlanInterimReport2017.pdf*

Action 3.5.8 – Biennially produce a progress report on plan implementation for distribution to the Ministry of the Environment that: (a) summarizes progress from the previous two years on plan implementation for all municipal actions, including the status of the performance measures, (b) includes summaries and budget estimates for proposed LWMP implementation programs for the subsequent two calendar years *(July 1st biennially).*

List budget estimates for the LWMP implementation programs and subsequent two years beyond biennial report (from 5 yr plan)

Table 9 Summary of LWMP Implementation Budgets and Forecasts

LWMP Implementation Action	Details/Notes	Budget			
		2017	2018	2019*	2020*
Sanitary Sewer Capital Program	Includes pump station replacement, gravity sewer and forcemain replacement, and sanitary rehabilitation works	*1.2M*	*4.9M*	*0.8M*	*9.1M*
Development Projects (Servicing Agreements)		*0.6M*	*0.2M*	*Unknown*	*Unknown*

** Subject to council approval*

Action 3.5.9 – This reporting is an annual requirement. In the year of the biennial report, this action is covered off by municipal reporting on 3.4.7 & 3.3.7. In other years this addressed through the Interim Report. This municipal reporting is summarized regionally by Metro Vancouver under its Action 3.5.6.

Note*: The Interim Report: 2018 was submitted to the Ministry of Environment in February 2018.*

Ministerial Condition 2 – Member municipalities are strongly encouraged to business case and/or implement residential water metering programs and to consider municipal rebate programs for water efficient fixtures and appliances to reduce potable water use.

Narrative 24: Discuss initiatives that evaluate/support water metering and rebate programs to water fixtures and appliances

Richmond has comprehensive water meter programs for both residential and commercial properties. All single-family, industrial, commercial, and farm properties in Richmond are metered. In 2017, Richmond completed implementation of universal water metering for all single-family properties. Multi-family complexes can volunteer for water meters, with the City providing a maximum subsidy of $100,000 per complex. By the end of 2018, 46% of multi-family properties are metered in Richmond.

In 2014, Richmond also introduced a pilot project for Fixed Base Meter Reading that facilitates the continuous reading of meters through radio towers. The program provides real time consumption data which allows staff to better help residents identify causes of leaks and water consumption habits. Deployment of a universal Fixed Base Network is currently underway with a target completion in 2019.

To complement these water meter programs, Richmond provides metered customers with free water conservation kits, which include low flow showerheads, faucet aerators, toilet fill cycle diverters, toilet leak detection tablets, and educational water conservation tools. In addition, Richmond offers a $100 rebate to residents for replacing old toilets with new low-flush toilets, and subsidized rain barrels to collect and store water for outdoor use. Richmond also partnered with BC Hydro to offer a $100-200 rebate for high-efficiency clothes washer replacements. At the end of 2018, 7976 toilet rebates, 1727 rain barrels, and 914 clothes washer rebates have been issued to Richmond residents.

Ministerial Condition 3 – Metro Vancouver, in partnership with member municipalities, is encouraged to pursue a region-wide water conservation program targeting the industrial, commercial, institutional and agricultural sectors as part of its new Drinking Water Management Plan. Remaining municipalities in the region that have not implemented metering for these sectors are encouraged to do so.

Narrative 25: Summarize whether any new municipal water metering policies or programs were introduced in 2017-2018 that address this action. If no changes, then indicate, "Same as the 2015-2016 reporting period: no changes".

ICI sector is fully metered, no changes.

Ministerial Condition 7 – Member municipalities will, with MV planning and coordination, and to the satisfaction of the Regional Manager, develop a coordinated program to monitor stormwater and assess and report the implementation and effectiveness of Integrated Storm Water Management Plans (ISMPs). The program will use a weight-of-evidence performance measurement approach and will report out in the Biennial Report. The Regional Manager may extend the deadline for completion of ISMP by municipalities from 2014 to 2016 if satisfied that the assessment program could result in improvement of ISMP and protect stream health.

Narrative 26: Quote relevant OCP sections addressing stormwater, stream health and their consideration of ISMPs.

Given the ISMP deadline requirement, please indicate in as a list any ISMPs not developed by the end of 2018.

Richmond's Integrated Rainwater Resource Management Strategy (IRRMS) addresses Richmond's needs for water quality treatment and monitoring plan. This plan was endorsed by Richmond Council in April 2016. In 2018, the IRRMS sampling program for water quality parameters was implemented. Nine pump stations sample locations were selected to be representative of the majority of Richmond storm water discharge flow volume.

Five samples were collected within 30 days in both the wet and dry seasons and analyzed for general water quality parameters, bacteria (fecal coliform and E.coli) nutrients (nitrate) and select metals. Analytical results are expected by early 2019.

Attachment 11:

a) *Monitoring results per watershed (as per ISMP Adaptive Management Framework)*

Not available at this time

b) *If undertaken, a map plus GIS shape files/coordinates showing location of monitoring*

Not available at this time

Ministerial Condition 9 – The ILWRMP has a goal of protecting public health and the environment. In keeping with this goal and to ensure alignment with other national, provincial and regional initiatives, Metro Vancouver and member municipalities are encouraged to: (a) Have a local land use planning consider the direction provided by the ISMPs, (b) Consider how the degree, type and location of development within a drainage can affect the long-term health of the watershed,(c) Consider how to protect the stream, including the riparian areas that exert an influence on the stream, from long-term cumulative impacts and (d) Use scenarios and forecasting to systematically consider environmental consequences/benefits of different land use approaches prior to build-out (for example, Alternative Future type approaches).

Narrative 27: Please describe any changes to how you have used proactive planning processes as listed in Ministerial Condition 9 for 2017-2018 and provide examples. If there are no changes since 2015-2016, then indicate: "Same as the 2015-2016 reporting period: no changes".

The strategies identified in the IRRMS are consistent with actions identified within the City's Ecological Network Management Strategy (ENMS), adopted by Council in 2014, and submitted in the 2015-2016 reporting period. Through the ENMS the City has identified an interconnected network of natural and semi-natural areas across Richmond's landscape to protect, connect and restore. These natural areas include green infrastructure that provides essential ecosystems services related to stormwater management. Additional Actions under the ENMS related to Ministerial condition 9 in this reporting period include:

- The City's Riparian Management Area (RMA) setbacks for minor (5m) and major (15m) designated streams were formally introduced into the City's Zoning Bylaw 8500 in 2018, meeting the requirements mandated under the Riparian Areas Regulation. The City has bolstered the Watercourse Protection and Crossing Bylaw 8441 to include provisions for further protecting RMA's from non-compliant development activity, while encouraging enhancement of these areas. The City has updated Bulletin Information-23 to include specific information for

development adjacent to RMA's for multifamily residential, commercial and industrial development. A new standalone Bulletin Information-44 has been developed to inform single family residential development adjacent to the RMA.

- In November 2018, the City established the ENMS Working Group to develop cross-departmental approaches to promote the ENMS in daily project work and build tools to track the City's annual progress. The ENMS Working Group includes representatives from eight City departments who will work together throughout 2019 to advance a management approach for the ENMS.

- In November 2018, the City hosted a Mitchell Island Environmental Management Collaboration Meeting. The purpose of the meeting was to define strategies to deal with the regulation of pollution on Mitchell Island. Storm water health was a primary topic of the meeting and provincial, regional, and city regulators were present.

- In December 2018, the City amended the Pollution Prevention Bylaw 8475 to allow for greater ease in cost recovery mechanisms in response to spills to the environment and implement changes to improve the management and field monitoring of permitted non-storm water discharges to the storm system.

- Continue to support and strengthen the pollinator pasture and the Bath Slough Revitalization Initiative as well as initiate pollinator pasture projects on suitable sites throughout the city.

    - Initiated the City's second Pollinator Meadow within Terra Nova Rural Park.

- ENMS 2018 update report
https://www.richmond.ca/__shared/assets/2018enmsupdatereport52187.pdf

Attachment 12:

a) Map showing any 2017-2018 changes to protected riparian areas & possible stream classifications. If no changes, then this figure is not required.

Municipal Progress Summary Table

The summary table is the same format at pervious Biennial Report. The columns (Dec 2016 + Additions/Changes) should add to equal the Dec 2018 Total.

Table 10 Summary of Municipal Progress 2017-2018

Description	Unit	Total as of Dec 31st, 2016	Additions & Changes	Total as of Dec 31st, 2018
1. Municipal Sewer System Inventory				
a. Sanitary Gravity Sewers	m	468,500	800	469,300
b. Sanitary Services (Connections)	ea.	31,565	-36	31,529
c. Sanitary Forcemains	m	101,200	0	101,200
2. Combined Sewer System Inventory				
a. Total Combined Sewers	m	n/a	n/a	n/a
b. Combined Services (Connections)	ea.	n/a	n/a	n/a
c. Combined Sewers Separated	m	n/a	n/a	n/a
d. Percentage of total system separated	%	n/a	n/a	n/a
3. Sanitary Sewer System Evaluation Program				
a. Sanitary Sewers Video Inspected	m	435,488	13,399	448,887
b. Percentage of Entire Municipal Sewer System Dye & Smoke Tested	%	0.7%	n/a	0.7%
c. Percentage of Entire Municipal Sewer System Video Inspected	%	100%	0	100%
d. Percentage of Entire Municipal Sewer System Structurally Rated	%	100%	0	100%
4. Sewer System Rehabilitation				
a. Total Length of Sewers Rehabilitated	m	2,584	0	2,584
b. Total Length of Sewers Replaced/Capacity Upgraded	m	14,764	1,361	16,125
c. Total Number of Service Laterals Rehabilitated	ea.	45	5	50
d. Number of Structurally Repaired Manholes/Cleanouts	ea.	2,886	1,416	4,302
e. Number of Cross-Connections Corrected	ea.	11	0	11
5. Sanitary Sewer Overflows				
a. Total Number of Reported Dry Weather SSOs	ea.	0	0	0
b. Total Number of Reported Wet Weather SSOs	ea.	0	0	0
c. Number of Breakdowns from Failures	ea.	136	148**	284

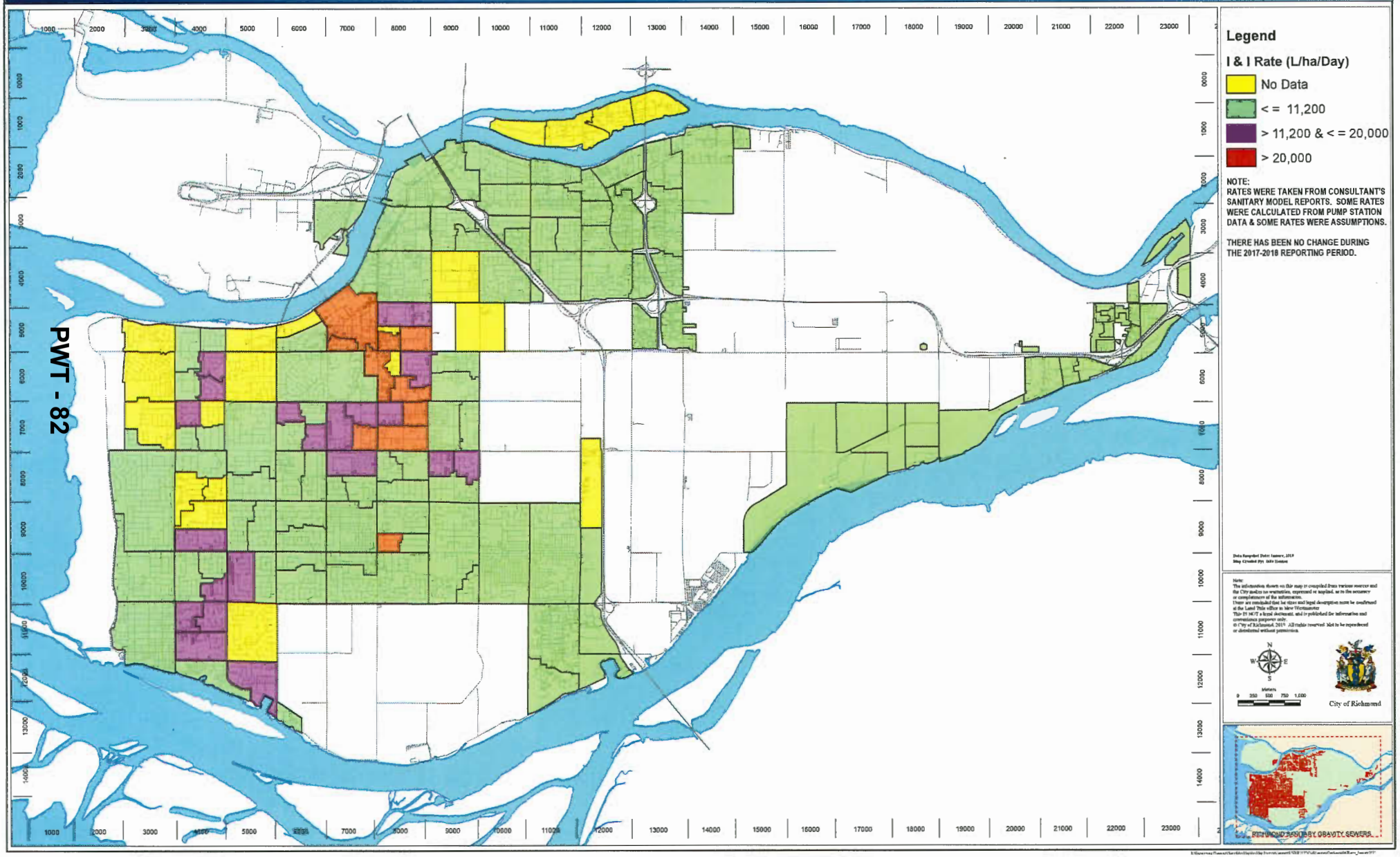
Description	Unit	Total as of Dec 31st, 2016	Additions & Changes	Total as of Dec 31st, 2018
6. Greenhouse Gas Emissions				
a. CO_2 emission reduction from sewer system	kg CO_2			
7. Summary of Costs		**2017**	**2018**	**Total**
a. Sanitary Sewer Condition Evaluation Program		1.0M	1.05M	2.05M
b. Combined Sewer Separation Program		n/a	n/a	n/a
c. Sewer System Rehabilitation Program		0.45M	0.35M	0.80M
d. CO_2 Reduction Program		0	0	0
e. ISMP Implementation		0	0	0
f. Total Cost for the Biennial Period		*1.45M	*1.40M	*2.85M

**Cost associated with items listed under 7-a to 7-e only. Capital investments associated with other aspects of sanitary system management are not included.*

*** Breakdowns include all Mainline, Manhole, & IC Blockages*

ATTACHMENT 1

City of Richmond Modelled Sanitary Catchment I&I Rates - January 2019



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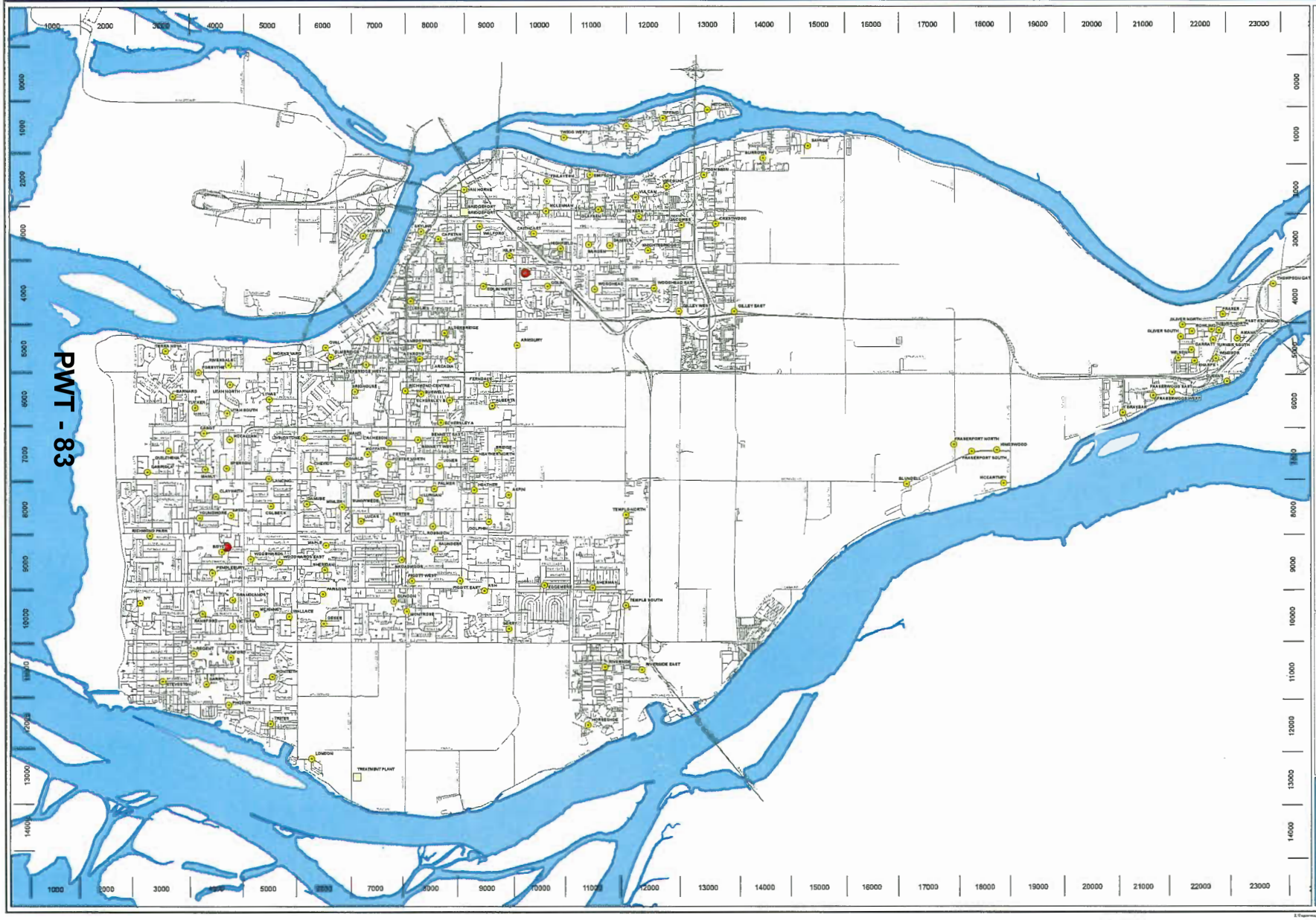
ATTACHMENT 4

City of Richmond Odour Control Facilities At Sanitary Pump Stations - January 2019



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Legend

- Odour Complaints 2017-2018
- GVS&DD Pump Stations
- GVS&DD Treatment Plant
- Sewer Pump Stations

Note:
There were 2 odour complaints related to Richmond sanitary infrastructure during the 2017 - 2018 reporting period

Data Snapshot Date: January, 2019
Map Created By: Mike Dowsett

Note
The information shown on this map is compiled from various sources and the City makes no warranties, expressed or implied, as to the accuracy or completeness of the information.
Users are reminded that lot sizes and legal descriptions must be confirmed at the Land Title office in New Westminster.
This is NOT a legal document, and is published for information and convenience purposes only.

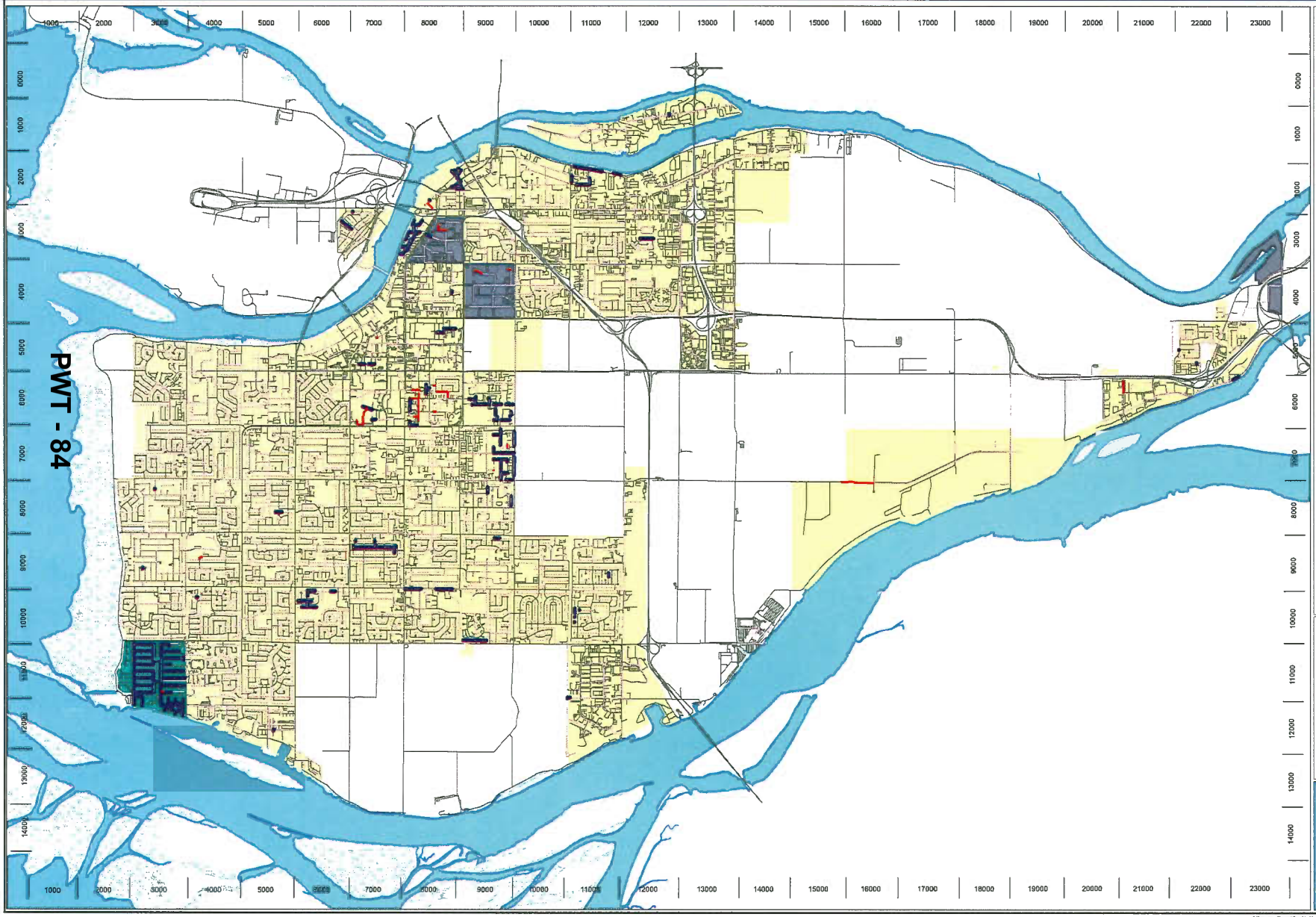
N W E S

Meters
0 250 500 750 1,000

City of Richmond

ATTACHMENT 5

City of Richmond Sanitary Sewer Assessement, Replacement & Rehabilitation January 2019



Legend

SANITARY INFRASTRUCTURE

2017-2018 Replaced, Rehabilitated, New

- GRAVITY
- FORCEMAIN

Municipal Service Area

- ASSESSED AREA

CCTV Inspection 2017-2018

- STEVESTON
- CCTV 2017-2018

New Catchments Not Assessed

- CAPSTAN
- ODLIN WEST
- THOMPSON GATE

NOTE:
ALL AREAS EXCEPTING THE NEWLY CREATED CATCHMENTS HAVE BEEN ASSESSED

INFORMATION OBTAINED FROM THE FOLLOWING SANITARY ASSESSEMENT CONTRACTS:

Sherman North & Aspin	September 2001
Shellmont Phase 1	February 2003
Shellmont Phase 2	July 2003
Elmbridge	November 2003
Fraser Sanitary Study Area	November 2003
Minoru	February 2004
Ackroyd, Alderbridge, Arcadia	March 2004
City Centre Study Area Phase 1	October 2004
Bridgeport Study Area Phase 1	January 2005
Bridgeport Study Area Phase 2	February 2005
City Centre Study Area Phase 2	August 2006
Broadmoor Study Area	June 2007
Terra Nova Area	February 2012
5015P-All Remaining Areas	January 2016
Steveston (In House)	June 2018

Data Snapshot Date: January, 2019
Map Created By: Julie Hamon

Note:
The information shown on this map is compiled from various sources and the City makes no warranties, expressed or implied, as to the accuracy or completeness of the information.
Users are reminded that lot sizes and legal description must be confirmed at the Land Title office in New Westminster
This IS NOT a legal document, and is published for information and convenience purposes only.

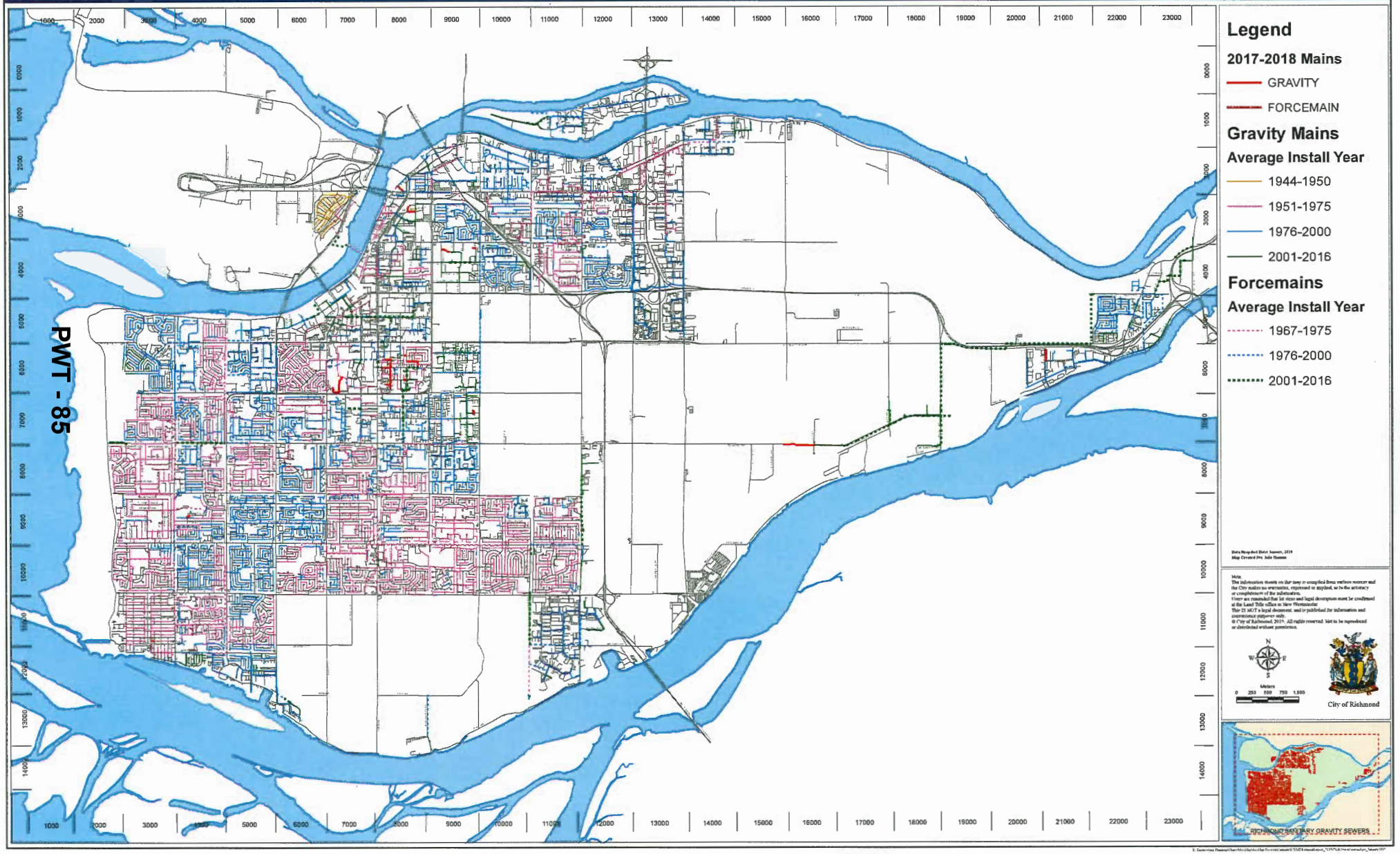
N W E S

Meters
0 250 500 750 1,000

City of Richmond

ATTACHMENT 6

City of Richmond Sanitary System Age - January 2019



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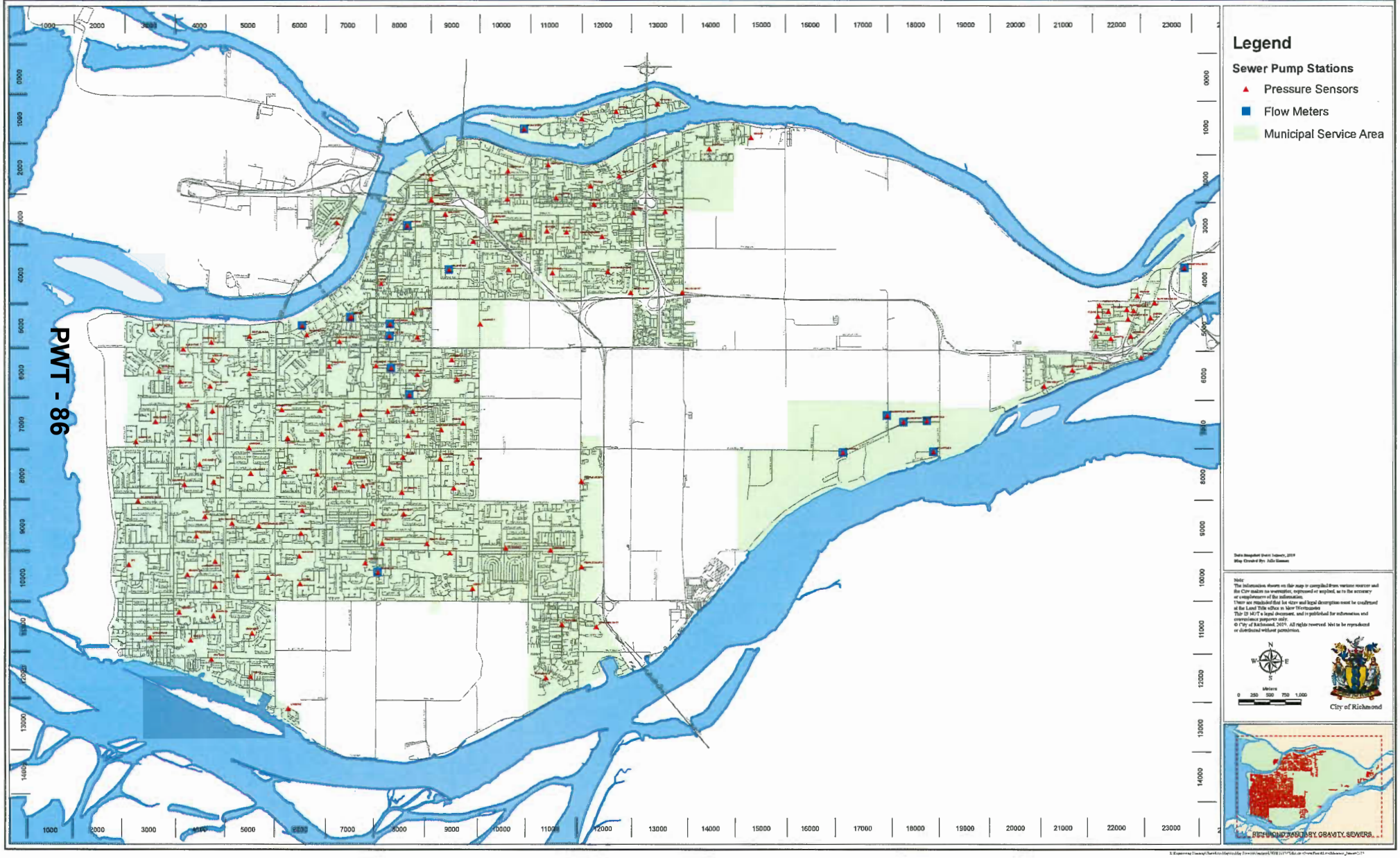
ATTACHMENT 8

City of Richmond Active Sewer Flow & Level Monitors - January 2019



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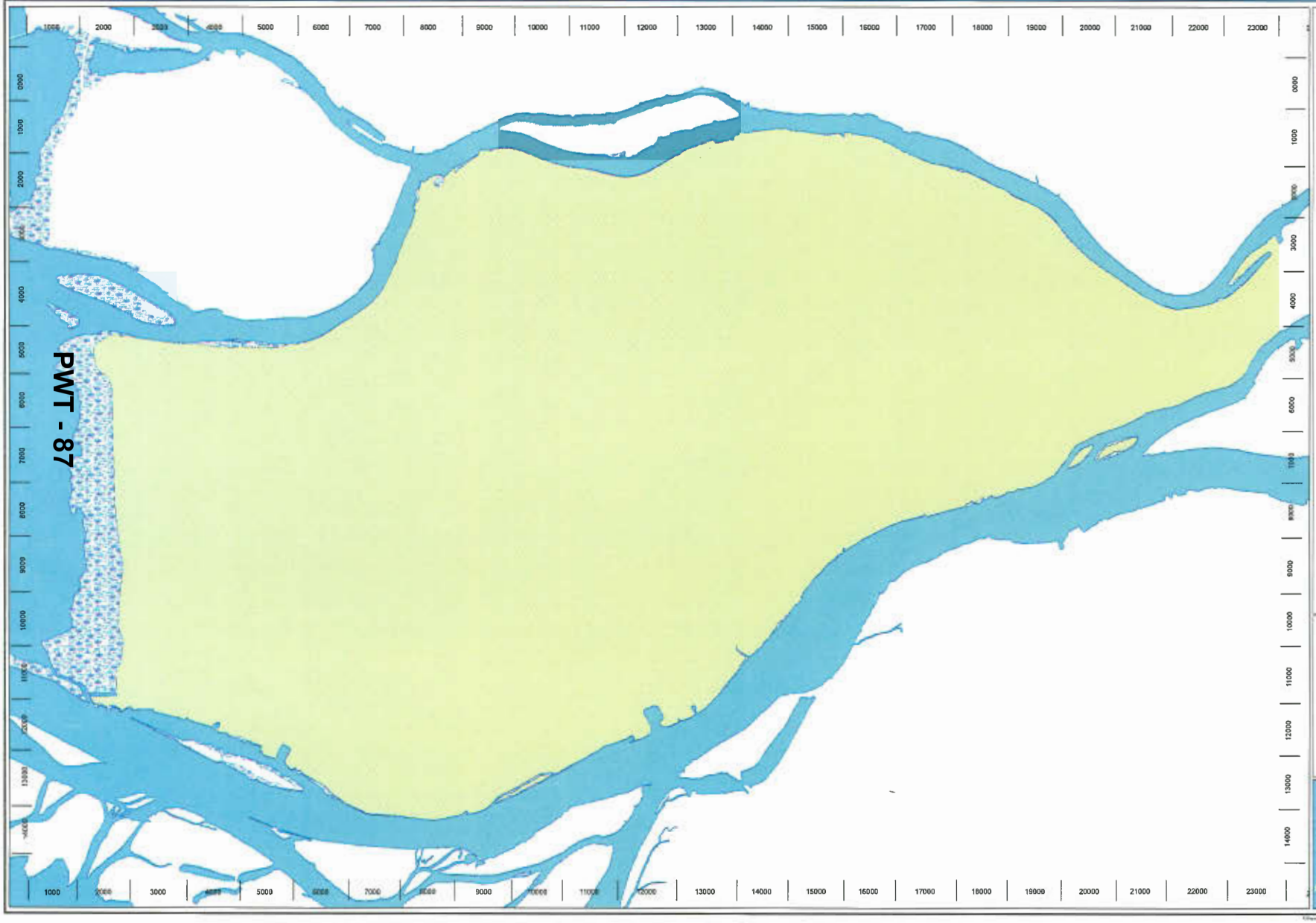
ATTACHMENT 10

Richmond Integrated Stormwater Management Plan (ISMP) Status Map - January 2019



Legend

Implementation Phase

NOTE:
Richmond is developing one ISMP for the entire City that will meet the Liquid Waste Management Plan (LWMP) requirements.

City of Richmond

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City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	January 11, 2019
From:	John Irving, P.Eng. MPA Director, Engineering	**File:**	10-6060-01/2018-Vol 01
Re:	**Burkeville Drainage Update**		

Staff Recommendation

That the staff report titled "Burkeville Drainage Update", dated January 11, 2019 from the Director, Engineering, be received for information.

John Irving, P.Eng. MPA
Director, Engineering
(604-276-4140)

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Sewerage and Drainage	☑	
Policy Planning	☑	
Transportation	☑	
Corporate Communications	☑	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	**INITIALS:** CJ	**APPROVED BY CAO**

Origin

Burkeville's drainage system, consisting primarily of a shallow ditch network that allows percolation of rainwater through the soil, has not been significantly upgraded for decades. In recent years, requests for private ditch infills as well as non-permitted ditch infills have increased as a result of new home construction and renovations. This created concerns for the drainage network within the neighbourhood as the conversion from ditches to pipes reduces the opportunity for percolation and increases demand on the system.

At the November 27, 2017 Regular Council Meeting, Council endorsed the following motion:

> *That a moratorium on ditch infills in the Burkeville neighbourhood, until a piped drainage network is implemented as outlined in the report titled "Burkeville Drainage" dated October 27, 2017, from the Director, Engineering, be endorsed.*

The purpose of this report is to provide an update on the status of drainage upgrades within Burkeville and address some of the recent questions on the project status.

Analysis

Initially constructed in 1941, Burkeville is a small neighbourhood of approximately 300 homes located on Sea Island. Burkeville's drainage system was originally designed using shallow ditches and small diameter culverts for road crossings. As houses within the neighbourhood are re-developed, there is desire to infill existing ditches. Private ditch infills change the nature of the drainage system in a way that could potentially cause flooding. As such, a moratorium on private ditch infills was placed in the Burkeville neighbourhood in November 2017. To provide adequate drainage for the neighbourhood, a comprehensive drainage improvement program is proposed. The program involves:

- Regrading existing ditches along Airport Road and Miller Road to increase system capacity;
- Maintaining existing concrete pipe crossings under Russ Baker Way to minimize construction impacts and cost; and
- Continued assessment on the Miller Road pump station and potential upgrades to increase station capacity.

Program Implementation

The overall implementation cost for the drainage improvement program is estimated at $13 million. Staff have reviewed multiple options for upgrading the drainage system and have selected the proposed plan as it avoids the need for high cost items such as upsizing the Russ Baker Way crossing. To achieve cost efficiencies and minimize construction impacts, staff have also identified opportunities to replace ageing local sanitary and water infrastructure in alignment with the City's Ageing Infrastructure Replacement strategy together with the drainage improvement works. Construction is proposed to be implemented in phases over 5 to 10 years, with phasing designed to prioritize addressing areas of known drainage concerns and mitigate the impacts of

construction to the community. During each phase, all water, sanitary and drainage infrastructure improvements within the identified area will be completed. Upon completion of the projects, roadways and laneways will be restored to their current conditions.

The approved 2018-2022 Capital Budget includes $2 million as part of the 2018 Capital Program to complete Phase 1 of the drainage improvement project, and $1 million each year from 2019 to 2022 for subsequent phases. Design of the infrastructure upgrades is underway, with construction of Phase 1 (Figure 1) anticipated to begin in summer 2019. Funding needs will be refined as design is completed and subsequent projects that form part of the Burkeville Utility Upgrade Program will be brought forward for Council's consideration as part of the capital planning process in future years.

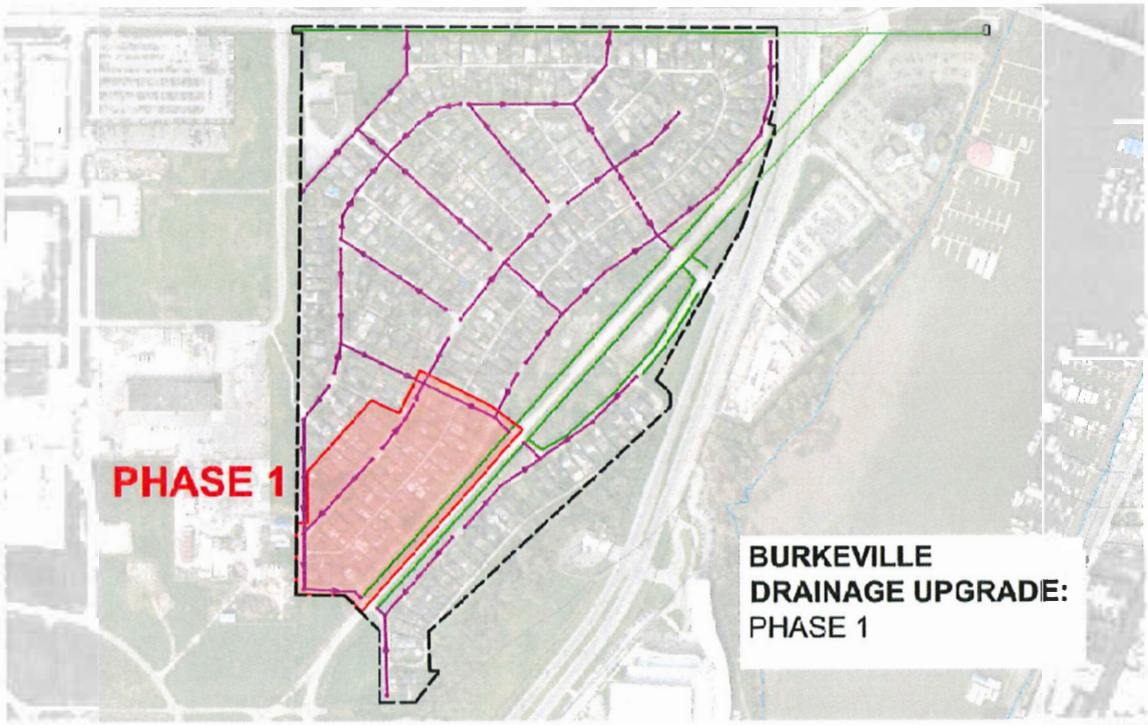

Figure 1 - Burkeville Drainage Upgrades - Phase 1 Works

Environmental Considerations

Design of the infrastructure upgrades will include input from Qualified Environmental Professionals to ensure that environmental best management practices are incorporated into the drainage improvement works.

Public Consultation

A series of public consultation activities took place in early 2018 to obtain local resident feedback on the proposed drainage upgrade strategy. An open house was held at Sea Island Elementary School on February 20, 2018. In addition, project information and an online feedback form were available through LetsTalkRichmond.ca between February 20, 2018 and March 4, 2018.

The open house was advertised to local residents through hand-delivered letters as well as printed advertisements in Richmond News. Approximately 50 local residents attended the open house. A total of 41 residents provided feedback through the open house and LetsTalkRichmond.ca.

A summary of the responses received is as follows:

- Over 65% of respondents identified localized flooding after significant storms as a concern for the neighbourhood;
- Over 85% of respondents were supportive of the proposed drainage improvement program;
- Residents wished to infill existing local ditches to address the need for sidewalks and walkways to enhance pedestrian, traffic safety, as well as parking; and
- Residents valued the existing ditch along Miller Road as a barrier between the neighbourhood and Miller Road as well as its ecological value and supported its preservation.

An additional open house is planned for spring 2019 to obtain resident feedback on the design, as well as to communicate the construction schedule and anticipated construction impacts prior to beginning construction.

Financial Impact

None at this time. Projects for Burkeville Utility Upgrades will be presented to Council for consideration as part of the annual capital budget process.

Conclusion

The drainage system in Burkeville currently relies on percolation to minimize flows in the ditched drainage network. Ditch infills reduce the drainage system's capacity for percolation, increasing drainage system flows which ultimately cause flooding in the neighbourhood. As such, staff recommend maintaining the moratorium that has been placed on ditch infills within the neighbourhood.

A phased drainage improvement program has been developed to facilitate future development within Burkeville while maintaining high levels of drainage service for the neighbourhood. Implementation of the Burkeville Utility Upgrade Program is currently underway through the City's capital construction program, with construction of the first phase anticipated to begin in summer 2019. Subsequent projects that form part of the Burkeville Utility Upgrade Program will be brought forward for Council's consideration as part of the capital planning process in future years.

Eric Sparolin, P.Eng.
Acting Manager, Engineering Planning
(604-247-4915)

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	January 25, 2019
From:	John Irving, P.Eng. MPA Director, Engineering	**File:**	10-6060-01/2019-Vol 01
Re:	**2018 Winter Storm and 2019 Flood Protection Update**		

Staff Recommendation

That the staff report titled "2018 Winter Storm and 2019 Flood Protection Update", dated January 25, 2019 from the Director, Engineering, be received for information.

John Irving, P.Eng. MPA
Director, Engineering
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Att. 1

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Sewerage and Drainage	☑	
Roads and Construction	☑	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	**INITIALS:** CJ	**APPROVED BY CAO**

Staff Report

Origin

The City of Richmond is situated approximately one meter above sea level and flood protection is integral to protecting the health, safety and economic viability of the City. Richmond is protected from flooding by infrastructure that includes 49 km of perimeter dikes, 642 km of drainage pipes and culverts, 165 km of watercourses and 39 drainage pump stations.

Demands on the City's flood protection infrastructure are most significant during storm seasons in the winter and freshet season in the spring. This report provides Council with an update on 2018's winter storms and ongoing works regarding the City's flood protection program.

Analysis

2018 Winter Storms and Flood Protection System

Significant Rainfall Events

Rainfall amounts and water levels in the City's drainage system and the Fraser River are monitored using five rain gauges, twelve drainage level sensors and nine river level sensors. Attachment 1 shows the total annual rainfall over the past 10 years and identifies record high total rainfall in 2018.

The City's drainage system is designed to accommodate a 10-year return period rainfall event. Between November 2018 and January 2019, the City experienced three significant rainfall events that exceeded the 10-year event. In recent years, there has been an increase in the occurrences and intensities of significant storms, with multiple storms exceeding a 10-year return period intensity in a given year. This is consistent with predicted climate change impacts on local weather patterns and reinforces the need for the City's continued flood protection upgrade program.

Staff analysis of these storms and recent trends has led to an update of the Intensity Duration Frequency design standards for drainage systems within Richmond. These updated standards will provide Richmond with more robust infrastructure to meet future needs.

December 11 and 13 Rainfall Events

During the December 11 and 13, 2018 storms, local surface flooding was experienced in the northern portion of Lulu Island, particularly within the Bath Slough drainage catchment. Staff undertook additional maintenance activities to clear the drainage system in response to these events. These measures were effective and no localized flooding was recorded for subsequent storm events. Staff have assessed the need for drainage improvements within the Bath Slough catchment and recommended projects are included in the five year capital program.

Rainfall is pumped off of Lulu Island through 39 drainage pump stations throughout the City. To date, 11 pump stations have been re-built to modern standards with higher capacity and reliability. During the December events, a number of the older pump stations were operating near full capacity. These stations have been identified to require upgrades through capacity analysis.

Projects to upgrade or replace these stations are either included in current capital programs or will be brought forward for Council's consideration as part of future capital programs.

December 20 King Tide and Wind Storm Event

On December 20, 2018, the region experienced a king tide event together with a significant wind storm. While the storm caused significant wave action, widespread power outages and damage throughout the region, the City's flood protection system performed well and no flooding issues were identified. A minimum freeboard of 0.7 m (excluding wave action) was recorded in the Steveston area during this event. While the storm caused local damage to rip-rap and debris build-up along the dike, the dike structure was never at risk. Staff responded immediately to reinstate erosion protection and prevent damages to the dike.

BC Hydro reported that the December 20, 2018 windstorm was the most damaging storm in their history, with over 750,000 of their customers province-wide without power. Within Richmond, approximately 9600 customers were impacted, and of these, over 98% had their power restored within 24 hours. During significant events such as this recent windstorm, the City works with BC Hydro to keep the public safe. The City relays information received from the public and staff on known outages and problem locations to BC Hydro and emergency services as needed. City crews are often dispatched to reported problem areas to investigate, and to secure the area and may close traffic lanes or sidewalks and barricade off the area when there is a potential risk to the public.

BC Hydro has reported that from reviewing the December 20, 2019 storm there are things that can be improved on. For example:

- BC Hydro knows some customers had challenges learning about the status of their outage, and will continue to ensure it is providing timely updates to its customers;
- BC Hydro will work with cities and municipalities to better map out major intersections and primary traffic routes so circuits feeding these areas can be prioritized to avoid traffic congestion and related safety issues.

Flood Protection Planning

Flood Protection Management Strategy Update

The City's flood protection efforts are guided by the 2008-2031 Richmond Flood Protection Strategy. The Strategy, originally adopted in 2006 and last updated in 2008, provides a framework for addressing flood protection within the City by assessing flood risks, defining roles and responsibilities, assessing funding strategies, establishing design standards with considerations for climate change, and identifying the components of Richmond's flood protection system. Since 2008, significant advances have been made to improve Richmond's resilience to flooding and many of the goals established in the Strategy have been achieved. Staff is currently undertaking a comprehensive update of the City's Flood Protection Management Strategy, funded through the National Disaster Mitigation Program grant, and will bring forward a draft strategy for Council's consideration in spring 2019.

Dike Master Plans

Climate change scientists estimate that sea level will rise approximately 1.0 m by 2100 and 0.2 m of subsidence is expected in that same time period. A key action identified in the City's Flood Protection Strategy involves preparing and implementing a comprehensive program to raise the City's perimeter dikes by 1.2 m over the next 25-75 years to stay ahead of climate change induced sea level rise. The City's Dike Master Plans addresses this need by recommending dike upgrade options for each dike reach throughout the City.

Public consultation for Dike Master Plan Phases 3 and 5 is currently underway. Finalized plans that incorporate the feedback received through public consultation will be brought forward to Council for consideration in spring 2019. Preparation of Dike Master Plan Phase 4 is underway and a draft will be brought forward to Council in 2019.

Infrastructure Improvements

Funded by the Drainage and Diking Utility and grants, the City's flood protection infrastructure is continuously upgraded and improved to address infrastructure age, growth and climate change.

Dike Upgrades

Design work has been completed for the upgrade of the South Dike between Gilbert Road and No. 3 Road. Upgrades include raising and widening approximately 650 m of dikes and improving the adjacent multi-use path to enhance the safety and accessibility of pedestrians and cyclists. A public open house was held on site on June 23, 2018. Construction is expected to commence in spring 2019.

Design is underway for dike upgrades along the South Dike between No. 3 Road and Finn Slough. Ongoing works include coordination with Parks Services for the impacts to the dog off-leash area at the No. 3 Road Waterfront Park and a public information session to be held in late spring 2019.

Design of South Dike upgrades between No. 9 Road and west of McMillan Way is awaiting provincial approvals and construction is anticipated to commence later in 2019.

In addition to dike upgrades completed as part of the capital program, 1.4 km of dikes were re-armoured with 10,500 tonnes of rip-rap as part of the City's Dike Maintenance Program in 2018.

Pump Station Upgrades

Significant progress has been made in upgrading the City's drainage pump stations to accommodate growth and climate change. Over the last 18 years, since the City introduced the Drainage and Diking Utility, the City has rebuilt 11 of its 39 drainage pump stations and has performed significant upgrades on four. Re-construction of the No. 2 Road North Drainage Pump Station upgrade was completed in 2018. Re-construction of Horseshoe Slough Pump Station is underway. Construction of the No. 7 Road South, Shell Road North and No. 2 Road South pump stations are expected to begin later in 2019.

Flood Protection Improvement Financing

Improvements to the City's flood protection system to address the needs of aging infrastructure and climate change are funded through three basic funding sources.

Drainage and Diking Utility

The Drainage and Diking Utility was established by Council in 2000 and currently generates $11.6 million to maintain and upgrade Richmond's flood protection infrastructure.

Senior Government Grant Funding

The City's Flood Protection Strategy aims to pursue 50% funding for dike improvement efforts from senior government. As a result of proactive flood protection planning efforts, the City has been successful in securing $18.5 million in senior government grants that will go towards implementing $30 million of dike and pump station improvements as well as ongoing flood protection assessments, exceeding the strategy's target of 50%.

Development

The City has successfully partnered with developers to secure dike upgrades through development. In particular, the City is actively pursuing opportunities to construct superdikes, where land supporting development behind the dike is filled to the same elevation as the dike crest. This eliminates visual impacts of a raised dike structure on waterfront views while providing an enhanced flood protection structure for the City. Superdikes constructed through development include sections near the Richmond Olympic Oval and at the Imperial Landing and Kawaki developments in Steveston. Superdike construction is expected to occur at the Parc Rivera development and the River Green developments in 2019. Staff estimates that up to 20% of dike upgrades along Lulu Island's perimeter dikes will be completed through development.

Financial Impact

None.

Conclusion

While the City's flood protection system meets current provincial standards, evolving climate change impacts must be addressed, as highlighted through the significant storms observed in the winter of 2018. Richmond maintains a robust and comprehensive flood protection program that proactively addresses the impacts of climate change.

The City's Flood Protection Strategy proactively guides the City to forecast, plan and improve the City's flood protection system to meet long-term requirements. Long-range planning of the City's diking needs are addressed through the ongoing Dike Master Planning efforts. Richmond's drainage infrastructure is well developed, with computer based hydraulic models to forecast future capacity requirements. Through the capital improvements and investment in preventative maintenance programs, the City has developed the ability to proactively prepare and respond to

flood related concerns. Significant progress continues to be made in advancing the City's dike planning efforts and implementing infrastructure improvements to the City's flood protection system.

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Att. 1: Annual Rainfall Data

Attachment 1 – Annual Rainfall Data