



REPORT

Report Date: January 13, 2020
Contact: Nick Kassam
Contact No.: 604.871.6859
RTS No.: 13050
VanRIMS No.: 08-2000-20
Meeting Date: February 12, 2020
[Submit comments to Council](#)

TO: Standing Committee on Policy and Strategic Priorities

FROM: General Manager of Real Estate and Facilities Management in consultation with the General Managers of Planning, Urban Design and Sustainability, Engineering Services and Vancouver Board of Parks and Recreation

SUBJECT: Aquatic Environments Action Plan

RECOMMENDATION

- A. THAT Council approve the recommended approach for improving aquatic environmental quality by:
 - 1. developing and coordinating strategies and actions for aquatic habitat and water quality health under the umbrella of the Vancouver Plan working in close coordination with integrated strategies of the One Water program and environmental policy areas; and
 - 2. advancing tactical actions outlined in this report, with focus on addressing microbial pollution to False Creek, Trout Lake and Vancouver's coastal beaches.
- B. THAT Council receive the False Creek Water Quality Improvement Initiative 2019 Progress Report for information.
- C. THAT this report be provided to the Vancouver Board of Parks and Recreation.

REPORT SUMMARY

This report responds to Council's motion of February 13, 2019, which, recognizing continual concerns pertaining to water quality in False Creek and Vancouver beaches, directed staff to report back with recommendations to create an action plan.

The City and the Park Board have been advancing action directed at improving water quality in aquatic environments for some time. This range of action includes on-the-ground tactical action measures (e.g. stationary and mobile pump-out services), coordinated action programs (e.g., False Creek Water Quality Improvement initiative) as well as strategic plans targeting specific areas (e.g. Combined Sewer Overflow (CSO) mitigation, urban runoff pollution prevention, green rainwater infrastructure, biodiversity, etc.) While a range of actions have been advanced and will continue with significant progress made, improving water quality in highly urbanized areas is a long-term endeavor requiring systematic effort. With various pieces of action underway, developing a comprehensive approach offers a key opportunity for achieving further progress. It is envisioned that a comprehensive approach would consider water quality and broader aquatic environmental health objectives holistically and strategically, on a community-wide basis. Such an approach also presents the opportunity to better understand overall system-wide dynamics and consider key activities impacting aquatic health collectively and in an integrated manner.

This report recommends that the City and the Park Board continue to advance targeted, concrete actions while advancing strategic action through existing plans already underway. Focused tactical interventions at the site-specific level can support definitive improvements over the shorter term while longer-term strategic action is being advanced as part of the Vancouver Plan efforts which integrate natural environmental policy and the One Water¹ program. Given the benefits of advancing an overall approach, the Vancouver presents a valuable opportunity for considering aquatic environmental health city-wide and developing comprehensive, broad-based policies and strategies that align with an overall shared community-wide vision.

The report also includes the 2019 False Creek Water Quality Improvement Initiative progress report which provides Council with an update on the concrete actions advanced in 2019 to improve water quality in False Creek. Future annual progress updates will report on all actions taken, across False Creek and other targeted water bodies.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

At their regular meeting of the Standing Committee of Council on City Finance and Services, held on Wednesday, February 13, 2019, Council adopted the following recommendations²:

- A. THAT Council direct the General Manager of Real Estate and Facilities Management to extend the pilot mobile sewage pump-out service in False Creek for the 2019 boating season.
- B. THAT Council support, in principle, the delivery of a mobile sewage pump-out service in False Creek for the 2020 to 2024 boating seasons, inclusive, and that staff report back with details on a recommended funding option to support this five-year service.
- C. THAT Council direct staff to come back in Q3 of 2019 with recommendations of the Waterfront Initiative to create an action plan to address water quality issues.

¹ The City's One Water program encompasses rainwater management, sewage management, green and blue systems, discharge water quality, non-point source pollution and associated infrastructure.

² <https://council.vancouver.ca/20190213/documents/cfsc20190213min.pdf>

This report addresses Recommendation C. Recommendations A and B are being addressed in a separate report (RTS 13618).

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

The City Manager and General Manager of Real Estate and Facilities Management support the recommendations of this report. A longer-term, strategic approach is seen as a way to consider issues holistically and prioritize and consolidate key improvement initiatives, while taking action reflective of the suite of community uses and objectives. Development of supporting environmental policy under the Vancouver Plan and integrating emerging strategies of the One Water program and future strategies of the Greenest City Action Plan under the umbrella of the Vancouver Plan is an effective means to align strategic efforts towards an overarching community vision. Concurrently, continued focus on advancing tactical action serves to maintain important momentum while strategic action development is underway.

REPORT

Context

As a waterfront city, Vancouver's aquatic environments, including streams, lakes, beaches, the Fraser River, False Creek and other marine coastal waters, are integral parts of the city's identity and provide a wide range of community amenities. They are also essential for ecological well-being, supporting biodiversity at the local, regional and global scales. Over time, as the city developed, Vancouver's aquatic environments have been impacted on multiple fronts. Impacts have occurred as a result of infilling of streams and coastal areas, hardening of shorelines, loss of riparian areas, alterations to water flow regimes, and introduction of pollutants, as well as effects from uses which occur in water bodies. A key area of concern has been the impact of these changes on water quality.

With 'Clean Water' and 'Access to Nature' being key components of Vancouver's Greenest City Action Plan, Council has provided consistent direction for targeted actions to improve water quality. Aquatic environmental water quality has also been a priority for the Park Board who has established a "no beach closure due to contamination" policy objective and reinforced goals to protect and enhance the integrity of aquatic environments as part of their Parks and Recreation Services Master Plan (VanPlay 2019) and OnWater: Vancouver's Non-motorized Watercraft Strategy (OnWater 2019).

a. False Creek Water Quality Improvement Initiative

In recent years, particular focus has been directed towards improving the water quality in False Creek given consistently high levels of microbial pollution (e.g. bacteria, viral, etc.). False Creek has been heavily impacted on multiple fronts, including legacy impacts from a range of past development practices and impacts from current activities.

In response to water quality issues and Council direction, the City and Park Board have implemented a number of actions to reduce sources of pollution and improve ecological conditions in False Creek. To better coordinate actions and ensure a comprehensive approach in False Creek, the City established an interdepartmental action program, the False Creek Water Quality Improvement Initiative, in 2017.

This program serves to strategically guide and coordinate action across five priority areas:

- increasing aquatic environment system understanding;
- pollutant source control and impact mitigation;
- integrating water quality considerations into strategic plans;
- strengthening partnerships; and
- restoring and improving ecological health.

Concrete actions advanced include implementing green infrastructure projects, conducting sewer cross-connection investigations, providing stationary and mobile sewage pump-out services for boats, strengthening City Health bylaws and enforcement, developing and implementing targeted water quality assessment studies, increasing engagement with the boater and marina community, and strengthening partnerships with regional and senior levels of government.

As part of the coordinated action program, annual progress reports are provided to Council. Key updates on the suite of actions that were advanced in 2019 to improve water quality in False Creek are provided in Appendix A.

b. Other Action

While no City or Park Board coordinated action programs exist that specifically target other aquatic bodies in Vancouver (e.g. Trout Lake, Still Creek, Burrard Inlet, etc.), the City and Park Board have advanced various actions to improve water quality in aquatic environments more broadly. Most notably, the City has established a planning initiative aimed at reducing pollutant discharges from two key sources: combined sewer outfalls and rainwater runoff. This initiative is also seeking to optimize utility infrastructure investment while adapting sewage and rainwater management systems to climate change (including more intense rainfall events), population growth and meet regulatory obligations. A progress update on this initiative is expected to be presented to Council in Q2 2020.

The City has also been participating with the Burrard Inlet Water Quality Roundtable being led by the Tsleil-Waututh Nation. In addition, the City has partnered with other governmental agencies to conduct water quality research to better pin-point key pollutant sources in Trout Lake, and targeted coastal beaches, as well as in False Creek.

Strategic Analysis

Key challenges and considerations

Water quality management and improvement in aquatic environments are complex, particularly in highly urbanized areas. Complexity stems from a variety of factors, including the multiple sources of impacts that are present. The City is in a strong position to advance strategic action with the recently adopted RainCity Strategy and the planning initiative to address CSOs and pollution from urban runoff underway. However, depending on the water body, water quality may also be affected by other sources of pollution (e.g. illegal cross-connections, illegal boat discharges, wildlife, legacy contamination from past activity, etc.) In any given water body, different and multiple sources of pollution are likely occurring at any time. In this respect, different targeted interventions may be needed for different water bodies.

While all pollutants are a concern, pollution impacts are not all the same. Rather, pollution impacts differ depending on a number of factors. These factors include the type of pollutant, the manner by which the pollutant is introduced, the fate and effects of the pollutant in the water body, as well as the characteristics of the receiving environment. Understanding of the relative risks posed by different pollution situations can assist in establishing a strategic approach and focusing resources on priorities.

Furthermore, different types of water (e.g. marine, fresh, sub-surface, estuarine, etc.) naturally have different water characteristics. As such, a characteristic considered to be positive for one type of water may be detrimental to another type (e.g. salinity in freshwater systems). This is also the case with respect to different needs for various human and ecological uses. For example, drinking water made suitable for human consumption with chlorine can adversely impact fish and other aquatic species. Different human uses (e.g. shellfish harvesting, subsistence economy, recreation, etc.) also depend upon different quality levels.

Water quality is also impacted in ways other than pollution. For example, impacts can occur from activities that alter flow regimes, make physical changes to shorelines and water bodies, introduce invasive species, impact upland environments and otherwise impair ecological functioning. There is a particularly close relationship between water quality and land use. Land use considerations include city-wide patterns pertaining to overall landscape cover, impervious surfaces, and connectivity. Site-specific considerations are also important with research finding that the land use immediately adjacent to the water body to be of particular importance. Climate change adds further compounding impacts. Changes such as sea level rise, increases in water temperatures and alterations in precipitation and runoff can significantly impair aquatic environmental water quality, as well as result in broader ecosystem impacts.

The complexity of aquatic ecosystems and the linkages within them means that impact to one component often has compounding effects. This means that water quality impairment in one area can lead to cascading effects. For example, levels of pH and oxygen can result in direct effects to aquatic resources, as well affect the solubility and toxicity of different chemicals which can lead to additional impacts. It also means that impacts to other areas, such as loss of habitat, can adversely impact water quality (e.g., reduce natural chemical processes, impact water flows, etc.) Accordingly, a focus on overall aquatic environmental health is beneficial for addressing water quality concerns.

Significant challenges are further posed by a fragmented governance system and overall lack of holistic environmental management. The rights and title of First Nations play a significant role. Aquatic environments have been home to First Nations for time immemorial and ancestors used natural resources, especially marine and intertidal resources, as the basis for their subsistence economy. From a regulatory perspective, multiple authorities from all levels of government exist with various policies and regulations generally targeting specific areas.

To facilitate an overall ecosystem-based management approach, two inter-governmental partnership programs previously existed. These programs established a framework to coordinate agencies involved in two key aquatic ecosystems, Burrard Inlet (which includes False Creek) and the Fraser River Estuary. In addition to coordinating activities through action such as joint project review, these collaborative programs also developed comprehensive environmental action plans. They also served as a centralized body of pertinent environmental quality knowledge, including developing and maintaining shoreline habitat maps and receiving water body water quality information. The coordinated and comprehensive approach was lost when the programs were ended in 2013. Currently, various federal, provincial, regional and local

agencies may be involved depending on the specific issue at hand and there is no established program for supporting ecosystem-wide planning. Recently, Tsleil-Waututh Nation developed a First Nations led Burrard Inlet Action Plan to foster ecosystem-based management and development of strategic actions.

Recommended Approach

While a range of actions have been advanced and progress made, improving water quality in highly urbanized areas is a long-term endeavor requiring systematic effort. Existing conditions have resulted from development patterns and decisions made over an extended period of time while at the same, system complexity creates significant challenges.

Staff are recommending that rather than developing a separate stand-alone plan, the City pursue an integrated approach that seeks to improve aquatic environmental health by advancing:

- strategic planning and policy work being developed under the umbrella of the Vancouver Plan including environmental, land-use and climate change areas, as well as integral work underway through the City's One Water initiative; and
- concrete action implemented through the City's water quality improvement programs and initiatives.

This full spectrum approach advances work comprehensively, encompassing broad-based high level community planning through to individual tactics. A focus on holistic aquatic environmental health (rather than solely water quality) is anticipated to better address inherent system complexity, helping to achieve greater progress with respect to water quality improvement as well as broader biodiversity objectives.

Integration with the Vancouver Plan also represents a significant opportunity for making greater progress. In particular, it will enable the City to take a broader and longer-term view. Consideration of aquatic environmental health as part of an overarching city plan allows greater focus to be placed on understanding overall system (human and natural) dynamics and efforts placed on harmonizing objectives. Integration of aquatic health and community planning also strengthens alignment, better ensuring that subsequent action is being driven by a shared vision and the suite of community uses and objectives. Further, it enables consideration of the suite of complex factors at play, seeking to address aquatic environmental health holistically and strategically on a city-wide basis. It also supports an efficient engagement process by capitalizing on public interest and momentum, improving planning and resources efficiency, and presenting a clear and united public message.

Under the recommended approach, strategic action pertaining to aquatic health will also be advanced through other key targeted initiatives, including the City's One Water initiative and the Greenest City Action Plan, under the umbrella of the Vancouver Plan. While strategic action is underway through the Vancouver Plan and related strategic plans, progress will continue over the short-term with the continuation of concrete actions under the City and Park Board's existing programs and implementation plans.

A guiding list of tactical actions intended to be advanced in 2020 is provided in Appendix B. The 2020 aquatic environments action program remains focussed on microbial pollution, incorporating a wide range of action to make meaningful improvement. Actions include efforts to

better identify sources of microbial pollution, improve understanding of the False Creek system, reduce potential sources and strengthen partnerships. The action list is meant to be flexible and adaptive, evolving as new information and learnings arise.

A progress report will be provided to Council on an annual basis to provide an update on both the concrete actions taken that past year as well as progress made with respect to developing broader strategic action as part of the Vancouver Plan and other key planning initiatives.

Collectively, the recommended multi-prong approach to action (i.e., strategic action development as part of Vancouver Plan with integration of aquatic health objectives with One Water and Greenest City Plan, and deployment of concrete action) is an effective approach to address Council's direction to address aquatic health and water quality issues. It is envisioned that this comprehensive approach will serve to:

- strengthen integration of aquatic health and community planning, better ensuring that action is being driven by a shared vision and the suite of community uses and objectives;
- build common understanding of the key issues, drivers, opportunities, and challenges pertaining to Vancouver's aquatic environments and clarify aquatic environmental health objectives;
- develop solutions and advance actions across all Vancouver aquatic environments strategically, in response to highest priorities community-wide;
- continue to advance meaningful concrete action over the short-term; and
- develop clarity around the City/Park Board's role in context of other governmental agencies and strengthen coordination amongst agencies and the community to achieve broader benefits, synergies, and efficiencies.

Implications/Related Issues/Risk

Financial

It is anticipated that a strategic approach will assist the City in addressing aquatic environmental health priorities in an equitable, cost-effective and systemic manner and best ensure that investments are being directed to areas of highest impact. Continued focus on advancing targeted concrete actions will maintain momentum gained from investments to-date and direct resources on immediate priorities. No additional resources are anticipated at this time. Staff will bring forward any additional funding requests as part of the regular budget process should additional resources become necessary.

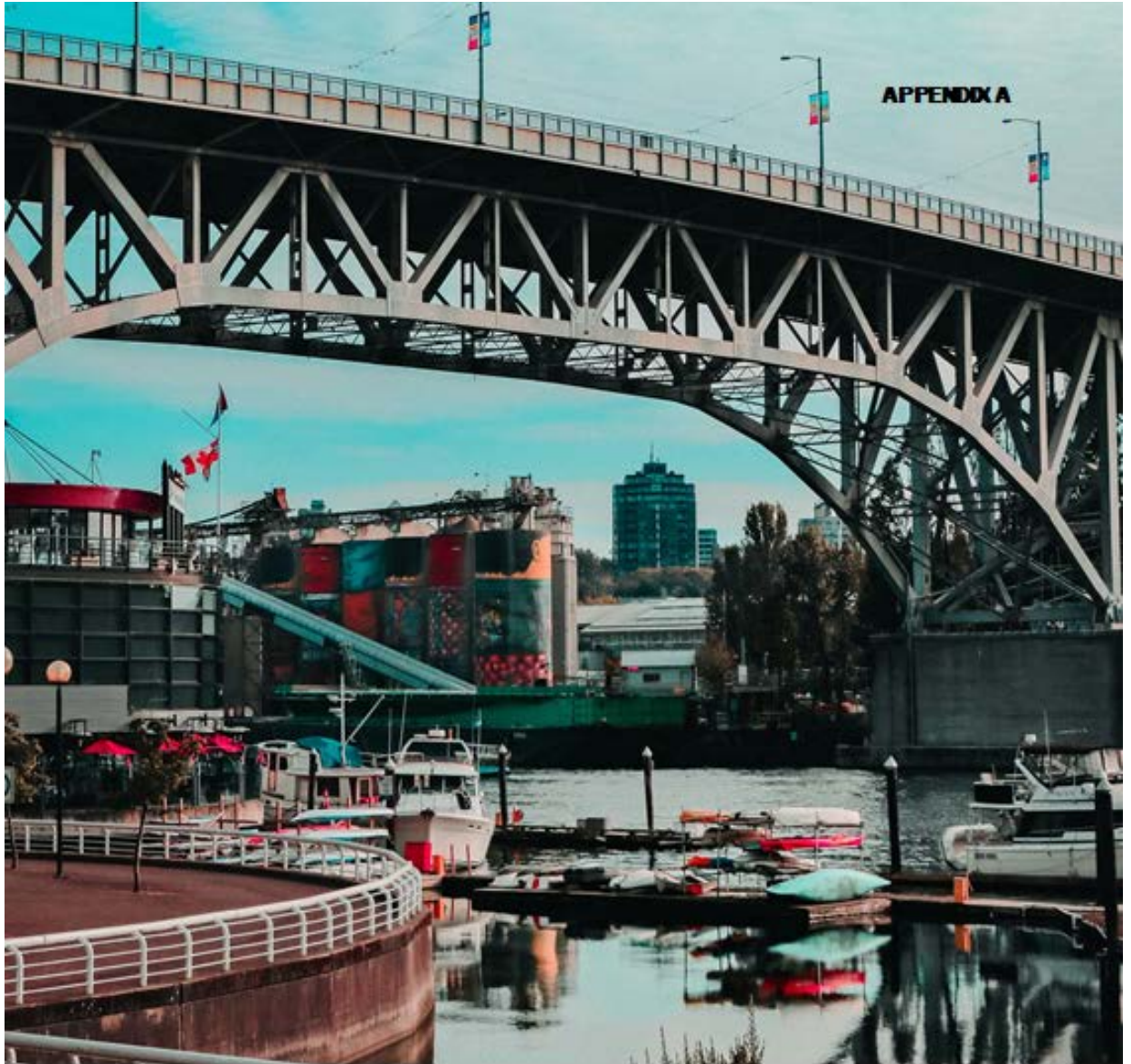
Environmental

The recommendations of this report are directed towards improving aquatic water quality and environmental health in an effort to better support overall ecological well-being as well as the broad range of values and uses that aquatic environments provide for current and future generations.

CONCLUSION

The City and the Park Board have advanced a suite of initiatives to improve water quality in aquatic environments, including both on-the-ground tactical action and strategic plans targeting specific areas (e.g. CSO mitigation, rainfall pollution prevention, green rainwater infrastructure, biodiversity, etc.) The recommendations of this report build on continuing and advancing this work. In addition, this report recommends that longer term strategies to address aquatic health be developed as part of the Vancouver Plan and associated implementation strategies. The scope of the Vancouver Plan includes environmental, land-use, climate change (and other) policy areas and effective integration of the One Water initiative guided by a robust, informed community vision. This multi-pronged approach of continuing to implement tactical actions while the strategic planning is under development will maintain momentum and continue to make effective aquatic health and water quality improvements over the short-term.

* * * * *



False Creek Water Quality Improvement Initiative
Progress Report 2019

Introduction

False Creek is an inlet off of English Bay, separating the downtown peninsula from the rest of Vancouver to the south. The waterway once provided valuable fishing, harvesting and hunting resources for the Musqueam, Squamish and Tsleil-Waututh Nations, and remains an important part of the First Nations cultural and ecological landscape. Once extending as far east as what is now Clark Drive, much of False Creek was infilled during the early 1900s to support railway expansion projects and create additional land for marshalling yards and terminals. Through to the 1950s, False Creek served as the industrial heartland of Vancouver with sawmills, ship building, small port operations, and other industries joining the railway terminals. With a vision to transform the area into a vibrant mixed-used community, efforts to redevelop the area began in the late 1960s.

The City and Park Board have been building on the ongoing efforts to improve water quality in False Creek, with a particular focus on addressing current levels of microbial pollution. In 2017 the False Creek Water Quality Improvement Initiative was established to consolidate action under one umbrella and provide an overarching framework for advancing future work. As part of this initiative, annual progress reports are provided to Council to provide a summary of key actions taken in the past year. This report serves to provide the annual update on those actions taken by the City and Park Board in 2019 to contribute to improving False Creek water quality.

Background

A primary pollutant of concern affecting water quality in False Creek is microbial contamination, which is assessed through measurements of indicator bacteria such as *Escherichia coli* (*E. coli*). With many potential sources of microbial pollution that exist at any given time – some of which, like boats, are mobile – as well as changing conditions with respect to water currents and other fluid dynamics, determining exact sources of pollution is challenging. There is also high variability in how long microbes survive in the environment, some of which is related to dynamic conditions such as rainfall, temperature, and tidal movement. Water quality testing is also limited as it solely provides information from a relatively small sample volume for a specific moment in time.

Given the complexity of the False Creek system, improving water quality necessitates a long-term approach involving multiple stakeholders and jurisdictions, and is dependent upon systematic effort across a suite of key action areas. The City's False Creek Water Quality Improvement Initiative (FCWQII) captures and tracks in one place the suite of actions being advanced by the City and Park Board across five priority areas:

1. Source Control
2. Research and Assessment
3. Ecosystem Health Improvement
4. Strategic Planning
5. Engagement, Partnerships and Inter-agency Coordination



Source Control

Reducing Land-based Discharges

Sewage discharges from land are one source of microbial contamination in False Creek. Potential sources include combined sewer overflows. As the vast majority of these discharges occur during the fall and winter rainy seasons, it is not yet clear how significant these discharges are in impacting conditions during the summer period when recreational use is the highest. Regardless, reducing land-based sewage discharges is important for reducing overall loadings, as well as improving the ecological health of False Creek. Other potential land-based sources include illegal cross-connections and polluted rainwater runoff.

Reducing Combined Sewer Overflows (CSOs)

The original sewer system in Vancouver combined stormwater/rainwater with sanitary sewage in what is known as a combined sewer system. These systems were built to handle sanitary flows but only a portion of the stormwater runoff. During precipitation events, pipe capacity can be exceeded and combined sewage and stormwater overflows into local water bodies, including False Creek. These occurrences are called combined sewer overflows (CSOs).

The City has been replacing combined sewers with a separated sanitary and stormwater sewer system for many decades. Catchment areas that flow into False Creek have largely been separated. Three City of Vancouver CSO outfalls and one Metro Vancouver CSO outfall remain in False Creek. In 2019, the City established a planning initiative to accelerate CSO mitigation and action to reduce rainwater pollution.



Credit: Wendy de Boog.

Addressing Cross-Connections

Cross-connections occur when sanitary systems are accidentally or illegally connected to stormwater systems. They are a common problem in many urban areas. The City conducts ongoing inspections throughout the sewer system to identify and address any cross-connections where sanitary wastewater is connected to stormwater that discharges to False Creek or other water bodies.

In 2019, investigations began regarding the connections to the storm sewer outfall at George Wainborg Park, as a result of elevated *E. coli* counts in the storm sewer upstream of the outfall. No definitive source(s) could be determined and investigations will continue into 2020.

Green Rainwater Infrastructure Program

Traditionally, rainwater is captured and discharged through a sewer system. The City's Green Rainwater Infrastructure (GRI) program aims to manage rainwater more naturally, providing space for rainwater to infiltrate and replenish groundwater supply. In addition to reducing flooding, GRI initiatives contribute to improving water quality. In particular, they reduce the frequency and intensity of CSO occurrences. GI initiatives can also decrease the amount of pollution entering receiving waters, such as False Creek, by trapping sediments that cause pollution directly and that may carry other contaminants such as heavy metals, road salt, and fertilizers.

In 2019, additional GRI assets were installed on City lands within the catchment areas that drain to False Creek. Rainwater tree trenches were installed at Quebec and 2nd Avenue, and Expo and Smith Street, covering 1,000 m². Performance measures at Quebec Street of the entire system installed from 2018 and 2019 indicated a reduction of up to 87% volume of rainwater entering the storm sewer. Data collection and analysis will continue into 2020, inclusive of newly initiated building rainwater harvesting performance indicators.

Preliminary design work was also initiated for GRI projects on Richards Street, Pine Street and 10th Avenue.

Source Control

Supporting Responsible Sewage Management by Boaters

While regulating and enforcing vessel sewage disposal is a federal responsibility, the City and Park Board are working to support responsible sewage management by boaters through available local government tools. Focus areas to date include education and engagement, provision of pump-out facilities and services, strengthening by-law requirements, and facilitating compliance at marinas.

Marina Compliance Promotion

In 2018, Council amended the *Health By-law* to:

- prohibit boaters from discharging any polluting substance,
- prohibit marina operators from allowing boaters to discharge polluting substances in their marinas, and,
- require all marinas to have an operational pump-out facility by January 1, 2019.

The City's marina compliance program works to ensure that City requirements are met. All marinas in False Creek achieved 100% compliance with the signage requirements in 2018 and this was maintained in 2019. All marinas, except one, have met the requirement to have an operational pump-out facility. The final marina, who had encountered uncertainty with their lease, has equipment on order.

Providing Pump-out Services for Boaters

Since 2015, the Park Board has made stationary sewage pump-out facilities at the two civic marinas in False Creek available year-round (and at no cost) to all boaters. This service continued in 2019.

In 2017, a seasonal, mobile sewage pump-out service was piloted by the City. It was expanded in 2018 and again in 2019, with additional service hours and a new boat. This service provides a convenient option for boaters and also assists those where access to the stationary pump-outs is difficult. Over three seasons, the boat provided 1,661 pump-outs, directing approximately 135,000 L of sewage to the sanitary sewer system.



Research and Assessment

Investigating Pollutant Sources and Strengthening Understanding of False Creek

The complex nature of False Creek and limitations in conventional water quality testing makes it difficult to pinpoint pollution sources. Gaining a better understanding of system conditions, including basin flow and the distribution and fate of pollutants, and developing measures to better assess and identify pollution sources will enable the City and Park Board to better direct investments towards priority areas.

Undertaking Water Quality Assessment Studies

In 2018, the City launched a supplemental water quality assessment program to develop a greater understanding of water quality conditions throughout the basin. This work continued in 2019.

While conventional water quality testing can provide indication of general trends of the level of microbial pollution, it can't provide any information on potential sources affecting different areas. To support source identification, the City, together with Metro Vancouver and Vancouver Coastal Health, supported a research initiative led by the BC Centre for Disease Control to develop improved methods for determining contamination sources through microbial source tracking. Identification of sources will enable a tailored approach to mitigation, guiding the selection of response measures to specifically address the particular source (s) affecting a given area.

Monitoring Sewer Flow

The City started monitoring combined sewer overflows around False Creek in 2019, installing ten sensors at potential overflow locations. In addition, the City started monitoring sewer flow at 20 strategic locations in the pipe network to support better understanding of sewer system dynamics.

Developing a Hydraulic and Water Quality Performance Model

The City is developing a hydraulic and water quality performance model for False Creek in order to better understand the complex nature of the estuarine basin and explore opportunities for water quality improvement. The primary objectives of the model are:

- General System Understanding** - by describing circulation in False Creek including the distribution and fate of *E. coli* from key sources;
- Communication and Engagement** - by creating a visual tool that demonstrates the system's behaviour; and
- Scenario/Intervention Assessment** - by providing a decision-making tool that assists with the evaluation of alternative actions.

In 2019, work began on building a foundational conceptual basin model. This qualitative model, based on existing data from available sources, will serve to identify and characterize the major inputs, outputs and fluxes that impact water quality in the basin. It will also identify data needs to support future numerical models. The conceptual basin model may also serve as a communication tool to further collaboration and drive better understanding of False Creek as a dynamic ecosystem.



Ecosystem Health Improvements

Efforts to address water quality in False Creek can be further advanced by improving overall ecosystem health. For example, restoring natural shorelines (such as those found on Habitat Island) supports ecological processes including temperature regulation, nutrient cycling, sediment trapping, and water filtration, while also providing habitat and food for wildlife. When these processes are functioning, water quality can be improved naturally.



Figure 4. Map of sites used for intertidal data collection. All sites are located in Downtown Vancouver, adjacent to waterfront pathways (Photos by Tamara Walton).

Conducting Intertidal Studies of False Creek Shoreline

In 2019, the City worked with University of British Columbia Environmental Science students and CityStudio to conduct an intertidal environment comparison study to make evidence-based recommendations for biodiversity enhancement in False Creek.

The study assessed shoreline biodiversity levels in False Creek and Stanley Park, specifically for abundance of the common seaweed, *F. gardneri* (also known as rockweed). Rockweed is the predominant marine plant species in False Creek and a key indicator of overall intertidal health.

The detailed results of the study are provided in the report "Life on the Edge: A Comparison of Vancouver's Intertidal Systems with Recommendations for Biodiversity Enhancement in Northeast False Creek". Overall, the study results suggest that intertidal biodiversity is greatest in areas with high rockweed abundance, reduced slope and large boulders. The results of this study and future studies will help shape shoreline design guidelines and other enhancement works, and contribute to healthier, more biodiverse intertidal zones.

Strategic Planning Integrating Water Quality Considerations

While the City's most visible efforts are its tangible actions such as the mobile pump-out service, the City is also working to advance longer-term systemic change by integrating water quality considerations into its strategic plans and initiatives. These strategic initiatives provide an opportunity to manage land, foreshore and on-water uses which are important factors that affect the quality of a surface-water body such as False Creek.

Rain City Strategy

The Rain City Strategy was adopted by Council in 2019. The Rain City Strategy is a cross-departmental initiative that reimagines how we manage rainwater in the city now and over the coming three decades to 2050. It outlines a series of holistic, integrated measures to better manage rainwater, including improving water quality crucially through implementation of green rainwater infrastructure (GRI). Capturing and preventing pollution to rainwater runoff will be key in reducing CSO events, effectively mitigating pollution discharge into False Creek and other water bodies.



VanPlay Implementation and Adoption of 'On Water' Strategy

In 2019 the Park Board adopted the VanPlay Master Plan, its parks and recreation services master plan, setting the course for the next 50 years. The plan, developed over the past three years, provides a compass for guiding long-range planning, policy and service delivery decision-making. VanPlay also includes a Playbook Implementation Plan. One of the key goals identified in the plan is to restore Vancouver's wild spaces and improve biodiversity, including re-establishing the tree canopy and rehabilitating shorelines.

In June 2019, the Park Board also adopted the On Water strategy, a plan to enhance public use and access to non-motorized watercraft opportunities in False Creek and other water bodies surrounding Vancouver. Out of six desired outcomes evaluated during the public engagement process, "Protect and enhance the environment" was the most supported, with "improving water quality" being a top theme.

Broadway Plan

In 2019, the Broadway Plan was initiated, a comprehensive community planning and engagement process for the area of Broadway between Clark Drive and Vine Street. A hydrogeological study was completed, outlining the hydrogeological conditions and conceptual flow characteristics of the corridor. The City initiated hydrologic (water cycle, surface runoff) and hydraulic (study of fluid mechanics and pipe hydraulics) modeling, which will continue into 2020.

Demonstrating leadership in sustainability and resilience is one of the key principles guiding the creation of the plan. This principle sets the direction that new development patterns should enhance neighborhood environmental systems and commits to an integrated water management approach, including the use of green infrastructure and CSO elimination in the area, reducing pollutant inputs into False Creek.

Engagement, Partnerships, and Inter-agency Coordination

While the City has a key role to play, improving water quality in False Creek is ultimately dependent upon a community-wide effort and action across multiple governmental agencies. As such, improving conditions requires a commitment to public engagement, partnerships, and collaborative efforts. To encourage a broad-based approach, the City and Park Board delivers targeted education and awareness campaigns as well as fosters inter-agency coordination.

Outreach Campaigns

Various campaigns have been advanced over the years to engage the community in reducing pollution.

In 2019, the Park Board and City continued collaborations to deliver the “Pump, Don’t Dump” campaign to encourage responsible sewage management by boaters. As part of this effort, social media posts, a news release, signage and newsletters at marinas, and a website presence all promoted the no-charge mobile service and pump-out stations at both civic marinas.

False Creek Water Quality Working Group

The False Creek Water Quality Working Group (FCWQWG) is a multi-agency group convened in 2015 by the City of Vancouver and comprised of representatives from the City, Park Board, Vancouver Coastal Health (VCH), Metro Vancouver, and Transport Canada. The purpose of the group is to foster a strategic and coordinated approach to water quality improvement and enforcement in False Creek through inter-agency collaboration and partnership.

In 2019, FCWQWG reviewed and updated the committee’s Terms of Reference and developed a set of guiding principles as a way to help guide and align member agency actions. Members also updated on efforts being taken by each agency. These included the microbial source tracking study partnership, VCH’s updated website providing access to real time beach water quality and Transport Canada’s engagement program for promoting compliance with the federal sewage discharge regulations.

Burrard Inlet Water Quality Objectives Update

The closure of Burrard Inlet Environmental Action Program (BIEAP) in 2013 resulted in the loss of a coordinated, comprehensive science-based environmental management approach to Burrard Inlet (which included False Creek). The Tsleil-Waututh Nation is now working with the Province to update ambient water quality objectives. The establishment of water quality objectives is a provincial mandate under the British Columbia *Environmental Management Act*. Identifying this as a high priority, the Tsleil-Waututh Nation have assumed a leadership role to spearhead updates in cooperation with the Province. As part of this effort, a Water Quality Roundtable and Technical Working Group has been established. In 2019, the City continued to serve as a participating member.



Conclusion

This 2019 Progress report highlights the measures taken by the City and Park Board this past year to improve water quality in False Creek. Building on actions taken in prior years, actions advanced in 2019 served to set direction to make significant broad-base systemic change. In addition to increasing investments to accelerate change and reduce pollution sources at the City-wide systems level, particular focus was also directed towards identifying site-specific sources of pollution to enable targeted, concrete action over the near term. Outreach and partnership activities also continued to foster coordination and encourage community-wide action, and to align goals internally and externally.

The return of herring and other wildlife to the waterway is a sign that the environmental quality in False Creek is improving. However, given the extent of impacts made, further action is needed. While system-wide changes are being pursued over the long-term, focused tactical interventions at the site-specific level can support definitive improvements over the shorter term.



Appendix B: 2020 Aquatic Environments Tactical Actions

Focus Area	Objective	Action	Timing	Lead
False Creek				
Research & Assessment	General microbial pollution assessment	Review water quality sampling results from MetroVancouver shoreline monitoring program	Q2-Q3	Environmental Services and Park Board
		Conduct supplemental water quality assessment to better understand microbial pollution throughout False Creek	Q2-Q3	Environmental Services
	Targeted microbial source identification	Conduct microbial source tracking study ¹	All year	Environmental Services
	Understanding fate & effects of microbial pollution	Complete conceptual basin model (Hydraulic model – Phase 1)	Q2	Environmental Services
	Evaluate additional interventions	Review merits of trial installation of Seabins ² at civic marinas to reduce litter and debris	Q1-Q2	Park Board
Assess risk and review options to reduce microbial pollutant inputs from streets (street flushing, illegal discharges)		Q1-Q2	Engineering and Environmental Services	
Source Control	Provide services to reduce illegal discharges from boats	Provide stationary pump-out services	All year	Park Board
		Provide mobile pump-out service	Q2-Q3	Environmental Services
		Deliver marina compliance promotion program	All year	Environmental Services
	Reduce microbial pollutant inputs from identified storm sewers	Conduct targeted investigations of storm sewers located in George Wainborn park and in the northwest corner of False Creek ³	As necessary	Engineering and Environmental Services
	Reduce polluted rainwater runoff	Conduct performance assessment of GI assets located in False Creek watershed	All year	Engineering Services
Advance work to install additional GI assets in False Creek watershed (design, implementation)		All year	Engineering Services	
Strategic Planning	Improve water quality through upland land-use decision-making	Integrate water quality and ecological health objectives into planning initiatives currently underway influencing False Creek (West End Waterfront Parks and Beach Ave Master Plan, Broadway Plan, NE False Creek Park Plan, Charleson Stormwater Management Plan)	All year	Engineering Services and Park Board (with Environmental Services)
Engagement, Partnerships &	Encourage responsible community practices to	Deliver “Pump Don’t Dump Campaign”	Q2-Q3	Park Board

¹ Delivery of this action item is subject to partnership with agency partners.

² Seabins are a flow through garbage can with a pump that gets fixed to a dock, pulls water through it and captures debris (> 2mm in size).

³ Preliminary water quality assessments have identified consistent elevated levels of microbial counts in these storm sewers.

Inter-agency Coordination	reduce illegal discharges from boats Facilitate interagency leadership & coordination	Chair False Creek Water Quality Working Group	All year	Environmental Services (with Park Board and Engineering)
Trout Lake				
Research & Assessment	General microbial pollution assessment	Conduct water quality monitoring program to support swimming activity in Trout Lake ⁴ and review results	Q2-Q3	Park Board (with Environmental Services)
	Targeted source identification – microbial pollution	Conduct microbial source tracking study	All year	Environmental Services
	Evaluate additional intervention	Review geese management options for Trout Lake ⁵	Q2-Q4	Park Board
Other Action (broader in scope beyond just False Creek or Trout Lake)				
Research & Assessment	Targeted source identification – microbial pollution	Conduct targeted microbial source tracking studies as appropriate	All year	Environmental Services
Source Control	Reduce polluted rainwater runoff	Advance work to monitor, design, install and maintain GI assets City-wide	All year	Engineering Services
Strategic Planning	Reduce combined sewer overflows (CSOs) and rainfall pollution	Advance One Waters planning initiative (mitigate CSOs and rainwater pollution)	All year	Engineering Services
Engagement, Partnerships & Inter-agency Coordination	Ensure corporate best practices	Review City practices to ensure alignment with updated <i>Fisheries Act</i>	All year	Environmental and Engineering Services
	Support First Nations led Burrard Inlet environmental planning	Participate on the Burrard Inlet Roundtable Working Group	Ongoing	Environmental Services

⁴ MetroVancouver conducts water quality sampling on behalf of member municipalities to support swimming at coastal beaches. Sample results are reviewed by Vancouver Coastal Health (VCH) who makes determinations on suitability. MetroVancouver does not provide service for inland water bodies. Sample results are reviewed by VCH who makes determinations on suitability to support swimming.

⁵ Preliminary microbial source tracking results indicate that the most likely primary source of microbial pollution at Trout Lake is fecal matter from geese.