

ADMINISTRATIVE REPORT

Report Date:October 18, 2019Contact:Jimmy ZammarContact No.:604.871.6880RTS No.:13116VanRIMS No.:08-2000-20Meeting Date:November 5, 2019

TO: Vancouver City Council

- FROM: Acting General Manager of Engineering Services in consultation with the General Managers of Planning, Urban Design and Sustainability, and Vancouver Board of Parks and Recreation
- SUBJECT: Integrated Blue-Green Systems Planning

RECOMMENDATION

A. THAT Council approve the scope of work for Watershed Revival delivered through watershed planning as described in this report and direct staff to proceed with the delivery of this scope of work in conjunction with the City-wide Plan, the Rain City Strategy implementation, and the work on the Greenways Plan;

FURTHER THAT Council direct staff to provide annual updates on progress on watershed planning.

B. THAT Council approve the scope of work for the Greenways Plan as described in this report and direct staff to proceed with the delivery of this scope of work in conjunction with the City-wide Plan and the work on watershed planning;

FURTHER THAT Council direct staff to provide annual updates on progress on the Greenways Plan.

C. THAT Council approve the preliminary scoping work proposed for the False Creek to the Fraser River Blueway path as described in this report and direct staff to proceed with the delivery of this preliminary scoping work;

FURTHER THAT Council direct staff to provide an update on the opportunities assessment undertaken for the False Creek to Fraser River Blueway by the end of Q3 2021.

REPORT SUMMARY

In Q1 of 2019, Council approved three motions related to blue-green systems and directed staff to report back with proposed scopes of work. The three motions relate to: Watershed Revival, Greenways Plan, and False Creek to the Fraser River Blueway. The purpose of this report is to build on and integrate the considerable effort undertaken over the past decades by the City, to provide proposed scopes of work and associated budgets and to identify projects that can be undertaken in the near-term while advancing these initiatives over the coming years. In addition to discrete work programs for each motion, this scoping work will support the exploration and potential of blue-green systems with the community as part of the City-wide Plan process and in support of the goals and objectives of the Rain City Strategy. The blue-green system ideas will be piloted in near-term projects such as St. George Rainway, and Alberta Street and Columbia Park. Examples of some key blue-green systems study areas are illustrated in Figure 1.

The City of Vancouver and the Park Board are taking steps towards integrating their approach to planning and managing water, transportation, urban ecology, and land. The overall approach proposed in this report is to build on the planning and engineering work that has been already underway, to identify opportunities for early successes, including exploring the early definition of the False Creek to the Fraser River Blueway path, and to undertake studies and analysis to chart long-term directions. The overall vision is to achieve, in the not too distant future, a network of streets, parks, and open spaces that will be redesigned into leafy green landscaped spaces, which prioritize people and communities, walking, cycling, and room for the urban forest and biodiversity to grow to its potential; and where ephemeral raingardens and other green rainwater infrastructure flourish and deliver on their water management potential—wet when it's pouring with rain and dry but healthy even at the end of our long warm Vancouver summer. Large open spaces serve as nature-rich and recreational places most of the year, and temporarily flood during intense rain events in order to limit the catastrophic impacts of extreme storms on people, property and the environment.

Blue-green systems by definition manage water and land in a way that is inspired by nature and designed to replicate natural functions and provide ecosystem services. When blue-green systems solutions are strategically implemented at a watershed scale, they have positive impacts on water utility system performance, increase community and utility system, climate resilience, improve biodiversity and equity outcomes, and enhance walking, cycling and recreation opportunities (Figure 2). Blue-green systems present a powerful opportunity for the City to achieve multiple objectives. The "blue" in blue-green systems refers to integrated water management and green rainwater infrastructure services provided as an inherent component of the blue-green system. This function includes nature-based constructed practices like rain gardens, wetlands or other forms of green rainwater infrastructure, as well as climate adaptation and flood management functions associated with both minor and/or major rainfall events. The "green" in blue-green system refers to the value of and the services provided by elements of terrestrial vegetation and biodiversity including trees or urban forest as well as other layers of plants, soils and biota present within the system.

Together, blue-green systems support both place-making and functional, enjoyable infrastructure that encourages walking and cycling transportation modes. Examples of how these values can be expressed in blue-green system planning include maximizing the use of water at the surface to achieve community well-being and climate resilience, enhancing the quality of green spaces, connecting habitats through corridors of green and blue infrastructure, daylighting previously culverted creeks and streams, community stewardship, education,

improving mobility, accessibility, and active transportation for all, and enhancing cultural awareness and representations of water in its many wondrous forms. Figure 3 illustrates some of the small scale examples of blue-green systems that have been implemented across Vancouver such as Hinge Park, 63rd Ave and Yukon St, and Ontario St Bio-swale. Figure 4 and Figure 5 show the City's large-scale aspirations that use systems approaches. For example, Hunter's Point in New York is a floodable space that adapts to sea level rise and coastal flooding events, serves as a living dyke, while providing a multi-functional space for park and recreational uses.

Blue-green systems provide immense co-benefit opportunities and can serve as amenities to local communities they serve, however they may also have inherent trade-offs with other uses within the street right-of-way, such as parking and vehicle access. The trade-offs need to be considered within the network and through community engagement. Where possible, the systems will be optimized to maximize co-benefits along the same corridors, and where overlapping opportunities are not available, parallel corridors will be considered in an integrated fashion within the broader network to minimize trade-off impacts and create engagement and coordination efficiencies.



Figure 1 - Examples of blue-green system study areas







Figure 3 - Examples of blue-green systems in Vancouver





SWALE ON YALE, SEATTLE Neighbourhood drainage





DAKPARK, ROTTERDAM Coastal flood protection & green roof



Figure 4 – Examples of blue-green systems





HUNTER'S POINT, NEW YORK Floodable park space

Figure 5 – Examples of blue-green systems

COUNCIL AUTHORITY/PREVIOUS DECISIONS

- Rain City Strategy (2019 in review)
- VanPlay, Parks & Recreation Services Master Plan Vancouver Board of Parks and Recreation (2019)
- A City-wide Plan for Vancouver General Planning and Engagement Program (2019)
- Resilient Vancouver Strategy (2019)
- Climate Emergency Response (2019)
- Climate Change Adaptation Strategy Update (2018)
- Northeast Quadrant Greenway Motion (2018)
- Rain City Strategy Interim (2017)
- 5-year Cycling Network (2017)
- Complete Streets Policy Framework and Related By-law Changes (2017)
- Biodiversity Strategy Vancouver Board of Parks and Recreation (2016)
- Vancouver Citywide Integrated Rainwater Management Plan (IRMP) (2016)
- Healthy City Strategy (2015)
- Greenest City 2020 Action Plan (2011, updated in 2015)
- Urban Forest Strategy (2014)
- Transportation 2040 (2012)
- 1995 Greenway Plan (1995)

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

The City Manager recommends that Council endorse the recommendations set out in the following report. The three motions represent an opportunity for the City to advance its policy objectives related to the climate crisis; restoring and enhancing watersheds, and improving water quality in the waters surrounding Vancouver; improving connectivity and accessibility within the active transportation and recreation networks; and accelerating the integration of utility systems planning within other city planning functions.

REPORT

Background

Modern-day Vancouver is located on traditional territory of three Çoastal Salish Peoples, the x^wməθk^wəÿəm (Musqueam), Skwxwú7mesh (Squamish), and Səlílwəta?/Selilwitulh (Tsleil-Waututh) Nations. The three nations have been the stewards of the land, air, and water for thousands of years.

Vancouver was once a mixed hemlock forest that contained acres of marsh that fed over 50 streams. The streams flowed either to the sea or the Fraser River and were abundant with salmon and trout¹. However, since the 1890s, as Vancouver developed, the marshes and estuaries were filled and many of the streams were redirected to pipes and buried underground².

¹ Harris, G., & Proctor, S. J. (1989). Vancouver's Old Streams. Vancouver Public Aquarium Association.

² City of Vancouver. (2016a). Integrated Rainwater Management Plan. Volume 1 Vision, Principles & Actions. Retrieved from City of Vancouver. (2016). Integrated Rainwater Management Plan. Volume 1 Vision, Principles & Actions. Retrieved from https://wancouver.ca/files/cov/integrated-stormwater-management-vision-principles-and-actions-volume-1.pdf

Over time, development patterns have significantly disrupted the City's natural water cycle due to increased impermeable surfaces, such as buildings and streets, and decreased green spaces that absorb and infiltrate rainwater. Rain that used to be absorbed by the ground or flow through vegetation-rich streams, recharging aquifers, and supporting local ecosystems, has been intercepted by roofs and paved surfaces and directed to the pipe network. When rain events exceed the capacity of the pipe network, the excess rainwater and sanitary water flows into the surrounding receiving waterbodies in the form of Combined Sewer Overflows (CSOs), resulting in pollution and environmental degradation of the Fraser River, False Creek, English Bay, Burrard Inlet, and the Salish Sea.

As with other cities with similar networks, Vancouver has undertaken multi-year investments to control and eliminate CSOs. Building on this multi-year effort, the City is currently undertaking a major shift towards a holistic water management approach (the "One Water" approach) that values water in all its forms (groundwater, rainwater, wastewater, drinking water, and surface water). The intent of the One Water approach is to integrate policy and planning in order to: improve regulatory compliance and eliminate CSOs, restore and protect our watersheds and waterbodies, efficiently allocate infrastructure investments, advance community well-being, equity and intersectionality, and increase resilience in the face of climate change.

Vancouver has had a long-standing aspiration to develop blue-green systems that improve liveability and water quality in receiving water bodies, promote active transportation and recreational access, and increase connectivity, access to nature, and biodiversity. Managing water and land and promoting biodiversity and nature in the city through interconnected blue-green systems at watershed and neighbourhood scales can magnify co-benefits, and requires deep coordination of land-use planning, transportation planning, parks and recreation planning, utility planning, and community input. The three motions guide, support, and accelerate these aspirations, and help the City build on the considerable efforts already undertaken by the City and with its partners and the community.

Strategic Analysis

Interconnectedness of the Three Blue-Green Motions

Though the three motions were passed separately by Council, the motions are connected by three themes: Holistic water resource management; biodiversity and nature in the city; and active transportation and recreation. There are also practical reasons for integrating the three motions; staff and financial resources can be coordinated and synergies between potential projects for each motion can be identified.

Holistic water resource management, nature in the city, and biodiversity are key drivers in many existing City plans and strategies, (e.g., *Integrated Rainwater Management Plan (IRMP), Climate Adaptation Plan, and the Biodiversity Strategy*). The *Rain City Strategy*, which is planned to go to council in the fall of 2019, will provide an updated city wide vision and implementation plan to achieve many of these objectives. Active transportation, connectivity and recreation are key drivers in the *1995 Greenways Plan, Transportation 2040 Plan,* and most recently, *VanPlay - Parks and Recreation Services Master Plan,* which was developed and recently approved by the Vancouver Board of Parks and Recreation (Park Board), with one of the *Strategic Bold Moves* identified in Report 3 being "Connectivity" through creation of a multifunctional city-wide network of parks and recreation. The *City-wide Plan* will provide high level overarching strategic directions that will guide the long-term planning associated with these strategies, plans, and their underlying systems (Figure 6).



Figure 6 – Scales of blue-green system integration

In addition, Figure 7 below provides a conceptual diagram to illustrate how watershed planning, greenway planning and blueway preliminary scoping are connected. It also illustrates the anticipated outcomes that systems-thinking can result in.



Figure 7 – Blue green systems conceptual diagram

Proposed Outcomes

Watershed Plans

- + Developing long-range watershed plans
- + Grey and green infrastructure opportunities
- + Integration with land use & other Blue-Green Systems
- + Implemention with spatial equity lense

Greenways Plan

- + Refreshing the 1995 Greenways Plan,
- identifying typologies, character and priorities
- + Amplification of network & linkage opportunity
- + Integration with land use public space/plaza
- opportunities & other Blue-Green Systems
- + Implemention with spatial equity lens

Blueway Preliminary Scoping Report

- + Explore the feasibility of the Vancouver portion of the False Creek to the Fraser Blueway
- + Collaboration with Metro Vancouver, City of Burnaby and City of New Westminster
- + Identifying an area that guides development for blue-green systems projects

12

Relationships with City Initiatives and Delivery Processes

There are many interconnected City initiatives and plans, which are related to the three bluegreen motions. These interconnections are highlighted in Table 1 below.

Relevant City and Parks Plans & Initiatives	Motions	Themes	Delivery Process	Master Plans
 Urban Forest Strategy Healthy City Strategy Biodiversity Strategy Climate Adaption Plan VanPlay IRMP / Rain City Strategy Places for People 	Watershed Planning False Creek to Fraser River Blueway	Integrated water management Nature in the City & biodiversity	Rain City Strategy Broadway Area Plan and Cambie Corridor Plan Clean Waters Plan* One Water Initiatives	WIDE PLAN (PARK BOARD)
 1995 Greenways Plan Climate Emergency Response Transportation 2040 Complete Streets Framework 5-Year Cycling Network Map VanPlay 	Greenways Plan	Active transportation & recreation	New Greenways Plan	CITY. VANPLAY

Table 1 – Three blue-green motions and their relationships with other City initiatives.

*The Clean Waters Plan is a recently-launched sewer and drainage master planning process that will guide city wide investments and address regional integration with Metro Vancouver to accelerate CSO mitigation, meet regulatory requirements, improve water quality in receiving bodies, and adapt to climate change.

Context of Current Blue-Green Efforts

The "blue-green" systems terminology and concept emerged in the 1990s and the City of Vancouver has begun contemplating such systems and concepts scopes around the same time, for example, as part of the 1995 Greenways Plan, Transportation 2040, and Greenest City Action Plan. The 1995 Greenways Plan included notable themes focussed on active transportation, nature in the city, clean air and water, place-making and increased biodiversity in and around our city. Transportation 2040 included objectives to design streets as part of green networks to support local ecosystems, provide access to nature, and improve the natural shoreline. The Greenest City Action Plan's Goal 6 "Access to Nature" also provided support for blue-green systems planning.

Strategies, Policies and Plans

More recently, initiatives such as the Integrated Rainwater Management Plan (IRMP), City-wide Plan, VanPlay, and Rain City Strategy (report to Council Nov 5, 2019) have contemplated the potential for blue-green systems to help meet a range of policy outcomes. The IRMP is a foundational plan for the Watershed Revival motion as one of its core intents is to help restore the role of urban watersheds to support urban and natural ecosystems. The Rain City Strategy builds on the IRMP and formally establishes blue-green systems planning as a targeted program for green rainwater infrastructure implementation within Streets and Public Spaces. There is also strong synergy with the City's Planning, Urban Design and Sustainability department's work to integrate city-wide systems thinking as part of community planning. The City-wide Plan will continue to provide an opportunity for further integration and clearer strategic direction to inform and to be informed by blue-green systems approaches.

Beyond City initiatives, there is significant alignment with the Park Board's *VanPlay*'s vision, particularly Bold Move 3 Connectivity. The Connectivity direction advocates for a multiplebenefits approach at a site, neighbourhood, citywide and regional levels to achieve a network of parks, nature and recreation, interwoven into day-to-day life (Figure 8). The *Urban Forestry Strategy* and the *Biodiversity Strategy* both support and inform blue-green systems planning.

Capital Programs and Projects

There are numerous pilots and projects completed or currently underway that demonstrate how the blue-green system aspirations can be accomplished. The *Arbutus Greenway*, for example, is seeking to apply blue-green system ideas, as shown in Figure 8. The preferred concepts include discrete bike and walking paths, urban forest, community spaces and green infrastructure. The integrated water resource planning undertaken efforts undertaken in 2019 and 2020, as part of the Cambie Corridor and the Broadway Area Plans, will also play an important role in informing the blue-green system opportunities city wide.

In addition, the City and the Park Board have initiated a number of enhancement projects in and around Still Creek, constructed stormwater wetlands (e.g. Hinge Park at Olympic Village), constructed a salt water marsh at New Brighton Park in cooperation with the Vancouver Fraser Port Authority, and daylighted the Spanish Banks Creek. The City has also developed and built more than 240 green rainwater infrastructure assets that aim to locally capture and manage rainwater. Additional projects envisioned and/or underway include Tatlow Creek daylighting, a fish ladder at Beaver Creek in Stanley Park, and a stormwater wetland at John Hendry Park to improve Trout Lake water quality. APPENDIX A includes detailed information on previous and current projects throughout the City of blue-green system projects.



Figure 8 - Arbutus Greenway concept meet the criteria of a blue-green system

Lastly, the City has started to use an intersectional lens to understand the perceived community needs and opportunities, which will help develop and prioritize blue-green system opportunities to better support equitable distribution of investment and benefits and reduce vulnerabilities related to climate change threats. To achieve this widely, collaboration and co-investment by all levels of government, water providers, private sector, non-profit sector, residents, and others are critical.

REPORTING BACK ON THE THREE BLUE-GREEN MOTIONS

The below sections aim to address the requirements of three blue-green motions, while developing a coherent scope of work to be delivered through multiple departments, and in collaboration with stakeholders and partners.

The overall vision is to achieve, in the not too distant future, a network of streets, parks, and open spaces that will be redesigned into leafy green landscaped spaces, which prioritize people and communities, walking, cycling, and room for the urban forest and biodiversity to grow to its potential; and where ephemeral raingardens and other green rainwater infrastructure flourish and deliver on their water management potential—wet when it's pouring with rain and dry but healthy even at the end of our long warm Vancouver summer. Large open spaces serve as nature-rich and recreational places most of the year, and temporarily flood during intense rain events in order to limit the catastrophic impacts of extreme storms on people, property and the environment.

The scope of work presented below aims to drive action to achieve this vision, in confluence with the *City-wide Plan*. Generally, the scope of work anticipated for each of the blue-green motions is structured around highlighting current work, and prescribing an initial scoping effort, as well as technical analyses and studies, and community engagement. Each component culminates in a deliverable that will be presented to Council before proceeding into the next phase of implementation.

(1) WATERSHED REVIVAL, INCORPORATING BLUE-GREEN NETWORK CONNECTIVITY

Watershed Revival will be delivered through watershed planning, a cross-departmental initiative that will build on and align with key initiatives within the City and the Park Board. Watershed planning informs and supports the *Rain City Strategy's* "Transformative Direction 4: Revitalize watersheds to enable communities and natural systems to thrive". This transformative direction calls for Vancouver to develop holistic plans for our 19 urban watersheds. Watershed planning also complements *VanPlay's* vision and Big Move 3 to provide access to high quality parks and recreation through an interconnected network throughout the City, acquisition of waterfront land to secure and enhance access to water, and movement of fauna via biodiversity corridors. Importantly, watershed planning is well aligned with the broad aspirations and next phases of listening and developing directions for the *City-wide Plan* as directed by Council in July, 2019 in supporting a planning program that integrates ecological, social, economic and cultural policy considerations.

Approach

Watershed planning provides a science-based and community-driven approach to understand our past, current and future relationship with surface water and groundwater resources, the ecological functions, and human activities within a watershed.

Watershed planning assesses the unique characteristics (i.e., ecology, hydrogeology, infrastructure and land use), needs, and challenges of each of the City's urban watersheds. It aims to ensure the health and sustainability of the whole-system, while identifying and acting on opportunities to improve or enhance rainwater management, flood management, climate change resilience, economic development, biodiversity, public health and well-being, urban growth and housing, transportation connectivity, partnerships, cultural and amenity services, and education and environmental literacy³. Table 2 outlines the technical, planning, and engagement elements of watershed planning.

Watershed Planning			
Technical	Planning	Engagement	
Detailed assessments of existing conditions Includes the geography, geology, sewer and drainage infrastructure, soil type, infiltration rates, groundwater regime, land use, transportation systems, urban heat island effect, ecology and biology hotspots, and social/cultural makeup. Watershed-based risks and vulnerability assessments Flooding, sea level rise, coastal impacts, urban heat and drought, environment.	Developing a clear vision, goals, objectives, and action items. Developing and layering watershed-specific plans Public engagement plans and communication strategies, cost/benefit analyses, transportation plans, community-led stewardship projects, environmental studies, policy reviews and plans, and	Representation of all affected and interested parties, initially and as often as decided by the partners and stakeholders. Partnerships with First Nations, government agencies, neighboring municipalities, key organizations and non- profits, and municipal departments.	
Modelling and scenario testing		Transparency and	

Table 2 – Elements of Watershed Planning

³ Brandes, O.M., & O'Riordan, J. (2014). A Blueprint for Watershed Governances in British Columbia. *POLIS Project* on *Ecological Governance*. Retrieved from <u>https://www.polisproject.org/node/480</u>

Hydrologic and hydraulic monitoring and modelling, which include climate change scenarios and system performance	Developing capacity for learning and improving plans over time and the ability to evaluate the process.	communications via range of avenues such as meetings, social media, public reports, art and visualization.

Proposed Scope and Deliverables

Watershed Plans

Staff will report back annually (Q3 2020 and Q3 2021) to provide updates on the methodology for watershed plans and the results of early application to pilot watersheds. In parallel, and as part of the City-wide Plan process, a long-term vision and strategic directions will be developed through 2021, and will include the ecological framework for blue and green systems, and guide watershed-specific plans. As Vancouver has 19 urban watershed areas, it is expected that developing plans for all 19 will extend beyond the end of 2021. The methodology and pilots will provide a better indication of the timeline for completing and sustaining all 19 watershed plans. Working closely across departments, and building on considerable progress underway within each department involved as well as the Park Board, watershed characteristic base mapping will inform policy and planning in the City's watersheds (Figure 10).

In the Broadway Area's integrated water resource planning process is using a watershedscale approach and a water-balance model for the five watersheds along the Broadway Corridor. This approach will guide a number of policy actions, drainage system upgrades, green rainwater infrastructure implementation and the development of the connected bluegreen system network in these areas. A prioritized set of city wide watershed plans and technical studies will be coordinated and developed to support ongoing work in other watersheds along the Cambie Corridor Area Plan, as well as in other prioritized watersheds such as China Creek, Hastings/Sunrise and South Hill Watersheds. Watershed planning will identify opportunities to integrate blue-green system functions coordinating with the Greenways network being identified. Other opportunities for integrating streetscape green rainwater infrastructure, creek daylighting, parcel-level rainwater management and potential Park Board projects will be identified on a watershed and catchment basis.



Figure 9 - Urban Watersheds of Vancouver

Studies to Support Watershed Plans

Technical studies will include climate vulnerability and risk assessments, geography, geology, sewer and drainage infrastructure assessments, geotechnical and soil type and infiltration rates studies, groundwater regime analyses, sewer and drainage asset and street condition assessments, urban heat island effect modelling, ecology studies, and transportation studies and well as social and equity considerations. The early scoping of watershed planning will undertake deep engagement of key partners at the definition stage.

Current Work

Work currently underway (included in the 2019-2022 capital plan) associated with Watershed Planning includes projects or initiatives that are planned to take place in the next three years.

- John Hendry Park Master Plan (Watershed: China Creek). Park Board staff are currently completing the John Hendry Park Master Plan (On-hold from 2014), which includes water quality improvement, access to nature, and biodiversity elements. The master planning project initiation is currently underway with public consultation and focus group meetings. The Park Board capital plan allocates \$2.0 Million of funds from 2019 to 2022. While the Plan will be subject to Park Board approval, Engineering hopes to see future integration of stormwater facilities within the park
- **St. George Rainway** (Watershed: Cambie/Heather). St. George Rainway is a community driven initiative that aims to use surface drainage from the surrounding neighbourhood to reflect one of Vancouver's lost historic streams. The Capital Plan has planned \$1.8 Million for the project from 2019 to 2022.
- **Tatlow Creek** (Watershed: Balaclava). The Park Board and Musqueam First Nation are working together to daylight a portion of Tatlow Creek (Figure 11). Two fundamental principles of the project are to incorporate traditional knowledge and ecological restoration practices into the design. The Capital Plan has planned \$2.0 Million for this from 2020 to 2022.



Figure 10 - Tatlow Creek concept

• Hastings Creek Stream Restoration (Watershed: Hastings/Sunrise). The Hastings Park Master Plan (Figure 12) proposes a naturalized connection between the Sanctuary Pond and New Brighton Park via a future creek. The capital plan allocates \$1.6 Million for the project through 2021 and 2022, to initiate the first phases of work. This project should be completed in conjunction with the Hastings Watershed Study (identified as a project considered for pursuit), to ensure a long-term rainwater supply to the creek.



Figure 11 - Hastings Creek concept

- Alberta Street and Columbia Park (Watershed: South Hill): As part of the Cambie Corridor planning process, Alberta Street and Columbia Park were identified as potential locations to manage rainwater, to defer upgrades to regional infrastructure and reduce Combined Sewer Overflows. VanPlay also identified the same corridor as a potential park interconnection route, named "Little Mountain to Big River". The capital plan identifies \$18.5 Million through 2021 and 2022, to complete a feasibility study, and the design and construction of a park interconnection along Alberta Street and large scale green rainwater infrastructure projects within Alberta Street and Columbia Park. Alberta Street will be considered in conjunction with Ontario Street greenway as a blue-green 'couplet' in an integrated fashion and the feasibility study and engagement will take into account network impacts and trade-offs to bring benefits to both corridors.
- Station Area Plans for the 29th Avenue and Nanaimo Stations (Watershed: China Creek). The Planning department is undertaking an early scoping of the two station areas associated with the 29th Ave and the Nanaimo stations. This effort includes the identification of blue-green system opportunities through a watershed planning approach, and will incorporate the Renfrew Ravine into the planning process.

Projects considered for pursuit

A number of potential projects may have a strong alignment with watershed planning and blue-green systems, and should be further explored for feasibility, prioritization and budget availability. This report recommends accelerated analysis and coordination in order to prioritize and advance these projects or initiatives, as needed. These projects will be assessed as part of the delivery of the scope of work, and will be considered for implementation as part of the yearly service planning process. A selection of the projects considered for pursuit is listed below.

- **Development Process Improvements**. Currently development requirements for creeks within the City of Vancouver are not amalgamated into one guiding document, increasing the risk of misalignment or missed opportunities. This project will identify key opportunities in priority creeks, based on preliminary watershed planning, historic stream locations analysis, flood risk information, and green rainwater infrastructure potential, and develop a guiding document to inform requirements for each creek. Staff will also work across departments to develop an amalgamated map of all creeks with established guidance, as well as the emerging guidelines for prioritized creeks.
- **Trout Lake Constructed Wetland**. Since 2010, targeted sewer separation in the Trout Lake catchment has been underway to allow for a hydraulic connection of stormwater to a constructed wetland and to Trout Lake. The water quality improvement wetland as identified in the Schematic Plans was estimated to cost approximately \$7.9 Million. Park Board staff are currently completing the *John Hendry Park Master Plan.*
- Hastings Watershed Study. A watershed study is required to develop a plan to have the upper watershed rainwater feed the future creek in Hastings Park/PNE. Additional funds may be required upon completion of the watershed study. Construction of the future creek as currently designed was estimated to cost approximately \$9.8 Million. Rescoping the project at a watershed scale should investigate to ability for the project to meet broader suite of utility system goals than currently being proposed.
- Still Creek Integrated Stormwater Management Plan (ISMP) and Enhancement Plan Update. Still Creek is a salmon bearing and a valued natural asset. To ensure the biodiversity of Still Creek is maintained, the *Still Creek ISMP* and the *Still Creek Enhancement Plan* were completed in 2002. To understand the current condition of the creek and how climate change and development within the watershed could impact the creek, an updated study is required. Metro Vancouver, the City of Burnaby, and the City of Vancouver have initiated discussions on how to collaborate on the future study.

(2) GREENWAYS PLAN, INCORPORATING BLUE-GREEN NETWORK CONNECTIVITY

Approach

The *Greenways Plan* provides a unique opportunity to assess and build upon the existing Greenway network to maximize co-benefits with other blue-green systems. As outlined in more detail in APPENDIX B, the amplification and intensification of the Greenways network is possible due to the concurrent planning of the other blue-green systems mentioned in this document, as well as other urban systems being explored by the *City-wide Plan*, providing timely integration opportunities.

City Greenways are 'green links' with primary active transportation (walk, bike, roll) and recreation functions, supported by enhanced ecological and place-making features. These green links are intended to provide a *safe, intuitive* and *convenient* connection to key destinations and public spaces and serve as viable active transportation and recreation corridors for people of *all ages and abilities*. Given this linkage to land use, the scope of work includes an examination of existing and planned routes with respect to current land use and demographic patterns, and will be integrated with the *City-wide Plan*'s future directions on key destinations and public spaces. Early engagement on the *City-wide Plan* to identify overarching values and priorities will help to identify values and principles for the greenways corridors.

Once the values and principles have been identified, the public will be engaged to develop the high level character of the greenways and provide more specific strategies for different corridors. This includes development of a vision and character zones within each corridor and exploration of intersecting opportunities with other blue-green systems. This will be done to identify public space opportunities as well as potential water and ecological features to be integrated within the greenway corridors. This engagement will need to be both broad with a city-wide focus as well as targeted towards the local community. There are inherent trade-offs within the street right-of-way such as the potential removal of parking, changes to local access, and potential impacts on adjacent and parallel streets, due to network changes which may be required to provide blue-green system features.

Proposed Scope and Deliverables

Greenways Plan

Staff will report back annually (Q3 2020 and Q3 2021) to provide updates on the Draft Greenways Plan. Engineering Services is leading the development of the updated Greenways Plan. The new plan will build on the original Greenways Plan by identifying citywide network intensification and amplification opportunities. It will also establish character areas for different corridors and provide high level vision and for these areas to guide the future development of these Greenways.

Studies

The plan will include assessment of greenways network performance through various criteria, such as access to key destinations, adjacent land uses, travel patterns, environmental outcomes (e.g. biodiversity), and public space integration opportunities. The network and key corridors will be analyzed through an intersectional spatial equity lens, identifying underserved neighbourhoods and key vulnerable demographics that benefit from such amenities.

Current Work

The current capital plan (2019-2022) identifies a number of projects and spot improvements which contribute to enhancing and amplifying existing greenway corridors. These projects are aligned with the objectives expressed within the blue-green systems motions and seek to incorporate blue-green features where possible. Where generous right-of-way is available, such as Arbutus Greenway, the opportunities for ground-truthing blue-green system ideas are heightened.

Projects considered for pursuit

Projects considered for pursuit refer to the projects or initiatives that have been identified in previous plans and policies and embody the objectives of the three blue-green motions, but are not currently funded for delivery within the current capital plan. These projects will be assessed as part of the delivery of the scope of work, and will be considered for implementation as part of the yearly service planning process.

- West End Waterfront. Develop a comprehensive long-term plan for the West End Waterfront, including the Seaside Greenway to improve "Sea-wall conflicts".
- East-Side Crosscut. Develop a plan to identify an alignment and a vision for the northern portion of the East-Side Crosscut, while exploring integration with the proposed False Creek to Fraser River Blueway. Concurrent with the Greenways Plan process, staff will undertake a more detailed planning work for the *Eastside Crosscut Greenway*. This project has been previously identified by Council, provides alignment with Hastings Park Master Plan, and prioritises an underserved area in the North East Quadrant of the City. Details of this process are identified in APPENDIX C.

(3) FALSE CREEK TO THE FRASER RIVER BLUEWAY

Approach

Proposed approaches are (1) to assess opportunities and explore the preliminary scoping of the City of Vancouver portion of the False Creek to the Fraser River Blueway, including opportunities to integrate with or amplify the Eastside Crosscut Greenway corridor planning and the scoping of the 29th Ave and the Nanaimo Stations Area Plans (Figure 13); (2) to benefit from the work done on *Rain City Strategy* and the scope of work proposed for the Watershed Planning and *Greenways Plan work plans*; (3) to recognize the significant environmental, cultural, and recreational components of Still Creek and developing strong partnerships and collaborations with communities and other agencies such as Metro Vancouver, the City of Burnaby, and the City of New Westminster to advance the Still Creek ISMP Update.



Figure 12 – False Creek to the Fraser River conceptual study area

Proposed Scope and Deliverables

Opportunities Assessment and Preliminary Scoping Report

An opportunities assessment will be undertaken by the end of Q3 2021, and a preliminary scoping report will be prepared and presented to the council by the end of Q1 2022. These reports will evaluate options and pathways, undertake cost vs. benefit evaluations, assess

opportunities, and objectively and rationally assess the physical conditions along the Vancouver portion of the proposed False Creek to the Fraser River Blueway and potential alignments of the Blueway.

Studies

Examples of studies that will be pursued include alignment studies, assessments of soil structure, hydrologic/hydraulic conditions, spatial analysis, and environmental and biodiversity assessments.

Projects considered for pursuit

Projects considered for pursuit in the context of the False Creek to Fraser River Blueway, are projects or initiatives that were identified in previous studies and embody the principles of the three blue-green motions. This report recommends accelerated analysis and coordination to prioritize and advance these projects or initiatives. These projects will be assessed as part of the delivery of the scope of work, and will be considered for implementation as part of the yearly service planning process.

- Metro Vancouver alignment. The City of Vancouver and Metro Vancouver work together on a number of regional drinking water, drainage and sewerage projects, but this project allows the two partners to collaborate on a project that could shape the region, and improve the biodiversity of the Still Creek / Burnett River watershed in a significant way.
- **Development Process Alerts.** Proposed development sites along the proposed blueway will be identified earlier during the pre-application enquiry stage to better define and communicate the integrated water management requirements to landowners and developers.
- Still Creek Integrated Stormwater Management Plan and Enhancement Plan Update. Identified in the Watershed Planning projects proposed for pursuit, this study will be one of the principle documents in determining the blueway alignment, and understanding the impacts and opportunities within the Still Creek watershed (Figure 14).



Figure 13 – VanPlay's Still Creek Concept

CONSOLIDATED WORK PLAN FOR THE THREE BLUE-GREEN MOTIONS

The combined work plan for the three blue-green motions, illustrating the integration of engagement and technical work, is shown in Figure 15.



Figure 14 – Consolidated work plans for the three blue-green motions

Implications

Financial

The scope of work described in this report is planned to be delivered through the 2019-2022 Capital Plan, and the anticipated annual program funding needs are as follows:

Table 3 – Anticipated annual program funding needs

Capital Costs by Program	2020	2021	2022
One Water Planning (Green Infrastructure and Utility Planning)	\$1,565,000	\$1,540,000	\$1,365,000
Transportation Planning Studies	\$100,000	\$100,000	\$100,000
Total	\$1,655,000	\$1,640,000	\$1,465,000

The funding requirement for 2020 has been included in the proposed 2020 Capital Budget to be considered by Council in December. Beyond 2020, funding requirement will be requested as part of the annual capital budgeting process.

Engagement and Communication

Engagement with the public and other stakeholders will be integrated with a number of other planning processes including the *City-wide Plan*, the *Rain City Strategy*, *Broadway Area Plan*, and the 29th Ave and the Nanaimo Station Area Plans. By engaging in an integrated way, we make better use of resources internally; are respectful of the time and energy it takes to participate in meetings, workshops and open house events; and, gain more meaningful comment while contextualizing and articulating the opportunities and trade-offs for the public, partners, and stakeholders. Engagement at all levels will provide an opportunity to discuss how blue-green systems planning generates a re-design and a re-allocation of space within the public right-of-way, including the impacts to street parking, property access, and street network impacts.

The project teams will, as appropriate, initiate, manage and facilitate processes designed to inform, engage, and empower City partners, groups, and residents including but not limited to: Park Board, Musqueam, Squamish, and Tsleil-Waututh First Nations, urban Indigenous communities, Metro Vancouver, TransLink, Port of Vancouver, Vancouver School Board, and citizen science initiatives. In addition, the project teams will explore opportunities to work with and to learn from the Georgia Strait Alliance's Waterfront Initiative, which has been working with a diverse group of stakeholders for three years to help develop a comprehensive approach to waterfront planning in Vancouver focusing on five key areas – living, working, transportation, access to nature, and ecosystems.

Vancouver residents and partners will be engaged in the watershed planning and Greenways Plan at three project decision points. The first point is establishing values and principles that will guide the blue-green planning effort, and will be in conjunction and coordination with the *City-wide Plan* process. Once values and principles are established, the second phase of engagement will focus on the local character areas: how the values and principles land on the ground in different neighborhoods. In terms of specific projects (including the False Creek to the

Fraser River Blueway), we will work with local communities as we develop design options and discuss opportunities and trade-offs. The third and final phase will focus on implementation, working with communities at a more granular level to develop phasing plans with consideration of community impacts during construction and implementation.

In addition, effective, accessible and timely communication will be essential for the successful implementation of these projects. The project teams and the Communication and Civic Engagement department will work collaboratively to develop a communication and engagement strategy that aligns with, and complements the effort undertaken through the *City-wide Plan* process.

CONCLUSION

Between March and May 2019, Council passed three distinct yet inter-related motions linked to blue-green systems: Watershed Revival, Greenways Plan, and the False Creek to the Fraser River Blueway. Watershed revival, through watershed planning, aims to develop holistic plans for Vancouver's 19 urban watersheds that will enable communities and natural systems to thrive. The Greenways Plan seeks to assess and build upon the existing Greenway network in a holistic fashion to improve pedestrian and cycling corridors and amplify biodiversity and water management services. Finally, the False Creek to the Fraser River Blueway is a specific blue-green system project concept that aims to improve accessibility, enhance, restore, and protect important water systems and ecosystems through a regional corridor.

The three motions are aligned around the desire to increase livability and resilience, bring nature into the city, recognize the significance of watersheds, and also improve water quality. They will also enhance the connectivity of sustainable transportation and recreation networks, providing a healthy and delightful mobility experience, and improve the lives of Vancouver residents. These initiatives will help inform and respond to direction from the *City-wide Plan* and the *Rain City Strategy* and yield a number of projects and initiatives that can be delivered in the near term.

The scope of work for these blue-green motions includes a series of deliverables that include plans, studies, and prioritized capital investments and partnerships (most of which are currently underway or planned as part of the 2019-2022 capital plan). Also, additional projects were identified for further pursuit as part of the annual service planning cycle, which embody the intent of the three blue-green motions. Together, these projects and initiatives will allow the City to advance the integrated blue-green systems planning function, while also providing staff and the community with the opportunity to refine the planning process, and embed this work into our core service delivery model.

Staff will prepare opportunities assessment and preliminary scoping reports for the Vancouver portion of the False Creek to the Fraser River Blueway project, and engage with partners around broader project definition. Currently, there is no presupposed route for this project. The preliminary scoping report will include a summary of the future project budget, initiatives, timeframes, and governance to guide potential implementation.

The development and implementation of the scope of work have the potential to make a significant contribution to city-wide key issues like climate change, resilience, community building, core service delivery, water quality, biodiversity, equity and intersectionality, transportation, and recreation. Some of the strategies and actions may be transferable to other

cities, as Vancouver shares our successes and challenges along the way. Vancouver will continue to look to international cities for best practices, and for innovative solutions that can be replicated or adapted to the Vancouver context.

* * * * *



Previous and ongoing studies on stream enhancement, daylighting, and stormwater management in Vancouver

Figure 15 – Map of the Previous/Ongoing Work Related to Blue-Green Systems in Vancouver

Name of project	Type of project	Team led by	Date
Balaclava			
B1: Tatlow Creek – Volunteer Park and Tatlow Park	Assessment	Park Board	On-going
B2: Arbutus Greenway- Park Interface Design Principles	Design vision	Engineering	2018
Cambie/Heather			
CH1: Great Northern Way	Structure plan	PDS + Engineering	2014
CH2: St. George Rainway	Community initiative + surface drainage	Engineering	2010-ongoing
CH3: Olympic Village	GI applications	Engineering	2006-2014
CH4: Hinge Park	Rainwater wetland	Engineering + Park Board	2010
CH5: Charleson Park	Pond construction	Engineering + Park Board	2012

Table 4– List of the Previous/Ongoing Work Related to Blue-Green Systems in Vancouver

China Creek			
C1: China Creek North Park Upgrades and Glen Pump Station	Park enhancement	Park Board	2017
C2: False Creek Waterway	Research project	UBC - Greenest City Scholar	2013
C3: Historic Walking Tour of Gibson Creek through Kensington-Cedar Cottage	Community-led initiative	Gibby's Field Subcommittee	2009
C4: John Hendry Park Master Plan	Park Master Plan	Park Board	2015
C5: Gladstone Creek and Copley Community Orchard	Community-led initiative	Copley Community Orchard	On-going
C6: Norquay Village	Public benefits strategy + Public Realm plan	PDS	2013, 2016
C7: Meandering Through Cities – Adapting Restoration Frameworks for Urban Streams	Master's Thesis	SFU – Resource and Environmental Management	2000
C8: Vancouver Sewage Area China Creek stormwater diversion to Grandview Cut	Hydrologic assessment	Metro Vancouver	2000
Champlain			
CP1: Everett Crowley Park	Park enhancement	Park Board	1987
CP2: East Fraser Lands	Plan	PDS	2014- Ongoing
Downtown South			
DTS1: Richards Street AAA Bikeway	GI application + bike lane improvements	Engineering	2019-2020
Dunbar			
D1: Musqueam Integrated Stormwater Management Plan Drafts	ISMP	Engineering	2014 - ongoing
D2: Port of Vancouver: McDonald and Point Grey tidal marsh projects	Environmental enhancement	Port of Vancouver	2016
Grandview Woodlands	I	1	
G1: Neighborhood Sewer Separation	Community plan	PDS	2016
Hasting Sunrise	Γ	1	
H1: East Side Village	Community initiative	East Side Village	Ongoing
H2: East Vancouver Port Lands Area	Area plan	East Vancouver Port Lands Working Group	2007
H3: New Brighton Park Shoreline Habitat Restoration Project	Habitat restoration	Vancouver Fraser Port Authority, Parks, Musqueam, Squamish, Tsleil-Waututh	2017
H4: Existing Ecological Conditions at Proposed New Brighton Park Habitat Enhancement Project	Technical study	Hemmera	2015
H5: Hastings Creekway Park Connection to New Brighton Park	Park enhancement	Park Board	2013
H6: Hastings Park/PNE	Master plan, Infrastructure Master Plan	Phillips Farevaag Smallenberg, Urban Systems	2011, 2017
H7: The Sanctuary Pond	Habitat restoration	Park Board	1999
H8: Hastings Sunrise Community Vision	Community vision	Hastings Sunrise Vision	2004

Kitsilano/South Granville			
K1: Burrard and Cornwall infiltration trench	GI application	Engineering	2017-2018
Manitoba			
M1: Langara Golf Course drainage improvements	Drainage improvement	Park Board	2018
M2: 63 rd and Yukon GI Plaza	GI application	Engineering	2014-2018
South Hill			
Alberta Street and Columbia Park	Complete streets, GI application, blue-green systems	Engineering + Park Board	2019-2021
Still Creek			
S1: Still Creek Enhancements	Administrative reports	Engineering + PDS	2005-2008
S2: Falaise Park - Wetland Garden	Park enhancement	Park Board + Engineering	2015
S3: Renfrew Ravine Hydrology and Geotechnical Study	Technical study	Still Creek Stewardship Society, GeoPacific	2008, 2017
S4: Restoration and Preservation of Renfrew Ravine + Linear Park	Park enhancement	Park Board	On-going
S5: Renfrew-Collingwood Community Vision	Community vision	Renfrew-Collingwood Vision Team	2004
S6: Still Creek Rehabilitation and Enhancement Study	Technical study	LEES+ Associates, Karen Hurley +Associates, Hudema, Dayton + Knight	On-going
S7: From Pipe Dreams to Healthy Streams – A vision for the Still Creek Watershed	Integrated stormwater management strategy	City of Vancouver City of Burnaby Metro Vancouver	2007
S8: Still Creek Watershed Ecosystem- based Stewardship Plan for Ecological Restoration	Ecosystem-based stewardship plan	Silva Forest Foundation	2018
S9: Low Carbon Resilience and Transboundary Municipal Ecosystem Governance – A Case Study of Still Creek	Research project	SFU – Adaptation to Climate Change (ACT) Team	2017
Terminal			
T1: The False Creeks Flats Planning	Area plan, Rezoning strategy	PDS	2017
T2: False Creek Flats Rainwater management Framework	Rainwater management framework	Engineering	2016
T3: False Creek Flats: An Urban Design Framework for a Connected Complete Neighbourhood	Master's thesis	UBC – School of Community and Regional Planning	2011
T4: Walk the Line	Public art and place making	Engineering	On-going
T5: Eastern Core Strategy	Transportation and land use strategy	PDS	2012
T6: Green Infrastructure in the Flats: Identifying Opportunities for Private Sector Participation	Research project	UBC- Greenest City Scholar	2018

Greenways Network

There are currently 18 existing and proposed Greenways at various stages of planning and development (Figure 16). In many cases, incremental improvements to the Greenway network are delivered through parallel programs including spot improvements, upgrades and additions to the 5-year Cycling Network, Complete Streets implementation, tree planting and public space projects. Other network additions, such as the Arbutus Greenway as the most recent example are delivered as standalone capital projects with an integrated array of improvements in one project.



Figure 16 – 1995 Greenways Plan

Eastside Crosscut Greenway Detailed Planning

Originally proposed in the 1995 Vancouver Greenways Plan, the Eastside Crosscut is envisioned as a north-south route connecting the Burrard Inlet with the Fraser River. In July 2018, City Council passed a motion calling for the prioritization of a Greenway in the Northeast (NE) Quadrant of Vancouver, which stretches from Main Street to Boundary Road and Grandview Highway to the Burrard Inlet. The NE Quadrant is prioritized as it has the lowest per capita open space in Vancouver, the least percentage of tree canopy cover, and significantly less plazas, parklets and neighbourhood public spaces.

Subsequent to this, development of the Eastside Crosscut Greenway between Hastings Park and the Central Valley Greenway has been identified by staff as a priority on which to announce planning work. There are multiple opportunities for coordination with other projects in the NE Quadrant, such as connecting to the greenway network outlined in the Hastings Park Master Plan. Additionally, there may be an opportunity to coordinate construction with the scheduled Cassiar Sewer Separation and Green rainwater infrastructure improvements along adjacent streets. Inputs from Watershed Planning and False Creek to the Fraser River Blueway Plan will play a role in route selection and influence the form that the greenway may take.

Staff have undertaken some preliminary technical work and public engagement is planned to begin early next year. Building on what the City has learned through previous greenway programs and research to date, the consultation process will be phased beginning with a visioning opportunity, inviting the public to share their ideas and values for the greenway.

Further phases of engagement will help refine the design as it moves forward. It is the goal of City staff to remain adaptive and flexible throughout the consultation process, so the proposed process may change depending on feedback from local residents and key project stakeholders.

Subsequent opportunities exist to potentially expand the focus beyond the Northeast Quadrant to south of the Central Valley Greenway.