Appendix D

Watershed Characterization

The maps and spider diagrams provided in this appendix aid in understanding the unique characteristics, needs and challenges of each of the City's urban watersheds. Using this information will ensure health and sustainability of the watershed, while identifying and acting on opportunities for rainwater management, flood management, climate change mitigation and resilience, economic development, biodiversity, ecological rehabilitation, public health and well-being, urban growth and housing, transportation connectivity, partnerships and collaborations, cultural and amenity services, education and environmental literacy.



PLANNING BY WATERSHED

Watershed planning provides a science-based and community-driven approach to understand our past, current and future relationship with the ground and surface water resources, their ecological functions and human activities within a watershed. As a progressive water management strategy, watershed planning informs and guides public policy by assessing the unique characteristics, needs and challenges of each of the City's urban watersheds, such as ecology, soil type, underlying geology, age of infrastructure and urban development patterns. Watershed planning aims to ensure health and sustainability of the watershed, while identifying and acting on opportunities for rainwater management (quality and volume), flood management, climate change mitigation and resilience, economic development, biodiversity, ecological rehabilitation, public health and well-being, urban growth and housing, transportation connectivity, partnerships and collaborations, cultural and amenity services, and education and environmental literacy.



RECEIVING WATERS

Vancouver's 19 urban watersheds drain into the receiving waters which surround the city: Burrard Inlet, False Creek, English Bay, and the Fraser River. These waters sustained Indigenous communities for millenia prior to First Contact, and were instrumental in the founding and development of the City of Vancouver. One of the driving concerns of the Metro Vancouver Integrated Liquid Waste and Resource Management Plan (ILWRMP) and the Rain City Strategy is to protect and improve the quality of these waters and the ecosystems and people they support.



Burrard Inlet | Sasamat

Burrard Inlet, known as *Sasamat* by the Coast Salish Peoples, is a short body of water that separates the City of Vancouver from the North Shore municipalities. Burrard Inlet is an active waterway, providing important marine habitat and serving significant port and cruise ship operations. Within the City of Vancouver there are 15 combined sewage outfalls and 56 urban rainwater runoff outfalls along the Burrard Inlet. North Shore municipalities also have their own respective outfalls that discharge into Burrard Inlet. The Vancouver watersheds that drain into Burrard Inlet are Downtown-North, Grandview-Woodlands, Hastings-Sunrise and China Creek. Burrard Inlet is subject to the Burrard Inlet Action Plan, a sciencebased initiative led by the Tsleil-Waututh Nation to improve the health of the inlet ecosystem.



English Bay | Ayyulshun

English Bay, known as *Ayyulshun* by the Coast Salish Peoples is a bay off of the Salish Sea that is bound on the south side by Vancouver and the University Endowment Lands, and on the north by the North Shore municipality of West Vancouver. Significant port and cruise ship traffic traverse English Bay, and it is the site of several important recreational beaches and marinas. There are 7 combined sewage outfalls and 5 urban rainwater runoff outfalls along English Bay from the City of Vancouver, and the Point-Grey, Balaclava, and some of Kitsilano / South Granville watersheds drain into the Bay. A further impact on water quality in English Bay is the large amount of sediment from the Fraser River which is deposited on the south-western parts of the bay.



False Creek | Snauq

False Creek, known as *Snauq* by the Coast Salish Peoples, is a small inlet separating downtown Vancouver from the rest of the city. False creek was historically a centre of industry in Vancouver, and is now a high traffic area for recreational boating. The majority of False Creek is surrounded by development, and the remainder is scheduled to undergo significant redevelopment in the next few years. The watersheds that drain into False Creek are Downtown South, Terminal, Cambie-Heather, and some of Kitsilano-South Granville. From these watersheds, there are 4 combined sewer outfalls and 16 urban rainwater runoff outfalls that drain into False Creek. Vancouver City Council has begun to explore the potential for a future where False Creek is swimmable.



Fraser River | Sto:lo

The Fraser River, known to the Coast Salish Peoples as *Sto:lo*, flows from its headwaters in the Rocky Mountains near the border with Alberta, to its delta south of the City of Vancouver. The Fraser is the world's premier salmon fishery and an important stop over for migrating shore birds. The North Arm, which runs between the City of Vancouver and the City of Richmond, supports a variety of industrial uses, while the South Arm has more protected natural areas. The Dunbar, Angus, Marpole, Manitoba, South Hill, Fraserview, Vivian, and Champlain watersheds drain into the Fraser River. From these watersheds there are 8 combined and 26 urban rainwater runoff outfalls that drain into the Fraser. The Still Creek watershed drains to Burnaby Lake in the City of Burnaby, and then out into the Fraser via the Brunette River.

Drivers for Implementing Green Rainwater Infrastructure

Urban heat island effect

Urban heat island describes the effect of urban areas being hotter than surrounded rural areas. Urban heat island effect is exacerbated by large paved areas and built up areas, limited green space, and limited tree canopy cover. In Vancouver, the areas which experience urban heat island tend to be industrial areas, and some residential areas on the east side of the city. The west side and downtown experience less urban heat due to both an improved tree canopy and proximity to the ocean.



wntown Mixed Us

Park

Industrial

Agriculture

lultiple Dwelling

One/Two Dwelling

Institutional

Land use

Land use is a critical driver for green rainwater infrastructure (GRI), as different typologies have different requirements for the amount of land that can be covered by buildings and impervious materials. The most predominant land use typology is One/Two Family Dwellings, where on average a parcel is 60% covered by impervious materials. In order to address water quality issues related to urban rainwater runoff contamination and combined-sewer overflows, rainwater management is a process that will need to be undertaken on both public and private property. This will involve working with residents, businessowners, and various levels of government in order to deliver an effective GRI program.



Tree canopy cover

Vancouver is home to an urban forest that comprises approximately 140,000 street trees, 300,000 park trees, and an unknown number of trees on private property. The urban forest plays important environmental and social roles, such as cleaning the air, absorbing storm water, storing carbon, providing habitat, and improving health and well-being. Additionally, a robust tree canopy provides localized cooling to help mitigate urban heat island effect and the hotter summers Vancouver will experience as climate change progresses. Trees filter and retain rainwater, helping to clean it and restore natural water cycles.



Impervious area

Impervious surfaces are paved areas, roofs, and other hard surfaces that do not allow for rainwater to soak into the ground. Vancouver, like other urban areas, is characterized by a high degree of imperviousness. As the city continues to develop and grow, it is critical to retain pervious areas where water can infiltrate back into the ground and where street trees have ample room to grow. Retaining pervious areas helps to prevent localized flooding, cool local environments, clean rainwater runoff, and reduce the volume of water entering the sewer system.

Road network

Streets, roads, and highways are the primary mode for moving goods, people, and services but also can carry urban rainwater runoff pollutants from the adjacent land and from cars, trucks, and buses, including heavy metals from tires, brakes, and engine wear, and hydrocarbons from lubricating fluids. If the pollutants are not properly controlled, they can impair waters causing them to no longer support the water's designated uses and biotic communities. Pollutants often adhere to sediments on our streets which can then be washed into receiving waters. Street sweeping programs is one effective tools to help protect water quality impacts from our streets.



Lost streams

While it may be difficult to imagine now, in our highly urbanized city, Vancouver once had a vast network of natural streams and creeks. As the city developed and grew, many streams were buried under pipes, filled in, or diverted. Many of these streams were salmonbearing and provided sustenance to the Indigenous people who lived in these lands prior to First Contact. The City of Vancouver has recently completed some daylighting projects where streams were restored to a more natural state above ground, although this will not be possible everywhere. Daylighting streams does provide effective rainwater management by cleaning rainwater and allowing it to infiltrate and filter through plant and soil material before discharging into our receiving water bodies.





Blue-green systems

Blue-green systems are networks of park-like corridors that manage water, contribute to the urban forest, and provide active transportation routes. They seek to protect the ecological, hydrological, and social values of the urban landscape and water cycle, and to provide resilient measures to address climate change and flood management, increase connectivity, and enhance access to nature.

The blue in blue-green system refers to the presence of water and ideally includes management of both minor and major rainfall events, where as the green refers to elements of terrestrial vegetation including trees or urban forest as well as other layers of plants that comprise and offer ecological services.



Sea level rise

Sea level rise is caused by the ocean expanding as it heats up due to global warming and as major stores of ice from glaciers and ice sheets melt. Around the world, sea level rise and flood-related events are causing billions of dollars in damage. To date, observed sea level change in Vancouver over the past century has been 3. 7cm. While the pace of sea level rise is uncertain, we are making plans that are flexible and that can accommodate sea level rise of 50cm by 2050, and 1 metre by 2100, and additional 1 metre thereafter. Approximately 13km2 and \$7B of property are vulnerable to the effects of sea level rise and climate change-related storm surges.

Water in the city

Integrated water management strategies are heavily influenced by local patterns of precipitation, expression of surface water and sub-surface groundwater.

Vancouver is well-known for its rain. On average, it rains over 160 days and between 1200 – 1600 millimetres a year. Rainwater that flows off of our roofs, streets, parking lots and other surfaces, picks up pollutants, and is conveyed through our pipes, either to the treatment plant or directly into our local waterbodies.

Groundwater is found underground in cracks and spaces in soil, sand, and rocks. Surface water is water on the surface of the earth, and includes streams, rivers, lakes, wetlands, and oceans.



Combined Sewer Overflow (CSO)

Vancouver has a semi-separated sewer system, where some areas are served by a system which conveys sewage and rainwater in one combined pipe, and some areas by separate pipes. During and immediately after rain events, capacity in the system is exhausted, resulting in rainwater-diluted sewage being discharged directly into our receiving water bodies through combined sewage outfalls. These overflow events are called combined sewer overflows (CSOs).

In 2018, the Vancouver Sewerage Area generated nearly 33 billion litres of CSO discharge volume. Additional CSOs occurred at the City of Vancouver-owned and operated outfalls.





Topography

The topography of the land dictates patterns of water drainage and storage. For example, areas of depression provide opportunities for water storage whereas sloped areas provide opportunities for water drainage. Also, the pattern of rainfall in Vancouver is influenced by the effect of the North Shore Mountains that force moisture-laden clouds to rise, cool, and then drop their rainfall. The variation in rainfall and the pattern of drainage to receiving waters may influence sizing of rainwater infrastructure, and priorities for action.



Age of infrastructure

Infrastructure systems are the facilities that allow our cities to function. These include roads and bridges, electrical grids, water supply pipes, and sanitary and rainwater sewers. Vancouver's infrastructure varies in age across the city. Pipes typically have a lifespan of approximately 100 years. With the goal of maximizing the usefulness of our existing system, watershedbased solutions will differ depending on the age of the infrastructure.

EXISTING CONDITIONS DASHBOARD

The figures in this document describe the current state of each of Vancouver's 19 watersheds, as they relate to green rainwater infrastructure (GRI) and rainwater management. While some characteristics of watersheds may be similar, there are dramatic differences across the city and no two areas are identical. The information presented in these pages allows an examination of the cumulative impacts of many characteristics across the watershed and downstream to the receiving water body.



Schools and community centres are highlighted as they often occupy large sites and are focal points for communities. They serve as gathering places and service providers, which sets them up well as hubs for future programming or post-disaster water provision.



Physical indicators

The six figures presented for each watershed explain physical characteristics of the area. For urban heat island effect, tree canopy cover, and impervious area, geographically weighted averages are presented alongside the figures.

Land Use describes how each parcel is utilized in a particular watershed.

The road network has been included as street rights of way are primarily the areas where rainwater falls and is diverted into catch basins. Arterial roads and truck roads are especially important for consideration as they generate highly polluted rainwater runoff that is damaging to the marine environment if it is discharged without treatment.

The City of Vancouver used to be a landscape of surface streams and forests. The urban landscape is significantly transformed, as is our shoreline. It is expected that the City will experience 1m of sea level rise by 2100, and more intense weather events related to climate change.

Social indicators

Social aspects, like physical aspects, differ by watershed. Social indicators are presented to provide readers with information that may inform how the Rain City Strategy is implemented and what tools are appropriate.

Description of watershed

Each watershed layout describes the neighbourhoods contained in the watershed, the land use character, the degree of sewer separation, and identifies the number of schools, community centres, and disaster hubs.

OPPORTUNITIES DASHBOARD

The opportunities dashboard is meant to be used as a reference document, and showcases overlapping initiatives that present strategic opportunities to implement green rainwater infrastructure on public lands and rights-of-way.



Location of watershed -

This small inset map highlights the current watershed in teal, helping the reader understand where in the city the watershed is located.



Opportunities

All opportunity sites are listed here. These include public facilities where the City may be more easily able to implement green rainwater infrastructure, transportation upgrades and facilities where green rainwater infrastructure can be incorporated into designs from the outset, among others.

Spider diagram

The Spider diagram provides a snapshot of Vancouver's watershed characteristics relative to each other. There are nine indicators rated from 1 to 4 where 1 represents a deficiency and 4 represents a positive attribute. Spider diagrams are used to prioritize GRI projects.

Watershed priorities

highlight the relevant characteristics of each watershed and how this influences the appropriate approach to meeting the Rain City Strategy objectives.

WATERSHED CHARACTERIZATION MAP

This map shows spider diagrams for each of the watersheds in Vancouver. Spider diagrams are an excellent tool for creating an overview of complex data. Each diagram provides a snapshot of Vancouver's watershed characteristics relative to each other, and aids in demonstrating relative priority for GRI.





Legend

There are nine indicators, rated from 1 to 4 (where 1 represents a deficiency and 4 represents a positive attribute). The indicators, calculated per watershed, are as follows:

A Pervious Areas

Aggregated area of pervious surfaces such as parks, gardens, and other pervious surfaces, divided by the total area.

1	<40%	2	40-50%	3	50-60%	4	>60%
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B Tree Canopy Cover

Aggregated area of tree canopy cover, divided by the total area.

1	<10%	2	10-15%	3	15-20%	4	>20%
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C Low Overland Flood Vulnerability

Aggregated area that is above the flood extent zone, divided by the total area.

1	<75%	2	75-85%	3	85-95%	4	>95%
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D Low Water-Intense Uses

Aggregated area of low water-intense uses such as single and double family residential, and park areas, divided by the total area.

1 <40%

E Light-Use Roads

Aggregated length of the light-use roads (km), such as residential and alleyway roads, divided by the total area (ha).

F Median Income

Average median income within a watershed (in CAD).

1	<25K	2	25-32. 5K	3	32. 5-40K	4	>40K
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G Newer Infrastructure

Aggregated length of sewage infrastructure built after 2000, divided by the total length of infrastructure.

1	<40%	2	40-60%	3	60-80%	4	>80%

H CSO Discharge

Qualitative representation of average CSO discharge rates to our receiving water bodies.

1	Very high	2	High	3	Moderate	4	Low/none
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I Biodiversity Blocks

Aggregated area of city blocks that are biodiversity-rich, divided by the total area.

1	70%	2	70-80%	3	80-90%	4	>90%
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Burrard inlet and seawall at Stanley Park

I DUNDOU DUNKAN

BURRARD INLET | SASAMAT



DOWNTOWN NORTH





About the area

The Downtown North watershed is located in the northern portion of Vancouver's downtown peninsula, bordering Stanley Park. The watershed consists of the West End, Financial District, Gastown and the Downtown East Side neighbourhoods. The watershed is predominantly commercial/mixed use, with large portions of multifamily dwellings and some industrial development along the Burrard Inlet waterfront. The watershed contains 18 parks, three schools, and four community centres, two of which (West End and Coal Harbour) are designated as disaster hubs. Rainwater in this watershed drains to Burrard Inlet and English Bay.



DOWNTOWN NORTH



Opportunities

IRMP Opportunities

- Future GRI
- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

Planned GRI

- 1 Robson Square
- 2 Georgia Gateway

IRMP Opportunities*

- 3 Devonian Harbour Park Upgrades
- 4 Coal Harbour

Transportation

5 Georgia Gateway Complete Street

*Opportunities previously identified in the IRMP

- 6 Robson Street Complete Street
- 7 Burrard Street Complete Street
- 8 West Waterfront Road
- 9 Water Street-Alexander Street
- 10 Bute Street
- 11 Richards Street
- 12 Smithe Street
- 13 Nelson Street
- 14 Gore Street

Public Facilities

- 15 Coal Harbour Community Centre
- 16 West End Community Centre
- 17 King George Secondary School
- 18 Carnegie Centre
- 19 Evelyne Saller Centre
- 20 Lord Roberts Elementary School
- 21 Lord Roberts Annex

Major Planning Projects

22 Northeast False Creek

Priorities for this watershed

- Downtown North sewer network is almost all separated (94%), which indicates that green rainwater infrastructure in this watershed should focus on cleaning contaminants from rainwater runoff to improve water quality in False Creek and English Bay
- Downtown North is canopy deficient (5.7%). Increasing the tree canopy by planting in rights-of-way can improve water quality by increasing biofiltration of rainwater runoff
- Downtown North is nearly three-quarters impervious (74%) which leads to increased rainwater runoff. Increasing the managed impervious area in this watershed will help to improve water quality of False Creek and English Bay.
- Several truck routes within this watershed exacerbate roadway pollution which is picked up in rainwater runoff



GRANDVIEW WOODLAND



At a glance...



About the area

The Grandview Woodland watershed is located in northeast Vancouver, bordering the Burrard Inlet on the north. The watershed is located primarily in the Grandview Woodland neighbourhood, with portions in the Strathcona, Hastings Sunrise, Renfrew-Collingwood, and Kensington-Cedar Cottage neighbourhoods. The watershed contains a mix of single family dwellings, commercial/mixed-use, multifamily and industrial areas. Commercial activity is clustered around E Hastings Street, Commercial Drive, and Nanaimo Street. The watershed contains 21 parks, nine schools, and two community centres, one of which (Britannia) is a disaster hub. Rainwater in this watershed drains to Burrard Inlet.



GRANDVIEW WOODLAND



Opportunities

Blue-green systems
Planned Cycling Route
Planned Complete Street
Community Centre
Public School
Major Planning Project

Transportation

- 1 Pandora Street
- 2 Semlin Drive
- 3 Nanaimo Complete Street
- 4 Commercial Complete Street

Public Facilities

- 5 Lord Strathcona Elementary School
- 6 Strathcona Community Centre
- 7 Ray-Cam Co-operative Centre
- 8 Admiral Seymour Elementary School
- 9 MacDonald Elementary School
- 10 Hastings Elementary School
- 11 Templeton Secondary School
- 12 Britannia Community Services Centre
- 13 Britannia Secondary School
- 14 Lord Nelson Elementary School
- 15 Grandview Elementary School
- 16 Queen Victoria Annex
- 17 Laura Secord Elementary

Major Planning Projects

- 18 False Creek Flats
- 19 Broadway Corridor

Blue-green systems

- 20 Powell Street Wall Street
- 21 Heatley Avenue
- 22 Hawks Avenue
- 23 Garden Drive
- 24 Central Valley Greenway

Priorities for this watershed

- While nearly three-quarters of this watershed's sewers are separated, they merge into combined trunks which result in combined sewage overflows when system capacity is exhausted. Removing rainwater runoff volume from the system is critical in this watershed to reduce CSOs here and in other downstream watersheds
- Urban heat island is of concern in this watershed (41°C). Green rainwater infrastructure should prioritize practices with green surface expression which enable evapotranspiration and localized cooling.
- This watershed is canopy deficient (7. 6%). Increasing the tree canopy can reduce the volume of rainwater runoff entering the system and mitigate the urban heat island effect by increasing canopy and shade, and evapotranspiration.
- This watershed is more than 50% impervious. Implementing GRI in rights-of-way will increase the amount of impervious area managed



HASTINGS SUNRISE



At a glance...



Roads make up 35% of Hastings Sunrise watershed.

About the area

The Hastings Sunrise watershed is located in northeast Vancouver, bordering Burnaby on the east and the Burrard Inlet on the north. The watershed is located entirely within the Hastings Sunrise neighbourhood. The watershed is primarily single family dwellings, with commercial/mixed-use activity along E. Hastings Street and Nanaimo Street. The watershed contains 19 parks, eight schools, and one community centre that is designated as a disaster hub. Rainwater in this watershed drains to Burrard Inlet.





Opportunities

IRMP Opportunities

Future GRI

- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School

Planned GRI

1 Cassiar Sewer Separation

IRMP Opportunities

- 2 Playland Redevelopment
- 3 Hastings Park Creek

Transportation

- 4 Nanaimo Complete Street
- 5 Pandora Street
- 6 Adanac Street

Public Facilities

- 7 Tillicum Annex
- 8 Dr. A. R. Lord Elementary School
- 9 Franklin Elementary School
- 10 Garibaldi Annex
- 11 Begbie Elementary School
- 12 Chief Maquinna Elementary School
- 13 Hastings Community Centre
- 14 Hastings Elementary School

Blue-green systems

- 15 Wall Street Bridgeway Street
- 16 Dundas Street Bridgeway Street
- 17 Lillooet Street
- 18 Windermere Street
- 19 E 1st Avenue

Priorities for this watershed

- Nearly two thirds of the watershed remains combined, and the separated portions feed into combined outfalls which discharge combined sewage when system capacity is exhausted. GRI strategies should focus on reducing volume of rainwater runoff entering system
- Canopy deficient (7.1%)
- Average in terms of urban heat island
- 50% impervious
- Major truck routes and freeway through watershed exacerbate road runoff pollution issue



CHINA CREEK



At a glance...



About the area

The China Creek watershed is located in east-central Vancouver. Along with the Still Creek watershed, the China Creek watershed does not border any receiving water body. The watershed consists primarily of the Kensington-Cedar Cottage neighbourhood, with portions of the Mount Pleasant, Riley Park, Sunset, Victoria-Fraserview, Renfrew-Collingwood, and Grandview-Woodland neighbourhoods. The watershed is primarily single-family dwellings, with commercial/mixed-use activity along Main Street, Fraser Street, Kingsway, Commercial Drive, and Victoria Drive. The watershed contains 24 parks, 17 schools, and two community centres which are designated as disaster hubs. Rainwater in this watershed drains to False Creek.





Opportunities

IRMP Opportunities

😑 🛛 Future GRI

- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

Planned GRI

- 1 China Creek North Park
- 2 Fraser Street
- 3 Brewers Park

IRMP Opportunities

- 4 Trout Lake Watershed Reconnect
- 5 Memorial South Park

Transportation

- 6 10th Avenue Bikeway
- 7 Commercial Drive
- 8 14th Avenue Bikeway
- 9 Prince Edward Street
- 10 Stainsbury Avenue
- 11 BC Parkway

Major Planning Projects

12 Broadway Area Plan

Blue-green systems

- 13 10th Avenue
- 14 Central Valley Greenway
- 15 Glen Drive (south)
- 16 Woodland Street-Dumfries Street
- 17 Windsor Street-Elgin Street
- 18 St. George Street
- 19 Ridgeway
- 20 Gladstone Street
- 21 Garden Drive
- 22 Stainsbury Street Vanness Avenue
- 23 Ridgeway

Priorities for this watershed

- 44% separated reducing volume of rainwater runoff is a priority
- Urban heat island effect above average (40°C)
- Canopy deficient (8%)
- Increase managed impervious area
- 10 truck routes in watershed exacerbate pollution in rights of way

Public Facilities

- 24 Queen Alexandra Elementary School
- 25 Dickens Elementary School
- 26 Tyee Elementary School
- 27 Lord Beaconsfield Elementary School
- 28 Livingstone Elementary School
- 29 Sir Charles Tupper Secondary School
- 30 Dickens Annex
- 31 Lord Selkirk Elementary School
- 32 Gladstone Secondary School
- 33 Brock Elementary School
- 34 McBride Annex
- 35 McBride Elementary School
- 36 Lord Selkirk Annex
- 37 John Norquay Elementary School
- 38 Cunningham Elementary School
- 39 Tecumseh Annex
- 40 Sir Alexander Mackenzie Elementary School
- 41 Tecumseh Elementary School
- 42 Trout Lake Community Centre
- 43 Kensington Community Centre



Hadden Park beach looking towards the West End

1
ENGLISH BAY | AYYULSHUN



POINT GREY





About the area

The Point Grey watershed is located on Vancouver's west side, and consists mainly of the Point Grey neighbourhood and portions of the Kitsilano and Dunbar-Southlands neighbourhoods. The watershed is predominantly single family dwellings, with some commercial/mixed use along W 10th Avenue, W 4th Avenue, and W Broadway. The watershed contains 13 parks, four schools, and one community centre that is designated as a disaster hub. Rainwater in this watershed drains to English Bay.



POINT GREY



- IRMP Opportunities
- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
 - Public School
 - Park

IRMP Opportunities

1 Jericho Beach Park

Transportation

- 2 Blanca Complete Street
- 3 Highbury Street

Public Facilities

- 4 West Point Grey Community Centre
- 5 Queen Mary Elementary School
- 6 Bayview Elementary School
- 7 Lord Byng Secondary School
- 8 Queen Elizabeth Elementary School

Major Planning Projects

9 Jericho Lands

Blue-green systems

- 10 West 8th Avenue
- 11 Discovery Street
- 12 West 16th Avenue
- 13 West 20th Avenue
- 14 10th Avenue Bikeway
- 15 Dunbar Street
- 16 West 7th Avenue

- More than half separated, but major combined outfalls make reducing volume here a priority
- Cleaning for the separated areas



BALACLAVA





About the area

The Balaclava watershed is located on Vancouver's west side, and consists of portions of the Kitsilano, Shaughnessy, Arbutus Ridge, and Dunbar-Southlands neighbourhoods. The watershed is predominantly a single family dwelling neighbourhood, with limited commercial/mixed-use activity along Arbutus Street, W Broadway and W 4th Avenue. The watershed contains 33 parks, seven schools, and one community centre that is designated as a disaster hub. Rainwater in this watershed drains to English Bay.





- IRMP Opportunities
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

- 1 Tatlow Creek Daylighting
- 2 Trafalgar Park
- 3 Prince of Wales Park
- 4 Quilchena Park
- 5 King Edward Avenue Boulevard

Transportation

- 6 W 4th Avenue Complete Street
- 7 Arbutus Greenway
- 8 10th Avenue Bikeway
- 9 14th Avenue Bikeway

Public Facilities

- 10 Gordon Elementary School
- 11 Kitsilano Secondary School
- 12 Kitsilano Community Centre
- 13 Carnarvon Elementary School
- 14 Kitchener Elementary School
- 15 Trafalgar Elementary School
- 16 Prince of Wales Secondary School
- 17 Shaughnessy Elementary School
- 18 Quilchena Elementary School

Major Planning Projects

19 Broadway Area Plan

Blue-green systems

- 20 W 3rd Avenue
- 21 Trafalgar Street Valley Drive
- 22 10th Avenue Bikeway
- 23 W 19th Avenue
- 24 W King Edward Avenue
- 25 Quesnel Drive Narvaez Drive
- 26 Balaclava Street
- 27 Eddington Drive Puget Drive
- 28 Arbutus Village Walk
- 29 Arbutus Greenway
- 30 Ridgeway
- 31 Valley Drive (South) Quilchena

- Only about one-quarter separated (28%) but network feeds into combined trunk which overflows into English Bay, therefore volume reduction is a priority
- Tree canopy is lower than city target (18%)
- Truck routes on arterials contribute to higher pollution loading in runoff



KITSILANO-SOUTH GRANVILLE





Roads make up 31% of Kitsilano-South Granville watershed.

About the area

The Kitsilano-South Granville watershed is located in central Vancouver, across False Creek from the downtown peninsula. The watershed contains Granville Island, and portions of the Kitsilano, Fairview, and Shaughnessy neighbourhoods. The watershed is predominantly commercial/mixed-use and multifamily dwelling in nature, with some light industrial development and single family dwellings. The watershed contains 13 parks, two schools, and one community centre that is designated as a disaster hub. Rainwater in this watershed drains to False Creek and English Bay.



KITSILANO-SOUTH GRANVILLE



- IRMP Opportunities
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

1 Hadden Park/Vanier Park

Transportation

- 2 Cypress Street
- 3 Granville Bridge
- 4 W 7th Avenue
- 5 10th Avenue Bikeway
- 6 14th Avenue

Public Facilities

- 7 Henry Hudson Elementary School
- 8 Tennyson Elementary School
- 9 False Creek Community Centre

Major Planning Projects

10 Broadway Area Plan

Blue-green systems

- 11 Cypress Street
- 12 Pine Street
- 13 Arbutus Greenway
- 14 10th Avenue Bikeway

- Nearly three-quarter separated but pipes still combine into combined outfalls, makes volume reduction a priority
- Cleaning a priority for separated sections which lead to urban rainwater runoff outfalls
- False Creek watershed major water quality issues
- Truck routes on arterials exacerbate pollution in runoff
- Highly impervious limited area for groundwater recharge and infiltration
- Lower than target tree canopy (15%)





FALSE CREEK | SNAUQ



DOWNTOWN SOUTH





About the area

The Downtown South watershed is located in the southern portion of Vancouver's downtown peninsula. The watershed includes the West End, Granville Entertainment District, and Yaletown neighbourhoods. The watershed is predominantly made up of commercial/mixed-use and multifamily dwellings. The watershed contains 16 parks, one school, and two community centres, one of which (Roundhouse) is designated as a disaster hub. Rainwater in this watershed drains to English Bay and False Creek.



DOWNTOWN SOUTH



IRMP Opportunities

- Future GRI
- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

Planned GRI

- 1 Northeast False Creek
- 2 Nelson Street / Cambie Street
- 3 Expo Boulevard / Cambie Street

IRMP Opportunities

4 Northeast False Creek

Transportation

- 5 Bute Street
- 6 Granville Bridge
- 7 Drake Street
- 8 Helmcken Street
- 9 Nelson Street
- 10 Smithe Street
- 11 Cambie Bridge
- 12 Richards Street

Public Facilities

- 13 The Gathering Place Centre
- 14 Roundhouse Community Centre
- 15 Elsie Roy Elementary School

Major Planning Projects

16 Northeast False Creek

Blue-green systems

- 17 Burnaby Street
- 18 Cardero Street
- 19 Bute Street
- 20 Richards Street
- 21 Haro Street Smithe Street

- Nearly 100% separated, so cleaning the urban rainwater runoff is a priority here as it drains to False Creek and English Bay
- Canopy-deficient (8. 4%)
- Highly impervious opportunities to increase perviousness or to manage impervious area will improve water quality



TERMINAL





About the area

The Terminal watershed is located in central Vancouver, adjacent to the downtown peninsula. The watershed is located primarily in the Strathcona neighbourhood, with small portions in the Downtown and Mount Pleasant neighbourhoods. The watershed is characterized primarily by light industrial land uses, with some one and two family dwellings and commercial/mixed use. The watershed contains ten parks, one school, and one community centre that is designated as a disaster hub. Rainwater in this watershed drains to False Creek.





IRMP Opportunities

- 😑 🛛 Future GRI
- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

- 1 False Creek Flats
- 2 Creekside Park
- 3 St. Paul's Hospital

Transportation

- 4 Gore Avenue
- 5 Quebec Street

Public Facilities

- 6 Strathcona Community Centre
- 7 Lord Strathcona Elementary School

Major Planning Projects

- 8 Northeast False Creek
- 9 False Creek Flats
- 10 Broadway Area Plan

Blue-green systems

- 11 Carrall Street
- 12 National Avenue
- 13 Thornton Street
- 14 Malkin Avenue
- 15 Hawks Avenue
- 16 Northern Street
- 17 Glen Drive
- 18 Central Valley Greenway

- 95% separated, so emphasis on water quality
- Industrial area, so higher pollutant loading in runoff
- Hottest watershed (42°C)
- Minimal tree canopy (5.1%)
- Highly impervious



CAMBIE-HEATHER





Roads make up 31% of Cambie-Heather watershed.

About the area

The Cambie-Heather watershed is located in central Vancouver, and contains the majority of the Mount Pleasant and South Cambie neighbourhoods, and portions of the Shaughnessy, Riley Park, Fairview, and Strathcona neighbourhoods. The Olympic Village development is located within this watershed. The southern and eastern sections are predominantly one and two family dwellings, while the northern and western portions are predominantly light industrial and mixed use development. The watershed contains 29 parks, ten schools, and four community centres which are all designated as disaster hubs. Rainwater in this watershed drains to False Creek.





- IRMP Opportunities
- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

- 1 False Creek South
- 2 St. George Rainway
- 3 King Edward Avenue Boulevard
- 4 Van Dusen Botanical Gardens
- 5 Queen Elizabeth Park
- 6 Little Mountain

Transportation

- 7 Cambie Bridge
- 8 1st Avenue
- 9 5th Avenue
- 10 Quebec Street
- 11 10th Avenue Bikeway
- 12 14th Avenue
- 13 Prince Edward Street
- 14 Ontario Street

Major Planning Projects

- 15 False Creek South
- 16 Broadway Area Plan
- 17 False Creek Flats

Public Facilities

- 18 Creekside Community Centre
- 19 Mount Pleasant Community Centre
- 20 False Creek Elementary School
- 21 Mount Pleasant Elementary School
- 22 Nightingale Elementary School
- 23 L'Ecole Bilingue Elementary School
- 24 Fraser Elementary School
- 25 Edith Cavell Elementary School
- 26 Douglas Park Community Centre
- 27 Carr Elementary School
- 28 Wolfe Elementary School
- 29 Hillcrest Centre
- 30 John Oliver Secondary School
- 31 Eric Hamber Secondary School

Blue-green systems

- 32 Hudson Street Spruce Street
- 33 10th Avenue Bikeway
- 34 Willow Street Heather Street
- 35 Ridgeway
- 36 Columbia Street
- 37 Manitoba Street
- 38 Ontario Street
- 39 Quebec Street
- 40 Windsor Street
- 41 St. George Street
- 42 Central Valley Greenway

- 53% separated but feed into combined outfalls so reducing volume is a major priority
- Yukon Gate is in this watershed
- Cleaning is a priority particularly in separated areas
- Truck routes on arterials exacerbate runoff pollution loading
- Canopy below target (13%)





FRASER RIVER | STO:LO



DUNBAR





About the area

The Dunbar watershed is located in Vancouver's west side, and is bordered on the south by the Fraser River. The watershed contains portions of the Dunbar-Southlands, Kerrisdale, and Arbutus Ridge neighbourhoods. Dunbar's land use is characterized primarily by one and two family dwellings, with pockets of commercial activity along Dunbar St, W 41st Avenue, and Mackenzie Street, and multifamily dwellings at the eastern edge of the watershed along W 41st Ave in Kerrisdale. The only agricultural land use in Vancouver is located within this watershed, in the southern portion along the Fraser River. The watershed contains more than a dozen parks, three schools, and two community centres which are both designated as disaster hubs. Rainwater in this watershed drains to the Fraser River.





- IRMP Opportunities
- **—** Laneway
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

- 1 McCleery Golf Course
- 2 Fraser River Park
- 3 Kerrisdale Centennial Park

Public Facilities

- 4 Queen Elizabeth Annex
- 5 Dunbar Community Centre
- 6 Kerrisdale Elementary School
- 7 Kerrisdale Annex
- 8 Kerrisdale Community Centre

Blue-green systems

- 9 King Edward Avenue
- 10 Wallace Street
- 11 Dunbar Street
- 12 Balaclava Street
- 13 Ridgeway
- 14 SW Marine Drive
- 15 Fraser River Shore

- Majority combined, so reducing volume entering system is a priority
- Cleaning of runoff in separated areas
- Area vulnerable to sea level rise







About the area

The Angus watershed is located on Vancouver's west side, and briefly borders the Fraser River. The watershed consists of the Kerrisdale, Marpole, Oakridge, Shaughnessy, and Arbutus Ridge neighbourhoods. The neighbourhood is primarily single family dwellings, with limited industrial areas along the Fraser River, and some commercial/mixed-use along West Boulevard and W 41st Avenue. The watershed contains nine parks, five schools, and one community centre that is designated as a disaster hub. Rainwater in this watershed drains to the Fraser River.




IRMP Opportunities

- **—** Laneway
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

1 Riverview Park

Transportation

- 2 Arbutus Greenway Upgrades
- 3 Hudson Street

Public Facilities

- 4 Point Grey Secondary School
- 5 Quilchena Elementary School
- 6 Kerrisdale Community Centre
- 7 Maple Grove Elementary School
- 8 Magee Secondary School
- 9 McKechnie Elementary School

Blue-green systems

- 10 Arbutus Greenway
- 11 SW Marine Drive
- 12 59th Avenue North Arm Trail
- 13 Hudson Street
- 14 Ridgeway
- 15 Fraser River Trail

- Majority combined (92%) so reducing volume entering system is a priority
- Green space deficient (3% park space)
- Area vulnerable to sea level rise







About the area

The Marpole watershed is located in South Vancouver and consists largely of the Marpole neighbourhood as well as a small portion of the Oakridge neighbourhood. The watershed is predominantly one and two family dwellings, with commercial/ mixed use development along Granville Street and SW Marine Drive, and industrial development along the Fraser River. The watershed contains seven parks, three schools, and one community centre that is designated a disaster hub. Rainwater in this watershed drains to the Fraser River.





IRMP Opportunities

- Future GRI
- **—** Laneway
- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

Planned GRI

1 W 67th Avenue & Cartier Street

IRMP Opportunities

2 Oak Park

Transportation

- 3 Arbutus Greenway Upgrades
- 4 Hudson Street

Public Facilities

- 5 Sir Winston Churchill Secondary School
- 6 Laurier Elementary School
- 7 David Lloyd George Elementary School
- 8 Marpole Oakridge Community Centre

Blue-green systems

- 9 Hudson Street
- 10 59th Avenue North Arm Trail
- 11 Arbutus Greenway
- 12 Fraser River Trail
- 13 Shaughnessy Street
- 14 SW Marine Drive

- About half combined, so volume reduction is a major priority
- Canopy deficient (8.8%)
- Urban heat island (41°C)
- 52% impervious opportunities to manage impervious area and reduce volume by allowing for infiltration
- Green space deficient (3% park space)
- Truck routes on Marine Dr, 70th, and Oak exacerbate pollution loading
- Area vulnerable to sea level rise



MANITOBA





About the area

The Manitoba watershed is located in South Vancouver, and straddles the Riley Park, South Cambie, Oakridge, Marpole, and Sunset neighbourhoods. The watershed is predominantly one and two family dwellings, with significant commercial activity on W 41st Avenue around Oakridge Centre, and in the southern portion along SW Marine Drive. The watershed also has significant industrial areas along the Fraser River. The watershed contains eight parks and four schools. There are no community centres in the watershed.





IRMP Opportunities

- **—** Laneway
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

- 1 Heather Lands
- 2 Langara Golf Course
- 3 Pearson Dogwood

Transportation

- 4 Kent Street
- 5 Kent Street Upgrades
- 6 Ontario Street Upgrades

Public Facilities

- 7 Sir William Osler Elementary School
- 8 Jamieson Elementary School
- 9 Sexsmith Elementary School

Blue-green systems

- 10 43rd Avenue 44th Avenue
- 11 Heather Street
- 12 Ash Street
- 13 Alberta Street
- 14 Yukon Street
- 15 Fraser River Trail
- 16 Ontario Street Quebec Street
- 17 Ridgeway
- 18 59th Avenue North Arm Trail
- 19 Hudson Street

- Area is 80% combined volume is a major priority
- Separated areas (20%) are primarily industrial areas, where cleaning is a major priority
- Urban heat is an issue (41°C)
- Green space deficient (11.6%)
- Area vulnerable to sea level rise



SOUTH HILL





About the area

The South Hill watershed is located in South Vancouver, and is largely within the Sunset neighbourhood, with portions in the Riley Park and Oakridge neighbourhoods. The watershed is predominantly one and two family dwellings, with some commercial activity along Fraser Street, Main Street, and SE Marine Drive. There is an industrial area along the Fraser River. The watershed contains eight parks, five schools, and one community centre that is designated as a disaster hub. Rainwater in this watershed drains to the Fraser River.



SOUTH HILL



IRMP Opportunities

- Future GRI
- Laneway
- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

Planned GRI

1 W 42nd Avenue & Ontario Street

IRMP Opportunities

2 Moberly Park

Transportation

- 3 Ontario Street Upgrades
- 4 Kent Street Upgrades

Public Facilities

- 5 Van Horne Elementary School
- 6 John Oliver Secondary School7 Sunset Community Centre
- 7 Sunset Community Centre8 Henderson Elementary School
- 8 Henderson Elementary
- 9 Henderson Annex
- 10 Trudeau Elementary School

Blue-green systems

- 11 Alberta Street
- 12 Quebec Street
- 13 St. George Street
- 14 59th Avenue North Arm Trail
- 15 Ridgeway
- 16 Fraser River Trail
- 17 Windsor Street Ross Street

- Area is 80% combined volume is a major priority
- Separated areas (20%) are primarily industrial areas, where cleaning is a major priority
- Urban heat is an issue (41°C)
- Very green space deficient (3%)
- Area vulnerable to sea level rise



FRASERVIEW





About the area

The Fraserview watershed is located in South Vancouver, and straddles the Sunset and Victoria-Fraserview neighbourhoods. The watershed is predominantly one and two family dwellings, with some commercial activity along Victoria Drive and Knight Street at E 49th Avenue and E 57th Avenue. There is industrial activity along the Fraser River. The watershed contains eight parks and eight schools. There are no community centres in the watershed. Rainwater in this watershed drains to the Fraser River.





IRMP Opportunities

- **—** Laneway
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

1 Ross Park

Transportation

2 Kent Street Upgrades

Public Facilities

- 3 Sir Sanford Fleming Elementary School
- 4 David Thompson Secondary School
- 5 Walter Moberly Elementary School
- 6 Sir Charles Kingford-Smith Elementary School
- 7 Sir James Douglas Elementary School
- 8 Sir James Douglas Annex
- 9 Oppenheimer Elementary School

Blue-green systems

- 10 Elgin Street Ross Street
- 11 59th Avenue North Arm Trail
- 12 Borden Street
- 13 E 61st Avenue
- 14 Fraser River Trail

- Area is separated
- Susceptible to sea level rise in low lying areas
- Overland flow routes and surface flooding require further study
- Urban heat is an issue (42°C)
- Green space deficient
- Area vulnerable to sea level rise







About the area

The Vivian watershed is located in southeast Vancouver, and consists of the Killarney and Victoria-Fraserview neighbourhoods. The watershed is predominantly single family dwellings, with some multifamily dwellings and the 84 hectare Fraserview Golf Course. The watershed contains three parks and two schools. There are no community centres in this neighbourhood. Rainwater in this watershed drains to the Fraser River.





- IRMP Opportunities
- **—** Laneway
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

IRMP Opportunities

- 1 Fraserview Golf Course
- 2 Foot of Victoria Drive
- 3 Gladstone Riverside Park

Transportation

4 Kent Street Upgrades

Public Facilities

- 5 Waverley Annex
- 6 Sir Charles Kingsford-Smith Elementary School

Blue-green systems

- 7 E 45th Avenue
- 8 E 57th Avenue Rosemont Drive
- 9 Vivian Drive Elliott Street
- 10 59th Avenue North Arm Trail
- 11 Fraser River Trail

- 96% separated reduce volume
- Enhance Vivian Creek
- Urban heat island (41°C)
- Vulnerable to sea level rise



CHAMPLAIN

E 48TH AVE





About the area

The Champlain watershed is located in southeast Vancouver, bordering Burnaby on the east and the Fraser River on the south. The watershed consists exclusively of the Killarney neighbourhood. The watershed is primarily multi-family dwellings, with some single family dwellings throughout, and industrial areas along the Fraser River. The watershed contains 12 parks, three schools, and one community centre that is designated as a disaster hub. Rainwater in the Champlain watershed drains to the Fraser River.





IRMP Opportunities

- Future GRI
- **—** Laneway
- Blue-green systems
- ---- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

Planned GRI

1 East Fraserlands Park

IRMP Opportunities

2 Riverfront Park

Transportation

3 Kent Street Upgrades

Public Facilities

- 4 Captain James Cook Elementary School
- 5 Champlain Heights Elementary School
- 6 Champlain Heights Annex
- 7 Champlain Heights Community Centre

Blue-green systems

- 8 Fraser River Trail
- 9 59th Avenue North Arm Trail
- 10 Kerr Street
- 11 Marine Way
- 12 Elliott Street

- 100% separated, cleaning urban rainwater runoff a priority
- Vulnerable to sea level rise
- Industrial areas



STILL CREEK



Existing GRI

Public School

• Community Centre



About the area

The Still Creek watershed is located in Vancouver's east side, bordering Burnaby on the east. The watershed consists primarily of the Renfrew-Collingwood neighbourhood, and portions of the Hastings-Sunrise, Killarney, and Victoria-Fraserview neighbourhoods. The watershed is primarily single-family dwellings, with commercial/mixed-use along Joyce Street and Kingsway, and industrial activity in the northern portions around Grandview Highway. The watershed contains 27 parks, 13 schools, and three community centres which are designated as disaster hubs. Due to the unique drainage circumstances of this watershed crossing municipal boundaries into Burnaby, Still Creek is subject to its own Integrated Urban rainwater runoff Management Plan (ISMP). Rainwater in this watershed drains into Burnaby Lake and ultimately to the Fraser River.





- Blue-green systems
- Planned Cycling Route
- •••• Planned Cycling Upgrade
- •••• Planned Complete Street
- Community Centre
- Public School
- Major Planning Project

Transportation

- 1 Duchess Street Wales Street
- 2 BC Parkway Upgrades

Public Facilities

- 3 Thunderbird Elementary School
- 4 Anne Hebert Annex
- 5 Vancouver Technical Secondary School
- 6 Nootka Elementary School
- 7 Renfrew Park Community Centre
- 8 Renfrew Elementary School
- 9 Windermere Secondary School
- 10 Grenfell Elementary School
- 11 Bruce Elementary School
- 12 Collingwood Neighbourhood School
- 13 Sir Guy Carleton Elementary School
- 14 Weir Elementary School
- 15 Killarney Secondary School
- 16 MacCorkindale Elementary School
- 17 Killarney Community Centre

Blue-green systems

- 18 Central Valley Greenway
- 19 Nootka Street
- 20 Vanness Street
- 21 Ridgeway Earles Street
- 22 E 45th Avenue
- 23 Rupert Street

- 100% separated, cleaning of urban rainwater runoff a priority
- Enhance Still Creek
- Vulnerable to sea level rise
- Industrial areas

