RAIN CITY STRATEGY

Welcome! The City of Vancouver is in the process of developing a Rain City Strategy. We envision a city where rainwater is embraced as a valued resource for our communities and natural ecosystems.

We invite you to view our posters to learn about how we are developing this strategy. Chat with us and find out what you can do to improve and protect Vancouver's water quality and become more resilient to climate change. Please share your thoughts and ideas as we embark on this transformational project!

Project Timeline

Phase 1
2016
Vancouver Citywide Integrated Rainwater Management Plan

Phase 2
2017- 2018
Rain City Strategy

Phase 3
2018 onwards
Implementation

Engagement Timeline

Phase 2

Internal Engagement with City Departments	Consultation with an Expert Panel	Public Engagement	Industry Engagement	Writing the Rain City Strategy report	**Rain City Strategy presented to Council**
Complete	**Ongoing**	**Ongoing**	**Ongoing**	**Upcoming**	**Upcoming**
					June/July 2018

vancouver.ca/raincitystrategy
#RainCityStrategy

Green Infrastructure Implementation
March 2018

RAIN CITY STRATEGY
Developing Vancouver's Plan

6

Vancouver's rainwater is embraced as a valued resource for our communities and natural ecosystems.

Goals

Resilience

Increase Vancouver's resilience through sustainable water management

Water Quality

Improve and protect Vancouver's water quality

Livability

Enhance Vancouver's livability by improving urban and natural ecosystems

Objectives

Remove pollutants from water and air

Green Infrastructure removes pollutants by harnessing natural processes and restoring ecosystems in the city. Plants and soil work together to filter pollutants, sequester carbon, and clean stormwater.

Reduce volume of water entering pipes

Green Infrastructure practices slow down the movement of water, allowing more to infiltrate into the ground and to evapotranspire into the atmosphere, with the result being reduced volume entering our stormwater system.

Harvest and reuse water

Rainwater is a resource which will be increasingly concentrated in the winter months. Harvest and reuse reduces our demand for potable water, and allows other types of water to be used for non-potable purposes, like irrigation.

Increase total green area

The city's parks and green spaces provide a host of environmental, physical, and mental health benefits.

Increase managed impermeable area

Vancouver is a highly-built up urban area filled with hardscape. Increasing the management of impermeable area allows for more integrated rainwater management, that will help capture and clean urban rainwater runoff.

Mitigate urban heat island effect

Urban areas are significantly warmer than surrounding areas. Green Infrastructure solutions help provide localized cooling by increasing the tree canopy and reducing hardscape, thereby mitigating this effect.

RAIN CITY STRATEGY
Green Infrastructure

7

UBC is using landscaping and green infrastructure like this bioswale to manage their rainwater and provide beautiful public space for students.

Bioswale, UBC Buchanan Complex

What is Green Infrastructure?

Green infrastructure is an approach to water management that protects, restores, or mimics the natural water cycle. It uses soils, plants, trees, and built structures such as green roofs, swales, and rain gardens to capture, store, and clean rainwater before returning it to our waterways and atmosphere. It increases the city's resilience to climate change, and supports neighbourhood livability and biodiversity. Green infrastructure delivers several co-benefits in addition to simply managing our rainwater.

Benefits

Clean Air & Water

The plants and soils found in many green infrastructure practices filter pollutants out of the water and soil, cleaning rainwater as it passes through. Plants also help remove pollutants from the air.

Climate Change Adaptation

Due to sea level rise and an increase in extreme rain events, climate change will lead to greater risks of flooding. Green infrastructure approaches to rainwater management help reduce and control flooding. They also provide important cooling benefits through the increased green space.

Community Cohesion

Increased green space and beautification of public space with green infrastructure can encourage people to spend more time outdoors in their communities, providing opportunities for social interaction and community building.

Biodiversity & Habitat

Green infrastructure features like constructed wetlands and rain gardens provide important habitat for bird and insect species. Adding more native plants also supports more pollinators, which can increase the health of other green spaces in the city as well.

Physical & Mental Health

Proximity to nature and green space has been proven to have significant positive effects on mental and physical health. Green infrastructure can help reduce stress, depression, ADD and ADHD in children, heart disease, obesity, and respiratory illnesses.

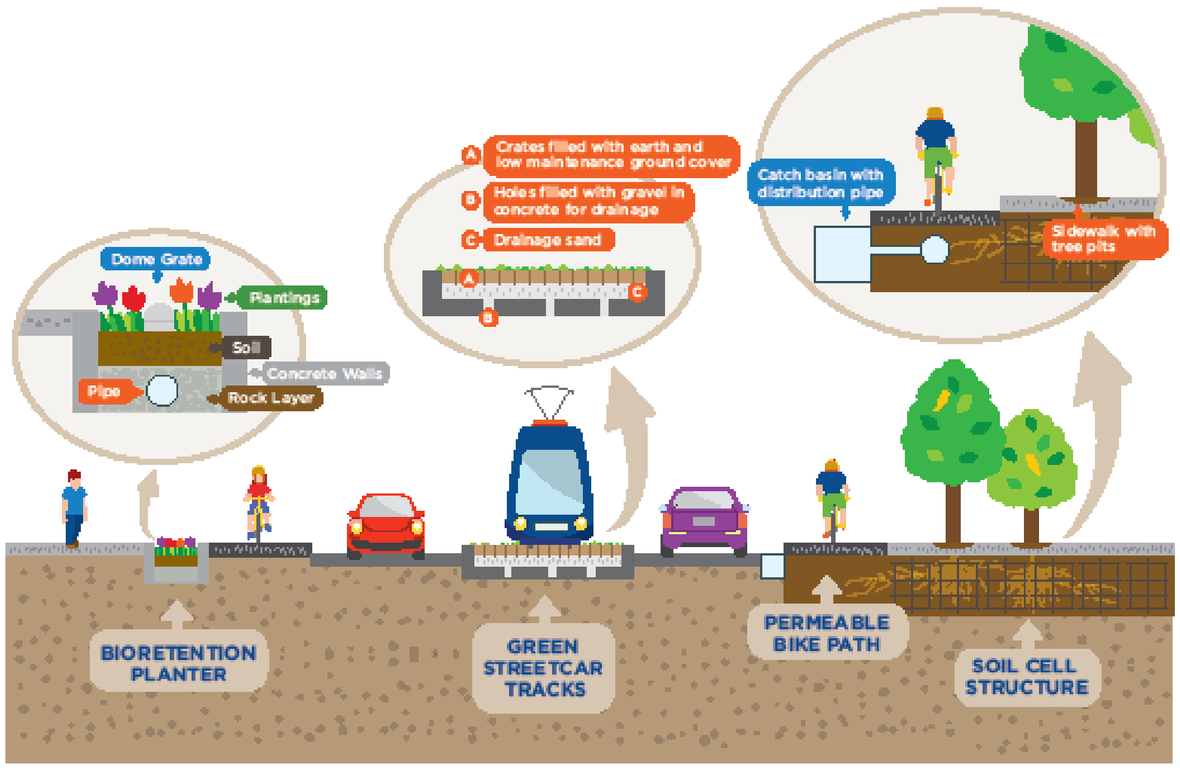
Infrastructure Cost Savings

Green infrastructure can, over the lifecycle of the project, save money on rainwater management practices, and contribute to other savings through co-benefits, including health care and building energy costs.

Green infrastructure leverages tax dollars to deliver multiple benefits and amenities.

RAIN CITY STRATEGY
Green Infrastructure Tools I

8



ARTERIAL STREET

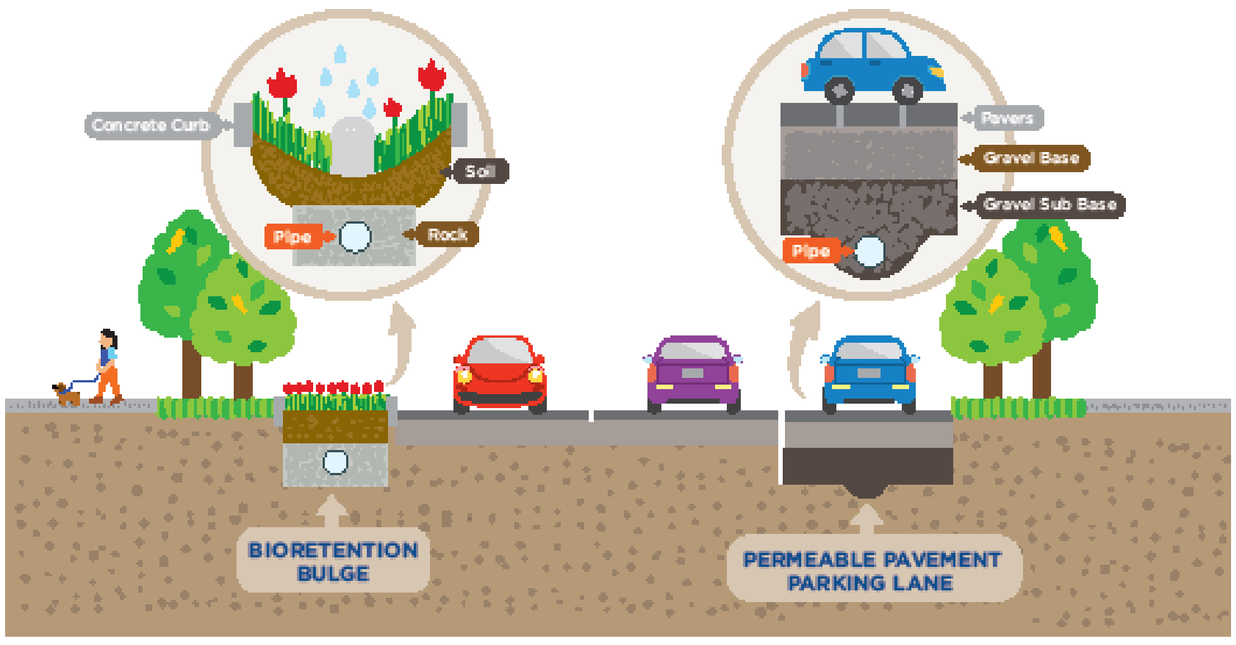
Arterial Streets

Bioretention Planters are planting boxes designed to use rainwater for their watering needs. These planters collect and filter rainwater, and provide an aesthetic function in beautifying our streets.

Street Car Tracks are often paved, but could be vegetated or covered with other surfaces that can absorb rainwater between the tracks and store it below the ground.

Permeable Bike Paths can be paved with porous asphalt, which allows rainwater to pass through it, and infiltrate into the soil below.

Soil Cells are the carefully designed soil below sidewalks where we plant trees. The structures within the soil allow the roots to grow wide and large enough to support a full grown tree, while also retaining water.

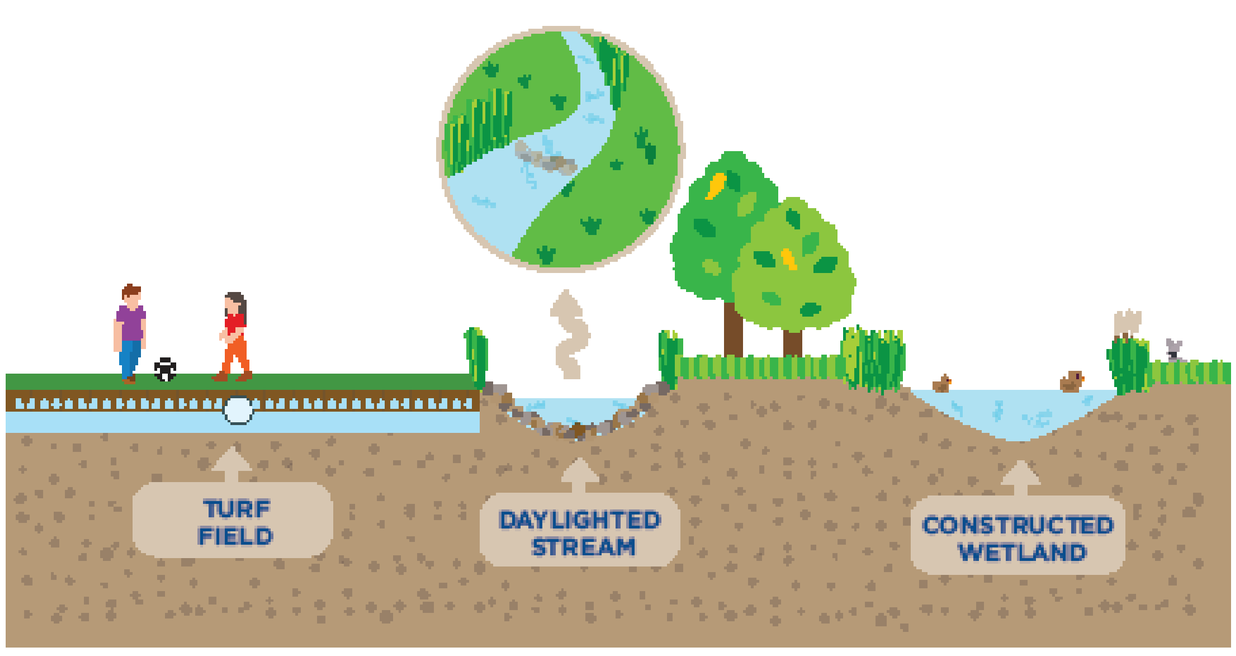


LOCAL STREET

Local streets

Biorentention Bulges are a traffic calming technique that also manages rainwater. They are designed to collect rainwater from the street and catch basins to slowly infiltrate into the soil.

Permeable Pavement can be put in parking lanes, using pervious pavers, similar to cobblestones, which allow rainwater to pass through and infiltrate into the soil below.



PARK

Parks

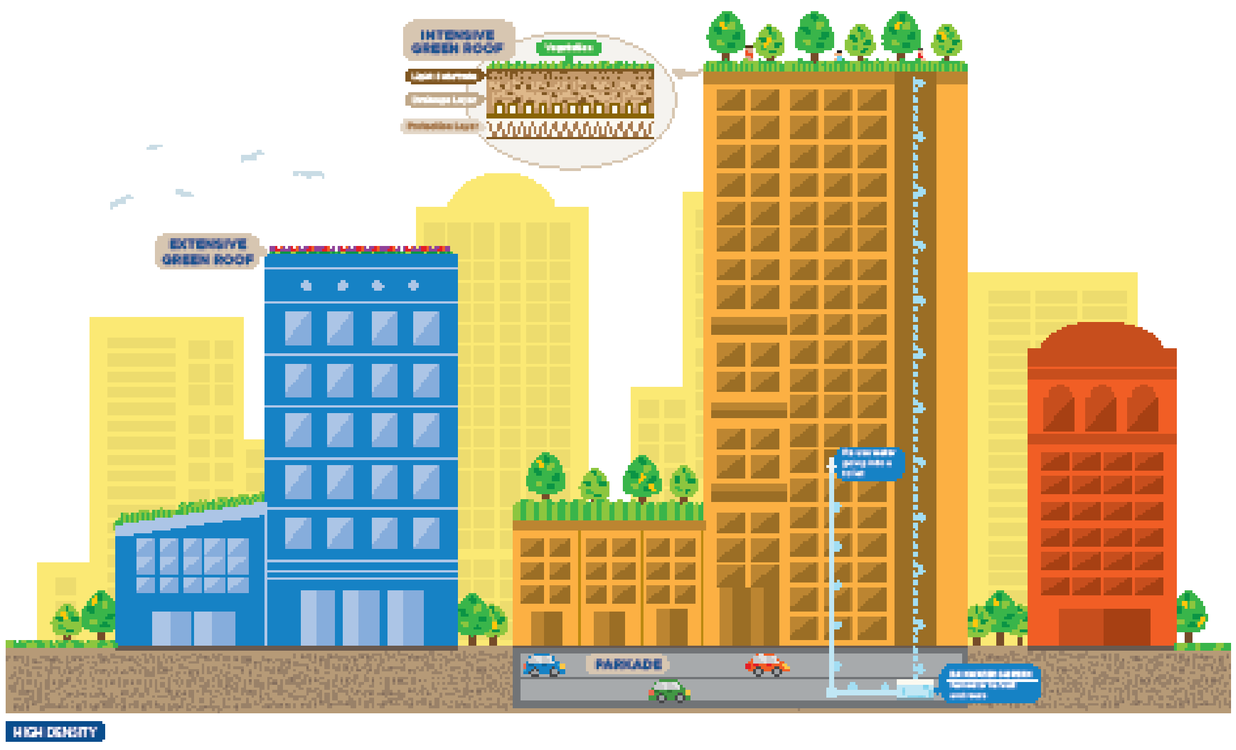
Daylighting streams is a practice of bringing urban streams that had been paved over back to the surface. This allows rainwater to flow more naturally across the landscape, instead of through pipes hidden underground.

Constructed wetlands are purpose-built marshy areas with enormous capacity to store and filter rainwater. They provide important wildlife habitat and can make unique park spaces.

Turf Fields can be designed to allow water to pass through the turf, to be collected in a storage layer. The water can then be infiltrated into the soil, or slowly released into the pipe system after a major rain event has ended.

RAIN CITY STRATEGY
Green Infrastructure Tools II

9

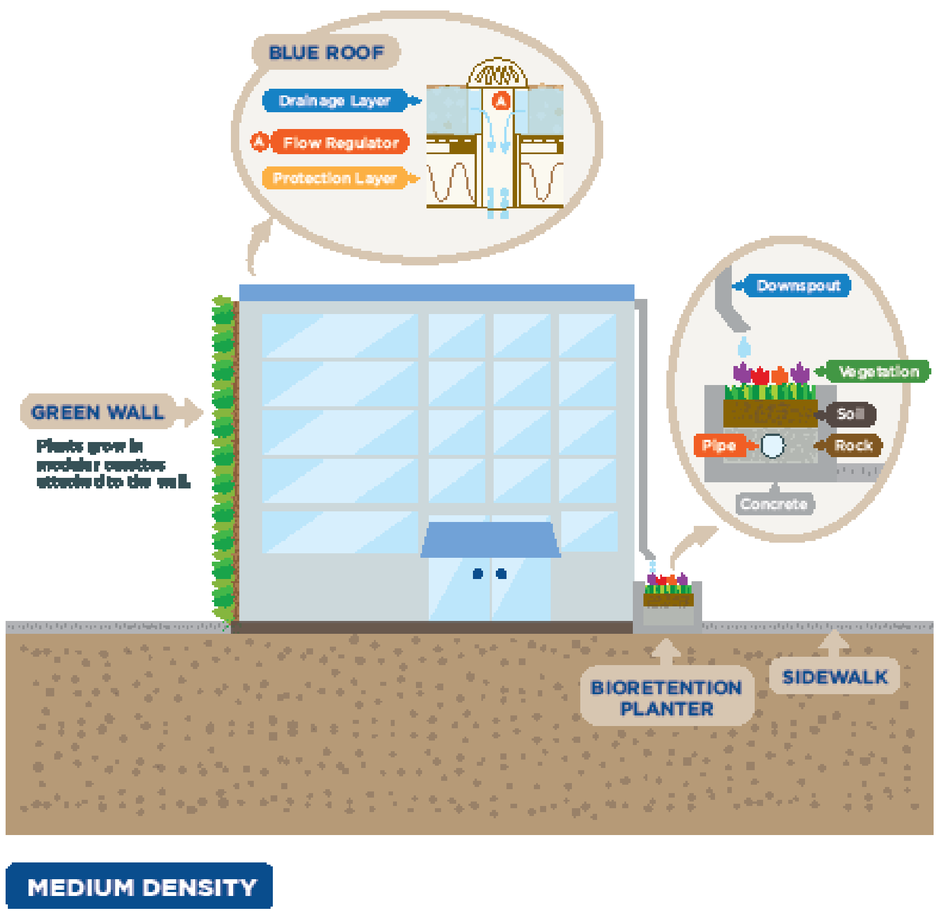


High Density

Extensive Green Roofs are layers of plants and absorbent soils on top of a building that keep rainwater from flowing down into our storm drains.

Intensive Green Roofs have thicker soil layers that allow larger plants, like trees, and are better suited for use as rooftop park space for people to enjoy.

Rainwater Harvest and Reuse systems collect rainwater and store it to be filtered and reused for things like flushing toilets.

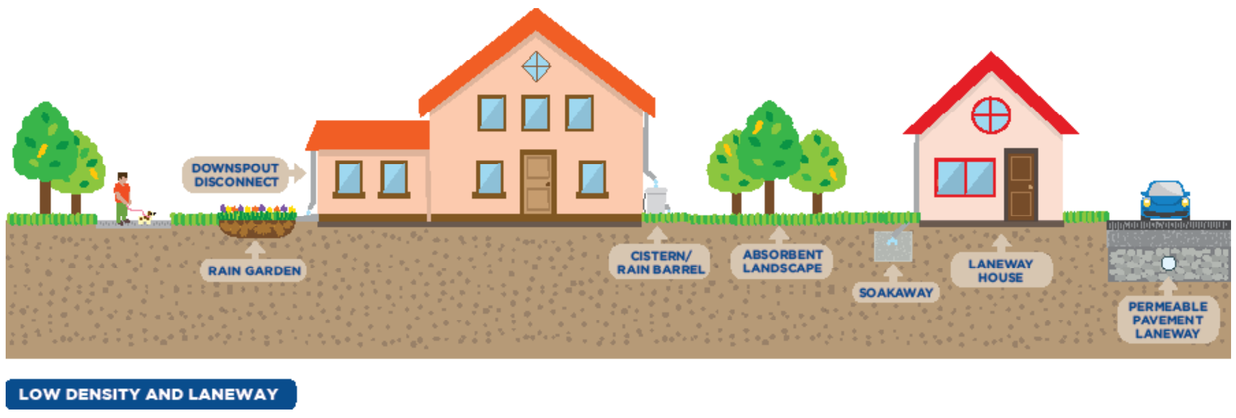


Medium Density

Blue roofs collect water and hold it in a storage layer. The rainwater can then be slowly released into the pipe system after the rainstorm.

Green Walls are plants grown up a wall, either inside or outside of a building. They can insulate a building, and provide important air filtration services.

Bioretention Planters are planting boxes designed to use rainwater for their watering needs. These planters collect and filter rainwater, and provide an aesthetic function in beautifying our streets.



Low Density & Laneways

Rain Gardens are gardens designed to collect and filter rainwater before releasing it slowly into the pipe system or letting it infiltrate back into the soil.

Downspout Disconnect programs redirect the water flowing off of roofs from the pipe system to raingardens or other landscaping designed to absorb and use the water.

Cisterns/ Rain barrels are one of many ways to capture and store rainwater for later use, for things like watering your garden, or washing your car.

Absorbent Landscapes are vegetated areas designed to absorb and store rainwater, often in their topsoil. This practice is often used in larger areas, like parks or entire yards.

Soakaways collect water from small drainage pipes, like roof downspouts, into holes filled with small stones that allow water to soak into the surrounding soil.

Permeable Pavement describes forms of pavement, like porous asphalt, that allow rainwater to pass through, to infiltrate into the soil below.

RAIN CITY STRATEGY
Priorities

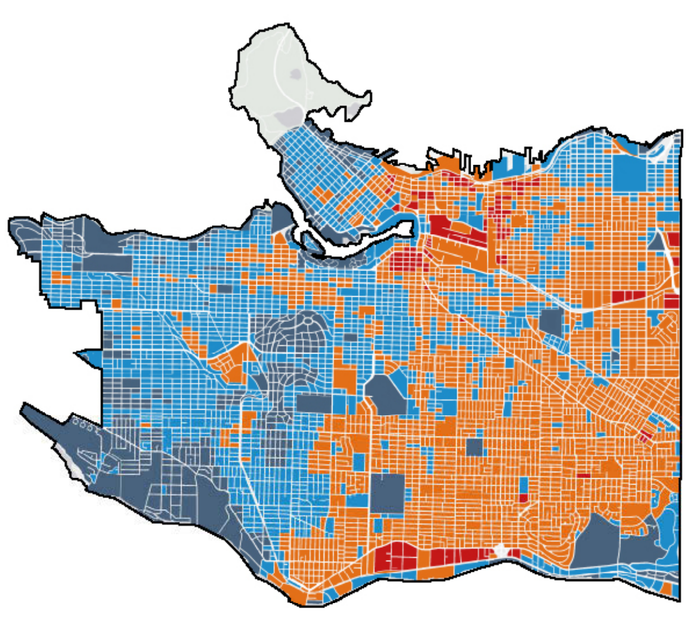
10

How can we prioritize?

Each Vancouver watershed has different assets and different needs. To determine areas of priority, we are proposing a data-driven approach. Taking into account various factors, including the six below, we can develop a sense of how urgently each watershed needs new rainwater management practices, and better understand what kinds of practices are most appropriate and effective in addressing each watershed's needs.

Urban Heat

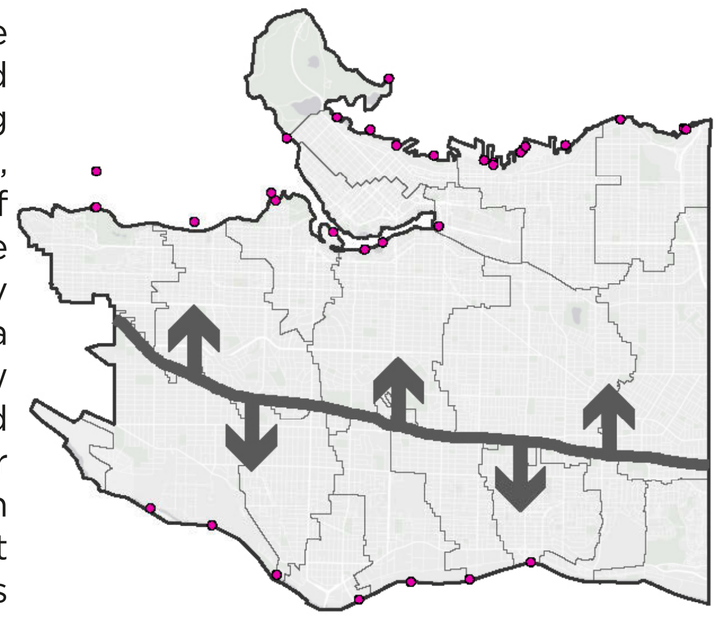
Urban areas are typically warmer than their surroundings, a phenomenon known as the "urban heat island effect." As cities adopt more dense forms of development, vegetation is lost and surfaces are paved or covered with buildings. The change in ground cover results in less shade and moisture to keep urban areas cool. Urban heat can help us determine areas where green infrastructure on the surface would have the most benefit.



Urban heat is more pronounced in the eastern and southern parts of the city.

Combined-Sewer Overflows

Vancouver's sewers combine both sanitary sewage and rainwater drainage. During higher precipitation periods, the combined volume of rainfall mixed with sewage can overwhelm the capacity of the pipe. This causes a combined sewer overflow (CSO), a mix of sewage and rainwater that flows in to our local water bodies. Green infrastructure can supplement sewer separation programs to eliminate CSOs.



Combined sewer outfalls are shown on the map in pink, while the grey line and arrows show Vancouver's "ridgeline" or high point, and direction of water flow.

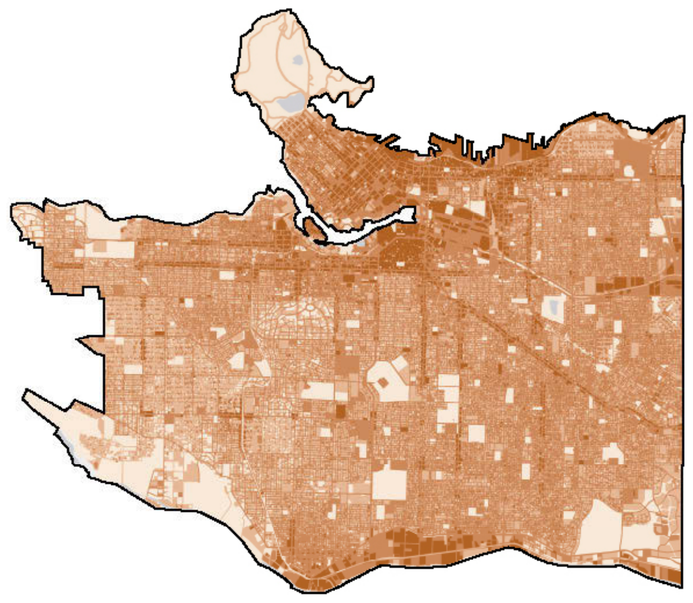
Sea-Level Rise Vulnerability

Low-lying areas at risk from sea level rise and protected with dikes and pump systems will be susceptible to backwater flooding from upland sources . This makes it especially important to control rainwater related flooding in and upstream from these areas, which can be achieved with green infrastructure.

Significant portions of Vancouver's coastal areas are at risk of coastal flooding due to sea-level rise.

Highly Impervious Areas

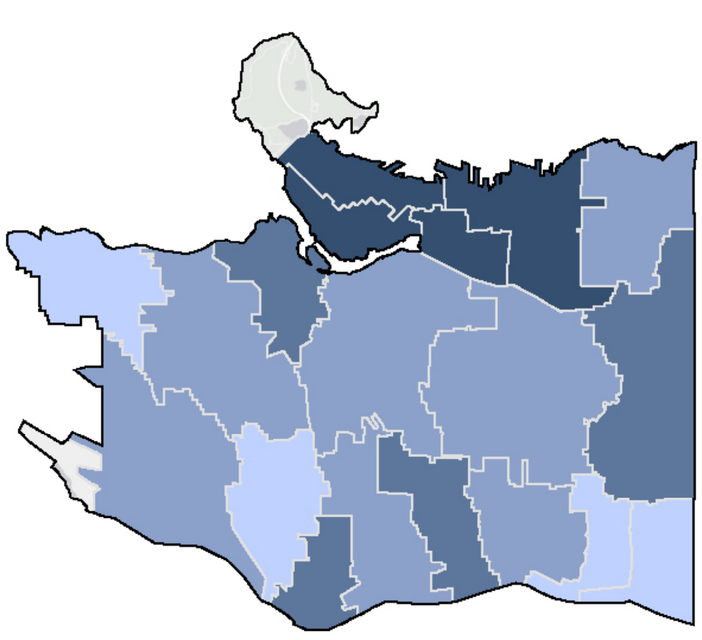
Highly impervious areas, like industrial zones and parking lots, do not allow water to infiltrate into the ground. The presence of these areas has a strong correlation to indicators of poor watershed health, including water temperature, total suspended solids, and aquifer and sub-surface flows.



Roadways and central neighbourhoods are the most impervious areas of the city.

High Pollutant Load Areas

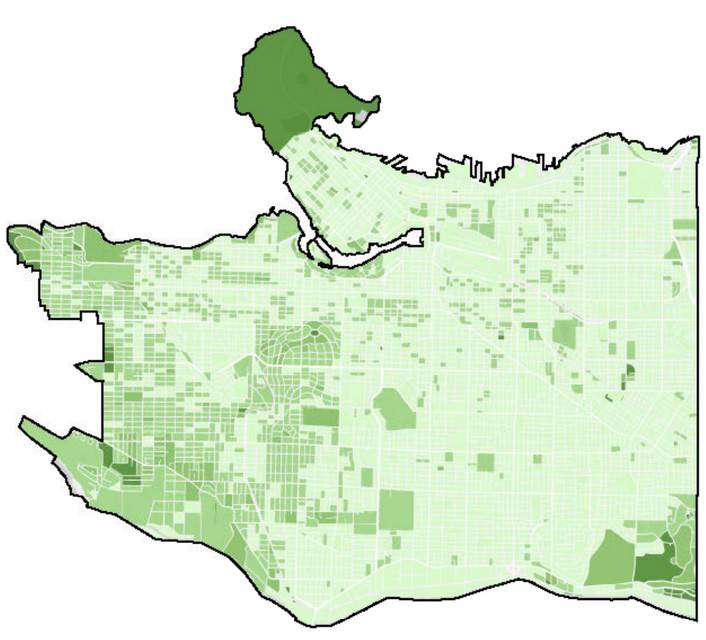
Areas with especially high levels of pollution will have greater downstream impacts if their rainwater runoff is left untreated, as their pollutants can be carried downstream to affect a wider area. By measuring levels of contamination in catch basins, we can understand which areas have the greatest need for rainwater treatment strategies to be integrated into their rainwater management plans.



The downtown core and adjacent neighbourhoods have the highest pollutant loads.

Tree Canopy

The tree canopy of a city is the area of a city covered by the crowns of trees. A denser tree canopy provides important environmental benefits, like cooling the area through evapotranspiration, intercepting rainfall in their leaves, and absorbing water at the roots. Areas with a low tree canopy could benefit more from green infrastructure on the surface. Increasing the tree canopy is also part of the Greenest City 2020 goals.



Vancouver's tree canopy is concentrated in the western parts of the city, with Stanley Park in the northwest and Killarney in the southeast as exceptions.