

# PRELIMINARY RESILIENCE ASSESSMENT





**RESILIENCE  
IS THE ABILITY  
TO SURVIVE,  
ADAPT, AND  
THRIVE IN THE  
FACE OF ANY  
CHALLENGE.**



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# EXECUTIVE SUMMARY

In 2016 the City of Vancouver was accepted into the 100 Resilient Cities (100RC) network – pioneered by the Rockefeller Foundation. 100RC defines urban resilience as the capacity of individuals, communities, institutions and businesses within a city to adapt, survive and thrive, no matter what kinds of chronic stresses and acute shocks they experience.

The 100RC cohort of cities across the globe are committed to developing resilience strategies aimed at addressing acute shocks (sudden events like earthquakes, floods, and fires) and chronic stresses (daily or ongoing issues like affordability, aging infrastructure, and reduced social cohesion). By leveraging expertise and resources to address these problems to ensure that we can survive, adapt, and thrive – now and in the future.

In Vancouver, local commitment to reconciliation and community health, our growing green economy, and climate adaptation efforts all contribute to urban resilience. This partnership with 100RC offers an opportunity for the City of Vancouver to build on this foundation and leverage new resources from the network, member cities are working together to address critical gaps and emerging challenges, and to align citywide initiatives to ensure we take a holistic approach to building citywide resilience for everyone.

With support from 100RC, the City of Vancouver is developing a Resilient Vancouver Strategy using a phased approach.

- Phase 1 included targeted engagement and research to establish priorities and identify knowledge gaps.
- Phase 2 includes analysis, innovation and ideation.
- Phase 3 includes strategy development and implementation.

This Preliminary Resilience Assessment synthesizes the information, research, and input from stakeholders from over 6 months of engagement as part of the first phase. The engagement process included one-on-one interviews, online surveys, workshops, events, and focus groups with over 2,000 residents and over 500 other stakeholders to gather public perspectives of resilience. These engagement activities explored the shocks that Vancouverites are most concerned with, and the stresses that are the most challenging to our day-to-day. During



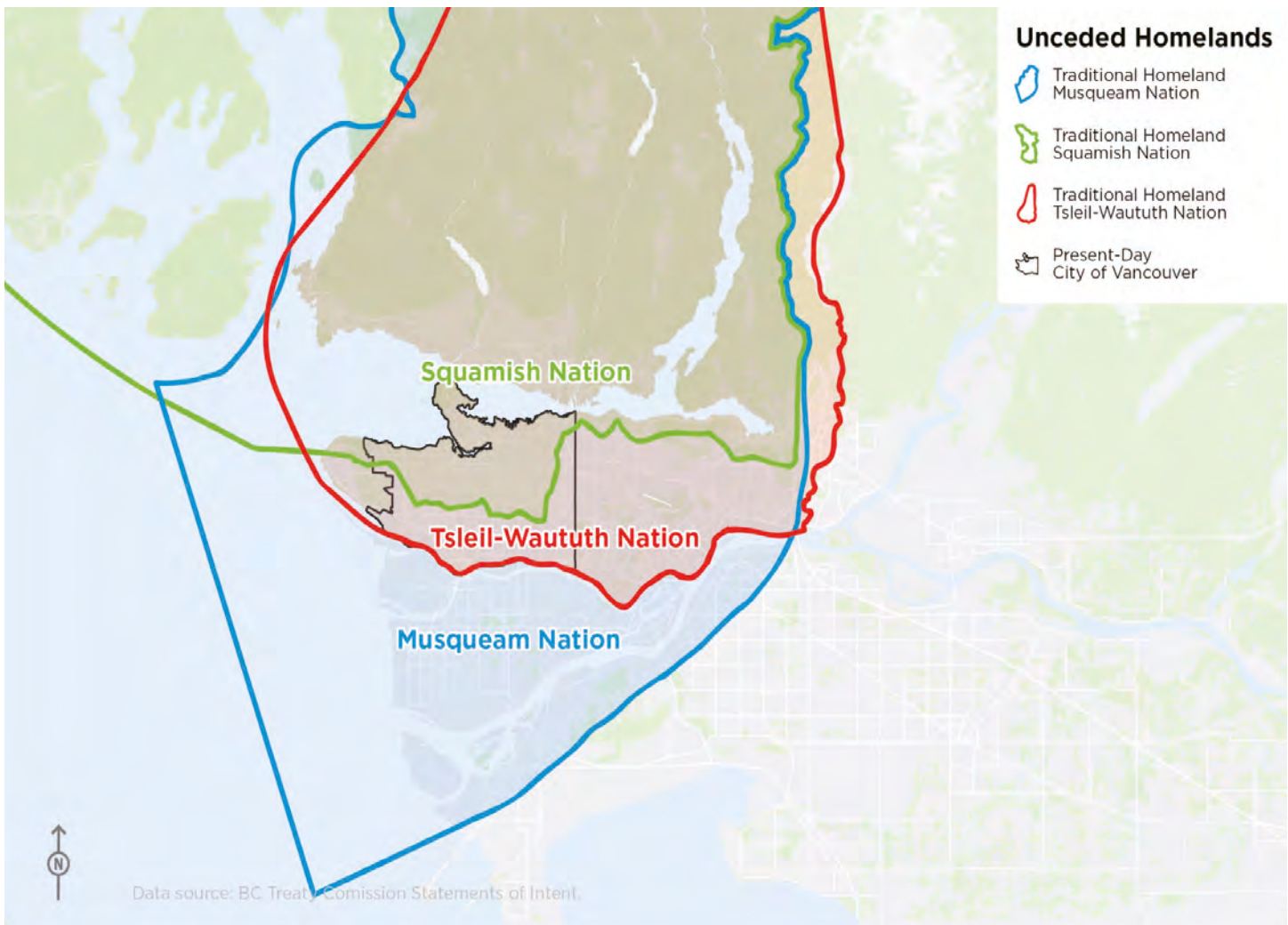
this phase, staff posed questions on these topics and more to uncover perceptions about resilience and gather an inventory of actions that are already taking place to help build a resilient future.

These perceptions and actions were compared and contrasted to determine the most significant gaps and opportunities in Vancouver's resilience trajectory and have been translated into four Discovery Areas for continued research and analysis that will inform the next phase of work.

## These 4 Discovery Areas are:

- Disaster Resilient Buildings and Infrastructure
- Connected, Resilient Neighbourhoods
- Inclusive, Resilient Economy
- Proactive, Resilient City Government

Over the next 6 months, staff and resilience partners are embarking on deeper research and analysis across each of these Discovery Areas to develop and test pilots, engage with subject matter experts, and leverage resources from 100 Resilient Cities and other partners to create actions and recommendations that will inform our Resilient Vancouver Strategy.



### Acknowledgement of the Traditional, Unceded Territory of the Musqueam, Squamish and Tsleil-Waututh People

A resilient future for Vancouver is inextricably linked to reconciliation with and among the First Peoples who have been here since time immemorial. Thus, this report starts with the acknowledgement that the City of Vancouver is located on the traditional and unceded homeland of the Musqueam, Squamish and Tsleil-Waututh Nations.

These Nations, as with most in British Columbia, have never signed treaties or otherwise given up their claim to their traditional homelands. As Vancouver looks to foster a resilient future, the City and its people have much to learn from Indigenous Peoples who, despite systematic and institutional efforts to eradicate their communities

and their cultures, have survived and are emerging as a powerful force – revitalizing their languages and cultures, reclaiming and naming traditional cultural spaces, and fighting to shape a new relationship between all people within this land.

Acknowledging and building a shared understanding of the experience and strength of Indigenous People in Vancouver and across Canada is a critical first step in envisioning a resilient future in which there is space for all people to thrive. As a City of Reconciliation, Vancouver City Council has committed to “form a sustained relationship of mutual respect and understanding with local First Nations and the Urban Indigenous community.” This is an ongoing and evolving commitment, and one that is foundational to a successful resilience strategy.





## INTRODUCTION

Rated as one of the most livable cities in the world, Vancouver is home to an expanding and diverse population, unparalleled natural beauty, a vibrant creative sector and Canada's fastest growing economy. Vancouver is an urban centre integrated into a wild, natural environment which attracts tourists and residents alike. It is recognized as a leader in green energy, environmental protection and innovation that attracts attention worldwide. Yet at the same time, it is also a city at risk.

Being surrounded by water means that space is limited and comes at a premium in a city where population growth, low vacancy rates and a limited land-base have translated to accelerated densification, skyrocketing land values, and growing pressure on green spaces, neighbourhoods, infrastructure and public amenities. The surrounding mountains that are enjoyed throughout the year by residents and tourists, alike, were formed by the same geological processes that expose Vancouver to substantial earthquake risk. Climate change leading to sea level rise, air quality concerns, and extreme weather pose threats to human and ecological health and well being.

Vancouver is already taking bold action. Current policies combined with impressive initiatives led by residents, businesses and organizations across our city, and throughout the region, ensure a strong foundation for building resilience. Through Vancouver's membership in the 100RC network, and the Resilient Vancouver Strategy process, the City will build on the work it has already done, address gaps and integrate and amplify resilience solutions being driven by local partners.

Through the lived experiences of our citizens, thoughtful planning and a willingness to work together, we have the opportunity to combine local knowledge with lessons from other cities around the world facing similar challenges. This will enable us to plan for a future in which we are prepared, adaptive and flexible in the face of both daily stresses, and sudden, unexpected shocks.

This Preliminary Resilience Assessment is the culmination of the first phase of research and engagement, and sets the foundation for targeted analysis across four key discovery areas in the second phase.

# VANCOUVER'S SHOCKS AND STRESSES

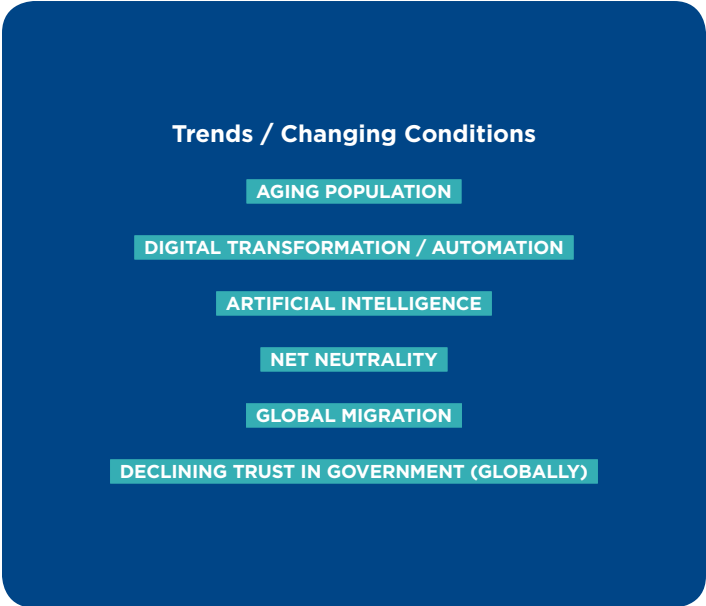
The City of Vancouver faces a wide range of hazards and threats. In the first phase, we asked stakeholders about the shocks and stresses they were most concerned about, and future trends that they believe would have the greatest influence on our ability to thrive in the future.

The following table highlights the most common shocks and stresses that Vancouverites are concerned about.

SHOCKS
Earthquakes
Extreme Weather
Oil Spills
Economic Downturn
Opioid Crisis
Cyber Attack
Air Quality - Wildfires
Flooding
Disease Outbreaks
Infrastructure Failure
STRESSES
Lack of Affordable Housing
Lack of Social Cohesion
Climate Change
Sea Level Rise
Commercial Affordability
Racism
Social and Economic Inequity
Food insecurity
Addictions, Mental Health & Stigma
Resource production and depletion - Food, Water, Energy
Environmental degradation
Aging Infrastructure

STRESSES	SHOCKS
Weakens the fabric of a city on a daily or cyclical bases. Examples lack of affordable housing, social isolation and sea level rise.	Sudden, sharp events that threaten a city. Examples include earthquakes, floods and disease outbreaks.

In addition to shocks and stresses, we also asked people about trends and potential changes that would influence the resilience of the city, their organizations, and their neighbourhoods. These trends are not necessarily negative, but will have an impact and need to be considered in the context of resilience actions.



In Vancouver, we must plan for multiple scenarios and enable our communities to be flexible and adaptive in the face of turbulence and uncertainty; this will be just as important as targeted interventions to address specific shocks and stresses.

For a more detailed city profile, including information about Vancouver's shocks and stresses, please see the appendix of this report.

# PRELIMINARY RESILIENT ASSESSMENT

To develop this Preliminary Resilient Assessment (PRA) the city undertook a discovery process to better understand the factors and trends that contribute to our city's resilience and identify our gaps and weaknesses. Using the City Resilience Framework as a guide, resilience perceptions and actions were gathered and inputted into a Perceptions Assessment tool and an Actions Inventory tool. Perceptions are defined as how people understand our greatest resilience challenges, and actions are ongoing work that contributes to building a resilient future. Through this, staff were able to identify four priority areas influencing resilience. This process resulted in the development of a set of guiding principles that will inform the next phase of work and the final strategy.

The perspectives and information gained through this phase will also help the City of Vancouver enhance ongoing projects and programs, increase funding for resilience-building initiatives, improve resourcing and access information and expertise to support a more resilient city. This document outlines the findings of our work and shapes the next steps in the development of the Resilient Vancouver Strategy.

## Phase 1 Stakeholder Engagement

The City of Vancouver led a robust engagement process to speak with residents, businesses and organizations about resilience and to learn what it meant to them and for our city. We heard from over 2000 residents and 500 stakeholders from a wide range of backgrounds, experiences and perspectives. Our goal was to better understand perceptions about Vancouver's strengths, weaknesses and vulnerabilities, learn about initiatives and work that contribute to our city's overall resilience, and identify the gaps that will inform phase two of the Resilient Vancouver Strategy.

Through events, interviews, focus groups, workshops and a public questionnaire we sought to learn what factors and trends contribute to our City's resilience, areas of strengths and weaknesses and the shocks and stresses people are most concerned about.

We started this work with the understanding that our greatest asset as a community is derived from the diversity and lived experience of residents that demonstrate resilience day-to-day. After all, city resilience is about making a city better, in both good times and bad, for the benefit of all its residents.

We learned through this process what resilience means to people, what resilience looks like in action and what a more resilient Vancouver could look like in the future.



## Objectives

The first phase of engagement took place from January - December and aimed to:

- Learn what resilience means to people and stakeholders across Vancouver
- Gather perceptions about Vancouver's strengths, weaknesses and vulnerabilities
- Understand how a resilience strategy and the 100RC partnership can be leveraged to address unique local needs
- Learn about, and identify opportunities to elevate existing initiatives that contribute to Vancouver's resilience



# CITY RESILIENCE FRAMEWORK

The City Resilience Framework (CRF) is a tool used to help cities understand the complexities and drivers that contribute to a city's resilience. In Vancouver, staff used the CRF to help guide discussions during the first phase of engagement.

## Qualities of resilient cities

## REFLECTIVE

## Using past experience to inform future decisions

## RESOURCEFUL

## Recognizing alternative ways to use resources

## ROBUST

well-conceived, constructed and managed systems

## REDUNDANT

Spare capacity purposively created  
to accommodate disruption

## FLEXIBLE

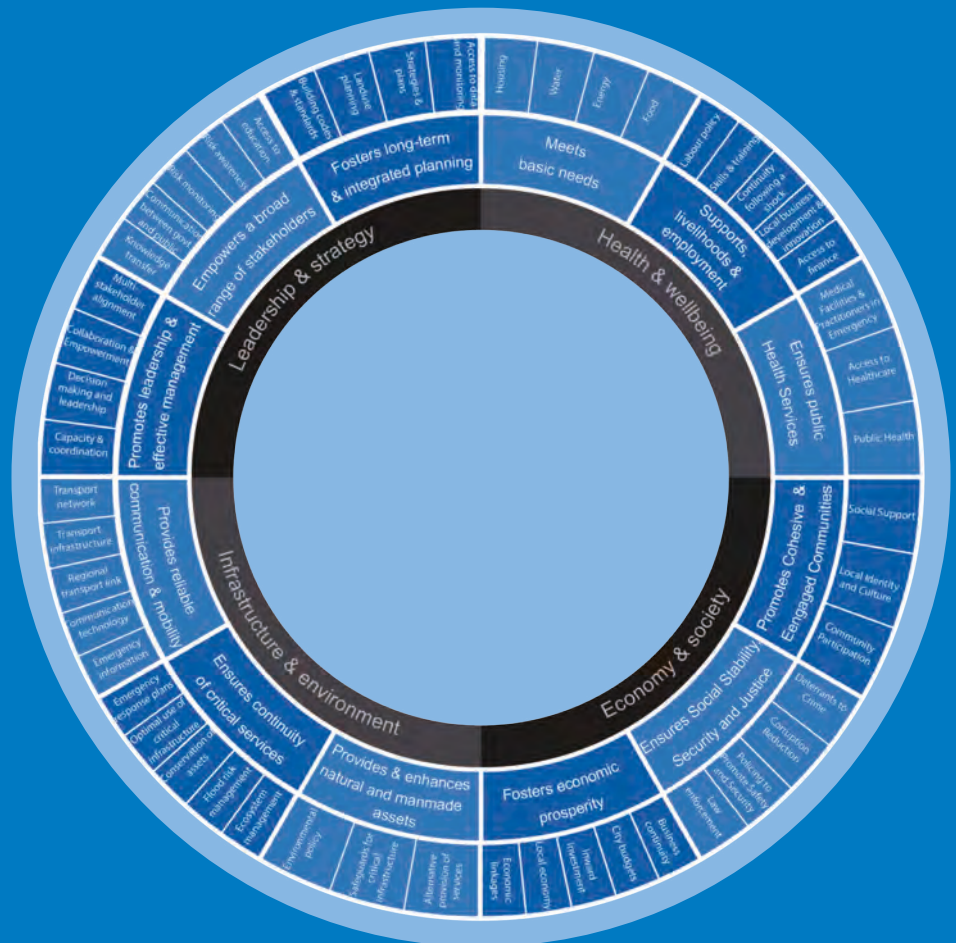
Willingness and ability to adopt alternative strategies in response to changing circumstances

## INCLUSIVE

## Prioritizing broad consultation to create shared ownership in decision-making

## INTEGRATED

Bringing together a range of distinct systems and institutions



## ENGAGEMENT ACTIVITIES



### PRESENTATIONS

A series of short presentations were delivered by the Chief Resilience Officer to the City Advisory Committees, other groups as requested, and at events and conferences.



### WORKSHOPS

Four distinct workshops in partnership with organizations, including: Simon Fraser University (SFU) Public Square, the Vancouver City Planning Commission (VCPC), the Vancouver Economic Commission (VEC) and four Vancouver organizations.



### INTERVIEWS

In-person interviews and focus groups were held with targeted experts, academics, organizations and businesses to dig deeper into the high-level information gleaned from the workshops and survey.



### ONLINE PUBLIC QUESTIONNAIRE

Online public questionnaire through Talk Vancouver to gather public perception on Vancouver's resilience and to identify new areas of focus.

Collaboration with the University of British Columbia (UBC), and the Global Network for Advanced Management (GNAM), to design and deliver a process to gather information from city staff about the range of initiatives underway that link to resilience, and to identify opportunities to integrate and support that work through the 100RC partnership.



### COLLABORATION

## Who didn't we hear from?

Engagement was carried out exclusively in English, and was not accessible to a number of residents. Resource constraints continue to preclude the investment required to improve access for people who don't speak English. In order to address this, we did speak to several groups and organizations representing multi-cultural clients and people, but this is not the same. Moving forward, as the City strives to be an organization that reflects its diverse population, making City services and processes accessible for more people will be critically important.

While we interviewed a number of non-profit organizations and service providers, we did not hear from faith-based organizations serving the Vancouver community.

We also did not engage directly with leaders from the Musqueam, Squamish or Tsleil-Waututh Nations. While we know that indigenous people attended some events, we have yet to connect directly to seek input or direction from leadership from the Nations.

## What we learned

### The Language of Resilience

Through discussions, we had an opportunity to hear important feedback on the language used to speak about resilience. For example, we heard from a number of people that some "stresses" are actually better defined as a "symptom" of a deeper, systemic issue. It was pointed out that characterizing homelessness, addictions, and mental health, as "chronic stresses" is disempowering to the people living with those conditions. Rather, these are symptoms of social inequity, intolerance and a growing ideological divide.

Tied to this is the issue of data, metrics and measurement, and the inherent bias in which statistics are often presented. We heard from one young indigenous woman that she's "tired of seeing her life presented as a statistic; as someone that is likely to have a low level of education, suffer from alcohol abuse, and live in poverty". The way data is gathered and presented can reinforce biases. In the case of this articulate and powerful woman, the numbers did not represent her experience at all. These stats would lead one to believe that a high number of indigenous people have poor resilience, when in reality they have been resilient through the atrocities of colonization, residential schools and oppression for generations.

These are just a few examples that highlight the need to be thoughtful about the language we use, challenge the way we measure resilience, and to work to understand and facilitate that sharing of perceptions across stakeholders.



# FACTORS INFLUENCING RESILIENCE

This section summarizes the prominent themes and factors that emerged from our engagement and demonstrate the vast perspectives on what's influencing our future.

Factor / Theme	Context
<b>Accessibility</b>	<p>Accessibility in an emergency was raised as a critical issue for people living with disabilities, as well as the cost of inaccessibility to our community. Accessibility spans physical, cultural, social and economic spheres.</p> <p><i>"How can you begin to develop a resilience strategy for the City when we don't yet have an accessibility strategy?" -Member of People with Disabilities Advisory Committee</i></p>
<b>Affordability: Housing; Commercial and Industrial; Non-Profits; Arts.</b>	<p>Affordability was highlighted as one of the most critical stresses affecting people today. Affordability is the highest priority objective of the City's 2018 Corporate Plan and Budget, but requires effort across sectors and government.</p> <p>High cost of living is driving people out of Vancouver and creating a transient community. Non-profits and spaces for the arts are under pressure due to rising costs for housing, operations and staff. Instability in these sectors threatens community resilience. As a city of small businesses, commercial affordability impacts the vibrancy of our community. Shrinking industrial space also sends jobs and resources out of the city.</p>
<b>Aging Population</b>	<p>Aging populations bring great wisdom and capacity to our community. An aging vulnerable population is creating new challenges for health and service providers in Vancouver.</p>
<b>AI, Technology and Digital Revolution</b>	<p>The link between tech and social isolation, and an inability to keep up with the pace of change is a concern for many individuals and businesses. Tech offers opportunity and also risk, like cyber attacks. Large institutions are not nimble enough to take advantage of new tech, and are getting farther and farther behind. Technology will fundamentally change the investment and budget priorities of cities and businesses in the future. Vancouver should leverage its tech expertise in the private sector to do good.</p>
<b>Business Continuity and Economic Recovery</b>	<p>How to recover from disruptions and disasters and continue business operations is unclear for many groups and businesses. There is interest in knowing what support government will provide, and how to keep businesses and the economy functioning after a shock.</p>
<b>Climate Adaptation in Neighbourhoods</b>	<p>At a neighbourhood scale people are interested in adaptation, but not sure what that means or what their role is.</p>

Factor / Theme	Context
<b>Community Collaboration and Resilience</b>	Our community is made up of resilient people. We need to acknowledge, celebrate, and learn from this. People want to work with others in their community to build resilience, in particular to earthquakes and climate change.
<b>Critical Infrastructure</b>	A challenge in information sharing about critical infrastructure means there is a weak understanding of the interdependencies between public and private infrastructure throughout the region. Critical infrastructure is at risk, and requires focused, collaborative effort. New opportunities for financing and modelling should be pursued.
<b>Culture</b>	Discussed in many different ways – culture and connection to culture was highlighted as core to the vibrancy of our community and to resilience. Vancouver is rich in culture and should leverage and value this asset.
<b>Data and information Sharing</b>	Expectation that the City has and shares data more openly within the City. Data collection and management can be improved for better analysis, planning and decision making. There is a risk of data bias in some cases.
<b>Data Literacy and the Digital Divide</b>	Impacting access to information and services, and concern over the pace of change leaving behind many people, including current workers and those without access to digital technology.
<b>Economic Diversification</b>	The inflated role of real estate is a risk to the City and residents. There is a desire for continued diversification and interest in building a more circular economy.
<b>Economic Opportunities Today and in the Future</b>	Highlighted as a strength in many sectors, including tech innovation, green economy, and creative sector. New immigrants with professional education don't have access to opportunities that suit their skills. Concern over future opportunities as jobs are automated, and the need to anticipate and support workers in transition.
<b>Emergency Preparedness</b>	At the neighbourhood scale and in the organization, emergency preparedness is viewed as a gap. People are interested in working towards this, but struggle to make time. Most people feel unprepared.
<b>Equity and Inclusion</b>	In the face of growing income gap, and social isolation, equity and inclusion are a measure of resilience in Vancouver. Prioritized by city staff and community organizations.
<b>Infrastructure and Investment</b>	As the city grows and ages, new infrastructure will need to be designed to meet different conditions. Financing this infrastructure is a challenge and an opportunity. Interest from government and private sector in working on this.
<b>Integration of City Plans and Strategies</b>	Vancouver has many plans and strategies, but they are not all prioritized or implemented consistently. There is an interest in aligning these strategies towards a consistent vision, and for more cohesive engagement with community on plans that intersect.



Factor / Theme	Context
<b>Intersectionality</b>	All people experience life and issues differently. An intersectional lens is fundamental to advancing equity, and developing solutions that address complexities of community.
<b>Local Decision Making and Civic Literacy</b>	Decision making processes about neighbourhood level issues are not well understood by many. There is interest in exploring community governance models to build civic literacy and more engaged citizenry.
<b>Recovery Planning</b>	Highlighted by subject matter experts, most people think about disaster response, but neglect recovery. The cost of disasters is related to recoverability. Need to set targets and shift the discussion.
<b>Regional Perspective</b>	Vancouver cannot be “a green island”. Our economy and planning decisions are interconnected. As we grow as a region, more issues will require a regional perspective. Also reference to the opportunities of connecting along the Cascadia corridor.
<b>Resilience of Buildings</b>	Safety of housing and buildings in an earthquake, and climate resilience is a major gap, lacking clear and near term solutions. Low income housing and social and supportive housing are especially vulnerable.
<b>Sharing Economy</b>	There is strong interest in pursuing more shared assets in community. From regulation of short-term rentals, to the space for communities to share their tools and knowledge, the sharing economy is also identified as a trend that will affect our future.
<b>Talent Acquisition and Retention</b>	Across all business and government sectors, comparatively low wages and affordability combine to challenge talent acquisition and retention. Perspective exists that people come here to get a start and then leave.
<b>Transportation and Mobility</b>	Discussed in the context of economy, social equity, environment, and health. A multi-modal city is celebrated, and densification requires continued work in this area. Not everyone loves bikelanes. Transportation and mobility during emergencies remains a challenge for many people.
<b>Trust in government</b>	Perceived as a global and local challenge, trust between community and government was identified as a factor with far-reaching implications for resilience, in particular when it comes to taking bold action and risk-taking. Trust is hard to measure, and value, and relies on relationships that take time to develop.
<b>Urban design and the built environment</b>	Design of streets, facilities and public spaces is a factor in resilience. Opportunity to continue to apply resilience lens to this. Legacy of built environment is a challenge in some cases (ie: building in flood plains). Designing resilient neighbourhoods is a priority for community and city planners.



## Envisioning a Resilient Vancouver

### What does resilience mean to you?

Through many of our events and engagement initiatives, we asked people to tell us what resilience means to them, to provide examples of resilience, and to describe or draw their vision for a resilient Vancouver in the future. We heard very different ideas about what resilience means to people in our community.

### We heard that resilience is:

- The ability to bounce forward.
- The collective strength and ability to recover and adapt without the loss of our core identity.
- Learning from challenges and becoming stronger.
- Reliance on the community to rebound and recover.
- Sustainability, adaptation, and community.
- People being able to help each other in times of crisis, disaster, social problems

## Community Assets – What Makes Us Resilient?

We had the opportunity to ask residents about the assets and the features in our city and their communities which contribute to resilience today.

From the resilience of people living with addictions at the heart of the opioid crisis, to the experience of newcomers re-establishing their lives in Vancouver and helping others to do the same, a common theme was the strength inherent to those who have struggled the most, and the opportunity to enhance our collective resilience by empowering them. Other assets highlighted included:

- Non-profits and local businesses for their role in providing opportunities for residents and strengthening our connection to people and place.
- Artists and the creative sector should be celebrated and supported.
- Leadership on issues like climate change and social equity, not only within government, but in businesses and community.

Many people spoke about resilience purely in the context of disasters, and specifically earthquakes, but others focused on climate resilience, social resilience, and personal resilience.



During the Vancouver City Planning Commission Summit, participants reflected on times in our history when Vancouver has been resilient – these included:

- The successful fight by Chinatown and Strathcona to stop the freeway.
- The response by community groups and citizens to the current refugee crisis.
- The establishment of the Insite Safe Injection Site.
- The community response to the Opioid Crisis, including pop-up injection sites.
- Embracing LGBTQ and 2 Spirited human rights.
- The ongoing fight for indigenous rights and freedoms and reconciliation.
- Volunteers cleaning up the downtown after the Stanley Cup Riot.

When we asked people to envision a resilient future, we heard responses spanning from ideas about social resilience and equity to governance, urban design, and finance.

When we asked participants to imagine a positive, resilient city in 30, 40, or 50 years in the future, most people envisioned a city that has resolved today's challenges, such as housing affordability, social connectivity, and earthquake risk. Some people also provided salient insights beyond today's challenges, highlighting the need to think creatively about changing future conditions and how to achieve our values in an era of rapidly expanding technology, global migration, climate change, and declining resources.

### **Analysis: Resilience Opportunities and Challenges**

The learnings from the first phase helped us identify four Discovery Areas for exploration during phase two. In addition, this work informed a set of community-driven Guiding Principles that will be applied across our work in the next phase.

### **Prioritizing Focus Areas**

Staff used the data gathered in the first phase and mapped the perceptions and concerns of stakeholders against actions and initiatives underway. A total of 394 initiatives and actions were captured and assessed as of Jan 2018. The results of the action inventory tool highlighted the City's commitment to addressing on-going stresses and preparing for future shocks through a number of existing strategies, plans and partnerships. It also identified gaps and areas where more work is needed. The large majority of initiatives mapped were related to housing affordability,

while the most significant gap was identified in the area of earthquake preparedness and risk reduction.

### **Guiding Principles**

Through input from stakeholders and in alignment with City priorities, the following foundational principles emerged to guide the development of the Resilient Vancouver Strategy in phase 2. These Guiding Principles serve as a lens through which to evaluate and prioritize opportunities, and as an accountability framework for working groups, staff and community. Application of these principles will strengthen the results of this work.

- **Reconciliation** – Resilience in Vancouver is inextricably linked to reconciliation with and among indigenous people who have existed here since time immemorial.
- **Equity, Diversity & Inclusion** – Our strategy is strengthened by the input of diverse people, and will only be successful if resiliency is enhanced equitably across our communities.
- **Affordability** – Resilience initiatives must consider the impact on affordability; the capacity for people to thrive in the future relies on their ability to live here today.
- **Ecological sustainability** – Building on our existing environmental and sustainability initiatives, resilience work will prioritize ecological sustainability as foundational to the long term health of our residents and our economy.
- **Building capacity** – The process by which we create a resilience strategy should elevate, amplify and build capacity within the community.

### **Discovery Areas**

Technical research combined with public engagement identified four overarching Discovery Areas - areas of opportunity for enhancing resilience through additional work and analysis in the next phase.

These discovery areas are broad and overlapping, and will be explored together with our guiding principles.

- Disaster Resilient Buildings and Infrastructure
- Connected, Resilient Neighbourhoods
- Inclusive, Resilient Economy
- Proactive, Resilient City Government

The following section provides an analysis of key themes and challenges associated with each Discovery Areas, and some ideas about how they may be advanced in phase two.

# DISASTER RESILIENT BUILDINGS AND INFRASTRUCTURE

## Theme: Disaster Risk Reduction

While earthquakes were identified as the greatest potential shock to Vancouver, earthquake preparedness is not top-of-mind for most. Many of Vancouver's buildings and infrastructure was constructed before we understood the magnitude of earthquake risk in this region. In fact, only in recent history did seismic risk become an integrated part of city planning.

Vancouver is home to about 100,000 privately owned buildings, for which there is limited data about seismic integrity or exposure. Vancouver may have one of the most stringent building codes in British Columbia, but many existing buildings do not meet this code. One of the most significant steps we can take as a City is to understand and address the risk posed by existing buildings. In 2017, the City hired its first Seismic Policy Planner to lead a technical committee of experts to advance components of this work. Under the Chief Resilience Officer, this committee is evaluating disaster risk and risk reduction options for buildings.

In 2013, Natural Resources Canada and the City of Vancouver used the best available data to evaluate the potential impacts of a magnitude 7.3 earthquake in the Strait of Georgia and the results suggested up to 90,000 homes could be damaged. Although the data was rough, this information was used to inform 50+ recommendations and actions in the Earthquake Preparedness Strategy – many of which have been implemented. Included in those recommendations was an acknowledgement that additional work was needed from multiple partners to refine our understanding of risk and evaluate options with respect to City planning. Since then, academics, private sector experts, and government agencies have invested in this work. And today, new data, research and analysis provide us with an opportunity to learn more about Vancouver's risk and to evaluate options to reduce it further.

A major earthquake could happen any day in Vancouver. The City needs to better understand the impact in order to protect lives, reduce risk and ensure the ability of our city, people and economy to recover. Our goal is to be in a position to recover from the earthquake we know is coming.

## Who inspires us?

Vancouver is able to look regionally and globally to advance this work. Regionally, we will work with and learn from colleagues at the City of Victoria, and the District of North Vancouver, who are leading similar efforts. In Canada, cities including Ottawa and Montreal are grappling with a new and growing awareness of seismic risk, and we aim to collaborate with them to advance the topic on a national scale. Globally, we look forward to working with the 39 cities in the 100RC Network that face earthquake risk. We have already benefited from a 100RC Network exchange in Mexico City, and are inspired by work led by our colleagues in Los Angeles, San Francisco, Berkeley, Wellington and Christchurch.

## Theme: City of Vancouver's Infrastructure Planning

A series of exploratory internal workshops were held by the City to gain a deeper understanding of the challenges and opportunities in this area. The workshops revealed that work done in recent years to understand climate change impacts and sea level rise puts Vancouver in a strong position to minimize risk from these hazards. However, limited modelling about earthquakes means the City is unable to make strategic decisions when it comes to upgrades and retrofits to mitigate earthquake risks. Upgrades to infrastructure are costly and take time, and prioritization must also reflect community values and risk tolerance.

As neighbourhood plans are developed and implemented across Vancouver, densification puts added pressure on infrastructure, from utilities to parks to roads. There are strong examples of collaborative, resilience planning happening in Vancouver to address these challenges – a resilient road in North East False Creek, and the Dedicated Fire Protection System are two examples. However, resilience as a concept hasn't been embedded consistently in all infrastructure planning, design and development processes. In order to make better infrastructure investments in all future planning, City planners, engineers, and developers would benefit from access to new technologies and analytical tools to evaluate system interdependencies and threats.



### Initiatives Underway: Infrastructure Resilience

There is already work progressing to enhance infrastructure resilience, including a program to assess and upgrade bridges, developing a post-disaster building and bridge damage assessment protocols, evaluating and implementing green infrastructure options, advancing a One Water initiative, and assessing asset exposure and risk tolerance to flooding on the Fraser River.

### Theme: Infrastructure Interdependencies

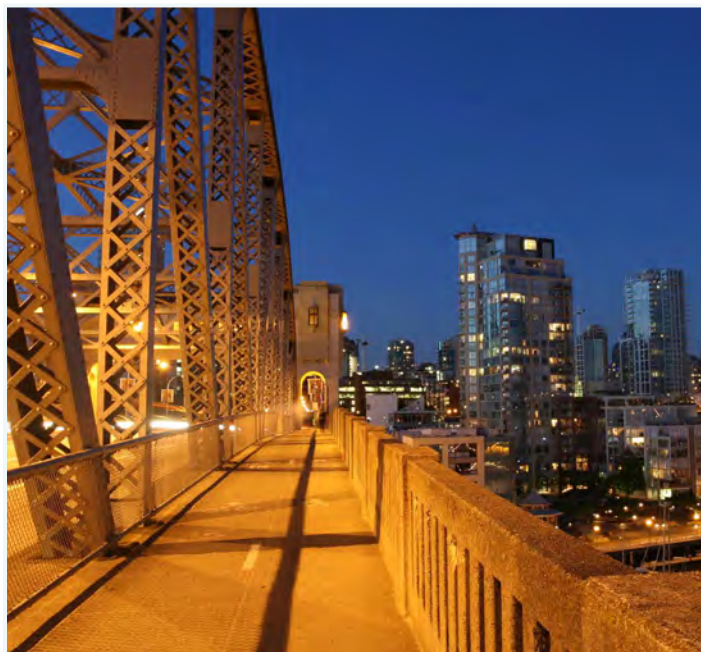
Across the region, there is limited understanding of the interdependencies of infrastructure and services, and inconsistent data and tools to develop a shared understanding of the cascading effects of infrastructure failure and disasters. This is especially true when talking about information and data sharing between varying private and public entities. There are some efforts underway to address this, for example, the Fraser Basin Council conducted a regional analysis of flood risk, and is leading an initiative to better understand the combined seismic and flood risk to regional infrastructure.

The way infrastructure is managed is also changing. The use of data and digital technology offers incredible opportunities to enhance the management and delivery of services and assets. The pace of change and the evolving nature of threats mean government institutions are challenged to keep up, not only with investment in new tech, but also with resilience and risk management requirements.

### Theme: Modernizing Infrastructure Management

About 70 – 80% of local government assets in British Columbia are not insured, which means the impact of a major regional disaster, like an earthquake or flood, could cripple the economy and prevent recovery of local communities. Even if federal and provincial governments guarantee post-disaster funding, the distribution of funds and the allocation of resources for repair and recovery of infrastructure could take months or even years.

Speaking with experts in finance and insurance, we heard these challenges are not unique to Vancouver, and that cities around the world are trying to modernize financing tools to ensure both sustainability and resilience. New finance and insurance models can help cities make better investments. These include a combination of policy incentives, regulatory requirements, and innovative



public-private partnerships. Products like resilience and catastrophe bonds for post-disaster insurance, as well as programs like PACE in California, that provides financing for energy and seismic retrofits for private infrastructure, are examples that could be explored here.

Beyond its role in keeping the city functioning, resilient public infrastructure is increasingly seen as an asset (or liability), that can affect a city's credit rating, and make it eligible for government funding. New financing mechanisms are evolving to help governments invest in infrastructure, transfer risk, and ensure continuity of services.

### Who inspires us?

To advance this work we will look to cities across the 100RC network, like New York City, who has leveraged unique financing options to compel investment in infrastructure. We look to San Francisco and the work done to understand lifelines and establish recoverability criteria. Pittsburgh demonstrated how to consider the value of ecological and social benefits of green infrastructure investments.

We hope to leverage the expertise of partners and explore innovation in the private sector to think about new ways public infrastructure and assets may be used to generate wealth for our communities. Closer to home, Calgary, Montreal, and Toronto provide ideas on how to bring multiple parties to the table to share sensitive information, both day-to-day and during emergencies.

# CONNECTED, RESILIENT NEIGHBOURHOODS

Neighbourhoods are the intersection of social and economic life in our City, and their resilience is deeply tied to both the people that make up a community and the built environment where they interact. Vancouver's 23 distinct neighbourhoods are diverse and all have place-based networks, organizations and businesses that support the local community and are integral to the ability of each neighbourhood to thrive. This overlap of community connections and urban design has proven to be a strong theme throughout this process.

## Theme: Social Cohesion and Emergency Preparedness

The impacts of shocks and stresses are acutely felt at the neighbourhood level, many of which are already at risk. Vancouver's neighbourhoods are under pressure for a variety of reasons; from empty homes hollowing out communities, to gentrification of neighbourhoods and rising costs pushing residents out of the city. Small businesses are struggling due to rising costs and there is a higher demand on local foodbanks.

And yet, people in Vancouver demonstrate resilience every day. Across the city, people and organizations are fighting to stay and thrive in the places they love, and are committed to bolstering their neighbourhoods to address these challenges. Vancouver's neighbourhoods are home to incredible social and physical assets, local knowledge and lived experience.

When disaster strikes our communities we will need to rely on each other, yet many residents reported a lack of understanding of how to help themselves during a disaster, much less their neighbours. Community organizations articulated an urgent need for emergency planning and preparedness support from the City of Vancouver.

In a major earthquake, or even a snowstorm that limits mobility, people want to know how they can take care of each other. They want information about risks and hazards that could impact them and how it could affect their neighbourhood. They want to understand how buildings and infrastructure will perform, so they can plan around them. They want to apply art, design, and their cultural and local knowledge to bring their neighbours together and connect with one-another on a deeper level. Emergency education and preparedness at a community level has huge potential to support social cohesion and disaster response and recovery.

We are presented with an opportunity to build on the good work happening within our communities. We need

to better understand the interconnectedness of shocks and stresses as they play-out across our city. By exploring innovative ways to engage citizens, stakeholders and city planners in designing neighbourhoods and public spaces, we can ensure they are inherently resilient.

Through our engagement with neighbourhoods and residents, we heard the desire to find innovative solutions to ensure:

- All people and organizations in our neighbourhoods and communities are connected, healthy and resilient; able and empowered to take care of each other day-to-day and during emergencies.
- Neighbourhoods, public spaces and community assets are designed to build resilience to local shocks, while enhancing the culture and connectivity of communities.
- Enhanced civic literacy and greater access for all people to learn about and contribute to neighbourhood resilience initiatives.
- Vancouverites have accessible, specific information on hazards and risks in order to plan for quick and successful recovery from disasters and emergencies.

## Initiatives Underway: Disaster Support Hubs

In 2016, the City of Vancouver launched the Disaster Support Hub initiative, acknowledging that in the event of an earthquake, neighbours will need to come together to help each other. By designating 25 Hubs across the region, the City aimed to promote awareness and cooperation among neighbourhoods to plan and prepare for disasters together. The Hubs have been well received, and many people are interested in learning how other public spaces can be transformed to serve communities in disasters. There is also interest in working together to develop tools to help neighbourhoods prepare for, respond to, and recover from emergencies.

## Resilient Neighbourhoods Program (pilot)

In 2017, the City of Vancouver approved funding to support the piloting of the Resilient Neighbourhoods Program – a partnership with 4 neighbourhood organizations to co-develop tools and resources to support neighbourhood resilience, including asset maps, a Disaster Support Hub guide, run exercises and training sessions, and create Neighbourhood Resilience Action Plans. The neighbourhood organizations include: 312 Main Community Co-op, Britannia Community Services Centre, Collingwood Neighbourhood House, and Dunbar Community Centre Association.

## Theme: Urban Design and the Built Environment

The built environment has a significant impact on how people access, experience, and move through our neighbourhoods. As our city densifies to sustainably accommodate a growing population, we must embed resilience strategically, not only in neighbourhoods and community networks, but also within the physical environment of the neighbourhood.

Urban design sets the stage for how we use limited public space and social infrastructure within neighbourhoods. Many of the City's plans provide guidance for what neighbourhoods can be, but inconsistent implementation means they don't always become a reality. City planners and community stakeholders have called for integration around these policies, and many see resilience as a lens that can support innovative urban design to enhance the resilience of our neighbourhoods. As Vancouver continues to grow and develop, we have a unique opportunity to apply a long-term resilience lens to neighbourhood design, and set a strong and adaptive foundation for the future.

### Who inspires us?

Locally there are thousands of inspiring groups and people working to build community resilience, and from whom we have much to learn. The foresight and determination of the Urban Indigenous Peoples Advisory Committee and local partners who advocated for and opened the Saa-ust Centre, taking an indigenous approach to providing space for families and survivors affected by the Missing and Murdered Women's Inquiry. Neighbourhood groups like Project GreenBloc, Village Vancouver and the Our Place -Youth Matters Committee, who bring people together to take action on local priorities. The Strathcona Community Centre's Breakfast Program provides thousands of meals to kids every month, and the Dunbar Community Centre Association has invested in emergency supplies for their neighbourhood. Britannia Community Services Centre opened their doors during cold, winter nights to provide refuge to vulnerable members of their community. Partners like the Vancouver Foundation and local neighbourhood houses provide incredible support, space and funding for community building and connections.

Globally, we look to initiatives in cities in the 100RC Network, including the Neighbourhood Empowerment Network in San Francisco, Wellington's Community

Emergency Hub program, Building Resilient Neighbourhoods in Victoria, Community Resilience to Extreme Weather in Ontario and Sustainable Neighbourhood Action Plan in the Toronto Region. From a planning perspective, we can learn from cities like Norfolk, New York, Paris and Medellin, about how to foster resilience, culture and social wellbeing through urban design.

## INCLUSIVE, RESILIENT ECONOMY

### Theme: Digital Literacy, Wealth Distribution, and the Future of Work

Vancouver's economy is outpacing most cities across Canada, and there are a number of success stories we can learn from. For example, a key measure of local success, from the Vancouver Economic Commission (VEC) has been the capacity to increase GDP, while concurrently decreasing carbon output and fostering growth in the green economy. Vancouver has set ambitious goals around zero-waste, and is striving to support a circular economy that will be more resilient to shocks, contribute to environmental sustainability, and provide opportunities for local businesses to grow. However, in Vancouver, strong economic growth does not translate into positive outcomes for all. Income disparity has been identified as an issue affecting multiple sectors and there is a need to re-think how we value work, generate wealth, and ensure equitable access to economic and social supports.

Equitable delivery and access to services is another important factor in an inclusive economy. Despite having a strong economy, not everyone is benefitting from it. We have an opportunity to look at the interconnectedness between our economy, social infrastructure and physical infrastructure and how it might evolve to ensure that everyone who wants to, has access to participate and benefit from the local economy.

The combined pressures of housing, industrial and commercial affordability has emerged as the top issue perceived to be influencing communities and the economy today, but people are also thinking ahead to the trends, shocks and stresses that may impact the economy of tomorrow. Even as businesses and organizations put effort into attracting talent, others are exploring ways in which human tasks can be automated.



As described at the Radius Lab ReFrame Summit, “There is much speculation about the pace and scope of automation and its impact on jobs, but agreement that changes will disproportionately impact low-skilled workers, including young people, the low-paid and less educated. In Canada, recent analysis suggests that workers in transportation, finance, logistics and retail industries are some of the most at risk in the next two decades.”

With 24.4% of Vancouver’s labour force working in sales and service, and 16.9% working in business, finance and administration, this is a concerning projection for many current workers. Employers across many sectors report that they are struggling to attract and retain talent, greatly due to wages not matching the cost of living. Lack of affordability is putting pressure on many small and medium businesses to make ends meet, and causing the rise of individuals working in the ‘gig’ economy

Digital and data literacy will continue to grow as a core competency for a large number of jobs, and many expressed concern about the pace of change and the ability to be prepared for jobs and an economic system that is influenced by new disruptive technologies. Preparing youth for jobs in a future that is difficult to imagine, re-training the current workforce to adapt, and supporting people through transition into different roles will be critical for individual and city resilience.

Reducing poverty, while fostering opportunity for inclusion in a changing economy is a challenge that requires collaboration and innovation across a wide range of stakeholders – fortunately, there are already many people and organizations working on these issues including:

- *Simon Fraser University’s 2018 Community Summit* on the Future of Work provided an opportunity to identify where this work was happening, and convene stakeholders to discuss new ways forward.
- Networking tables, like the League of Intrapreneurs is supporting change-makers in large organizations and institutions to connect, learn and collaborate on initiatives related to work and professional development.
- Innovation challenges, like the federal government’s *Supercluster Initiative* and *Smart City Challenge* are motivating private sector and public sector to come together to envision a future where technology contributes to better opportunities and outcomes for local communities.

As a municipality, the City influences how Vancouver is physically built, and can help it shape and adapt it in a changing economy. We heard ideas about the way city zoning can shape a future economy, and questions about whether there is a need to rethink traditional approaches to urban planning and regulation to ensure that developments today can adapt and support the needs of the future.

#### Initiatives Underway:

As a large employer, the City of Vancouver is working to enhance opportunities by guaranteeing a living wage for all employees and third party contractors, and through a recent commitment to a gender equity strategy.

These ongoing initiatives provide an opportunity to integrate city policy to support an inclusive economy: VEC’s Economic Strategy, the Smart City Challenge, Creative City Strategy, Equity Framework, Employment Lands Study, Small Business Study, Gender Equity Strategy, and CityCore 2050

As an innovative and wealthy community with strong social values and multiple educational institutions, Vancouver is well positioned to contribute solutions to this complex challenge.

## PROACTIVE, RESILIENT CITY GOVERNMENT

### Theme: Role of City Government

The City of Vancouver is responsible for maintaining critical services, managing programs and making decisions that impact resilience for all of its residents. Known globally as a progressive organization, the City has led a wide range of initiatives that set a strong foundation for resilience.

Through this process we heard from many participants that integration of city plans and strategies is important to enable public participation in civic processes. Looking to the future, the City must find ways to uphold those values within these strategies, while also identifying and addressing barriers to their implementation.



Going forward the City has a chance to test and model resilient practices. Among the most significant hurdles for city government will be financing future investment in resilient infrastructure, and being nimble and flexible to the needs of residents under changing conditions.

We heard a need and a desire for the City to expand engagement opportunities, and strive for a leadership that reflects the diversity of our community. Civic literacy has been elevated by the public, who want to better understand civic processes, and from City staff who want an opportunity to connect more deeply with residents and stakeholders.

Within the organization, City staff have identified the need to consider how the role of government is changing, and how city services can transform to meet the needs of the future. Already, we see the City being called upon more often to respond to crises, and that additional support is needed to help take care of residents.

Urban resilience will be influenced in part by the resilience of municipal government. This organizational resilience isn't just about being prepared for known threats and hazards, it's about creating systems and structures that are nimble and flexible enough to adapt and thrive in ways that effectively serve the community, no matter what the future brings. This will also help to generate trust and

accountability between community and government. Empowering staff with a common vision, data, tools and knowledge to evaluate future scenarios, assess resilience value, and integrate community knowledge and values are critical in the long-term viability of policies and projects.

### **Theme: Infrastructure Financing and Resilience**

A high priority for the City of Vancouver is to build, maintain and finance resilient infrastructure – including social infrastructure. This is important to manage daily risks in our city, and imperative for critical services to recover quickly in the event of a disaster.

The City manages a complex portfolio of infrastructure, assets and services which are critical to the day-to-day function of our city. They also rely on infrastructure, assets and services operated by private and public sector entities.

Through the first phase of engagement, infrastructure financing and resilience emerged as a top priority over and over again. We heard that as Vancouver grows and demands change, it will put further pressure on our infrastructure and become more costly to maintain a “state-of-good-repair”. For instance, climate change will require intensified energy efficiency standards for buildings, and an aging population will use infrastructure differently, needing more accessibility.

# DISCOVERY AREA QUESTIONS

The themes discussed across our Discovery Areas are broad and overlapping, and will be explored in concert with our guiding principles. In order to continue researching these Discovery Areas and to identify actions that will build Vancouver's resilience, we have created a set of questions for each Discovery Area to guide the next phase of work. These questions will be further refined as work advances through the second phase.

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## DISASTER RESILIENT BUILDINGS AND INFRASTRUCTURE

- How can the City of Vancouver assess and establish consensus around citywide and community recoverability criteria for hazards?
- How might we advance effective seismic risk reduction policy for infrastructure and buildings, while also achieving climate, housing and affordability objectives?
- How can we leverage data and technology to better understand infrastructure interdependencies and manage risk?

## CONNECTED, RESILIENT NEIGHBOURHOODS

- How might all people and organizations within communities be empowered to take collective action to support each other day-to-day and in times of crisis?
- How can hazard information be shaped and communicated in a way that inspires and enables action across our diverse communities, and generates support for disaster mitigation interventions?
- How can we work collaboratively to plan, design and build neighbourhood spaces and infrastructure that are inherently resilient?

## INCLUSIVE, RESILIENT ECONOMY

- How will technology and labour trends impact the way that Vancouverites work, live and play?
- What role can City government play in fostering a more equitable and inclusive economy?

## PROACTIVE, RESILIENT CITY GOVERNMENT

- What could impact the financial future of city government, and what options does the city have to ensure long term financial sustainability while enhancing the resilience of physical and social infrastructure?
  - How might the City more efficiently generate, manage and share data to enhance decision making, planning, and innovation?
  - How can existing City plans and strategies be aligned to include and integrate resilience objectives?
- 

The knowledge and analysis gained through this PRA and the four discover areas, set the foundation for the next phase of work in the Resilient Vancouver Strategy. Over the next six-eight months we will dive even deeper into the challenges highlighted in each of these areas and work with experts, partners and other cities to continue our research, develop and test pilots and continue to engage with a range of residents, businesses, partners and stakeholders. The next phase of work is where we learn, innovate, and partner to create solutions for the resilience strategy, and elevate work underway in our communities. We will aim to generate knowledge to inform actions in the strategy, and empower staff and stakeholders to integrate resilience thinking into their own work.



## NEXT STEPS

While many people think about resilience in the context of major shocks, we heard that the capacity to withstand shocks is linked to the conditions that exist in our community day-to-day. Building resilience means holistically targeting both – addressing the physical and structural threats, while also enhancing social wellbeing and economic opportunities. Ongoing issues like wage inequity and lack of housing affordability puts intense pressure on our residents. We have an aging population requiring infrastructure and support, while families struggling with mental health and addictions aren't able to access the services they need. We see that our residents are struggling and families are moving away from Vancouver; more than one in five Vancouver residents face poverty. Despite all these challenges, Vancouver is a strong city, filled with resilient people. No one challenge stands alone, and no one organization or government is solely responsible. Participation on every level – individual, neighbourhood, community and public and private sector – is essential to our success. We must all work together, and with the support of 100RC and our community partners we believe we can achieve unity in our work.

In Vancouver, the PRA process highlighted areas of strength and initiatives contributing to resilience across the city. The process also revealed gaps and opportunities to explore, evaluate and pilot new approaches to address complex challenges. This presents an opportunity to apply resources to better understand and enhance the resilience value of ongoing projects and programs, and invest in analytical research about current and future trends, evaluate interdependencies, and engage community to advance resilience-building initiatives in the city.

The knowledge and analysis gained through this PRA has set the foundation for our next phase of work in creating the Resilient Vancouver Strategy. Over the next six- to-eight months we will work with experts, partners and other cities to continue our research across each Discovery Area, develop and test pilots and continue to engage with a range of residents, businesses, partners and stakeholders. From this, we will work collaboratively to develop and refine a set of actions and recommendations that will make up the Resilient Vancouver Strategy.

Moving forward, Vancouver can and should be a global leader in resilience. Now, more than ever, we recognize the strength of our residents and the value of our communities in creating a more resilient Vancouver. Through this process we've come to understand that government plays a necessary role in building resilience, but it's only part of the picture. It will take much more than our leadership to ensure our city doesn't just recover from inevitable threats and hazards, but thrives in the face of uncertainty.

As a local government, we're in a position to take action. The many policies and actions listed in this PRA, combined with impressive initiatives by citizens, businesses and organizations across our city, ensure a strong foundation for building resilience. By staying connected with our communities, partners and stakeholders, we will continue to build on this work.



# APPENDIX 1: VANCOUVER'S CITY CONTEXT

The following provides contextual information about Vancouver relevant to resilience.

## Geography

Vancouver's geography and surrounding natural resources have shaped its history and underpin its resilience.

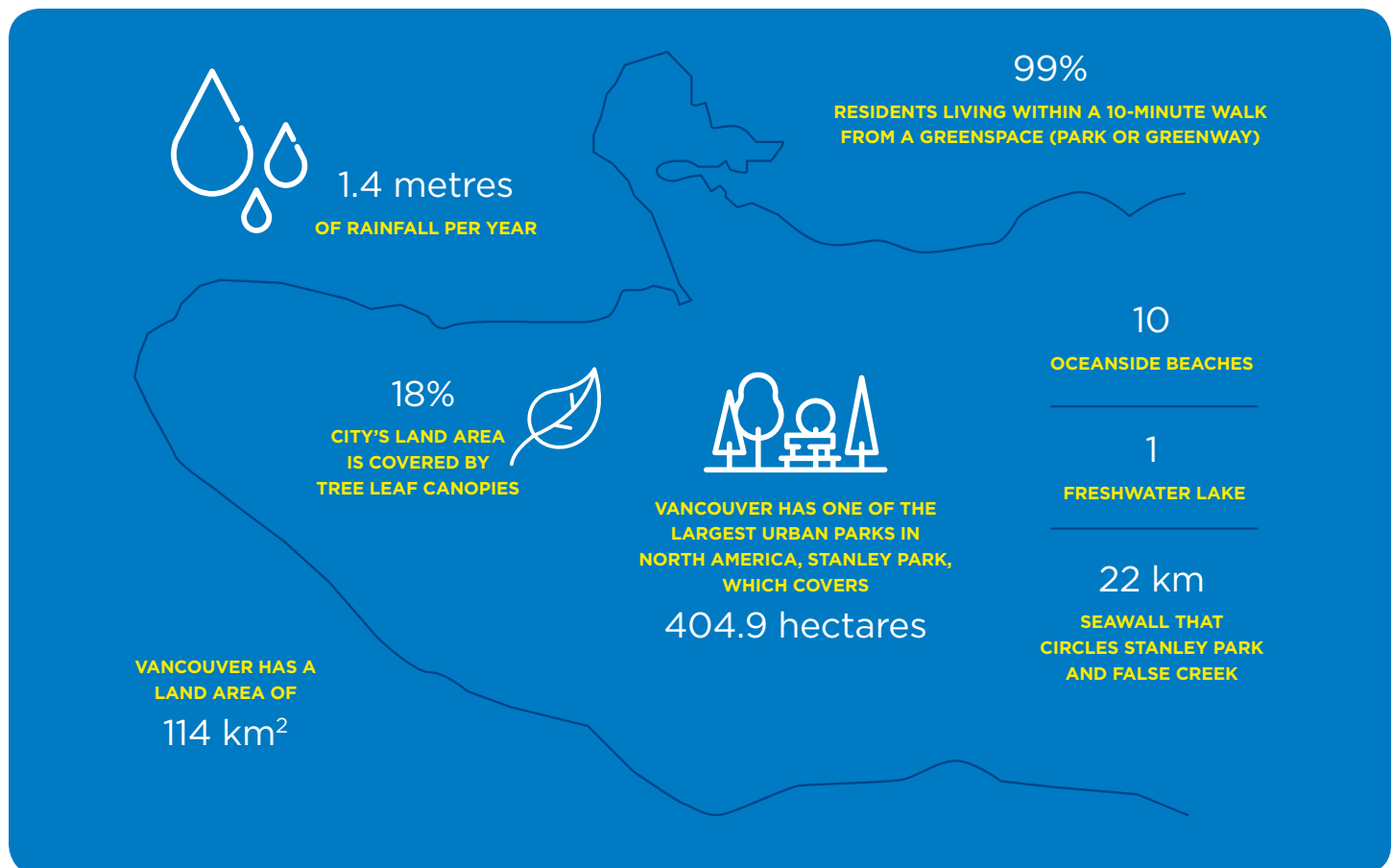
Vancouver is surrounded by water, with Burrard Inlet to the north, the Fraser River to the south, and the Salish Sea to the west. Vancouver Island, across the Strait of Georgia, shields Vancouver from the Pacific Ocean. The city's landmass is only 114 km<sup>2</sup>, including both flat and hilly ground and is in the Pacific Maritime Ecozone which is home to Canada's tallest trees, the most rainfall, and the longest and deepest fiords.

Vancouver has a moderate, oceanic climate receiving approximately 1.4 metres of rainfall per year, leading to the often-used moniker of "Rain City". A total of 30% of the rain falls during large or extreme rainfall events, whereas the remainder falls during light showers or small storms. Protected by the mountains and warmed by the Pacific Ocean currents, Vancouver is one of the warmest cities in Canada.

The beaches, seawall and mountain views are defining features of Vancouver's identity and reputation as one of the world's most 'Liveable Cities'. The landscape and natural surroundings have significantly driven the local economy (past and present) as well as inspire the City's commitment to preservation of the natural environment.

Vancouver has one of the largest urban parks in North America, Stanley Park, which covers 404.9 hectares (1,001 acres). Ten oceanside beaches and one freshwater lake provide residents and visitors ample access to the water, as does the 22km Seawall that circles Stanley Park and False Creek. An impressive 99% of Vancouver residents live within a 10-minute walk from a greenspace (park or greenway) and 18% of the city's land area is covered by tree leaf canopies.

These natural features, which make Vancouver a desirable place to live, also present challenges for the city in the form of natural hazards, and have a real potential to test Vancouver's resilience.



## People and Population

Today Vancouver is home to an urban population of 631,486 residents. Vancouver has a land area of 114 km<sup>2</sup> (almost the entire population of Surrey in half the landmass), the highest density of any urban area in Canada, and the fourth most densely populated city in North America. While much of this density is concentrated in the downtown core, the majority of Vancouver is comprised of single family neighbourhoods. The extended area of Metro Vancouver has a population of 2,463,431 residents.

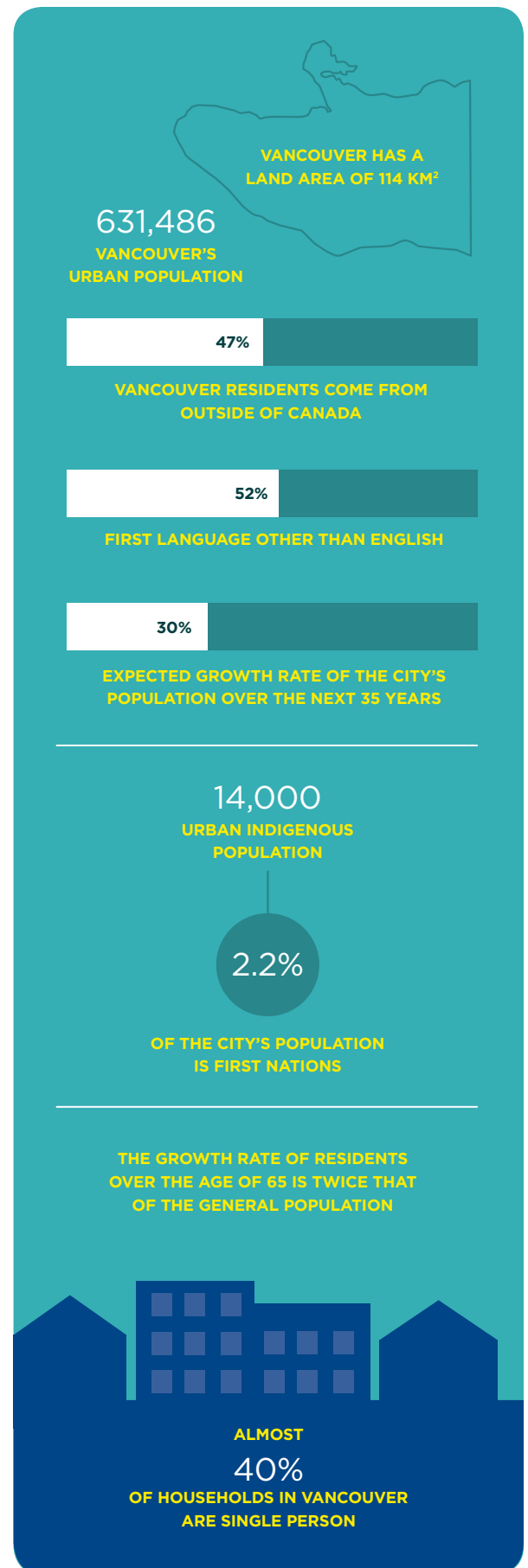
Vancouver is home to a diverse population, attracting new residents from around the world. Almost half (47%) of Vancouver residents come from outside of Canada and more than half (52%) have a first language other than English. Today, cultural diversity is recognized as a great strength, and through initiatives like the Vancouver Immigration Partnership, the City is working with partners to support newcomers. Over the next 35 years the city's population is expected to grow by 30%, leaving the City of Vancouver to manage a large and diverse population.

In Vancouver there is a dark history of racism, intolerance and persecution that has not been widely recognized. That history is inherent to the way many institutions and systems have been created. In April 2018, Mayor Gregor Robertson took an important step forward by issuing a formal apology to residents of Chinese descent and acknowledging discrimination and wrong-doings of past legislation, regulations and the policies of previous City Councils.

Vancouver remains the unceded homelands of the Musqueam, Squamish and Tsleil-Waututh Nations, and by recent estimates has an urban Indigenous population 14,000 persons, including people from many First Nations across the country. First Nations account for 2.2% of the city's population.

Like many cities in North America and Europe, Vancouver has an aging population; in fact the growth rate of residents over the age of 65 is twice that of the general population. In the next 25 years, Vancouver's young population (under 45 years) is expected to decrease while the older population (over 45 years) will increase significantly, with the greatest increase in those over the age of 75. In general, neighbourhoods in the south and west have older populations than those in the downtown core and in the Mount Pleasant and Riley Park neighbourhoods.

Almost 40% of households in Vancouver are single person, and that trend continues upward, which means that more people are living alone than ever before. There's also been a decrease in the number of families in Vancouver and an increase in Metro Vancouver. Data on households and migration show a high turnover rate for our residents, with a significant amount of transience with renters.





Fewer children and adolescents will add pressure for local schools to stay open and high quality services to continue for our youth. For our older populations, an increase in age-related disability and social isolation will create demand for greater support systems. In order to improve Vancouver's resilience, the City must plan for its aging population. Resiliency will be of great consideration as the City of Vancouver launches an Age-Friendly Planning Process to better understand, prepare and address these challenges.

In 2017, Vancouver Foundation conducted a survey to evaluate community connections compared to five years ago. According to the survey results, residents are less active in community life today compared to five years ago, and participation in almost every community related activity has dropped. However, people would like to be engaged in community activity and still prefer connecting in-person. Social cohesion and loneliness weakens the resilience of our communities day-to-day, but especially in times of disaster.

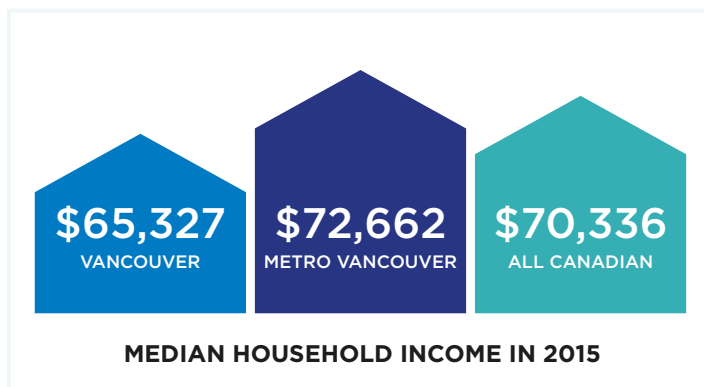
### Housing, Income and Affordability

The increasing cost of living and its cascading effects on affordability are impacting residents and businesses alike. The gap between housing costs and wages is reflected in the growing disparity between the wealthiest residents and the poorest. Despite a low unemployment rate and a highly educated population, a 2014 study revealed that 44% of Vancouver residents were not making a living wage.

In 2015, the median income for single person households was \$38,449. Given that almost 40% of households in Vancouver are single person, this is of great concern, especially given the housing affordability crisis. In fact, single person households earned \$50,000 less than two-person or more households in 2015, suggesting that the higher proportion of single person households could be the cause for Vancouver's lower median household income, compared to the region.

According to the low-income measure after tax (LIM-AT) used by Statistics Canada in the National Housing Survey, 19% of Vancouver's population were considered low-income in 2015. The minimum wage, as set by the Province, is \$10.85 per hour, whereas Metro Vancouver's living wage is nearly twice that at \$20.64 per hour.

The greatest concentration of low-income resident is found in the Downtown Eastside, with an astonishing 70% of residents below the low-income tax measure. One in five people in Vancouver live in families below the low-income tax measure; this rate remains steady, and is one of the highest amongst Canadian cities.



Although affordability and economic conditions are not exclusively within the control of the City of Vancouver, our City Council has taken important steps to prioritize affordability. Vancouver is in the midst of an affordable housing crisis and the City of Vancouver is taking leadership to reverse this trend. In late 2017 a new Housing Vancouver strategy was passed, and in June 2018, Vancouver City Council approved the creation of a \$2 billion Vancouver Affordable Housing Endowment Fund. This fund's mandate is to preserve and grow affordable housing by focusing on the delivery of the Housing Vancouver targets: 72,000 new homes over the next ten years, with an emphasis on 12,000 social, supportive and co-operative housing for lower and middle income households.

The City of Vancouver is also the first city in North America to institute an Empty Homes Tax to return empty or under-utilized properties to the long-term rental market. The tax will generate an estimated \$30 million in revenue in its first year.

To further address the shortage of long-term rental homes, the City introduced short-term rental regulations in 2018. Within the first six weeks of the regulations being enacted, over 1100 licenses were issued and 400 listings either converted to long-term rental units or delisted.

With funding from the Provincial government as part of their \$66 million commitment to build temporary modular housing in Vancouver, the City has enabled the construction of 500 units on eight sites. This housing provides safe and stable homes for individuals facing homelessness.

Cooling the market slowly and purposefully is essential to ensuring Vancouver remains the vibrant, diverse and resilient city it is today. A shock, such as a sharp decline in real estate values would have devastating and widespread implications on Vancouver's population and economy as a whole.



Port Metro Vancouver, Canada's largest and most diversified port, supports more than \$172 billion in trade with over 160 different trading economies annually.

Vancouver's low incomes, exacerbated by the housing crisis have resulted in 2,181 homeless residents living on the streets and depending on shelters and support services, according to the 2018 annual homeless count. This was an increase of 2% from the previous year, despite Vancouver's steps to address homelessness. Investments in interventions to support people living in poverty, and suffering from mental health challenges, addictions, and other factors contributing to homelessness are desperately needed. Non-profits and government services offer significant support services, yet it's difficult to measure just how effective they are, and to understand how many people are not on the street because of them.

## **Economy**

Vancouver is also Canada's fastest growing economy. Home to Canada's busiest port, Vancouver is Canada's Asia-Pacific gateway, and plays a critical role in the broader Canadian economy. With the introduction of the Greenest City Action Plan and the creation of the Vancouver Economic Commission (VEC), the City of Vancouver made a concerted effort to work with the private sector to foster a successful and growing green and clean economy. Still, a majority of Vancouver's wealth is tied to real estate and development, and continued diversification must be a priority to reduce exposure.

Hosting major events, such as Expo '86 and the 2010 Olympics, brought Vancouver to the world's stage and attracted international attention and investments. Today, Vancouver's economy hosts burgeoning tech and creative sectors, and is the number one start-up environment in

Canada. Real estate remains a key driver, accounting for huge growth in the construction industry.

As Vancouver continues to grow, so does increasing pressure on land-use, due to geographic constraints. This year the City will launch a City Core Planning process, which will include a comprehensive vision for Vancouver's urban core. This planning process is a chance to facilitate, shape, and preserve flexibility for future generations to have economic opportunities.

## **Green Economy**

Vancouver is recognized as a global leader in the green economy; in 2015, the City's "green brand" was valued at \$31 billion. Today, one in 15 residents work in the green economy. A leader in green buildings, Vancouver has also demonstrated that a green economy can grow GDP. In the past 25 years, Vancouver's population has increased by 34%, with jobs increasing by 30%. Over the same time, Vancouver's carbon emissions saw a net reduction of 7% and are expected to keep falling, showing that the city can continue to grow and be economically strong while removing the burden of carbon pollution.

## **Port of Vancouver**

Port Metro Vancouver, Canada's largest and most diversified port, supports more than \$172 billion in trade with over 160 different trading economies annually. Port activities generate \$9.7 billion in GDP and \$20.3 billion in economic output. Vancouver is also the headquarters of British Columbia's forest product and mining companies.





### **Creative and Tech Sectors**

As a supportive city to launch a start-up Vancouver is attracting many tech businesses, from video games to biotechnology. Over 42,000 direct and indirect jobs are generated by film and TV production in British Columbia, with more than 80% located in Metro Vancouver. Vancouver's creative sector boasts the highest number of artists per capita in Canada. The creative sector is supported and encouraged through the City's Creative City Strategy.

### **Tourism**

Vancouver's scenic location makes it a major tourist destination. Annually, tourism contributes approximately \$4.8 billion to the Metro Vancouver economy and supports over 70,000 jobs. Over 10.3 million people visited Vancouver in 2017– the highest overnight visitation in the city's history.

### **Small Business**

Small businesses make up 95% of businesses in Vancouver. An increasing number of small businesses are run by women (37%) and many launched by immigrants, bringing new ideas and cultural ventures to our city. However, small businesses are under enormous pressure from decreasing affordability of rental space and the high cost of living for employees. In Vancouver, many businesses have had to contend with rent increases of 30% to 100% and have been forced to move location or close permanently.

### **Academic Institutions**

There are five public universities in the Metro Vancouver area with the University of British Columbia and Simon Fraser University consistently ranked in the best universities in the world. Not only do these institutions contribute to the economy, but they attract national and international talent who stay to give back to Vancouver's economy after completing their education.

Vancouver is one of the most highly educated cities in Canada: 73% of the population aged 25-64 has a post-secondary credential. Nearly half of our residents have a post-secondary education from an institution outside British Columbia, and nearly a third has an international credential. The Vancouver School Board enrolls more than 110,000 students in its elementary, secondary, and post-secondary institutions, making it the second-largest school district in the province.

Despite high levels of education, there are inequities in access to education and workforce opportunities. This disparity of education, and in turn labour, exacerbates the gap between wealth and poverty, increasing tensions between socio-economic groups.

Current education models and traditional post-secondary education may not meet emerging economic, technological and labour trends. There is an opportunity to leverage Vancouver's strong education systems to explore new models for adult education and workforce training.



## Planning and Development

Vancouver has 22 historic neighbourhoods, each with varying and diverse needs. Understanding and meeting these needs is huge challenge. Planning for social and physical infrastructure requires not just knowing the physical boundaries of the neighbourhoods, but understanding the people who live there.

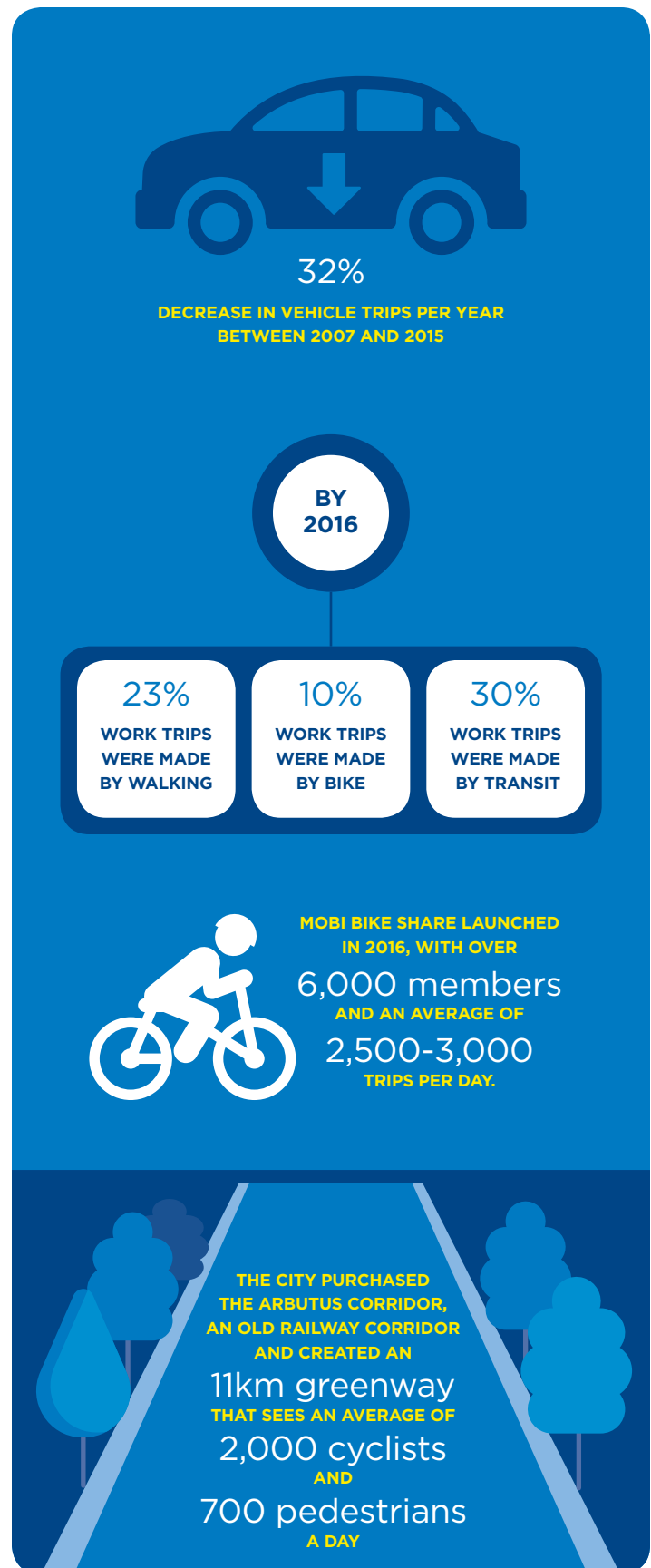
Vancouver was originally developed around streetcar lines, which have now become the main thoroughfares and commercial shopping areas. Being a port city, most industrial lands were found close to the water. Many of these areas are now zoned commercial, residential or created into public spaces, such as parks. Because industrial land is now limited the City has created policy to protect it.

Although Vancouver is one of the most densely populated cities in North America, the majority is zoned for single family housing. The city has several community plans that are clear but flexible frameworks to guide positive change and development in neighbourhoods over a period of approximately 20 – 30 years. They are developed and amended through collaboration with stakeholders and the community and by assessing infrastructure, housing and commercial needs for the future. Responding to the need for affordable housing, the City is developing new community plans, such as the Cambie Corridor master plan to create row homes for families, midrise rental buildings and social and supportive housing.

Transportation and mobility has been a key driver of city planning and regional development. Over the past two decades, the City of Vancouver has made significant strides in transitioning to environmentally friendly transportation: walking, cycling, public transit and, car and bike share programs.

### The City's Transportation 2040 Plan has resulted in major achievements including:

- 32% decrease in vehicle trips per year between 2007 and 2015
- By 2016, 23% of work trips were made by walking, 10% were made by bike and 30% by transit.
- Mobi Bike Share launched in 2016, with over 6,000 members and an average of 2,500-3,000 trips per day.
- The City purchased the Arbutus Corridor, an old railway corridor and created an 11km greenway that sees an average of 2,000 cyclists and 700 pedestrians a day.





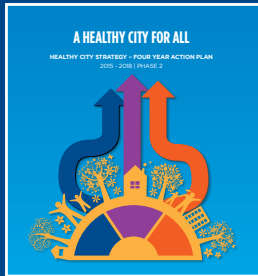
Plan <sup>76</sup>	About
<b>City Core 2050</b>	Council have directed staff to develop a comprehensive vision for the future of the City Core – a collection of neighbourhoods bounded by Arbutus, Clark, 16th Ave, and the Burrard Inlet. The City Core area is home to a third of the city's residents, two thirds of its jobs, and critically important social, cultural and heritage amenities, public space, and urban infrastructure. It's an area that is also a key area of focus for work on reconciliation, resilience, and sustainability.
<b>North East False Creek (NEFC)</b>	Approved in late 2017, NEFC is the largest undeveloped site in Vancouver. Constructed on fill and exposed to sea level rise and liquefaction, the site has been designed to include an innovative resilient road to support transportation between the downtown core and the east side of the city.
<b>False Creek Flats and St Paul's Hospital</b>	Bordering NEFC, the Flats is an industrial area with significant critical infrastructure, including the proposed site of a new major hospital. The Flats is being planned as a major employment hub for the city. Sitting on fill, it is vulnerable to sea level rise and liquefaction, and is an opportunity to innovate around Critical Infrastructure resilience.
<b>Broadway Corridor</b>	Outlined in the Transportation 2040 plan, implementing transit on the broadway corridor is a significant step to relieve congestion and enhance mobility along this busy commercial area.
<b>East Fraserlands</b>	On the south side of the city, this plan calls for a mainly residential community with a variety of housing types and a commercial centre. Flood and seismic resilience will be a key requirement in this area.
<b>Britannia Renewal</b>	Renewal of the Britannia Community Centre is an opportunity to apply resilience principles to city infrastructure. Britannia is a partner in the Resilient Neighbourhood Pilot Project.
<b>Joyce Collingwood Station Precinct</b>	Near to Collingwood Neighbourhood House, density in this neighbourhood brings new challenges and opportunities for resilience.

# GUIDING STRATEGIC PLANS

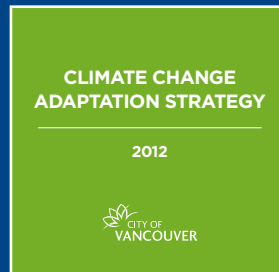
City staff and policy are guided by a number of major strategies.



FOOD STRATEGY



HEALTHY CITY  
STRATEGY



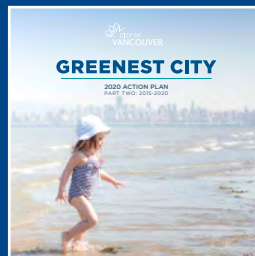
CLIMATE CHANGE  
ADAPTATION STRATEGY



TRANSPORTATION  
2040



EARTHQUAKE  
PREPAREDNESS STRATEGY



GREENEST CITY  
ACTION PLAN



HOUSING VANCOUVER  
STRATEGY



RENEWABLE CITY  
STRATEGY



RECONCILIATION  
FRAMEWORK



CAPITAL STRATEGIC  
OUTLOOK



# REGIONAL, PROVINCIAL AND FEDERAL GOVERNMENTS

## Metro Vancouver

The City of Vancouver is part of a federation of 21 municipalities, one Electoral Area and one Treaty First Nation that makes up the Metro Vancouver Region. The Metro region is governed by a Board of Directors of elected officials from each local authority.

Metro Vancouver collaboratively plans for and delivers regional-scale services. Its core services are drinking water, wastewater treatment and solid waste management. Metro Vancouver also regulates air quality, plans for urban growth, manages a regional parks system and provides affordable housing. Metro Vancouver primarily raises its funds through contributions by member municipalities.

The City of Vancouver only encompasses 4% of the Metro region land area, but accounts for a quarter of the population. Vancouver's role as the core city of the region gives it a disproportionate share of jobs, a more sustainable model of urban life and an uneven percentage of apartments and rental housing. Many people who work in Vancouver commute from other regions. Vancouver houses a relatively small, and declining share of Metro Vancouver's overall population, but it houses a much larger share of socio-economically diverse communities who access social housing and support services.

## Provincial Government

The Province of British Columbia is responsible for areas listed in the Constitution Act, 1867, such as education, health care, some natural resources, and road regulations.

In Vancouver, the Province funds the Vancouver School Board and the Vancouver Coastal Health. BC Hydro is a crown corporation of the Provincial government, providing energy for the province.

## Federal Government

The Federal Government (Canada) deals with areas of law listed in the Constitution Act, 1867 and that generally affect the whole country. The federal level of government has powers that are different from those of provincial governments, including:

- national defence
- foreign affairs
- employment insurance
- banking
- federal taxes
- the post office
- fisheries
- shipping, railways, telephones and pipelines
- Indigenous lands and rights
- criminal law

## First Nations

Across the country band councils govern First Nations communities. These elected councils make decisions that affect their local communities. First Nations negotiate on a Nation-to-Nation basis with the Federal Government. In Vancouver, City Council meets directly with the Councils of the Musqueam, Squamish and Tsleil-Waututh Nation in Council-to-Council meetings to discuss issues of importance and advance the Framework for Reconciliation.

# CITY BUDGET

The City of Vancouver creates an annual budget based on the development of departmental services plans for each City Department. In 2018, City Council approved a \$423 million capital budget, and a \$1,407 million operating budget, focused on 4 key priorities:

- Address housing supply, affordability and critical social issues
- Improve service and maintain and upgrade streets, utilities and facilities
- Continue to build vibrant communities
- Increase investments in public safety

The services the City of Vancouver provides are primarily funded from property taxes, user fees, utility fees, development contributions and contributions from senior governments, non-profit organizations, foundations and philanthropists. Property taxes, collected from homeowners and businesses create 56% of the City's budgeted operating revenues.

The City's payment methods include pay-in advance funding from capital reserves, pay-as-you-go funding from current revenues and user fees, and debt financing that is repaid over time.

Over the past several years, Vancouver has funded a number of programs and initiatives that fall within the jurisdiction of the provincial and federal government. Today, closer alignment around environmental and social values have led to significant commitments from senior levels of government in areas including housing, poverty reduction, infrastructure, transportation, climate adaptation and disaster mitigation. The City of Vancouver has an opportunity to leverage these opportunities.

Vancouver is a growing city, with significant demand for enhanced community amenities and social infrastructure. The City also faces significant threats from climate change and earthquakes, relative to its size and tax-base. Transforming city infrastructure to accommodate densification while also building resilience to these hazards will be costly and the City looks to partner with the Federal and Provincial Governments to address these challenges.

The City has a strong credit rating today, but it's unclear how a sudden shock or economic downturn could impact the city's capacity to finance operations and maintain infrastructure. We know that Disaster Financial Assistance is insufficient for the billions of dollars of uninsured

infrastructure at risk from earthquakes and flooding in the Lower Mainland. As new insurance and funding models become available, the City is interested in exploring options to transfer risk and guarantee the ongoing function of infrastructure and services.

## LIVING WITH RISK – NATURAL HAZARDS

Vancouver is a dense city exposed to many natural and manmade hazards. Many of the features that enable us to thrive and provide a beautiful natural landscape, also contribute to the risk of natural hazards, including earthquakes, landslides, sea level rise, flooding and liquefaction. For example, the mountains that our residents and visitors enjoy skiing are the result of geological fault lines – the same fault lines that result in earthquake risk. Meanwhile, as a Port City, a wide range of hazardous materials are transported through our waterways and transportation networks every day, and while Vancouverites benefit from the jobs generated through industry, we are also exposed to significant health risks.

The Integrated Partnership for Regional Emergency Management (IPREM), the Province of British Columbia, and Natural Resources Canada have completed Hazard Risk and Vulnerability Assessments. The City of Vancouver relies on these assessments to develop emergency plans to prepare for local risks and hazards.

### Earthquakes

Recent research estimates a 40% chance Vancouver will experience a magnitude 6.8 or greater earthquake in the next 30 years. An earthquake this size would be devastating, and while it's impossible to know precisely when this type of event will strike – we do know it's happened before, and it will happen again.

Despite widespread knowledge that earthquakes occur in the Pacific Northwest, many people are personally unprepared for the reality. Work has been done in recent years to better understand and address earthquake risk, yet there is no comprehensive program in British Columbia to evaluate and mitigate risk to buildings and residents.

As experienced by many cities facing catastrophic risk, motivating and incentivizing people, organizations, and businesses to plan and invest in disaster risk reduction is a major challenge. As earthquake science evolves, we have an opportunity to use this expertise and data to plan for earthquake resilient communities, and to reduce social, economic, and physical risk.



1. Cascadia Subduction Zone ("megathrust") earthquake - M9
2. Georgia Strait: shallow crustal earthquake - M 7.3
3. Deep, intraslab earthquake - M 6.8

### Resilience Actions and Opportunities

In 2013, the City of Vancouver released an Earthquake Preparedness Strategy, identifying 50 + actions to decrease exposure to earthquakes. Since then, the City has trained hundreds of citizen members of the Vancouver Volunteer Corps to help with emergency response at the community level. The City has delivered hundreds of earthquake preparedness workshops to residents and businesses, and has invested in seismic work to upgrade bridges and other critical infrastructure. This work also included identifying disaster staging areas and disaster support hubs, creating a Dedicated Fire Protection System (DFPS) to ensure Vancouver Fire and Rescue Services can respond and a Heavy Urban Search and Rescue team.

Although this work has represented significant improvements in earthquake mitigation and safety, a robust modelling of seismic hazard, social vulnerability and infrastructure interdependencies is needed to prioritize efforts around critical infrastructure and buildings.

### Marine Oil Spills

Metro Vancouver region is home to Canada's busiest marine shipping port, and while the Port of Vancouver has a strong record of safety, an increase in vessel traffic, combined with a growing population increases both the likelihood and the consequences of an oil spill. An oil spill that impacts any of the Metro Vancouver municipalities puts the health and safety of the public, the environment, and the economy at risk.

Any oil spill that enters Burrard Inlet could spread widely throughout the inlet and impact one or more municipalities, along with the First Nations within whose lands are located. Land-based oil spills may be more localized, depending upon the type and location, however

those which enter the Fraser River or Burrard Inlet may spread and travel quickly.

An oil spill could be disastrous for Vancouver, threatening the tourism sectors and destroying sensitive coastal ecosystems, as well as recreational and cultural assets<sup>84</sup>. Even in the best case scenarios, most oil is never recovered. Spill response focuses largely on the technical process of cleaning up oil on water, and there is currently no process in place to comprehensively assess the cascading impacts. Current legislation puts significant power in the hands of the polluter, and available funding is not sufficient to cover the costs of spills to communities. Spill response regulations contribute to a deep mistrust between industry and communities, leading to challenges in advancing collaborative planning processes.



### Resilience Actions and Opportunities

Following the 2015 Marathassa Oil Spill in English Bay and faced with multiple proposals for the expansion of shipping and transportation of oil and hazardous substances through the Lower Mainland and coastal waters, a group of local First Nations, municipalities, health authorities, and expert stakeholders, came together to develop a proposal for a Regional Community Advisory Council (RCAC). The proposal has been refined with input from senior governments, but has yet to secure funding.

The vision of the RCAC is *"to provide local communities a meaningful role in mitigation, prevention, preparedness, response and recovery from oil and hazardous materials storage, transportation, refining, and related activities in our region."*



## Hazardous Materials Incidents

As a terminus city for rail and transport from across Canada, Vancouver is vulnerable to a wide range of hazardous materials incidents.

In 2015, a 20 foot container carrying a Trichloroisocyanuric acid ignited at the Port of Vancouver. The incident prompted evacuation of nearby neighbourhoods and the issuance of a Shelter-in-Place order for the east side of Vancouver, requiring residents to take cover indoors. The incident tested the response plans of the City of Vancouver, the Port of Vancouver, and the Vancouver Health Authority, as well as engaged federal, provincial and regional agencies. Given the location of the incident, and the density of the impacted population, a mass evacuation was not a viable option. The incident exposed a number of vulnerabilities and complexities related to cross-jurisdictional responses, communication and notification, and the provision of care for homeless and vulnerable residents.

## Public Health Emergencies – Opioid Crisis

Vancouver is at the forefront of the Opioid Crisis, an ongoing epidemic resulting in thousands of deaths. Vancouver's leaders in harm reduction are working together with the Province of British Columbia to address this crisis, identifying ways to reduce overdoses.

In 2016, the BC Coroner reported 967 illicit drug overdose deaths, an 87% increase from the previous year. This drastic increase prompted the Chief Medical Health Officer to declare a Public Health Emergency. In 2017, that number increased again to 1,422, the highest number of deaths ever recorded. A severely contaminated illicit drug supply in Vancouver has put the city at the epicentre of this crisis and roughly half of those deaths occurred in Vancouver's Downtown Eastside<sup>1</sup>.

Despite Vancouver's reputation as a leader in Canadian harm reduction and addictions programs, such as safe injection sites, the stigma around mental health and addictions continues to affect Vancouver's opioid crisis and addiction recovery.

Vancouver continues to see high rates of poverty, mental health challenges and addictions. While fatalities are the most visible symptom of this crisis, many drug users also struggle to live on insufficient income assistance, and experience barriers to employment. With 28% of Vancouver's population considered low-income, using the low-income measure after tax (LIM-AT), it means that one in five residents experience poverty.



## Resilience Actions and Opportunities

Vancouver City Council approved \$3.5 million for the Opioid Crisis in 2017 and strategically invested in the 2018 budget initiatives to mitigate the effects of the crisis. These investments include:

- a new three-person medic unit in the Downtown Eastside and a mental health coordinator to support firefighters.
- a new Community Policing Centre (CPC) in Strathcona and inflationary budget increases for CPCs across the city.
- 23 high-impact community overdose response grants

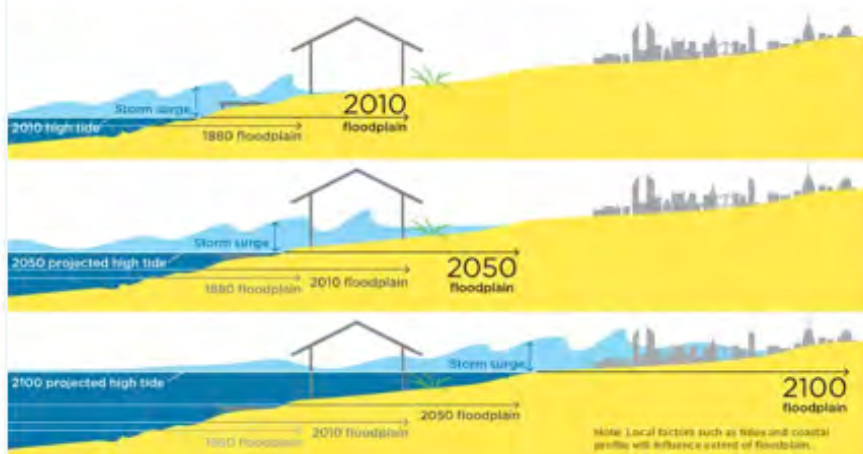
The City has also partnered with the Canadian Mental Health Association to develop a first responder Resilient Minds training program to provide education to firefighters dealing with the opioid health crisis.

The opioid crisis has also placed a major stress on Vancouver's first responders and their ability to provide service to our city. The number of service calls received by Vancouver Fire and Rescue Services and the BC Ambulance Service increased dramatically, by 60% between 2015 and 2016.

## Resilience Actions and Opportunities

In 2014, the City commissioned a Coastal Flood Risk Assessment (CFRA) to better understand flood risk, and to develop preliminary adaptation options. In order to develop strategies for flood prone areas, the CFRA assessed the effects of projected sea level rise with specific case studies. The City has also implemented a number of other initiatives to better prepare for sea level rise: the BC Storm Surge Forecasting Program, updating building bylaws to incorporate floodplain standards, resilient design standards for coastline infrastructure projects, and comprehensive public engagement.

## Storm Surge and High Tides Magnify the Risks of Local Sea Level Rise



## Climate Change

In 2012, the City of Vancouver was the first major municipality in Canada to adopt a comprehensive Climate Adaptation Strategy. This strategy projected trends and shocks likely to occur from climate change. As a result of this strategy, significant work has been done to further understand the consequences of climate change and to enhance climate resilience.

The Pacific Climate Impact Consortium (PCICs) conducted an analysis of climate impacts for the City of Vancouver in 2016. The analysis showed a warming trend, with warmest summer days increasing by 3.9° Celsius and coldest winter nights increasing by 4.9° Celsius by 2050. Summers are expected to be dryer, winters to be wetter and extreme rainfall events to increase 39% by 2050, thereby increasing the risk of flooding. These changes in weather will amplify summer energy and water demands, impact ecosystems and decrease summer water supply due to smaller snowpack.

## Sea Level Rise and Coastal Flooding

Despite global efforts to slow climate change, the City of Vancouver is planning now for the coming impacts of sea level rise. As a coastal city, the metro Vancouver region is considered to be the most vulnerable urban area in Canada to sea level rise. Even today, low lying areas of the city flood regularly, and City infrastructure and private property are increasingly affected by king tides and storm surges.

An increase in sea level temperature by two degrees will put False Creek under water. At four degrees, climate scientists believe that the iconic Stanley Park would

become an island and the neighbourhoods of Mouth Pleasant and Fairview would be partially submerged. With 1 meter of sea level rise almost 13km<sup>2</sup> of city lands will be affected, the assessed value of land and buildings in this floodplain is estimated at \$7 billion.

## Water Quality, Insecurity, and Floods

Known for its temperate rainforest climate, Vancouver is not often associated with water insecurity. However, climate change and population growth put increased pressure on our water resources, and we need to act now to plan ahead for our city's future water supply.

In 2016, the Pacific Climate Impacts Consortium updated its modelling and projections to show what Vancouver could expect by 2050 with a changing climate. Their prediction is for warmer winters and a 58% decline in the snowpack, which charges our drinking water reservoirs. Models also project more intense rain storms in winter, which means managing more rainwater, and increased risk of flooding. Not to mention how an earthquake would put Vancouver's water supply at risk.

As rain patterns and intensities change, new demands will be placed on traditional water infrastructure. As with many older cities, Vancouver historically buried natural creek channels and used sewers that combine both sanitary and sewage waste. Today, approximately half of Vancouver's pipe systems are combined, meaning rainwater runoff from roofs and ground surfaces combines with sewage waste in the same pipe. During dry periods that combined water goes to the waste water treatment plant, but during heavy rain, combined sewage overflows in nearby receiving waters.

Through the Rain City Strategy, Vancouver is developing a green infrastructure plan as a means to address these upcoming climate challenges, but financing and developing local capacity to implement will require efforts across public and private sectors, as well as strong community education and engagement. There are three key imperatives for this new approach: resilience, water quality and livability.

### Resilience Actions and Opportunities

Since the 1980s, Vancouver has been working on a long-term plan to address sewer overflows by separating sewer and storm water pipes. However, even with a fully separated system, there would still be risk of water pollution in terms of contaminants picked up by rainwater run-off on our roofs, lands and road.

Vancouver is investing in the use of vegetation, soils and other engineered systems and practices to mimic natural processes to manage water and create resilient and healthier urban environments. The goal is ultimately cleaner, more resilient water management through the launch of the One Water initiative and green infrastructure programs. This a unique opportunity to build resilience to multiple hazards, such as building resilience into local water sources to ensure availability of water during an earthquake.

### Extreme Weather and Temperatures

Vancouver has already experienced a number of extreme weather events, such as intense heat, cold, periods of drought, and severe wind, snow and rain. These experiences demonstrate the detrimental effects of extreme weather conditions on our city, our residents and our buildings and infrastructure.

In late August 2015, a windstorm hit, bringing gusts in excess of 90 km/hr. While this was a significant storm by any standard, months of drought that year had weakened trees and root systems, exacerbating the consequences of the wind and leading to damage to the city's urban forest and significant power outages.

In the winter of 2016-17, an extended period of snow and cold weather caught residents unprepared. Unaccustomed to long period of snow, many residents were not prepared with shovels, rock salt or snow tires. In a city of year-round cyclists and transit-users, impacts to bike lanes and bus services were problematic. Icy sidewalks and roads impacted accessibility, transportation, and safety. The extreme cold prompted the City to open warming centres



for residents at risk. This extreme weather led to increased costs and required reprioritization of City resources. In July 2017, City Council approved an additional \$0.8 million operating investment and a \$4.3 million capital investment to improve the City's ability to respond to future snow events.

Responses like those described above have become more frequent and with greater consequences. They exhaust City staff and resources, put additional pressure on first responders, and disrupt systems and infrastructure residents rely on. As this type of weather becomes the "new normal", building resilience to extreme weather and temperatures will be important to save both costs and lives moving forward.

### Resilience Actions and Opportunities

As a result of extreme weather in December 2016, the City of Vancouver worked with partners and civic volunteers to utilize community centres as temporary warming centres for at risk residents, unable to access shelter during cold weather. This was a lifesaving intervention that facilitated more than 2000 visits over the course of that exceptionally cold winter, prompting the City to formalize this program. This action demonstrates an innovative, neighbourhood-based response to a crisis, and a compassionate and responsive citizenry.





The smoke from fires hundreds of kilometres away led to several multi-day Air Quality advisories in Vancouver.

### Regional Climate Shocks - From Floods to Fires

The spring of 2017 brought record flooding to communities across British Columbia. Evacuation centres were opened to host thousands of evacuees, and resources were deployed province wide to lay sandbags and help affected communities. Just as the flooding subsided, recovery efforts were thwarted by the most devastating wildfire season in recorded history.

More than 1.2 million hectares of forest burned as 1300 fires raged across the province during an unusually long fire season. Collectively, floods and fires led to the evacuation of more than 65,000 people province-wide, cost an estimated \$564 million in fire suppression, and contributed more than 190 million tonnes of greenhouse gases to the atmosphere.

While Vancouver did not experience severe flooding or wildfires, the smoke from fires hundreds of kilometres away led to several multi-day Air Quality advisories. Air Quality emergencies, like other disasters,

disproportionately impact people who are homeless or without access to safe indoor spaces, those living with poverty, children and elderly, and people who have pre-existing medical conditions.

As climate change continues, experts tell us that this will be the new normal, and adaptation to this type of event will be critical. Climate change will drive water shortages and drought, increasing the risk of fires in our region. Whether or not these events occur within the boundaries of the City of Vancouver, when the region is affected, so are we. Whether by deploying resources through mutual aid agreements, accepting and providing refuge for evacuees, or through the impact of smoke and pollutants entering our air and water – wildfires are a risk which significantly affects Vancouver. Not to mention impacts to the supply chain of critical resources from other parts of the province or through the Port of Vancouver, and economic impacts including tourism and agriculture and forestry.

House and Apartment Fires

Vancouver Fire and Rescue Services respond to hundreds of residential fire calls every year. While rarely catastrophic, house and apartment fires are a frequent event, and depending on the severity of the incident and people affected, can have broad consequences. On average, 20 to 30 of these result in the evacuation of people from their homes, and the activation of the City’s Emergency Social Services Team. From time-to-time, larger fires, generally in apartment buildings, trigger the activation of Group Lodging and Reception Centres. When these fires happen in low-income rental units, or other facilities housing vulnerable people, the response and recovery can be more complicated. Finding appropriate shelter for victims and supporting them to get back on their feet is challenging in an environment where rental vacancies are low and housing costs high.

Cyber Attacks

Cyber security is consistently identified as one of today’s top risks in all organizations across different sectors. Security breaches can have devastating impacts on the systems that support our city. As cyber criminals have become more sophisticated and attacks are much more prevalent, the potential for serious financial, operational and reputational damage of a cyber-attack is a critical risk that must be managed.

With over 75,000 technical professionals, Vancouver is emerging as one of the world’s premiere tech hubs, but with this rapid growth comes increased exposure to disruptive and potentially debilitating cyber-attacks. These attacks can vary in scale and consequence with significant attacks resulting in massive disruption,

potentially destroying digital infrastructure, and resulting in the release of sensitive data. Cyber criminals are capable of detecting and exploiting vulnerabilities in the many layers of a company’s network. Security innovations and resilience are critical in the face of increasingly sophisticated and large-scale cyber-attacks.

These attacks can occur at a localized level, impacting vulnerable citizens. In 2009, over 240,000 British Columbians reported being victims of internet bank fraud and countless others affected by malware, ransomware, and other disruptive computer viruses.<sup>3</sup> Technological literacy and education is becoming increasingly important to protect the vulnerable and keep information protected and data safe.

Resilience Actions and Opportunities

Recognizing the threat of cyber attacks and the fact that many emergency preparedness measures rely on a secure ICT infrastructure, the City of Vancouver has advanced the City’s technology security and resilience, with a focus on enhancing the City’s data centre redundancy, improving the City’s cyber security, and assessing the City’s mission-critical operational technologies.

The Government of Canada has also targeted this threat with a \$102 billion emergency fund to ensure the government remains functional following a severe crisis such as a cyber-attack which blocks access to international financial markets. This preventative effort is part of a larger ongoing movement, focused on organizational cyber-security and resilience.

# PRELIMINARY RESILIENCE ASSESSMENT