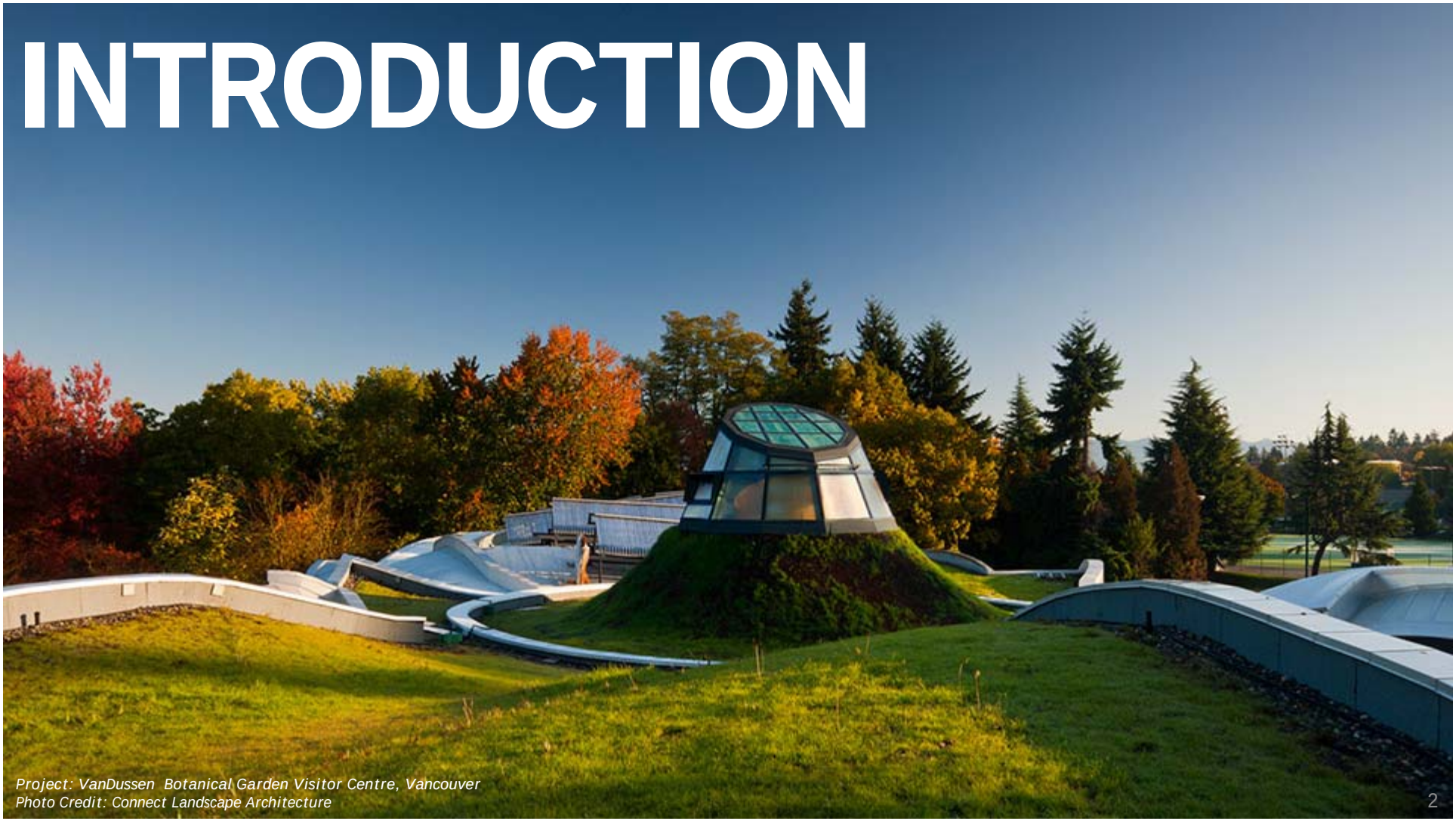
RAIN CITY STRATEGY

green infrastructure | sustainable urban rainwater management

Metro Vancouver RPAC-ENV – Feb 15, 2018

Photo Credit: Wendy de Hoog

INTRODUCTION



Project: VanDussen Botanical Garden Visitor Centre, Vancouver
Photo Credit: Connect Landscape Architecture

VANCOUVER IS A CITY SURROUNDED BY WATER

Image: Overview of Vancouver
Photo Credit: www.fiercebiotech.com 01/25/2017

THE WATER IS WHERE WE PLAY AND ENJOY NATURE...

Image: Hadden Park, Vancouver
Photo Credit: Wendy de Hoog

BUT A LOT OF THE NATURAL WATERSHEDS HAVE CHANGED...

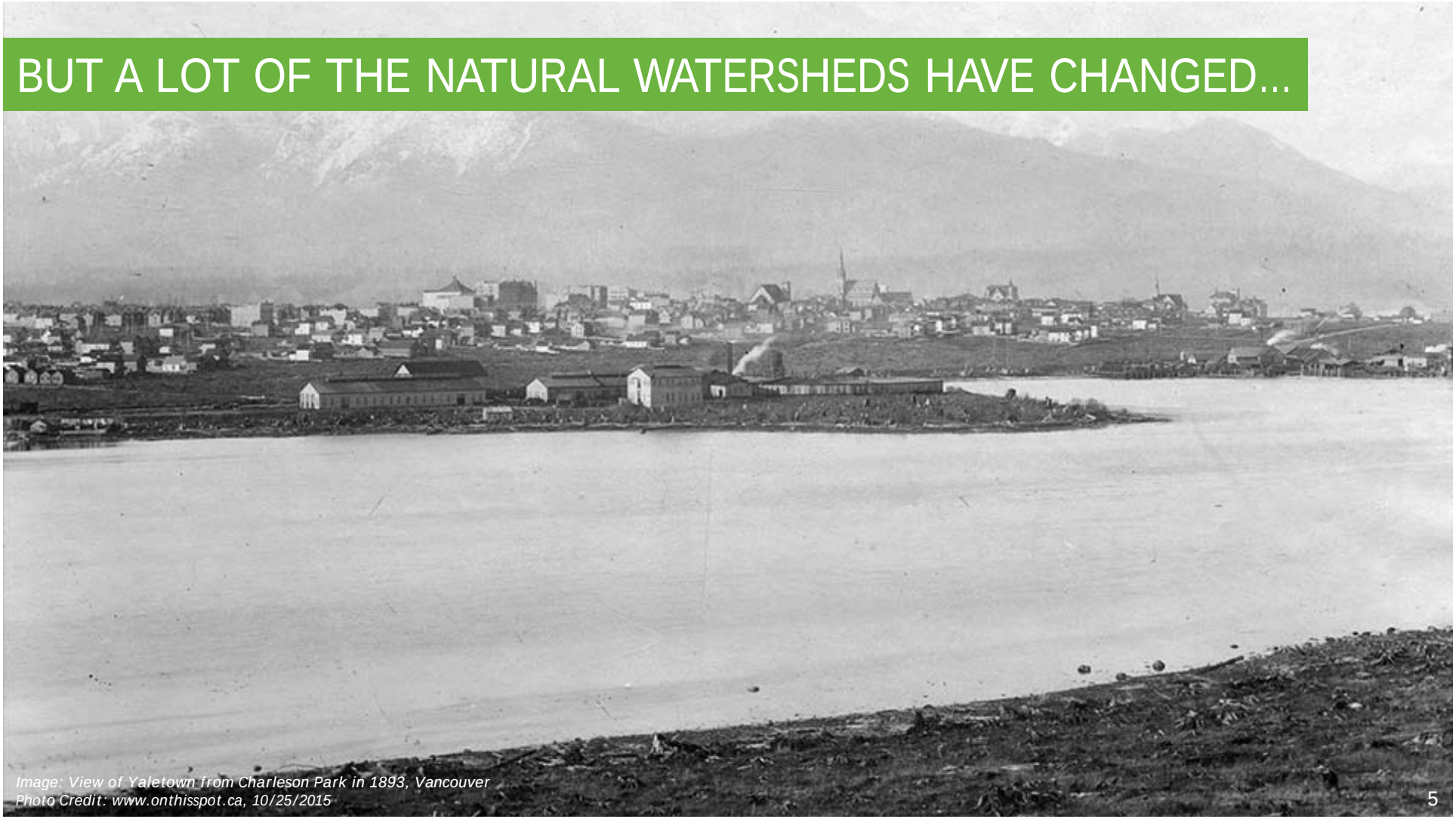


Image: View of Yaletown from Charleson Park in 1893, Vancouver
Photo Credit: www.onthisspot.ca, 10/25/2015

TO ALLOW RESIDENTS AND BUSINESSES TO PROSPER AND GROW

Image: View of Yaletown from Charleson Park in 2013, Vancouver
Photo Credit: Wendy de Hoog

HOT OFF THE PRESS... EVERY DAY, A NEW STORY

CBC news | Canada

Home | Opinion | World | Canada | Politics | Business | Health | Entertainment | Technology & Science | Video

Canada | Photo Galleries | Indigenous | Editor's Blog | CBC SecureDrop

'Where's that money going to come from': Insurers, government back away from disaster relief

Larger and more intense weather events estimated to cost federal government close to $1B annually

By Mark Gollom, CBC News Posted: Sep 10, 2017 5:00 AM ET | Last Updated: Sep 10, 2017 5:00 AM ET

Flooding across Alberta in 2013 cost roughly $5 billion in damages (Cameron MacIntosh/CBC)

CBC news | Politics

Home | Opinion | World | Canada | Politics | Business | Health | Entertainment | Technology & Science | Video

Politics | Power & Politics | CBC SecureDrop

ANALYSIS | 'We are not well prepared': An expert's view of climate change and the next big storm

The federal government has struck an expert panel to consider adaptation

By Aaron Wherry, CBC News Posted: Sep 03, 2017 5:00 AM ET | Last Updated: Sep 03, 2017 5:00 AM ET

A woman gets out of her car to check it in floodwater in Toronto back in 2013. (Frank Gunn/Canadian Press)

WEATHER August 30, 2017 10:39 am

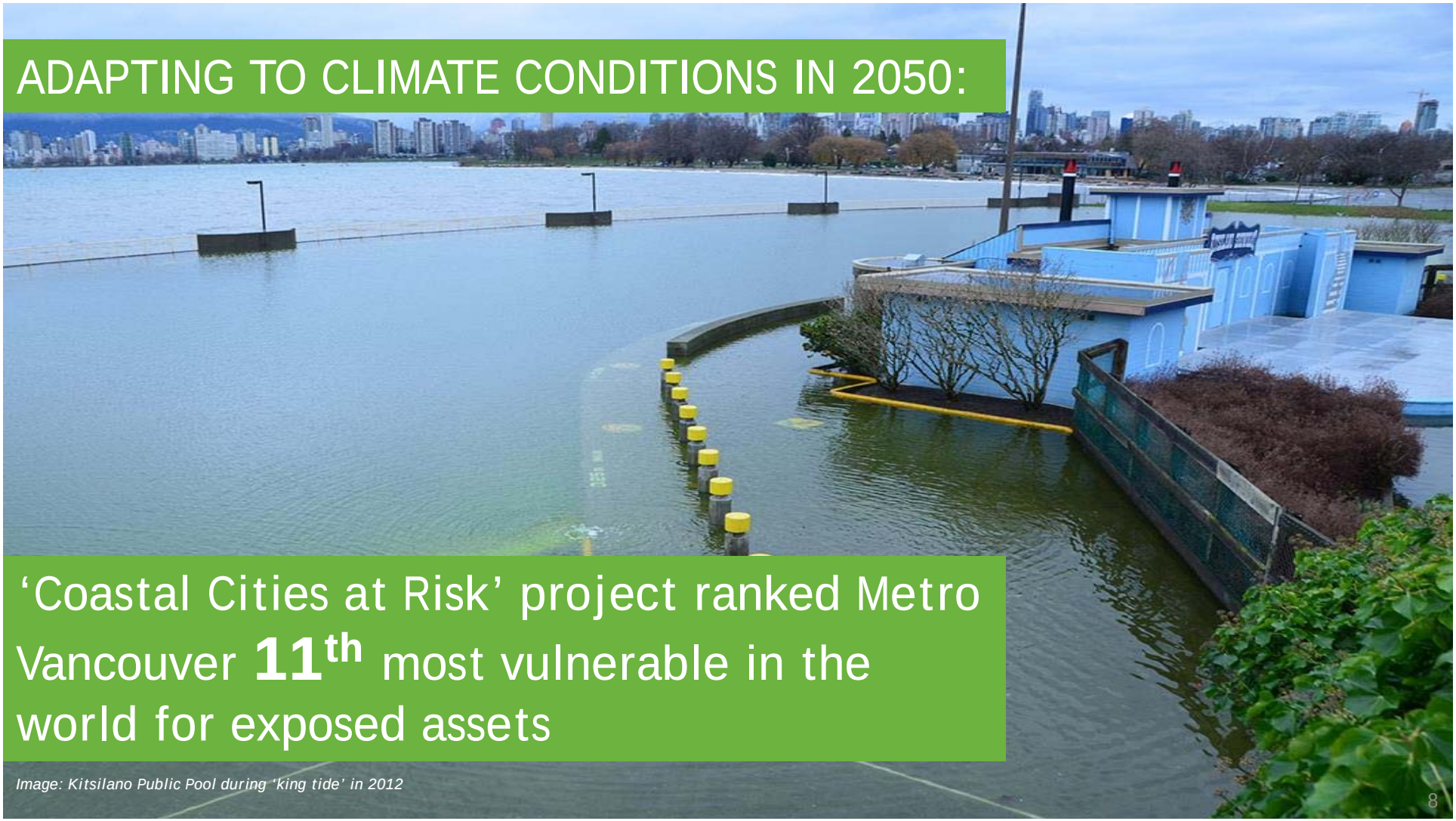
Vancouver breaks 50-year-old temperature record and hot weather will return for long weekend

By Amy Judd

Online News Producer Global News

Comments 7 | Facebook 1.8k | Twitter | Email | Print | ...

ADAPTING TO CLIMATE CONDITIONS IN 2050:



‘Coastal Cities at Risk’ project ranked Metro Vancouver **11th** most vulnerable in the world for exposed assets

Image: Kitsilano Public Pool during ‘king tide’ in 2012

MODELS PREDICT:
Decrease in snowpack in drinking watersheds

Image: Capilano lake, North Vancouver
Photo credit: Wendy de Hoog

WARMER WINTERS

58% decrease in snowpack

WHICH MEANS

increased risk of summer drought

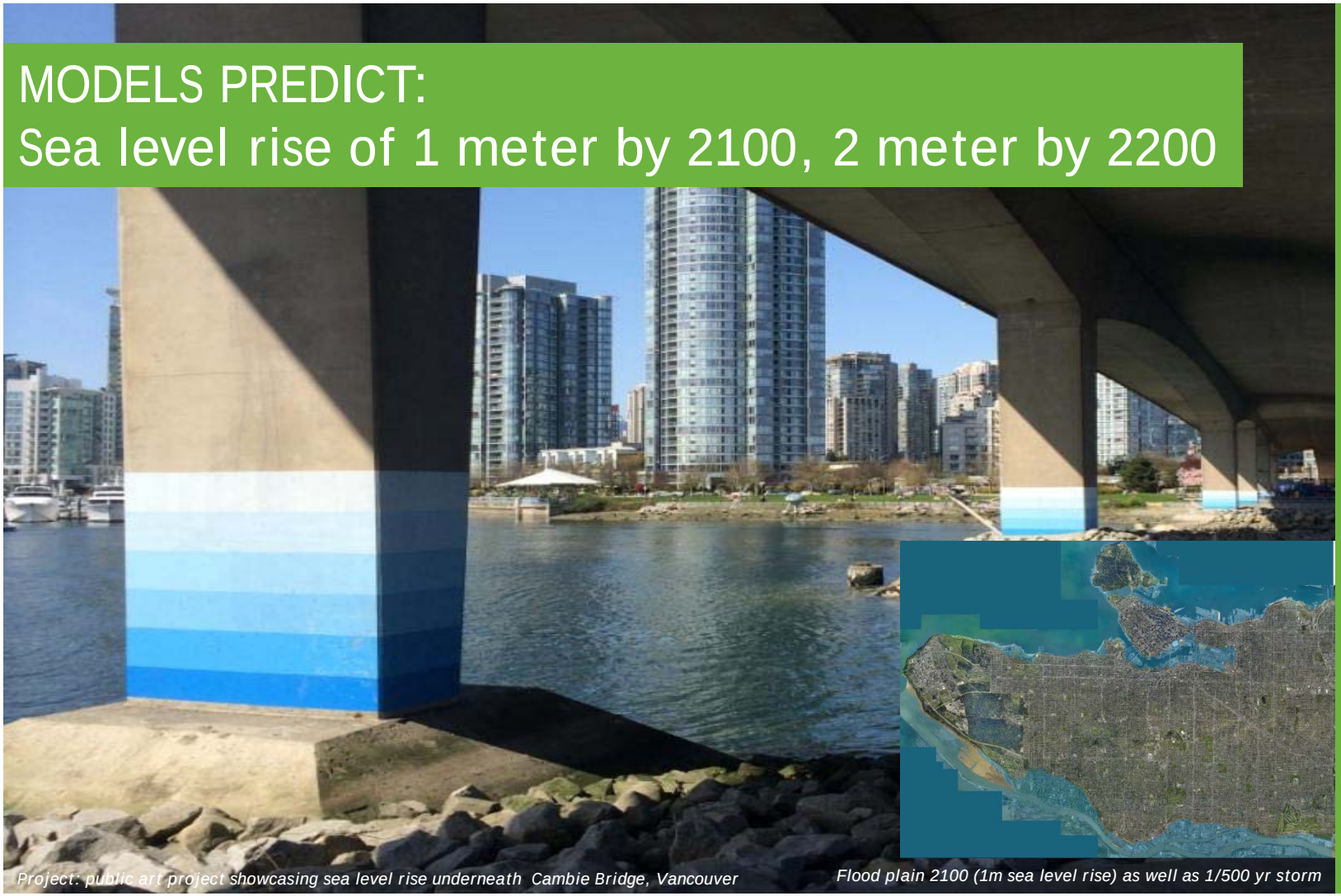
minimum temp goes up by 4.8°

29% reduction in home heating needs

increased risk of coastal flooding

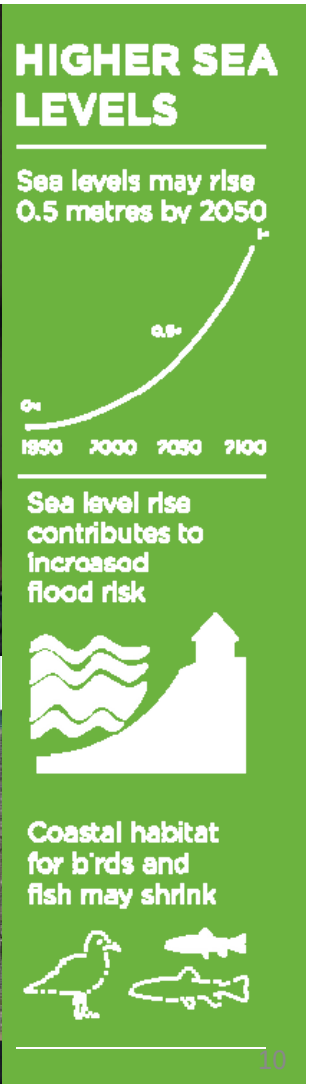
because of king tides and stormy weather

MODELS PREDICT:
Sea level rise of 1 meter by 2100, 2 meter by 2200



Project: public art project showcasing sea level rise underneath Cambie Bridge, Vancouver

Flood plain 2100 (1m sea level rise) as well as 1/500 yr storm



MODELS PREDICT:
More intense rain storms

Image: Flooding at Cambie St & W Broadway, Vancouver
Photo Credit: Alexandra Coulliard

WETTER AUTUMNS

heavy rain events 35% more intense

21% more rain on the wettest days

a higher flood risk

MODELS PREDICT: More extreme heat

Image: Heat stress

WARMER SPRINGS

15% longer growing season

72% decrease in frost days

snow melts earlier

20% increase in April showers

HOTTER SUMMERS

more frequent heat waves

hottest days even hotter

twice as many days above 25°C

increased health risks to vulnerable people

20% less rain

increased water restrictions

SPONGE CITIES

VANCOUVER'S VISION

Project: Mid Main Park Vancouver
Photo Credit: HAPA Collaborative

VISION, GOALS & TARGET

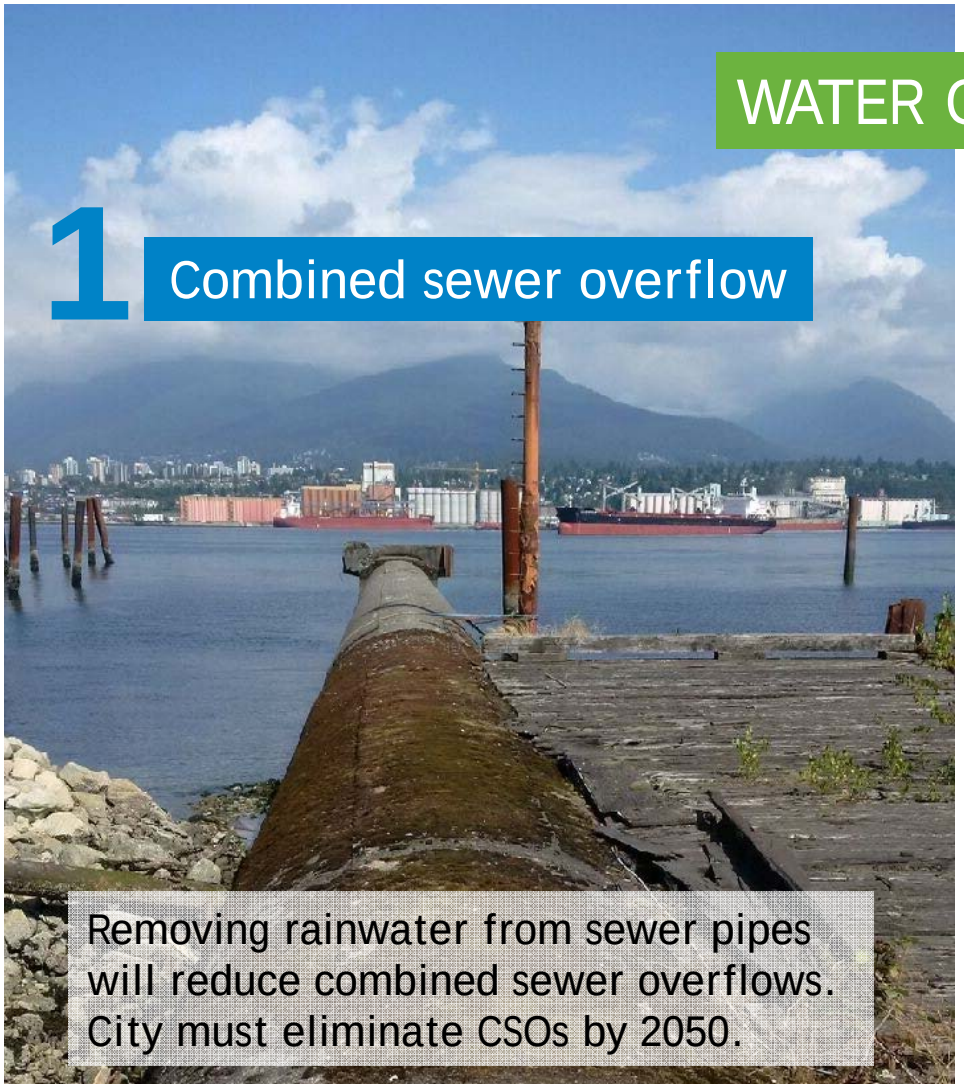
VISION

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

TARGET

Capture and clean 90% of Vancouver's rainfall on both public and private property

WATER QUALITY



1 Combined sewer overflow

Removing rainwater from sewer pipes will reduce combined sewer overflows. City must eliminate CSOs by 2050.

2 Urban stormwater pollution

Rainwater carries urban pollutants, such as gasoline, motor oil, heavy metals, sediments, litter, organics & fertilizer

GREY INFRASTRUCTURE

- Necessary but costly
- Less adaptable
- Single purpose
- Limited integration with other City priorities

GREEN INFRASTRUCTURE

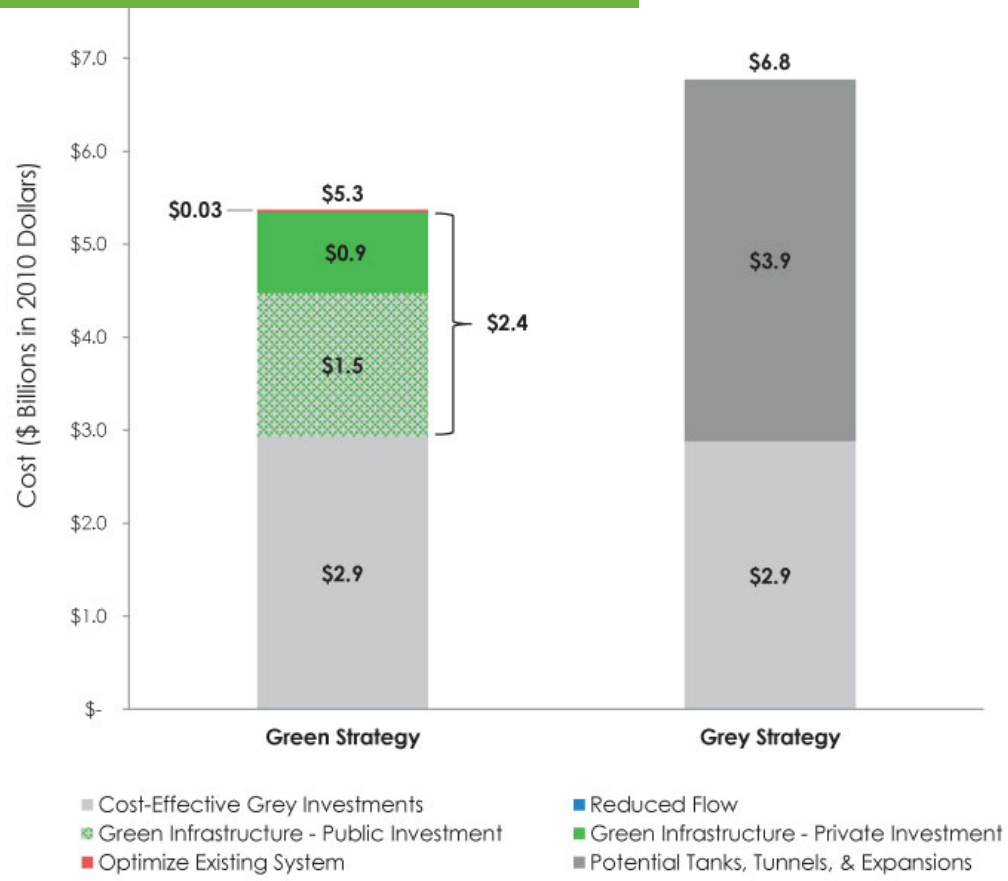
- Cost-effective
- Adaptable
- Multi purpose
- Leverages co-benefits for other City priorities

evapotranspiration

infiltration

harvest & reuse

COSTS: GREEN VS. GREY
(NEW YORK CITY EXAMPLE)

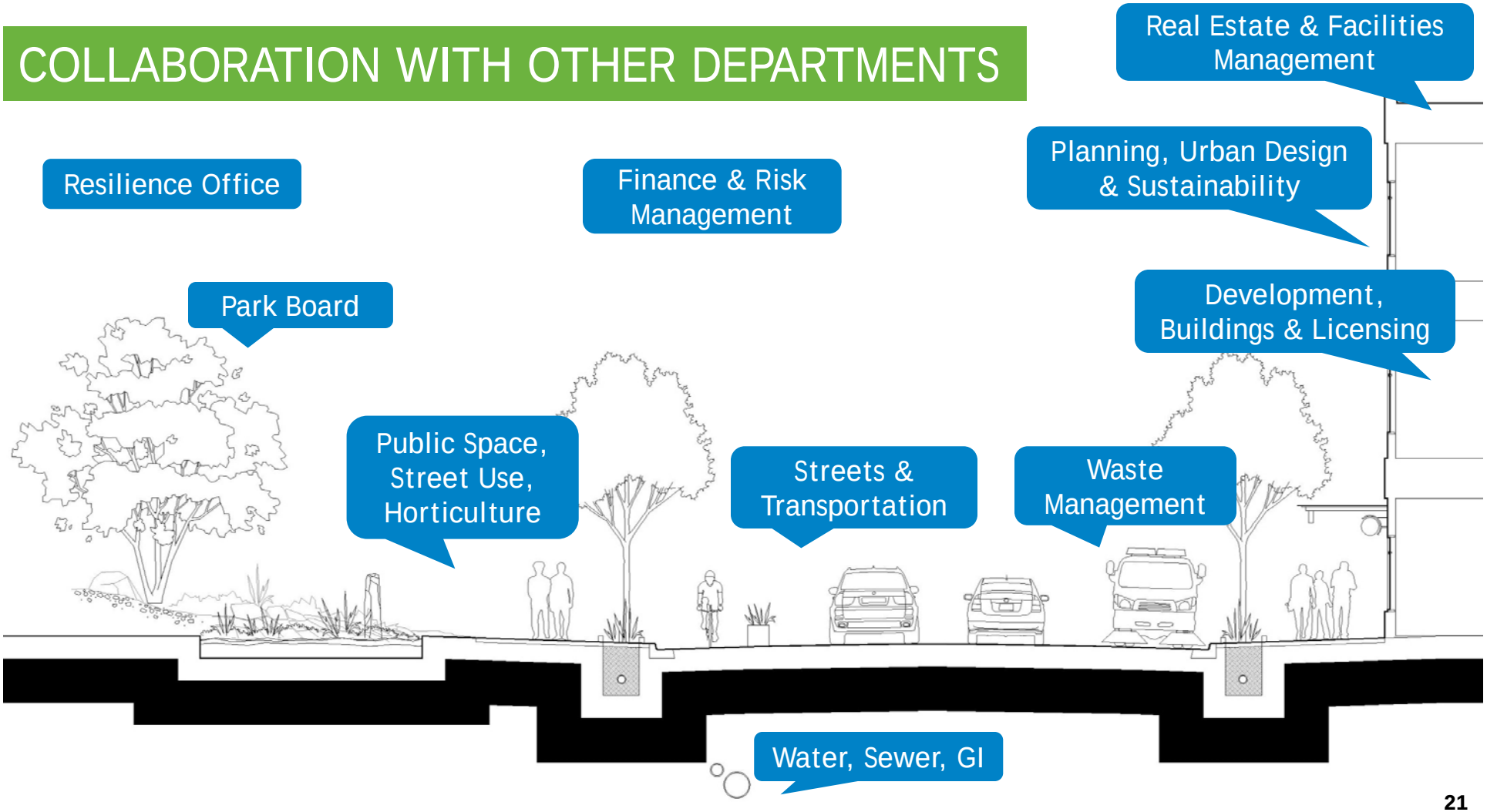


VANCOUVER'S APPROACH

Project: Bosco Verticale, Milan
Photo Credit: Paolo Rosselli


GREEN INFRASTRUCTURE INTERSECTS WITH A GREAT NUMBER OF CITY INITIATIVES
Greenest City Goals:
Green economy
Green buildings
Green transportation
Access to nature
Clean water
Urban Forest Strategy
Comprehensive City Building & Capital Planning Framework:
30 yr Strategic outlook
Habitat & Biodiversity Strategy
Resilience Strategy
Water Conservation Strategy
Healthy City Strategy
Climate Adaptation Strategy

COLLABORATION WITH OTHER DEPARTMENTS



ENVISIONING GREEN INFRASTRUCTURE

Project: University of British Columbia, Vancouver
Photo Credit: www.ubc.ca

TOOLKIT

tree well structure

rain garden & infiltration bulge

street car

: Melbourne
redit: Peter Bennetts

green roof

non-porous asphalt

porous asphalt

TOOLKIT

Project: Jellicoe Street, Auckland
Photo Credit: waal.co.nz

bioswale

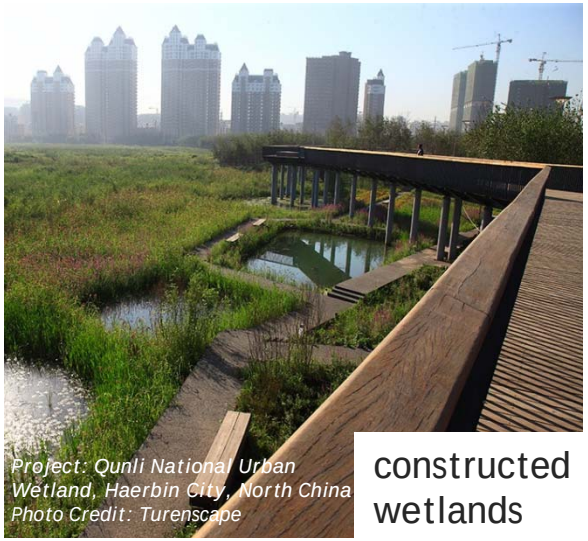
rainwater harvesting

Project: Hastings Creek, Vancouver
Photo Credit: Dan Toulgoet

daylighting streams

Project: Rochetaillée banks of the Saone, Lyon
Photo Credit: IN SITU

absorbent landscape



Project: Qunli National Urban Wetland, Haerbin City, North China
Photo Credit: Turenscape

constructed wetlands

Project: Museumppark garage, Rotterdam
Photo Credit: City of Rotterdam

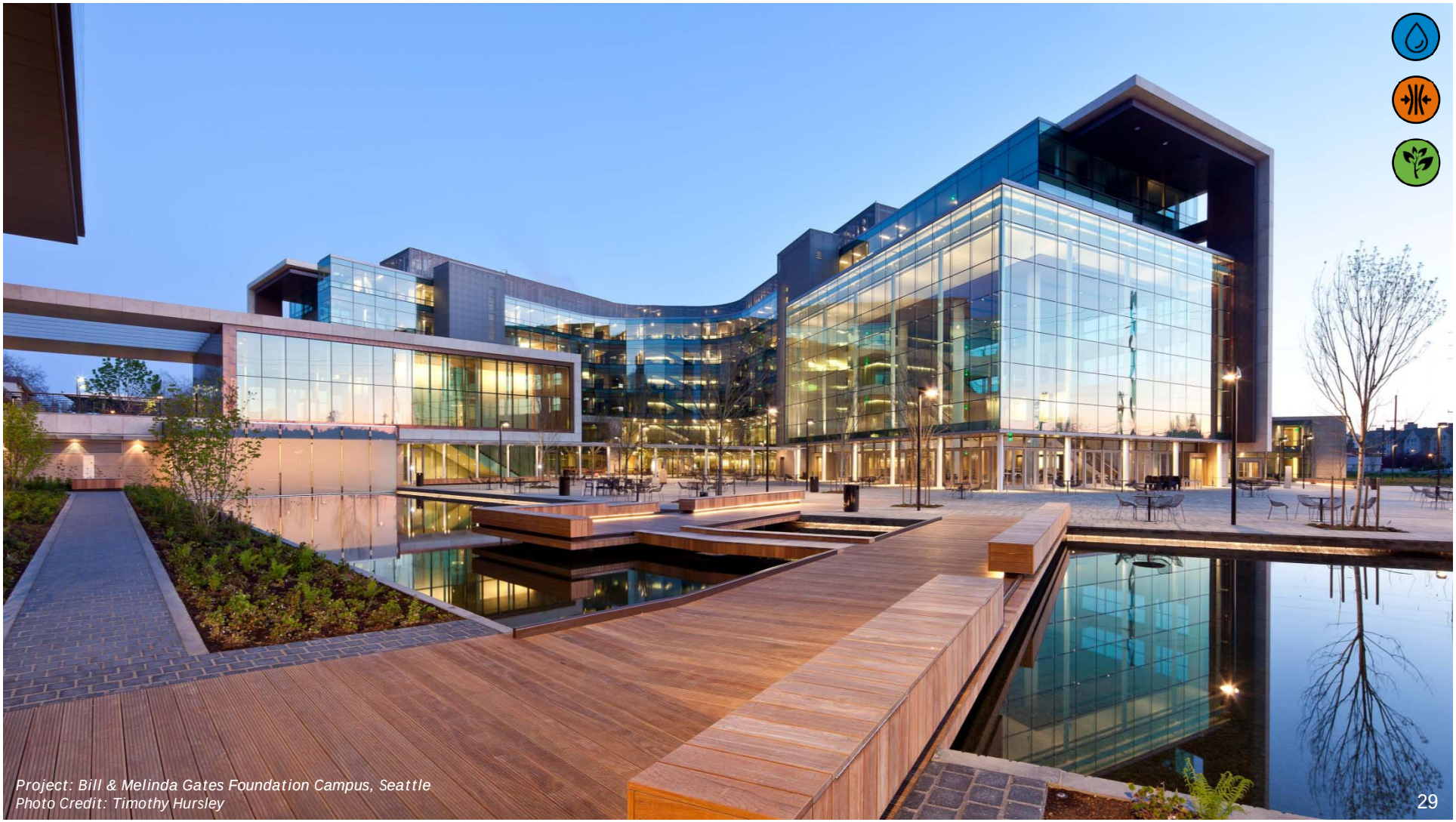
detention tanks

Project: The soul of Nørrebro, Copenhagen
Photo Credit: SLA / Beauty and the Bit

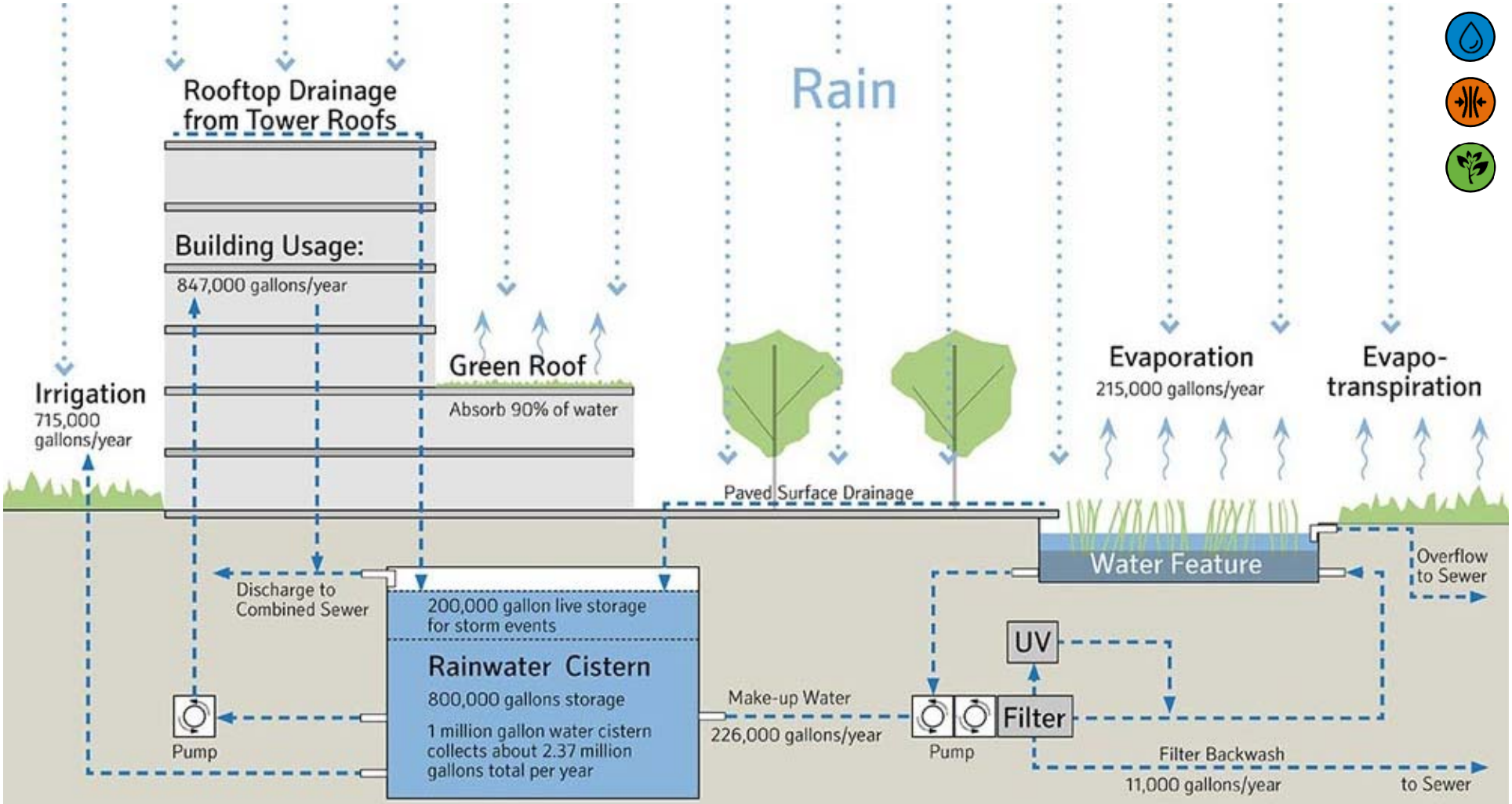
Project: The soul of Nørrebro, Copenhagen
Photo Credit: SLA / Beauty and the Bit

Project: Millennium Park, Chicago
Photo Credit: http://www.chicagoculturalmile.org/venue/millennium-park/

Project: Millennium Park, Chicago
Photo Credit: http://www.chicagoculturalmile.org/venue/millennium-park/



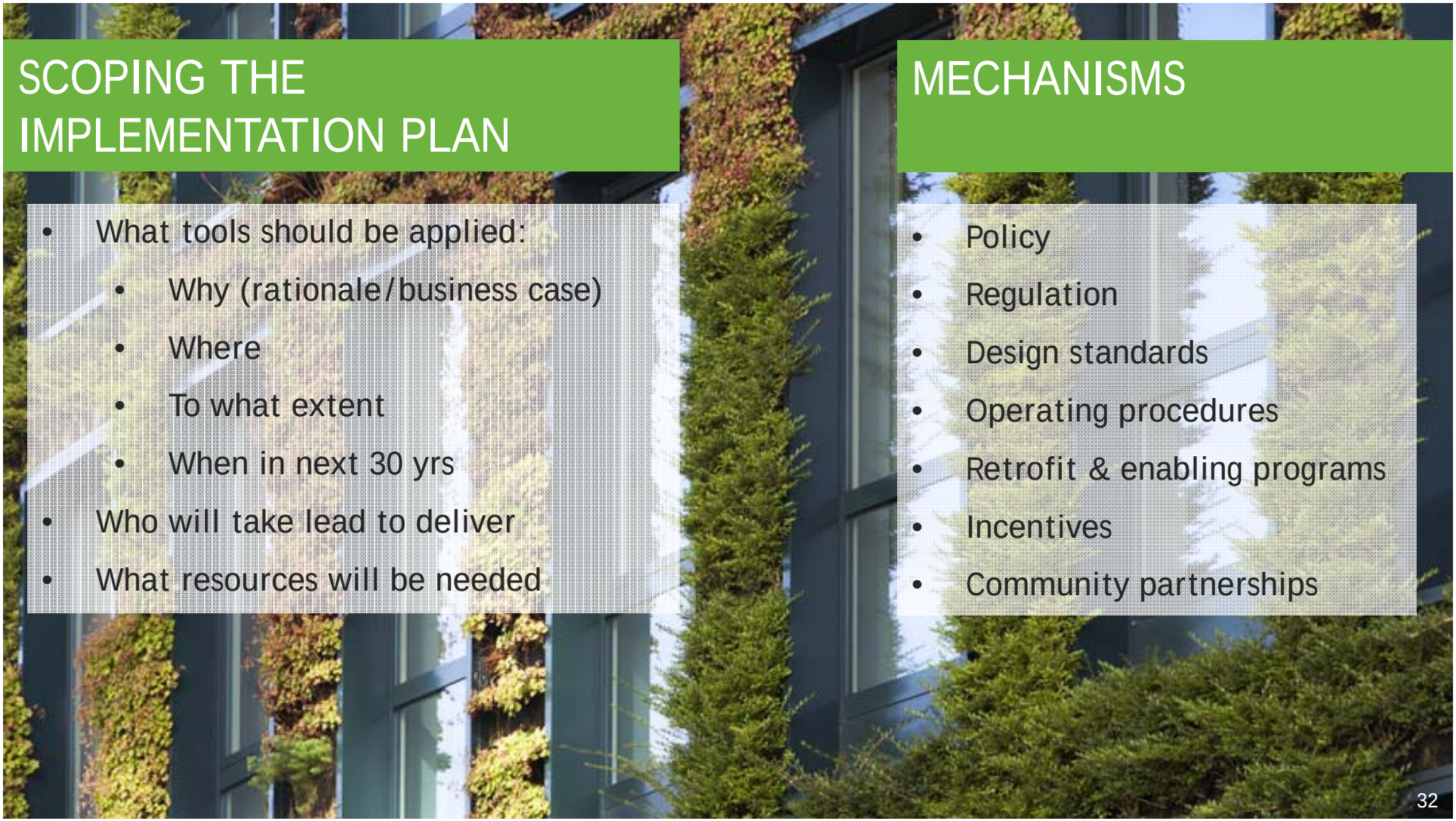
Project: Bill & Melinda Gates Foundation Campus, Seattle
Photo Credit: Timothy Hursley



Project: Bill & Melinda Gates Foundation Campus, Seattle
Photo Credit: Gustafson Guthrie Nichol

SCOPING THE IMPLEMENTATION PLAN

Project: Ontario Street Bioswale
Photo Credit: Wendy de Hoog



SCOPING THE IMPLEMENTATION PLAN

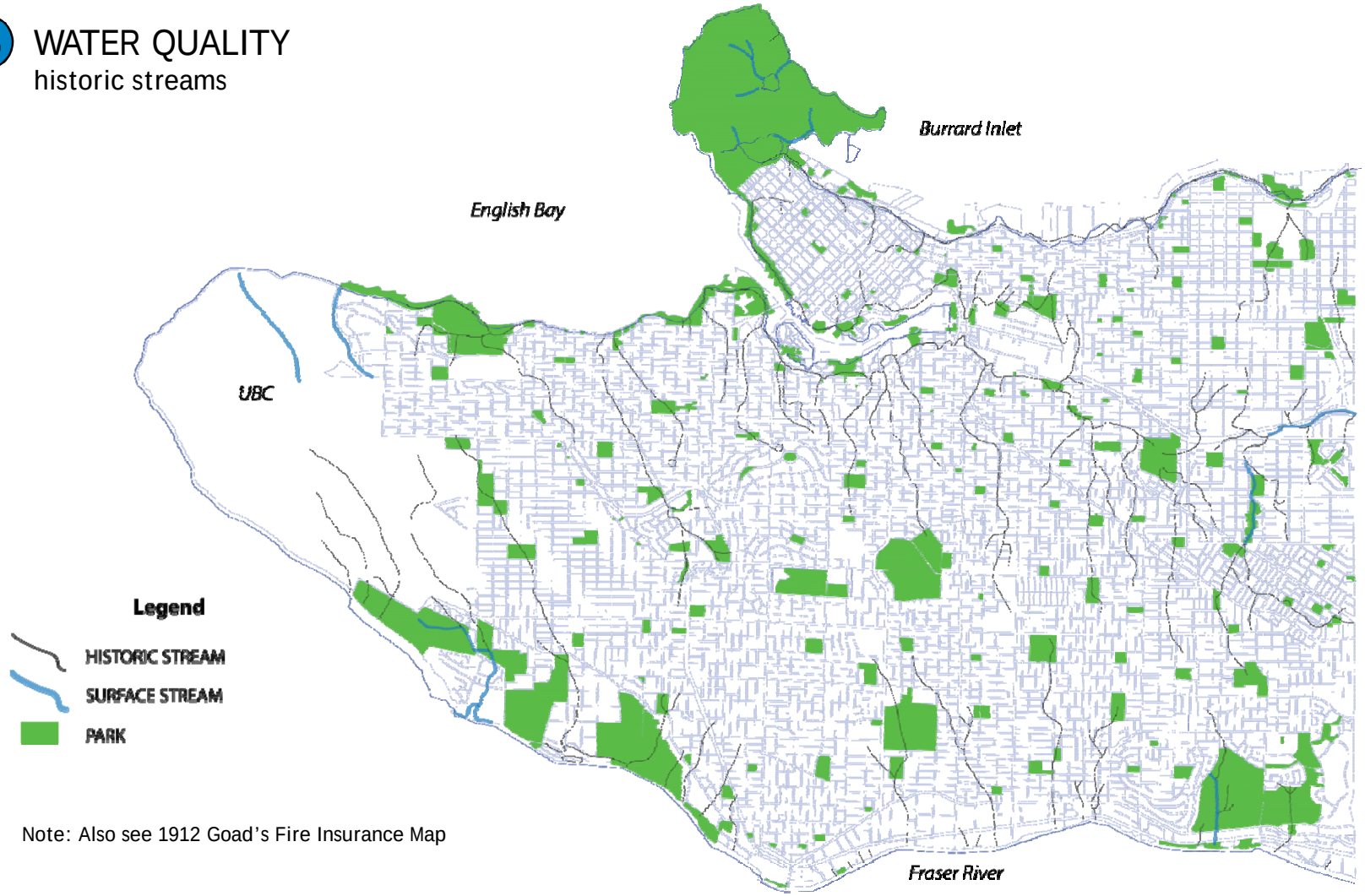
- What tools should be applied:
  - Why (rationale/business case)
  - Where
  - To what extent
  - When in next 30 yrs
- Who will take lead to deliver
- What resources will be needed

MECHANISMS

- Policy
- Regulation
- Design standards
- Operating procedures
- Retrofit & enabling programs
- Incentives
- Community partnerships

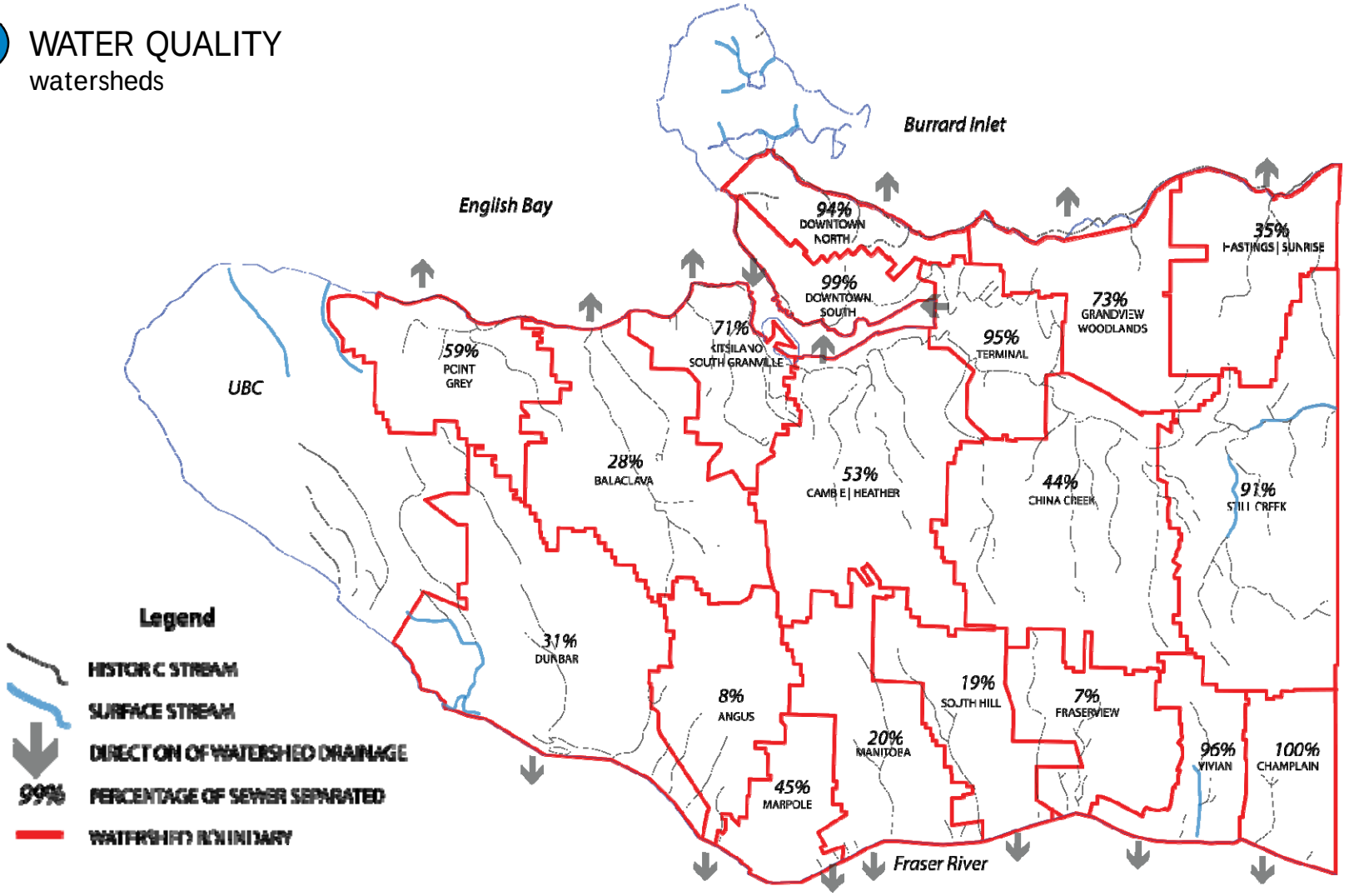
WATER QUALITY

WATER QUALITY
historic streams



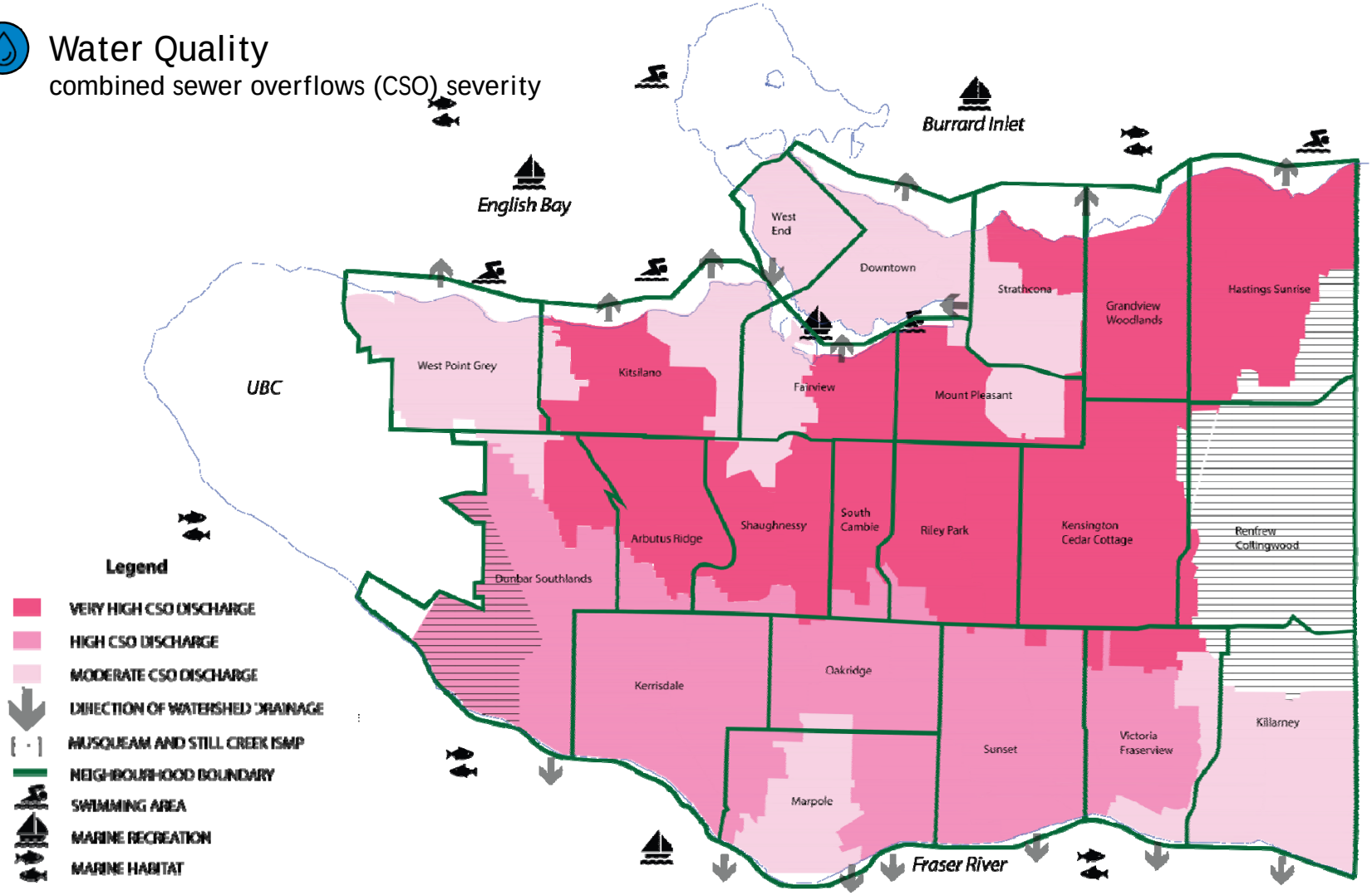
Note: Also see 1912 Goad's Fire Insurance Map

WATER QUALITY
watersheds



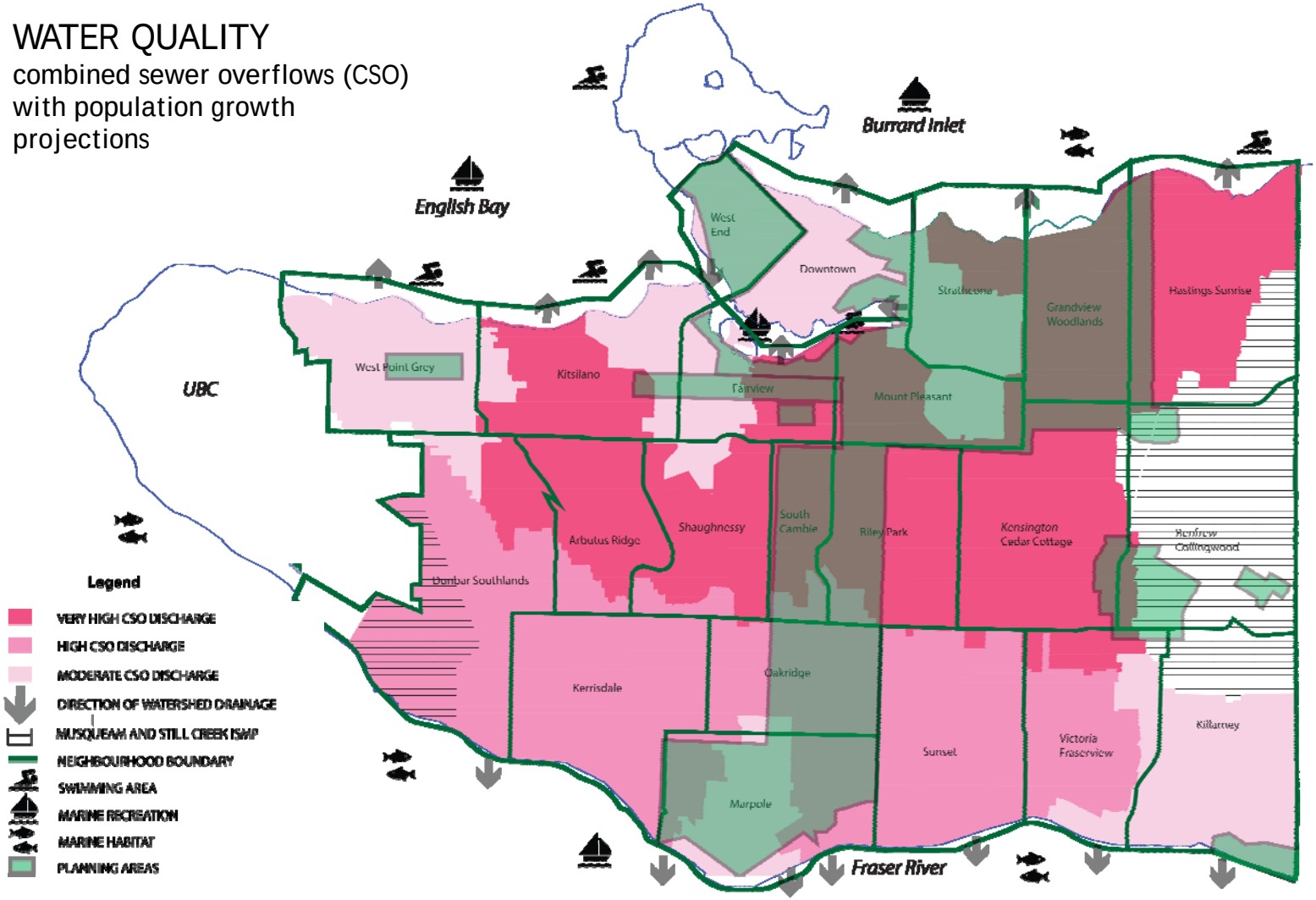
Water Quality

combined sewer overflows (CSO) severity



WATER QUALITY

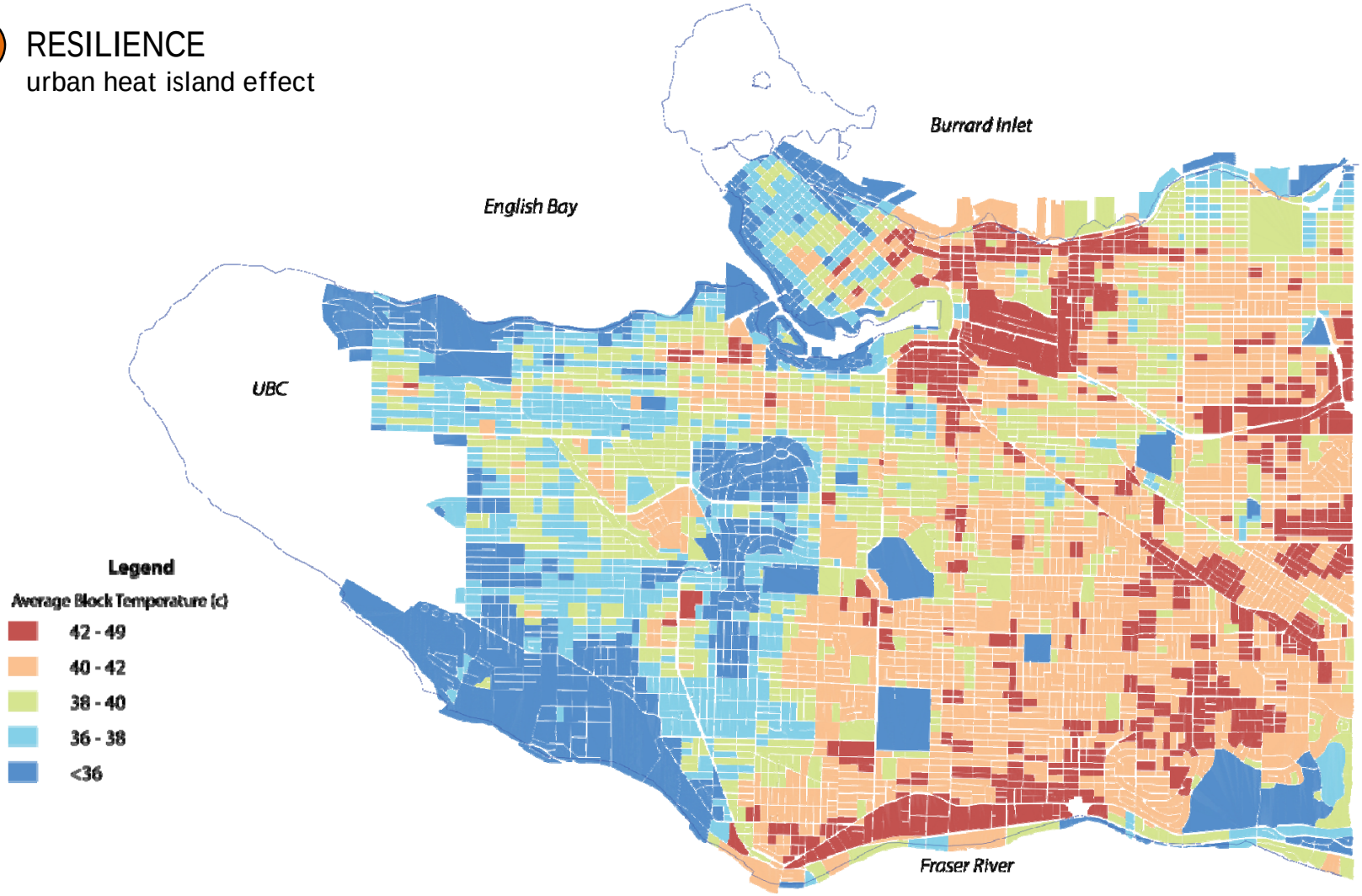
combined sewer overflows (CSO) with population growth projections



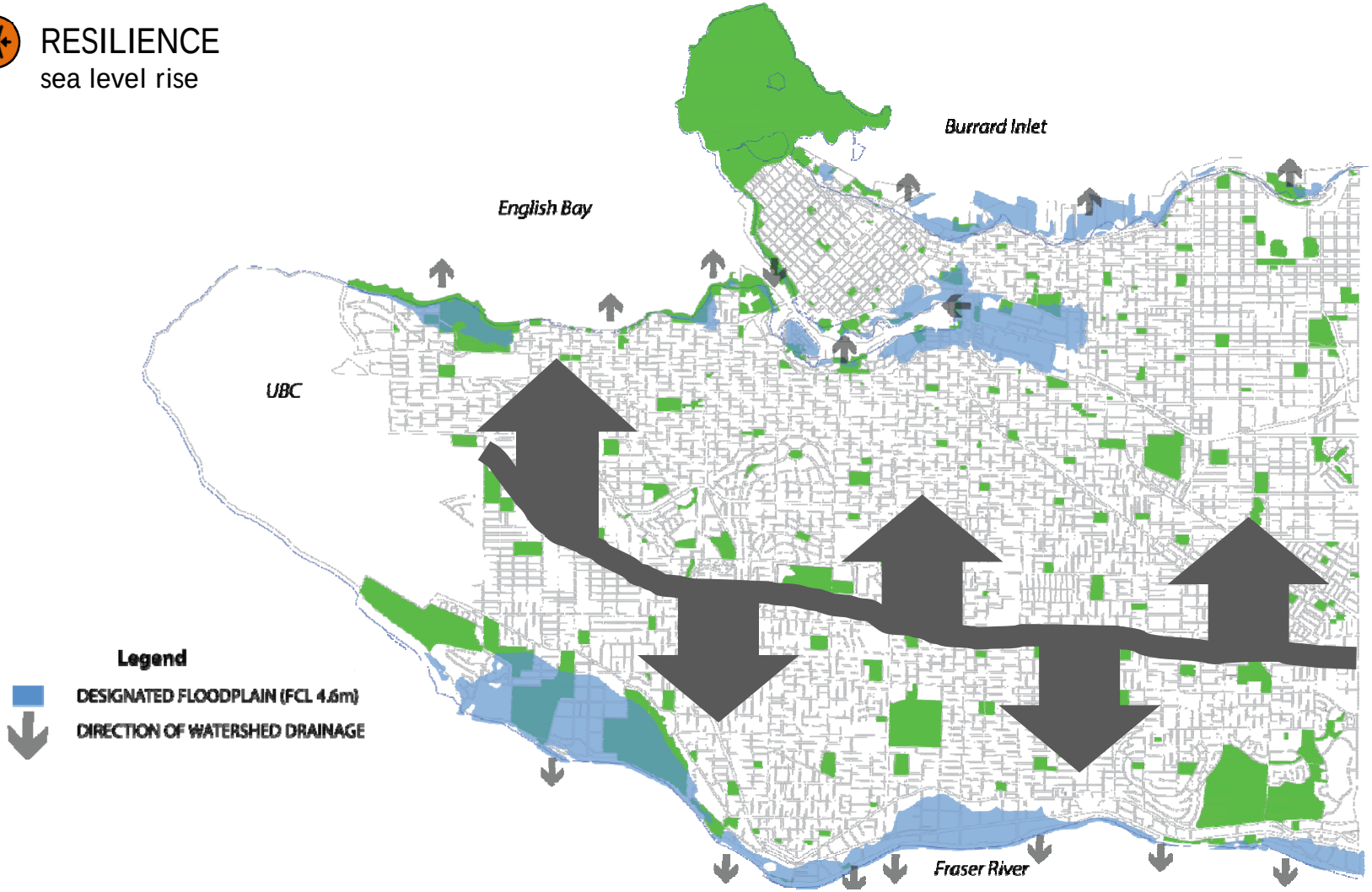
RESILIENCE

RESILIENCE

urban heat island effect

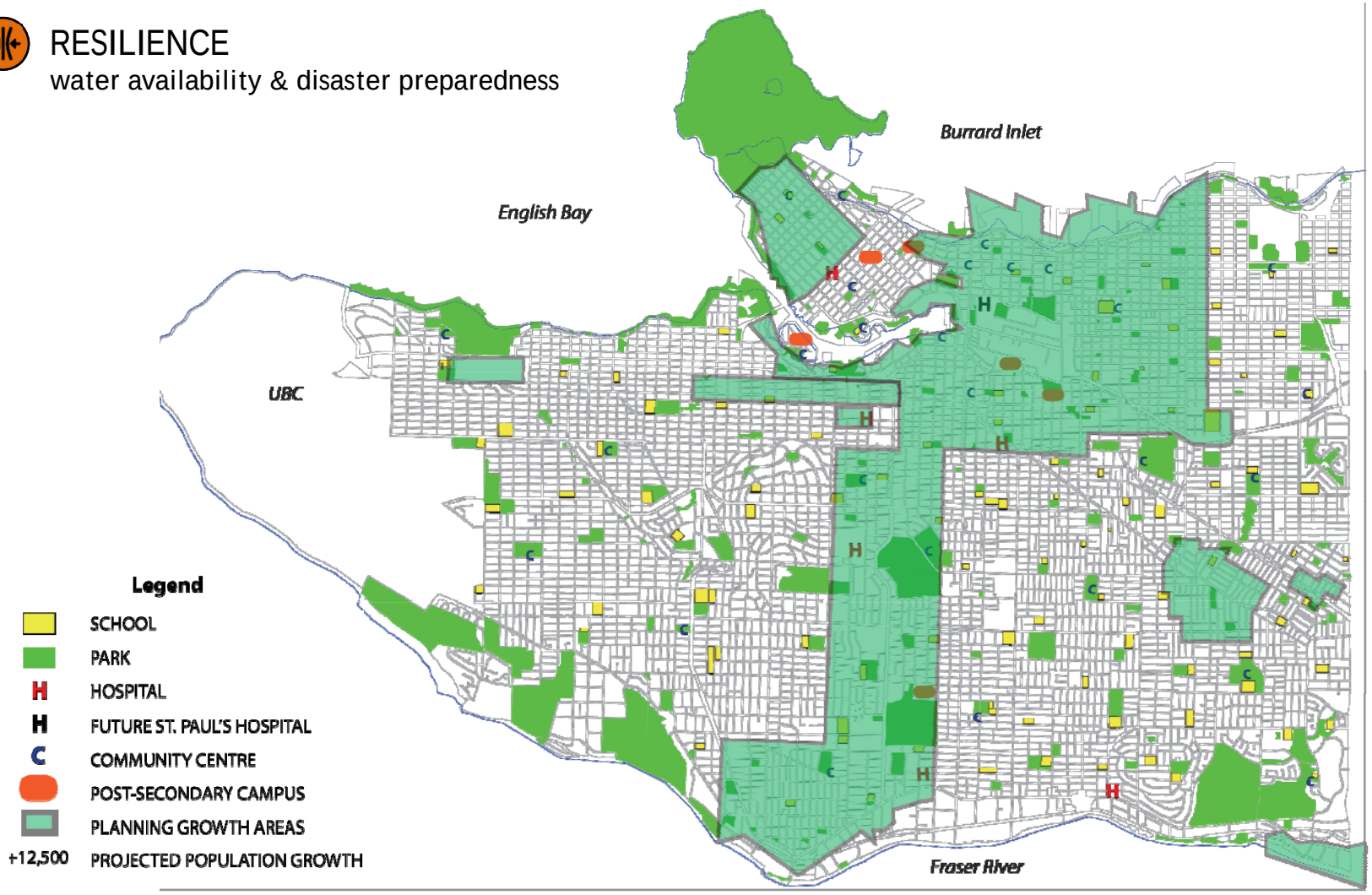


RESILIENCE
sea level rise



RESILIENCE

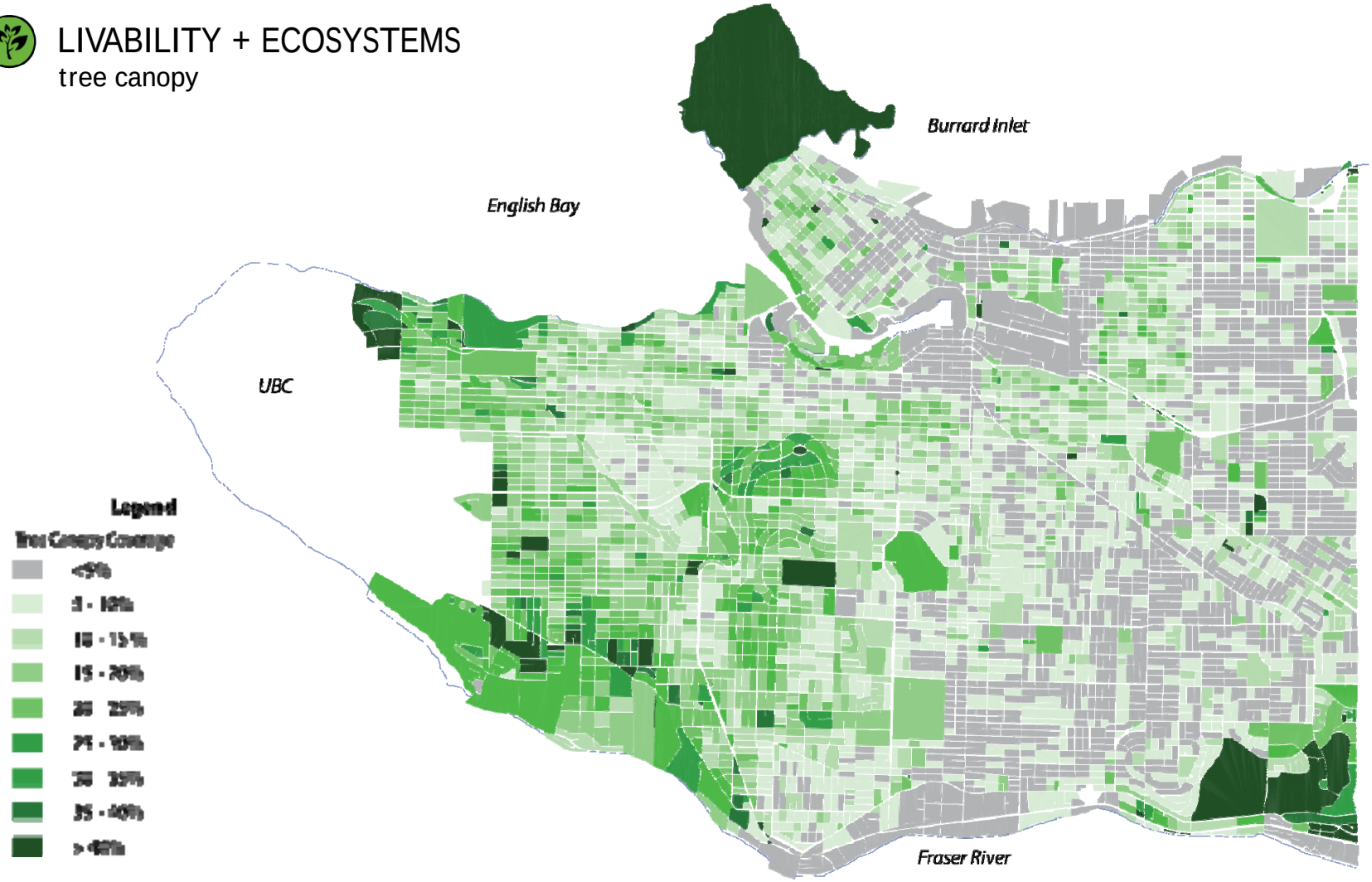
water availability & disaster preparedness



LIVABILITY + ECOSYSTEMS

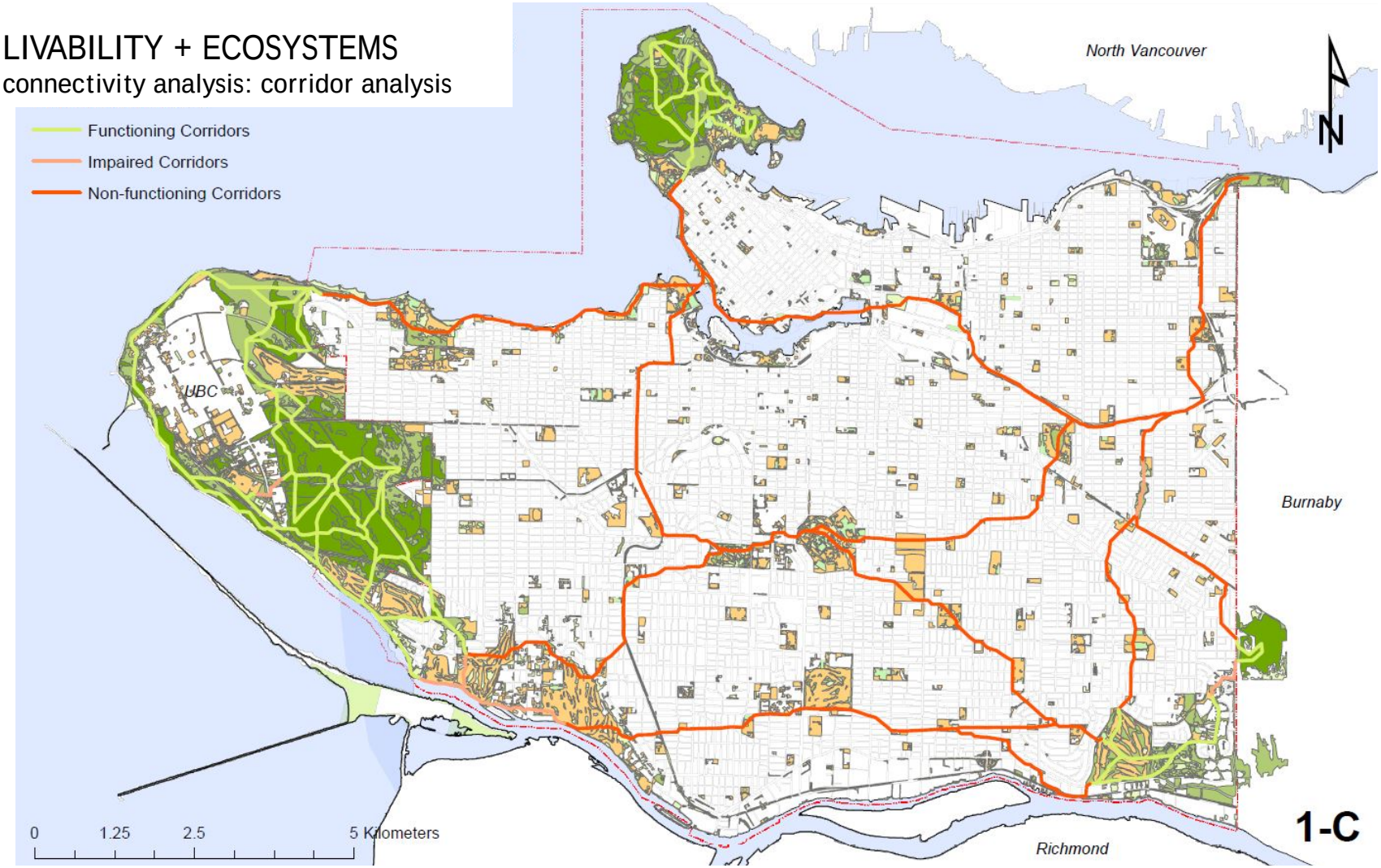
LIVABILITY + ECOSYSTEMS

tree canopy



LIVABILITY + ECOSYSTEMS

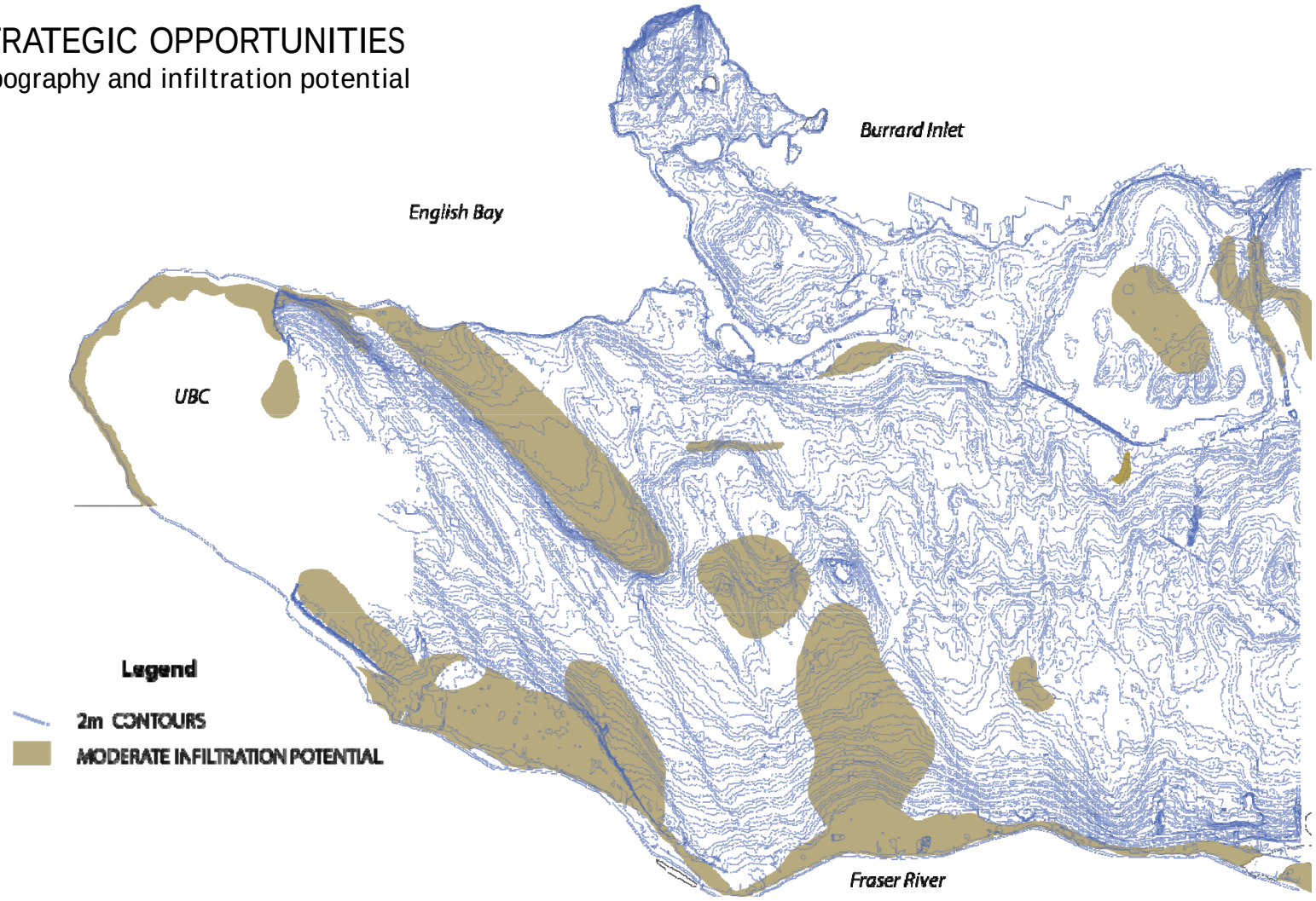
connectivity analysis: corridor analysis



STRATEGIC OPPORTUNITIES

STRATEGIC OPPORTUNITIES

topography and infiltration potential



THANK YOU!

Melina Scholefield, P. Eng., Manager
Green Infrastructure Implementation, City of Vancouver
melina.scholefield@vancouver.ca 604-296-2972

Project: Waterlicht by Studio Roosegaarde showing sea level rise, Amsterdam
Photo Credit: Studio Roosegaarde