Climate Change Adaptation Strategy

Council Report Reference

July 24th, 2012

Overview

- Background
- Adaptation Planning Process
- Strategy Content
- Primary Action Detail

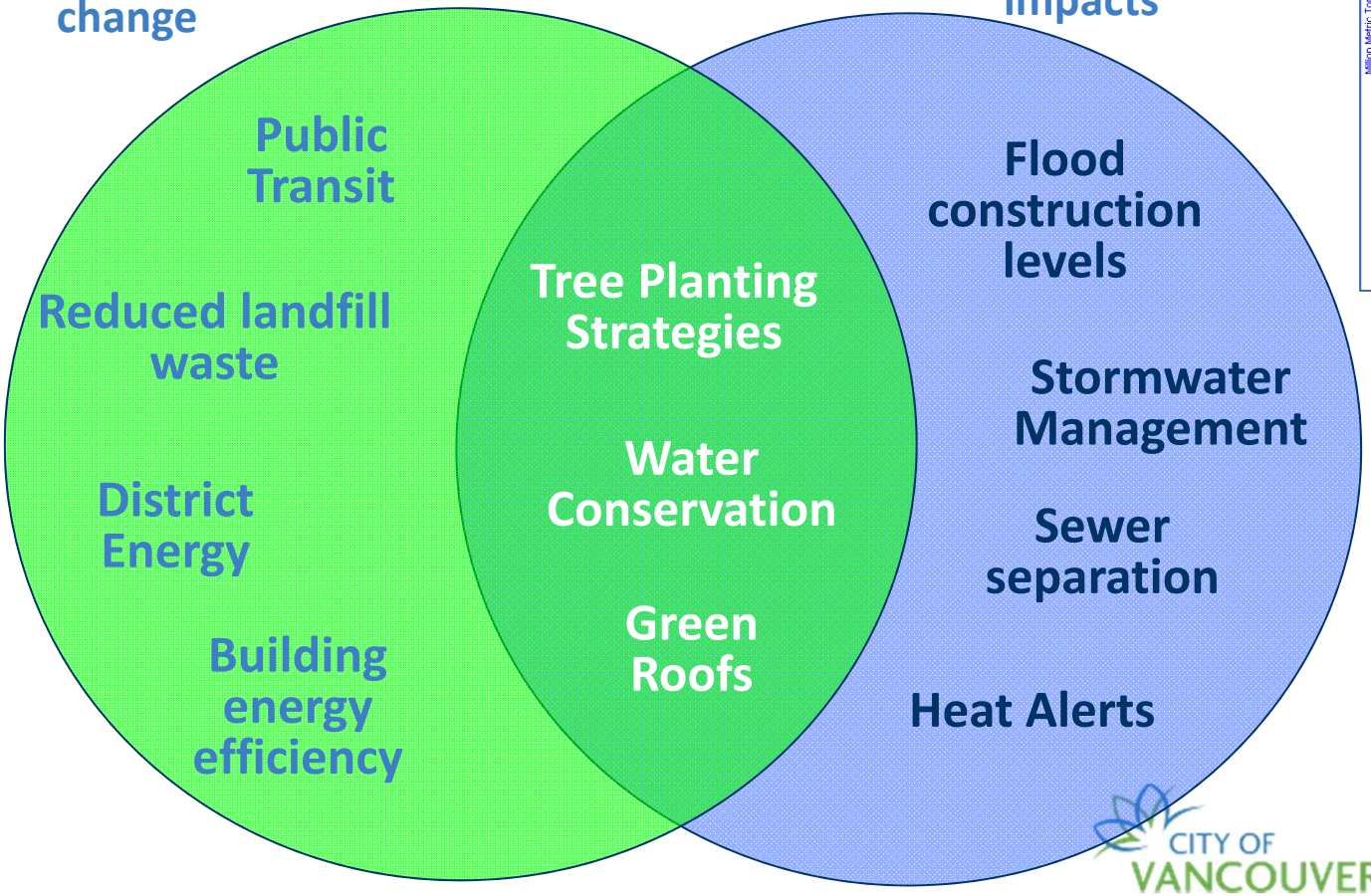
Mitigation vs. Adaptation

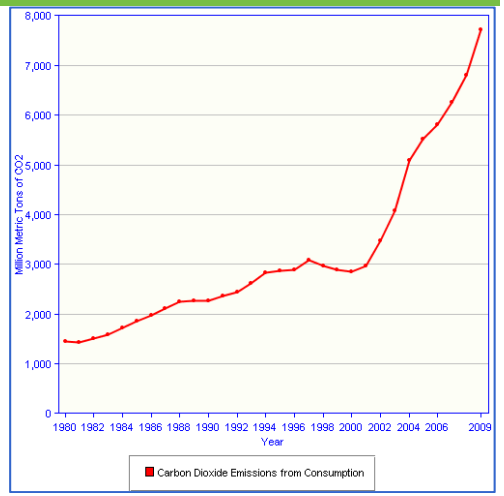
MITIGATION

Prevent climate change

ADAPTATION

Prepare for the impacts





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Observed Changes

- 2006 Windstorm: $10 Million in forest restoration, repairs, etc.
- Summer 2009: 34.4°C -122 excess heat-related deaths
- Sept., 2010 rainstorm: 173 claims filed
- May, 2011: BC guidelines for sea level rise published.
- Spring 2012: flooding / debris flows

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Adaptation Strategy Overview

- Vision to 2100
- Roadmap for short and long term actions
- Living document
- Builds on existing adaptation
- Focus on win-win actions


Vancouver. City
Miscellaneous
CLOUDS OF CHANGE
Final Report of the
City of Vancouver
Task Force on Atmospheric Change
1990
Volume I
City of Vancouver
June 1990
The Cool Vancouver Task Force's
Community Climate Change Action Plan:
Creating Opportunities
2003
SUSTAINABILITY
THE CLIMATE-FRIENDLY CITY
A Corporate Climate Change Action Plan
for the
City of Vancouver
2003
A3
CITY OF VANCOUVER
ADMINISTRATIVE REPORT
2008
Report Date: May 27, 2008
Author: Brian Beck / Brian Crowe
Phone No.: 604.871.6752
RTS No.: 7193
VanRIMS No.: 11-4000-01
TO: Vancouver City Council
FROM: General Manager of Engineer
SUBJECT: Climate Change Adaptation
RECOMMENDATION
THAT Council receive this report for INFORMATI
COUNCIL POLICY
On March 1, 2007 Council directed staff to exam
of Vancouver infrastructure and identify measu
SUMMARY
The City has formed a new Climate Adaptation
established new collaborations with external st
Consortium (PCIC), the BC Government, and Environment Canada. The City also joined the
Canadian Alliance of Resilient City's (ARC) to share leading practices.
A framework for new adaptive planning was prepared. As a first step, The Working Group
identified climate change variables of interest to the City, and PCIC provided the data
contained in the preliminary Vancouver Climate Change Projections Table (Table 1). PCIC has
performed several recent regional climate analyses. This is the first time PCIC has directly
assisted with preparation of climate information to be used by a municipal adaptation working
group. Timely access to this kind of data will help City staff's efforts to plan for the local
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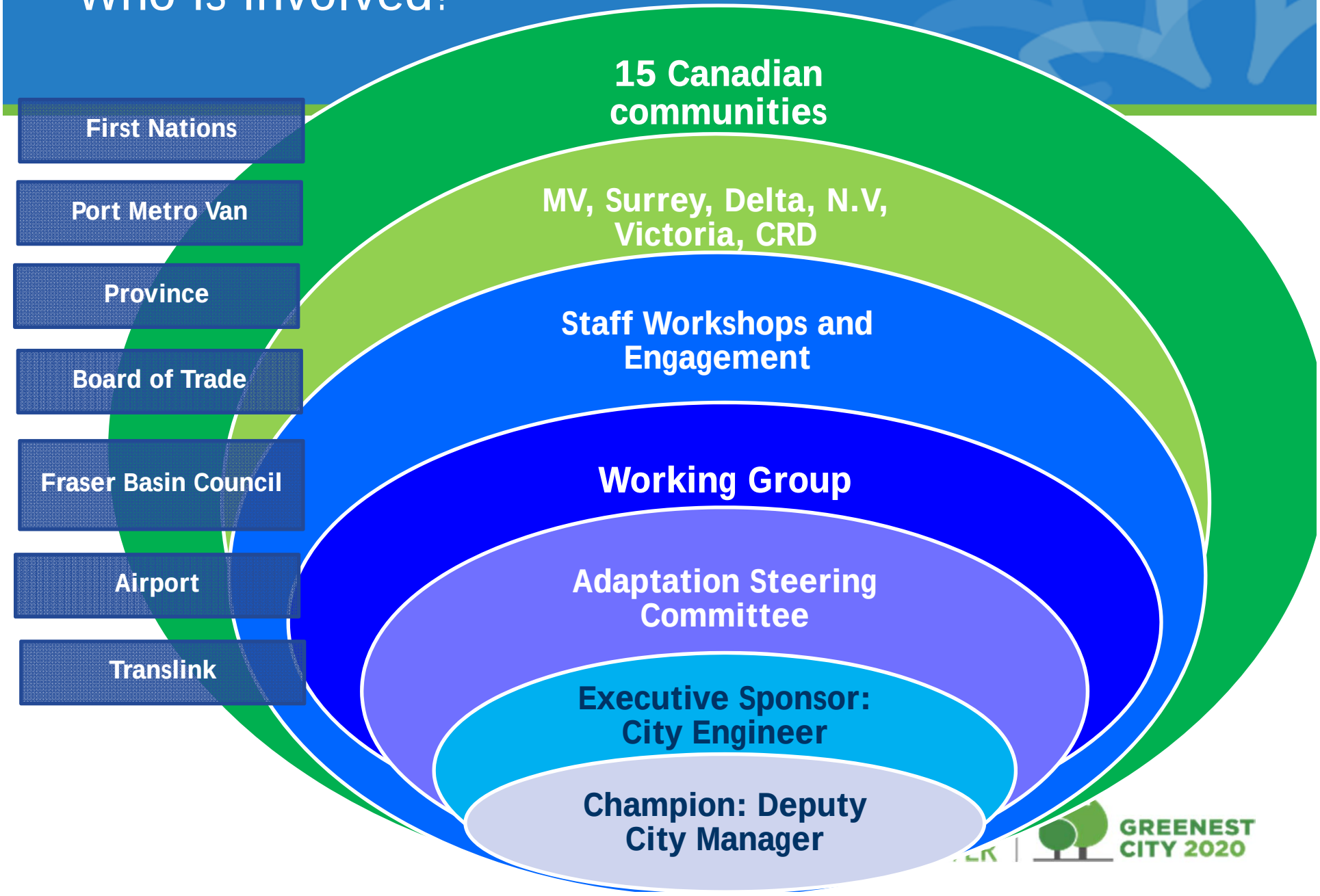
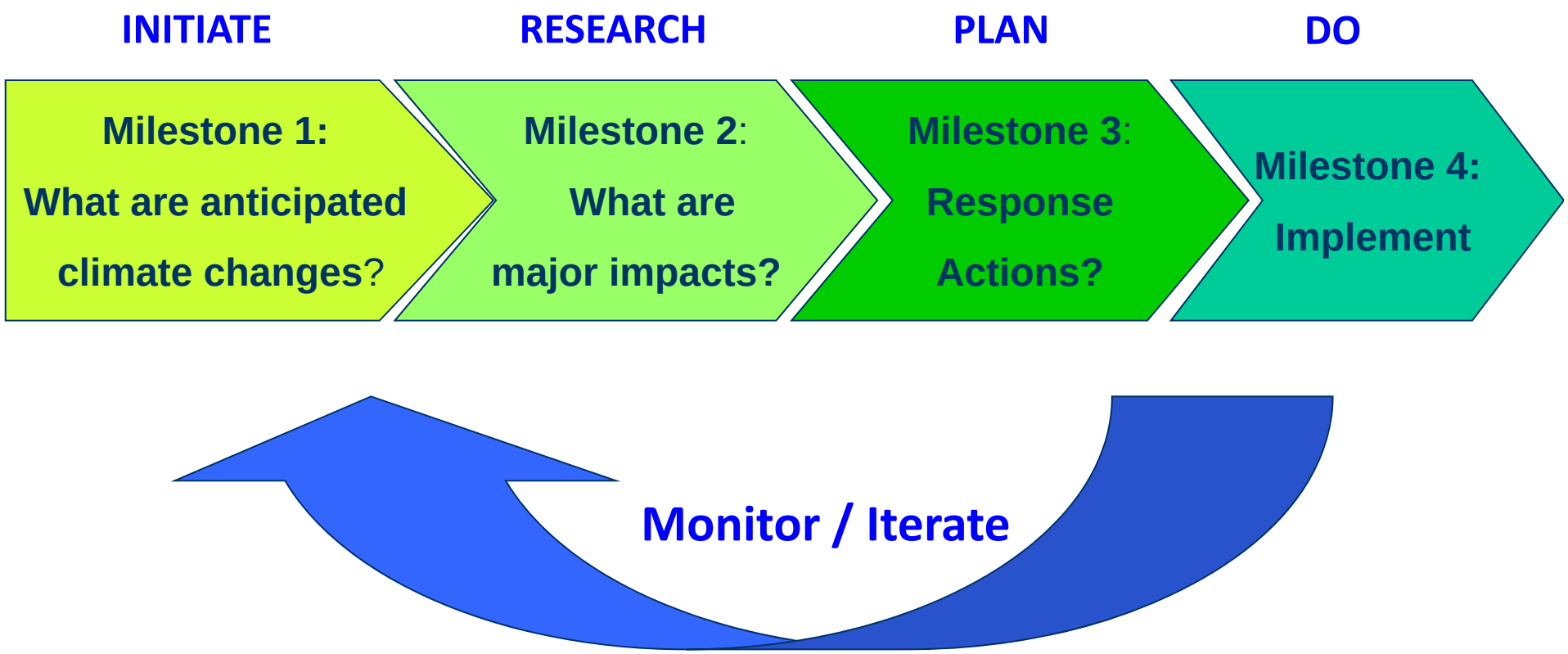
I·C·L·E·I
Local Governments for Sustainability

Who is involved?



ICLEI Adaptation Initiative:
A Proven Planning Framework



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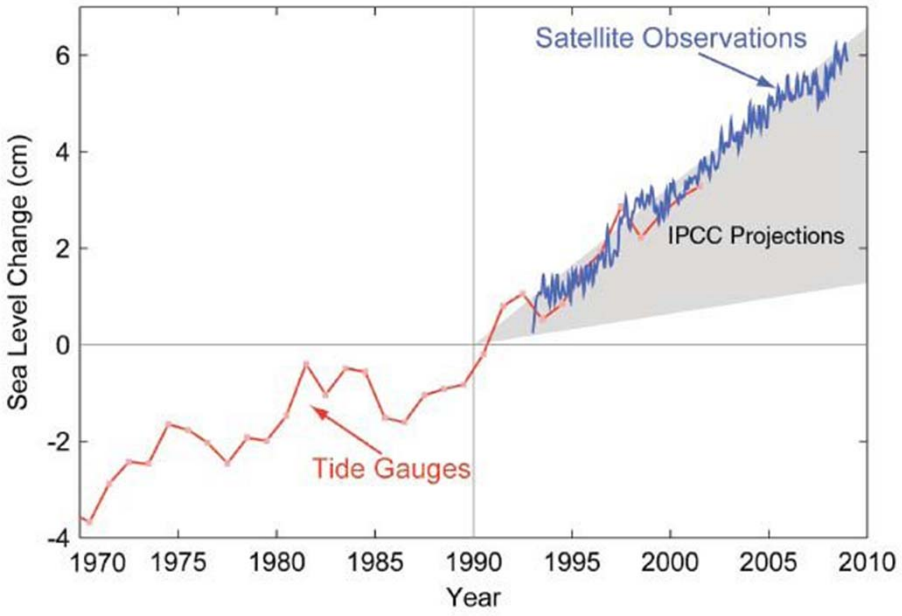
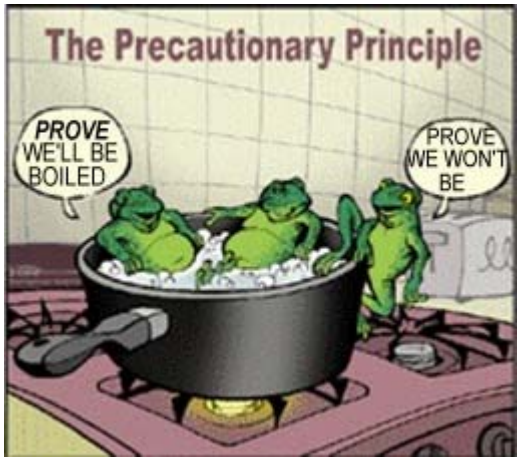
Guiding Principles

- Planning based on best science
- Precautionary Principle
- Adaptive Management approach
- Prioritize through Risk Assessment





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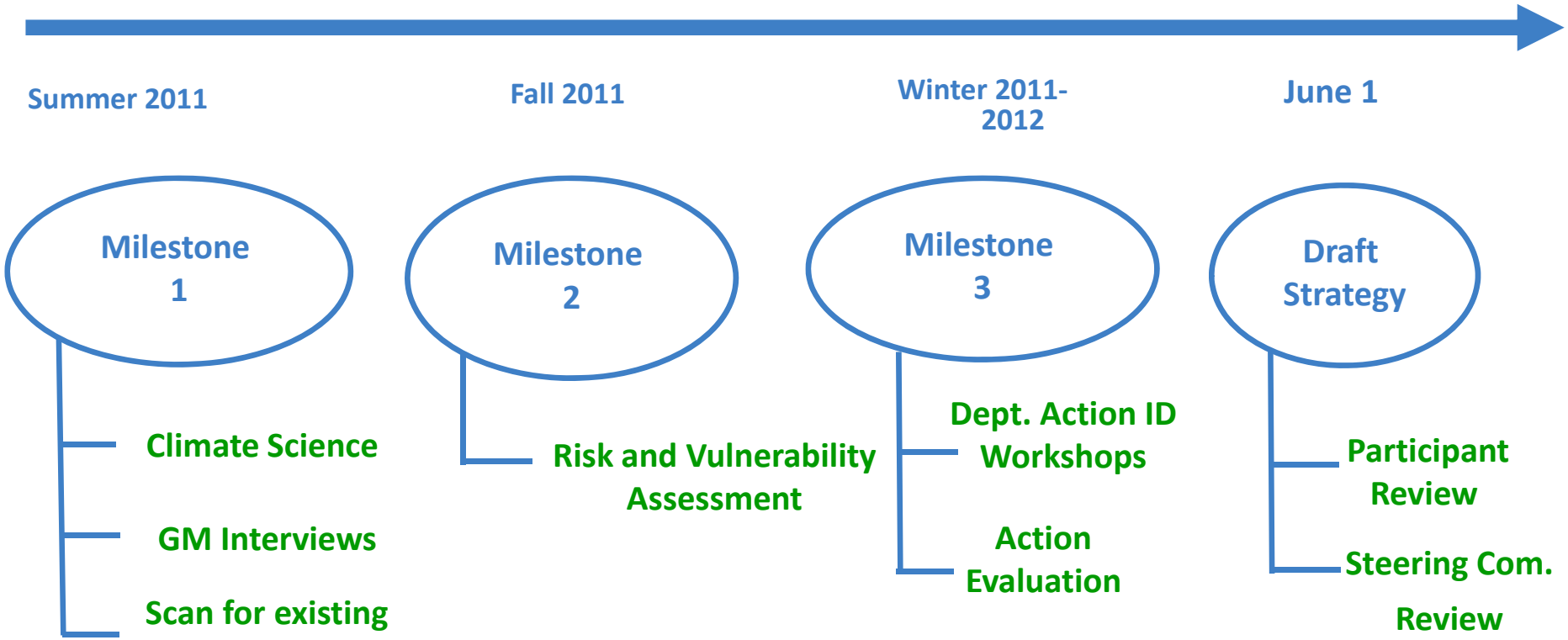
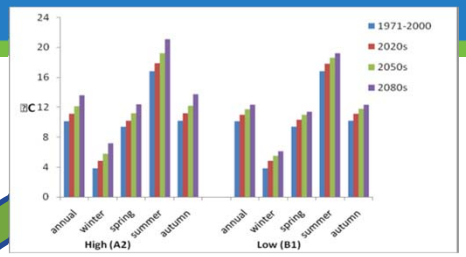
Adaptation Strategy: Process and Timeline



From Impacts to Actions



Impact: Increased street flooding from heavy rain

Action: Add catch basins in high flood risk areas

Climate Science

80 Impacts

20 Impacts

Vulnerability and Risk Assessment

Develop Actions

9 Primary Actions

Evaluation Criteria

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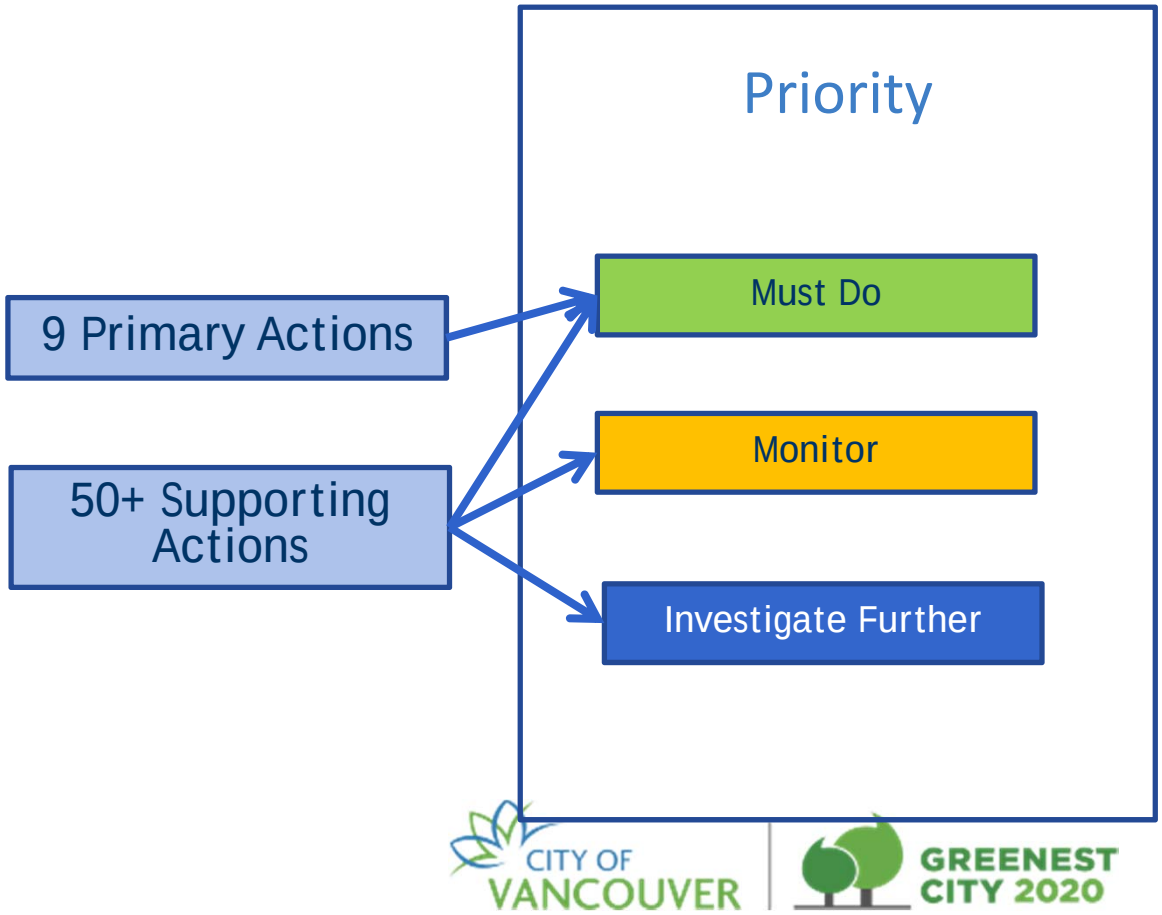
Evaluation

150+ Actions

Criteria

- Mitigation and other co-benefits
- Equity
- Cost / Benefit
- Robustness
- Urgency
- Window of Opportunity



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How Will Vancouver's Climate Change?

- Sea Level Rise: 1.0m by 2100
- Storm surge

- Increased rainfall volume and intensity
- 16% less rainfall in the summer

- Increase in intensity and frequency of extreme events

- 2 degrees warmer annually by 2050
- Drier and more summer heat waves

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Sea Level Rise

Priority Impacts:

- Flooding / inundation
- Reduced gravity drainage
- Damage and erosion

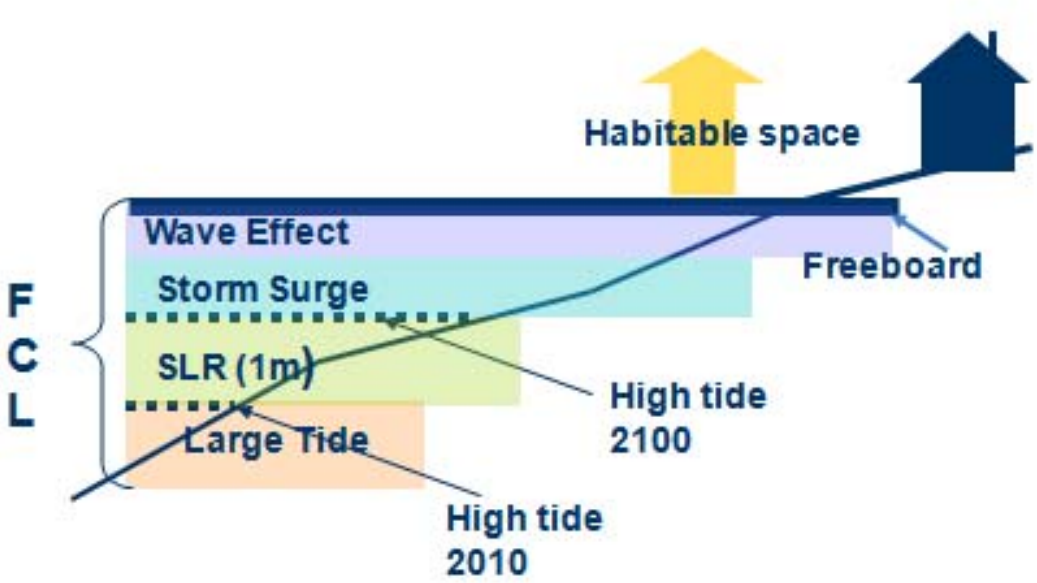
Source: King Tide Photo Initiative

Primary Actions:

- Amend Flood-proofing policies
- Coastal Flood Risk Assessment → Risk Management Plan

- 17 Supporting Actions

Amend Flood-Proofing Policies
Flood Construction Levels (FCLs)



Current FCL	New Provincial Guideline FCL
False Creek: 4.5m	5.6m – 8m
Coal Harbour: 4.5m	5.7m – 6m
Fraser River: 4.5m, 4.8m	4.8m

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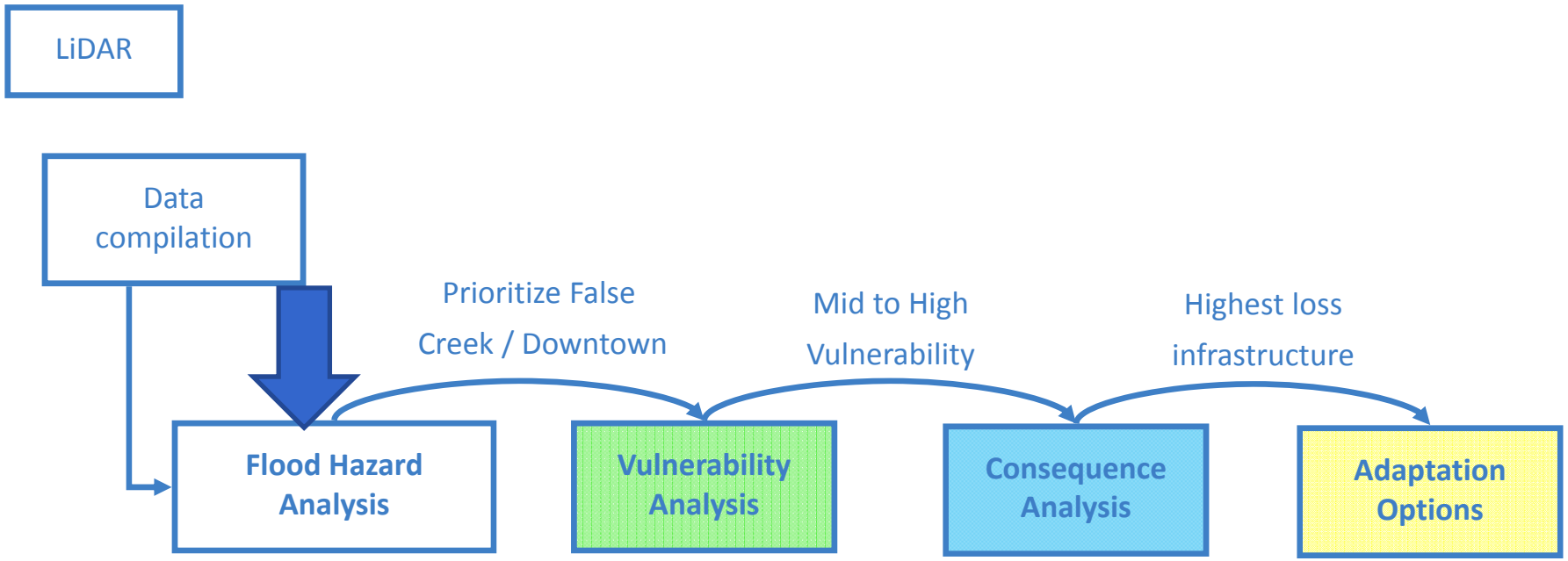
Sea Level Rise
Coastal Flood Risk Assessment



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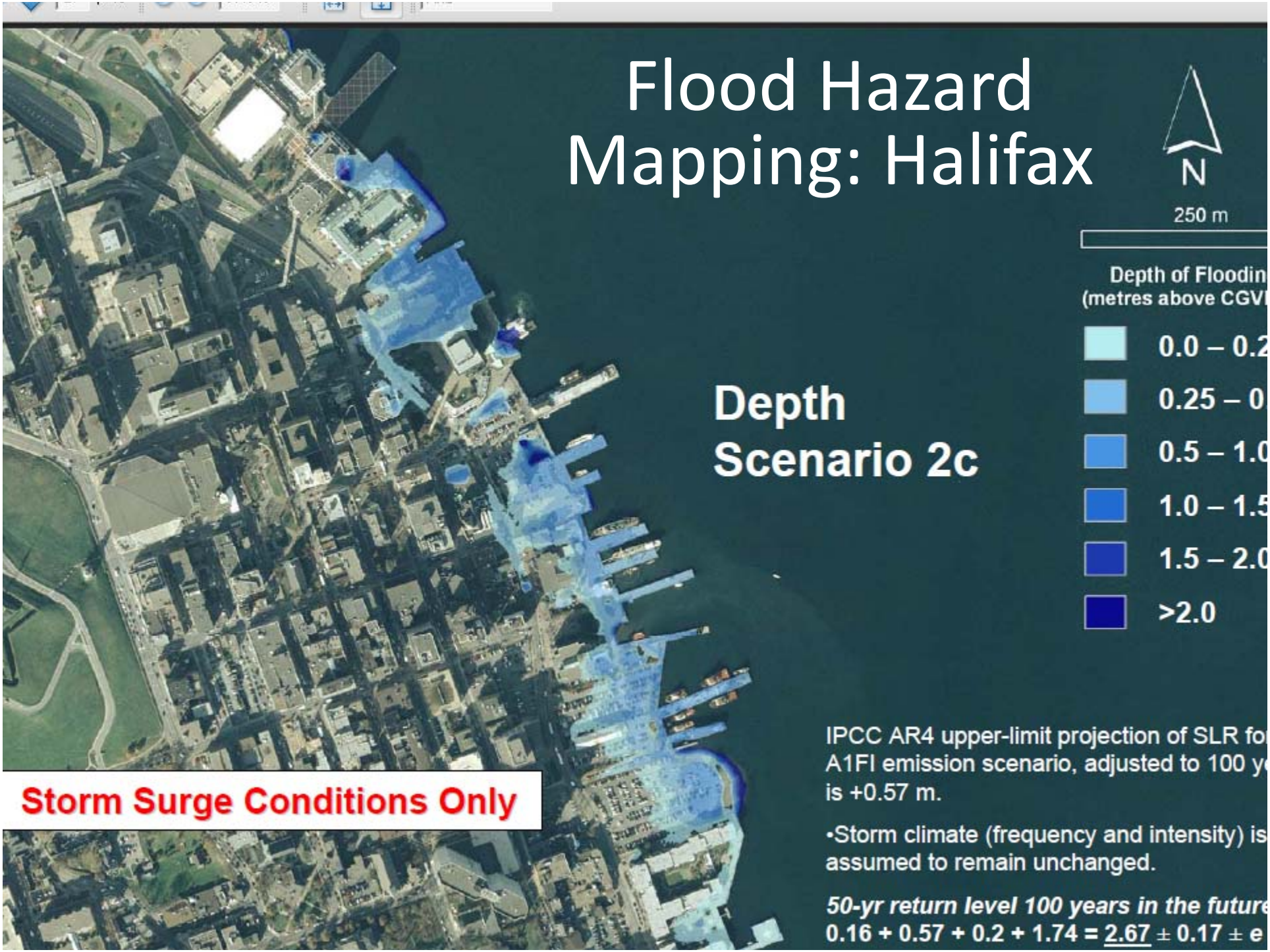
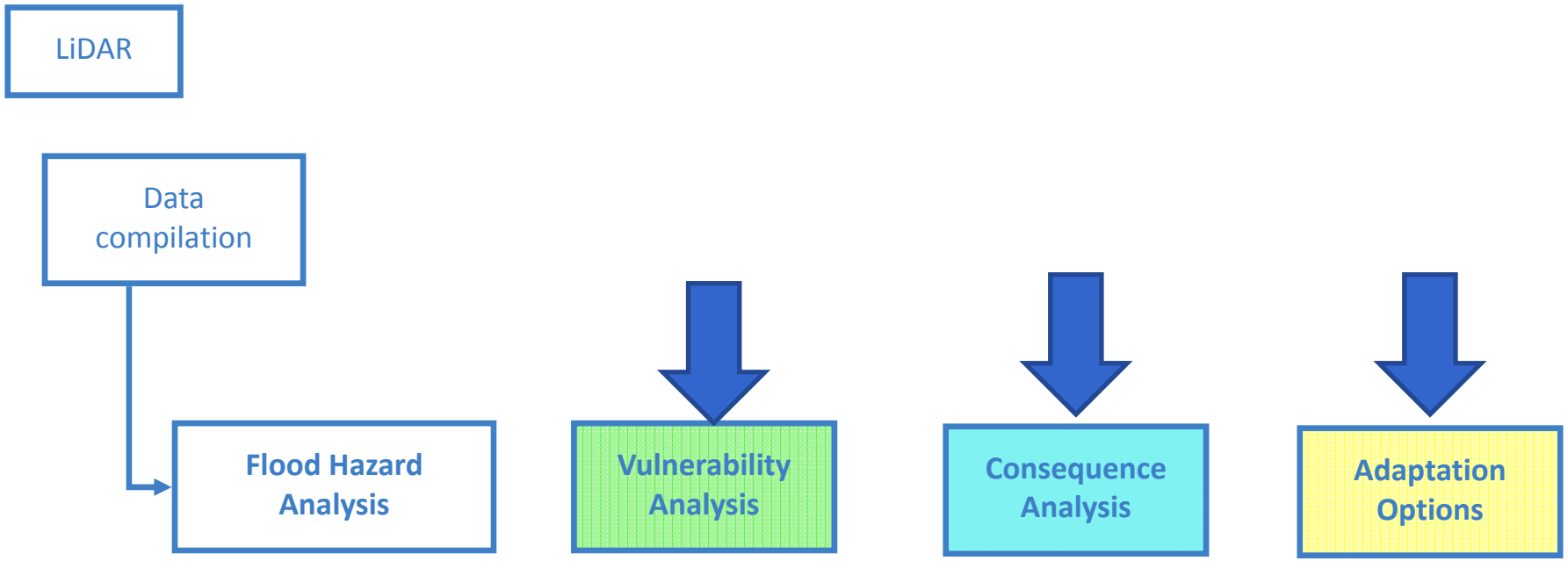

Flood Hazard Mapping: Halifax
N
250 m
Depth of Floodin
(metres above CGV
0.0 – 0.2
0.25 – 0
0.5 – 1.0
1.0 – 1.5
1.5 – 2.0
>2.0
Depth Scenario 2c
Storm Surge Conditions Only
IPCC AR4 upper-limit projection of SLR fo
A1FI emission scenario, adjusted to 100 y
is +0.57 m.
•Storm climate (frequency and intensity) is
assumed to remain unchanged.
50-yr return level 100 years in the future
0.16 + 0.57 + 0.2 + 1.74 = 2.67 ± 0.17 ± e

Coastal Flood Risk Assessment



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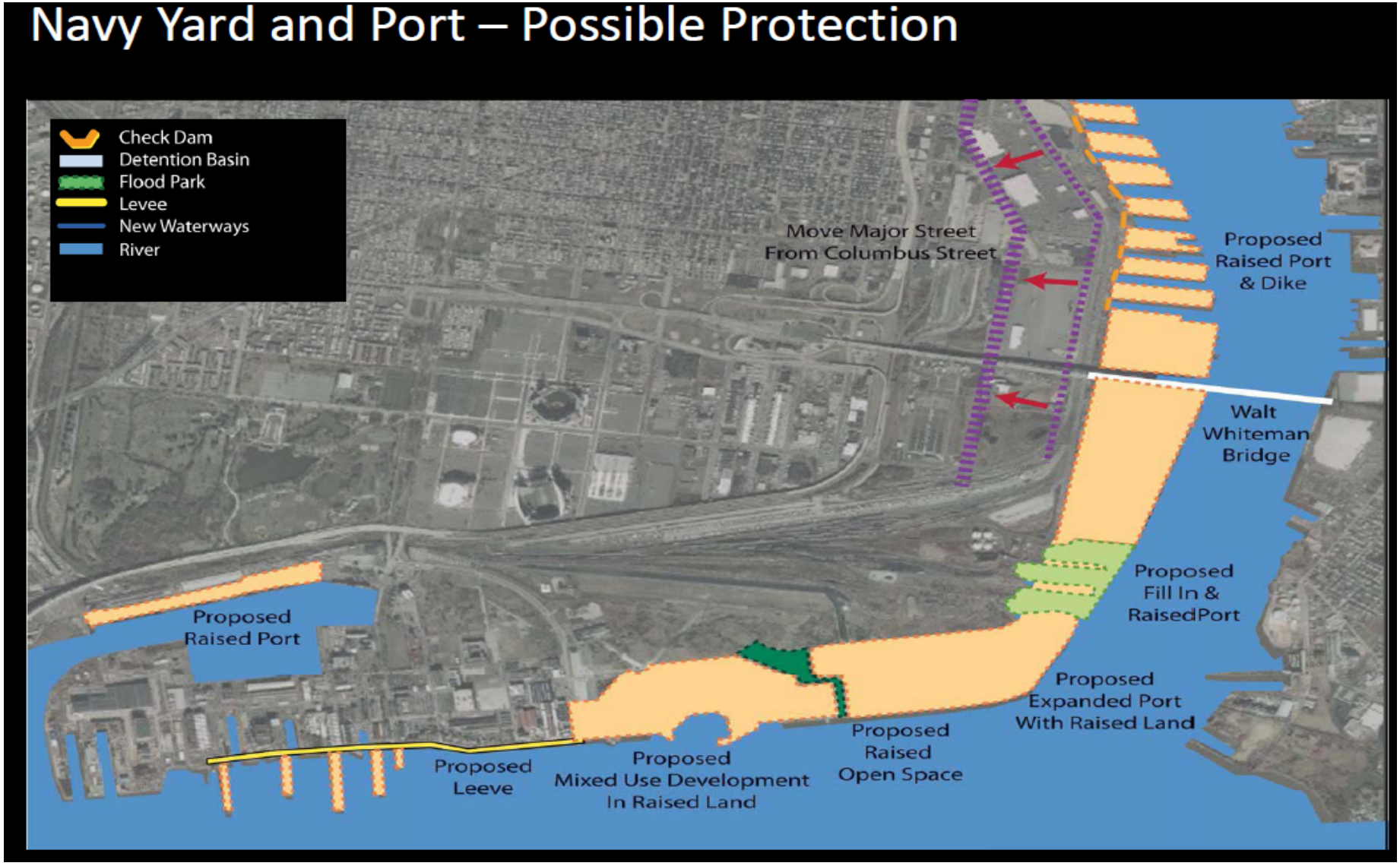
Devise Options
University of Pennsylvania



Increased rainfall volume and intensity

Priority Impacts:

- Increased street flooding, sewer backups and combined sewer overflows
- Increased landslide risk (Renfrew ravine, Point Grey)

Primary Actions:

- Integrated Stormwater Management Plan
- Sewer Separation

- 16 Supporting Actions

Stormwater Management Plan and Sewer Separation

On Sept. 19, 2010 heavy rainfall = 173 claims + 23 flood reports

- A portion of rainwater is kept out of sewer and stored or infiltrated back to ground instead
- More rainfall volume can be accommodated in existing system
- Techniques: Permeable pavement, direct to parks, infiltration on streets, water re-use/recycling
- Changes to policy, design practices, standards, bylaws

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Increased storm intensity and frequency

Priority Impacts:

- Safety and health risks
- Emergency management and response capacity taxed

Primary Actions:

- Develop a Back-up power policy

- 15 Supporting Actions

Back-up Power

2006 Windstorm: 100,000+ without power for multiple days

- Adding power must be done strategically given costs
- Where do we have it and where do we need it?
- Supply Chain → Fuel
- Important for all natural hazards - earthquakes

Critical Infrastructure

-Inconvenience
-Business Disruption
- Secondary impacts

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Hotter, drier summers

Priority Impacts:

- Safety and health risks for vulnerable populations
- water supply shortages

Primary Actions:

- Water conservation actions
- Expand extreme heat plan (Extreme Hot Weather Committee)

- 5 supporting actions

CANADA

Scorching summer weather P8

Expect a hotter-than-usual summer across Canada. Environment Canada predicts "above normal" temperatures throughout June, July and August.

CMI AGENCY FILE PHOTO

Water Conservation

Vancouver residents consume on average 320L/day.
No North Shore snowpack predicted by 2080

- Most cost effective to focus on conservation and demand side rather than adding supply infrastructure

- Greenest City high priority actions: Enhanced education, incentives and conservation programs

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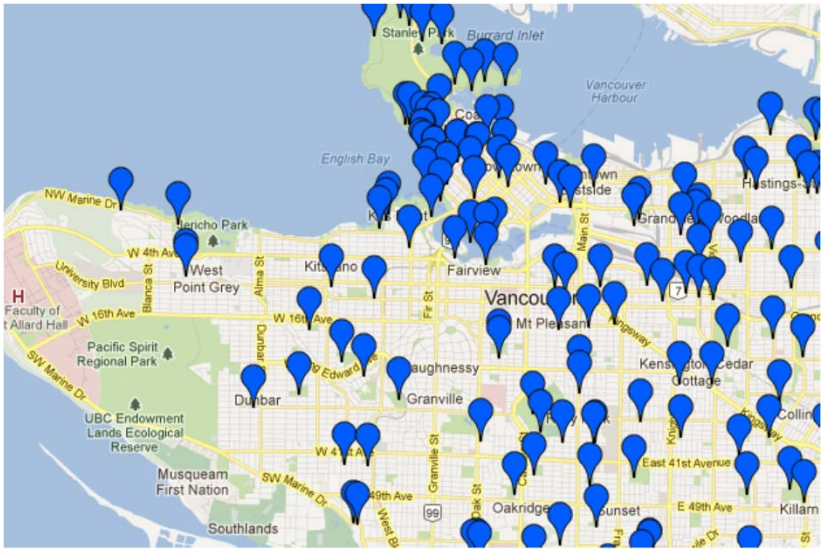
Extreme Heat Planning

Last extreme heat event in ‘09 reached highs of 34.4 degrees.
Estimated 122 excess deaths in the Lower Mainland.

- Vulnerable populations more at risk
- Policies for cool refuges, cooling capacity, cool rooms (Civic Facilities)
- Transportation, access to water, shade, patrols



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Combination of Changes

Priority Impacts:

- Buildings poorly designed for new conditions
- Decrease in the durability and lifetime of infrastructure
- Damage and loss of trees/plants

Source: The Vancouver Courier

Primary Actions:

- Complete an Urban Forest Management Plan
- Include climate change adaptation in the 2017 Building Bylaw update
- 13 Supporting Actions

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Urban Forest Management Plan

Rate of return on each tree planted estimated at $1.5 to $3 for every dollar invested

- Trees high value for mitigation and adaptation
- Maximize investment over the long-term by choosing appropriate species and locations, and ensuring integrated design and soil management.

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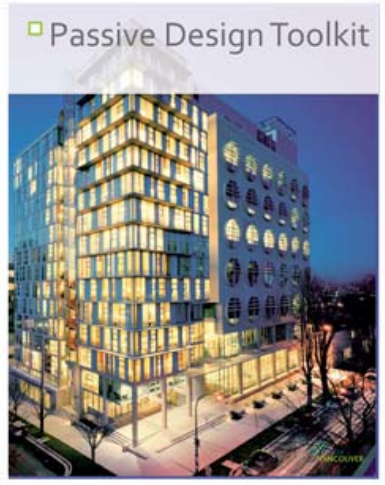
Building Bylaw Update 2017

25% increase in peak wind gusts can generate 650% increase in building damage claims

- Work with other levels of government and academics to reflect most up to date climate projections
- Consider:
  - Climate loads that reflect projections
  - reflective surfaces
  - roof drainage sufficient for heavy rainfall
  - evacuation plans
  - grey water use
  - Cooling as cooling degree days increase



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Existing Adaptation Actions

- Curtis Brick heat stroke death resulted in Extreme Heat Response Plan
- '06 windstorm lead to tree wind-firming measures and Stanley Park plan addressing climate change
- Water conservation efforts in place to decrease water consumption

Integrate Adaptation into how we do business

"Climate Change is exposing Canada's infrastructure to conditions it was not originally designed to withstand" Engineers Canada

- Opportunities taken: raised River District site by 1m
- Opportunities missed: raised seawall sections built in 2010/2011 by 0.3m
- Upfront Cost **<** increased maintenance, damage recovery, retrofitting later

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Primary Actions Summary

- Coastal Flood Risk Assessment
- Flood-proofing Policies
- Coastal Flood Risk Assessment
- Citywide Integrated Stormwater Management Plan
- Sewer Separation (In Progress)
- Back-up power policy
- Extreme Heat Planning
- Water Conservation (In Progress)
- Future Building Bylaw update
- Urban Forest Management Plan

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Thank You
Questions?