

EARTHQUAKE RISK IN Existing Privately OWNED BUILDINGS

NOVEMBER 12, 2024

Agenda

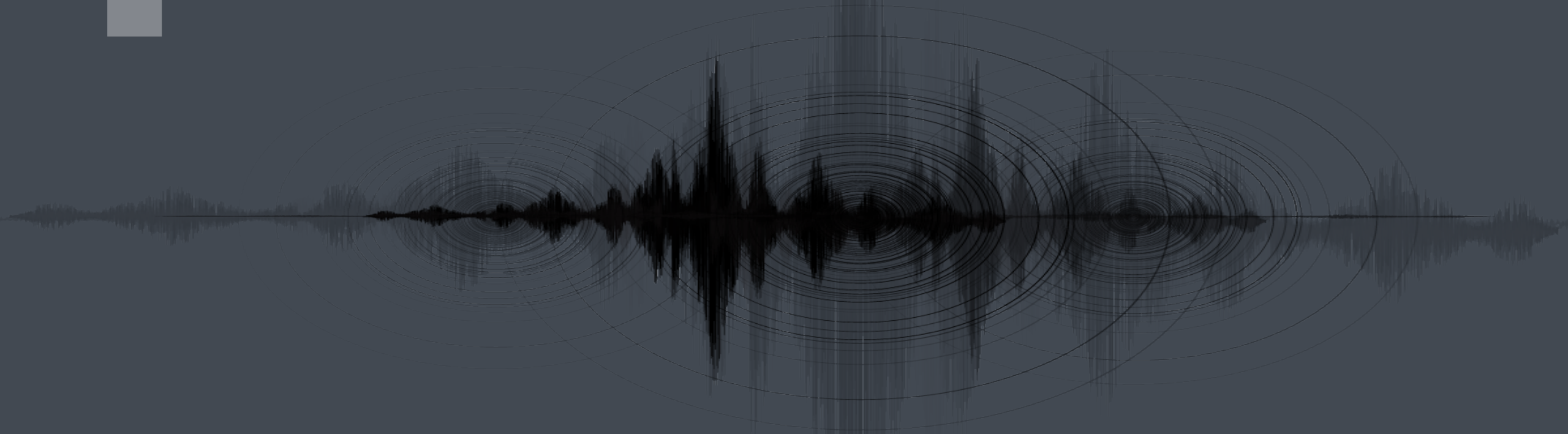
1. Earthquakes Background
2. Earthquake Planning & Roles
3. Earthquake Risk & Risk-Driving Buildings
4. Next Steps



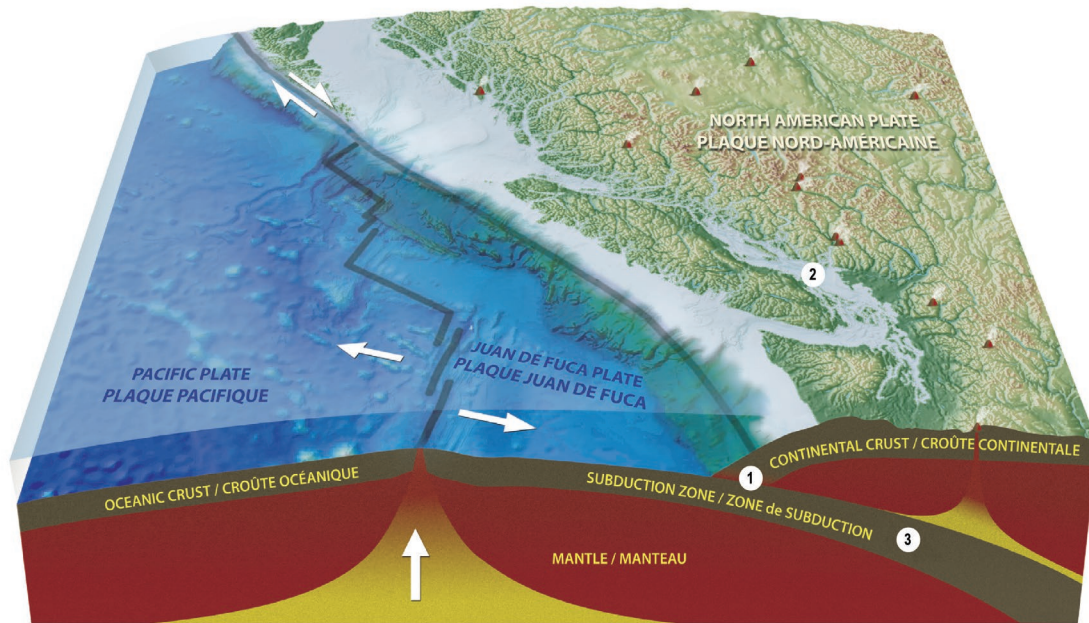
The City of Vancouver is on the unceded traditional territory of the Musqueam, Squamish and Tsleil-Waututh First Nations.

These lands are the foundation of thousands of years of living culture of the Musqueam, Squamish and Tsleil-Waututh peoples and their unique relations, Title, and rights in these territories remain intact.

1 Earthquakes Background



1 Earthquakes



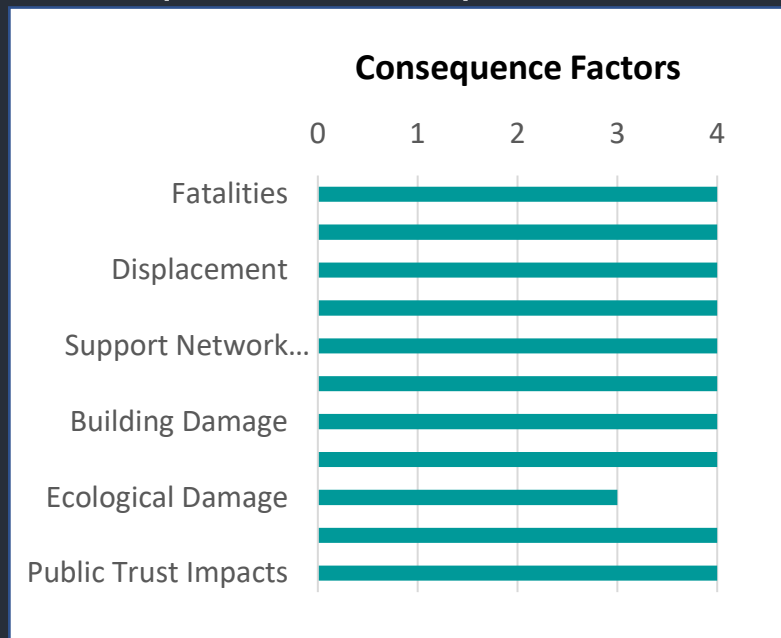
Source: Natural Resources Canada

**Models show a
1 in 5 chance
of a very strong
earthquake in the
next 50 years.**

The NZ \$40B 2010-11 Christchurch earthquake sequence occurred on a previously unknown fault line.

1 Earthquake Risk

HRVA, Earthquake Risk Profile,
Consequences of Earthquakes



0= none to 4 extreme

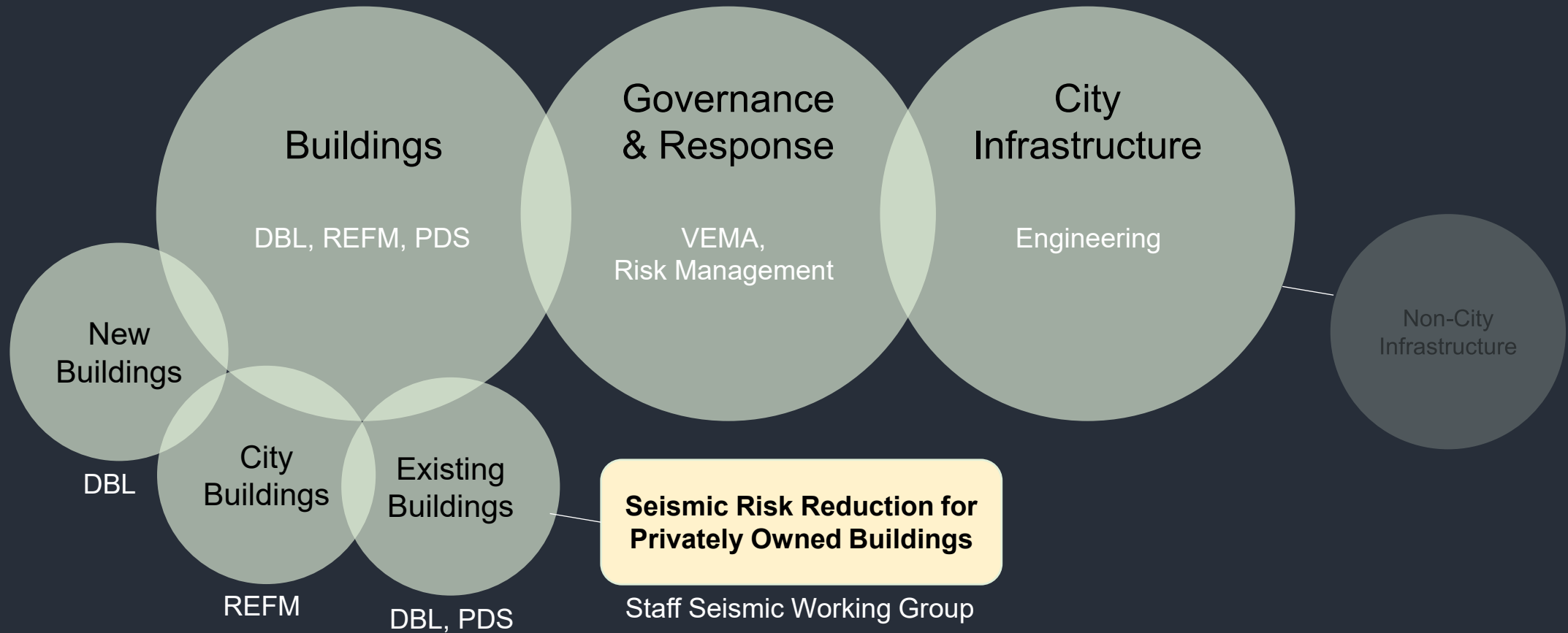
Earthquakes are the highest consequence hazard in the **City's 2024 Hazard, Risk, and Vulnerability Analysis**

The province adopted the nation's most advanced seismic standards into **the BC Building Code 2024**

The federal government has identified a BC earthquake as one of the three costliest disasters facing Canada

2 Earthquake Planning & Roles

2 City's Earthquake Risk Management



2 City's Risk Reduction Work

Existing Privately Owned Buildings

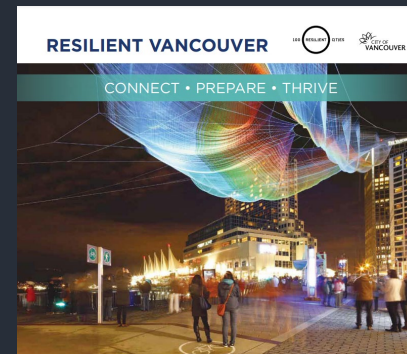
1973 & 1990
VBBL

2010 - 2011
CHRISTCHURCH
EARTHQUAKES



2013
EARTHQUAKE
PREPAREDNESS
STRATEGY

2022 - Ongoing
STAFF SEISMIC
WORKING GROUP



2019
RESILIENT
VANCOUVER
STRATEGY

2 The City's Role

in Risk Reduction for Privately Owned Buildings

- Vancouver's high density of older, at-risk buildings places it at unique risk across the province and nation
- Currently, the City reduces risk in a limited number of buildings, through VBBL Part 11
- Emergency response alone will not be sufficient to protect life safety and ensure recovery
- The VBBL and Charter provide the City tools to begin reducing risk

2 Senior Government

Earthquake Risk Management

- The BC Building Code 2024 contains the nation's most advanced seismic standards
- The Province has spent >\$1.3B in the last 20 years to retrofit schools
- The Province passed the Emergency and Disaster Management Act in 2023, targeting, in part, risk reduction planning at the municipal level
- The federal government completed a nation-wide risk profile in 2023 and recently launched an earthquake early warning

3 Earthquake Risk & Risk-Driving Buildings



3 Buildings Seismic Risk

Modelled using the M7.2 Georgia Strait Planning Scenario Earthquake

6,080 heavily damaged buildings, leading to:

230,520

residents disrupted &
displaced over
3 months

365,340

daytime building users
disrupted & displaced
over 3 months

As many as

1,370

severe injuries
& fatalities

\$17B

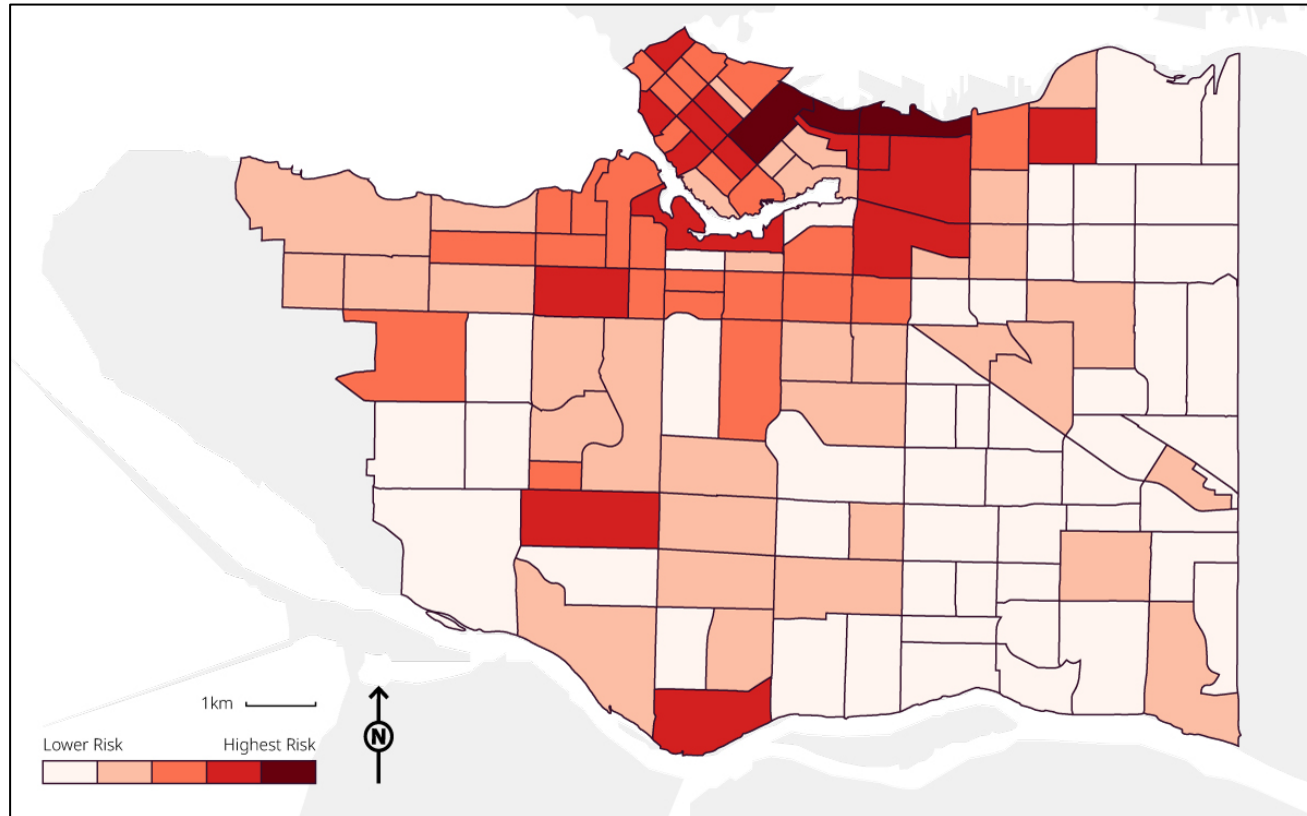
in direct financial
losses

Modelling does not include the contribution of infrastructure failure, delayed emergency response and recovery, aftershocks, and fire following earthquake. Heavily damaged buildings are red and yellow-tagged buildings. Direct financial losses include only replacement values. Severe injuries are those requiring immediate hospitalisation. Population figures are estimates only.

3

Neighbourhood Seismic Risk

Modelled using the M7.2 Georgia Strait Planning Scenario Earthquake



Six neighborhoods contribute nearly 65% of buildings seismic risk

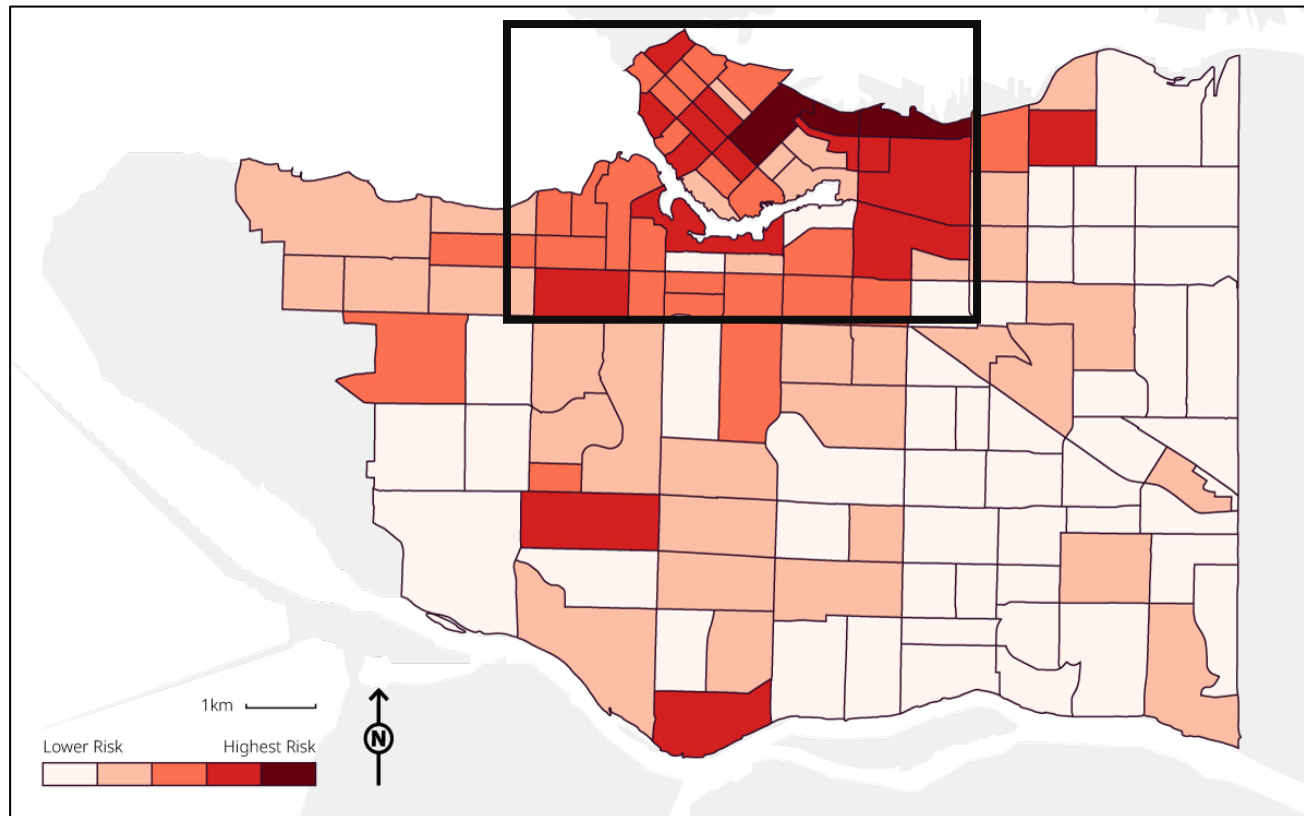
Relative Seismic Risk Map
By Census tract, Modelled M7.2 Georgia Strait Planning Scenario

Modelling supporting this map does not include the contribution of infrastructure failure, delayed emergency response and recovery, aftershocks, and fire following earthquake. Heavily damaged buildings are red and yellow-tagged buildings. Direct financial losses include only replacement values. Severe injuries are those requiring immediate hospitalisation. Population figures are estimates only.

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3 Risk of Cordoning

Cordoning is where access to all buildings – damaged and undamaged – in areas of concentrated damage is closed for weeks, months, or even years.



**Less than 10% of
buildings drive nearly
80% of risk.**

3 Risk Driving Building Types

Less than 10% of buildings drive nearly 80% of risk.

Risk-Driving Building Types	Approximate Count (% total buildings)
1. Concrete Mid- and High-rise Multiunit Residential Buildings	1,100 (1.2%)
2. Unreinforced Masonry Multiunit Residential Buildings	600 (0.6%)
3. Wood-framed Multiunit Residential Buildings	3,900 (4%)
4. Unreinforced Masonry, Wood, & Low-rise Concrete Commercial Buildings	2,700 (3%)
5. Concrete Mid- and High-rise Commercial Buildings	300 (0.3%)
	8,550 (9.5%)

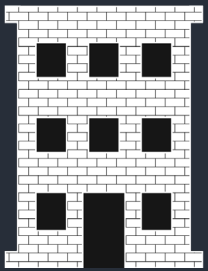
3 Risk Driving Building Types



1. Concrete mid- & high-rise multiunit residential buildings (MURBs)

- Concentrated in the West End, Downtown, containing many strata and 30% of purpose-built rental units
- Highest contributor to risk of residential casualties, driving nearly 40% (230) of modelled total
- Drive nearly 40% (85,000) of modelled long-term residential disruption and displacement
- Some buildings are at risk for partial or complete collapse, and many are expected to be not repairable

3 Risk Driving Building Types



2. Unreinforced masonry (URM) MURBs

- Concentrated in the Downtown Eastside and Gastown, including many SRO buildings
- Drive 30% (180) of modelled residential casualties
- Drive 10% (24,000) of modelled long-term residential disruption and displacement
- Very prone to partial or complete collapse, with additional severe impacts to sidewalk occupants and streets from falling debris

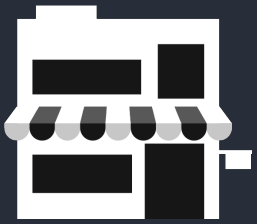
3 Risk Driving Building Types



3. Wood-framed MURBs

- Concentrated in Fairview, Kitsilano, Mount Pleasant and the West End, containing 40% of the city's purpose-built rental units
- Highest contributor to risk of long-term residential disruption and displacement, driving 45% (105,000) of modelled total
- Drive 20% (125) of modelled residential casualties
- Many buildings are expected to be uninhabitable or not repairable

3 Risk Driving Building Types



4. URM, wood, & low-rise concrete commercial buildings

- Contain nearly all small businesses, located along commercial high streets and arterials, and throughout Downtown
- Drive nearly 30% (380) of modelled daytime casualties
- Nearly 25% (86,000) of modelled daytime long-term disruption and displacement
- 1 in 3 buildings are modelled to be heavily damaged, with additional severe impacts from falling debris to sidewalk occupants and emergency response

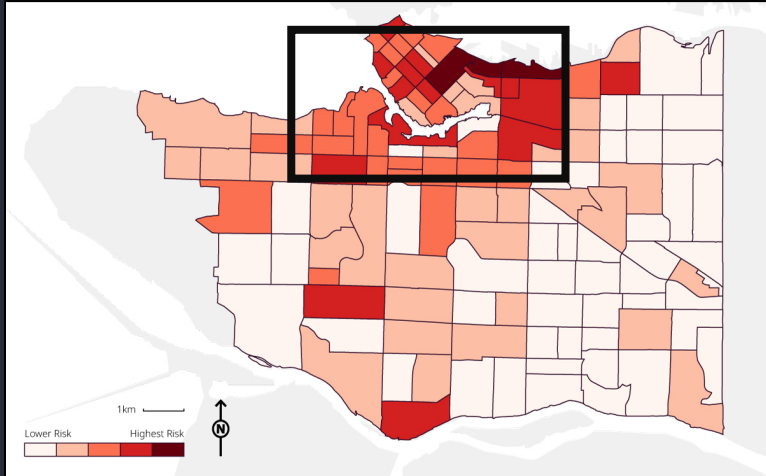
3 Risk Driving Building Types



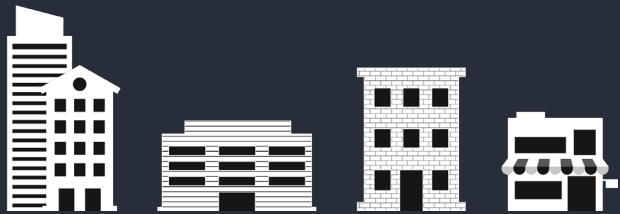
5. Concrete mid- and high-rise commercial buildings

- Concentrated in Downtown and along Broadway, containing many of the city and province's major employers.
- Drive 8% (110) of modelled daytime casualties
- Drive 8% (28,000) of modelled daytime long-term disruption and displacement
- Some buildings are at risk for partial or complete collapse, and many are expected to be not repairable

3 Community & Housing Impacts



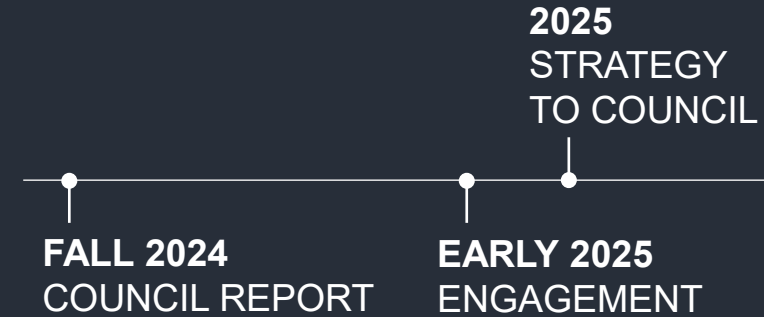
Highest-risk neighbourhoods contain nearly 70% renters. These renters are nearly 20% low-income, over 10% seniors, 30% identify as visible minorities, and 4% are Indigenous Peoples



Risk-driving building types contain the majority of housing units, including 80% of the purpose-built rental units

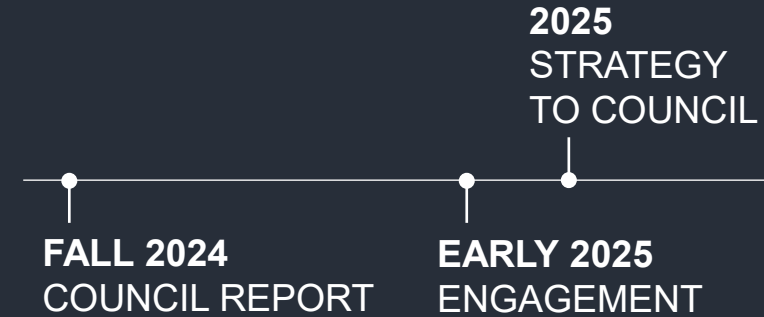
4 Next Steps

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1. Complete Staff Seismic Working Group development of risk reduction actions (Winter 2024-2025)
2. Seek input on potential risk reduction actions through stakeholder engagement (Early 2025)
3. Develop and seek Council adoption of strategy (2025)

4 Policy Option Considerations



Key Policy Option Development Considerations:

- Minimise tenant and small business **displacement**
- Minimise **cost** to owners, tenants, and small businesses
- Consider potential interactions with other **City priorities**
- Consider the **roles** of senior levels of government

4 Risk Reduction Actions



Potential Risk Reduction Actions

- At-risk **building inventory**, supported by **seismic screening**
- Nonmarket housing **pilots & support programs**
- Simplifications and enhancements to the **VBBL Part 11**
- **Land use planning** tools
- **Community & Owner education** programs

4 Public Education & Seismic Risk Reduction



- Develop owner education programs that make voluntary building upgrades clearer and easier
- Expand existing community and renter education programs about risk and preparedness
- Overall, build awareness and facilitate voluntary action where possible



4 Land Use & Seismic Risk Reduction

- Within existing area plans, redevelop at-risk building sites with new, more dense buildings
- Around 40% of risk-driving building type buildings are in rezoning-enabled areas or the Broadway Plan area
- Tenant protection framework is critical when considering redevelopment-based risk reduction.

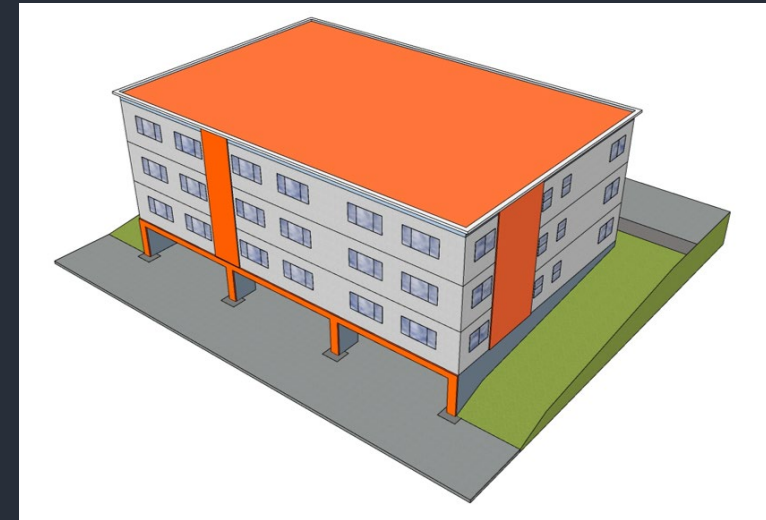


FIGURE: Typical wood MURB with seismic vulnerabilities (Ausenco, 2024)

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FIGURE: Broadway Plan tower renderings (2022)

4 Engagement



- Engaging On: Seismic risk and potential risk reduction policy actions
- Desired Outcome: Understand the risks and opportunities of potential actions to better inform recommended city policies and programs
- Stakeholders: Tenant groups, building owner and operator groups, industry
- Potential Partners: NRCan, Public Safety Canada, BC Building and Safety Standards Branch, and BC Ministry of Emergency Management and Climate Readiness

THANK YOU