



# Trans Mountain Pipeline Expansion Proposal (TMEP)

## Summary of Evidence

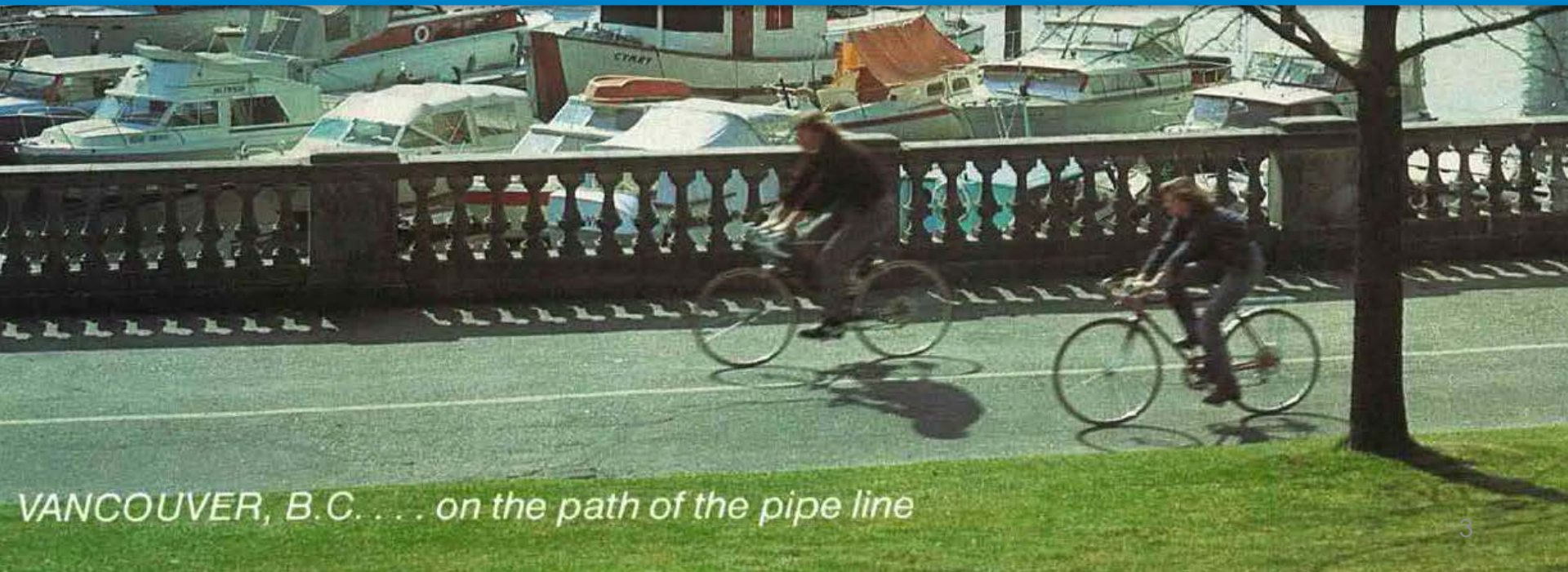
Council Presentation  
27 May 2015

- Background
- Key findings
  - Economic viability of the project
  - Risk and risk assessment
  - Spill impacts and preparedness
- Conclusion





# Background



VANCOUVER, B.C. . . . on the path of the pipe line

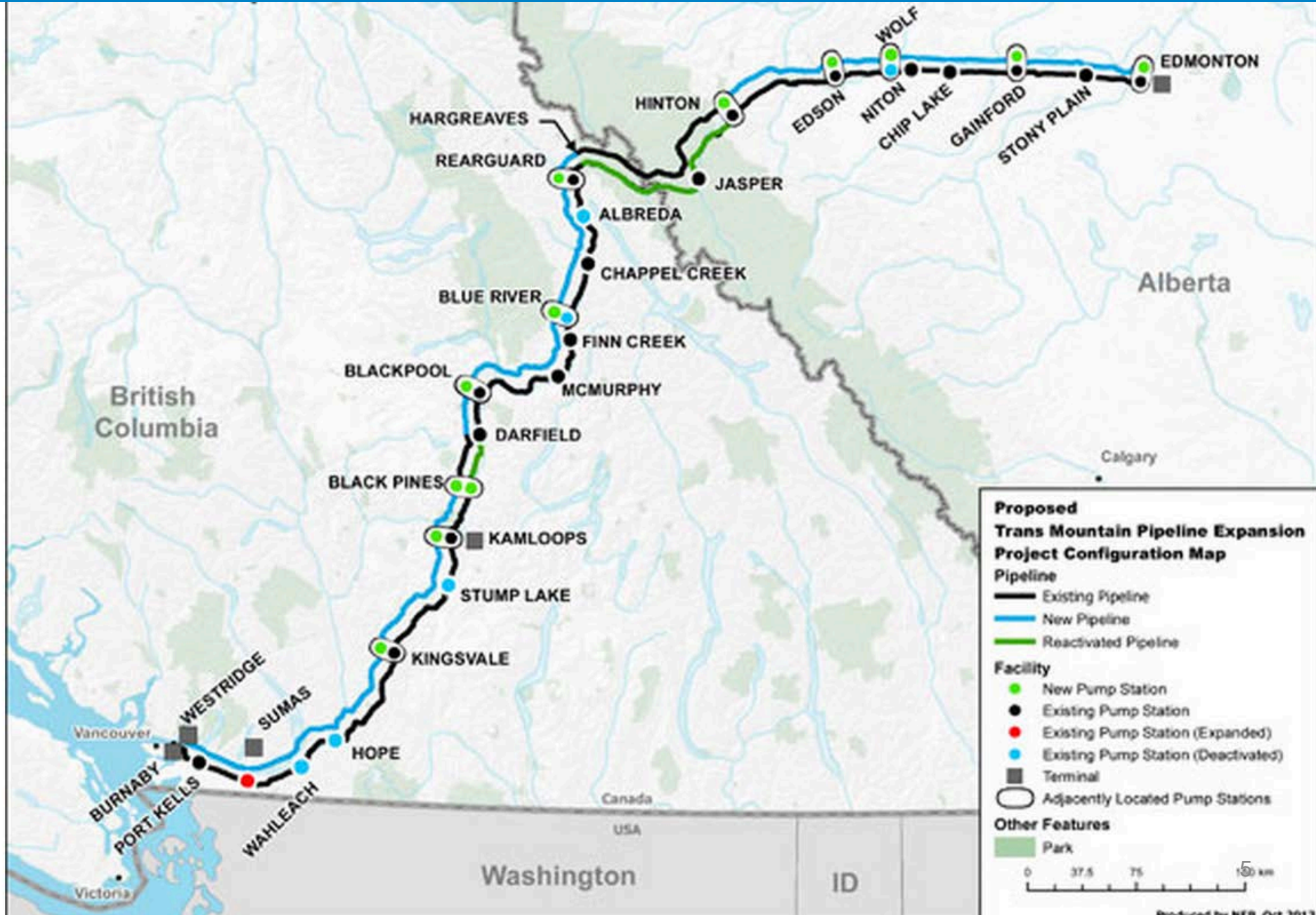
- In 2013 City staff were directed by Council to seek intervenor status in the NEB hearings
- The City was granted intervenor status in April 2014
- Today (May 27) the City files final evidence with NEB
  - Summary contains all the results of our research and analysis

## Key review themes:

1. The economic viability of the pipeline expansion within a climate constrained world
2. Risk of an oil spill from the expanded pipeline and increase in tankers
3. Impacts of an oil spill on Vancouver



# Background: Path of the Expanded Trans Mountain Pipeline



- Current pipeline capacity ~300,000 barrels
- Expanded capacity will increase to 890,000 barrels (300% increase) per day
  - Existing pipeline built in 1952-3 will continue to operate
- Majority of new capacity will be exported by tanker from Westridge Oil Terminal in Burnaby
- Docks at Westridge will triple in capacity
- Oil storage at Burnaby terminal will increase by 330% to 890,432 m<sup>3</sup> (~350 swimming pools)
- Passage of Oil Tankers through Burrard Inlet:
  - from 5 to 34 per month
  - ~ 212 million barrels of oil total per year

The project could have a major impact on Vancouver, including our:

## People

- 25,000 people live within 300m of Vancouver's waterfront

## Economy

- Our coastline supports ~98,800 jobs per year and \$9.7 billion in GDP

## Environment

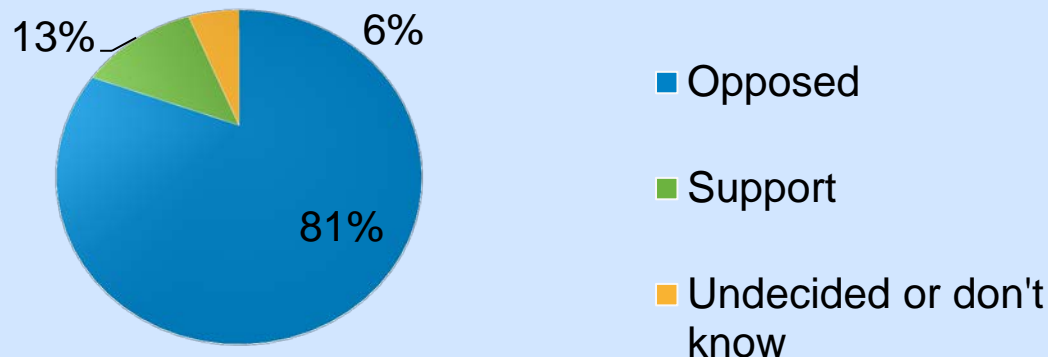
- Burrard Inlet and Fraser River estuary are some of the world's most important ecosystems
- Combined areas are inhabited seasonally by over 1 million sea- and shorebirds
- Vancouver has 0.17 square kilometres of natural shoreline

# Background: Public Engagement

To inform our position, we engaged with residents using the following tools:

- Online TalkVancouver survey (4994 responses)
- Public open space forum
- Infographics
- Driftcard oil spill experiment
- Pop-up City Hall
- City website and social media

Public Opinion on Trans Mountain Expansion



## Oil Spills Spread



### DAVE SPICER FOUND A DRIFT CARD AT SARGEANT BAY, SUNSHINE COAST

Kinder Morgan is proposing to triple the amount of oil that it carries by pipeline and increase the number of foreign bound tankers in Burrard Inlet from 5 to 34 a month.

On August 26, 2014, to model potential oil spill movements, the City of Vancouver, Raincoast

Conservation Foundation and Georgia Strait Alliance dropped biodegradable 'drift cards' where the proposed tankers will travel and where the pipeline crosses the Fraser River. The cards spread across the coast, and many washed ashore in days.

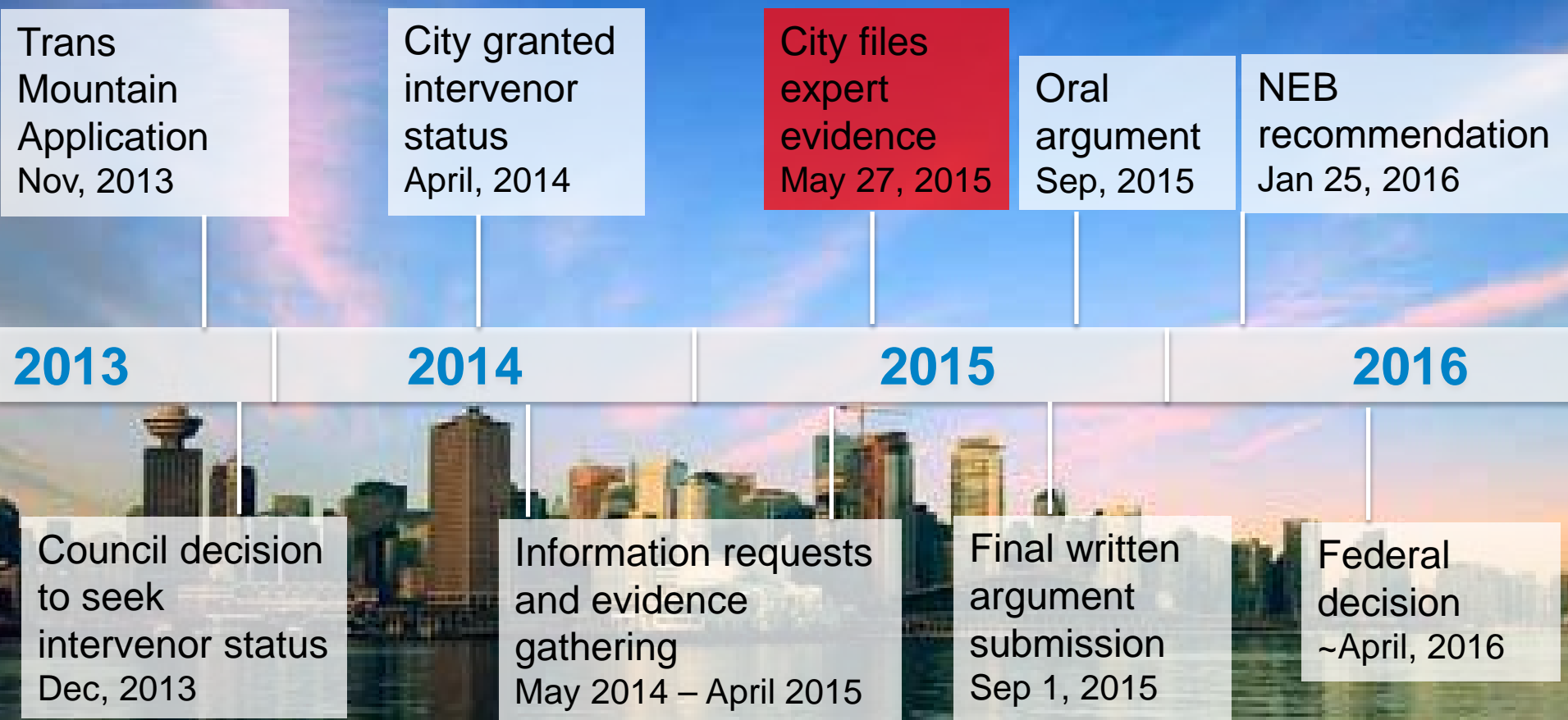
Learn more online and fill out our survey: [vancouver.ca/talktankers](http://vancouver.ca/talktankers)  
Spread the word at: #TalkTankers  
See the full map at: [salishseasplillmap.org](http://salishseasplillmap.org)







# Background: NEB Timeline and Process



## City assumptions:

- Expertise from outside City staff necessary for many of the key areas required
- Other partners share concerns (First Nations, neighboring Municipalities, Public Health officials, other key stakeholder organizations)
- Limited timeframe for development and submission of evidence
- Cost of developing submission significant
- Legal issues complex
- Goal: rigorous, evidence based submission to NEB

## City strategy:

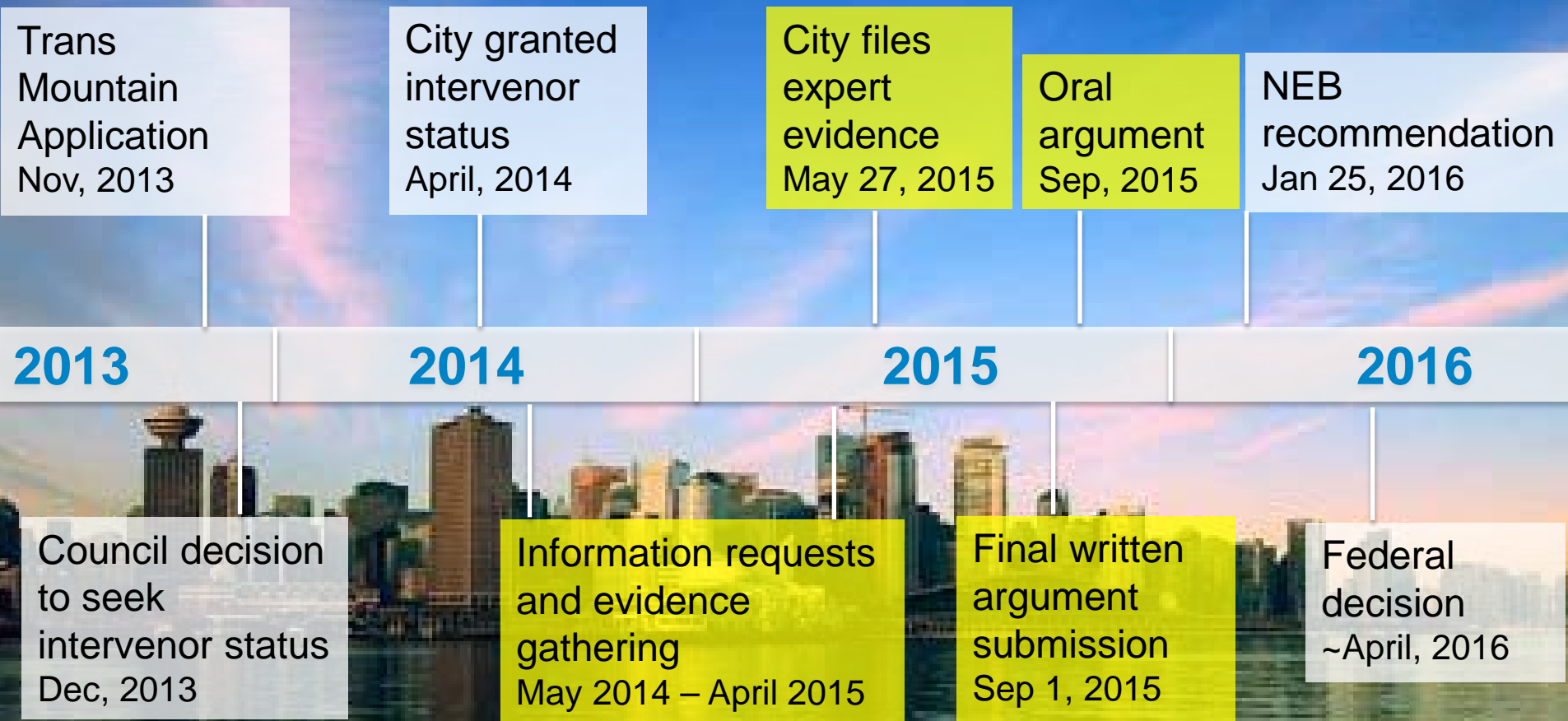
- Partner with others to prepare and fund evidence based submissions



## Experts contributing to research, science and analysis of COV submission:

- Economic viability of the project
  - Prof. M. Jaccard (SFU) – Energy economist
  - Prof. K. Harrison (UBC) – Political scientist and chemical engineer
- Risk assessment and history
  - Assoc. Prof. D. Etkin (York University) – Risk expert
  - Assoc. Prof. S. Kheraj (York University) – Historian
- Spill impacts and preparedness
  - Genwest Systems Inc. – Spill model developers
  - Nuka research and planning – Oil spill response experts
  - Dr. J. Short (JWS consultants) – Chemist and ecological impact specialist
  - J. Stone (Recovery and Relief Services) – Post disaster recovery cost experts
  - Prof. R Sumaila (UBC) – Marine economist
  - E. Baum (Brand Finance) – Brand valuers
  - Karen MacWilliams – Risk transfer expert

# Background: NEB Timeline and Process



## Broad concerns

- Changes to the *National Energy Board Act* introduced a requirement to make a recommendation within 18 months
- NEB was given powers under the *Canadian Environmental Assessment Act 2012* to undertake an assessment in the place of the Canadian Environmental Assessment Agency
- Members of the NEB are required, by statute, to “reside in, or within a reasonable commuting distance of, Calgary, Alberta”

## Specific concerns

- No general public input
- No oral cross examination
  - Removing the ability to ask direct questions of Kinder Morgan’s experts
- No input from intervenors on the NEB List of Issues for the hearing
  - Upstream and downstream GHG emissions excluded from the scope
- Short timelines and large volume of material to review
  - Application alone over 15,000 pages long
  - Critical reports (including seismic studies) filed late with the NEB
  - Geotechnical assessment of Westridge Marine Terminal filed late and only in draft



## Information request process

- Across two rounds of written information requests the City asked 1252 questions
- Kinder Morgan provided written responses to the questions
- In 40% of the City's questions the answers were, in the view of the City, unsatisfactory
- The City filed notices of motion with the NEB to compel a full response
- Despite City staff being of the view that Kinder Morgan's responses were inadequate the NEB ruled in its favor in nearly all of the cases
- Any questions related to the existing line were ruled to be irrelevant including:
  - The amount of taxes Kinder Morgan currently pays
  - The emergency management plans
  - The number of land slides and rock falls experienced
- When we asked for the professional opinions of their experts many times it was ruled to be a "fishing expedition"
- Inadequate time was given to review responses
  - As little as a 48 hour turnaround (on the late filed geotechnical reports)

Despite the issues with the information request process we did learn some facts:

**CoV:** What is the smallest leak size the leak detection system will be able to detect in terms of a release rate from the pipeline?

**KM:** Trans Mountain estimates that leaks below 75,000 litres per hour may not be detected.

**CoV:** How has DNV (marine risk assessment) addressed the potential for sabotage or acts of terrorism with respect to estimating the likelihood of accidents?

**KM:** Acts of sabotage and terrorism are not predictable, and thus cannot be evaluated through a quantitative risk assessment

**CoV:** Has a seismic liquefaction assessment report been completed for Trans Mountain at the Fraser River crossing

**KM:** No - A detailed site-specific seismic hazard assessment has not yet been performed at the Fraser River HDD crossing exit/entry points.

- Diluted bitumen (DilBit) is a mix of super-heavy crude bitumen and a diluent
- The diluent is unprocessed liquid condensate from natural gas extraction (a unrefined mix of hydrocarbons such as benzene, propane, butane, pentane, hexane, hydrogen sulfide etc.)
  - All of which are toxic and some carcinogenic
- When spilled on water the lighter compounds in the mix evaporate quickly
  - The lighter compounds in the vapour cloud are both flammable and noxious
  - The heavier compounds may start to sink into the water column making recovery significantly more difficult than conventional crude oil
- The export of DilBit has been approved by the NEB through a series of short term licences
  - No process for local stakeholders to raise concerns



Raw bitumen before it is diluted.



- **Economic viability of the project**
  - The proposed expansion is economically viable based on future growth of the oil sands
- **Risk assessment and history**
  - The history of spills and ruptures of the existing pipeline is not relevant
  - There is very low risk of a pipeline or a tanker spill
  - There is a good history of pipeline safety and the existing pipeline provides the justification for the location of the expansion
- **Spill impacts and preparedness**
  - The negative impacts are reasonable and manageable
  - There is good preparedness for an emergency and improvements will further enhance readiness
  - Diluted bitumen does not sink and is not different from conventional crudes

**Kinder Morgan:**  
**The benefits outweigh the costs and risks**

- Need for the project
  - The pipeline is not economically feasible in a carbon constrained world
- Risk assessment and history
  - Kinder Morgan's assessment has fundamental flaws that systematically underestimate the risks to Vancouver
  - The existing pipeline has a history of spills not acknowledged in their evidence and was approved with no environmental assessment
- Spill impacts and preparedness
  - A major oil spill would be a disaster for Vancouver's environment, economy, health and reputation
    - Even a less than "worse case" spill would be disastrous
  - There are significant gaps in preparedness for a major spill. City staff are working to improve systems but many of the issues are outside of our jurisdiction

**The risks and costs outweigh the benefits**



# Economic Viability of the Project

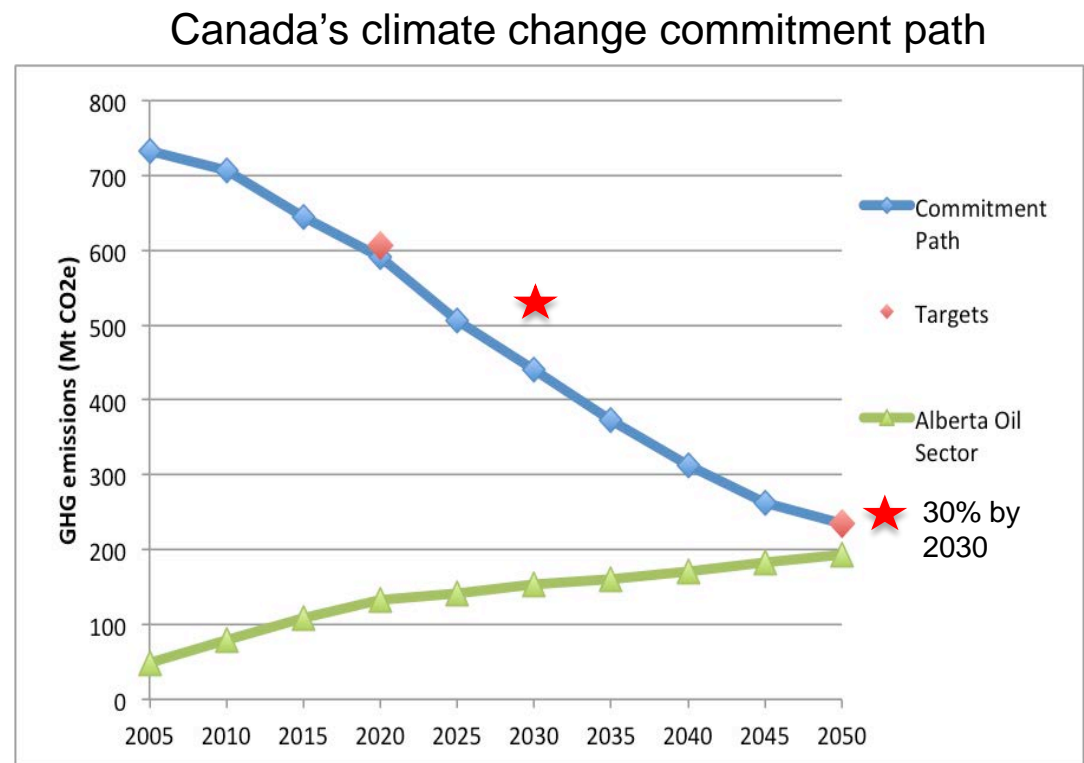
The City worked with Professors Jaccard (SFU) and Harrison (UBC) to evaluate the viability of the project

## Key findings:

1. Oil sands production growth forecasts do not consider Canada's international commitments to reducing CO<sub>2</sub><sub>e</sub> emissions
2. Emissions regulation is changing in key foreign markets that will gradually reduce demand for the pipeline
3. Long term oil price will be lower than projected as the world takes action to limit climate change. Therefore, Alberta's oil sands will not be economic to expand



- Canada has set targets to reduce GHG emissions
  - Recently announced targets are less stringent
- Oil sands are forecast to be the largest contributor to the growth in Canada's GHG emissions
- Canada's ability to meet these targets is challenged by the size of the impact from oil sand production
- Kinder Morgan's business case does not consider policy and regulation changes needed to meet these targets



## Foreign demand for oil in climate constrained world

- Carbon emission standards, in the transportation sector, have and will continue to be strengthened
- 5 key markets for TMP have regulations:
  - China and India have matched the strictest global standards for fuel efficiency in 2020 and 2021
  - Japan and South Korea are focusing on low carbon innovation
  - By 2025 California has set a target of 22% of new vehicles being zero emission
- This is projected to significantly reduce demand for Alberta's higher cost, heavy crude oil

# City Evidence – Oil Price Assumption (Jaccard)

NEB will not approve a pipeline if it is not going to be used and useful

## Kinder Morgan assumes a high price of oil









- Kinder Morgan's business case assumes long term average price of oil at \$94 per barrel (current price: \$59)
- Countries are taking action to reduce the GHG emissions to limit climate change to 2C
- This will lead to a decrease in demand for oil
- This declining demand creates a "buyers' market" of downward price pressure and zero profits for high cost producers
- Projections through modelling: by 2020 the long term average will be \$76 per barrel; by 2050 it will be \$39 per barrel
- Soon after 2030, the falling price of oil will render uneconomic all oil sands investments

The price of oil will be far below the level necessary to expand the oil sands, and the TMP expansion will not be "used and useful."

Expanded pipeline likely to be a "stranded asset"

## Global Climate change

- Atmospheric concentrations of GHG emissions are now at levels not seen in at least 800,000 years
- Global temperatures are likely to rise by 0.3C to 4.8C by the end of the century, depending on carbon controls
- Sea levels expected to rise further 26-82cm
- Projected frequent and intense storms and heat waves

Climate Variable	Summary of Change
	 Increase in average annual precipitation with a decrease in the summer.
	 Increase in average annual temperature with most notable change in night-time lows.
	 Rising Seas
	

The image is a composite. The top half shows a range of blue, hazy mountains under a clear sky. The bottom half is an aerial photograph of a city, likely Vancouver, showing a dense cluster of skyscrapers, a large bridge crossing a body of water, and a marina filled with boats. A solid blue horizontal band separates the two images, containing the title text.

# Risk Assessment



NEB required Kinder Morgan to assess the risk of a spill.

Kinder Morgan created their own assessment methodology. Their reported findings:

- There is very low risk of a pipeline or a tanker spill
- There is a good history of pipeline safety and the existing pipeline provides the justification for the location of the expansion

## Expert findings

(Assoc. Profs Etkin, Kheraj & Dr Short)

- Kinder Morgan's assessment has fundamental methodologic flaws that systematically underestimate the risks to Vancouver
- The existing pipeline has a history of spills not included in the application and was approved in 1951 with no environmental assessment

# City Evidence - History of TMP (Kheraj)

## 1951

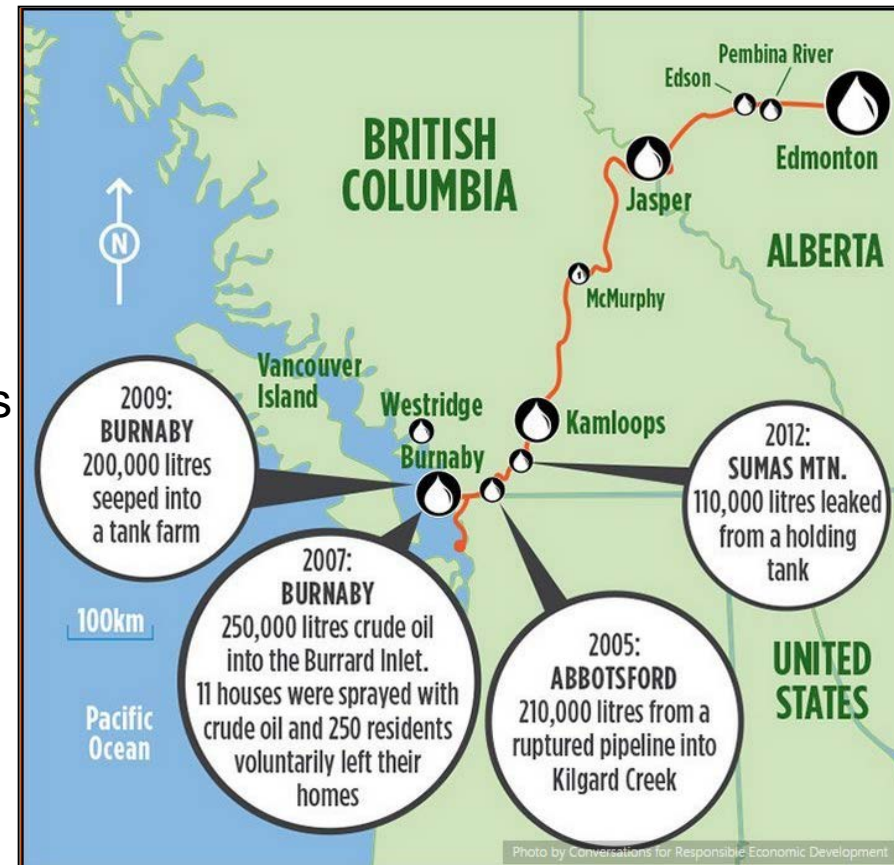
- TMP approved without public consultation or environmental assessment

## 1953

- Spill occurred the day TMP began operation

## 1961 – 2013

- 81 spill incidents reported to the NEB
- On average the pipeline has reported spills 1.5 times a year
- Spills of nearly 6 million litres have been uncontained
- The 2007 Burnaby oil spill resulted in oil being discharged into the Burrard Inlet
- Most damaging spills caused by faulty welds, human error and forces of nature
- Crude oil has not been shipped via tankers from Westridge for all of Trans Mountain's life



- International standards for risk assessment:
  - Assessment of both likelihood and consequence
  - For their analysis of risk in Burrard Inlet, Kinder Morgan did not meet this standard for assessing risk
- Kinder Morgan risk assessment methodology is flawed and underestimates risk of oil spills by excluding high consequence events (such as a tanker spill in Burrard Inlet)
- A spill at the terminal or in the Inlet over any 50-year period has a **79 to 87 per cent likelihood**
- Major gaps also identified in environmental risk assessment (ERA):
  - ERA considers environmental risk and consequences
  - Failed to adequately value the importance of the Fraser River ecosystem
  - Failed to consider all the ways that organisms could be exposed to oil

# Spill Impact Assessment



## Kinder Morgan's impact assessment

- “Spills represent low-probability events; the location and specifics of these events cannot be predicted.”
  - Did not analyze or model the impacts of a tanker spill in Burrard Inlet

## City's experts addressed the following:

- Where the oil would go in a Burrard Inlet spill (Genwest Systems)
- What happens when diluted bitumen spills (Dr Short)
- Assessment of the capacity to respond (Nuka research)
- Air quality impacts (Metro Vancouver led)
- Ecological impacts of a spill (Dr Short)
- Municipal costs (Recovery and Relief Services)
- Impact on marine industries (UBC Fisheries Economic Unit)
- Impact on Vancouver's brand (Brand Finance)
- Alternative risk transfer mechanisms (Karen MacWilliams)
- Lessons from Marathassa fuel spill (Nuka and City Staff)



# Where the Oil would Go (Genwest)

- Experts used computer model worst case oil spill scenarios at 4 locations in Burrard Inlet
- 50% - 90% of oil reaches shorelines in all scenarios



# The Results of a Diluted Bitumen Spill (Short)

- Diluted bitumen, once spilled rapidly loses the high-volatility components (benzene and others) which creates toxic vapour
- The bitumen component of diluted bitumen is naturally prone to submerging in fresh and brackish water
  - Burrard Inlet and Fraser River estuary surface water often brackish
- In warm summer temperatures and moderate winds, when there is more likely to be brackish water and wave action, spilled diluted bitumen may begin to submerge after about 24 hours

## Key Findings:

- During winter, the weather means a response to a spill is not possible 57% - 78% of time along the tanker route
- A 48 hour delay (caused by weather) during a 16,000,000L Outer Harbour spill could result in 11,000,000+ L of oil left in the environment
- Current response forces in Southern B.C. (WCMRC) have the capacity to recover only 10-20% of a worst case oil spill under favourable conditions
- If spill occurs at Port Mann Bridge crossing and the river is in high or very high flow, there may not be time to mobilize and deploy equipment before oil reaches the Lower Fraser Delta

## Key finding

- A major oil spill in Vancouver Harbour could result in significant air quality and health issues
  - Up to 1 million people potentially exposed to unsafe levels of Benzene
  - Up to 31,000 people exposed to Benzene levels that would cause health impacts (PAC-1)
  - On parts of the Stanley Park Seawall Benzene levels could cause irreversible health effects (PAC-2)
  - Other gases are projected to be at levels that have life-threatening health effects (PAC-3)

PAC-1: Mild, transient health effects

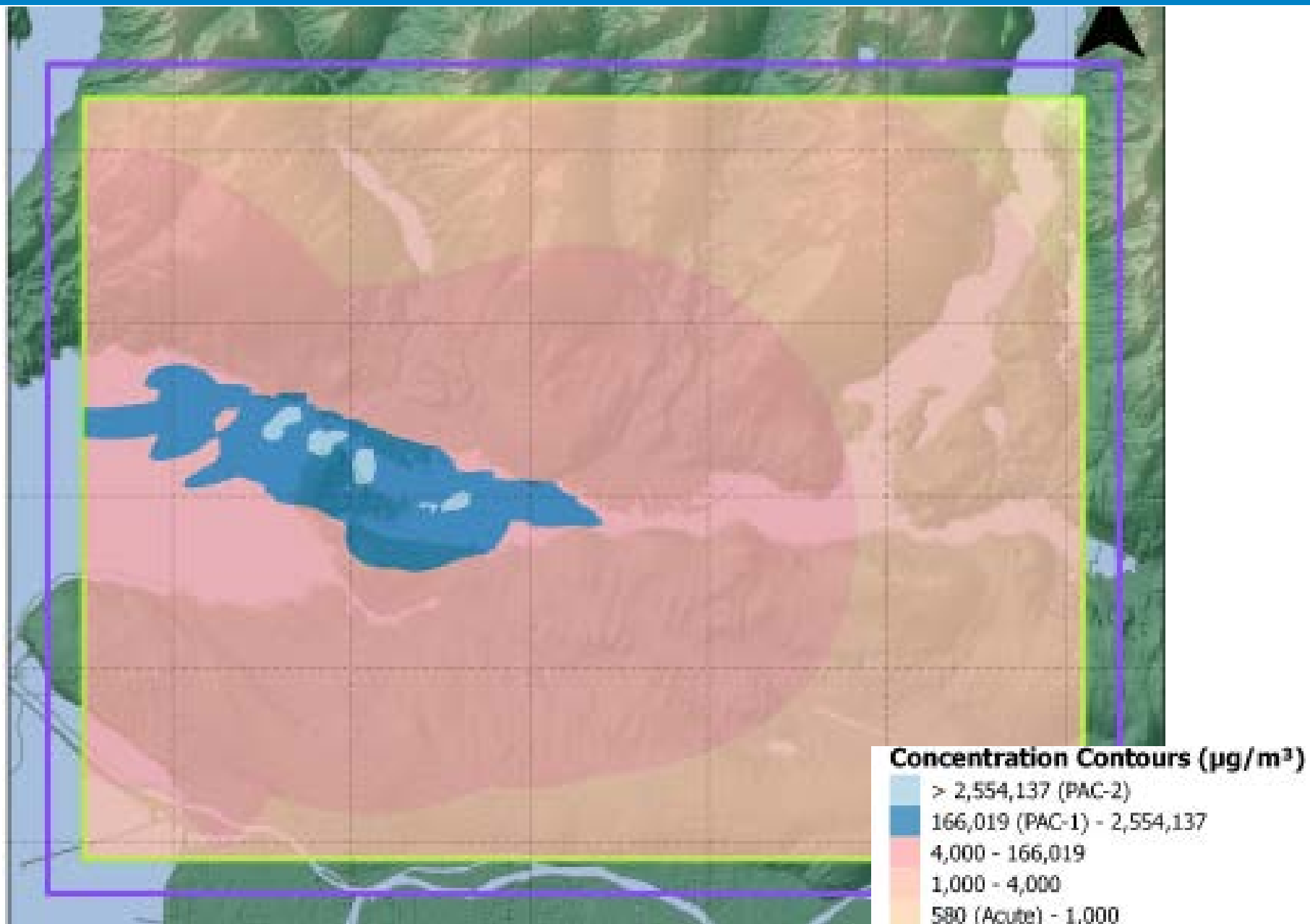
PAC-2: Irreversible or other serious health effects that could impair the ability to take protective action

PAC-3: Life-threatening health effects

### **Benzene exposure symptoms:**

Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction, nausea, and vomiting. Coma and possible death.

# Metro Vancouver Evidence – Air Quality Analysis





# City Evidence: Ecological Impact (Short)

## Key findings:

Salish Sea is one of the most ecologically important coastal marine habitats along the Pacific coast of North America

Impacts of a large diluted bitumen spill near the Fraser River Estuary:



Potentially more than 100,000 birds dead



The already endangered southern resident killer whale population would be jeopardized



Marine mammals, especially Harbour seals and Harbour porpoises would perish



Adult sockeye salmon would ingest small droplets of diluted bitumen

## Key Findings

- “All spills are local”
- In past spills municipalities have faced a range of costs and losses
  - Costs are estimated to be higher than actually formally documented to date by municipalities
- Significant solid waste can be generated needing safe disposal
  - Kalamazoo spill – 3,500 t of oil → 100,000t of waste (major diluted bitument spill)
- A catastrophic spill could present significant costs for the City

## Key Findings

- In 2013, Vancouver's ocean-dependent events attracted 417,000 tourists
- Local use of the beaches, seawall and waterfront contributes \$144-\$170 million in total output value
- Marine based industries employ 4% of Vancouverites
- A spill in May could create losses of:
  - \$380-1,230 million in output value
  - \$201-687 million in GDP
  - 3238-12881 PY of employment

## Key findings:

- Vancouver's Brand is worth: \$31bn
- Vancouver has a strong reputation, a diverse and growing economy – global brand is key to attracting business and investment in our city
- Our key differentiator to other cities is being seen as “green, clean and sustainable”
  - Vancouver's brand is more susceptible to an oil spill than comparator cities
- Expert analysis: An oil spill could impair the brand value by up to \$3bn
- Significant investment would be needed to rebuild the brand

- The total funds available for a tanker spill are capped at ~\$1.6B
  - spill impacts could be in tens of billions
  - The cap is the result of multiple components and accessing the \$1.6B cap is complex and not guaranteed
- The risk of a spill **will be** transferred to citizens and businesses
  - Risk expert commissioned to look at options to transfer some of Vancouver's financial risk to a third party

## Key findings:

- Financial instrument “catastrophe bond” (CatBond) is possible but limited
  - CatBonds are issued to investors who receive an annual return if the “triggering event” does not occur but may lose their investment if it does
  - For a CatBond of \$1 B, the likelihood of placement success is estimated at less than 20%.
  - The cost range will be 3.5% - 14% of the limit of coverage
    - For a \$1B bond: \$35 - 140m per year



- **Need**
  - The pipeline is not needed in a carbon constrained world
- **Risk**
  - The risks are very real and Kinder Morgan's assessment has fundamental flaws that systematically underestimate the risks to Vancouver
- **Impact**
  - A major oil spill would be a disaster for Vancouver's environment, economy, health and reputation
    - Even a less than "worse case" spill would be disastrous
  - There are significant gaps in preparedness for a major spill. City staff are working to improve systems but many of the issues are outside of our jurisdiction

**The risks and costs outweigh the benefits**