

NATIONAL ENERGY BOARD

IN THE MATTER OF the *National Energy Board Act*, RSC 1985 c N-7, as amended, and the Regulations made thereunder;

AND IN THE MATTER OF the *Canadian Environmental Assessment Act*, 2012, SC c 19, s. 52, as amended, and the Regulations made thereunder;

AND IN THE MATTER OF an application by Trans Mountain Pipeline ULC as General Partner of Trans Mountain L.P. for a Certificate of Public Convenience and Necessity and other related approvals pursuant to Part III of the *National Energy Board Act*.

FINAL ARGUMENT OF THE DISTRICT OF WEST VANCOUVER

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A. Introduction

1. These are the written submissions of the District of West Vancouver in National Energy Board (“NEB”) Hearing Order OH-001-2014 (the “Hearing”), regarding the application of Trans Mountain Pipeline ULC (“Trans Mountain” or the “proponent”) for the Trans Mountain Expansion Project (the proposed “Project”).
2. West Vancouver is a mountain side and ocean front community whose population, visitors and economy are focused around the municipality’s 30 km shoreline which lies along the north shore of Burrard Inlet and south shore of Howe Sound in the Strait of Georgia.
3. With the construction of the pipeline from Edmonton, Alberta to Burnaby, British Columbia, the Project would increase pipeline transport capacity from about 47,700 m³/d to 141,500 m³/d (i.e., 300,000 bbl/d to 890,000 bbl/d).¹This pipeline capacity increase would lead to an increase in marine shipping from the current 5 Aframax-class tankers a month to as many as 34 vessels a month from Westridge Terminal in Burnaby.
4. These tankers will travel from the Terminal through the Inner and Outer Harbours of Burrard Inlet, across the Fraser Delta and Georgia Strait, through the Gulf Islands and Haro Strait and into Juan de Fuca Strait before heading into the open Pacific Ocean.² These tankers will travel through some of the most densely populated areas in British Columbia, and through some of the most biologically productive, sensitive and ecologically important marine waters in Canada.
5. These tankers will travel and anchor along the shores of the District of West Vancouver in their journeys to and from the Westridge Marine Terminal.
6. These submissions address the particular impacts the Project would have on the municipality of West Vancouver through the increased marine shipping activities the Project would bring. West Vancouver is part of a family of ocean front communities that lies along the shores of Burrard Inlet, along with Squamish and Tsleil-Waututh First Nations, the District and City of North Vancouver, and the Cities of Port Moody, Burnaby and Vancouver. In many respects the impacts upon these communities will be felt in common; these submissions recognize that, while putting forward the particular position and perspective of the District of West Vancouver.
7. Similarly, the District of West Vancouver is part of the global community that will bear the atmospheric impacts of the extraction, processing, transport and burning of the petroleum the pipeline would be built to sell. West Vancouver does not, as a community, consider the proposed pipeline and marine shipping in isolation from these

¹ Trans Mountain Expansion Project, Volume 1, Summary ([A3S0Q7](#)) at p. 1

² Appendix A-3

atmospheric environmental effects. These effects will be the inexorable result of the proposed Project. It is the District of West Vancouver's position that there is no natural or rational distinction between the purpose of the Project and the means of carrying it out. The purpose of the Project is to extract bitumen from the oil sands in Alberta and to bring it to market for combustion. The pipeline and the marine tankers are the means of transporting it. The atmospheric environmental effects of the Project will be adverse and serious, and will be borne by present and future generations both locally and globally. Despite this, the NEB has curtailed the scope of this hearing to exclude consideration of these fundamentally important environmental effects of the Project.

8. However, even within the scope of the review established by the NEB—which excludes these effects—the District of West Vancouver has determined, based on evidence submitted by the proponent, that the proposed expansion Project will cause adverse local environmental and human health impacts through its operations, and would cause very significant harm in the event of a spill. **The Project will bring negative impacts and costs to the municipality through its regular operations, will burden the municipality with ongoing and significant risk of serious harm from accidents or malfunctions, and will, on the other hand, bring no local, and insufficient regional and national, benefits.**
9. The District of West Vancouver submits that the public interest is not served by the expansion Project, the Project is not required by present or future public convenience and necessity, and the significant adverse effects the Project will cause are not justified in the circumstances. In the result, the NEB should, in exercising its powers under s. 52(1)(a) of the *National Energy Board Act*³ and s. 29 of the *Canadian Environmental Assessment Act, 2012*⁴, recommend against approval of the Project.

I. Process

10. The District of West Vancouver applied to intervene in the NEB review of the proposed Project because the District will be directly affected by the seven-fold increase of marine shipping (from 5 to as many as 34 Aframax tankers per month) of diluted bitumen along its coastline.
11. The District of West Vancouver relies upon the regulatory processes established under the NEB Act and CEAA, 2012 to understand the nature and extent of the impacts upon the municipality from the proposed Project.
12. However, the District of West Vancouver has been hindered in its ability to come to a full and reliable understanding of the impacts of the proposed Project on our community due to the significant procedural limitations the NEB has placed on the Hearing. For example, the inability of intervenors to cross-examine the proponent on the evidence it has submitted in support of its application has not been remedied by the Information

³ R.S.C. 1985, c. N-7 (“NEB Act”)

⁴ S.C. 2012, c. 19, s. 52 (“CEAA, 2012”)

Request process. The NEB granted only approximately 5% of the motions brought by intervenors to compel the proponent to provide sufficient answers to the first round of Information Requests, and then only 3% of the motions arising from the second round. The District of West Vancouver relies upon senior governments to monitor and regulate important areas of public interest within their respective jurisdictions which will have significant bearing on the municipality and its inhabitants, and yet the NEB refused 100% of the Province of British Columbia's requests to compel sufficient answers from the proponent on fundamentally important issues such as: the safety record and operating history of Trans Mountain and its parent company, Kinder Morgan; the strength of the proponent's current and proposed emergency response plans; and the proponent's ability to respond effectively to spills.⁵ These are issues that directly affect the District of West Vancouver.

13. Despite participation as an intervenor in the NEB process, the District has been unable to obtain evidence from the proponent's application or responses to questions that demonstrates:
 - a) a comprehensive and reliable assessment of the operational impacts of the Project, including impacts on air quality which will directly affect West Vancouver residents,
 - b) a comprehensive and reliable assessment of the risks to the District of West Vancouver from the shipment of diluted bitumen by tanker along the West Vancouver coastline, and
 - c) a sufficient and coordinated emergency management plan in the event of a spill of bitumen in or near the waters that surround the District of West Vancouver.

14. While the District of West Vancouver recognizes that environmental assessment does not require certainty, it is, nevertheless, a science, fact and evidence based process whose purpose is in part to ensure that major decisions that will affect the environment and our population are not made in a vacuum, and are not purely political decisions.⁶ As set out below, the District of West Vancouver submits that the evidence put before the NEB by the proponent is not sufficient to allow the safe recommendation of the approval of the Project. Furthermore, based on the evidence that has been put forward by intervenors affected by the Project, the harms the Project would bring to local communities are significant, and are not outweighed by local or national benefits.

II. Public interest

15. Having reviewed the evidence and information requests that have been submitted in this process, the District of West Vancouver submits that it is not safe for the NEB to recommend that a certificate of public convenience and necessity or a decision statement authorizing the Project should be issued for the proposed Project based upon

⁵ Province of British Columbia, Notion of Motion #1 and Attachment ([A3Y8R3](#), [A3Y8R4](#)); National Energy Board, Ruling No. 33 and Appendix 1 ([A4C4H5](#), [A4C4H7](#))

⁶ See *Pembina Institute for Appropriate Development v. Canada (Attorney General)*, 2008 FC 302 at para. 72

the evidence the NEB has before it. The onus is on the proponent to establish that the public interest is served by the proposed Project,⁷ and in the District of West Vancouver's submission, the proponent has not met that burden.

16. The evidence put before the NEB by the proponent does not provide an adequate assessment of risk arising from the Project:
 - 1) It ignores the existing pipeline system, which must be taken into account in assessing the total risk borne by local communities from the proposed Project. Petroleum is already being shipped by the proponent through the marine shipping route adjacent to West Vancouver, however, the proponent's risk assessment does not take the existing pipeline system and shipping into account. This is contrary to established spill risk determination methodology.⁸ The coast of southern British Columbia is already recognized as one of the two most likely areas for a major oil spill to occur in Canada.⁹ Local residents need to understand the aggregate risk they face from the proposed increase in bitumen transport the Project proposes.
 - 2) It does not adequately assess the potential effects of the Project with respect to a credible worst-case oil spill scenario, and the associated impacts on air quality, human health, and environment.¹⁰
 - 3) It does not assess the risk of accidents and potential malfunctions at "representative locations along the marine shipping route", the selection of which must be informed by both probability and consequence of a spill, as directed by the NEB.¹¹
17. Furthermore, the risk that is borne by the local communities that must support the increased shipping of diluted bitumen along their shores is not fully captured by the review made in this NEB proceeding. **The review is restricted only to the "applied-for" capacity of 540,000 barrels a day, despite the fact that the new pipeline is**

⁷ See NEB Filing Manual (<https://www.neb-one.gc.ca/bts/ctrg/gnnb/flngmnl/flngmnl-eng.pdf>) at pp. 4-3 and 4-4.

⁸ See Tsiel-Waututh Nation, Record of Written Evidence, Volume 5 – Assessment of Spill Risk for the Trans Mountain Expansion Project, Drs. Thomas Gunton and Sean Broadbent ([A4L6A6](#)) (the "Gunton Report") at pp. 76-77, where the authors note that "A fundamental component of this [the OSRA] forecasting method is defining an appropriate exposure variable." They state that volume of oil handled is widely recommended as the exposure variable in the OSRA, as spill occurrence estimates "depend fundamentally on the estimated amount of oil to be produced". The authors review the formula for determining the probability of spills, which bases the rate at which spills occur on historic spill occurrence data per volume of oil produced/transported. By failing to take the existing pipeline system and shipping into account in its risk assessment, the proponent may be underestimating the actual risk posed by the Project.

⁹ Metro Vancouver, Written Submissions, Exhibit 30 – Supplementary Report Supporting Environmental Evidence for Metro Vancouver, Zoetica Environmental Research Services ([A4TOR7](#)) at p. 79

¹⁰ See Part C. III

¹¹ National Energy Board letter to Trans Mountain, dated 10 September 2013 and attachment entitled "Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities" ([A3K9I1](#); [A3K9I2](#)) ("NEB Filing Requirements") at p. 2 of attachment; City of Vancouver, Written Evidence, Appendix 3 – Fate and Effects of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary ([A4L7W1](#)) ("JWS Report") at p. 20

designed to carry 780,000 barrels a day (for a total system capacity of 1.1 billion barrels a day). Accordingly, if the proposed Expansion Project is approved, the District of West Vancouver faces a future with even greater operational impacts and increased risk than what is before the NEB in this application. The Board has, however, restricted its review to the applied for 540,000 barrels a day.

18. **The District of West Vancouver will not have future opportunity to have the full risk and impacts it will bear from full capacity throughput—and the increased marine traffic that throughput will cause—reviewed by the regulator.** The increased throughput will not come within the definition of a designated project under the *Canadian Environmental Assessment Act, 2012*¹², nor will it trigger a s. 52 review under the *National Energy Board Act*.¹³
19. The evidence submitted by the proponent also fails to adequately assess the operational impacts the Project would have on the District of West Vancouver and other communities:
 - 1) The application does not adequately assess the full scope of emissions from the marine shipping activities of the Project, nor, as a result, does it assess the full impacts on air quality and human health in a region that the NEB has already acknowledged has a limited capacity to accommodate additional pollutants.¹⁴
 - 2) The application does not sufficiently assess the noise and light pollution impacts that the District of West Vancouver and other communities will face from the increased anchorage and transit of tankers along their shores.¹⁵
 - 3) The current review and the evidence submitted by the proponent ignore the operational impacts of greenhouse gas emissions and resultant impacts on climate from the extraction and processing of the petroleum and the combustion of the petroleum.¹⁶
20. Shortcomings in the evidence submitted by the proponent have been addressed in part by evidence submitted by intervenors in this proceeding. As the District of West Vancouver sets out in these submissions, evidence submitted by intervenors to this proceeding demonstrates that the operational impacts of the proposed Project on local communities will be significant, as will the risk to those communities from Project accidents or malfunctions.

¹² See CEAA, 2012, s. 2(1) and *Regulations Designating Physical Activities*, SOR/2012-147. The Minister may, by order, designate a physical activity that is not prescribed by the regulation as a designated project pursuant to section 14(2) of the Act.

¹³ NEB Act, s. 52

¹⁴ See Parts B. I.; NEB Reasons for Decision, Sumas Energy 2, Inc, EH-1-2000, Section 8.3.2 Other Burdens Associated with the Power Plant (<http://publications.gc.ca/collections/Collection/NE22-1-2004-1E.pdf>) at pp. 96-97

¹⁵ See Part B. III

¹⁶ See Part B. II

21. West Vancouver is part of a family of ocean front communities along Burrard Inlet with more than a million inhabitants, with 42,500 in West Vancouver itself. West Vancouver shares important economic, infrastructure and demographic characteristics with the City of Vancouver: (i) density of population in close proximity to Vancouver Harbour and English Bay in Burrard Inlet, (ii) transportation infrastructure that is dependent upon crossing Burrard Inlet, (iii) extensive shoreline, (iv) wildlife supported by ocean, rivers and creeks, (v) marine-dependant economic and recreational activities.¹⁷ As the City of Vancouver's evidence recognizes, the sandy beaches, seawalls and calm ocean waters that skirt the shorelines of Vancouver and West Vancouver contribute to our global reputation for high quality of life and livability. These factors also drive our local economies based on ocean-dependent economic activities: commercial fishing, tourism and recreation.¹⁸ The health of these economic activities depends upon the health of our local marine environment. Moreover, as the evidence submitted by the City of Vancouver establishes, the local economic benefits of these ocean-dependent economic activities far outweighs even the proponent's assessment of local economic benefits of the construction and operation of the proposed Project; according to these calculations, **ocean-dependent activities in Vancouver produce greater economic benefit in one year than the Project is expected to produce over a 25-year period in present value terms:**

“Ocean-dependent activities in Vancouver are estimated to currently contribute a total of \$6,430-\$6,700 million Canadian Dollars (CAD) in output value, 32,520-36,680 PYs of employment and \$3,061-\$3,261 million in GDP to the Vancouver economy each year.

According to Hodgson (2014), the construction and operation phases of the proposed Trans Mountain Expansion Project are estimated to produce total economic effects of \$2,700 million in output value, 5,758 PY in employment and \$1,800 million in GDP to the Vancouver economy, in present value terms, over a

¹⁷ City of Vancouver, Written Evidence ([A4L7V8](#)) at pp. 31-32

¹⁸ City of Vancouver, Written Evidence, Appendix 83 – Potential economic impacts of a tanker spill on ocean-dependent activities in Vancouver, British Columbia, Rashid Sumaila, PhD ([A4L9G4](#)) (“Sumaila Report”) at p. 11:

“Tourism is a major economic driver in BC with 6.5 percent of British Columbians being employed in tourism-related activities in 2012 (Hallin 2014). Within BC, the Vancouver, Coast & Mountains Region (VCM) employs 64 percent of the province's tourism sector (Tourism BC 2012).

On average, Metro Vancouver attracts over eight million overnight visitors per year (Tourism Vancouver 2012) while the Vancouver, Coast & Mountains Region captures 57.8 percent of tourism business in the Province of BC (Destination BC 2012). Outdoor recreation activities were reported as the primary motivator for 48 percent of those likely to take a trip to the Vancouver, Coast & Mountains Region, followed by experiencing scenery and nature (32%) and to relax and unwind (16%) (Tourism BC 2012). Water-based outdoor activities motivated 33 percent of Canadian travellers' vacation plans, while 64 percent reported participating in water-based outdoor activities even if they were not the primary reason for travel (Tourism BC, TAMS CAD 2007).”

25-year period. It is worth noting that estimates provided by Hodgson (2014) have not been verified within this study.”¹⁹

22. West Vancouver also shares the concerns of neighbouring communities, including the issues so effectively raised in this proceeding by the Tsleil-Waututh Nation:

“The Salish Sea, and especially Burrard Inlet and the Fraser River estuary, is one of the most ecologically important coastal marine habitats along the entire Pacific coast of North America. It is seasonally inhabited by over a million sea- and shorebirds, including more than 30% of the global population of snow geese. It is one of just 6 sites along the west coast of North America of international and hemispheric importance. It is the only site of comparable ecological importance from the Canadian border with the State of Washington to the Copper River delta in Alaska.

The Fraser River is the largest single salmon-producing river on the Pacific Coast of North America (including Alaska), supporting runs of sockeye salmon (*Oncorhynchus nerka*) that can number in the tens of millions, along with major runs of chinook (*O. tshawytscha*), chum (*O. keta*), pink (*O. gorbuscha*) and coho (*O. kisutch*) salmon, as well as steelhead trout (*O. mykiss*). These returning adult salmon support several species of marine mammals, including the endangered southern resident killer whale (*Orcinus orca*) stock, commercial fisheries worth millions of dollars, and subsistence harvests for First Nations that depend on them for maintaining their cultural heritage as well as for nutrition. Juvenile salmon out-migrating from the Fraser River depend on the estuary’s high biological productivity and in turn provide forage for the seabirds.

The combined aggregations of extraordinarily high densities and numbers of sea- and shorebirds, marine mammals and fish make them especially vulnerable to potentially devastating mortalities should a major oil spill occur in Burrard Inlet or the Fraser River estuary as a result of the Project.”²⁰

23. At a local level, the District of West Vancouver will suffer no appreciable benefits from the proposed Project but will suffer daily adverse operational impacts, including impacts to air and human health, and will bear the tremendous risk to its environment, inhabitants and economy of a spill or spills from the greatly increased marine shipping activities associated with the Project.

¹⁹ Sumaila Report at p. 4. The calculations in the Sumaila Report are based on the November 21, 2014 Conference Board of Canada report “The Trans Mountain Expansion Project: Understanding the Economic Benefits for Canada and its Regions” which was amended and resubmitted by Trans Mountain on September 21, 2015 ([A4T6F1](#)). While the revised Conference Board of Canada Report predicts annual revenue, person-years of employment and GDP in excess of the original report, these revisions do not appear to be significant enough to affect the conclusions in the Sumaila Report regarding the cost-benefit analysis for Vancouver and neighbouring municipalities with ocean-dependent economies.

²⁰ JWS Report at pp. 1-2, as cited by Tsleil-Waututh Nation ([A4L6A8](#))

24. At a regional and even national level, benefits of the Project do not outweigh its significant costs.
- “According to a study by Goodman & Rowan (2014), conducted in collaboration with The Centre for Public Policy Research at Simon Fraser University, BC will receive less than two percent of the total revenue generated by the Trans Mountain Expansion Project over its lifespan. In comparison, the oil and gas industry will retain 68 percent of total revenue and Alberta and other provinces will receive 31 percent in the form of royalties, corporate income taxes and transfer payments. Thus, it is projected that the citizens of Metro Vancouver will bear a disproportionate share of the risk of a spill relative to project benefits.”²¹
 - “Our benefit cost analysis shows that:
 - a) Under base case assumptions the TMEP results in a net cost to Canada of \$7.4 billion
 - b) Net costs could range between \$4.6 and \$23.0 billion based on different scenarios and assumptions. Fewer new transportation projects, higher oil production, and lower environmental costs reduce the net costs while more new transportation projects, lower oil production, and higher environmental impacts increase the net costs. We also included a sensitivity that incorporated potential option and diversification values provided by the TMEP accessing new markets with higher oil prices. Under all scenarios tested, construction of the TMEP as planned will result in a net cost to Canada.”²²
25. Based upon the evidence that has been put before the NEB, the District of West Vancouver submits that **the NEB should recommend against the issuance of a certificate or decision statement approving the proposed Project.** This is based upon both the operational impacts that the District of West Vancouver and surrounding areas will suffer from the routine operations of the proposed Project, as well as on the risk of the impacts that will be suffered in the event of spills resulting from malfunctions or

²¹ Sumaila Report at p. 53

²²Tsawout First Nation, Public Interest Evaluation of the TMEP (December 2015) ([A4W0Q9](#)) at p. iii; See also Metro Vancouver, Written Evidence ([A4L7Y3](#)) at p. 70 where it is stated:

“The economic analysis describing the benefits and costs of the Project is contained in the Conference Board of Canada Document “The Trans Mountain Expansion Project Understanding the Economic Benefits for Canada and its Regions”. Rather than measure benefits of the Project it details economic impacts of the Project. Capital costs and operating costs generate economic impacts in proportion to their scale but may not generate net benefits when compared to alternative uses of scarce resources such as capital. For example, a project to construct a large building and then immediately tear it down will generate large, positive economic impacts using input-output model methods but would certainly not be seen as desirable by a reasonable person and would not produce a positive net present value using cost-benefit analysis.”

accidents in or near the waters along West Vancouver's shoreline. These harms are not in the public interest, and are not outweighed by local, regional or national benefits.

B. Operational Impacts

26. West Vancouver is a municipality that is geographically, socially and economically configured around the ocean front. Our population density is focused around the waterfront in the Ambleside and Dundarave neighbourhoods, and many of our residential areas on the hills and mountains abutting the shore are configured toward the ocean. Our commercial and recreational centers, which draw multitudes of people from well beyond our municipal boundaries, are on the roads, parks and beaches along our waterfront.
27. **All of these will be impacted by the regular shipping operations of the proposed Project. The shipping operations will add approximately 380 vessel calls to Burrard Inlet every year, with average time at anchor estimated at 20 hours by the proponent, but at 70 hours by Environment Canada.**²³ Both anchorage and transit involve 24 hour a day noise, light and air pollution that will adversely impact West Vancouver as set out below.

I. Air Quality and Human Health

28. As a municipality, the District of West Vancouver relies upon the government bodies that have jurisdiction and expertise in air quality regulation to assess the potential air quality impacts of the Project on the District and its residents. The District therefore relies upon the evidence of Environment Canada and Fraser Health and Vancouver Coastal Health (the "Health Authorities") and the Lower Fraser Valley Air Quality Coordinating Committee ("LFVAQCC") (with representatives from Metro Vancouver, the Fraser Valley Regional District and other agencies in Canada and Washington) in this proceeding. A review of the evidence submitted by these bodies gives rise to significant concerns for the District of West Vancouver, and demonstrates:
 - 1) It is not safe or in the public interest to approve the additional marine shipping activities associated with the Project based upon the evidence that is before the NEB, which reveals that the proponent has underestimated the following emissions:
 - a. **NOx emissions could be underestimated by as much as 37% (or 750 tonnes annually);**²⁴
 - b. **Volatile Organic Compound (VOC) emissions are underestimated by approximately 800 tonnes/year of fugitive VOCs during anchorage alone;**²⁵

²³ Environment Canada, Written Evidence ([A4L8Y6](#)) at pp. 89-95

²⁴ Environment Canada, Written Evidence at p. 95

²⁵ Environment Canada, Written Evidence at p. 94

- c. **Particulate Matter emissions are expected to have been underestimated by about 20% due to the exclusion of boiler emissions by the proponent;**²⁶
 - d. **Additionally, marine emissions are predicted to increase by 89,586 tonnes of CO₂e per year as a result of the Project.**²⁷
- 2) Increase of these emissions risk significant adverse health impacts for local residents:
- a. **NOx and Volatile Organic Compounds**: NOx and VOCs are precursors to the formation of tropospheric or ground level ozone, “which is an air pollutant of particular concern in the Metro Vancouver region.”²⁸ Exposure to ground level ozone has adverse health impacts, including effects on respiratory, cardiovascular and central nervous system health and increased mortality.²⁹
 - b. **Particulate Matter**:
 - i. **Particulate Matter**: Any increase in particulate matter is expected to increase negative health impacts, including respiratory problems.³⁰
 - ii. **Diesel Particulate Matter**: Diesel particulate matter impacts cancer rates in the population.³¹ Diesel particulate matter cancer risks associated with the proposed Project exceed Health Canada screening thresholds.³² This is established by the evidence presented by the proponent, the results of two toxic air pollutant risk assessments prepared by consultants for Metro Vancouver as well as the analysis presented in Metro Vancouver’s evidence.³³
29. The District of West Vancouver is very concerned by Environment Canada’s conclusion that it does not have confidence in the proponent’s conclusion that project emissions will be within ambient air quality standards for the local study area:

“In addition EC has the following concerns:

²⁶ Environment Canada, Written Evidence at pp. 86-87

²⁷ Trans Mountain, Marine Air Quality and Greenhouse Gas Marine Transportation Technical Report, Supplemental Report, Part 1 ([A3Y1G0](#)) at p. 33

²⁸ Environment Canada, Written Evidence at p. 83; Metro Vancouver, Written Evidence - Exhibit 15, Regional Ground Level Ozone Strategy ([A4L8A1](#)) (“Metro Van Ozone Strategy”) at p. 3

²⁹ Metro Van Ozone Strategy at p. 14

³⁰ Metro Vancouver Information Request No. 1 to Trans Mountain Health and Air Quality 2002 – Phase 1 Methods for Estimating and Applying Relationships Between Air Pollution and Health Effects. RDWI West Inc., May 2003 ([A60239](#), [A3W7C8](#))

³¹ Metro Vancouver, Written Evidence, Exhibit 17 - Levelton 2007 Air Toxics Emission Inventory - Health Risk Assessment ([A4L8A3](#)) (“Levelton 2007”)

³² Metro Vancouver, Written Evidence at pp. 47-48

³³ Trans Mountain Response to Fraser Valley Regional District Information Request No. 2 ([A4H8S0](#)) at pp. 61-67; Levelton 2007; Metro Vancouver, Written Evidence, Exhibit 18 - Sonoma Technology 2015 Toxic Air Pollutants Risk Assessment ([A4L8A4](#)); Metro Vancouver, Written Evidence at pp. 46-48

- Project marine NO_x emissions could be underestimated by as much as 37% due to an underestimate in anchorage times (section 3.2.2.4) and difficulties with the NO_x calculation methodology (section 3.2.2.2);
- The Proponent's decision to exclude boiler emissions is expected to result in a 20% underestimation of Project marine-source PM_{2.5} emissions;
- EC has also identified uncertainties related to the impact of excluding emissions from vessels anchored beyond the inner harbour and uncertainties about emissions from the Vapour Combustion Unit; and
- In addition to the emissions uncertainties noted above, there is a further degree of uncertainty that is inherent to the dispersion modelling process. The U.S. Environmental Protection Agency estimates that errors in the highest predicted concentration for a substance are typically on the order of ±10 to ±40%.

In summary, EC expects project emissions to increase concentrations of NO₂ and PM_{2.5} (with their associated health impacts) in the vicinity of the Tsleil-Waututh Nation reserve. Although the Proponent predicted that pollutant concentrations will remain well within ambient air quality standards, the multiple uncertainties in those emissions reduce confidence in that conclusion.”³⁴

30. As Environment Canada states in its evidence:

Marine Emissions Generally

“With the Trans Mountain Expansion Project, the Proponent is proposing to increase operations at an expanded marine terminal in Port Metro Vancouver, which is located in the Burrard Inlet, a harbour within an urban area with a population of close to 2.5 million. Marine emissions will occur within an airshed that is considered sensitive by the National Energy Board, which acknowledged, in a previous project review, the limited capacity of the airshed to accommodate additional pollutants without negative effect.

In addition to contributing to products of combustion, such as NO_x, SO_x and PM, petroleum tankers are also a source of fugitive VOC emissions. Fugitive VOCs are generated from petroleum-carrying tanks of ships during loading and off-loading and to a lesser extent during transit and anchorage.... VOC emissions are harmful to human health and are a precursor (along with NO_x) to the formation of tropospheric ozone, which is an air pollutant of particular concern in the Metro Vancouver region....

While emissions of SO₂, PM, and NO_x are expected to decrease as the ECA [Emissions Control Area] becomes fully implemented, in the near term, emissions of NO_x will continue to increase due to slow turnover of vessels....

³⁴ Environment Canada, Written Evidence at p. 105

Most tankers and tanker barges have the equipment and employ best practices to limit VOC emissions. However, VOC from marine vessels are not regulated....

As described in detail below, EC's analysis indicates the Proponent's marine emissions have been underestimated for several reasons, which leads to multiple uncertainties in the Proponent's approach and findings in regards to the impact of Project-related marine source pollutants on air quality." (emphasis added)³⁵

31. Environment Canada's evidence is that:

- The time in port for project tankers—and therefore, importantly, emissions from engines—is much higher than the proponent has estimated in its application. The proponent's average berth time of 20 hours is based on unsupported assumptions and is not corroborated by Automated Identification System (AIS) data.

“To estimate the impact of longer anchorage hours on marine emissions, EC used AIS data and tanker activity from 2012, for which it had a complete set of tanker data calling at Westridge. EC used the total number of anchor hours for Westridge-bound tankers and divided this by the number of calls and found that the average time a Westridge-bound tanker spends at anchor is about 70 hours, 3.5 times as long as the 20 hours used to estimate anchorage emissions in both the Marine RSA and the Westridge LSA. Using the Proponent's methodology described in TR1, EC estimates that an average of 70 hours spent at anchor will increase the Project NOx emissions in the Marine RSA by ~250 tonnes/year.” (emphasis added)³⁶

- The proponent has inappropriately omitted boiler emissions from its final estimates of marine-source pollutant emissions and inputs to air quality dispersion modelling. Environment Canada determined that boiler emissions can account for approximately 10- 30% of the emissions from Westridge tankers in the region close to port, depending on the pollutant.³⁷

“EC's analysis also identified several other uncertainties related to NOx emissions, including the exclusion of boiler emissions (see section 3.2.2.1), and the exclusion of emissions from Vancouver Harbour Inner Anchorage and English Bay Anchorage (section 3.2.2.3) from the emissions estimates input to the dispersion model.”³⁸

“This finding is also not consistent with the Proponent's submission in that boilers don't operate at berth/anchorage within the RSA (Exhibit B290-45, Section

³⁵ Environment Canada, Written Evidence at pp. 83, 85

³⁶ Environment Canada, Written Evidence at p. 94

³⁷ Environment Canada, Written Evidence at p. 88

³⁸ Environment Canada, Written Evidence at p. 102

3.4.1.1) and indicates that the marine-source inputs to air dispersion modelling are proportionally less than they should be as a result of omitting these emissions.” (emphasis added)³⁹

- The proponent has not assessed the full extent of the anchorages that will occur, and that will impact the District of West Vancouver:

“Where the tankers anchor is important for the air quality assessment because during that time the auxiliary engines and boilers are combusting fuel and contributing to the marine emissions. But only the anchorages closest to the Westridge terminal, the Indian Arm Anchorages are included in the Proponent’s emissions estimate....Over the course of the year, the omission of these emissions could represent a substantial underestimate of marine emissions due to the Project.” (emphasis added)⁴⁰

- The proponent has underestimated particulate matter emissions from the marine shipping activities:

“EC found several uncertainties in the project emission estimates of PM2.5 that increase the uncertainty about the modelled air quality impacts. As indicated in Section 3.1.2.1, the Proponent did not include boiler emissions as inputs to the dispersion modelling. According to the estimates in the national Marine Emission Inventory Tool, excluding boiler emissions can lead to an underestimate of about 20% (see table 3-2) for the emissions of marine-source PM2.5 for tankers. It would be expected that the Project emissions would be similarly underestimated by the exclusion of boiler emissions.

...additional time-at-anchor (based on AIS 22 data) is also expected to increase PM2.5 impacts

EC’s analysis also identified two other uncertainties related to PM2.5 emissions: the exclusion of marine emissions from Vancouver Harbour Inner Anchorage and English Bay Anchorage (section 3.2.2.3) from input to the dispersion model; and the emission factors used to calculate PM emissions from the Vapour Control Unit....” (emphasis added)⁴¹

The proponent has failed to adequately assess the level of particulate matter emissions from the vapour combustion unit at Westridge Terminal. The effect of particulate matter emissions from the vapour combustion unit is unknown.⁴²

³⁹ Environment Canada, Written Evidence at p. 88

⁴⁰ Environment Canada, Written Evidence at p. 94

⁴¹ Environment Canada, Written Evidence at p. 104

⁴² Trans Mountain has not provided stack test data for a VCU, information from the VCU manufacturer, or other adequate justification that the emissions from a VCU would be similar to those from a propane boiler. (Metro

- The proponent may have underestimated NO_x emissions from the Project. In addition to Volatile Organic Compounds, NO_x is a precursor to ground-level ozone, which is known to have adverse impacts on human health.⁴³

“The region along the north shore of Burrard Inlet...already experiences some of the higher hourly NO₂ concentrations in Greater Vancouver...”⁴⁴

“By applying the Proponent’s emissions methodology,...EC identified a 500 tonne/year difference between the Proponent’s estimated NO_x emissions and NO_x emissions estimated by EC using the same methodology, a difference of ~25%.”⁴⁵

“EC, as noted in Section 3.2.2.4, estimates that if an anchorage time of 70 hours is used, will increase Application Case marine NO_x emissions by an additional ~250 tonnes/year or roughly 10%.”⁴⁶

“Combining this 250 tonnes/year with the underestimate due to NO_x calculation methodology (500 tonnes/year), EC estimates that, in total, the Proponent has potentially underestimated marine-source NO_x emissions by 750 tonnes/year, or 37%. To provide a sense of the magnitude of these emissions, this means the Project-related marine-source NO_x would represent ~7% of the total NO_x produced from all sources in the Canadian portion of the Lower Fraser Valley in 2020, rather than 5% as per the Proponent’s filing.” (emphasis added)⁴⁷

- According to Environment Canada, the application also underestimates fugitive VOC emissions in Burrard Inlet:

“Additional time at anchor also has an impact on fugitive VOC emissions from the tanker holds....EC then estimates that about 1600 tonnes/year of fugitive VOCs during anchorage would be emitted. EC further estimates that 75% of those emissions occur in the Burrard Inlet, near urban areas.” (emphasis added)⁴⁸

- Metro Vancouver has identified a further basis upon which VOC emissions are likely underestimated in the application:

Vancouver, Written Evidence at pp. 31-32, citing Trans Mountain Pipeline ULC - Response to Metro Vancouver Notice of Motion regarding IR Round 2 responses, TM response to motion 2.1.01b ([A4J5G9](#))

⁴³ Metro Van Ozone Strategy at p. 3

⁴⁴ Environment Canada, Written Evidence at p. 105

⁴⁵ Environment Canada, Written Evidence at pp. 101-102

⁴⁶ Environment Canada, Written Evidence at p. 102

⁴⁷ Environment Canada, Written Evidence at p. 95

⁴⁸ Environment Canada, Written Evidence at p. 94

“Metro Vancouver is concerned that Trans Mountain’s revised assessment of VOC emissions during ship loading at Westridge Marine Terminal is based on an assumption of 99.9999% collection efficiency for which there is no historical basis because Trans Mountain is not currently required to measure, track or report actual VOC collection efficiency. Trans Mountain has used unsubstantiated, aspirational assumptions to assess VOC emissions during ship loading at Westridge Marine Terminal.”⁴⁹

- Additionally, Metro Vancouver and the LFVAQCC remain concerned that the proponent has not adequately modelled the effect of VOC emissions on the secondary formation of ozone. Of central concern is the fact that the proponent’s conclusions were based on only one 10-day episode, representing only one of the four meteorological types that have been shown to result in elevated ozone concentrations.⁵⁰

32. Environment Canada concludes:

“EC’s analysis indicates that the marine-source of emissions of NO_x and fugitive VOCs could be substantially underestimated and therefore lacks confidence in the Proponent’s maximum modeled concentrations, some of which are close to the applicable Ambient Air Quality Objectives, such as for NO₂. Unless additional modelling is done, it is uncertain whether exceedances of some of these pollutants would be reached if the additional marine emissions were included.”⁵¹

33. In light of this conclusion, the District of West Vancouver submits that it is not safe for the NEB to recommend approval of the proposed Project based upon the evidence that is before it.

34. Ambient air quality objectives serve the purpose of providing objective, health-based air quality standards for pollutant concentrations in outdoor air. Exceeding these objectives is not in the public interest. The proponent’s evidence is that marine emissions from the proposed Project will be within (although in some instances, such as for NO₂, only just within) the applicable ambient air quality objectives. However, Environment Canada’s evidence is that this is not a reliable conclusion, and that the proponent has significantly underestimated additional marine emissions.

II. Greenhouse Gas Emissions

35. Operation of the Project will generate 1,082,750 tonnes CO₂e per year.⁵² In addition to this amount, which relates to the operation of pipeline segments, pump stations and

⁴⁹ Metro Vancouver, Written Evidence at p. 39

⁵⁰ Metro Vancouver, Written Evidence at pp. 29, 31

⁵¹ Environment Canada, Written Evidence at p. 95

⁵² Trans Mountain, Trans Mountain Expansion Project, Volume 5C Part 1 - RWDI Air Inc. 2014 Air Quality and Greenhouse Gas Technical Report ([A3S1U1](#)) at pp. 214-218

terminals, the proponent also estimates an increase in marine emissions of 89,586 tonnes CO₂e per year.⁵³ CO₂ is a “Greenhouse Gas” (GHG), which has significant negative effects on the atmospheric environment, with resulting impacts on climate change globally.⁵⁴ Marine shipping is a significant source of CO₂ emissions.⁵⁵

36. This in itself is a significant impact of the operations of the Project, which, in the District of West Vancouver’s submission, weighs against approval of the marine shipping activities inherent in the proposed Project. West Vancouver will, as a coastal community, suffer the impacts of climate change.
37. Much like the City of Vancouver, the District of West Vancouver’s waterfront is vulnerable to flooding caused by rising sea levels, its infrastructure is susceptible to increasingly frequent and severe weather events, and its environment and residents are susceptible to the effects of changing precipitation patterns, which result in drier summer periods (droughts, reductions in drinking water, increased incidences of heat-related mortality and morbidity) and wetter winter periods (increased flooding and sewer backup).⁵⁶
38. Furthermore, West Vancouver does not consider the proposed pipeline in isolation from the environmental effects associated with the extraction and use of the petroleum that is to be transported by the pipeline and tankers. These effects will be adverse and serious, and in particular West Vancouver is concerned by the following evidence:
 - Oil sands extraction produces large amounts of GHGs.⁵⁷ The Project, and the increased capacity that it provides, will make the transportation of petroleum products from the Alberta oil sands development more cost effective, thus facilitating further expansion of the oil sands.⁵⁸ An increase in oil sands production will result in an increase in GHG emissions.⁵⁹
 - Emissions from the use of the petroleum products transported by the pipeline will produce large amounts of downstream emissions. Based on the projected volume of

⁵³ Trans Mountain, Marine Air Quality and Greenhouse Gas Marine Transportation Technical Report, Supplemental Report ([A3Y1G0](#)) at p. 33

⁵⁴ Metro Vancouver, Written Evidence at pp. 75-76

⁵⁵ Trans Mountain, Trans Mountain Expansion Project, Volume 8A 4.2.3.5 to F4.2.19D ([A3S4X8](#)) at p. 8A-123

⁵⁶ City of Vancouver, Written Evidence, Appendix 7 – Affidavit of Sean Pander ([A4L7W5](#))

⁵⁷ Metro Vancouver, Written Evidence at p. 77, citing National Energy Technology Laboratory, Development of Baseline Data and Analysis of Life Cycle Greenhouse Gas Emissions of Petroleum-Based Fuels, DOE/NETL-2009/1346 (2008), 13, table 2-4; International Panel Climate Change. 2011. Special Report on Renewable Energy Sources and Climate Change Mitigation: Renewable Energy in the Context of Sustainable Development. p. 732 http://srren.ipccwg3.de/report/IPCC_SRREN_Ch09.pdf.

⁵⁸ Metro Vancouver, Written Evidence at p. 77 citing Jeff Lewis, “New pipelines needed to hit oil sands growth targets: CIBC,” Alberta Oil, September 21, 2012, <http://www.albertaoilmagazine.com/2012/09/new-pipelines-needed-to-hit-oil-sands-growth-targets-cibc/>

⁵⁹ Metro Vancouver, Written Evidence at p. 77 citing Pembina Institute. 2013. Forecasting the impacts of oilsands expansion. p.4 <http://www.pembina.org/reports/oilsands-metrics.pdf>

petroleum products being transported through the pipeline, the downstream emissions are expected to total 107 million tonnes.⁶⁰ This calculation does not include emissions associated with refining.

39. Metro Vancouver has submitted the following calculations into evidence:

Table 7-1: Total Greenhouse Gas Emissions associated with Trans Mountain Pipeline Expansion (tonnes CO₂e/yr)⁶¹

Emissions Type	Existing Pipeline	Proposed New Capacity	Combined (Existing and New)
Upstream	8,501,663	16,845,260	25,408,852
Downstream	54,749,309	107,761,159	162,510,468
Project operations	not quantified	1,082,750	not quantified
Total Annual GHG Emissions	63,250,971	125,689,169	189,002,070
Construction-related GHG emissions		985,780	

40. In its Written Evidence, which was prepared by and under the direction and control of the General Manager of Planning, Policy and Environmental Development, the Director of Air Quality and Environment, as well as air quality planners and engineers, Metro Vancouver notes that:

“...over a 50 year time span, the expansion of pipeline capacity will enable an additional 6.3 billion tonnes CO₂e of GHG emissions to be emitted into the atmosphere. ...

[...]

Using a generally accepted range for the social cost of carbon (\$38-\$71/tonne), at 190 million tonnes CO₂e emissions enabled by the Project and the existing pipeline, it can be estimated that the GHG emissions associated with the Trans Mountain pipeline would have a global social cost of \$7.18 billion per year in 2015 and \$13.4 billion per year by 2050.

[...]

⁶⁰ Metro Vancouver, Written Evidence at p. 79

⁶¹ Metro Vancouver, Written Evidence at p. 77

For Canada, it has been estimated that climate change will cost the country an estimated \$21 billion to \$43 billion per year by 2050 or equivalent to 0.8%-1% of GDP.”⁶²

41. As the District has submitted above, a full assessment of the proposed Project must include an environmental and economic assessment of the costs associated with extracting, processing and combusting the petroleum the pipeline would be built to sell. Based upon the evidence that has been submitted in this proceeding, those costs significantly outweigh any local, regional or national benefit that the proponent has sought to establish in this proceeding.

III. Light and Noise Pollution

42. In addition to the air and atmospheric emissions that will be emitted from the marine shipping operations of the Project, light and noise pollution will also negatively impact the Burrard Inlet communities including West Vancouver.
43. The increased marine shipping traffic will result in a near seven-fold increase in Project-related tankers in Burrard Inlet, including extending the anchorage area of the tankers waiting to load at Westridge Marine Terminal.
 - 1) As set out in the proponent’s Application, in 2012, an average of 336 large vessels travelled through Burrard Inlet per month, 10 of which were tankers related to the Trans Mountain pipeline. By 2018, the total number of large vessels is expected to increase to 414, which will include 68 Project-related tankers.⁶³
 - 2) The increase in marine traffic related to the proposed Project is significant and will represent at least 16.4 percent of total marine traffic volume, compared to the current 3 percent.⁶⁴
 - 3) The actual increase in marine traffic may be higher than these calculations indicate. The proponent’s calculations are based on the use of Aframax tankers and does not account for the additional 4 to 6 movements through Burrard Inlet per month that would result from the use of Panamax tankers.
44. The increase in marine traffic will bring increased noise, air and sound pollution to the shores off West Vancouver. Despite the increased impacts this will bring to the residents of West Vancouver, the proponent has refused to conduct visual modelling of Project-related tankers at anchorages or multiple points along the shipping route within

⁶² Metro Vancouver, Written Evidence at pp. 80-83

⁶³ Trans Mountain, Trans Mountain Expansion Project, Volume 8A 1.4.2.7 to T4.1.1.1 - Marine Transportation ([A3S4X4](#)) (“TMEP Marine Transportation”) at p. 8A-69

⁶⁴ TMEP Marine Transportation at p. 8A-69

Burrard Inlet “as Project-related tankers are one of many kinds of vessels that may be anchored or in transit at any given time.”⁶⁵

45. However, this misses the fundamental point at issue in this regulatory review—that the proposed Project will increase the marine traffic in Burrard Inlet, and it will increase the impacts and risks of that traffic in a way that is specific to the proposed Project. Moreover, as a matter of law, the NEB is required to assess the cumulative impacts of the proposed Project.⁶⁶ In West Vancouver’s submission, the NEB cannot reasonably find that this does not require assessment of the visual and auditory impacts of the increased number of tankers anchored and in transit.
46. The evidence of residents who experience the current noise, air and light pollution from tankers waiting to dock at Westridge Marine terminal is directly relevant to the increased impacts residents of West Vancouver will face from the increased tanker traffic associated with the proposed Project. They report:
- Noise and light emissions from anchored tankers 24 hours a day;
 - Loud noise from the lowering and raising of anchor chains;
 - Noise of generators and other equipment carrying across water;
 - Disruption of sleep, and peaceful enjoyment of property including the need to close windows (to shut out noise) and drapes (to shut out light);
 - Large glaring lights from anchored tankers at night (see Appendix A-7);
 - Long puffs of diesel and exhaust emissions from tankers at anchor and in transit which are very visible, and remain suspended in cloud for several minutes before slowly dispersing to form a low level of clearly visible grey smog in the vicinity of anchorages and WMT (see Appendix A-7);
 - Foul smells associated with tanker emissions.⁶⁷
47. It is important to note that these impacts are apparently occurring within the guidelines of the Port Metro Vancouver.⁶⁸ There is no indication that these practices will be

⁶⁵ Trans Mountain, Response to District of West Vancouver IR No. 2.12 ([A4H8Q8](#))

⁶⁶ CEAA, 2012, s. 19(1)(a) and National Energy Board, Hearing Order OH-001-2014, Factors and Scope of the Factors for the Environmental Assessment pursuant to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) ([A3V6J1](#)) at s. 21.1(a) and p. 3

⁶⁷ North Shore NOPE, Written Evidence of Chloe Hartley ([A4L5Y6](#)) at pp. 2-6; Appendix A-7; See also Village of Belcarra, Written Submission ([A4L5G5](#)) at p. 1:

“Currently, the greatest source of complaints from residents living in proximity of the WMT are bright lights (e.g. tower lights on vessels) and noise (e.g. loud diesel generators) from the vessels at anchor east of the Second Narrows while waiting to be loaded at the WMT.”

⁶⁸ Transport Canada, TERMPOL Review Process Report on the Trans Mountain Expansion Project, Link 2 – Port Metro Vancouver Port Information Guide ([A4F8Z7](#)) at pp. 111-112:

“All vessels, while at anchor, should minimize noise levels and light usage in consideration of local residents.

reduced or modified with the increased tanker traffic. Rather, these impacts will be increased proportionate to the increased marine traffic.

48. Residential property in the District of West Vancouver is largely focused around ocean views and access. This is a fundamental part of the community's economy and identity and the quality of life of the community's residents and the enjoyment of its visitors. The seven-fold increase in tanker traffic along our shores that is envisioned by the proposed Project will expand and increase light, noise and air pollution at a scale that will fundamentally and negatively harm the quality of life and economy of the District of West Vancouver.

C. Impact of Spill Risk

49. Beyond the actual impacts of the daily operations of the proposed Project, which would be a constant presence for the residents of and visitors to the municipality of West Vancouver, the residents of the municipality would have to live with the ongoing and increased risk of an oil spill off or near our shores. Living with this risk is in itself an adverse impact, but it is exacerbated by the known uncertainty of the oil spill response capabilities in the Burrard Inlet and Georgia Strait which are demonstrated by the evidence filed in this proceeding and were displayed in the recent response to the oil spill from the *M/V Marathassa* which directly impacted the District of West Vancouver, oiling several of our popular beaches. Furthermore, should the ever present risk of oil spill be realized—whether by small, medium or catastrophic spills—the actual impacts on the municipality, its residents and its environment will be acutely felt, and will be significant and potentially devastating.
50. The District of West Vancouver submits that **it is not safe or in the public interest for the NEB to recommend approval of the Project** on the basis of the evidence and analysis before it regarding spill risk and impact.

I. Risk of spill

The following guidelines apply to all vessels anchoring within the Authority's jurisdiction.

Noise:

- Generator usage should be reduced to the minimum required generator(s) to operate essential services and systems;
- External doors and hatches to machinery spaces must be kept closed...;
- Power tools and chipping hammers usage must be kept to a minimum and is not permitted on deck between sunset and sunrise...

Lights

- Deck lights must be kept to a minimum consistent with the safety and security of the vessel, and;
- Lighting...must be aimed downward, and not outward or toward the shore."

51. The NEB must consider the risk and impact of accidents or malfunctions from the proposed Project in determining the potential environmental and socio-economic effects of the proposed Project and in determining whether to recommend whether a certificate of public convenience and necessity should be issued for the Project.⁶⁹
52. However, in the District's submission, the evidence that has been submitted by the proponent is insufficient to allow the NEB to come to reliable determinations upon which the NEB can safely recommend approval of the proposed Project.
53. Moreover, the evidence that has been put before the NEB by intervenors to this proceeding has demonstrated that the risk and impacts of a spill from marine shipping would place a significant burden upon the local population and environment. This burden is not in the public interest.

a. Proponent Analysis of Spill Risk is Insufficient

54. The NEB required the proponent to submit an assessment of accidents and malfunctions related to the increase in marine shipping activities, including an assessment of credible worst-case spill scenarios at Westridge Terminal and at representative locations along the marine shipping routes.⁷⁰ However, the proponent has not provided a risk assessment for a spill in Vancouver Harbour or English Bay. This in itself fails to meet the onus established by the Board, and required by legislation. Moreover, as intervenor evidence demonstrates, the assessment the proponent has provided of a worst-case spill at the Terminal seriously under-represents a reasonable worst-case spill. Finally, insofar as the proponent does estimate the risk of tanker spills, the lower end of that range is demonstrated by the evidence to be an unreliable estimate of risk. These points are expanded below.
55. The risk or likelihood of a spill in Burrard Inlet has been underestimated by the proponent and has not been established on the evidence:
 - 1) The most densely populated communities in British Columbia live on the shores of the Vancouver Harbour and English Bay. Yet, the proponent's application excludes risk assessment for a spill in the Vancouver Harbour area and English Bay. This ignores best practice in risk assessment methodology that high consequence spills must be considered, even if determined to be low probability.⁷¹
 - 2) The exclusion of the Vancouver Harbour and English Bay study segments from Trans Mountain's choice of spill locations does not appear to be informed by the

⁶⁹ CEAA, 2012, s.19(1)(a) and NEB Act, s. 52(3)

⁷⁰ NEB Filing Requirements at p. 2

⁷¹ City of Vancouver, Written Evidence, Appendix 22 - Written Evidence of David Etkin ([A4L7Y0](#)) ("Etkin Report"); City of Vancouver, Written Evidence, Appendix 51 - Letter from Fraser Health and Vancouver Coastal Health ([A4L7L0](#)) ("Health Authorities Letter")

potential consequences of spills.⁷² Its choices also fail to fulfill the NEB's direction that accidents and potential malfunctions at "representative locations" along the shipping route, which includes Burrard Inlet, must be considered.⁷³ Further, it is inconsistent with the TERMPOL requirement that risk assessment "should not be limited to a mathematical index but should also include perceived risks to:

- populations within coastal zones along the intended route;
- the terminal berth and surrounding area;
- the marine environment, fish and wildlife habitat."⁷⁴

- 3) The proponent has also failed to put evidence before the NEB of the potential cumulative impact of smaller spills in Vancouver Harbour and English Bay. In the District of West Vancouver's submission, the perceived and actual risks of these cumulative impacts to the local population are of vital importance to assessing overall impact and merit of the proposed Project. This is underscored by the fact that the proponent's estimated spill return periods themselves result in a spill probability of between 62.8-78.7% in 30 years and 80.8 and 92.4% in 50 years for any size tanker or terminal spill.⁷⁵ Moreover, consideration of such cumulative impacts is required both by *CEAA, 2012* and by best practice in risk assessment.⁷⁶
- 4) The proponent estimates a tanker spill likelihood of 16-67%.⁷⁷ However, the 16% estimate is shown by the Gunton Report to be an outlier that is significantly below the estimates based on other accepted methods of risk estimate, and should not be relied on as an accurate estimate of tanker spill risk.⁷⁸
- 5) The Vancouver Harbour and English Bay are busy marine traffic areas. The potential for human error would be expected to increase under such conditions - with a concomitant effect on spill risk⁷⁹ - however, the proponent has not provided any spill risk assessment for these areas, let alone an assessment that factors in the high traffic of these areas. The District of West Vancouver notes the evidence of Dr. Short on this issue:

"By assuming that a single point of spill origin is typical for the Strait of Georgia, the Trans Mountain ERA implicitly assumes that the only accidents that could

⁷² JWS Report at p. 3

⁷³ JWS Report at pp. 2-3

⁷⁴ Transport Canada, TERMPOL Review Process Report on the Trans Mountain Expansion Project, TERMPOL Guide ([A4F8Z5](#)) at s. 3.15.4; Etkin Report at p. 6

⁷⁵ Gunton Report at pp. 94-95

⁷⁶ Trans Mountain, Trans Mountain Expansion Project, Volume 8C, Part 2 - TERMPOL 3.15 General Risk Analysis and Intended Methods of Reducing Risks ([A3S5F4](#), [A3S5F6](#), [A3S5F8](#)) ("Trans Mountain TERMPOL Risk Assessment"); CEAA, 2012, s. 19(1)(a); Etkin Report at p. 18

⁷⁷ Trans Mountain TERMPOL Risk Assessment; Trans Mountain, Response to NEB IR TERMPOL Rpt and Outstanding ([A4G3U5](#)) at pp. 18-23; Gunton Report at p. 131

⁷⁸ Gunton Report at p. ix

⁷⁹ Trans Mountain TERMPOL Risk Assessment; Trans Mountain, Response to City of Port Moody TERMPOL IR ([A4J7R2](#)) at pp. 18-20.

ever occur would involve collisions between ferry and oil tanker vessels. ... Arbitrarily dismissing all other possibilities for accidents, including any that may occur within Burrard Inlet (apart from the Westridge Marine Terminal) or elsewhere along the tanker route amounts to unreasonably eliminating much or even most of the risk of a spill occurring. ...

Rather than relying on a single point of origin, the oil exposure assessment should have been based on trajectory modeling results from several points along the tanker route. ...The single spill origin selected by Trans Mountain resulted in a low probability of oiling..., but had the point been moved a few km toward Burrard Inlet, the oiling risk would likely have been considerably greater.”⁸⁰

- 6) Nor does the proponent provide an assessment of the increased risk from substituting some shipments by smaller Panamax tankers from the larger Aframax tankers assumed in the proponent’s application. Although the proponent acknowledges in the application the potential increase in the number of tankers of 2 to 3 per month for a 25% Panamax tanker class substitution (a substitution that could increase tanker traffic by 96 to 144 tankers per year), the proponent’s risk assessment provides no consideration of the potential increase in risk from this increase in tanker traffic.⁸¹ This is another example of a potential expansion of project activities that increases risk to the local population and environment and which would be permitted without regulatory consideration or oversight once the project is approved, but for which there is no risk assessment.
- 7) The proponent has not considered an appropriate “credible worst-case spill” at Westridge Terminal. The proponent has modelled a spill of only 160m³ as the credible worst case scenario, however, as explained by Nuka Research & Planning Group, LLC (who are recognized and experienced international experts in marine environmental consulting and whose evidence was submitted by Tsleil-Waututh Nation, the City of Vancouver and Tsawout First Nation), this volume is not consistent with either information or analysis in the project application itself, and is fundamentally not credible. The authors of the Nuka Report explain why instead 8,000 m³ is supported by the Project risk assessment and is consistent with the methods used by the proponent elsewhere in its application to select worst case volumes for other locations:

The selection of 8,000 m³ as a worst case oil spill for the Westridge Marine Terminal is consistent with information that is presented in the project application. In evaluating the potential worst case volume of tanker oil spills from grounding or collision, the project application considers the conditional probability for various spill sizes based on modeled analysis. Conditional probabilities describe the likelihood of a particular outcome if an initiating event – in this case a tanker grounding or collision – should occur. The project application

⁸⁰ JWS Report at p. 4

⁸¹ Gunton Report at p. 54

uses the 10% highest outflow (P90) for tanker groundings or collision. This represents the probabilistic estimate of spill size for the most severe 10% of cases, which is a reasonable approach to establish a worst case spill volume, and is the approach used to come up with a worst case discharge volume for all sites except the Westridge Marine Terminal.

Figure 3.2, extracted from the project risk assessment, identifies the potential spill volumes for a vessel strike at anchorage that range from approximately 3,000 to 25,000 m³...and potential spill volumes for a vessel strike at berth that range from approximately 2,000 to 12,000 m³.... Applying the P90 method (10%) used in the project application to estimate spill volumes for grounding and collisions yields a worst case discharge volume of 8,000 m³ for an oil spill resulting from a tanker that is struck while at berth at the Westridge Terminal. The authors believe that it is reasonable and consistent to use the same method to estimate a worst case volume for the Westridge Terminal as for other sites, and therefore an 8,000 m³ spill is the worst case scenario modeled in this study.⁸² (emphasis added)

- 8) The NEB's draft conditions themselves contemplate a spill far larger than the proponent's unrealistic and not-credible worst case of 160 m³. The draft conditions would require a "marine oil spill response regime capable of delivering 20,000 tonnes of capacity within 36 hours of notification" (Draft Condition 114). This equates to a spill of approximately 21,277 m³—significantly larger than the proponent's 160 m³ worst-case model.⁸³
- 9) The proponent has provided no assessment that addresses risk to be borne by the local population from systems vulnerabilities or failures. These are fundamentally important to assessing actual risk of harm. For example:
 - The Transportation Safety Board of Canada determined that the 2007 Westridge Burnaby spill was in large part caused by communication failure between the pipeline operator, contractor and engineering consultant;⁸⁴
 - The Health Authorities advise that the Transportation Safety Board of Canada determined that the Pacific Pilotage Authority did not have a comprehensive safety management system in place at the time of a 2012 incident involving a bulk carrier striking the terminal at Roberts Bank.⁸⁵ The

⁸² Metro Vancouver, Written Evidence, Exhibit 2A - Nuka Research and Planning Group, LLC, Oil Spill Response Analysis ([A4L7Y6](#)) ("Nuka Report") at pp. 39-40

⁸³ Trans Mountain, Trans Mountain Expansion Project, Volume 8C, Part 5 - Future Oil Spill Response Approach Plan Recommendations on Bases and Equipment ([A3S5I9](#)) at p. 4

⁸⁴ City of Vancouver, Written Evidence, Appendix 50 – Vancouver Coastal Health and Fraser Health Authority, "Guidance to Metro Vancouver and Fraser Valley Municipalities to Assist in Reviewing the Trans Mountain Pipeline Expansion Project from a Public Health Perspective" ([A4L7K9](#)) ("Public Health Guidance Document") at p. 12

⁸⁵ Public Health Guidance Document at pp. 12-13

Pacific Pilotage Authority will be relied upon by the proponent in the shipping of diluted bitumen as proposed.⁸⁶

- The City of Abbotsford has submitted evidence that reveals that even where advance emergency response planning has been put in place by the proponent, the proponent has failed to ensure that planning is translated to ‘on the ground’ response actions. This has led to confusion and delay in spill responses.⁸⁷
- As set out in more detail below, the April 2015 oil spill in English Bay from the *M/V Marathassa* also revealed system failures in responding to the spill.

10) The proponent’s spill risk analysis meets none of the seven best practice criteria for estimating spill rates: transparency, reproducibility, clarity, reasonableness, reliability, validity and stakeholder participation.⁸⁸

11) The proponent’s analysis suffers significant methodological flaws (27 major weaknesses in the proponent’s risk analysis were identified by the experts commissioned by the City of Vancouver).⁸⁹ Some of the key weaknesses include:

- Ineffective communication of spill probability over the life of the project;
- Lack of confidence ranges for spill risk estimates;
- Inadequate sensitivity analysis of spill risk estimates;
- No presentation of the combined spill risk for the entire project;
- Reliance on tanker incident frequency data that underreports incidents by up to 96%;
- Incomplete assessment of the significance of oil spills; and
- Inadequate disclosure of information and data supporting key assumptions that were used to reduce spill risk estimates.

56. The District of West Vancouver agrees with Metro Vancouver: “The risk of a worst-case potential oil spill has not been established by Trans Mountain and the full risk of an oil spill in Burrard Inlet is not known.”⁹⁰

57. The District of West Vancouver will suffer significant harm in the event of a spill in Burrard Inlet. The scale of the harm will vary depending on the size and location of spill. The District of West Vancouver submits that the NEB should reject the proponent’s assessment of risk of a spill in Burrard Inlet. The evidence of Professor Etkin provides a reliable basis upon which to do so:

⁸⁶ Trans Mountain, Trans Mountain Expansion Project, Volume 8C, Part 1 - TERMPOL 3.2 – Origin, Destination & Marine Traffic Volume Survey ([A3S4R7](#)) at p. 12 and TERMPOL 3.5 & 3.12 – Route Analysis & Anchorage Elements ([A3S4T7](#)) at pp. 6, 38

⁸⁷ City of Abbotsford, Written Evidence, Affidavit of Donald Beer ([A4L6D3](#))

⁸⁸ Gunton Report at pp. ii-iii; See Appendix A-6

⁸⁹ Gunton Report at p. viii

⁹⁰ Metro Vancouver, Written Evidence at p. 13

“My conclusion is that the methodology used by TM/DNV Risk Assessment is flawed and significantly underestimates the real risk of an oil spill. I reach this conclusion because of the following reasons:

- a. A flaw of logic: by using only hazard probability, instead of risk (which includes both hazard and consequences), to exclude Segments 2, 3 & 4 and to exclude scenarios greater than 16% of cargo loss, the TM/DNV methodology failed to properly use their own definition of risk in their risk assessment.” [As Professor Etkin explains: “though they defined risk properly in their risk analysis (Risk = Hazard x Consequence), they only use probability of hazard to eliminate Segments 2, 3 & 4, and LPHC scenarios larger than 15% of tanker capacity.”⁹¹]
- b. Observational evidence shows that the full range of Low Probability / High Consequence should be included in the oil spill risk analysis.
- c. Theoretical considerations show that the full range of Low Probability High Consequence should be included in the oil spill risk analysis.”⁹²

58. Professor Etkin goes on to explain that the “Titanic Mentality”— the idea “that failure is not possible because the system/ship/etc. has been designed so well”—is not a supportable approach to robust and logical risk assessment. He begins by citing the proponent’s rationale for limiting its worst case scenario considerations:

"Based upon the fact that there has not been any total loss of containment scenarios involving a double hull tanker, ever, to date a credible worst case scenario does not include total loss of tanker with complete loss of cargo." This is a mindset that is fundamentally flawed. The problem with relying exclusively upon historical data for risk analyses (particularly data that are only a few decades in length) is that it excludes events that just haven't happened yet. For example, a tsunami risk analysis based upon data extending over a few decades, if done prior to 2004, would not have captured the Indonesian catastrophe of December 2004 or the Japan one of 2011. Using such data as a basis for a credible worst case scenario can easily lead to a deeply flawed risk estimation. If risk assessments are to be robust, they must go beyond a historical lessons learned approach and include scenarios of possibilities. To do otherwise is to be caught in a cognitive trap where risk estimations are bounded too narrowly.”⁹³

b. Risk of Spill from Marine Shipping

59. Transport Canada’s risk assessment ranked the Georgia Strait, including the area around Vancouver and West Vancouver as “very high” on the Environmental Risk Index for

⁹¹ Etkin Report at p. 18

⁹² Etkin Report at p. 2

⁹³ Etkin Report at p. 17

crude oil spills within a range of volumes from 10 m³ to 10,000 m³.⁹⁴ With the increase in tanker traffic that would be brought by the proposed Project, the risk for 10 000 m³ spill volume and greater is also ranked “very high”:

“doubling the volume of oil passing through the Pacific sub-sector 5 would likely increase the spill risks to “very high” for all zones...for 10 000 m³ spill volume and greater.”⁹⁵

60. Even with the shortcomings in Trans Mountain’s risk assessment discussed above, Trans Mountain’s own analysis nevertheless shows that **the combined likelihood of an oil spill for the Project is high, at 99%**.⁹⁶
61. For terminal and tanker spills specifically, Trans Mountain finds that the spill probability is 77% and between 16-67% respectively.⁹⁷ The Tsleil-Waututh Nation, Tsawout First Nation and Upper Nicola Indian Band commissioned two experts to assess the spill risk for the Project (the “Gunton Report”). In the Report, Drs. Thomas Gunton and Sean Broadbent conclude that these probabilities understate the likelihood of spills associated with the Project due to methodological weaknesses in Trans Mountain’s analysis.⁹⁸ Their own analysis, which uses a range of widely accepted methods, and the method used by Trans Mountain, reveals:
 - 1) **The likelihood of a tanker spill is high, between 58% and 98%**.⁹⁹
 - 2) **Trans Moutain’s low end estimate of 16% spill risk is an outlier significantly below the estimates based on other methods.** Given the methodological deficiencies in Trans Mountain’s oil spill risk assessment and the fact that its low end estimates are significantly below the estimates generated by other methodologies, the low end spill risk estimates in the TMEP application **should not be relied on** as accurate estimates of tanker spill risk.¹⁰⁰
 - 3) **In particular, the spill risk in the Vancouver Harbour area is high.** The authors compare the spill risk assessment provided in Trans Mountain’s Application and estimates generated with the United States Oil Spill Risk Assessment (“OSRA”) model, and find that spill probabilities over 30- and 50-year periods were relatively similar. While the TMEP application estimates an 83% likelihood of a spill in the

⁹⁴ City of Vancouver, Written Evidence, Appendix 55 – WSP Canada (2014) Risk Assessment for Marine Spills in Canadian Water ([A4L7L4](#)) (“WSP Risk Assessment”) at pp. 72-87 and appendices

⁹⁵ City of Vancouver, Written Evidence at p. 53

⁹⁶ Gunton Report at p. 131

⁹⁷ Gunton Report at p. 131

⁹⁸ Gunton Report at p.viii

⁹⁹ Gunton Report at p. iv

¹⁰⁰ Gunton Report at pp.viii-ix

harbour over a 50-year period, the OSRA model estimates a spill probability of 87.4%.¹⁰¹

62. In sum, the District of West Vancouver faces a high probability of a spill from the Project that will affect its shores. Despite this, the potentially serious impacts of such a spill are not adequately assessed in the application, as discussed below.

II. Spill Trajectory

63. Despite the risk of a marine spill in the Burrard Inlet, the proponent has not provided an assessment of the potential impacts. In order to inform their understanding of the effect that such a spill could have, the City of Vancouver, the City of Burnaby and the Tsleil-Waututh Nation commissioned Genwest Systems Inc. to assess, perform and analyze oil spill trajectory modelling for four oil spill scenarios in Burrard Inlet (the “Genwest Report”).
- 1) The authors identified at least two serious shortcomings which have significant implications for oil spill trajectory modelling in Burrard Inlet:
 - i. Trans Mountain’s spill model does not allow for refloating of oil. The authors note that this is strongly contradicted by experience with thousands of real spills. Heavily oiled shoreline tends to be reworked, and rather than being removed, stranded oil tends to be retained for a number of tidal cycles, acting as a secondary source. The authors find that failure to allow for refloating could lead to significant underestimates of both the extent and duration of concern following a spill.¹⁰²
 - ii. Trans Mountain’s model includes unrealistic and inappropriate assumptions which impact the validity of its modelling of a spill at Westridge Marine Terminal. In particular, it assumes that a containment boom will always be available and will always be effective. Not only is this not the historical norm, it is also not appropriate from an oil spill trajectory modelling perspective.¹⁰³
 - 2) The Genwest modelling demonstrates that oil spreads quickly in the confined setting of Burrard Inlet and has the potential to spread throughout Burrard Inlet, from Indian and Port Moody Arms to the Outer Harbour and beyond.¹⁰⁴
 - 3) Oil movement in Burrard Inlet is driven mainly by winds and tides. The Genwest modelling demonstrated that while strong winds tend to strand oil on the leeward shore, weak winds allow the tidal currents to more widely distribute the oil.¹⁰⁵

¹⁰¹ Gunton Report at pp. 93-94

¹⁰² City of Vancouver, Written Evidence, Appendix 56 – Genwest Systems Inc., Oil Spill Trajectory Modelling Report in Burrard Inlet for the Trans Mountain Expansion Project ([A4L7L5](#)) (“Genwest Report”) at p. 1

¹⁰³ Genwest Report at p. 1

¹⁰⁴ Genwest Report at p. 3

- 4) While the effect of a spill on the District will depend on tidal currents, wind and other factors¹⁰⁶, models of a spill in Burrard Inlet often result in significant oiling of beaches on the north shore of the Inlet. For example, Figure 11 in that Report shows the results of an oil spill at Second Narrows, which results in very heavy oiling along the northern shore of the Inner Harbour.¹⁰⁷ Spills at First Narrows produce equally concerning results, as shown in Figures 12, 13, 14 and 15.¹⁰⁸
 - 5) As summarized in the JWS Report, the Genwest Report demonstrates that “an oil spill anywhere in Burrard Inlet would almost certainly result in considerable shoreline oiling”.¹⁰⁹
64. Working from Genwest’s models, Nuka Research and Planning developed a series of trajectory maps to illustrate the potential shoreline impacts of a 16,000 m³ diluted bitumen tanker spill in Burrard Inlet at First Narrows.¹¹⁰ The modelling indicates:

“Six hours after the collision occurs, a 3.5 km slick of oil moves toward the West Vancouver shoreline between West Bay and Sandy Cove, and some of the oil reaches the rock and gravel shoreline.”

Within 12 hours, more than 5 km of the West Vancouver shoreline, from John Lawson Park at Ambleside to Godman Creek at Sandy Cove, have been fouled. Over a quarter of the total spill volume has encountered shoreline at this point. Some of the oil may re-float, and the sediments that are attached to the sticky oil will contribute to potential sinking.

Stranded oil may persist on the shoreline for months to decades, depending on the shoreline type.”¹¹¹

III. Impacts of Spill

65. The impacts of a spill in Burrard Inlet have been inadequately modelled and assessed, and have been understated by the proponent.
 - 1) The proponent has not included in its application an assessment of the impacts of an oil spill into either Burrard Inlet or the Fraser River.¹¹²

¹⁰⁵ Genwest Report at p. 7

¹⁰⁶ Genwest Report at p. 5

¹⁰⁷ Genwest Report at p. 42

¹⁰⁸ Genwest Report at pp. 44, 46, 48 and 50; See Appendix A-9

¹⁰⁹ JWS Report at p. 11

¹¹⁰ City of Vancouver, Written Evidence, Appendix 80 - Nuka Research and Planning Group, LLC, English Bay Oil Spill Debrief and Tanker Scenario Planning Workshop ([A4L8E8](#)) (“Nuka Spill Debrief”)

¹¹¹ Nuka Spill Debrief at pp. 14-15

¹¹² City of Vancouver, Written Evidence at p. 56

- 2) As set out above, the hypothetical ‘large’ spill in Burrard Inlet at Westridge Terminal assumed a spill amount that was so small it cannot be considered credible (160 m3). Furthermore, the assessment assumed a containment boom was already deployed before the spill and that an even smaller fraction of oil is released into the environment.”¹¹³
- 3) Trans Mountain has failed to include in its assessment “the range of weather and marine conditions that could prevail during a spill event” as required by the NEB.¹¹⁴
- 4) The proponent has not modelled the health impacts of a large spill in Burrard Inlet. Fraser Health and Vancouver Coastal Health advise that health impacts from large spills of diluted bitumen are possible and concerning, especially in densely populated areas—such as Vancouver and West Vancouver.¹¹⁵

a. Environmental Effects

66. **Deficient Ecological Risk Assessment:** An expert report commissioned by the Tsleil-Waututh Nation, the City of Vancouver and Living Oceans Society (the “JWS Report”) identifies significant deficiencies in Trans Mountain’s ecological risk assessment (“ERA”), concluding that these flaws result in a serious underestimation of the environmental impacts of an oil spill from the Project.¹¹⁶
 - 1) There are at least four fundamental deficiencies in Trans Mountain’s ERA, as identified by the JWS Report, including failures to:
 - a. integrate oil exposure risk based on several ecologically distinct sub-regions;
 - b. assess hazard independently of exposure;
 - c. assess the possibility of organisms being exposed to submerged oil; and
 - d. consider all the ways that oil can harm organisms.¹¹⁷
 - 2) Despite the NEB’s requirement that the proponent select “representative locations along the marine shipping route” informed by both “probability and consequence”¹¹⁸ of a spill, the proponent considers only a single point of spill origin for the Georgia Strait based only on its assessment of the probability of a spill. The proponent thus dismisses all other possibilities for accidents, including those that could occur within Burrard Inlet. Evaluating these other risks is critical because the precise location of the spill alters the probability that certain habitats, shorelines or species will be exposed and also changes the potential impacts on those habitats, shorelines and species; even a slight change in location could significantly alter the probability and

¹¹³ Metro Vancouver, Written Evidence at p. 14

¹¹⁴ NEB Filing Requirements at p. 2

¹¹⁵ Health Authorities Letter at pp. 2-3

¹¹⁶ JWS Report at p. 36

¹¹⁷ JWS Report at p. 3

¹¹⁸ NEB Filing Requirements at p. 2

potential impacts of oiling. A truly representative and credible risk assessment would evaluate these risks.

67. The JWS Report identifies a number of basic principles of ecological risk assessment, including a through d above, that were violated in Trans Mountain's ERA.¹¹⁹ The Report concludes that Trans Mountain's ERA is fundamentally flawed and cannot be relied upon to assess the environmental impacts that would result should an oil spill occur.¹²⁰ According to the Report, the cumulative effects of the flawed approach used in Trans Mountain's ERA can be illustrated by comparing its conclusions with the effects of an actual oil spill involving similar circumstances, such as the *Hebei Spirit*, where heavy shoreline oiling occurred and persisted for years.¹²¹
68. It is not possible to adequately assess and understand the risks of a spill until a proper ERA is conducted that, unlike Trans Mountain's ERA, "does not confound the assessment steps, considers multiple potential spill origin sites, evaluates habitat sensitivities on the basis of species' densities and abundances and species sensitivities on the basis of their intrinsic vulnerability to bitumen exposure, recognizes the susceptibility of bitumen to submerge in receiving waters and includes the range of exposure and damage pathways".¹²²
69. **Behaviour of Diluted Bitumen:** The behaviour of diluted bitumen complicates an assessment of ecological risks and may lead to an increased probability of impacts to species and habitats.
- 1) Diluted bitumen is more likely than crude oil to emulsify which may contribute to increasing spreading.¹²³
 - 2) Trans Mountain's ERA fails to account for the possibility of the submergence of oil, which results in the exclusion of potentially major oil exposure pathways.
 - Submergence may occur quickly in fresh or brackish waters, such as those in Burrard Inlet:

"Under near worst-case ambient conditions of warm summer temperatures and moderate winds, spilled diluted bitumen may begin to submerge in the surface layer of the Fraser River plume and Burrard Inlet about 24 hours following initial release."¹²⁴

¹¹⁹ JWS Report at p. 36

¹²⁰ JWS Report at pp. 8, 36

¹²¹ JWS Report at p. 31; See Appendix A-4

¹²² JWS Report at pp. 3-5, 7, 8

¹²³ Squamish Nation, Evidence, 4 - Potential Effects of Diluted Bitumen Spills on Salmonid Species ([A4L7E7](#)) ("Report re: Effects on Salmonid Species") at p. 15

¹²⁴ JWS Report at p. 9

- If oil submerges, it becomes much more difficult to track as it disperses widely to shorelines, the open ocean and the sea floor.¹²⁵ Uncertainty regarding the amount of submerged oil makes it difficult to assess its effects on the water column, which can lead to public fear about widespread contamination.¹²⁶
- Submergence also results in multiple exposure pathways and exposure to a wide variety of biological communities, which Trans Mountain's ERA does not consider.¹²⁷ As a result, the potential impacts on a large variety of species, many of which are important for commercial and subsistence harvests, have not been assessed.¹²⁸

“Submergence of diluted bitumen following an accidental release greatly increases the risk of oil exposure through contact or ingestion for species inhabiting the water column, from phytoplankton to fish. Contamination of these species in turn provides a pathway for secondary exposure for other species that consume them, such as marine mammals. In addition, suspension-feeding organisms inhabiting the shorelines are also vulnerable to oil exposure through ingestion of submerged oil droplets entrained in the water column. However, none of these exposure pathways are considered in Trans Mountain's ERA.”¹²⁹

3) In addition to and as a result of submergence, diluted bitumen may strand on shorelines surrounding Burrard Inlet:

- “The large tidal excursion range is conducive to spilled diluted bitumen stranding on shorelines, particularly on armoured or low-gradient shorelines in Burrard Inlet....”¹³⁰
- “...an oil spill anywhere in Burrard Inlet would almost certainly result in considerable shoreline oiling.”¹³¹
- “Once incorporated beneath the surface of these beaches, diluted bitumen may persist for considerable periods in the absence of physical disturbance, determined mainly by oxygen availability. In low-oxygen sediments, diluted bitumen may linger for several decades or more. These lingering reservoirs of diluted bitumen pose long-term threats to intertidal organisms, predators including seabirds, marine and terrestrial mammals that consume them, and

¹²⁵ JWS Report at pp. 6-7

¹²⁶ JWS Report at p. 78

¹²⁷ JWS Report at p. 9

¹²⁸ JWS Report at p. 26

¹²⁹ JWS Report at p. 28

¹³⁰ JWS Report at p. 9

¹³¹ JWS Report at p. 11

marsh-dwelling birds and mammals. They also impair the value of these habitats for subsistence harvests.”¹³²

- 4) Beaches of the type present in West Vancouver are particularly prone to oiling.
 - “Shorelines especially susceptible to oil retention include sandy/gravel beaches covered by cobbles to boulders, beaches with extensive biological cover, and sand- or mudflats with burrows excavated by worms, crabs and other organisms that allow penetration of oil stranded on the beach surface.”¹³³
- 5) Diluted bitumen that remains on the sea surface poses a contact hazard for marine mammals and seabirds.¹³⁴
- 6) The behaviour of diluted bitumen poses unique challenges for emergency response and clean-up, discussed further below.

70. **Impacts on Wildlife:** A large spill in Burrard Inlet could have significant and long-lasting impacts on wildlife inhabiting shorelines, the sea surface and the water column. Large scale mortalities could “de-stabilize or permanently alter the food web of Burrard Inlet and cause ecosystem-level effects there and beyond.”¹³⁵ Even spills significantly smaller than the credible worst-case scenario of 16,000 m³ may result in substantial adverse effects for birds, marine mammals and other organisms.¹³⁶

- 1) The Salish Sea is home to 29 species of marine mammals, all of which are dependent on the health of marine habitats and food sources.¹³⁷ A large diluted bitumen spill would have significant adverse impacts for these species, both through direct contact with floating diluted bitumen and indirectly through ingestion of contaminated prey.¹³⁸
 - “A large (e.g. 8,000–16,000 m³) diluted bitumen spill in Burrard Inlet or near the rest of the Fraser River estuary would almost certainly kill substantial numbers of marine mammals....Other marine mammals may also be adversely affected by diluted bitumen from a spill, although detecting adverse impacts to these species remains problematic.”¹³⁹

¹³² JWS Report at p. 11

¹³³ JWS Report at p. 11

¹³⁴ JWS Report at p. 9

¹³⁵ JWS Report at pp. 8-12

¹³⁶ City of Vancouver, Written Evidence at p. 47; JWS Report at pp. 8-12

¹³⁷ JWS Report at pp. 75-76

¹³⁸ JWS Report at p. 75

¹³⁹ JWS Report at p. 76

- “Exposure of individual killer whales...could have adverse population-level consequences for this already endangered stock, where premature loss of just one individual could significantly contribute to the jeopardy of this stock.”¹⁴⁰
 - Spilled oil may persist for years or decades in significant amounts and toxic forms, high enough to cause chronic exposure to species.¹⁴¹
- 2) Burrard Inlet is home to several salmonid species.¹⁴² A spill of diluted bitumen in the Burrard Inlet would result in significant short and long-term impacts for these species and those that they support.
- Salmonid species are critical to Squamish Nation and other First Nations, who depend on them for subsistence harvest and cultural heritage.¹⁴³ Salmonid species also support several species of marine mammal and commercial fisheries worth millions of dollars.¹⁴⁴
 - Salmonid species may suffer immediate impacts resulting from physical contact with floating or submerged oil, or oil spills may indirectly affect populations by making habitat features unsuitable for eggs; impacting growth rates, nerve function, circulation and immunity to disease; increasing incidences of cancer; and reducing reproductive success.¹⁴⁵
 - Experience from spills of crude oil show that such spills result in adverse effects for salmonids at all stages of the life cycle. Many of these effects result in long-term impacts on the health of salmonid populations and lead to indirect impacts on species that consume them.¹⁴⁶
- 3) Many locations within the Project Marine Area¹⁴⁷, including the Fraser River Estuary and Burrard Inlet, provide important habitat for a large variety of marine birds.¹⁴⁸ A credible worst-case scenario spill near the Fraser River estuary could result in one of the top bird mortality events from an oil spill.¹⁴⁹ Even small to medium sized spills can cause significant sea- and shorebird mortality.¹⁵⁰

¹⁴⁰ JWS Report at p. 76

¹⁴¹ Report re: Effect on Salmonid Species at pp. 13-14; JWS Report at p. 11

¹⁴² Report re: Effects on Salmonid Species at p. 11

¹⁴³ JWS Report at p.2

¹⁴⁴ JWS Report at p. 2

¹⁴⁵ Report re: Effects on Salmonid Species at pp. 14-15

¹⁴⁶ Report re: Effects on Salmonid Species at pp. 13-14; JWS Report at pp. 11-12

¹⁴⁷ The City relies on the definition used by Environment Canada in its Written Evidence, which is “the Regional Study Area for marine transport as well as any area likely to be oiled in the case of a major spill.” (Environment Canada, Written Evidence at p. 57)

¹⁴⁸ Appendix A-1

¹⁴⁹ JWS Report at p. 10

¹⁵⁰ JWS Report at p. 73

- 4) As mentioned above, uncertainties regarding the behaviour and effect of diluted bitumen complicate the assessment of potential impacts. For example, there is very limited knowledge of diluted bitumen ecotoxicity.¹⁵¹ The increased tendency of diluted bitumen to emulsify may result in increased toxicity due to a higher concentration of polycyclic aromatic hydrocarbons dissolved into water.¹⁵²

b. Air Quality and Human Health Effects

Air Quality

71. Based on its review of evidence provided by Metro Vancouver, Vancouver Coastal Health and Fraser Health, as well as various experts, the District has determined that Trans Mountain's air quality assessment contains significant gaps, and that further assessment is required to determine the true impact of a large spill in Burrard Inlet or English Bay.
72. Metro Vancouver has jurisdiction over air quality regulation in the project study area.¹⁵³ Metro Vancouver has made several important observations about the deficiencies in the proponent's description of potential impacts on air quality from the proposed Project, and has submitted that the air-quality dispersion modelling for an oil-spill in Burrard Inlet is inadequate and erroneous.¹⁵⁴
- a. The proponent has relied upon dispersion modelling that assumes that Burrard Inlet is a discontinuous waterway and that North Vancouver and Vancouver are connected by land—neither of which are true.¹⁵⁵
 - b. The proponent has acknowledged but not corrected errors in its meteorological monitoring inputs.¹⁵⁶
 - c. There are large data gaps in the proponent's assessment where representative meteorological stations have not been used for the majority of the study area including the North Shore Mountains, Indian Arm, and Vancouver.¹⁵⁷
 - d. The proponent has not followed the "Guidelines for Air Quality Dispersion Modelling in British Columbia". It has avoided presenting a consideration of the minimum one year of meteorology as recommended by the Guidelines, and has instead presented only one possible start time for each oil spill considered.¹⁵⁸

¹⁵¹ Report re: Effects on Salmonid Species at pp. 16-17

¹⁵² Report re: Effects on Salmonid Species at p. 15

¹⁵³ *Environmental Management Act*, SBC 2003, c. 53, s. 31

¹⁵⁴ Metro Vancouver, Written Evidence at p. 13

¹⁵⁵ Metro Vancouver, Written Evidence at pp. 17-18 and Exhibit 7 – Enlarged Extract of Land-use used by Trans Mountain in Oil Spill Modelling showing a non-continuous Burrard Inlet ([A4L7Z3](#))

¹⁵⁶ Trans Mountain, Project and Technical Update No.4, Part 12 – Responses to Lower Fraser Valley Air Quality Coordinating Committee ([A4F5C9](#)) at p. 42

¹⁵⁷ Metro Vancouver, Written Evidence at p. 19

¹⁵⁸ Trans Mountain, Trans Mountain Expansion Project, Volume 8C, Part 2 - Modelling the Fate and Behaviour of Marine Oil Spills for the Trans Mountain Expansion Project ([A3S5G9](#)) and Addendum to: Modelling the Fate and Behaviour of Marine Oil Spills for the Trans Mountain Expansion Project ([A3Y3X9](#)); Metro Vancouver, Written

Although at the request of the NEB¹⁵⁹ the proponent included two more meteorological start times, the full range of potential meteorology that could occur in a given year has not been analyzed.¹⁶⁰ As Metro Vancouver has submitted, this appears to significantly undermine the analysis of actual risk of harm to air quality.¹⁶¹

73. The District of West Vancouver adopts the position of Metro Vancouver:

“Given the significant under-estimation of a credible worst-case oil spill at Westridge Terminal (section 2.4.1.1), the lack of conformance to NEB’s requirement to consider a “range of weather and marine conditions that could prevail during the spill event” (section 2.4.1.2), the errors made in CALMET model along with the execution of model without sufficient input data (section 2.4.1.4), Metro Vancouver concludes that the air quality dispersion modelling for an oil spill considered by Trans Mountain is misleading and not credible. Trans Mountain has not provided a legitimate modelling assessment to consider an oil spill in Burrard Inlet. Metro Vancouver seeks that the air quality dispersion modelling for an oil spill considered in Metro Vancouver is rejected as credible evidence submitted by Trans Mountain.” (emphasis added)

74. Metro Vancouver commissioned its own comprehensive assessment of air quality (the “Levelton Report”), examining four locations in Burrard Inlet to demonstrate the potential effects of an oil spill and demonstrate the importance of further study.¹⁶² The Levelton Report made numerous findings regarding the types and amounts of emissions that would be released during a spill, and found that a spill would impact the air quality in many municipalities surrounding Burrard Inlet, including West Vancouver.¹⁶³

75. Vancouver Coastal Health and Fraser Health reviewed the Levelton Report, noting that “more than one million residents in the communities surrounding the Burrard Inlet and English Bay could be exposed to the volatile chemical compounds released from a large oil spill...” and that the “level of exposure may be associated with potentially significant adverse health impacts in the local/regional population”. (emphasis added)¹⁶⁴ Given the population density in and around Burrard Inlet, even a small spill could have very significant impacts.¹⁶⁵

Evidence, Exhibit 4 – BC Ministry of the Environment, Guidelines for Air Quality Dispersion Modelling in BC ([A4L7Z0](#)) at p. 47

¹⁵⁹ National Energy Board, Information Request (IR) No. 2 to Trans Mountain ([A3Y7L4](#)) at p.24

¹⁶⁰ Trans Mountain, Follow-Up Response to NEB F-IR No. 2.024b-Attachment1 ([A4A1Z9](#))

¹⁶¹ Metro Vancouver, Written Evidence at p. 16

¹⁶² Metro Vancouver, Written Evidence, Exhibit 3 – Levelton Consultants Ltd., Air Quality Impacts from Simulated Oil Spills in Burrard Inlet & English Bay ([A4L7Y8](#)) (“Levelton Report”)

¹⁶³ Levelton Report at pp. ii-iv

¹⁶⁴ Metro Vancouver, Written Evidence, Exhibit 3A – Vancouver Coastal Health and Fraser Health, Letter to Metro Vancouver re: Air Quality Impacts from Simulated Oil Spills in Burrard Inlet & English Bay Air Quality Dispersion Modelling Report ([A4L7Y9](#)) (“Health Authorities Letter re: Levelton Report”) at pp. 1-2

¹⁶⁵ Health Authorities Letter re: Levelton Report at p. 2

76. Metro Vancouver, Vancouver Coastal Health and Fraser Health agree that further risk assessment should be done to assess the air quality impacts from a large spill in Burrard Inlet or English Bay.¹⁶⁶ In particular, the Health Authorities state that “the air dispersion modelling should be improved through having
- A complete set of time periods and weather conditions for the spill occurrence, giving consideration to future impacts from climate change;
 - A complete set of volatile chemical compounds from a spill of diluted bitumen (the Levelton report only modelled benzene);
 - Consideration of the potential cumulative health effects from concurrent exposures to multiple chemical compounds released from a spill;
 - More simulated spill locations, particularly closer to shore;
 - A complementary assessment of the long term health impacts from such a large spill.”¹⁶⁷

Health Effects

77. The District of West Vancouver is also concerned about the potential human health impacts of an oil spill, both due to the actual health impacts, but also because of the further impact of perceived risk of harm that a spill would bring to the community.
78. Based on the findings in the Levelton Report, Metro Vancouver made the following conclusions regarding the predicted health effects from the air emissions resulting from a spill in Burrard Inlet:
- Over a million people are predicted to be exposed to Benzene levels above the Acute Inhalation Exposure Limit during an oil spill in Burrard Inlet.
 - A spill is predicted to result in life-threatening health effects for people on the water near the oil slick, including those using marine transportation or involved in recreation or tourism.
 - A spill could result in the release of several hazardous air pollutants above levels at which the general public could experience irreversible or other serious long-lasting adverse health effects. Some of these health effects could interfere with the ability to take protective action.
 - Concentrations of emissions that are associated with mild, transient health effects are predicted to affect more than 31,000 people close to the Inlet.¹⁶⁸

¹⁶⁶ Metro Vancouver, Written Evidence at pp. 14-22; Health Authorities Letter re: Levelton Report at p. 2

¹⁶⁷ Health Authorities Letter re: Levelton Report at p.2

¹⁶⁸ Metro Vancouver, Written Evidence at p. 11

79. Vancouver Coastal Health conducted a review of literature regarding oil spill health impacts. It noted that few studies have examined acute physical impacts in residents due to the fact that relatively few oil spills have happened near densely populated areas.¹⁶⁹
- The studies that are available show acute impacts on residents who did not participate in spill clean-up, which often included headaches, respiratory symptoms and eye and throat irritation.¹⁷⁰
 - Studies suggest that oil spills are associated with both short-term and long-term health impacts in adults who are highly exposed, such as those involved in spill clean-up, including volunteers and paid workers.¹⁷¹
 - Spills may result in both short and long-term impacts on mental health and wellness for members of the public, which often persist or worsen over time. Depression, generalized anxiety disorder and post-traumatic stress disorder have been shown to result from the trauma associated with a spill, including the resulting income loss, the disruption of culturally significant activities and the stress associated with long-term uncertainty.¹⁷²

c. Economic Impact on Local Government

80. In addition to impacts on the environment and human health, a spill would have significant economic impacts for the District of West Vancouver. The full range of these impacts has not been considered by the proponent in its application, nor is a scheme ensuring full indemnification and compensation to local government provided for.
81. The District of West Vancouver's experience in responding to the April 2015 spill in the Burrard Inlet from the *M/V Marathassa* provides a recent example of the shortfalls the municipality has suffered as a result of a marine spill.
82. As discussed in more detail below, District of West Vancouver staff were engaged at the Incident Command Post and the North Shore Emergency Management Operations Centre in order to participate in critical response, coordinate clean-up activities and accompany Shoreline Cleanup Assessment Techniques teams in the field.¹⁷³ Staff also monitored beaches for oiling, installed signage on beaches to warn the public, and implemented and enforced restrictions on water access. Significant staff time was dedicated to patrolling the large affected area, due in large part to the insufficient response provided by Unified Command. Finally, District staff were forced to advocate for the proper clean-up of West Vancouver beaches, which, due to inadequacies in response plans, would not have been restored to a satisfactory condition.

¹⁶⁹ Public Health Guidance Document at Appendix C, p. 8

¹⁷⁰ Public Health Guidance Document at Appendix C, pp. 9-10, 33

¹⁷¹ Public Health Guidance Document at Appendix C, p.33

¹⁷² Public Health Guidance Document at Appendix C, p. 34

¹⁷³ District of West Vancouver, Affidavit of Dorit Mason ([A4L6L2](#)) ("Affidavit of D. Mason) at paras. 5.1-5.15

83. Spills draw upon not only municipal staff time, but also require volunteer management. The proponent has provided for no programs for control of the public and volunteer management in the event of a marine spill. However, the District's experience in the *M/V Marathassa* response demonstrates that this is an important draw on municipal resources.

All Disasters are Local

84. District of West Vancouver points to the informative evidence submitted by Jeremy Stone, an expert for the City of Vancouver. Based on a review of and interviews with other local governments that have experienced oil spills, Mr. Stone provided an opinion on the costs that local governments are likely to incur in responding to and recovering from an oil spill ("Costs Report").¹⁷⁴ As Mr. Stone states, it is a common principle of disaster management that 'all disasters are local':

"Until external resources arrive, local jurisdictions confront disasters on their own, and long after recovery teams leave local communities live with the lasting effects of disasters."¹⁷⁵

85. Under the present draft conditions of approval distributed for comment by the NEB on August 12, 2015 and December 11, 2015, the proponent need only implement a "marine oil spill response regime capable of delivering 20,000 tonnes of capacity within 36 hours of notification" (Draft Condition 114). Not only will the first 36 hours of a spill inevitably require a very significant draw on local, including municipal resources, but based on the District of West Vancouver's experience, and on the evidence of other jurisdictions, this resource draw continues well after external help has arrived.

"Local governments are on the front lines of oil spills, even though they are rarely highlighted in the oil spill response literature. Municipalities bear the physical scars of spills on the landscape, experience the core losses to their economies, and confront the long-term effects through costly and long-lasting recoveries. Although there is often a surge of recovery dollars following a spill, these rarely cover all of the individual costs across all categories."¹⁷⁶

86. Based upon his review and interviews, Mr. Stone identified the following categories of costs that were incurred by local governments in responding to and recovering from oil spills:
- i. Staging
 - ii. Space requirements
 - iii. Evacuation

¹⁷⁴ See Appendix A-2 for a list of oil spills researched in the preparation of the Costs Report

¹⁷⁵ City of Vancouver, Written Evidence, Appendix 81 – Evidence of Jeremy Stone ([A4L8E9](#)) ("Costs Report") at p. 3

¹⁷⁶ Costs Report at p. 6

- iv. Fire, police and emergency services
- v. Public health costs
- vi. Waste collection, transportation and disposal
- vii. Communication costs
- viii. Volunteer Management
- ix. Permitting and Regulatory Oversight
- x. Lost Use of Parks and Other Municipal Spaces
- xi. Municipal Brand Recovery
- xii. Opportunity Costs
- xiii. Costs of damage assessment
- xiv. Recovery planning
- xv. Technical Assistance Programs
- xvi. Interim Financial Relief
- xvii. Mitigation and Preparedness Activities
- xviii. Lost Tax Revenues
- xix. Legal Costs

87. The District of West Vancouver submits that even if the upper bound of potential spill costs is not reached¹⁷⁷, the economic impacts on the municipality from a spill would be significant. The sources of these costs are set out effectively by Mr. Stone, and are summarized below.

Methodology

“Although the Government of Canada has established the need for a world class response system (Transport Canada, 2013), the current strategies and capacity have been found to be far below what is necessary (Office of the Auditor General of Canada, 2010¹⁷⁸; Nuka Research, 2013). Moreover, the 1992 Civil Liability Convention (CLC 1992), to which Canada is a signatory, is generally sub-standard to the US-equivalent Oil Pollution Act of 1990 (OPA 1990). Numerous studies have detailed the CLC 1992’s inferior environmental protections, lower clean-up standards, and smaller compensation coverage than that of OPA 1990 (Mason, 2003; Kim, 2003; Jacobsson 2007; Kiran 2010; Schoenbaum, 2012).

¹⁷⁷ The evidence is that these costs are close to \$1 billion (Costs Report at p. 8)

¹⁷⁸ This report (Office of the Auditor General of Canada (2010) "Report of the Commissioner of the Environment and Sustainable Development to the House of Commons, Chapter 1: Oil Spills from Ships", [online] URL: http://www.oag-bvg.gc.ca/internet/docs/parl_cesd_201012_01_e.pdf) looked at how the federal government has managed spills of oil and chemicals in Canada’s oceans and the Gulf of the St. Lawrence. In particular, the report considered whether Transport Canada (TC), the Canadian Coast Guard (CCG) and Environment Canada (EC) were prepared to respond to such spills. The report found that although CCG and EC had conducted risk assessments, they had not used a consistent or systematic approach and had no process for ensuring ongoing reassessment, resulting in incomplete and out-of-date knowledge. The report also noted that CCG and EC’s emergency management plans are not up to date. Although TC reviews private sector certified response organizations for spill response readiness, it did not have procedures in place to verify CCG’s response readiness, and the report found that CCG itself did not have accurate knowledge of its capacity. Lastly, the report found poor documentation by CCG of its response efforts. The Report noted that the entities involved agreed with the recommendations.

Thus, studies that claim Canada's cost of oil spill response is cheaper than the United States are not reporting cost-savings or economies of scale, but are instead describing the lower response and recovery standards that characterize the Canadian system. Accordingly, analyses that seek to establish the requirements for a world class system in the Vancouver region should rely on relevant empirical findings from best-in-class responses.”¹⁷⁹

Volunteer Management

“Experience with previous oil spills has shown that large groups of volunteers may converge at a scene following highly publicized, widespread oil spills in coastal areas (Gass and Henry, 2005). Some examples include the estimated 1.82 million volunteers for the Hebei Spirit spill in 2007, which released 10,500m³ of crude oil along the western coast of South Korea (Cheong, 2012). One million of these volunteers showed up during the first six weeks alone (Tucker and O'Brien, 12 2011). During the 1997 Nakhodka incident in Japan which released 6,200m³ of fuel oil, approximately 500,000 volunteers actively participated in the response (Tucker and O'Brien, 2011). Similarly, an estimated 100,000 volunteers from across Europe traveled to Galicia for the Prestige oil spill in Spain. ...

Even though volunteers work without pay, they still create a series of costs for local governments in order to organize them and make them effective in the response. Some of the typical cost categories for volunteers include: reception and registration, training (both safety and work training), personal protective equipment (PPE - overalls, boots, gloves, masks etc), equipment and materials (spades, buckets, sorbents), accommodation, transport, and food/water and medical costs (Tucker and O'Brien, 2011). Estimates from the Prestige incident list costs per volunteer were up to \$70/day for PRE and basic cleaning equipment (Gass and Henry, 2005; Tucker and O'Brien, 2011). Many volunteers were housed with willing local residents or in temporary accommodation set up in municipal sports halls and in other public buildings.

According to the City and County of San Francisco, the Cosco Busan response enlisted approximately 1,500 volunteers as Disaster Service Workers (DSWs). Volunteer costs detailed Local Government Impacts of Oil Spills by the City for the incident were \$408,377 or \$273 per volunteer (CCSF Audit, 2008). Although local regulations may have prohibited the use of volunteers, it quickly became apparent that volunteers were going to clean the beaches anyway, so a volunteer management plan had to be drafted and executed (CCSF After Action Report, 2008).”¹⁸⁰

Losses to Tax Revenues

¹⁷⁹ Costs Report at p. 6

¹⁸⁰ Costs Report at pp. 18-19

“When economies, incomes, and real estate lose value, tax bases suffer. ...

Although it is difficult to measure precisely which variables led to tax decreases in particular places, some jurisdictions have made very specific claims. By April 2011, BP had paid out \$736 million in lost tax revenue claims to governments throughout Texas, Louisiana, Alabama, and Florida (GCCF, 2011). Additionally, the State of Alabama claimed tax losses from specific industries including tourism, retail, fishing, and real estate in two coastal counties. This was calculated at a loss of \$164 million in taxes which resulted in a reduction of education spending of two full percentage points statewide (Leinwand, 2010; Addy and Ijaz, 2010). Likewise, five Florida cities claimed a combined \$21 million of lost tax revenue related to lost tourism business (Tampa Bay Times, 2013; Dolac, 2013).”¹⁸¹

Legal Costs

“Recovery from oil spills can cost millions of dollars in litigation and other legal services. However, due to the strict confidentiality that is held around legal expenses it is challenging to determine the total cost associated with litigation. The following are a few known examples of legal costs associated with oil spills.

- Prestige: The Spanish government was involved in litigation for over 11 years after the Prestige disaster, pursuing both criminal and civil penalties, as well as being sued themselves. ...The total cost of litigation was calculated at approximately \$59 million over this period....
- Exxon Valdez: ... Eventually, the 10 costs were up to \$47 million per year, far exceeding the initial estimates....”¹⁸²

Costs for Permitting and Regulatory Oversight

“Following the Exxon Valdez disaster some researchers found that issues like temporary structure permit requests, building code enforcement, land use permits, land leases, water demand, and other types of requirements put enormous pressure on local governments (Rodin et al., 1992).”¹⁸³

Damage to Municipal Property

“Marine and waterfront properties owned or used by municipalities may be damaged by direct oil contamination or while being used as staging or temporary disposal sites during the response.”¹⁸⁴

¹⁸¹ Costs Report at p. 26

¹⁸² Costs Report at pp. 26-27

¹⁸³ Costs Report at p. 27

¹⁸⁴ Costs Report at p. 28

Brand Recovery

“The image of a city can be tarnished by an oil spill when concerns are raised over the cleanliness of the city, the safety of seafood or local goods, and the quality of the water or other tourist amenities. In almost every case it is necessary for municipalities to launch brand recovery campaigns to reinvigorate their economies in the wake of such disasters. These campaigns range in scope but generally focus on announcing that the area is "back to normal", and/or promoting the positive aspects of the municipality or region. ...

Costs for campaigns like these typically run into the millions of dollars. Following the Prestige disaster, Spain launched the "Espana Verde" (Green Spain) campaign, which focused on municipal and regional brand revitalization. This campaign alone cost \$37 million (Loureiro et al, 2005). After Deepwater Horizon, BP set aside \$166 million for brand recovery and tourism campaigns throughout the Gulf Coast (Finn, 2012). ...

Within the Canadian context, brand recovery campaigns for various disasters besides oil spills have been initiated. Two notable examples include:

Following the SARS epidemic in 2003, the City of Toronto spent \$11.5 million on marketing efforts to draw tourists back to the city.

Following the Southern Alberta floods in 2013, the Calgary Business Recovery Task Force...launched an eight-week “Rediscover Our City” marketing campaign which cost approximately \$1 million....”¹⁸⁵

Opportunity Cost

“The greatest gap in our understanding of oil spill impacts on municipal governments are the opportunity costs associated with focusing on the spill response and recovery. These activities may occupy city agendas and budgets for years after the spill response, and may create hidden costs and hardships for municipalities as they try to carry on daily work or execute long-term plans. A selection of common opportunity costs are listed below:

- Staff time: If staff are working on the oil spill, they are not working on the business of cities. Following Valdez the functioning of government in some places came to a "standstill", while others experienced reduced efficiency (Rodin et al, 1992). The City of Valdez spent 60 to 70% of their time immediately following the disaster on oil spill operations, which prompted reimbursements on a monthly basis from Exxon, and an additional \$196,000

¹⁸⁵ Costs Report at pp. 29-30

to pay for upfront costs (Rodin et al., 1992)....Similarly, massive mobilizations of volunteers (1.8 million after Hebei- Spirit, etc.) channel civic resources away from activities that could benefit the municipality or region. Although it is relatively easy to calculate the value of labor put towards oil spill activities, it is much more difficult to determine the lost value of this labour for the city's other problems.

- Routine Operations and Maintenance: Similar to the staffing issue, when cities are focused on responding to an oil spill they are typically not engaged in the routine operations and maintenance that are usually performed.”¹⁸⁶

Costs to Ocean-Based Economy

88. Additionally, the costs to West Vancouver's ocean based economy must be considered. The District of West Vancouver has 13 designated swimming beaches and 24 ocean-based parks. As is the case with the City of Vancouver, these waterfront amenities draw millions of people to our community—they are a significant reason people visit and live in the District of West Vancouver. The District of West Vancouver is a beach-city with an economy that is in no small part, ocean-based.
89. The City of Vancouver has submitted helpful evidence to provide a sense of the potential scale of loss to its ocean-based economy in the event of three potential scenarios (no spill, and a 16,000 m³ at First or Second Narrows in May and in October). The City's expert Professor Sumalia concludes that the ocean-dependent economic activities he analyzed (commercial fishing, port activities, inner harbor transportation, tourism and recreation) contribute a total of \$6,430 - \$6,700 million CAD in output value, 32,520 – 36,680 person years of employment and \$3,061 - \$3,261 million CAD in gross domestic product (GDP) to the Vancouver economy each year.¹⁸⁷

“Professor Sumalia concludes that, in the event of a May spill, Vancouver's ocean-dependent activities could suffer total losses in the range of \$380 - \$1,230 million CAD in output value, 3,238 – 12,881 persons years of employment and \$201 - \$687 million CAD in GDP. ...

In the event of an October spill, Vancouver's ocean-dependent economy could suffer total losses in the range of \$215 - \$1,020 million CAD in output value, 1,972 – 11,216 person years of employment and \$115 - \$757 million CAD in GDP. Under this scenario, 38 % of output value, 120 % of employment and 34 % of GDP from the proposed TMEP, as estimated by Trans Mountain in its Application, would be lost to the spill.”¹⁸⁸

¹⁸⁶ Costs Report at pp. 30-31

¹⁸⁷ Sumaila Report at p. 41; Appendix A-5

¹⁸⁸ City of Vancouver, Written Evidence at pp. 93-94

90. While the ocean-based economy of the District of West Vancouver is both quantitatively smaller and qualitatively more limited than that of the much larger City of Vancouver (for example, port activities do not play the same role in our economy), the District submits that there is a reasonable basis to conclude that West Vancouver would suffer proportionately similar losses to the City of Vancouver in the event of the spill scenarios examined.

Compensation regime does not cover full local government and health authority losses

91. As Transport Canada explains, the Marine Liability Act (MLA) is the principal legislation dealing with ship owner and vessel operator liability.¹⁸⁹ While the MLA is based upon the ‘polluter pays’ principle, it does not ensure that all economic losses suffered by communities are compensated. First, the total compensation available is limited to \$1.44 billion.¹⁹⁰ Even with additional allowance made for full access to the Ship Source Pollution Fund, there may still be a shortfall in compensation available in the event of a larger tanker spill.¹⁹¹
92. Furthermore, recent marine spill experiences have demonstrated that only a minor portion of applications for compensation following a spill are actually compensated.¹⁹²
93. Finally, the Canadian scheme’s requirement that the claimant has suffered “quantifiable economic loss”¹⁹³ is vague, and entails restrictions that will ensure that certain costs to local government are not compensated
94. The analysis of Drs. Gunton and Broadbent is consistent with the concerns of the District of West Vancouver:

“The provision of adequate compensation to mitigate economic, environmental, and social costs from a potential tanker spill is an important consideration in the

¹⁸⁹ Transport Canada, Written Evidence at p. A-29

¹⁹⁰ Gunton Report at p. 125.

¹⁹¹ See Gunton Report at p. 126 citing Transport Canada, World-Class Tanker Safety System: New measures to strengthen oil spill 3438 prevention, preparedness and response, and the polluter pay principle. Retrieved March 3439 8, 2015, from news.gc.ca

As stated by the authors of the Gunton Report at p. 126:

“Indeed, spill costs estimated based on spill volumes from the TMEP application and costs from WM (2012) show that total spill costs could exceed available compensation by up to \$2.9 billion. ...Removing the limit on the Ship-source Oil Pollution Fund would increase potential compensation provided by the domestic and international compensation scheme from \$1,440.7 million to \$1,677.9 million. This level of spill compensation would leave a shortfall of over \$2.7 billion in uncompensated damages that would not be covered (Figure 6.4). If additional damage costs such as passive use damages and ecosystem services damages are included, the shortfall would be even higher.”

¹⁹² City of Vancouver, Written Evidence at pp. 100-102

¹⁹³ Transport Canada, Written Evidence at p. A-32

assessment of the public interest of the TMEP. Although TM provides an overview of compensation funds in its Contingency Plan (TM 2013, Termpol 3.18), TM has not provided a comprehensive compensation plan that provides details about the process for mitigating and compensating damages incurred by impacted parties. The Contingency Plan does not define compensable damages, identify compensable parties, specify methods for determining damage claims, identify funding sources to fully cover all damage costs and specify dispute resolution procedures. Instead, TM defers compensatory responsibility for tanker spills to the IOPCF and the domestic Ship-Source Oil Pollution Fund, which ... are inadequate in the case of large oil spills (Figure 6.4). The potential inadequacy of the international and domestic funds to compensate for all damages shifts the shortfall in damage costs to third parties impacted by the damages or to taxpayers.

TM does not provide a comprehensive mitigation and compensation plan to provide assurance to the Canadian public that TM will be fully responsible for all spill clean-up and damage costs from a tanker, terminal, or pipeline spill. The elements of a detailed comprehensive compensation plan would include:

- defining compensable and non-compensable damages;
- identifying eligible and ineligible parties for compensation;
- specifying methods for determining and evaluating damage claims;
- identifying timelines for impacted parties to receive compensation;
- identifying funding sources to fully cover all damage costs;
- requiring the project proponent to accept unlimited liability for all damages resulting from the project;
- specifying dispute resolution procedures;
- establishing an independent monitoring process to assess ongoing impacts;
- specifying a legally binding and independent arbitration process to determine damages; and
- providing financial support for First Nations and stakeholders to participate in the monitoring and compensation process.”¹⁹⁴

Uncompensated Claims

95. The analysis submitted by the City of Vancouver which reviews three of the largest tanker oil spills in recent history, two of which were covered by the same compensation regime that applies to Canada—the Hebei Spirit (Republic of Korea, 2007) and Prestige (Spain, France & Portugal, 2002) oil spills—is instructive.

“According to the IOPC 2010 Annual Report, the *Hebei Spirit* was a major challenge to the Fund as 127,483 claims (mainly from fishing and shellfish sector) were received in connection with the incident by 31 December 2010. Compensation was only paid on 32,420 of these claims, representing 25% of the

¹⁹⁴ Gunton Report at pp. 128-129

total number of claims submitted. Of the 32,420 claims that were at least partially compensated, only 35% of the total value of these 32,420 claims was paid. ...

[...]

Claims handling offices were set up in Spain and France [for the *Prestige* spill]. The office in Spain received 845 claims, including 15 claims from the Spanish Government totalling €984.8 million related to costs incurred in respect of:

- at sea and on shore clean-up operations,
- removal of the oil from the wreck,
- compensation payments made in relation to the spill on the basis of Spanish legislation
- tax relief for businesses affected by the spill,
- administration costs,
- costs relating to publicity campaigns,
- costs incurred by local authorities and paid by the State,
- costs incurred by towns that had been paid by the State,
- costs incurred by the regions of Galicia, Asturias, Cantabria and Basque Country and
- costs incurred in respect of the treatment of the oily residues.

The IOPC assessed the claims by the Spanish Government at €300.2 million. Other losses, such as loss of natural heritage (the Atlantic Islands National Park) and loss of recreational uses by tourists and residents, arising from the *Prestige* oil spill were estimated at 14 times greater than the allowable IOPC compensation limits.”¹⁹⁵

96. The District points to the helpful summary of categories of losses which are particularly relevant to the District of West Vancouver, and the IOPC Fund’s treatment of those losses as compensable or not:¹⁹⁶

	Example	CLC-IOPC Compensation
Environmental Damage	Non economical marine environmental	Unclear
...
Tourism	loss of earnings to hotel or a restaurant that is not located close to a contaminated public beach; Marketing campaigns to prevent/ reduce economic losses	No (however each claim should be considered on its merits)

¹⁹⁵ City of Vancouver, Written Evidence at pp. 100-102

¹⁹⁶ City of Vancouver, Written Evidence at pp. 104-106

Tourism (Non-regulated)	AirBnB, temporary/ vacation rentals	No
Other businesses	Businesses providing services or goods to tourism-related businesses and not directly to tourists (e.g. laundry services, taxi companies, merchants who purchase the fish from the boats, etc.)	No
Recreation	Use of beaches, seawall and landscape, sports (such as fishing) and natural resources by the public during the recovery period	No
Non-use/passive use	Cultural, existence and heritage value (e.g. Stanley Park)	No
Public Health costs	Short and Long term health costs (physical and psychological)	No
Evacuation of urban area and temporary shelter	Evacuation of urban area, temporary shelters, food and water	Unclear
Technical Assistance Programs	Claims & legal assistance, employment assistance, etc.	Unclear
Other Assistance Programs	Human and social services designed to assist impacted populations, such as job training, child care assistance, senior services, domestic violence response, etc.	No
Legal Costs	Legal/ litigation costs incurred by government	Unclear
Volunteer Management	Engagement, PPE (Personal protective equipment), transportation, food and water, medical cost, liability insurance, planning, training, management of volunteers during oil spills	Unclear (some claims presented by voluntary groups involved in the protection of wildlife were accepted on BRAER and TANIO cases)
Research and damage assessment	Research studies and assessments	Only if the study was carried out as a part of the spill response as, a direct consequence of a particular oil spill

Communication Efforts	Developing and Launching website, signage, IT support (cell phone, computers, printers), internet	Unclear
Tax revenue	Property taxes, sales taxes	No (refer to TANIO and HAVEN case)
Cost of police, fire, first responders and emergency staff	Overtime, insurance, PPE, special equipment required, fuel for equipment, such as boats and vehicles, etc.	Unclear
Routine Operations and Maintenance	Continuity of city routine work that needs to be subcontracted at higher price	No
Brand recovery (City of Vancouver)	Marketing campaigns and tourism promotion to prevent/ reduce pure economic pure economic loss	Unclear (rejected in HAVEN, BRAER cases)
Brand value (long-term)	Value of the brand	No
Future developments	Future developments being disrupted due to the perception about the heightened risk of oil spills	No

Costs of responding to health impacts of spill

97. The District of West Vancouver is also concerned that the costs associated with the health consequences of a spill are not readily compensable as set out in the application, or under the existing legislative scheme. As the Health Authorities (Fraser Health and Vancouver Coastal Health) state:

“Currently health authorities have no legal means to recover the costs incurred from responding to a spill, or to participate in spills preparedness work. ...

It is not clear from the proposal what the proponent is planning to fund with respect to human health consequences of a spill. The literature review on the health impacts from oil spills (Appendix C) found no consistency in how health care and health monitoring following spills are funded. ...

With respect to compensation for the affected populations, the literature review also found no consistency in approach.”¹⁹⁷

¹⁹⁷ Public Health Guidance Document at p. 17

IV. Insufficient emergency management plan

98. The adverse impacts of the high risk and potentially serious environmental and economic impacts of a spill in Burrard Inlet are compounded by the insufficient evidence of an adequate, thorough and reliable emergency response plan in the Application.
99. The District of West Vancouver is very concerned that the proponent has not, in its Application or in its responses to questions, treated the issue of emergency response—both planning and preparedness—with an approach that demonstrates the level of respect and rigour required to safeguard the local environment and population. In this regard, the proponent appears to have taken an approach similar to that it has taken with respect to risk assessment: having decided that a spill in Burrard Inlet is unlikely, it has not attended to the risk inherent to the local community in such a spill. Similarly, the proponent has not demonstrated rigour in setting out actual plans for spill response, including diluted bitumen recovery along local shorelines, recovery of submerged or sunken bitumen, or oiled wildlife response.
100. The proponent states, in its final written argument:

“KMC, as operator, only has an emergency response role if the spill originates from the Westridge Marine Terminal or a tanker that is docked at the terminal. Once a tanker has completed loading and leaves the Westridge Marine Terminal the cargo falls under the jurisdiction of the *Canada Shipping Act, 2001* and associated marine transport regulations. In the unlikely event that an oil spill occurs in the marine environment multiple organizations (e.g., WCMRC, Transport Canada, Environment Canada and the Canadian Coast Guard) will quickly take coordinated action to mitigate public and environmental impacts.”¹⁹⁸
[footnotes omitted]

101. In this submission the proponent:
- a. Fails to recognize the necessary roles of local governments in responding to a marine spill, which is set out in part in the evidence in this proceeding of the response to the *M/V Marathassa* spill in Burrard Inlet in April 2015,¹⁹⁹ and
 - b. Ignores the real-time evidence of delays and lack of coordination between responding agencies in the *M/V Marathassa* incident and states merely that the listed agencies “will quickly take coordinated action to mitigate public and environmental impacts.”

¹⁹⁸ Trans Mountain, Revised Final Written Argument ([A4W6L8](#)) at p. 173

¹⁹⁹ See Affidavit of D. Mason; City of Vancouver, Written Evidence at pp. 36-74

102. Further, the proponent's submission suffers from a false premise. Simply because a marine spill that occurs beyond the Terminal would fall under the jurisdiction of the *Canada Shipping Act* does not mean that the proponent does not bear responsibility to ensure sufficient and reliable emergency response capacity is in place to respond to accidents or malfunctions from its own transport operations. Indeed, draft condition #114 recognizes this, putting the burden on the proponent to ensure a quantifiable response capacity is in place before it begins to load its tankers at Westridge Marine terminal. However, draft condition #114 does not go far enough to ensure adequate spill response capacity is in place. Nor has the proponent submitted evidence that is sufficient to establish that it will ensure adequate, coordinated and capable response capacity.
103. As the proponent notes:
- “The Board requires companies to provide relevant information consistent with that specified in EMP documents to first responders and all persons, including municipalities, that may be involved in an emergency response activity.”²⁰⁰
104. Although a marine spill itself will fall under the joint responsibility of federal response authorities and the responsible party, local governments have a fundamental obligation to respond to protect their populations and their shorelines. As the evidence filed by the District of West Vancouver and others demonstrates, the North Shore Emergency Management Office (NSEMO) works with industry that operates on or near North Shore municipalities' shorelines in order to prepare for coordinated and effective emergency response. As an example, Canexus Corporation is a chemical manufacturing and handling company with a terminal in North Vancouver. In recognition of the risks its business poses to humans and the environment, Canexus participates in the North Shore Hazmat Working Group and also fully funds the Rapid Notify mass emergency notification system for the whole North Shore, which is used by local police, fire and emergency operations center.²⁰¹
105. Similar coordination has not yet occurred between NSEMO and the proponent.²⁰²
106. Despite requests through this NEB process²⁰³, neither the proponent nor WCMRC has provided any plans for oil spill response along shorelines in Burrard Inlet, including West Vancouver's shorelines, or to respond to submerged or sunken oil that threatens these shorelines. As the City of Vancouver points out:

²⁰⁰ Trans Mountain, Revised Final Written Argument at p. 172 citing National Energy Board - Ruling No. 63 – Motions to compel full and adequate responses to the second round of intervenor information requests (April 27, 2015) ([A4K8G2](#))

²⁰¹ Affidavit of D. Mason at paras. 3.4, 3.5

²⁰² Affidavit of D. Mason at para. 3.6

²⁰³ City of Vancouver, Information Request No.1 to Trans Mountain ([A3W8F4](#)), Information Request No. 2 to Trans Mountain ([A4G5Z7](#)), Information Request No. 3 to Trans Mountain: TERMPOL ([A4H9F3](#))

“To compound this issue, the current Canadian Coast Guard Marine Spills Contingency Plan - National Chapter does not incorporate the Incident Command System, and provides no specific area plans or information for the Pacific Region.

This stands in contrast to the level of detail provided by Kinder Morgan to the US Pipeline and Hazardous Materials Safety Administration by its Emergency Response Field Guide for Puget Sound.”²⁰⁴

107. No table top exercises (let alone full scale emergency simulation exercises) have been done by WCMRC with the North Shore municipalities.²⁰⁵

108. Such exercises are essential to determining:

- how emergency responders will be contacted,
- how the North Shore municipalities will be represented in the Incident Command Post in order to influence response and recovery as required to protect shorelines and minimize impacts;
- the level of authority of WCMRC in the Incident Command Post (“ICP”) and its roles as a resource to the Canadian Coast Guard and/or Responsible Party
- how human resources will be utilized to protect the shoreline
- how public information will be disseminated²⁰⁶

a. *M/V Marathassa* Spill

109. As the April 8, 2015 *M/V Marathassa* spill in Burrard Inlet demonstrated, agencies with overlapping jurisdictions will respond in the event of a spill in Burrard Inlet. That incident demonstrated that spill response and mitigation relies upon coordinated and competent performance of roles by all agencies involved. Empirical shortcomings in the actual real time response to the *M/V Marathassa* spill shed valuable light on the weaknesses in the proponent’s Application, and its vague reliance on the same systems which were to have been in place and ready to respond to the *M/V Marathassa* spill. For instance:

- NSEMO was contacted by WCMRC to advise of the spill approximately 14 hours after the spill was detected.²⁰⁷
- NSEMO and City of Vancouver representatives working at Vancouver Emergency Operations Center made repeated requests to obtain information regarding the known extent of the spilled material from the Incident Command Post, but none was forthcoming.²⁰⁸

²⁰⁴ City of Vancouver, Written Evidence at p. 69

²⁰⁵ Affidavit of D. Mason at para. 4.1

²⁰⁶ Affidavit of D. Mason at para. 4.1

²⁰⁷ Affidavit of D. Mason at para. 5.1

²⁰⁸ Affidavit of D. Mason at para. 5.2

- It was not until almost 22 hours after the spill was initially detected that the extent of the spill was communicated by the Coast Guard.²⁰⁹
- This information indicated that the spill was approximately 500 m from the shoreline of West Vancouver. Shortly thereafter, oil was observed immediately off of the West Vancouver shoreline.²¹⁰
- A North Shore Emergency Response Center was established at that time.
- The Incident Command Post and NSEMO had difficulty putting sufficient personnel in place to prevent public access to oiled beaches.²¹¹

110. The *M/V Marathassa* spill caused a very significant draw on District of West Vancouver staff resources:

- West Vancouver Chief Administrative Officer, Fire Chief and Information Officer were all engaged at the North Shore Emergency Operations Center.²¹²
- Other municipal staff were assessing beaches, responding to on-site media and supporting the emergency response as required.²¹³
- As demonstrated in the evidence submitted by the City of Vancouver, local governments were a primary source of information for the public regarding the oil spill.²¹⁴
- The District implemented restrictions on water access, with police and other municipal staff enforcing.²¹⁵
- District of West Vancouver Fire representatives assessed the West Vancouver shoreline by fireboat with the City of Vancouver fire department.²¹⁶
- Staff were also located at the Incident Command Post in Port Metro Vancouver offices for communication relating to critical response and clean-up activities. This involved, over the course of the response and clean up, municipal management staff, emergency management staff and environmental staff from West Vancouver and the District and City of North Vancouver.²¹⁷
- Installation of signage from Park Royal to Lighthouse Park to warn the public about the spill and keep the public away from beaches.²¹⁸
- District of West Vancouver Bylaws, Police, Fire and Parks Department staff had to patrol the beaches to ask the public to stay off the beach; Unified Command provided insufficient personnel to patrol the large affected area.²¹⁹

²⁰⁹ Affidavit of D. Mason at para. 5.2

²¹⁰ Affidavit of D. Mason at para. 5.2

²¹¹ Affidavit of D. Mason at para. 5.3

²¹² Affidavit of D. Mason at para. 5.13

²¹³ Affidavit of D. Mason at para. 5.5

²¹⁴ Nuka Spill Debrief at pp. 4-5; Appendix A-8

²¹⁵ Affidavit of D. Mason at para. 5.5

²¹⁶ Affidavit of D. Mason at paras. 5.10 - 5.11

²¹⁷ Affidavit of D. Mason at para. 5.12

²¹⁸ Affidavit of D. Mason at para. 6.9(a)

²¹⁹ Affidavit of D. Mason at para. 6.9(b)

- North Shore municipalities staff inspected beaches and at the request of Unified Command went out in to the field with Shoreline Cleanup Assessment Techniques (“SCAT”) teams.²²⁰
111. Despite this, the International Tanker Owners Pollution Federation (“ITOPF”) and Emergency Management BC advised NSEMO and the North Shore municipalities that compensation would be paid to local governments only for the over-time hours worked by staff.²²¹ This fundamentally ignores the tremendous lost opportunity costs incurred by not having staff able to attend to matters they would otherwise attend to but for the oil spill.
112. NSEMO and the North Shore municipalities were not provided with important and relevant information in a timely way by WCMRC or the Coast Guard during the spill response and recovery. They further observed that Unified Command initially had no formal document management system established, and that not all public reports of oil were being recorded adequately, nor passed on to local governments.²²²
113. In addition to not being supplied relevant information in a timely way during the response, NSEMO and the District of West Vancouver also learned that the response plans themselves were inadequate to the task of cleaning and restoring West Vancouver beaches to a safe condition. As the head of NSEMO attests:
- “John Lawson Beach is a high use public recreation beach, with easy access, and has a large playground right next to it. This location is a destination for families from across the North Shore and is connected by a seawalk along the whole waterfront. This beach was one of the areas hardest hit by the oil spill. John Lawson Beach would not have been adequately cleaned up to the appropriate level of beach end point criteria if not for the insistence by the District of West Vancouver that an independent analysis of the beach be done. Unified Command was prepared to leave this beach cleaned and to the level of the normal standard for beach clean-up end points which allows for globules of oil to be present. However, the District of West Vancouver insisted that this standard be modified to take into account the high public use of this beach and the potential exposure to the public.”²²³
114. The Responsible Party objected to enhanced clean up for this beach. Unified Command eventually agreed to bring in an expert from Environment Canada (from Montreal) to visit and inspect John Lawson Beach. After observing the high use of this beach by the very young to the very old, the Environment Canada representative determined that while this condition may have been adequate for other beaches, this very high use beach required additional clean up, which took three additional days to complete. Further,

²²⁰ Affidavit of D. Mason at para. 6.9(c)

²²¹ Affidavit of D. Mason at para. 6.13(a)

²²² Affidavit of D. Mason at paras. 6.4, 6.7

²²³ Affidavit of D. Mason at para. 6.8(a)

Vancouver Coastal Health Authority did not approve re-opening of John Lawson Beach (and the 28th to 31st Street beaches) until May 15, 2015, a full 21 days after the Incident Command Post was shut down by the Coast Guard on April 24, 2015. These were the last of the beaches reopened in Metro Vancouver. As the head of NSEMO observed:

“There did not appear to be any objective criteria for reaching end-points such as when the clean-up of John Lawson Beach would be considered complete. End-points must consider all aspects of the beach, including environmental sensitivity, human use, and cultural importance.”²²⁴

115. The total volume of oil spilled still remains unknown to West Vancouver and NSEMO. Furthermore, there was no scheduling of monitoring for re-oiling events after end-points had been reached or after the closure of the Incident Command Post.²²⁵
116. The District of West Vancouver was directly adversely affected by the delayed and insufficient response to the oil spilled from the *M/V Marathasa*. In the District’s submission, no evidence in the proponent’s application demonstrates that similar or analogous shortfalls in spill response are not a significant risk associated with the marine shipping component of the proposed Project. Moreover, the intervenor evidence on response capacity demonstrates that shortfalls in response should be anticipated. In the event of a major oil release, such shortfalls would be potentially devastating for the local residents and environment, including the District of West Vancouver.

b. Response Capacity

117. Neither the application nor the NEB draft conditions sufficiently recognize the critical importance of the early hours of spill response and the significant environmental impact that can occur in these hours.
118. NEB draft condition #114 would require the proponent to ensure a marine oil spill response regime capable of delivering 20,000 tonnes of capacity **within 36 hours of notification**. However, as the evidence submitted by City of Vancouver, Tsleil-Waututh Nation and Tsawout First Nation demonstrates, **a 48-hour delay in the modelled response to a spill in the Outer Harbour would result in over 69% of the oil being left in the environment**, unrecovered.²²⁶ Moreover, in order for on-water mechanical recovery systems to work, the oil must remain as a floating slick through the entire recovery process. If the oil submerges even a few millimeters below the surface of the water, it becomes difficult and ultimately impossible to recover the oil using skimmers.²²⁷ As the analysis of the behaviour of diluted bitumen demonstrates, **oil spills from tankers that occur under certain conditions that are reasonably likely in**

²²⁴ Affidavit of D. Mason at para. 6.8

²²⁵ Affidavit of D. Mason at paras. 6.12(e)

²²⁶ Nuka Report at p. ix (“A 48-hour delay in the modeled response to a 16,000 m³ Outer Harbour spill would result in over 11,000 m³ of oil left in the environment.”)

²²⁷ Nuka Report at p. 66

Burrard Inlet may sink in as little as 24 hours after the release, thereby thwarting on water mechanical recovery.²²⁸ Furthermore within 24 hours after a spill at the First Narrows at any time of year, virtually all stretches of City of Vancouver waterfront could be affected.²²⁹

119. The expert evidence submitted by the City of Vancouver, Tsleil-Waututh Nation and Tsawout First Nation regarding response capacity establishes that:
- a. “On-water oil spill recovery capacity is reduced during winter months by as much as 50% compared to summer.”²³⁰
 - b. “If spill response were delayed for any reason – lags in detection, poor weather, equipment malfunction, air quality impacts – the total volume of oil recovered would decrease significantly. A 48-hour delay in the modeled response to a 16,000 m³ Outer Harbour spill would result in over 11,000 m³ of oil left in the environment.”²³¹
 - c. “The modeled response capacity estimates do not consider the potential for shoreline stranding. This may overestimate total recovery at all sites, and most significantly in Burrard Inlet where models show up to 90% of an oil spill stranding on the beaches.”²³²
 - d. “The spill response forces currently available in Southern B.C. have the capacity to recover only 10-20% of a worst case oil spill under favourable conditions.”²³³
 - e. “Changes to diluted bitumen density and viscosity within the first few days of the release may render oil spill response systems ineffective.”²³⁴
120. The same report also conducted an oil spill response analysis, which came to the following conclusions:
- a. “There is no location along the Trans Mountain tanker route where on-water oil spill response will always be possible.
 - b. There may be times when on-water vessel operations are possible but poor visibility - including darkness — precludes aerial reconnaissance, making it very difficult to track and target oil for recovery.
 - c. During the winter, response is not possible between 56% and 78% of the time at sites along the Trans Mountain tanker route.
 - d. If a spill occurs during a time when response gap conditions exist, the unmitigated oil slick will remain in the environment until conditions improve. If the response

²²⁸ Nuka Report at pp. 66-67

²²⁹ City of Vancouver, Written Evidence at pp. 56-59

²³⁰ Nuka Report at p. ix

²³¹ Nuka Report at p. ix

²³² Nuka Report at p. ix

²³³ Nuka Report at p. ix

²³⁴ Nuka Report at p. ix

gap conditions extend for several days, there may not be any opportunity for on-water recovery.”²³⁵

121. Further delay in response and harm would result in the event of fire or explosion related to a spill. Like the City of Vancouver, the District of West Vancouver does not have the training or equipment to fight shipboard fires on tankers.

122. Nor has the proponent presented any plan for health authority notification in the event of a spill. This is despite a serious and demonstrable gap in such protocols:

“At the time of the 2007 Westridge Burnaby spill, Fraser Health first heard about the incident from the news media. In the case of the recent *M/V Marathassa* fuel spill, Vancouver Coastal Health was indirectly notified through the City of Vancouver more than 12 hours after the event.”²³⁶

123. Given the dense population around Burrard Inlet, an appropriate spill response plan would include ensuring capacity to quickly identify and track chemical substances being released from the spill in order to allow evidence based and timely public health decisions to be made (e.g. warnings, evacuation orders).²³⁷ However, the local health authorities have advised that they do not have the capacity to monitor chemicals released following a large oil spill, and the application has not revealed whether the proponent or its designated oil spill response agency, Western Canada Marine Response Corporation (“WCMRC”), have such capacity locally.²³⁸

124. The application has also not revealed “whether equipment such as air quality monitors, personal protective equipment for responders (other than for WCMSRC [WCMRC] and TMP staff), and volunteers are part of the prepositioned supply and ready for deployment. It is also unknown whether the proponent and its designated oil spill response agency WCMSRC [WCMRC] have oil spill related environmental health, toxicology, and laboratory expertise on standby that can be deployed in a timely way following a spill.”²³⁹ Again, the Health Authorities have advised that they do not have the necessary equipment or expertise to meet these needs.

125. Finally, the proponent has not developed or presented specific plans for coordinated oiled wildlife response, or raised the issue at all in its Application. This is a significant shortcoming in light of:

- a. The potentially serious impacts of oiling on birds and wildlife
- b. The likelihood that members of the public including volunteers will interact with oiled wildlife, whether or not at the direction of a formal agency

²³⁵ Nuka Report at p. vi

²³⁶ Health Authorities Letter at pp. 2-3

²³⁷ Health Authorities Letter at p. 2

²³⁸ Health Authorities Letter at pp. 2-3

²³⁹ Public Health Guidance Document at p. 13

c. The potential for contamination spread by oiled wildlife.²⁴⁰

126. In the end, it is the local population and environment that will suffer the harm of any shortfall in emergency planning and preparedness. The District of West Vancouver is very concerned by the evidence before the Board in this proceeding, which reveals that there are significant shortfalls in Trans Mountain's emergency response planning and preparedness for a marine spill in Burrard Inlet. The proponent has not provided actual plans for prompt spill response, including diluted bitumen recovery along local shorelines, recovery of submerged or sunken bitumen, or oiled wildlife response. **The District submits that it is not safe for the NEB to recommend approval of the project based upon the current evidence of Trans Mountain's marine spill response planning and preparedness.**

D. Overall Impact on District of West Vancouver

127. A review of the evidence in this proceeding reveals that the District of West Vancouver, its residents and its visitors, face a substantial risk of negative environmental, health and economic impacts from the increased shipping of diluted bitumen under the proposed Project. The Project will bring a seven-fold increase to the oil tankers travelling and anchoring along the shores of West Vancouver, with the potential for an even greater increase in the future. The Application does not adequately assess the operational impacts this marine shipping will have on the District of West Vancouver—including the full scope of impacts of marine emissions on air quality and human health, of noise and light pollution or of greenhouse gas emissions. Nor does the Application demonstrate adequate spill risk and impact assessment, or adequate spill response planning and preparedness. Intervenor evidence has filled in many of the gaps left by the proponent's evidence.
128. As set out in the submissions above, the evidence in this proceeding demonstrates that the Project will bring negative impacts and costs to the municipality through its regular operations, will burden the municipality with ongoing and significant risk of serious harm from accidents or malfunctions, and will, on the other hand, bring no local, and insufficient regional and national, benefits.
129. Based upon the evidence that has been put before the NEB, the District of West Vancouver submits that the NEB should recommend against the issuance of a certificate or decision statement approving the proposed Project. This is based upon both the operational impacts that the District of West Vancouver and surrounding areas will suffer from the routine operations of the proposed Project, as well as on the risk of the impacts that will be suffered in the event of spills resulting from malfunctions or

²⁴⁰ See, for example, City of Vancouver, Written Evidence at pp. 69-73 citing Appendix 73 - Oiled Wildlife Trust & Wildlife Advantage/Coleen Doucette, World Leading Wildlife Response Standards ([A4L7V4](#)) and Appendix 76 – Written Evidence of Rob Dudgeon ([A4L9F6](#)); JWS Report; Report re: Effects on Salmonid Species; Costs Report

accidents in or near the waters along West Vancouver's shoreline. These harms are not in the public interest, and are not outweighed by local, regional or national benefits.

All of which is respectfully submitted.

Dated January 11, 2016 in the District of West Vancouver.

Appendix A: Attachments

Appendix A-1 –Marine bird species with particular vulnerabilities to spills in the Project Marine Area (Environment Canada, Written Evidence, pp. 59-68, Table 2-4)

Guild	Vulnerabilities to oil spills	Vulnerable species or populations
<p>Waterfowl</p>	<p>Approximately 33 species of waterfowl are regularly found within the Project Marine Area. The vulnerability of waterfowl to oil spill is, in part, the result of the large amount of time they spend foraging in the intertidal zone where oil tends to collect, the large amount of time they spend swimming on the surface of the water, as well as their tendency to aggregate into dense groups.</p>	<p><u>Pacific Black Brant</u></p> <p>Pacific Black Brant (<i>Branta bernicla nigricans</i>) is Blue-listed in BC, and approximately 40,000 Brants rely on various sites within the Strait of Georgia during spring staging. These sites are critical for Brants as this is where they build body reserves needed to complete spring migration, as well as for egg development and incubation. Of these sites, the Fraser River delta and the Parksville Qualicum Beach sites are the most important, together supporting approximately 25,000 to 30,000 Brants during spring.</p>
		<p><u>Lesser Snow Goose</u></p> <p>Lesser Snow Goose (<i>Chen caerulescens caerulescens</i>) is Yellow-listed in BC, and approximately 25% of the Wrangel Island (Russia) population overwinters in the Fraser River Delta from Richmond to Brunswick Point. The Wrangel Island population is red-listed in Russia and constitutes an internationally important population of geese. As a result, Environment Canada sees a responsibility to manage this species, along with its habitat, into the future.</p>
		<p><u>Trumpeter Swan</u></p> <p>Trumpeter Swan (<i>Cygnus buccinators</i>) is Yellow-listed in BC and approximately 10% of the global population is found in the Project Marine Area, mostly in the Fraser River delta and Fraser Valley but also in Squamish estuary and Comox Valley.</p>
<p>Shorebirds</p>	<p>Shorebirds are found within the southern Strait of Georgia and Strait of Juan de Fuca primarily in winter and during spring and fall migration. Approximately 23 species of shorebirds are regularly found within the Project Marine Area. Shorebirds are especially vulnerable to oil spills due to their reliance on intertidal habitats, where oil tends to collect. In particular, large proportions of</p>	<p><u>Western Sandpiper – Pacific Flyway population</u></p> <p>Western Sandpiper (<i>Calidris mauri</i>) is Yellow-listed in BC and the mudflats of the Fraser River delta provide the most important migration stopover habitat for shorebirds on the Pacific Coast of Canada. Approximately 14% to 21% of the total Western Sandpiper population for the</p>

Guild	Vulnerabilities to oil spills	Vulnerable species or populations
	<p>the population of certain species rely on specific sites within the Project Marine Area during spring and fall migration, including reliance on biofilm grazing.</p>	<p>Pacific Flyway regularly stops over at Roberts Bank, and possibly up to 42%-64% in some years. Other studies show that thousands more use Sturgeon Banks and Boundary Bay (Drever et al. 2014).</p> <p><u>Pacific Dunlin – Pacific Flyway population</u></p> <p>Dunlin (<i>Calidris alpina</i>) is Yellow-listed in BC and during migration the entire population may be found on the Fraser River delta. Approximately 30% - 50% of the total Pacific population regularly passes through Brunswick Point. Other studies show that thousands more use Sturgeon Banks and Boundary Bay (Drever et al. 2014).</p> <p><u>Great Blue Heron, Fannini subspecies</u></p> <p>The Great Blue Heron (<i>Ardea herodias fannini</i>) is federally listed as Special Concern and provincially Blue-listed in BC. Nearly all of this subspecies is found within the Strait of Georgia (Butler and Baudin, 1999). Great Blue Herons rely on intertidal, foreshore and upland habitats throughout the year (Kenyon, 2005). Other important concentrations of Great Blue Heron include Burrard Inlet, Stanley Park and Comox, where large numbers of herons nest every year.</p> <p><u>Black Oystercatcher</u></p> <p>Black Oystercatcher (<i>Haematopus bachmani</i>) is Yellow-listed in BC and is an example of a rocky intertidal specialist. It is the only resident shorebird and thus breeds, in the Project Marine Area. This species is found in globally-important numbers in the Strait of Georgia and is used as an umbrella species for coastline-dependent birds (Tessler et al. 2010).</p>
<p>Alcids</p>	<p>Alcids are widespread in the Strait of Georgia and Strait of Juan de Fuca and use the area throughout the year. Seven species of alcids are found within the study area; Pigeon Guillemot, Marbled Murrelet, Ancient Murrelet, Common Murre, Rhinoceros Auklet, Cassin’s Auklet and Tufted Puffin. There is increased potential for adverse effects from an oil spill on alcids due to the extensive amount of time they spend swimming on the sea surface and their tendency to aggregate in dense groups. In addition, although alcids are found in lower abundance than other marine birds in the area, some are of high responsibility as they are</p>	<p><u>Marbled Murrelet</u></p> <p>Marbled Murrelet (<i>Brachyramphus marmoratus</i>) is federally Threatened and provincially Red-listed in BC. The federal Recovery Strategy for the Marbled Murrelet was finalized in 2014 and notes that “Marbled Murrelets and other related seabirds (alcids) are among those species most vulnerable to oil spills at sea, and this threat has always been a consideration in designating its status (COSEWIC 2012).[...] Marbled Murrelets and related seabirds were the birds most affected by the Exxon Valdez spill in Alaska and Marbled Murrelets had the highest number of identified carcasses” (Environment Canada, 2014).</p>

Guild	Vulnerabilities to oil spills	Vulnerable species or populations
	species of conservation concern.	<p><u>Ancient Murrelet</u></p> <p>Ancient Murrelet (<i>Synthliboramphus antiquus</i>) is federally listed as Special Concern and Blue-listed in BC. The federal management plan for this species identifies presence of oil tanks as a serious potential threat to Ancient Murrelet (Environment Canada, 2015a).</p> <p><u>Common Murre</u></p> <p>Common Murre (<i>Uria aalge</i>) is Red-listed by the province of BC.</p> <p><u>Pigeon Guillemot</u></p> <p>Pigeon Guillemot (<i>Cepphus columba</i>) is Yellow-listed in BC and breeds in the Project Marine Area. The largest breeding colonies are at Mandarte and Mitlenatch Islands, together containing over half the coastal population (Emms and Morgan 1989). The largest concentrations of breeding Pigeon Guillemots are on Mandarte Island and the Great Chain Islets, although the islands and islets surrounding the Northern Saanich Peninsula, Saltspring Island and those off of Victoria and Pender and Saturna Islands are also of importance (Emms and Verbeek 1989).</p>
Diving ducks	<p>Large numbers of diving ducks use the Project Marine Area for wintering and moulting. Diving ducks include members of the families <i>Mergus</i> (mergansers), <i>Bucephala</i> (Goldeneye and Bufflehead), <i>Melanitta</i> (scoters), and <i>Histrionicus</i> (Harlequin Duck). Diving ducks are especially vulnerable to oil spills due to their reliance on marine prey as well as the large amount of time they spend on or diving into marine waters, as well as due to their tendency to aggregate in dense groups on the water.</p>	<p><u>Surf Scoter</u></p> <p>Surf Scoter (<i>Melanitta perspicillata</i>) is Blue-listed in BC, and about 13% of the global population of Surf Scoters uses the Project Marine Area, largely within the Fraser River delta and Burrard Inlet.</p> <p><u>Barrow's Goldeneye</u></p> <p>Barrow's Goldeneye (<i>Bucephala islandica</i>) is Yellow-listed in BC; about 3% of the global population winters in Burrard Inlet. This species is highly vulnerable to oil spills as it depends on shallow, intertidal habitats where oil tends to collect.</p> <p><u>Harlequin Duck</u></p> <p>Between 10,000 and 15,000 Harlequin Ducks winter and use rocky shorelines along all parts of the Strait of Georgia. This species is highly vulnerable to oil spills as it depends on shallow, intertidal habitats where oil tends to collect. They</p>

Guild	Vulnerabilities to oil spills	Vulnerable species or populations
		not only overwinter in the Strait of Georgia for 8-9 months of their annual cycle, they are highly site-faithful and have low reproductive rates, making them slow to recover from any population impacts such as an oil spill.
Gulls	A few species of gulls are found in large numbers in the Project Marine Area either in winter, on migration or year round. Gulls can be especially vulnerable to oil spills due to the large amount of time they spend foraging on shore and in water, as well as swimming on the water	<p><u>Glaucous-winged Gull</u></p> <p>Glaucous-winged Gull (<i>Larus glaucescens</i>) is Yellow-listed in BC, and more than 10% of the global population uses the Project Marine Area for breeding and wintering. Important breeding colonies are found at Mandarte Island, Great Chain Islets, Snake Island, White Islet and Wilson Creek and Jervis Inlet on the Sunshine Coast, Comox on eastern Vancouver Island and Porlier Pass.</p>
Loons, cormorants and grebes	<p>Loons, cormorants, and grebes are found in large numbers in the Project Marine Area. Impacts from an oil spill can be more significant for these birds because they spend most of their time swimming on the sea surface and often aggregate in dense groups.</p> <p>Cormorants are not protected under the MBCA (they are covered under provincial legislation). However, they are included here as some species are of conservation concern, and for completeness in representing this group of birds.</p>	<p><u>Western Grebe</u></p> <p>Western Grebe (<i>Aechmophorus occidentalis</i>) is Red-listed in BC, and about 2% of the global population uses the Project Marine Area, mainly the Fraser River delta and Burrard Inlet.</p> <p><u>Pelagic Cormorant</u></p> <p>Pelagic Cormorant (<i>Phalacrocorax pelagicus</i>) is Red-listed in BC. Approximately 4% of the global population uses the Project Marine Area. A significant proportion of this population is found in Burrard Inlet during winter. The largest Pelagic Cormorant breeding colonies in Georgia Strait are found at Mandarte Island and Vancouver bridges of Burrard Inlet and False Creek.</p> <p><u>Brandt's Cormorant</u></p> <p>Brandt's Cormorant (<i>Phalacrocorax penicillatus</i>) is Red-listed in BC. Approximately 4% of the global population uses the Project Marine Area during migration. The Great Chain Islets is an important fall migration area for Brandt's Cormorant.</p> <p><u>Double-crested Cormorant</u></p> <p>Double-crested Cormorant (<i>Phalacrocorax auritus</i>) is Blue-listed in BC. The largest breeding colonies in the Georgia Strait are found at Christie Islet, Sand Heads, Roberts Bank Terminal, Great Chain Islets, the Galiano Island cliffs, Thetis Island and Mandarte Island (Davidson, Butler, Couturier, Marquez and Lepage, 2010).</p>

Guild	Vulnerabilities to oil spills	Vulnerable species or populations
<p>Pelagics</p>	<p>Pelagic birds include albatrosses, stormpetrels, fulmars, shearwaters, etc. and, while generally inhabiting the open ocean, many species are also known to occur closer to shore, including near the western entrance to, and within, the Juan de Fuca Strait. They can be especially vulnerable to oil spills as they often aggregate in large rafts on the water, and also tend to forage while sitting on or diving below the surface of the water.</p>	<p><u>Black-footed Albatross</u></p> <p>Black-footed Albatross (<i>Phoebastria nigripes</i>) is federally listed as Special Concern and Blue-listed in BC. The risk of oil spill effects to this species was characterized as “The majority of Blackfooted Albatrosses have been observed along the Canadian continental shelf break, an area bisected by commercial shipping traffic, resulting in high potential to encounter either chronic discharges or a catastrophic spill from shipping traffic during the summer and fall” (Environment Canada, 2015b).</p>
		<p><u>Pink-footed Shearwater and Shorttailed Albatross</u></p> <p>Pink-footed Shearwater (<i>Puffinus creatopus</i>) is federally listed as Threatened and provincially Blue-listed in BC. Short-tailed Albatross (<i>Phoebastria albatrus</i>) is federally listed as Threatened and provincially Red-listed in BC. According to the last COSEWIC assessment report for the Short-tailed Albatross, this species is highly vulnerable to marine oil spills. Foraging areas for this species are close to major routes used by large numbers of tankers and other shipping. In particular: “Proposals to double the Trans-Mountain Pipeline from Alberta to Burnaby (Metro Vancouver) (NEB 2013) would greatly increase tanker traffic through areas off western Vancouver Island where Shorttailed Albatrosses tend to be found” (COSEWIC, 2013). The federal Recovery Strategy for Pinkfooted Shearwater and Short-tailed Albatross highlights that “Oil spills or discharges in or near key foraging areas could pose a high risk to the Short-tailed Albatross and the Pink-footed Shearwater. [...] Short-tailed Albatrosses and Pink-footed Shearwaters will occasionally form large single or mixed species rafts at sea [...] which increases the potential effects of a marine oil pollution event. [...] If Short-tailed Albatrosses and Pink-footed Shearwaters travel and forage along the continental shelf–upper slope, they move along a relatively narrow band bisected by shipping lanes. Thus, there is a high potential for these species to encounter either catastrophic or chronic discharges of oil” (Environment Canada, 2008).</p>

Guild	Vulnerabilities to oil spills	Vulnerable species or populations
<p>Federally and Provincially listed species</p>	<p>There are approximately 37 species and subspecies listed Federally or Provincially in the Project Marine Area, as well as species assessed by COSEWIC as at risk. Species of conservation concern can be especially vulnerable to oil spills in the marine environment because their populations are subject to other ongoing threats, such as habitat fragmentation, disturbance from marine traffic, contaminants, etc. The potential effects of an oil spill on these populations, in combination with effects from existing, or past, threats, as well as with current population dynamics, could further impede these populations' capacity to recover and/or survive.</p>	<p><u>Federal</u></p> <p>Black-footed Albatross, Short-tailed Albatross, Pink-footed Shearwater, Great Blue Heron (Fannini), Barn Owl, Ancient Murrelet, Marbled Murrelet, Peregrine Falcon.</p>
		<p><u>Provincial</u></p> <p>Peregrine Falcon (anatum and pealei), Snowy Owl, Black-footed Albatross, Northern Fulmar, Pink-footed Shearwater, Flesh-footed Shearwater, Buller's Shearwater, Brandt's Cormorant, Double-crested Cormorant, Pelagic Cormorant, California Gull, Caspian Tern, Common Murre, Ancient Murrelet, Marbled Murrelet, Barn Owl, Cassin's Auklet, Tufted Puffin, Horned Puffin, Laysan Albatross, Short-tailed Albatross, American Bittern, Great Blue Heron, Red Knot, American Golden Plover, Wandering Tattler, Long-billed Curlew, Short-billed Dowitcher, Red-necked Phalarope, Pacific Black Brant, Cackling Goose, Tundra Swan, Surf Scoter, Yellowbilled Loon, Horned Grebe and Western Grebe.</p>

Appendix A-2: Oil Spills Researched (Costs Report, Appendix B, pp. 35-38)

The following are case studies for oil spills that formed the bulk of this study's analysis.

Amoco Cadiz: On March 16th, 1978, a steering gear failure resulted in the Amoco Cadiz tanker running aground off the coast of Brittany, France. 223,000m³ of light crude oil and 4,000 m³ of bunker fuel were released into the ocean in the weeks following the incident. The volume of contaminated fluid multiplied as oil mixed with the sea waters and eventually contaminated 320km of Brittany shoreline and resulted in the greatest loss of marine life recorded after a spill to that point. Millions of dead sea urchins and dead mollusks washed ashore and oyster cultivation was seriously affected. Rocky shores recovered relatively quickly, while the salt marshes took many years to recover (ITOPF, 2014a).

Burnaby Oil Spill: In July of 2007 a pipeline carrying crude oil was struck by an excavator working on a sewer line in Burnaby, BC, Canada. Lack of communication and pre-construction procedures were cited as factors contributing to the break. The pipeline released about 201m³ of oil some of which flowed into the Burrard Inlet and some of which sprayed homes in the residential neighborhood. The incident caused environmental pollution in the area and led to the evacuation of about 250 residents. Cost estimates for clean-up operations were about \$17 million dollars (CBC, 2011).

Cosco Busan: On November 7, 2007, the freighter Cosco Busan struck the Bay Bridge under conditions of restricted visibility as it attempted to depart San Francisco Bay. As a result 53,569 gallons of oil flowed into the San Francisco Bay (according to US Coast Guard calculations). 89.66 miles of shoreline were polluted; although only 34.45 miles were polluted heavily or moderately. The spill precipitated widespread beach closures, fisheries closures (both commercial and recreational), and the cancellation of many activities on the Bay. A large-scale response ensued, with clean-up crews active for several weeks. The US Coast Guard officially declared the response to be complete on November 9, 2008, one year and two days after the spill. Some clean-up continued at several beaches into summer 2008, as they continued to have oiling episodes washed up by wave action. The overall costs of the incident as of 2011 were \$222,300,000.

Deepwater Horizon: On April 20, 2010, the Mobile Offshore Drilling Unit Deepwater Horizon located off the Gulf of Mexico, USA, suffered a catastrophic blowout which caused the rig to sink and spew oil for nearly three months before being capped. It is estimated that 627,000m³ of crude oil were spilt about a mile under the surface. Spill response was complicated given the severity of the spill, complexity of response, and potential impacts (Papp, R. J., 2011). Clean-up operations were still ongoing after a year and the event cost at least \$44 billion dollars.

Exxon Valdez: On March 24th, 1989, the Exxon Valdez was grounded on a reef in Prince William Sound, Alaska, USA. Located in a pristine wilderness area, the collision resulted in 37,000m³ of crude oil spilling into the Sound and spreading down the coast. Over 1,800km of shore line were affected and it is estimated that 1,000 sea otters and 35,000 birds died as a result. Particular efforts were made to protect fisheries but oil residues remained trapped in intertidal sediments at a few locations for years after. The spill resulted in one of the most expensive clean-up operations in North American history and costs were estimated to be above \$4.7 billion (ITOPF, 2014b).

Hebei-Spirit: On December 7th, 2007, the 1993 tanker ship was anchored off Taean, South Korea, and was struck by a crane barge. The barge, having broken free from its tow in the bad weather, punctured three cargo tanks of the Hebei Spirit. 1 0,900m³ of crude oils were released to the sea and proceeded to affect hundreds of kilometers of coast line around Korea. Clean up efforts went on for most of the year with significant involvement from local fishing vessels on top of the Korean organizational response. Fishing and seaweed cultivation facilities as well as tourism activities were affected. Claims up to about \$3 billion were submitted though about two thirds of them were rejected for various reasons including lack of documentation (ITOPF, 2014).

Kalamazoo River Spill: On Sunday, July 25, 2010, Enbridge's Line 6B ruptured in a wetland near Marshall, Michigan. The rupture occurred during the last stages of a planned shutdown and was not discovered or addressed for over 17 hours. During the time lapse, Enbridge twice pumped additional oil (81 percent of the total release) into Line 6B during two start ups. The total release was estimated to be 843,444 gallons of crude oil. The oil saturated

the surrounding wetlands and flowed into the Talmadge Creek and the Kalamazoo River. Local residents self-evacuated from their houses, with about 320 people reporting symptoms consistent with crude oil exposure. No fatalities were reported. According to the Enbridge Energy Partners' filing with the United States Securities and Exchange Commission in 2014, the cost of Kalamazoo clean up was \$1.32 billion CAD, not including possible additional fines and penalties that might be imposed by US authorities in the future.

Kirby 27706: On March 22, 2014, about 546m³ of fuel oil spilled into Galveston Bay near Texas City, Texas, USA. A ship collided with the oil tank-barge Kirby 27706 puncturing one of the tanks. The barge was moved aground relatively quickly and the remaining oil was removed from the vessel. The Houston Ship Channel and Intracoastal Waterway were initially closed to traffic and cleanup efforts are still ongoing (US Department of Commerce, 2014).

LA Pipeline Spill: On May 15, 2014 an above ground pipeline transporting oil from Bakersfield, CA to Texas ruptured in Los Angeles, CA, USA. Crude oil burst out of the pipe and spilled over a half-mile area which led to the evacuation of local businesses and sent two people to hospital. 160m³ of oil spewed out onto the streets and the primary clean-up was expected to take about a week. Final costs and cleanup are still ongoing (Reuters, 2014).

Mississippi River Spill: On July 23, 2008, a tugboat pulling an oil-laden barge swung into the path of a large tanker near Louisiana, USA. The vessels collided splitting the barge in two and spilling 900m³ of heavy oil over the span of a couple days. Nearly 100 miles of waterways reaching out into the Gulf of Mexico were coated in thick black oil resulting in river closures estimated to cost \$320 million per day. Clean up operations got underway and were estimated to be about \$100 million but litigation around who is ultimately responsible for the disaster was still ongoing in 2012 (Nossiter, 2008, Sayre, 2012).

Prestige: On 13 November 2002, the Prestige oil tanker sprung a leak 30 miles west of Galicia, in northwest Spain. The 25-year-old single-hull ship was transporting 77,000m³ of heavy fuel oil from Lithuania to an undetermined destination (under a Bahamian flag, owned by a Greek shipping company and chartered by an Anglo-Swiss company). The tanker was towed, and having sailed for five days with a gash in its hull, it broke in two and sank 130 miles off the coast. The bulk of the 77,000m³ of heavy fuel spilled into the Atlantic Ocean and arrived on the coastline in three "black waves", polluting approximately 1,000 km of shoreline in Galicia alone, resulting in losses to sea-based industries, tourism and environment. (Loureiro et al, 2005).

Sea Empress: On 15th February 1996, the Liberian registered single hull oil tanker carrying 130,000m³ of crude oil from North Sea towards Texaco Refinery struck a rock at the entrance to Milford Haven harbor in South Wales (United Kingdom). A total of 72,000m³ of light crude oil and 450m³ of heavy fuel oil was spilled. After seven days the Sea Empress was eventually brought under control and taken into dock at Milford Haven. As a result, 120 miles of Welsh coastline were contaminated and thousands of seabirds/wildfowl killed. Main shoreline clean-up activities completed in 6-9 months. Costs claimed for the clean-up were \$18 million in this time (Purnell, 1999).

Appendix A-3: Map of Tanker Route (JWS Report at p. 19)



Figure 1. Salish Sea, including Burrard Inlet, the Westridge Marine Terminal, Sturgeon Bank, South Arm marshes, Robert’s Bank, Boundary Bay, the tanker route, Haro Strait, and the oil spill origin locations selected for the oil spill trajectory models presented in the Trans Mountain ERA.

Appendix A-4: *Hebei Spirit* Photos (JWS Report at pp. 33-34)

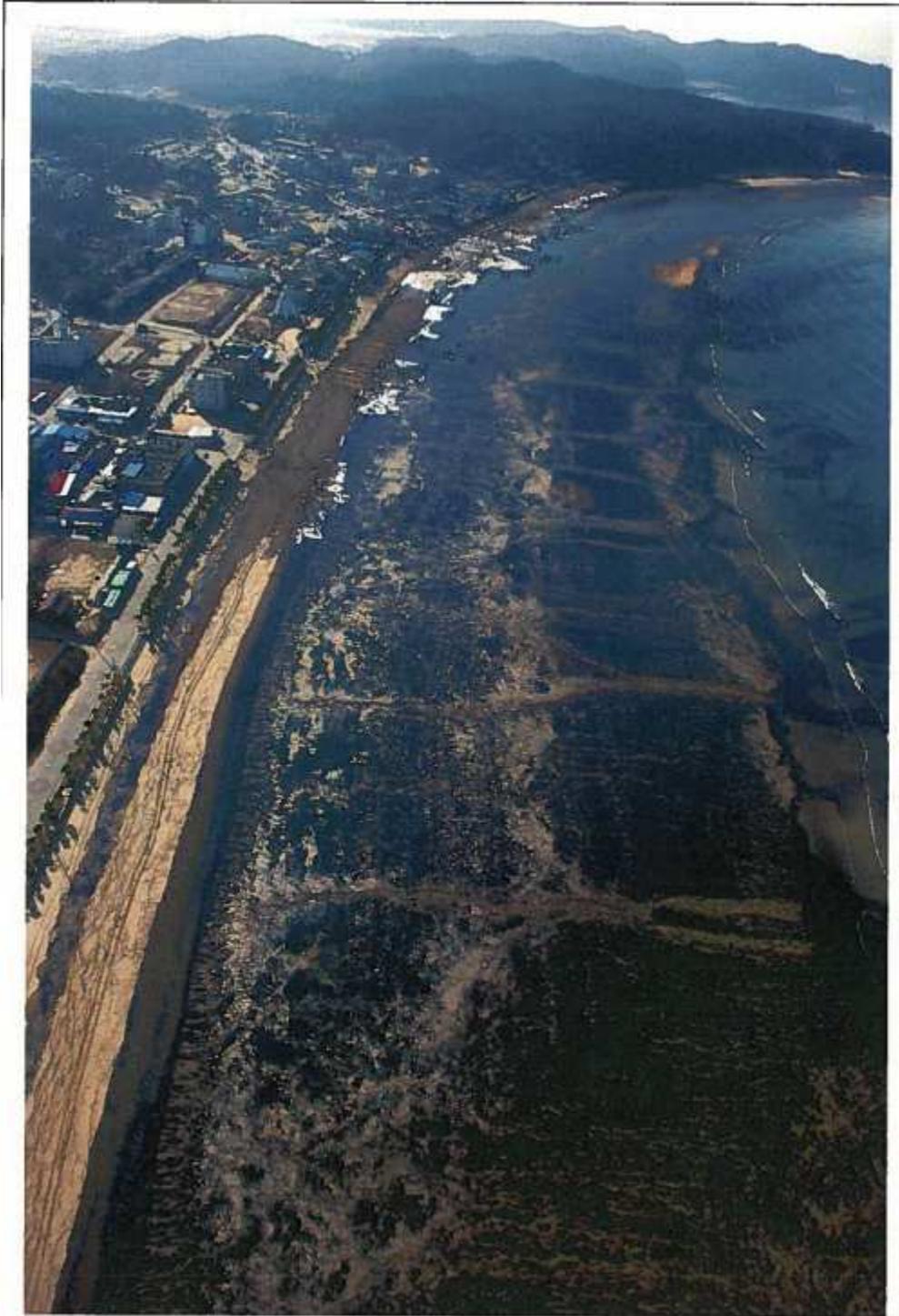


Figure 3. Oiled sand beach at Tae'an, Republic of Korea days after the 2007 *Hebei Spirit* oil spill. This beach is one of the most popular seaside resorts in the Republic of Korea. Photo copyright courtesy of Jungdo-ilbo, Republic of Korea.



Figure 4. Initial oiling of Tae'an Beach, Republic of Korea, from the 2007 *Hebei Spirit* oil spill. Photo copyright courtesy of Jungdo-ilbo, Republic of Korea.

Appendix A-5: Comparison of estimated present value economic impacts of May and October spill scenarios (Sumalia Report, p. 50, Table 10)

Losses	Value of output (2013, millions)	Employment (PYs)	Contribution to GDP (2013, millions)
Total Losses – Spill in May	380-1,230	3,238-12,881	201-687
Total Losses – Spill in October	215-1,024	1,972-11,216	115-575
Difference between seasons	165-206	1,266-1,666	86-112
May losses as % of October losses	120-170	115-164	119-174

Appendix A-6: Results for the Assessment of Risk in the TMEP Application (Gunton Report at pp. ii-iii, Table ES.1)

Criterion	Major Weakness	Rating	Result
Transparency <i>Documentation fully and effectively discloses supporting evidence, assumptions, data gaps and limitations, as well as uncertainty in data and assumptions, and their resulting potential implications to risk</i>	<ol style="list-style-type: none"> Inadequate description of the model estimating tanker spill return periods Lack of transparency supporting mitigation measures that reduce the likelihood of terminal spills Inadequate evidence supporting the reduction of pipeline spill frequencies 	Very Poor	Not Met
Reproducibility <i>Documentation provides sufficient information to allow individuals other than those who did the original analysis to replicate that analysis and obtain similar results</i>	<p>Insufficient proprietary data and information required to replicate:</p> <ol style="list-style-type: none"> MARCS modelling outputs that estimate tanker incident frequencies and consequences for grounding, collision, foundering, and fire/explosion Mitigation measures that reduce spill risk from marine terminal operations Outputs from the analysis of external and internal corrosion pipeline frequencies 	Very Poor	Not Met
Clarity <i>Risk estimates are easy to understand and effectively communicate the nature and magnitude of the risk in a manner that is complete, informative, and useful in decision-making</i>	<ol style="list-style-type: none"> Inefficient presentation of tanker spill risk estimates Ineffective communication of spill probability over the life of the project Lack of clear presentation of spill risk for TMEP pipeline spills No single spill risk estimate provided for the entire project Inadequate assessment of the likelihood of significant adverse environmental effects consistent with existing law 	Very Poor	Not Met
Reasonableness <i>The analytical approach ensures quality, integrity, and objectivity, and meets high scientific standards in terms of analytical methods, data, assumptions, logic, and judgment</i>	<ol style="list-style-type: none"> Limited definition of the study area to estimate tanker spill return periods Reliance on tanker incident frequency data that underreport incidents by between 38% and 96% Potential omission of tanker age characteristics in spill likelihood analysis Questionable evidence supporting negligible external and internal corrosion threats to pipeline Inadequate assessment of a worst-case oil pipeline spill Omission of tug traffic that potentially results in an underestimation in spill risk Lack of rigorous analysis supporting revised tanker spill risk estimates 	Very Poor	Not Met
Reliability <i>Appropriate analytical methods explicitly describe and evaluate limitations, sources of uncertainty and variability that affect risk, and estimate the magnitudes of uncertainties and their effects on estimates of risk by completing sensitivity analysis</i>	<ol style="list-style-type: none"> Lack of confidence intervals that communicate uncertainty and variability in spill risk estimates Lack of sensitivity analysis that effectively evaluates uncertainties associated with spill estimates Lack of risk factor associated with the effective implementation of risk-reducing measures Inadequate statement of uncertainties, limitations, and qualifications in the analysis 	Very Poor	Not Met
Validity <i>Independent third-party experts review and validate findings of the risk analysis to ensure credibility, quality, and integrity of the analysis</i>	<ol style="list-style-type: none"> Inadequate review and validation of spill risk estimates No justification of the use of the MARCS model to estimate tanker spill risk for the TMEP 	Very Poor	Not Met
Stakeholder Participation <i>Stakeholders participate collaboratively throughout the risk assessment and determine acceptable levels of risk that assess alternative means of meeting project objectives</i>	<ol style="list-style-type: none"> Lack of stakeholder engagement in a collaborative analysis Failure to define risk acceptability in terms of the needs, issues, and concerns of stakeholders potentially impacted by the project Inadequate assessment and comparison of risks from project alternatives 	Very Poor	Not Met

Appendix A-7: Photos of Light and Noise Pollution (North Shore No Pipeline Expansion, Written Evidence, Written Evidence of Chloe Hartley ([A4L5Y6](#)) at pp. 3-5)

Photo #1 of Oil Tanker at Anchor off Sea Shell Lane. May 22, 2015



Photo #2 taken on 700 Block of Beachview Drive, District of North Vancouver, May 14th 2014



Photo #3 taken at Cates Park, directly across from WMT, June 24th 2014



Appendix A-8: Public Interest and Social Interactions during English Bay Oil Spill (Nuka Spill Debrief at p. 5)

Public Attention to English Bay Oil Spill		
3-1-1 Call Line and City-sponsored websites with information about the English Bay oil spill	Public calls to 3-1-1 line (reports and enquiries) between April 9 and April 22, 2015:	278
	Volunteers that registered with City of Vancouver via City-hosted website or 3-1-1 calls over 5-day period (April 9-13, 2015):	4,043
	Number of page views for City of Vancouver volunteer cleanup website between April 9 and April 30, 2015:	12,776
	Number of page views for City of Vancouver "Fuel spill in English Bay" website between April 9 and April 30, 2015:	1,984
	Average length of time spent on City of Vancouver "Fuel oil in English Bay" website between April 9 and April 30, 2015:	3.7 minutes
Social media activity tracked	Estimated number of social media mentions for #vanfuelspill between April 9 and April 30, 2015:	31,026
	Estimated number of Twitter mentions of "oil spill" between April 9 and April 30, 2015:	50,901
	Estimated number of Twitter users to mention "oil spill" between April 9 and April 30, 2015:	26,442

Appendix A-9: Oil Spill Scenario Maps (Genwest Report at pp. 44, 46, 48, 50)

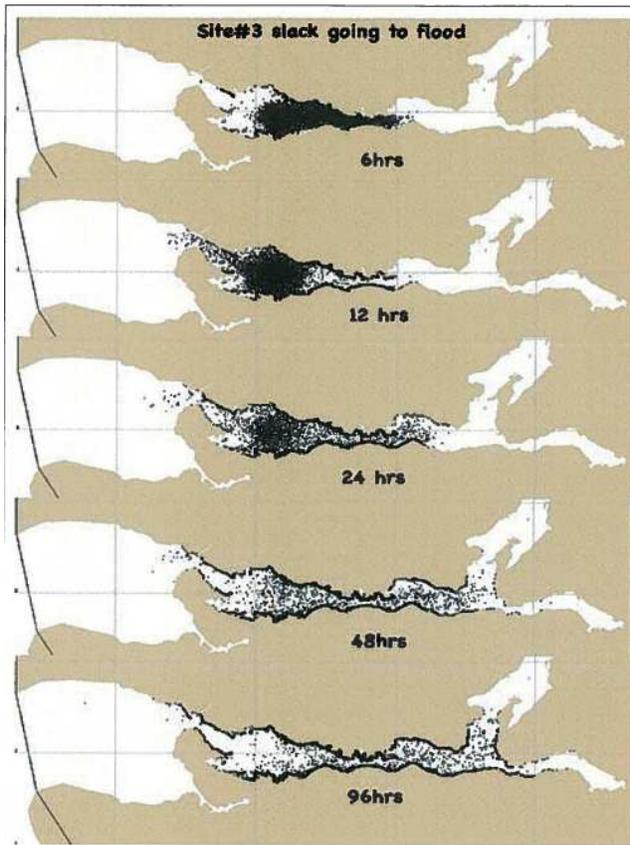


Figure 12: Oil spill trajectory time sequence at First Narrows for "slack going to flood" starting on August 24, 2007 at 13:48

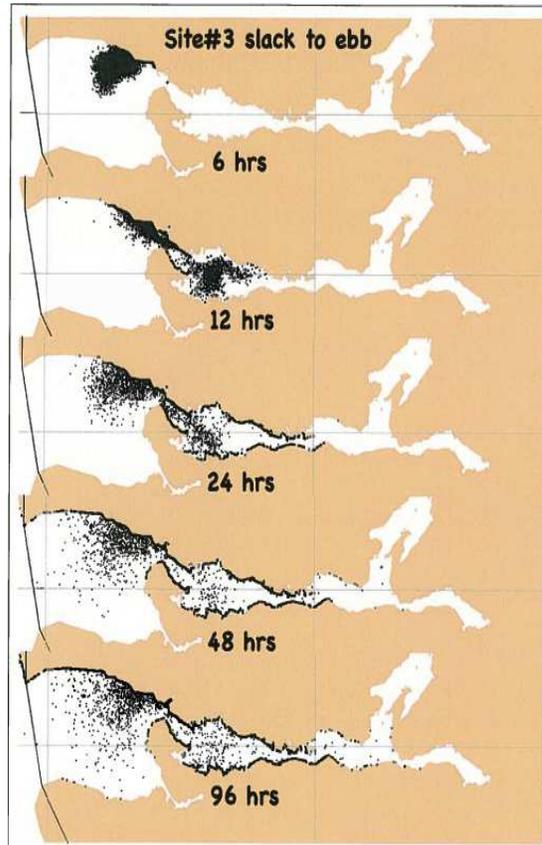


Figure 13: Oil spill trajectory time sequence at First Narrows for "slack going to ebb" starting on August 19, 2007 at 01:20

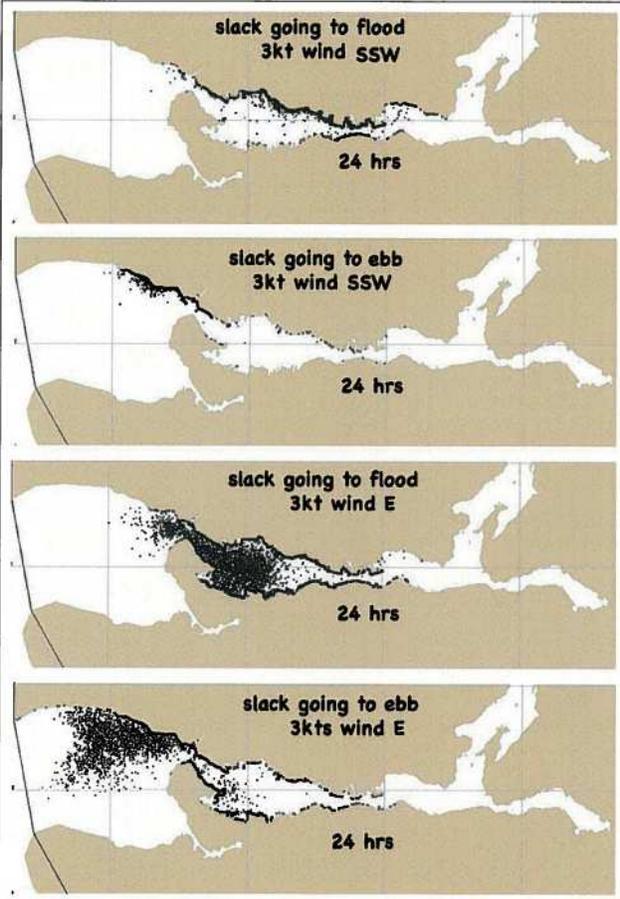


Figure 14: Two oil spill scenarios at First Narrows with a 3 knot SSW wind and two scenarios with a 3 knot wind from the east after 24 hours

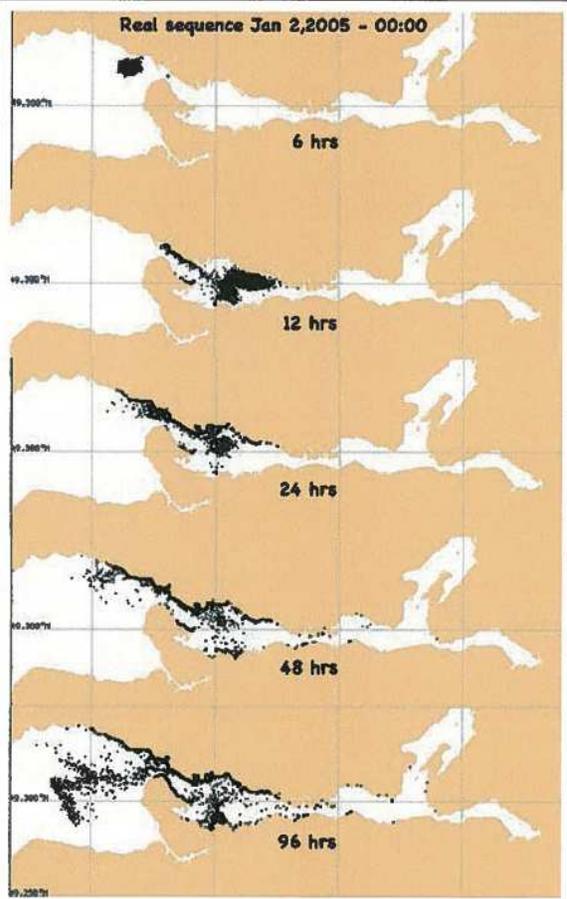


Figure 15: Results of an oil spill at First Narrows using modeled real winds and tides

Appendix B: Submissions Regarding Conditions

The District of West Vancouver submits that the public interest is not served by the expansion Project, the Project is not required by present or future public convenience and necessity, and the significant adverse effects the Project will cause are not justified in the circumstances. The District further submits that the draft conditions for the Project released by the Board on August 12, 2015 and December 11, 2015 are not sufficient to address these concerns.

The District opposes the Project, and for the reasons set out in its Written Argument-in-Chief, the District request that the National Energy Board reject the Application. However, in the event that the Project is approved, the District submits that the following conditions are required to mitigate some of the risks posed by the Project.

I. Modelling of Credible Worst-Case Scenario Oil Spill

Based on its review of the application as well as the evidence submitted by Metro Vancouver and other intervenors, the District submits that the oil spill modeling conducted by the proponent is inadequate and based on erroneous assumptions.

The District adopts the position of Metro Vancouver on this point and submits that, should the Project be approved, the proponent must be required to model a credible worst-case oil spill of 16,000 m³ throughout Burrard Inlet with:

“a minimum one to five years of meteorology and tidal conditions with a meaningful analysis that provides results that can be used to determine shelter-in-place and/or evacuation zones. The assessment must be conducted in consultation with Metro Vancouver and other agencies such as municipalities and Health Authorities. The assessment must be completed prior to approval so that shelter-in-place and evacuation zones are understood by Trans Mountain and the relevant authorities in advance of an accident or malfunction. A complete understanding of the risks is necessary if any type of meaningful emergency response is expected.”²⁴¹

The modeling must be completed six months prior to commencing construction, must be reviewed and analyzed by an independent third party, and must be made available to the public.

II. Emergency Response

a. Incident Notification and Consultation Protocol

As set out in its Written Argument-in-Chief, the District has serious concerns regarding emergency response capacity, one aspect of which is timely notification of health authorities. It

²⁴¹ Metro Vancouver, Written Evidence at p. 13

is imperative that health authorities be included in incident notification protocols so that they can participate in risk assessment and mitigation decisions and respond as soon as possible after a spill event.

As put forward by the City of Vancouver in its Written Evidence²⁴², the District submits that the development of a cross jurisdictional decision making process, filed prior to operations and tested and updated regularly to ensure clear and timely notification of health authorities and other stakeholders must be imposed as a condition of approval. This condition should be imposed in addition to proposed conditions #119 (Emergency Preparedness and Response Exercise and Training Program) and #124 (Emergency Response Plan for the Westridge Marine Terminal) which do not specifically require the proponent to involve health authorities in incident response protocols. The cross-jurisdictional decision making process should be developed with genuine and meaningful collaboration with the health authorities, municipalities and other stakeholders.

b. North Shore Emergency Response

The evidence of Dorit Mason, Director of North Shore Emergency Management Office, identified several deficiencies in response capacity that may have a direct impact on the effects experienced by municipalities on the north shore of Burrard Inlet, including the District. The District adopts the conditions proposed by NSEMO regarding North Shore response capacity and submits that these requirements be made conditions of approval for the Project:

- “7.1 To properly and adequately respond to a spill in Burrard Inlet in the future, equipment caches (i.e. booming equipment, etc.) should be located on the North Shore to protect the shoreline and personnel made available to activate this equipment. If there is an expectation that municipal staff are to use the equipment, they would also require appropriate training. A SCAT training program should be made available for municipal staff so that they can initiate this activity as soon as a spill occurs.
- 7.2 It would also be advisable to have an Incident Command Post located on the North Shore whenever there is an impact to our communities to ensure that there is a coordinated response that takes into consideration our local needs. We have been informed that there will only be one incident command post and that it would be located on the south side of the inlet.
- 7.3 It is critical that municipalities have a voice at the Unified Command table to ensure that our communities’ concerns, needs, and requirements are appropriately considered and acted upon. The community’s economic, cultural and psycho-social needs must also be considered during any spill.

²⁴² Public Health Guidance Document at p. 14

- 7.4 Finally, compensation should be provided to local governments which reflects the significant impacts and true costs to local authorities for planning, responding and recovering from a spill event.”²⁴³

c. Response Training

Joint training and exercising, involving the District, other potentially affected municipalities, as well as emergency response agencies, is “a critical element of a comprehensive emergency management program”.²⁴⁴ Further, participation by the District and other affected parties is critical to identifying and addressing gaps in emergency response plans prior to an incident arising. A requirement for the proponent to actively involve the District and other affected parties in emergency response training and exercising should be made a condition of approval for the Project.

The District notes that the current proposed condition #119 (Emergency Preparedness and Response Exercise and Training Program) is not sufficient to address these concerns. Further, the District notes that the proponent has proposed to limit its responsibility to develop only Trans Mountain responder competencies, and not the competencies of local government or First Nations fire departments and other first responders.

d. Availability of Product Data

The District adopts the evidence of Environment Canada regarding the lack of clear data on the products to be shipped:

“EC recognizes the extent of data already provided and accepts it as useful for understanding possible spills of these products. However, data needs for emergency preparedness and effective response requires consistent data on key chemical constituents and certain physical properties for all products to be transported by the proposed project, and secondly, routine, periodic re-measurement to ensure that the data adequately represent the hydrocarbon products transported in the future. ...

EC recommends that the Proponent commit to provide to spill responders and regulators, the standard test data in Table 4-2 for all types of hydrocarbon products to be shipped. These data should be made readily accessible to responders and regulators prior to shipping, to facilitate appropriate spill response preparedness.”²⁴⁵

As a condition of approval for the Project, Trans Mountain should be required to provide data regarding the products to be shipped in order to ensure that the District, NSEMO and others can safely and properly prepare for and respond to a spill event.

III. Protective Booming

²⁴³ Affidavit of D. Mason at paras. 7.1-7.4

²⁴⁴ City of Vancouver, Written Evidence at p. 54

²⁴⁵ Environment Canada, Written Evidence at pp. 121-123

The District submits that, as a condition of approval for the Project, the proponent must be required to establish a list of sensitive sites in consultation with local governments and other stakeholders and deploy protective booming for these sites in the event of a marine spill. This proposed condition arises from the experience of local governments, including the District and the City of Vancouver, during the *M/V Marathassa* spill. Despite requests for protective booming of sensitive sites during that spill, the proponent and the Canadian Coast Guard used a “wait and see” approach, resulting in oiling of several beach and park locations.

IV. Air Quality Monitoring

As set out in the District’s Written Argument-in-Chief, the District relies upon the evidence of the government bodies that have jurisdiction and expertise in air quality regulation to assess the potential air quality impacts of the Project on the District and its residents. The District supports the conditions proposed by Metro Vancouver regarding air quality, and submits that the following should be made conditions for approval of the Project:

- i. A condition that Trans Mountain, “at their expense, establish real-time air quality dispersion modelling that will have the capability to consider an oil spill using real-time meteorological observations and provide results to municipalities and other agencies within less than 30 minutes from the initiation of a spill event.”²⁴⁶
- ii. A condition that Trans Mountain, “at their expense, establish a capability to collect real-time air quality measurements of hazardous pollutants from a mobile monitoring station that could result during an oil spill.”²⁴⁷
- iii. Recognizing the meteorological data gap in Indian Arm, a condition that a meteorological station “be installed in Indian Arm in consultation with Metro Vancouver and data from it used in real-time modelling and/or available for incident response.”²⁴⁸
- iv. Given that the potential effect of benzene emissions from ship loading is still unknown, a condition for Trans Mountain to “measure, track and report publicly their actual hourly and annual benzene emissions.”²⁴⁹
- v. Given Trans Mountain’s failure to adequately assess the level of particulate matter (“PM”) emissions from the vapour combustion unit (“VCU”), and the resulting lack of knowledge regarding the potential adverse effect of PM emissions from the VCU on ambient air quality in Metro Vancouver, a condition that Trans Mountain “conduct comprehensive monitoring of the PM emissions from the VCU once it has been commissioned and on a regular basis thereafter.”²⁵⁰

²⁴⁶ Metro Vancouver, Written Evidence at p.13

²⁴⁷ Metro Vancouver, Written Evidence at p.13

²⁴⁸ Metro Vancouver, Written Evidence at p. 14

²⁴⁹ Metro Vancouver, Written Evidence at p. 27

²⁵⁰ Metro Vancouver, Written Evidence at p. 32

- vi. A condition that Trans Mountain establish additional air quality monitoring capabilities in order to assess the impacts of the Project on an ongoing basis. These additional capabilities should include additions or enhancements to existing Metro Vancouver monitoring stations as well as new permanent stations.²⁵¹
- vii. A condition that Trans Mountain, at their expense, “establish monitoring of sulphur dioxide (SO₂) at a new community monitoring location in the Queensbury neighbourhood of North Vancouver.” The station should be established in consultation with Metro Vancouver and to the specifications described by Metro Vancouver in its Written Evidence.²⁵²
- viii. A condition that Trans Mountain, at their expense, establish a new permanent air quality monitoring station in the Westridge community, meeting the specific requirements set out in Metro Vancouver’s Written Evidence.²⁵³

V. Environmental Conditions

In addition to relying on the expertise of Metro Vancouver with regards to the air quality impacts of the Project, the District relies on the evidence of Metro Vancouver pertaining to the overall impact of the Project on the environment in the region. The District submits that the following conditions suggested by Metro Vancouver in its Written Evidence should be made conditions for approval of the Project:

- i. A condition that Trans Mountain “provide a more complete socio-economic analysis that includes ecological valuation and an assessment of upstream and downstream benefits”²⁵⁴ for a more complete and accurate Cost-Benefit analysis.
- ii. A condition that Trans Mountain place automatic shut-off valves on either side of fish-bearing waterways throughout Metro Vancouver.²⁵⁵
- iii. A condition that Trans Mountain commit to no Net Loss of Habitat.²⁵⁶
- iv. A condition that Trans Mountain re-route the proposed pipeline to avoid Sensitive Ecosystems.²⁵⁷

²⁵¹ Metro Vancouver, Written Evidence at p. 41

²⁵² Metro Vancouver, Written Evidence at p. 42

²⁵³ Metro Vancouver, Written Evidence at p. 42

²⁵⁴ Metro Vancouver, Written Evidence at p. 51

²⁵⁵ Metro Vancouver, Written Evidence at p. 53

²⁵⁶ Metro Vancouver, Written Evidence at p. 59

²⁵⁷ Metro Vancouver, Written Evidence at p. 59

- v. A condition that Trans Mountain provide an ecological valuation, performed by a qualified third party or consultant, of the habitat that will be lost in construction and separately, in operation.²⁵⁸
- vi. A condition that Trans Mountain re-route the pipeline to increase riparian setbacks so that the pipeline is not within 30 m of fish-bearing watercourses.²⁵⁹
- vii. A condition that Trans Mountain complete adequate data collection for the riparian and sensitive ecosystems identified in Zoetica, 2015, as referenced in Metro Vancouver's Written Evidence.²⁶⁰
- viii. A condition that Trans Mountain "use thicker pipeline and pipeline casings in sections near or under waterways to protect them from unanticipated scour."²⁶¹
- ix. A condition that Trans Mountain "re-route the pipeline or use additional HDD [horizontal directional drilling] methods to minimize calculated habitat loss within sensitive ecosystems and BEC [Biogeoclimatic Ecosystem Classification] subzones."²⁶²
- x. A condition that Trans Mountain evaluate the impacts on the Project of a magnitude 9.0 or greater earthquake.²⁶³
- xi. A condition that Trans Mountain use thicker walled pipe to withstand a worst-case scenario earthquake event.²⁶⁴
- xii. A condition that Trans Mountain conduct toxicology analyses (lethal and sub-lethal effects) for spills.²⁶⁵
- xiii. A condition that Trans Mountain "determine, in consultation with appropriate agencies, additional mitigation and requirements that can be placed on tankers to reduce the noise, and risk of spills or impacts."²⁶⁶ This proposed condition may supplement proposed condition #114.
- xiv. A condition that Trans Mountain contribute to regional monitoring efforts for cumulative impacts, including "efforts that monitor marine noise and wave motion due to tanker traffic and effects on biota, and cumulative contaminants".²⁶⁷

²⁵⁸ Metro Vancouver, Written Evidence at p. 59

²⁵⁹ Metro Vancouver, Written Evidence at p. 59

²⁶⁰ Metro Vancouver, Written Evidence at p. 59

²⁶¹ Metro Vancouver, Written Evidence at p. 60

²⁶² Metro Vancouver, Written Evidence at p. 60

²⁶³ Metro Vancouver, Written Evidence at p. 60

²⁶⁴ Metro Vancouver, Written Evidence at p. 60

²⁶⁵ Metro Vancouver, Written Evidence at p. 60

²⁶⁶ Metro Vancouver, Written Evidence at p. 60

²⁶⁷ Metro Vancouver, Written Evidence at p. 61

VI. Baseline Data

Of fundamental importance to spill clean-up and remediation is proper knowledge and understanding of baseline conditions pre-spill. However, as the Health Authorities, Environment Canada and others have demonstrated, the Application does not present sufficient or reliable evidence of baseline understandings that are important to both human and animal health. The District submits that the following should be made conditions for approval of the Project:

- i. A condition that Trans Mountain develop baseline data that includes information about the potential population exposed, the social environment, and the physical environment parameters discussed in Environment Canada’s evidence for a spill in Burrard Inlet. The baseline information should also include “data for example on the levels and types of First Nations and non First Nations cultural and recreational use of Burrard Inlet beaches and water, as well as the baseline conditions of the recreational, commercial, and First Nations fishery in the area.”²⁶⁸
- ii. Given that the deficiencies in the ecological risk assessment regarding spatial and temporal habitat use patterns of marine birds as well as threats and risks for which impacts are not well understood, a condition that Trans Mountain:
 - a. develop “a marine bird baseline monitoring plan to describe species composition and their spatial and temporal abundance patterns that can be used to identify high consequence areas/habitats in the event of an oil spill”²⁶⁹; and
 - b. “develop an Avian Monitoring Plan as part of due diligence and in order to assess the effectiveness of proposed mitigation measures to avoid harm (incidental take) to migratory birds that could arise from activities related to the Westridge Marine Terminal facility, marine transportation, or any other lighting sources. This plan should include post- construction monitoring at the Westridge Marine Terminal, including berthed vessels, as well as monitoring aboard tankers during shipping to assess the effectiveness of mitigation measures in avoiding incidental take through collisions and to identify the need for additional mitigation measures.”²⁷⁰

VII. Shore Power

As set out in its Written Argument-in-Chief and elsewhere in this Appendix, the District has significant concerns regarding the noise, light and exhaust emitted from tankers at anchor. As noted by the proponent in its application and in responses to information requests, a requirement that tankers calling at Westridge Marine Terminal use shore power is not likely to be feasible given that less than 5% of tankers are currently equipped to utilize shore power.²⁷¹

²⁶⁸ Health Authorities Letter at p. 3

²⁶⁹ Environment Canada, Written Evidence at pp. 69-70

²⁷⁰ Environment Canada, Written Evidence at p. 77

²⁷¹ Trans Mountain, Trans Mountain Expansion Project, Volume 4A, 3.4.4.1.5 to 3.4.4.2.3 - Project Design and Execution – Engineering ([A3S0ZO](#)) at p. 4A-85; Trans Mountain, Response to Information Request from Fraser

Although the majority of tankers are not currently able to utilize shore power, greater numbers of tankers may have this capacity in the future. Given the reductions in noise, light and emissions that are associated with the use of shore power, the District submits that as a condition of approval for the Project, the proponent should be required to provide shore power in at least one berth for tankers that do have the capacity to utilize it. Further, the proponent should be required to reserve space at the Westridge Marine Terminal for the development of shore power facilities as greater numbers of tankers are able to utilize it.

VIII. Anchorage Hours

In its Written Evidence, Environment Canada notes a discrepancy in the proponent's calculation of anchorage time as compared to data regarding actual anchorage time for tankers using the Westridge Marine Terminal:

“EC, as noted in Section 3.2.2.4, also analysed Automated Identification System (AIS) data from 2012 which showed that tankers using the Westridge Marine Terminal spent approximately 70 hours at anchor. This is in contrast to the Proponent's assumption of 20 hours for an average anchorage time which was used to estimate anchorage emissions in both the Marine Regional Study Area and the Westridge Local Study Area. During a meeting with the LFVAQCC on November 13, 2014, the Proponent acknowledged that berth times may increase due to limited anchorages (Exhibit B310-26, PDF page 13). EC, as noted in Section 3.2.2.4, estimates that if an anchorage time of 70 hours is used, [it] will increase Application Case marine NO_x emissions by an additional ~250 tonnes/year or roughly 10%. This additional time-at-anchor (based on AIS data) is also expected to increase NO₂ impacts on First Nations reserves.”²⁷²

As noted by Environment Canada, anchorage time is directly related to NO_x emissions. An increase in emissions will lead to impacts on the air quality in the District that has not been accounted for in the Application. As a result, the District submits that, as a condition of approval for the Project, the proponent must be required to establish a process for monitoring and ensuring that anchorage hours do not exceed the estimates in its Application.

IX. Tug Escorts

The District adopts the position of the State of Washington Department of Ecology regarding the need for tug escorts and the stationing of emergency response towing vessels:

“A comparison between the U.S. and Washington State vessel safety systems and the analogous Canadian systems is shown in table 39 of the Marine Rail Report...The table notes that having tug escorts for vessels navigating Boundary Pass/Haro Strait is not

Valley Regional District (FVRD) IR No. 2 ([A4H8S0](#)) at pp. 57-79; Trans Mountain, Response to Information Request of Neil Syme ([A3X6U3](#)) at pp. 5-6; Trans Mountain, Response to Information Request from Vancouver Fraser Port Authority ([A4H8W5](#)) at pp. 53-54.

²⁷² Environment Canada, Written Evidence at p. 102

required, but voluntary under the Pacific Pilotage Authority....To provide equivalent standards of protection in Canada with those in the U.S. and Washington State against transboundary spills, TM should commit to requiring in its Tanker Acceptance Criteria tug escorts for vessels calling on the Westridge Terminal that navigate through Boundary Pass/Haro Strait....

TM has committed to implementing DNV's [Det Norske Veritas] recommendation to have additional tug escorts for the entire transit between the Westridge Terminal and the Pacific Ocean...Along with this requirement for tug escorts, TM must require adequate tug escort capability, and the stationing of emergency response towing vessels (EMTVs) along the vessel routes, to reduce the increased risk of spills from the project...."²⁷³

In addition to the requirement that the proponent have adequate tug escort capability and station emergency response towing vessels along the vessel route, the District submits that the following should be imposed as a condition of approval of the Project:

“TM should be required under its Tanker Acceptance Criteria to require vessels and barges to have tug escorts to buoy J....

Through its Tanker Acceptance Criteria TM should require vessels calling on Westridge Terminal to develop preventing and contingency plans that include the same elements as the U.S./State of Washington plans outlined above, and engage in oil spill drills that ensure the plans' effectiveness. This should include both scheduled and unannounced drills, using published criteria to evaluate the plans, and a commitment to update the plans when lessons are learned to improve them. TM's Tanker Acceptance Criteria and vessel plans should be available to the public and to responders for their review and comment.”²⁷⁴

X. Noise and Light

The District is concerned with the impacts of noise and light pollution on its residents and strongly agrees with the concerns expressed by the Village of Belcarra in its written submission:

“Trans Mountain should be required to implement measures to minimize and/or mitigate the bright lights and noise from both the WMT [Westridge Marine Terminal] loading facility and on-board their client vessels both at anchor and at dockside. This can be accomplished by utilizing environmental design features incorporated during construction of the expanded WMT in combination with requirements for enhanced noise suppression (e.g. better mufflers) for the electrical generators onboard the vessels at anchor waiting to berth. The issues of ‘excessive noise and light pollution’ from the expanded WMT facility and potential impact of these nuisances on wildlife and neighbouring residential

²⁷³ Washington State Department of Ecology, Written Evidence ([A4Q1X6](#)) at pp. 6-7

²⁷⁴ Washington State Department of Ecology, Written Evidence at pp. 12-13

areas, thus far have not been adequately addressed by Trans Mountain in its NEB application.”²⁷⁵

The seven-fold increase in tanker traffic along the District’s shores envisioned by the Project will increase light, noise and air pollution at a scale that will fundamentally harm the District’s economy as well as the quality of life of its residents and visitors.

Requirements for the proponent to submit visual modeling of light emissions and exhaust, as well as pre-construction light and noise management plans, including for vessels waiting in Burrard Inlet to dock at Westridge Marine Terminal, should be imposed as conditions of approval of the Project. These requirements should be imposed in addition to draft conditions #66 and #132, which respectively require the proponent to file a light emissions management plan for the Westridge Marine Terminal at least 90 days prior to construction and a post-construction noise survey for the Westridge Marine Terminal within 90 days after commencing operations.

XI. Risk Financing

As identified in the District’s Written Argument-in-Chief, there are a number of significant gaps in the existing compensation regime and, in the event of a spill, it is likely that the District would be inadequately compensated for the resulting impacts.

The District adopts the evidence of the City of Vancouver, whose expert investigated possible risk transfer mechanisms that could be purchased by Trans Mountain to provide compensation for economic impacts that would not otherwise be covered under the existing regime:

“[The City’s expert]...concludes that the most suitable risk financing option is a catastrophe bond/insurance securitization arrangement with a cost estimated to be in the range of 3.5% to 14% of the total coverage required, for an initial bond issue with a maturity of 1 to 5 years. For example, a \$500,000,000 bond could have an initial cost ranging from \$17,500,000 to \$70,000,000 (including broker’s commission). One time administrative costs could be as much as \$450,000 with ongoing administrative costs up to \$400,000 annually if there are claims from a triggering event. The likelihood of successfully issuing and subscribing a catastrophe bond decreases as the amount of the bond increases. The likelihood of subscribing a catastrophe bond for an amount that is sufficient to compensation for \$1 billion in losses from a triggering event is less than 20%.”²⁷⁶

The District submits that, as a condition of approval for the Project, Trans Mountain must be required to adopt a risk financing option that meets the substantive criteria identified by the City of Vancouver’s expert as the most suitable option (described above).

²⁷⁵ Village of Belcarra, Written Submission at p. 1

²⁷⁶ City of Vancouver, Written Evidence at pp. 107-108

XII. Volunteer Management

The proponent has not provided for any programs to address volunteer management following a marine spill. As set out in the District's Written Argument-in-Chief, control and management of the public, and in particular volunteers, creates a significant draw on local government resources. Costs associated with organizing and managing volunteers include costs of staff time, training, providing personal protective equipment, transportation, accommodation, and food/water.²⁷⁷ These costs are likely to be incurred by local governments even if volunteers are discouraged from participating in spill response.

The District submits that, as a condition of approval for the Project, the proponent must be required to establish a comprehensive volunteer management program for marine spills in consultation with local governments and other stakeholders. The program must include a mechanism to compensate local governments for costs associated with volunteer management.

XIII. Future Changes

The District has serious concerns regarding the potential for greater operational impacts and increased risk in the future caused by changes to Project capacity or other major changes to Project scope. The District identified one such change in its Written Argument-in-Chief, where it noted that the current regulatory review is restricted to the "applied for" capacity of 540,000 barrels a day, despite the fact that the new pipeline is designed to carry 780,000 barrels a day. The Project will not be subject to additional review when this full capacity is realized, meaning that the full risk and impacts that the District will bear will not be assessed.

In light of this and other potential changes to the Project following approval, the District submits that, as a condition of approval for the Project, the proponent must be required to meaningfully consult local governments and other stakeholders on all contemplated future significant increases to capacity or other major changes to project scope that may impact local governments. Any such future expansions or changes must be subject to independent oversight, review and approval by the Board, with a comprehensive opportunity for local governments to make full submissions to the Board on any proposal.

XIV. Peer Review of Major Documents

The District submits that, as a condition of approval for the Project, the proponent be required to submit for peer review by an independent third party all major documents to be submitted to the Board after project approval but before construction must be submitted to the Board **for approval with an opportunity for local governments and other stakeholders to review and make submissions to the Board with respect to the adequacy of the plans and measures described in the documents.** Further, the proponent should be required to submit these documents to independent peer review before submission to the Board, and include the results of the independent peer review with the submission. This initial step is to ensure that local governments and stakeholders

²⁷⁷ See Costs Report at pp. 18-19; See also Appendix A-8

are not required to seek the technical assistance of subject matter experts (which is time consuming and expensive), but can, rather, provide valuable information that is within their existing realm of knowledge and experience. Major documents that should be subject to this process include:

- Training and Education Monitoring Plan (Draft Condition #13)
- Aboriginal, local and regional skills and business capacity inventory (Draft Condition #14)
- Socio-Economic Effects Monitoring Plan (Draft Condition #17)
- Worker accommodation strategy (Draft Condition #18)
- Air Emissions Management Plan for Westridge Marine Terminal (Draft Condition #19)
- Navigation and navigation safety plans and assessments (Draft Condition #46)
- Fugitive Emissions Management Plan for Westridge Marine Terminal (Draft Condition #54)
- Westridge Marine Terminal Environmental Protection Plan (Draft Condition #64)
- Plan for implementing, monitoring, and complying with marine shipping-related commitments (Draft Condition #77)
- Consultation on improvements to Trans Mountain's Emergency Management Program (Draft Condition #88)
- Commercial Support for the Project (Draft Condition #146)
- Noise management plans (Draft Conditions #147 and #148)
- Grasslands Survey and Mitigation Plan (Draft Condition #149)

XV. Public Documents

The District submits that, as a condition of approval for the Project, the proponent be required to make all documents filed in relation to the Project available to the public immediately upon filing.